Farmers as Scientists

This is a series anchored by M.C. Nandeesha. It describes farmer-driven innovations and experiences.

The "Gher Revolution"

Innovations in freshwater prawn farming by Bangladesh farmers

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Happy fish farmers display the harvest of giant prawn from Ghers. Periodic harvesting helps farmers to access income regularly throughout the culture period

Giant Freshwater prawn production

Globally , the freshwater prawn industry is growing at a rapid speed surpassing all estimations and assumptions. Mr. Michael New organized the first dedicated symposium on Freshwater prawn more than two decades ago in Bangkok in collaboration with the Department of Fisheries and brought out a special publication with selected papers entitled Giant Prawn Farming through Elsevier . That global event consolidated research and development directions for giant freshwater prawn (GFP) farming. The latest revised publication of the manual "Farming Freshwater Prawns (FAO Technical paper 428) further indicates the growing importance received by this group from farmers, researchers and development personnel. In August, 2003, in Kochi , in the southern part of India , an international symposium on Freshwater prawns was held with representatives from 15 countries and more than 400 delegates attended the event. Mr. Michael New took part in this symposium and delivered the key note address. Historically , a lot of significance was attached to the participation and presence of Michael New and in particular for the constant efforts made by him in stimulating timely debate on GFP and driving healthy growth of the industry.

India produced a very small amount of fresh water prawns from the cultured environment about two decades ago. Ten years ago the College of Fisheries at Kerala Agriculture University organized the first symposium on freshwater prawn farming in India. I had the opportunity of attending that symposium. Most people were not sure how the industry would expand further as many technical and social questions remained unanswered. However, the latest symposium organized by the same College in August 2003 a decade later clearly demonstrated that their vision on the potential of this species has been right and the industry is likely to further expand greatly. Today , with the research and developmental efforts of many organizations and farmers in particular, giant freshwater prawn farming has grown into a major industry in the country contributing to more than 30,000 tons of production. Over 34,000 ha of water bodies are under the culture of this species. Land locked states are perfecting the technique pf producing prawn seed using artificially constituted sea water. As per the information presented in the symposium, based on 2001 statistics, China is leading with a production of 128,000 tonnes followed by Vietnam (28,000 t) , India (24,230 t) , Thailand (12,067) , Bangladesh (7000t) , Taiwan (6859 t) , Brazil, (5380 t) , etc. These production figures need to be viewed with caution as the data collection systems for aquaculture production is yet in developing stage in many countries. However, most importantly , much of the production of GFP comes from small farmers . The species is contributing immensely in poverty alleviation and ensuring most essential livelihood necessities of these small farmers. As it is time to learn from the repeated success of this species culture by small farmers, in this article an effort is made to document the "Gher Revolution" accomplished by the farmers of Bangladesh.

Cultivation of GFP in Ghers: Bangladesh farmers innovation

Gher is a Bangla word used for the physical construction made for growing freshwater prawns in an impounded environment. These constructions, generally built in paddy fields, are used for growing both paddy and prawns / fish. The Ghers usually have a large dike with canals and an area dedicated for paddy cultivation

A Gher with paddy crop

within the Gher. Generally , less than 50% of the area is allocated for canal and rest of the area is used for paddy cultivation. The latest production figures reported by various authors from Bangladesh indicate that the country is already producing about 12,000 tones of giant fresh water prawn from Ghers. This huge quantity is produced by a large number of families (100,000) in an area of 30,000 ha using the types of Ghers described above. The farmers involved in the activity are generally very small farmers with land area being less than 0.3 ha.

Necessity is the mother of invention

With high population density, farmers in Bangladesh have always had a need to innovate to increase productivity and income from the small area of land owned by them. Paddy is the widely cultivated cereal crop in the country. With large amounts of water logged area rice and fish became the staple diet of the people. With the modernization in agriculture resulting in heavy usage of fertilizers , pesticides and high intensity cropping patterns, many fish species have been disappearing from the environment . In the Southwestern part of Bangladesh, paddy cultivation was compounded with the problems of productivity and profitability. To meet their livelihood necessities, farmers have been looking for alternative profitable crops. The availability of freshwater prawn post larvae in the costal environment encouraged some of the progressive farmers to explore ways of culturing prawns in paddy fields. Their initial success encouraged farmers to innovate improved ways to grow both paddy and prawn together. Small ditches were converted in to canals with more than a meter depth to hold water during the dry season and these canals sometimes either covered all the four sides of the paddy field or, based on convenience, covered only some portion of the paddy field. As a general principle less than 50 % of the area was used for canals and rest of the area for growing paddy. This activity, which started as a small venture in Bagherhat district, has spread to almost all parts of Bangladesh although still most of the activity is concentrated in the Southwestern part of the country. The farming area is reported to be growing at about 10% / year. Recognizing the vulnerability of small farmers in undertaking giant prawn farming, and with a view to reduce risks and increase profitability , DFID undertook a massive programme of assisting 15,000 families involved in Gher farming through CARE Bangladesh . The project used the innovative potentials of farmers and helped them to recognize the capacity available within themselves and in the community to solve various problems encountered in Gher farming. Using knowledge as the basis, strategic interventions were made in the key problem areas.

Practices followed

Although farmers began experimenting on culture of prawns in paddy fields , high price for prawns influenced farmers to resort to stocking of only prawns and grow only one crop of paddy during the boro season. They adopted high stocking with more than 20,000- 30,000 PL / ha. Ghers were generally stocked with post larvae by April-May and fed heavily with snail meat as feed. Fish were either stocked at very low density or not used at all. Dikes were either underused or unused. Usage of pesticides to both paddy and even the vegetables cultivated added additional costs. Harvesting was done

Another model of Gher with canal surrounding the paddy field

Women generally take care of vegetable cultivation on dikes.

Men attending a learning session in the project area

Women attending a learning session in the project area

intermittently with most harvest being completed by December. Small size prawns were left and allowed to grow up to March- April and harvested before stocking with fresh post larvae. These culture practices were not very profitable due to the heavy cost of feed. Small farmers with no experience entered prawn farming often with capital borrowed with an interest rate exceeding more than 100% / year. As the average productivity of prawns is less than 250 kg/ha, with high input cost on snail meat as feed some farmers were pushed into a debt trap. This created a social crisis in several areas and created an impression that aquaculture was adversely affecting the livelihoods of people. Hence , the DFID project implemented by CARE mainly targeted farmers with less than two acre of land and socially vulnerable groups with an objective of assisting them to adopt sustainable farming practices and help them derive benefits from the system.

Reaching the unreached

Most developmental projects aim at targeting one member in the family for imparting knowledge under the assumption that the imparted knowledge is shared with other members in the family and also to save cost on training two people. However, such exchange of information between the sexes often does not take place because of the existing social practices . Several important parts of aquaculture activities are often carried out by women such as feeding fish and growing vegetables. Hence, the project targeted at least one male and one female member from each family. The training used a group training approach with 20-30 farmers in an area being formed into a group. Because of social constraints, male and female groups were formed separately.

The groups met at a fixed time at least twice a month for a limited period of time that would allow them to focus completely on the learning session. Usually , these meetings did not last more than 2-3 hours at a time. The groups identified common problems that are confronted by most farmers and prioritized the issues that can be tackled using the resources that are easily available to them. The project

assumed no responsibility to provide credit support or organize credit , except that the knowledge and technical support needed to address the agricultural problems encountered are provided from the project. Each field trainer was responsible for managing at least 5-6 groups and was encouraged to provide follow up support to farmers through individual visits to the farm.

Learning sessions

Farmers identified several problems related to technical aspects of prawn farming , vegetable and paddy cultivations, social aspects arising due to expanding ghers and income and a declining natural resource base particularly in regard to snail populations. As most farmers have been focusing heavily on the prawn component of the system , neglecting the opportunity that is available to raise income from mixed farming of prawn and fish , efficient utilization of pond dikes for vegetable cultivation, use of the central portion of the gher for growing at least two crops of paddy and reducing feed input cost by efficient management of feed resources were identified as the strategic areas wherein intervention could bring perceptible changes in the cultivation practices. Hence, learning sessions were planned to address these problems by enriching farmers knowledge and helping them to set up observation plots either in their own farm at little or no risk or making a collective observation with one or more of the farmers in the group. Each learning session was centered around the most felt necessity of the group and on several occasions , farmers themselves were asked to develop the session contents with only support from the project to provide them with the technical information. Hence, the use of group approach with creation of atmosphere of trusting and respecting the knowledge of each other helped in getting the best from each farmer in finding solutions to the problems encountered.

A tin shed based house is an indicator of the wealth status of family. A Gher farmer is finishing the house built with income earned from Gher farming

Thatched houses indicate the poverty level, note the roof being replaced with tin sheets

Impact of learning sessions on innovations

The Learning sessions began to make changes in the culture practices of farmers with the increasing confidence of farmers on the trainers and understanding project's sincere efforts to resolve problems using local resources. Farmers began nursing post larvae to juvenile stage in hapa or impounded canal sites and reduced stocking density; they stocked fish species along with prawn and used it as one of the prime approaches to increase income; the dikes of ponds were used for growing vegetables of diverse varieties with growing season extending to almost all the years. Instead of taking one crop of paddy during the boro season , farmers began taking two crops in wet and dry seasons. Pesticide usage was reduced in both paddy and vegetables and several farmers stopped using pesticides based on the lessons learnt from the observations they set up. Most importantly , farmers began learning strategies on feed management to avoid wastage of feed and reduce their dependence on snail meat. Locally available feed ingredients

Pata Mallick, a widow with two children has been able to improve her family economy by resorting to Gher farming. Her children dream to acquire a good education with the income derived

Women display locally designed feed making machines. These are constructed from bamboo. The one on the right side is more commonly used

like various oil cakes , rice bran , wheat bran and dry fish powder were processed and used for preparing feeds and the processed feed ingredients were compressed in to pellets using different types pellet making devices that were locally manufactured . A survey revealed almost eighteen different types of pellet making instruments were invented locally by farmers. As can be seen in the pictures, bamboo available locally was used to manufacture simple pellet making machines following the principle of pressure pump.

Reaching beyond the targeted groups

Spreading the message across large section of the community practicing Gher farming called for new innovative approaches to be tried based on the local customs. The Bengal region being rich in culture , folk songs and dramas have tremendous mass impact. Special folk songs and dramas appropriate to local traditions were explored covering various aspects of Gher farming , including poaching with an objective of bringing visible changes in the culture practices beyond the targeted group of 15,000 families. Evaluation studies conducted following such public demonstrations revealed that large percentage of farmers changed some of the practices following the knowledge gained from such public demonstrations.

Use of cooperative spirit and local knowledge

Gher farming has been reported to cause enormous damage to water drainage systems through improper planning of ghers in the area. However, when the village level competitions were organized with elders on how their village was about 50 years ago and what they would like to see in the coming years, many new ideas emerged from the elderly persons who are considered as knowledge banks by the villagers. Those ideas were used to make community level planning appropriate to each village. An eco-village concept was adopted with an objective of making villages free from pesticide usage, provision of good sanitary measures to avoid health problems and plantation of adequate numbers of trees to build up the vegetation helped in building community based movements based on local knowledge and resources.

Gender and social issues

With Gher farming expanding the impact on women in particular became more conspicuous. As the learning sessions were organized separately for the women and men , there were no easy opportunities to discuss gender issues together . Hence , plans were made to bring both men and women groups together , identify key gender related issues confronted in the family and set pathways to resolve such issues. For example increasing workload on women due to gher farming is an issue that needs coordinated efforts in the family . Education and other equal opportunities for girls are issues that also need the coordinated efforts and understandings of parents. Apart from discussing some of the general issues of gender at the end of learning sessions , special gender days were celebrated wherein both men and women groups met together discussed the common gender issues and made plans. Project assessment results demonstrate that the position of women in the family and status in the society improved enormously with the introduction of Gher farming in the area.

Exploring new method of credit system

As the existing credit systems did not suit the needs of prawn farmers, new methods of credit that suit the prawn farming cycle with long repayment period were encouraged to be experimented by the partner NGOs.

These payment systems proved useful both to farmers as well as lending agencies. As the borrowed capital constituted major cost factor in the production cycle, farmers were encouraged to make group savings and lend money to the needy farmers within the group. This approach developed based on the principle of self help groups gave raise to considerable savings and lending opportunities within group members.

Knowledge based approach

The project used the approach of imparting knowledge to farmers and help them in solving the problems by themselves by group learning and sharing approaches using the resources available or that can be accessed easily based on their capacity. Evaluation results indicate that most of the farmers were able to achieve improvements in production and were pleased with the knowledge based approach used. In fact , with building of confidence of farmers on the project strategy and approach, even there was no easy way to distribute even research materials freely to members of the group. In such cases, farmers made an agreement on the strategy to adopted. Five years of working experience with 15,000 families within the project area and several more families beyond the project area indicate that poor farmers will derive better benefits through knowledge based approaches that help them to optimize the resource utility in the farm and derive best benefits from aquaculture on a sustainable basis.

Conclusion

Pata Mallick is one of the farmers who worked closely with the project and derived benefit of knowledge based intervention. With a small Gher , she has been able to improve her family situation. She lost her husband due to a poisonous snake bite few years ago. With two children , she had to struggle to cover the family expenses. Today , gher farming has given her the required income and brought stability. Her daughter who was born handicapped with the loss of one fore hand desires to be a teacher and help people like her mother in the area with no education to become literates. Her son, having seen the death of father with snake bite and no doctor and medicine available in the area, desires to become a doctor. Time and social circumstances will decide whether they will accomplish their dreams. However, several indicators suggest that diversified Gher farming has been most beneficial to farmers in reducing risk and increasing income.

The Project has increased productivity of prawns from Ghers and currently it ranges up to 500 kg/ha depending on the strategies adopted with most farmers deriving around 350 kg/ha in 8-10 month culture period. With the improved prawn productivity , increased income from fish , vegetable and paddy , the system is reported to be growing and in the majority of cases giving returns that brings smiles and little comforts these families. As per the information presented in the Kochi meeting , there is an additional support set up under the banner of Shrimp seal of Quality Organisation that helps farmers with certification when they meet the standards. This is likely to help farmers in deriving a better price and also create positive outlook for the product.

The lessons from Bangladesh DFID CARE project , wherein I had an opportunity to work and see the changes clearly demonstrate that GFP farming can be an effective tool for poverty alleviation and improvements in livelihoods of the family. Hearing again from several of the participants from Bangladesh in Kochi International Symposium on Freshwater Prawns influenced me to write again on GFP for the second time during this year through this column. However, to ensure such a positive change, it should be noted that project invested heavily in capacity and confidence building of staff involved with the project work . Over 150 field level trainers interacted with more than 15,000 families over a period of five years to bring such a change. These ground level staff were supported with various technical and managerial staff that helped in the effective implementation of the program. If some of these successful approaches are adopted in our extension / development programs, we should be able to see more benefits of aquaculture in poverty alleviation.

Lastly, Bangladesh farmers continue to depend heavily on wild caught seed for culture and there is a need to initiate programs to increase quality seed production from hatcheries . With large number of families engaged in collecting wild seed, as a by-catch several other species are being destroyed. This is likely to have negative impact on the environment. Government has already banned the collection of seed from nature . With the establishment of hatcheries in the private sector , the scenario should change soon in the best interest of the industry.

Prawn farming is spreading to various regions in Bangladesh wherein it is grown with paddy commonly