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OPPORTUNITIES FOR SOCIAL MOBILIZATION AMONG THE IRULAR TRIBAL PEOPLE USING COMMON WATER BODIES FOR AQUA FARMING

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Scope of work & Opportunities

The Central Institute of Brackishwater Aquaculture (CIBA) (Indian Council of Agricultural research) has been engaged not only in developing the technologies on hatchery seed production, grow out farming and management strategies for sustainable production of brackishwater shellfish such as shrimps, mud crabs and finfishes but also taking efforts in introducing farming practices to the farmers at individual as well as community levels. In the past ten years constant efforts have been made in successfully transferring the technologies through training programmes and on-farm frontline demonstrations in shrimp farming, mud crab fattening and the fish Asian seabass grow out culture and nursery seed production through the maritime states of the country.

In many studies freshwater water bodies have been used for this kind of fish farming but this present work is of its first kind, where, efforts have been made by the project team by introducing polyculture of the Asian seabass (*Lates calcarifer*) and the mudcrab (*Scylla serrata*) in a brackishwater community pond located in the coastal hamlet by totally involving the villagers, belonging to the tribe named "*Irular*", in managing the culture as an additional option for their income and economic development. Thus, a common water body in a coastal hamlet with the available resources has been well utilized for income generation. This trial demonstration was carried out under the Tribal Sub Plan (CIBA-TSP) of the Institute for Tamilnadu sector. Only one trial was possible to be carried out due to seepage of water in this community pond. The hard work was put in by the project team and lot of lessions were learnt during this trial. The detailed account of social mobilization, process of project implementation, technological interventions, problems, issues encountered in the project and possible remedies for such constraints have been documented and presented in this publication.

Background and Social Mobilization

Social mobilization is a core aspect of every demonstration programme, particularly involving more than one farmer/person, and acts as the foundation for every community activity. This programme was an extension of the earlier demonstrations conducted by CIBA on seabass nursery rearing in hapas technology among the women self help groups (WSHGs) of Kulathumedu village during 2012 – 2013.

In the beginning, two WSHGs namely, *Marikolunthu* and *Annaparavai* came forward to adopt seabass nursery rearing in hapas technology and this technology was successfully adopted by these two groups. They realized a corpus amount of Rs. 1,94,194/- from the above technology adoption. Seeing the success of these 2 WSHGs, a total of 147 irular tribal people both men (82 nos.) and women (65 nos.) including new 5 WSHGs in this village came forward with a new proposal of polyculture trials of the brackishwater species, the mud crab (*Scylla serrata*) and the Asian seabass (*Lates calcarifer*) in their community pond.

These irular tribal people are fishers and crab collectors. They go for fishing in Pulicat lake as well as in the adjacent sea. During lean fishing season their major income from fishing is affected. Hence they are compelled to look for alternative avocation during off-season. Since this community pond is situated very close, just in the backyard of their residential colony, aquafarming using the pond is the best option for them to compensate the financial deficit during lean fishing season.

A community pond named "Irular pond" located at Kulathumedu village, Pulicat, Tiruvallur district in Tamil Nadu was adopted by CIBA for demonstration of polyculture trials of the brackishwater species, the mud crab (*Scylla serrata*) and the Asian seabass (*Lates calcarifer*) by irular tribal people of the village. The objectives of this trial demonstration involving the community villagers as a whole was to utilize the available common brackishwater resources in the village for cultivating mud crab and seabass and also to facilitate this tribal group to develop an alternative livelihood for additional income.



The Irulars fishers and Irular pond' at Kulathumedu village, Pulicat, Tiruvallur District

Signing of MOU by the village head at CIBA

A total of 147 irular tribal people both men (82 nos.) and women (65 nos.) were the beneficiaries of this trial and they participated actively in this trial demonstration. They themselves developed the planning skills in preparing the daily work schedules, executing the planned works accordingly and with had the satisfaction that each family had the responsibility to contribute their work to this trial viz., procurement of crab and trash fish from the local market, feeding management, monitoring, watch-and-ward and record maintenance, etc.

Both men and women irular tribal people of this village as a whole (in rotation basis) participated in this polyculture trials of the brackishwater species. The leaders were selected to lead different farm activity like purchase of inputs, pond management, feeding, watch and ward. It was decided that the profit realized out of this trial will be used for their village temple renovation work and for other community welfare activities of the village.

A Memorandum of Understanding (MOU) was signed between CIBA and the tribal beneficiaries of the village, in which, it was agreed that CIBA, will provide the required aquaculture inputs free of cost to the irular tribal beneficiaries under the CIBA - Tribal

Sub Plan. CIBA will also provide 75% of crab required for stocking in this trial and the remaining 25% of crab will be procured and stocked by the beneficiaries (i.e., each family will contribute 2 kg of crabs) for stocking in the pond. The seabass fingerlings required for stocking will be purchased by CIBA from *Marikolunthu* and *Annaparavai* WSHGs.

A tribal woman, who was one among the villagers, was selected among the beneficiaries and was recruited as the field assistant to collect data and to maintain proper record of the field demonstration trial of aqua farming. She liaised between CIBA and the beneficiaries and was also trained to manage this aqua farming trial, including book keeping, accounts maintenance etc. Thus, a tribal woman was given a temporary job opportunity as a field assistant by CIBA. By this her leadership qualities and technical knowledge was also found to be improved.

Regular cleaning and monitoring of the pond was done by the beneficiaries (both men and women) by removing any debris/filaments and algae present in the pond. During monitoring, the feed intake of the animals, level of water and its other parameters were monitored regularly by the beneficiaries. The dead crabs in the pond were removed immediately from the pond by the beneficiaries.

All the records including work schedules, sampling data, feeding and pond management were maintained properly by the SHG leaders. The bank accounts were opened for the beneficiaries, which has created an enthusiasm and confidence in carrying out such aquafarming in and around their village using the natural resources available in that location.

Periodical interaction meetings were conducted with the beneficiaries by CIBA scientist team to stress on the importance of this new aquaculture technique as a viable income generating means for them and also emphasizing on their oneness for successful completion of such ventures. During the interactions many young persons of the community suggested innovative ideas to conduct this trial successfully. Thus, the beneficiaries were motivated and guided by the team members in all technical matters of brackishwater aquafarming of mud crab and Asian seabass.

Interaction and doubts clearing by project team members

Development of technology package for common water bodies

The 'Irular pond' had a water spread area of 2.0 ha, situated in the backyard of Irulas community colony was selected for the present trial. Seabass fingerlings cultured under nursery rearing in the hapas by the women self help groups of Kulathumedu village during 2012 -2013 under this programme were procured and stocked in the pond. A total of 2000 nos. of seabass fingerlings at a cost of Rs. 15/- per fingerling with a total length of 6-9 cm and 4-6 g body weight were stocked in the pond during first week of January 2014. Before stocking, the seabass fingerlings were first weighed and then stocked. The live crabs *Scylla serrata* procured from Pulicat fish landing centre were stocked in the pond. A total of 1048 nos. crabs (249.2 kg) ranging from 100 – 450 g of size at a cost of Rs.450 / kg were procured. The crabs were measured and washed before stocking.

Procurement of oxygen packed seabass from WSHGs beneficiaries

Measurements of fish seed

Seabass fingerlings stocking by Officials of CIBA and dignitaries in the pond

Crabs for stocking

Weighing the crabs before stocking

Beneficiaries with crabs for stocking

Stocking of crabs by beneficiaries in the pond

Locally available low cost fishes (like *Sardines, Terapon spp, Tilapia, Eel* etc.,) procured from the local market were cut into small pieces and fed to crab and seabass. Procurement of feed was carried out by both men and women beneficiaries. The trash fish before feeding was cleaned, weighed, and then fed to the crab and seabass in the pond. Feeding was carried out by both men and women by boating as well by broadcasting at different feeding points in the pond. Feeding was adjusted based on the standing biomss and the fish and crab were fed @ 8-10% of the biomass. The total quantity of feed was divided in to two doses and fed in the morning and evening. After one hour of feeding feed consumption was monitored and the feed quantity was adjusted accordingly. During this trial live Tilapia fish 120 nos. (with 80- 250 g) were left in the pond for seabass for feeding.

Eel used as feed (before cutting) for crabs and seabass

Processing of low cost fish by beneficiaries

Washing and cleaning the low cost fish

Cleaned low cost fish pieces


Weighing the low cost fish before feeding


Supply of feed to the crabs in the pond by men and women

Feeding to the seabass fingerlings near the feeding points

Hide outs made of bamboo baskets (12 nos.) were kept at different places in the pond for the protection of water crabs during molting. Moderate sized thorny bushes and water plants were planted as hide outs for seabass fingerlings.

Shelter kept in the pond for crab

Shelter kept in the pond for seabass

Regular sampling of seabass and crabs was carried out once in 15 days to assess the growth and to check the health of the stock. The crabs and fishes, 20 nos. each were collected to measure the total length and weight for the fishes and carapace width and weight for the crabs. Feed consumption rate was also worked out month wise.


Monitoring the feed intake and checking for mortality of crabs and seabass



Crabs in the pond

Molted crab shells

During full moon and new moon the molting of crabs were noticed. Crabs digged burrows and made shelters in the pond for stay. During night time the crabs were noticed to roam on the bunds of the pond.


Digging of pits by crabs

Foot marks of crabs in the pond bed


Collecting the crabs for sampling

Collecting seabass fingerlings for sampling

Transporting of crabs and seabass for sampling

Sampling by project team and beneficiaries

Sampling by beneficiaries

It is a seasonal pond, in which, water will be available only during September - March and water depth reaches to a maximum of 1.2 meter during peak north-east monsoon from October to December. During summer and pre monsoon period (May-August), the pond remains in dry condition. Although, the pond receives water from adjacent Pulicat lake backwater during monsoon months, the salinity range varies from 28 to 50 ppt. or even more than that. The pond water salinity was found to be 28-35ppt during September - January depending upon the monsoon rain fall. However, the salinity increases from February and reaches about 45ppt in March 2014. The fluctuations in salinity solely depend on the occurrence of rain fall in this area. The pond depth also decreases due to seepage and evaporation during dry season recording at 30 - 45cm in March. The pond will have full water spread area only during monsoon months October-December) and rest of the period the water level reduces gradually and reach dry condition during summer.

During October - December, 2014, the pond water temperature varied from 26.0 - 29.5ºC and thereafter, it increased to the maximum of 34^{0}C in March 2014. The water temperature is inversely proportional to pond depth and as the water depth decreases, the water temperature also increased in the pond. The entire pond was fenced by nylon netting to prevent escape of crabs from the pond. Flood lights were also

provided by CIBA and the beneficiaries guarded the stock in the pond during night hours to protect the stock in the pond from poaching as a precautionary measure

After three months of culture period, the seabass has attained the total length from 13.5 cm to 4.5 cm (average 19 cm) and total weight varied from 40 g to 180 g (average-110 g). A total of 217 seabass juvenile fishes have been collected through partial harvesting and marketed. An amount of Rs. 6,510/ was realized out of seabass sale. A total weight of 159.5 kg of crabs {with XXL size - 1 kg and above; XL size – 750 – 1000 g; Big size 500 – 750 g; Medium size – 350 -500 g and RL size (crabs with missing appendages)} were harvested. An amount of Rs.1,27,398/ was realized out of crab sales. The total amount of Rs.1,33,908/- was realized out of mud crab and seabass sales from this trial.

Harvesting seabass

Transporting seabass to the shore

Collection of seabass for packing

Harvesting of crabs

Transporting of crabs to the shore

Beneficiaries with the harvested crabs

Tying the harvested crabs

Crabs packed for market

Marketing of crabs and seabass

Transporting seabass and crabs to market

Constraints and remedies

The Panchayat leader, Counselor and the village leader participated actively as one of the beneficiaries in this trial representing the village. Their family members were also the beneficiaries in this trial. There were 2 hierarchy groups and monopoly leadership found in this village and this created disturbance and interference in the smooth functioning of this trial. But the village people were united and were enthusiastic to participate in this trial as a group.

This pond is having one inlet point where the water from the Pulicat lake enters into the pond during monsoon season. The water depth varies from 0.5 to 1.2 m during September - March. During summer the water level decreases due to seepage and evaporation and the pond becomes dry. The seawater supply system was established for this pond, on war footing basis, to compensate the water loss immediately and to prevent increase in the salinity so that the stocked mud crabs and seabass fishes are not affected. The lake water was pumped using 7.5. HP diesel pump. Pumping of lake water into this community pond was initiated and the required pond water level was maintained. But this could be taken up only temporarily. During installation of diesel pump and laying of 450m pipe line with 6 inch dia hose pipes to provide seawater supply to the pond from the pulicat lake, the labour for digging was put by 40 village people (including both men and women).

Installation of diesel pump and laying pipe line to provide seawater supply to the pond

The water level started decreasing day by day due to seepage and evaporation and the pond was drying faster. Since the immediate harvesting was the only option to save the stock, the demonstration ended with the harvest done in the 1st week of April 2014. Birds like cranes and crows used to catch the seabass fingerlings stocked in the pond. This was controlled by bursting crackers on the shore to avoid birds flying over this pond.

During early February 2014, gradual reduction in the pond water level could be noticed due to seepage in the pond. Thereafter, the water temperature also slightly increased due to increase in the atmospheric temperature. In order to maintain the required water level in the pond, attempts were made to draw the seawater from adjacent Pulicat lake. A 500 m long canal with the depth of 2 - 2.5 ft and a width of 3 ft was dug by the beneficiaries from pumping site to pulicat lake lagoon water front area. A shallow well with the width of 4 m diameter and 1.2 m depth was dug by the beneficiaries to collect and retain the lagoon water for pumping. A diesel pump of 7.5 hp capacity was fixed nearer to the shallow well and seawater delivery line was provided from suction site to the pond site for the distance of 450 m by connecting 6 inches diameter hose pipes. The seawater was pumped to the pond from 28th February 2014 onwards. All the beneficiaries participated in the manual works such as digging of the canal, removal of mud, laying the pipe line, fixing and operation of the diesel pump for drawing the seawater to the pond.

Lessons learnt

The present demonstration of brackishwater aqua-farming involving the people of a hamlet in the coastal area with the available resources in and around the village, has lead to the following inference that needs to be kept in mind for any such social mobilization and technology package implementation.

(i) Social mobilization

- It was observed that while selecting the beneficiaries, it should be ensured that when WSHG is formed for farming purpose, the members in the WSHG should not be from the same family. This will lead to more profit sharing by one single family. Even when there is a social issue, as observed in this demonstration trial, the WSHG members from the same family may have a united opinion towards any social issue. This will also lead to difficulty in taking decisions during social issues in the village.
- Before selecting a village and the beneficiaries, it is always better to study whether there are any hierarchy groups and monopoly leadership in the village.
- The National Rural Employment Guarantee Act (NREGA) scheme being operated by the Government of India has been useful in making or repairing the minor infrastructures, etc., in the rural areas using the local manpower. In the present case also, arrangements may be made by the village Panchayat and other government agencies to engage the village people for digging and deepening such community ponds in their own village so that these kinds of short term aquaculture trials of the mud crabs (*Scylla serrata*), fishes like Asian seabass (*Lates calcarifer*), etc., can be successfully practiced in the community pond under this scheme. The beneficiaries of this scheme can also take up such trials as an alternate livelihoods under this scheme.
- When a research organization takes up such trials to set-up and create assets required primarily for the tribal group for the trial. This creates a platform to other organizations like State Govt. departments, private entrepreneurs and NGOs to come foreword to support these beneficiaries after the host institute completes its trial.

(ii) Technology package

- Before selecting a community pond, a feasibility study about the aquaculture site, such as physic-chemical parameters of the soil and water, water availability and quantum, pond designing, leveling, inputs availability and transportation means, culture management implementation and marketing options are to be thoroughly made.

- In a community pond, different systems of aquaculture may be done, for example small crab pen with different compartments can be erected in the same pond in one portion leaving aside the main body of water for open water stocking and rearing fishes. The differently sized soft shell crabs can be stocked in the crab pen compartments which will help re-stocking the water crabs obtained during harvest for further culture or hardening. This will also help in studying the different crab farming models in the same community ponds.
- Prior arrangements are to be made before beginning such aquaculture operation regarding the procurement of soft shell crabs for stocking and the market agent to whom the harvested hardened crabs are to be sold. It is always better to dispose the harvested crabs to the same market agent from whom the soft shell crabs were procured, under a sort of contract farming with buy-back arrangements, by even fixing the market rates (Rs. 50/- less than the market value) approximately during sales. This will help in good liaison between the beneficiaries and the supplier and also avoid interference of new market agents to purchase crabs at lower price during the harvest time.

Conclusion

These kinds of investments made under tribal Sub-plan will help creating assets required for the tribal group beneficiaries to take up brackishwater aquaculture on a regular basis continuously. This intervention has helped the irular tribal beneficiaries to learn the means of new income generation avenues and has facilitated them to adopt aqua farming practice as an alternative / supplementary livelihood option. This intervention proves to be a good model of supplementary revenue generation portraying the community participation in adoption of brackish water aquaculture technologies.

Beneficiaries along with Director - CIBA and project team members