

# CRAB FATTENING

## Alternative Livelihood for Fisherwomen



M S Swaminathan Research Foundation  
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## 1. Introduction

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Post Tsunami the need to rebuild the ecological foundations and livelihoods of the tsunami victims was the need of the hour. The State and Central governments and development organizations were at the field to bring the situation back to near normalcy. The Foundation keeping its principles in the forefront of being pro poor, pro women and pro nature, efforts were directed towards rehabilitating livelihoods and fostering sustainable livelihood security of the fishing communities, agriculture farmers, widowed women and orphaned children by the tsunami under rehabilitation frame based on the situation analysis.

Based on this the Foundation took up initiatives for medium and long-term rehabilitation of the coastal communities. One of the rehabilitation interventions by MSSRF initiated in the Tsunami areas was that of restarting livelihoods through catalytic interventions. A micro-credit programme was implemented in three villages (Samiyarpettai and Muzhkuthurai in Cuddalore dt and Madavamedu in Nagapattinam dt and it continued to support the fishing communities to revive and diversify the livelihoods.

This document gives an account of the crab fattening activity as an alternative livelihood option to the women of the coastal communities who were involved in fish and dry fish vending.

## 2. The Approach

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Several rounds of discussions with the community members and other stake holders in the rehabilitation process and field visits by the staff led for a concerted effort for designing programmes based on the needs of the community. Bottom -up approach was adopted at every stage in defining and designing the action plan. The need assessment carried out through informal group discussion with the community members revealed their needs and livelihood intention to restart fishing activities and also showed interest to take up to other fish allied enterprise activities. Based on the prioritization, MSSRF extended support for various livelihood activities/interventions by the groups.

The intervention/activities and implementation process were discussed with the men and women of the village; self help group leaders, traditional fishermen panchayat leaders, leaders of elected village panchayats, local government officials from rural development department, forest department and NGOs. Community based groups/structures was initiated with representatives from all sectors of the community, government and non-government and they acted as the implementing

agency at the village level. The identified activities were executed based on the Memorandum Of Understanding (MOU) signed (where ever essential) between the Foundation and the local community based groups, indicating clear roles and responsibilities for each of the partners, monitoring mechanism and sharing of the resources and benefits. The process mode adopted to facilitate the activities in the field helped the community for active participation and develop ownership in the rehabilitation process.

For the past three years the field staff of the Foundation have been monitoring the functioning of these SHGs by attending their monthly group meetings and facilitating any group arising conflicts, rather than active participation.

As part of the tsunami rehabilitation process for livelihoods strengthening, Participatory Rural Appraisal (PRA) exercise was undertaken by transecting in the back waters near Madavamedu, Pazayar and Muzhkuthurai (in the Pichavaram region) to find out the feasibility and suitability for culture fisheries with experts from Periyar Integrated Fish Farm, Chennai, MSSRF staff and the community members. The team found that the estuaries near the villages could be used for crab fattening, the available un-used prawn farms for crab culture and the open back waters for different activities like mud crab fattening (through pen-culture and cage methods), grooper, sea bass fish in floating cage culture and Oyster and green wood culture).

During the visit, discussion was held with the fisher folk on water availability (seasonal) in the backwaters. An exploratory survey was conducted to assess the availability of water crabs in the landing spots which shows that around 17.5% of the landing crabs are water crabs; hence there is a possibility to introduce crab fattening as one of the income generating activities in the village.

One self help group - *Malligai* Women SHG in Madavamedu, Sirkazhi Taluk of Nagapattinam District who showed keen interest took to crab fattening in a 100 sq ft area, adopting the cage method as an alternative livelihood option which is described here.

### **3. Crab Fattening -A Process**

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The mud crabs inhabit marine as well as brackish water environments. Mud crabs are a seafood item of high demand being exported to foreign countries alive. Culturing of the mud crab is not economical and hence the crab fattening being profitable is practiced. Mud crabs are recently gaining importance in corporate sector too due to its export value and has been realized as an alternative species due to set back in shrimp



farming.

Crab fattening is essentially stocking soft shelled crabs or water crabs that are held in smaller impoundments for 20-30 days till the shells are hardened and they 'flesh out'. Fattening of mud crab is being undertaken in the states of Andhra Pradesh, Tamilnadu, Karnataka, Orissa, and West Bengal.

#### 4. Involvement of Women as Entrepreneurs

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Fifteen women from Madavamedu village formed into the *Malligai* Self Help Group (SHG) August 2006. The members of this SHG were keen on taking up the crab fattening activity. This interest paved way for building their knowledge and capacity by way of a training which was held in September 2006. The training was conducted by Mr. Eranniappan, Director of Periyar Mud Crab Hatchery, Kancheepuram district, Tamilnadu. The content of the training related to water quality management, species identification, culture and fattening, feed management and tank maintenance both theoretically and practically.

Later the number of members reduced to ten, when the actual activity took off. Initially the group was given five cages and all the cages were maintained by the group as a whole.

The group earned around Rs.700/ average per batch in five cages for every fifteen days cycle.

The good experience gained by the support extended by Friends of MSSRF - Asia Initiatives to one of the clusters operating from Samiyarpettai village in Cuddalore district, when it returned

#### List of Members of Malligai Women SHG, Madavamedu

V. Vembu  
M. Vijayalakshmi  
S. Shakunthala  
K. Sundari  
E. Adilakshmi  
V. Selvi  
P. Lakshmi  
T. Kala Rani  
B. Vimala  
R. Rani



the loan amount of one lakh without default within the stipulated time, encouraged the *Malligai* SHG to apply for similar loan to expand their crab fattening enterprise in April 2008.

A survey was conducted in the crab landing spots in the region to know the business potential of buying more water crabs and to increase the number of cages.

Accordingly, the number of cages used for crab fattening was increased from five to ten and the technology was further fine tuned to improve the quality of the crabs in the cages.

Support was also provided to construct a small wooden bridge to catwalk in the backwater for crab fattening process. The *Malligai* Fisherwomen SHG members are consistent conducting the regular monthly meetings to discuss about their savings and also about their activity.

During the focus group discussion with the women, it had been found that availability of the crabs are seasonal and so the women wanted to grow small crabs and sell them for higher price during the season. And this would also provide alternative employment for the women for 4-6 months. During the group meetings, discussions apart from savings and loans, other technical information relating to the parameters within which need to be followed while involved in the crab fattening were also discussed. The technical components relate to the soil and water conditions, atmospheric temperature, stocking details, feed details, duration of fattening, harvesting and handling of the crabs while transporting were all that was discussed.

Discussions are on with the export companies operating in the region to enter into buy back arrangement. In the process, the women have increased their negotiating and bargaining skills for better prices. The crabs for fattening are supplied from Pazhayar Village which is at a distance of 2 kms from Madavamedu.

## 5. Technical Parameters for Crab Fattening

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### *Water Quality Management*

Monitoring of water quality parameters such as temperature, salinity, dissolved oxygen concentration, pH, watercolor and daily transparency is important as a tool for the management of good water conditions.

Mud crabs are highly tolerant to varying salinity conditions, so brackish water would be ideal for crab fattening operation within a temperature of 23 - 30 degree centigrade.

### *Crab Species for Fattening*

There are four species of mud crabs namely *Scylla serrata*, *S. tranquebarica*, *S. paramamosain*, and *S. olivacea*. Among these, *Scylla tranquebarica* has been the chosen species for fattening activity as it is available in abundant in the coastal



area in the inshore sea, estuaries, backwaters, coastal lakes and mangrove swamps.

*Scylla serrata* is locally called 'giant mud crab'. The color is greenish with white polygonal markings on the swimming and walking legs, chelipeds, carapace and with orange claws. It has deep serration and pointed frontal spines. The spines at the dorso-posterior side of the merus are more prominent.

*Scylla tranquebarica* has almost similar features with the *serrata* species except that the color of the chelipeds is purple and polygonal markings are only prominent at the cheliped and swimming legs and gradually fade towards the anterior walking legs. It has shallow serrated and blunt frontal spines and the spines at the dorso-posterior side of the merus are not as prominent as the *Scylla serrata*. This difference could not be identified at the juvenile stage. Only when their size is reached sub adult (or) >90 g, *Scylla serrata* can be differentiated from the *Scylla tranquebarica*. The sex of the crab can be identified even at the juvenile stage.

Mud crab fattening has been considered as most profitable venture and as a method for small-scale aquaculture as the

- turnover is fast, and the period between investment and returns is relatively short
- fattened crabs can be stocked at higher densities (15 crabs/sq m) compared to grow-out systems (1 crab/sq m) as no moulting occurs and therefore losses due to cannibalism are reduced to a great extent and
- short production time reducing the risk of losing crabs to disease and thus rendering a higher survival rate for fattening (>90%) compared to grow-out systems (40%).

#### ***Stocking of the Crabs and Feeding in Cages - Fibre Reinforce Plastic (FRP) Cage with Chambers***

Mud crab floating cage was procured from Mr. Eranniappan, Periyar Integrated Fish Farm, at Chennai. Cost of the cage is around Rs 5000 each. The cage made upon by fiber-glass and consists of nine chambers. It is durable, portable and the crabs cannot bite the hard plastic material.

#### **FRP Floating Cage**

<b>S No</b>	<b>Particulars</b>	<b>Dimensions</b>
1	Size	1 mt * 1mt * 33cm
2	Diameter of holes	1 inch
3	Diameter of PVC pipe	10 cm
4	Thickness of copper	0.2 cm

#### ***Cage Culture Operation***

The cages are kept immersed in water and tied with bamboo poles for support. The water crabs are then released in the chambers. Since then on an average 20 to 30 days



is required to fatten the water crabs. After the crabs have been harvested the hardened crabs would be sold @ Rs250 / kg in the market.

### *Stocking of the Mud Crabs*

Initially at the start of the project, five cages were given to the group of ten women members. Later an additional five cages were purchased by the SHG as part of their expansion.



Mud crabs are acclimated before releasing into cages to prevent thermal and salinity shock that lead to death. Stocking of mud crabs in the early morning or late afternoon when water temperature is low is preferable. Mud crab juveniles are stocked individually in each chamber.

### *Feeding*

Mud crabs are omnivorous and they feed on a wide variety of food items. They feed preferably on mollusk by crushing them with their claws. They also feed on small crabs, slow moving animals, small fish and shrimps which they catch as they lie camouflage in the muddy bottom of their natural habitat. Feed comprises 40% of the total cost of production. If brown mussel meat is available and cheap, a mixed diet of 75% brown mussel meat and 25% trash fish is recommended. The crabs are fed 10% of the crab biomass per day twice daily when the mean carapace length is <6cm and 5% when >6cm with 40% of the daily feed ration given at around 7.30 am and 60% given at around 5 pm.

### *Duration of Fattening*

The fattening duration was about 20 -30 days. The cages were checked from the 10th day of stocking for the hard crabs. If hard crabs were found, they were harvested from 10th day onwards and up to 30 days. The survival is rate of the crabs is 90%.

### *Harvesting*



Selective harvesting is the removal of harvestable size and fat mud crabs several times during the culture period in the range of 500 to 750 gm and above by hand picking method. The average increase in weight after fattening is around 40-50 gms. Crabs may be harvested totally at the end of 20 to 30 days culture by hand picking method. Harvested crabs are immediately placed in a moist and



shady, cool place. Mangrove fronds should be placed in the harvest container. Cool water is poured frequently on the crabs. The crabs should not be exposed to heat nor should they be bunched and hanged, as this would reduce the turgidity of the crab mussels. In the case of algal fouling on the crab carapace, it was removed by brushing. Sometimes the barnacles also foul the carapace and these are also removed.

### *Packing*

The first pair of largest legs with pincers (chelate legs) of each crab should be firmly tied up to the body by jute/nylon thread to avoid fighting among them. The method of tying a live crab is as follows: a stick is firmly placed on the carapace for instant arrest of its movement and the thread is placed in between the frontal portion of the body and chelate legs. After keeping the chelate legs in folding posture, the thread is coiled around their fingers (chela) and both the ends of thread are put into a double knot at the posterior end of the crab. Wet cloth are kept in between the packed layers of crabs to enhance moist and cool condition during transport from place to place. The tied-up crabs are washed with fresh seawater and packed either in bamboo baskets or in perforated thermocole boxes or in wet baskets.

### *Transportation*

Mud crabs are transported in a bamboo basket or in straw bags from dealer to site for stocking. Seawater is frequently poured into the transport container to keep the crab moist. Crabs could withstand out of water even 7 days provided they are kept cool and moist seawater. Transport charge varies with distance.

### *Nutrients and Other Uses of Crab*

Crab meat serves as a good source of protein and essential vitamins. It also contains phosphorus, zinc, copper, calcium and little quantity of fat. The crab is said to contain a lot of medicinal properties. The shell of crabs contain non digestible fiber called chitosan encourages weight loss by binding to fat molecules in the digestive tract and preventing the body from absorbing the fat.

### *Disease Management*

Monitoring the growth along with health maintenance, disease occurrence, and product quality of the crabs has been inevitable and pose as major constraints. These issues are inter-related, especially if disease prevention or control implements have long-term effects on the environment or produce



residues that make the crabs unacceptable for consumption. So every care is to be taken for any disease outbreak.

The level of production has been taken as an indicator of healthy or diseased crab. For ensuring good production and healthy fattening of the crabs starts at the planning stage of the venture. At each step of planning and production, questions and answers should be anticipated on how to decrease the possibility of pathogen entry and environmental contamination. These considerations include the following:

- Selection of the crabs
- Feed quality and feeding practices
- Harvesting and transportation
- Detailed record keeping

## **6. Economics of Crab Fattening Activity**

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The economics of the crab fattening activity is given below, which clearly indicate the cost involved and the profits made through this.

### ***Financial viability***

Cage size	1 square meter with 9 inner segments
Culture period	20 - 30 days
Stocking density	1 / each inner segment
Survival	90%
Initial price for crab	Rs. 100/ kg
Cycles per year	8
Farm gate price	Rs. 250 / kg

### ***Optimum water quality parameters***

Water temperature	25 to 35 degree Celsius
Water salinity	10 to 35 ppt
Dissolved oxygen	> 4 ppm
PH	8.0 to 8.5
Water depth	>80 to 100 cm
Desirable water color	Golden brown
Transparency	30 to 40 cm

### *Economics of the crab fattening in one cycle*

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<b>2007- 2008</b>	
Purchase of water crabs @ Rs.100/Kg totally 35.8 for all the 5 cages	3580
Feed cost (25 Kg trash fish )@ Rs. 20/Kg	500
Total sales (31.7 kg. p@ Rs. 250/ kg)	7925
Wages @ Rs.50/8hrs,per day 2 hrs so for 25 days@ Rs. 50	1250
Total income	7925
Operation cost (Purchase cost + Feed cost+ labor cost)	5330
Net profit per cycle	2595
Total for 8 cycles	20,760
<b>2008 - 2009</b>	
Economics of the Crab fattening in one cycle	
Purchase of water crabs @ Rs.100/Kg totally 71.6 kg for all the 10 cages	7160
Feed cost (50 Kg trash fish )@ Rs. 20/Kg	1000
Total sales (67.5kg p. good crab @ Rs. 250/kg)	16875
wages @ Rs.50/8hrs,per day 2 hrs so for 25 days @Rs. 50	1250
Total income	16875
Operation cost (Purchase cost + Feed cost+ labor cost)	9410
Net profit per cycle	7465
Total for 8 cycles	59,720

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### *Availability of the crabs*

The peak season when the crabs are available for fattening is between July to November every year. The availability of the water crab in this region has been posing a problem especially during the lean season. The cost of the soft crabs escalates almost three fourth of its original cost, and the women find it too costly. So during the lean season, the women suspend the crab fattening activity for around three - six months between January to June and the women take up to fish and dry fish vending as stop gap enterprise.



### *Hand holding support*

With the performance of the Malligai SHG being good, the women approached the Community Bank of the Foundation for an interest free loan of rupees one lakh supported by the Friends of MSSRF- Asia Initiatives. As part of its hand holding support, the Foundation had given the requested loan amount. The SHG invested the amount to purchase five more cages and have also repaid thirty thousand rupees towards the first installment.

The SHG have earned a profit of Rs. 80, 480 from fattening the crabs in the last two years. In the current year (2009 - 10) they have fattened two hundred and fifty crabs worth Rs.75000. The women members each got a profit of Rs. 700 - 1000 per month when all the cages are stocked to its full capacity.

## 7. Replication of Crab Fattening Activity

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With the success seen in this activity, a group of women from Kaveripoompattinam showed interest in crab farming. So around fifty women have undergone training and also have been taken on an exposure visit. Through the Fish for All Research and Training Centre set-up at Kaveripoompattinam, these women would take up the crab fattening activity.

## 8. Impact on the Women

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The crab fattening activity as an alternative livelihood has been a boon in the lives of the tsunami affected coastal women. Crab fattening as an enterprise was never thought before by the coastal fisher women who had always been looking at



livelihoods only through the fish vending or drying up the left over sales and market them as dry fish to meet their needs in a marginal way. The women with their experience over the three years in the crab fattening activity as an alternative livelihood option, have been showing as a great source of strength being together and doing the activity in a collective manner.

By taking up this new venture, the women have set standards as role models for the women of other SHGs. Their work has impacted on their lives in numerable ways:

- Coming together as a group, the women have understood the collective strength underlying their lives. Their self confidence have been boosted and are able to earn more profit, rather as an individual with a marginal benefit.
- With their enhanced knowledge gained and the technical training received these women, exhibit high levels of absorbing capacity, though with literacy level is low. The way they handle the learnt knowledge blending it with their traditional knowledge has value added. The knowledge on handling the crabs in a hygienic manner has helped them in



handling other fishery products in a clean and safe manner, adding value to the products.

- The women have enhanced their business management skills and thus with their enhanced bargaining capacities are able to market the fattened crabs for a higher price.
- The group cohesiveness has built in a strong bondage at the community level. Even when their husbands' had difference of opinion as members of different political parties these women always voiced as one in any situation, convincing their men and coming forward to take up other community activities.
- Their joint decision making at meetings whenever any resolutions are passed and their decision making at their homes always show cased their individual identities in the decision making processes.
- By their internal savings and revolving funds, accessing to market and vending the crabs, the women handle the 'money' by themselves and decide on what they want and what they need to buy for themselves and for their family.
- The crab fattening activity as an enterprise and as a business asset, the women have created in a collective way have been quite productive with profits enriching the supportive incomes to their families, which further helps to enrich the health of self and family members and education of their children.
- With crab fattening as an activity which requires mobility outside their homes and villages, these young women are showing dynamism in the process.
- These women do not believe in whiling away their time fruitlessly, but find all means to earn during the lean season by taking up alternate fish vending activity.

## 9. Lessons Learnt

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With the technical training input received by the members of the SHG on the crab fattening activity, these members with their hands on experience over a couple of years came out with their own innovative ideas. This helped them in enhancing the activity in a more productive manner, which is worth mentioning here.



- Initially while stocking the crabs, two to three crabs were put together and caged in a single compartment, with the cannibalistic feature of the crabs, they found that few of these crabs did not survive from their fellow mates. So it was decided by the women that they would stock only one crab in each compartment.



- While transporting the crabs either after purchase for fattening or taking them to the market, these crabs could not survive high temperature, so the women always wrapped the perforated bags with wet cloth to maintain a cool climate, thus reducing the mortality rate due to the heat outside.
- The women also suggested for the design of the cages which stopped the crabs from escaping and entering into the other compartments of the cage.
- The compartments within the cage were such that it was hard enough so that the crabs could not bite to cross over.

## **10. Challenges Faced**

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The challenges faced by women involved in crab fattening are given below:

- Crabs dying due to over heat of water
- Lack of sufficient space for one kilogram crabs'
- Settlement of Oyster and planktons on carapace
- Breakage and damage of legs due to insufficient space in the cage
- Problem in locking the cage
- Shortage of mud crabs

## **11. Suggestions**

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During the interaction with the women involved in the crab fattening activity, on the issues they have been facing, the following suggestions emerged:

- The cage should be kept in running water and some coconut leaf are to be spread over cage
- Periodical cleaning of crabs and cage once in a week
- Putting some quantity of soil inside the cage
- Copper locks are to be used
- Set up hatchery and grow crabs in ponds, so the water crabs could be availed

## **12. Other Considerations**

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While various technical parameters are to be considered for the crab fattening activity, other factors are to be taken into account are:

- There must be a sufficient supply of stocking materials in the locality
- The site should be away from domestic and industrial effluents
- Storage facilities required for unprocessed feed
- The farming site should be protected from poachers

- Adequate electricity, communication and conveyance facility must be available

### **13. Conclusion**

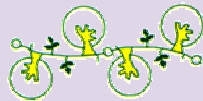
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This is the first time that a community-based crab fattening project has been implemented for alternative livelihood purposes especially for the fisher women. This has proved to be a great success not only in terms of generating extra income to the family through the SHGs but also in creating an awareness among fisher folk about the value of marine resources and the need for conservation and sustainable utilization. Active participation, infrastructure, hand holding support from the Foundation, financial support from the Community Bank funded by the Friends of MSSRF- Asia Initiatives has made the project successful. Madavamedu crab fattening unit thus has become a model for the establishment of similar projects in the other fishing villages along the coastline, where the Fish for All project has been set up at Kaveripoompattinam of the Sirkazhi taluk of Nagapattinam in Tamil Nadu.









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