

Successful Women Entrepreneurs in Aquaculture: Case Studies from Tamil Nadu, India

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Abstract

The nature and extent of women's involvement in aquaculture vary greatly from place to place and, within a place, they vary among castes, religions and positions in the family hierarchy. The present study covers 13 cases of successful women entrepreneurs in Tamil Nadu, India who were engaged in production, input supply and export and marketing through shrimp farming, crab culture, crab fattening in cages, pens and concrete tanks, shrimp hatchery management, crab hatchery management, live feed farming and processing, shrimp processing, fish meal formulation and feed development, aqua by-products management and exports. Analysis of the case studies demonstrated that women can take part in different parts of the aquaculture value chain, especially if it involves a traditional activity they have been carrying out. The presence of organisational structures such as Women Self Help Groups (WSHGs) helped to galvanise women to take up more complex activities. Women with low formal education levels also played a role as workers. However, women with higher education or with family business connections exhibited high entrepreneurship skills, usually with family support, and could manage complex aquaculture activities.

Introduction

Women are involved in many fisheries activities, although their degree and type of participation is variable depending on local cultural conditions. In small scale aquaculture, rural women's involvement could augment fish production, uplift their social and economic conditions and promote gender equality. This will enable them to participate productively and independently to improve their family's nutritional and living standards. In some cases, they may even be the main source of family income as urban male migration and other social problems have led to an increased number of permanently or temporarily women headed households.

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In southern India, women are proving to be well suited to many of the new activities in aquaculture, beyond their well-established and traditional roles in fisheries marketing, processing and administration. Although women have proved to be competent in adopting new aquaculture technologies, their role is very restricted and often ignored. Major reasons for this include the location of aquaculture sites and socio-cultural taboos against women who strive to earn their family's subsistence in rural areas. To ensure that women utilise their full potential in profitable activities like aquaculture, rural women in southern India need capacity building support which will eventually lead to their empowerment. (Shaleesha and Stanley, 2000).

The present study illustrates how women are actively engaged in aquaculture in Tamil Nadu state, India, through case studies that show a wide range of opportunities for the women principals and women workers and group partners. By analysing individual cases, we show opportunities to improve women's participation and avenues for getting more women involved. The objectives of the study were to document the success stories in the aquaculture sector and study the socio-economic factors for success for women in aquaculture.

Materials and Methods

The present investigation was carried out in Tamil Nadu, South India. Primary data were collected from 13 successful women entrepreneurs engaged in shrimp farming and culture, crab culture, crab fattening in cages, pens and concrete tanks, sea bass farming and culture, shrimp hatchery management, crab hatchery management, live feed farming and processing, shrimp processing, fish meal formulation and feed development, aqua-byproducts management and exports. All the women were married and all the entrepreneurs were located in Chennai, Tiruvallur District and Kancheepuram District. Purposive sampling was adopted because of the nature of the study, availability of samples and time limitations. Direct personal interviews and interview schedules were used to elicit the data. The interviews were conducted by the first author from 2006 to 2008. The 13 cases have been organised according to value chain category, viz; (1) production, (2) input supply, and (3) marketing and export. Fictional names have been given to all the cases to protect the identity of the entrepreneurs.

Results

1.0 Production

1.1. Hatchery manager

Mrs. Renuka was the manager in a mud crab or green crab (*Scylla serrata*) hatchery at Kancheepuram District, Tamil Nadu. She was educated only up to elementary level and possessed strong expertise in hatchery management. Mrs. Renuka also possessed good leadership qualities, good knowledge and experience in fresh water prawn and mud crab hatchery management. She had

strong expertise in seed production of fresh water prawns (*Macrobrachium spp*) and hatchery production of mud crabs, brood stock maintenance, induced maturation, spawning/hatching, larval rearing, live-feed culture, post-larval rearing, maintenance of biological stock, seawater supply systems, air-supply systems, cleaning of brood stock and larval tanks and monitoring of water quality parameters. Twenty women employees worked under her supervision. Mrs. Renuka was a Jamsetji Tata National Virtual Academy (NVA) Fellowship awardee for 2007. She was awarded this fellowship by the M. S. Swaminathan Research Foundation (MSSRF), nominated by the Central Institute of Brackishwater Aquaculture (CIBA), Chennai for her expertise in hatchery management.

1.2. Crab farmer (Crab farming in ponds)

Mrs. Annai was the first woman crab farmer in Tamil Nadu state, and she had been culturing crabs for 15 years. Mrs. Annai and her group lived in Tuticorin, Tamil Nadu. In 1992, Mrs Annai started mud crab farming. She was 45 years old and was educated to primary level. She supported her group members and husband in crab farming activities. Mrs. Annai and her husband were pioneers in short and long term mud crab culture in earthen ponds. They were perhaps the longest standing crab farmers in Tamil Nadu. The crab species *Scylla tranquebarica* was cultured for about 9 months a year. The culture was being done over 101 ha consisting of 25 ponds of varying sizes (0.1 to 1.0 ha each), each with a depth of 1-2 m. These ponds were frontier ponds, where seawater was passed through one pond after another and finally reached the salt pans for salt production. Water crabs, i.e., those that had recently moulted, were purchased on a daily basis from Chennai and transported to Tuticorin by train and by road. Water crabs with size ranging from 50-750 g were stocked in each pond. The water crabs were purchased at Rs. 75 – 180 kg⁻¹. Trash fish was fed to these crabs at 10% of the body weight of the crabs. Crabs with an average weight of 800 g were collected from ponds by hand and sold live to the exporters. Crabs weighing below 500 g (medium) were sold at Rs. 300 kg⁻¹, crabs of 500 g at Rs. 400 kg⁻¹ and crabs of 750 g–1 kg at Rs. 500 kg⁻¹. Mrs. Annai was a Jamsetji Tata National Virtual Academy (NVA) Fellowship awardee for the year 2007. She was awarded this fellowship by the MSSRF, nominated by CIBA for her expertise in crab farming. Thus, Mrs. Annai played a major role as a flag bearer of mud crab fattening by women in Tamil Nadu, and was a role model in the village and played a major part in community development.

1.3. Crab farmers (Crab fattening in Cages)

Mrs. Kayal played a major role in the diversification of aquaculture species by taking up crab fattening (in fibreglass cages) as an alternative livelihood for Self Help Group (SHG) members. Under the leadership of Mrs. Kayal, a Women's Self Help Group (WSHG) consisting of 15 members was engaged in mud crab fattening in fibreglass cages in Kancheepuram District. Mrs. Kayal's leadership qualities and drive had led to the success of adopting this venture among the groups. Fibreglass cages with 6 and 9 compartments were used for crab fattening. Each

compartment was stocked with 1 crab weighing 500-700 g. The four sides of each cage were well perforated for free circulation of water. Trash fish collected from the fisheries landing centres was fed at a rate of 10% of the biomass of the crab. Feeding was done twice a day. Algal and barnacle fouling on the carapaces of the crabs were brushed off. Harvesting of fattened crabs was carried out by hand picking and scoop nets. Hardened crabs were packed in bamboo baskets and marketed live. The water crabs weighing 500–1000 g were purchased at Rs. 150–180 kg⁻¹ and hardened crabs weighing 500–1,000 g and above sold at Rs. 300-450 kg⁻¹. Water crabs were purchased from export companies at Chennai.

1.4. Crab farmers (Crab fattening in pens)

Mrs. Sumathi lived in Tiruvallur District, Tamil Nadu. She was a crab farmer fattening crabs in pens. Mrs. Sumathi was the leader of a WSHG. There were 12 members in Mrs. Sumathi's group and they were actively involved in crab fattening in pens in the village. Each day she and her group members walked more than 4 km to reach their work spot. In spite of walking such a long distance every day, Mrs. Sumathi motivated them to keep going. Mrs. Sumathi worked hard to diversify livelihoods among her co-members by making them understand that they need not solely depend on the income earned by their husbands. Crab fattening was carried out by Mrs. Sumathi and her group in small, fenced pens ranging from 100 to 200 m² in size and water depth of 1.5 m. The water crabs ranged in size from 350- 1500 g and were stocked at 1-3m³. Crab fattening took about 3 to 4 weeks. Crabs were fed with bivalve meat or trash fish daily at the rate of 5 to 10% of the body weight. Harvesting was done using scoop nets and ring nets with baits. The harvested crabs were sold at the local and city markets. The WSHG had substantial savings in the local commercial bank. This bank had provided the group with a loan of Rs. 60,000 for crab fattening activities. In 2010, Mrs. Sumathi was one of the Jamsetji Tata National Virtual Academy (NVA) Fellowship awardees. She was awarded this fellowship by the MSSRF, nominated by CIBA for her expertise in crab fattening in pens. Mrs. Sumathi and her group's experience suggested that the WSHG concept could be a tool to improve the living standards not only of women members but of their community.

1.5. Crab farmers (Crab fattening in concrete tanks)

Mrs. Mariammal, aged 54 years, headed a WSHG at Cuddalore, Tamil Nadu. There were 20 members in the group practising crab fattening in concrete tanks. Mrs. Mariammal and her group had 3 years of experience in this practice. Mrs. Mariammal's group was the only one engaged in this enterprise. She displayed self-confidence, leadership qualities and drive and these had benefited her family and her group members through additional income. The group under the leadership of Mrs. Mariammal was also able to save and was granted a loan from the Indian Bank. The profit gained from this enterprise was used to repay the loan and the remaining amount was shared among the group members. Ten concrete cement tanks were constructed for crab fattening. These tanks were erected on the banks of a brackishwater canal to facilitate water exchange. A concrete tank of 2.5 m x 2 m x 1.5 m was used for stocking water crabs. Sixty six water crabs weighing 23 kg and of size

300–400 g per piece were stocked at 6 tank⁻¹. The total height of the tank was 1.5 m and the water level 1 m. Water was exchanged daily. The culture period was 45 days. Trash fish at 10% of the body weight of the crab was given as feed. Feeding was done twice a day. Mrs. Mariammal promoted to her group that this enterprise could help provide them with livelihood income.

1.6. Shrimp farmer

Mrs. Akila, Nagapatinam District, had been engaged in tiger shrimp (*Penaeus monodon*) and sea bass (*Lates calcarifer*) farming since 1994. She was 38 years old and had a B. Sc (Home Science). She also worked as a consultant for other shrimp farms located in Nagapatinam and helped her husband, who was a consultant for fish feed exporters. Her own self interest and the motivation given by family members encouraged her to take up brackishwater shrimp farming seriously. The farm had fifteen men and three women workers. The women's work on the farm included scraping out old pond bottom sediments, pond preparation, weeding and hand picking. Thus, Mrs. Akila was a pioneer in generating local employment and income. She bought shrimp seed for 25–35 paise PL⁻¹. Six lakh (1 lakh = 100,000) seeds were stocked in her farm i.e. 100,000 ha⁻¹. For 6 ha, 3 tonnes of shrimp were harvested and, therefore, the total harvest year⁻¹ was 6 tonnes. The harvested shrimp were sold at Rs. 260 kg⁻¹ (30 counts) to seafood companies in the cities. She was also a role model for shrimp farmers by encouraging quality production to achieve good returns.

1.7. Ornamental fish farmer

Ornamental fish culture was being practised by 5 WSHGs of Irular tribal women in Kancheepuram District. Mrs. Latha was an ornamental fish farmer and also a leader of a WSHG. Traditionally, Mrs. Latha and her group members were engaged in catching snakes and rats but with urbanisation this was no longer viable and was also of low social status. She has worked hard to diversify livelihoods among her group members by making them understand that they need not depend solely on the income earned by their husbands. Each day she and her group members worked hard and had established an ornamental fish culture unit at Kancheepuram District. She and her group devoted most of their time to managing this unit. Six varieties of ornamental fish were being cultured. The fish were measured as "M" size, "S" size or "SM" (small medium, a size in-between medium and small) size. The breeding time for a crop was 15 days and 200 fish were stocked per tank. The price at which these fish were sold ranged from 70 ps. to Rs. 300/-. Fish traders from different places around Chennai come to purchase these fish. The WSHG had also received a bank loan of Rs. 200,000 from a self-employment scheme. This group was successful. They had good savings in a local commercial bank and the bank had also provided many loans to this group because of their prompt re-payments. They had also received two awards from the State Government for being a very successful WSHG.

2.0 Input Suppliers

2.1. Clam collector (Live feed processor)

Mrs. Kamatchi of Kancheepuram District, Tamil Nadu, was a clam (*Meritrix* spp) collector and a clam marketing agent. She supplied clams to five-star hotels and hatcheries in Kancheepuram, and as a feed for crabs and shrimps. Mrs. Kamatchi was a woman of great mettle for field work. She rode motor cycles and traveled 60 km day⁻¹ to supply clam meat to hotels and hatcheries. She gave employment to more than 100 women in the village through the clam meat enterprise. She was conscientious and prompt in her service of supplying clams to hotels and hatcheries. She played a vital role in community development and capacity building of rural coastal women. The steps involved in clam collection were, first, collection of clams; second, meat separation from clam shells; and, third, drying clam shells. The women only collected clams after they had received an order from a hatchery or hotel. The women's work started at 6 am and ended at 3 pm. The WSHG members helped Mrs. Kamatchi in collecting clams. The group members wore very light clothing and did not consume food when they went clam collecting in the brackish water canals or rivers. They changed their areas for collecting clams when they realised that the availability of clams was falling. After some time, they would return to the original area. By this means they helped in the growth of clams. Mrs. Kamatchi and her group members would search in rows in the brackish water canals or rivers, swimming, although only in shallow depths. They knew from experience where to find the clams. They ate when they returned to shore, and sometimes not even then because of nausea from swallowing brackishwater from the canal or river. When collecting clams, they were immersed in water or wet for more than 6-7 hr day⁻¹ because they tended to keep collecting until they had sufficient clams. They often hurt their feet and palms on sharp mussel shells in the water. Mrs. Kamatchi was a Jamsetji Tata National Virtual Academy (NVA) Fellowship awardee for 2007. She was awarded this fellowship by the MSSRF and CIBA, Chennai for her expertise in clam collection and processing. She was a role model to other women in clam collecting.

2.2. Fish meal processor

Mrs. Latha was educated to primary school level. She and her group lived in a fishing village in Tiruvallur District, Tamil Nadu. They were fish meal processors. She had expertise in fish meal production. Mrs. Latha and her group supplied fishmeal to ornamental fish growers at Kolathur, Redhills, Oothukottai and to fish traders in and around Chennai city. She was a leader of a WSHG of 18 women who produced fish meal. She displayed good leadership qualities, a dynamic personality, self confidence and perseverance and had good knowledge of fish feed preparation. She built the capacity of the rural women by providing employment opportunities in her feed meal production unit. Fish meal production involved trash fish drying, storing, powdering, sieving, drying and packaging. The fish meal was tested at CIBA and its quality certified. The fish meal was produced with the savings money of the group and the profit was shared among the group members. Mrs.Latha acted as a role model in the village. In 2007, Mrs. Latha was awarded a Jamsetji Tata

National Virtual Academy (NVA) Fellowship by the MSSRF and CIBA for her expertise in fish feed processing.

2.3. Aquaculture accessories business manager

Mrs. Sai was the Managing Director of an Aquatech Company in Chennai. She had a post-bachelor degree qualification. She was also working as a part time manager of another Aquatech Company in Chennai that supplied inputs such as feed and aquamedicines. Mrs. Sai had emerged as a successful woman in the field of aquaculture accessories business management. She had 10 years experience in this business. She was supported by her family and friends in managing this business. Mrs. Sai supplied products such as shrimp feeds, medicines, probiotics, chemicals and farm implements (net, aerators, tubes, air stones, air valves, filter cloth, bags, lead weight and tube rolls) for shrimp and crab farms and hatcheries in Tamil Nadu, Andhra Pradesh, Kerala and Karnataka in India. She started as a full time manager of a company that supplied aquaproducts. While keeping her position as a part time manager of a company, she was able to start a company of her own. She had been innovative in recognising a niche area for self employment in aquaculture.

3.0 Marketing and Export

3.1. Shrimp processors (Small-scale cottage industry)

Mrs. Sony was the leader of a WSHG in a fishing village in Chennai, Tamil Nadu. In this SHG, 25 coastal women members were engaged in processing white shrimps (*Fenneropenaeus indicus*). Mrs. Sony and her group members had 2-7 years of experience in this venture. White shrimps were used as an ingredient for making live feed for the brooders and shrimp seeds stocked in the hatcheries. Mrs Sony and her group members purchased white shrimps from the coastal areas of Tiruvallur District. The WSHG led by Mrs. Sony was involved in the following processing steps: collection of white shrimps from local villages, weighing shrimps, processing and ice packing. The ice packed shrimps were supplied to hatcheries. The raw white shrimps purchased for processing were first weighed and then divided into different quantities by Mrs. Sony. She then distributed the divided portions to the members in her WSHG for processing. One kg of shrimp were peeled either individually or as a group. The processed shrimps were then returned to Mrs. Sony. Each member was paid a wage for the shrimps she processed. Every day, 25-40 kg of white shrimp were processed and sent to market agents and hatcheries. Raw white shrimp were bought Rs. 80 kg⁻¹ and the processed shrimps were sold at Rs. 160 kg⁻¹. The processed white shrimp were supplied to hatcheries at Kancheepuram District. This venture was her traditional occupation. She also ensured that the members of the SHG found alternative occupations during the off-season to ensure that the group members remained faithful and loyal to her. In this way, Mrs Sony displayed leadership qualities by keeping her group happy both economically and socially.

3.2. Shrimp processing plant technicians

Mrs. Lakshimi and Mrs. Rani were pioneer technicians leading a group of women wage labourers at a marine products company in Mandapam, Tamil Nadu. They were educated to primary school level. They possessed 10-12 years of experience. This experience had helped them gain good knowledge in processing, packing, maintaining official records of the workers and market techniques. Their duty began with collecting raw fish stocks from the marketing department in the company, taking attendance records of the women wage earners, deciding the day's work for the workers and the distribution of raw materials for processing by the labourers. One hundred and fifty women wage earners who worked in this processing plant were supervised by the two women. They also allotted labour for each processing activity and decided the quantity to be processed. Although they had minimal formal education, their leadership qualities and good management techniques led to the growth of this company and helped the women workers. The wage earners became loyal and hard working. The operations in the processing plant included de-heading, peeling, removal of alimentary canal, back scraping, final checking and packing.

3.3. Crab exporter

Mrs. Selvi was a partner in a sea food export company at Chennai. She had 5-6 years experience in crab export. She was educated to primary school level. Despite having only primary education, she used her knowledge, intimacy with the staff in the company and with the other crab export traders to learn business techniques and to keep track of daily market rates through the Internet. She was innovative and self confident and her keen interest helped her to thrive in this business. She purchased both water and hardened crabs from Orissa, Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Maharashtra and Andaman. With the support of her husband, Mrs. Selvi had become knowledgeable in crab marketing. Her interest in this business gave her an opportunity to become a partner of the company. She was capable of managing company staff and could run the business even in the absence of her husband. Daily, her company exported 1-2 tonnes of 600 g crabs to different destinations. The company traded in crabs of 500–800 g size. Fattened crabs were sold to domestic markets in Mumbai and New Delhi and to international markets such as Singapore, Taiwan and Bangkok.

Discussion

Women involved in production were mainly working in hatcheries or on farms or growing short term crops, e.g., crab fattening, that involved less capital. The exceptions were: (i) the shrimp farmer whose education level and work on an activity started by her husband had helped her to succeed in a field dominated by men; and (ii) the crab farmer (crab farming in ponds). From the small data set of these case studies, education and family businesses appeared to give women an added advantage. The successful women needed strong entrepreneurship and support from their families to succeed in the complex processes involved in the longer production cycle businesses.

The first input supplier case study showed how traditional clam collecting had changed into a promising livelihood supplying hatcheries to meet a niche requirement. The second case study involved more complex fish food processing and showed it could be managed by women themselves. The institutional structure of WSHGs and the technical support provided by a research institute had helped women succeed. In the third case study, as for some of the production examples, educational background and family support played roles. Among the three case studies of women involved in marketing and export, the first one involved processing. Again, the presence of the institutional structure of the WSHG had helped in translating what is normally a large scale business activity into small scale cottage industry operations, even though the education level of the women was low. As observed in the production sector, the women employed as workers in shrimp processing plants were educated only up to primary level. In the third case, the business was started by the woman's husband and though she did not have a high education level she managed the export company with the encouragement of her husband, including during his absence seeking more business.

Conclusion

Analysis of the case studies demonstrated that women can take part in different parts of the aquaculture value chain, especially if it involves a traditional activity they have been carrying out. The presence of organisational structures such as WSGHs helped to galvanise women to take up more complex activities. Women with low formal education levels also played a role as workers. However, women with higher education or with family business connections exhibited high entrepreneurship skills, usually with family support, and could manage complex aquaculture activities. Thus, depending on the circumstances of the women, their families and the industry segment, women can work successfully in many levels of aquaculture. The challenge is to create more opportunities by constructing an environment conducive to their participation and benefit.

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