



Aquaculture Based Interventions for Livelihood and Empowerment of Women in Konkan Region of Maharashtra

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

A study was carried out to assess the possibility of carp culture in village ponds for livelihood and empowerment of women fish farmers and women SHG's. Awareness programmes followed by training programmes on carp culture in open water bodies were conducted. A village pond of 1.5 ha area of Posheri, Palghar District and 0.8 ha area of Malgund, Ratnagiri District of Maharashtra state were selected for demonstration. The fertilisers were applied in Posheri pond to boost plankton production. A total of 10000 carp fingerlings (40-60 mm) were stocked and were fed commercial floating feed. The catla grown to a size of 1.0 to 1.2 kg whereas weight of rohu and mrigal ranged between 0.5 and 0.7 kg at the time of harvest. A fish yield of 1200 kg was obtained with a productivity of 800 kg/ha. The fishes were sold at the rate of Rs. 200/- per kg and a revenue of Rs. 2,40,000/- was realised. In Malgund pond, 2000 carp fingerlings were stocked in September, 2019. Carps were fed commercial feed and grown for a period of eight months. At the time harvest, catla reached a size of 1.2 to 1.5 kg and rohu weighed from 0.3 to 0.5 kg. A total yield of 250 kg was sold at average price of Rs. 120/- per kg in fish market of Ratnagiri and revenue of Rs. 30,000/- was generated. Thus, carp culture activity demonstrated at both places indicated a possibility for augmenting socio-economic status of women through provision of livelihoods.

Keywords: Demonstration; carp culture; Village ponds; women; livelihood; empowerment.

1. INTRODUCTION

Aquaculture is one of the fastest growing animal food production sectors which showed a growth rate of 4.69% in production of aquatic animals during the year 2010 to 2018 [1]. Apart from provision of nutrient rich and cheaper food in terms of fish, aquaculture plays significant role in employment generation and provision of livelihood to many people. India stood second in aquatic animal production through aquaculture [1]. Aquaculture is promoted as an economic activity for poor farmers by acting as a source of income to secure livelihoods for rural people in low- and middle-income countries [2-6]. Indian aquaculture production is dominated with carps and they are cultivated in aquaculture ponds, village ponds, lakes and reservoirs employing varied culture practices. India has freshwater sources of 4.03 million ha [7] in term of reservoirs, tanks and ponds for undertaking open water aquaculture. At national level, the fish productivity from such open water bodies is less than 20 kg/ha. The fish production from these open water bodies can be augmented by stocking large sized fingerlings at appropriate density. Wherever possible, in some of the small and manageable open water bodies like village ponds and tanks, the fish production can further be enhanced by application of fertilisers, manures and provision of formulated fish feed. Women are present in all phases of fish production, processing and distribution, and contribute to the generation of wealth, the preservation of aquatic ecosystems, and the maintenance of households and communities in rural and coastal regions [8]. They make up half the workforce and play a prominent role in fisheries and aquaculture economies around the world [9-11]. Therefore, in the present study attempt has been made to cultivate of carps in village ponds of Palghar and Ratnagiri Districts of Maharashtra involving women Self Help Groups (SHGs) to improve production through aquaculture interventions like stocking of large sized carp fingerlings, provision of formulated feed and regular harvesting. The objective of the study was to improve fish production and empower women through provision of livelihood.

2. MATERIALS AND METHODS

Initially, the survey and visits were undertaken at various places in Ratnagiri and Palghar districts to identify community ponds and women Self

Help Groups (SHGs). In Ratnagiri district, survey and visits were undertaken at Oni, Rajapur, Malgund, Rajwadi (Sangmeshwar) whereas the places like Wada, Safale, Posheri, Boisar were covered in Palghar district. Participatory rural appraisal was conducted by holding focused group discussions and visits to village leaders and stakeholders. Preliminary discussions were held with women self-help group members in Ratnagiri and Palghar districts. Awareness programmes with regard to carp culture in open water bodies were conducted for women of villages Posheri (on 22/02/2019) and Malgund (on 23/09/2019) of Palghar and Ratnagiri districts, respectively.

2.1 Posheri Community Pond

A community pond (19°41'08" N 73°03'53" E) of around 1.5 ha in village Posheri was selected for carp culture. Thirty members from three SHGs namely *Gulab Mahila Swayam Sahayata Bachat Gat*, *Mogra Mahila Swayam Sahayata Bachat Gat* and *Aboli Gulab Mahila Swayam Sahayata Bachat Mahila Swayam Sahayata Bachat Gat* of village Posheri were given training (on 14/05/2019) by Faculty members of College of Fisheries (Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli), Ratnagiri on the aspects of carp culture. During this training programme, fundamental information and practices followed with respect to pre-stocking management, stocking of carp seed, feed and feeding management, fertilisation, and harvesting and marketing were dealt. The groups were motivated to undertake carp culture activity.

The natural food of fishes was developed by applying organic and inorganic fertilisers before stocking. In the month of August, 2019, a total of 6000 fingerlings (40-60 mm) of Catla (*Gibelion catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*) were stocked after proper acclimatisation for temperature and pH. In the month of October, 2019, additional 4000 carp fingerlings were stocked to compensate loss of seed because of flooding and overflow of tank. The SHG members were given a feeding chart as guideline. The practice of feed broadcasting was demonstrated to members. The feed ration was adjusted based on average fish weight estimated through monthly sampling. The feed was offered thrice a day in first two months and

then onwards a feeding frequency was reduced to twice a day. Fish health was regularly checked. Partial harvesting using drag net and marketing of harvested fish was initiated in tenth month of culture.

2.2 Malgund Pond

A village pond (17°09'49" N 73°16'36" E) of about 0.8 ha in village Malgund was selected for carp culture. This pond is developed by Grampanchayat to recharge adjacent wells constructed for supply of water for drinking and industrial purpose. Considering its use for drinking purpose, it was decided to employ low-input system for carp culture. A group 12 women from *Jaiambye Mahila Swayam Sahayata Bachat Gat* (Women SHG) has been motivated and trained to undertake carp culture. The fertilisers were not applied in pond. A total of 2000 catla and rohu fingerlings procured from Fisheries Research Station, Muldhe, Sindhurdurg were stocked in the month of September, 2019.

Fishes were fed commercial pelleted feed and a mixture of rice bran and ground nut oil cake in the ratio of 1:1 regularly for two to three times in a day. The growth was measured in terms of fish length, weight and health check-ups were conducted regularly. Fishes were harvested at the end of May, 2020. The harvested fishes were packed in ice and transported to sell at Mirkarwada, Ratnagiri harbour market located at 25 km from site of production.

3. RESULTS AND DISCUSSION

3.1 Posheri Community Pond

In tenth month of culture, catla reached a size of 1.0 to 1.2 kg whereas rohu and mrigal attained a size in the range of 0.5 to 0.7 kg. A total of 1200 kg of floating feed was used which has given feed conversion ratio of 1.0. Then onwards partial harvesting of fish was initiated and a total yield of 1200 kg was recorded. The fish production has been improved from earlier yield of around 600 kg from this water body. This increment of 200% can be attributed to composite culture of catla and rohu, supplementary feeding with commercial floating feed and adoption of partial harvesting. Similar increment in fish production through aquaculture intervention has also been reported [12-14]. As per the guidelines issued by National Fisheries Development Board (NFDB), Hyderabad, it is expected to elevate fish production to a level of 500 kg/ha from small reservoirs through sustained supplementary stocking of quality seeds. In this demonstration pond, a fish productivity of 800 kg/ha was recorded which is higher than expected fish production of 500 kg/ha of small reservoirs. The demand for carp fish was very high in Palghar district that helped the women groups to sell their fishes at the site of ponds itself at the rate of Rs. 200/- per kg. The price realised for carps from this unit was relatively higher than an average retail price of Rs. 176/- per for both catla and rohu in Maharashtra [15]. The capital cost and variable cost along with income and profit earned by SHGs are detailed below:

Capital cost:

Sr. No.	Particulars	Unit	Quantity	Rate (Rs. per unit)	Amount (Rs.)
1	Land				Rented
2	Motor pump, 5 HP	number	1	20000.00	20000.00
3	Shed				20000.00
	Total				40000.00

Variable cost:

Sr. No.	Particulars	Unit	Quantity	Rate (Rs. per unit)	Amount (Rs.)
1	Rent / Lease	-	1	7000.00	7000.00
2	Lime	kg	500	4.00	2000.00
3	Fertilizer	kg	100	30.00	3000.00
4	Cost of feed	kg	1350	45.00	60750.00
5	Cost of seed	number	10000	1.00	10000.00

6	Probiotics	kg	10	2000.00	2000.00
7	Transportation charges towards procurement of feed and seed				1500.00
8	Miscellaneous				5000.00
	Total				91250.00

Total expenditure	= variable cost + capital cost
	= 91,250.00 + 40,000.00
	= Rs. 1,31,250.00
Total income	= 1200 kg @ Rs. 200/kg
	= Rs. 2,40,000.00
Profit	= total income – total expenditure
	= 2,40,000.00 – 1,31,250.00
	= Rs. 1,08,750.00

3.2 Malgund Pond

Catla of 1.2-1.5 kg and rohu of 0.3-0.5 kg were harvested. The feed conversion ratio (FCR) of 0.5 was maintained. A total of 250 kg of fish were harvested with a production rate of 312.5 kg/ha. In comparison with the carp production 843.75 kg per Ha in Jaipur village [16], a lower productivity has been recorded in this study owing to less stocking density, no use of fertilisers and very minimal feeding. The production realised was less than that expected as a result of presence of predatory fish Indo-Pacific tarpon, *Megalopsis cyprinoides* in pond. Such predatory brackishwater fishes could have got entry in this pond when it was connected to Arabian sea through stream because of flooding and overflowing conditions during heavy rains. As this pond was located close to drinking water wells, care was taken to keep good water quality by adopting farming strategy of 'no use of fertilisers' and 'minimal feeding levels'. This strategy may be one of the reasons for achieving less growth of rohu. The price realised for harvested fish in market was relatively less than average price realised for carps in Maharashtra (NFDB, 2021). This less price fetched for carps may be due to less consumer preference for freshwater fishes in general in coastal area. The income of Rs. 30,000/- generated through sale of fish from the demonstration unit was given to the concerned SHG. The details of expenditure and income are given below. No capital cost was incurred.

Variable cost:

Sr No	Particulars	Unit	Quantity	Rate (Rs)	Amount
1	Rent / lease	-	1	4000.00	4000.00
2	Cost of feed	kg	125	50.00	6250.00
3	Cost of seed	numbers	2000	2.00	4000.00
4	Transportation charges towards procurement of feed and seed				1000.00
5	Miscellaneous (Harvesting charges)				2000.00
	Total				17250.00

Total expenditure	= variable cost + capital cost
	= 17250 + 0
	= Rs. 17,250.00
Total income	= 250 kg @ Rs. 120/kg
	= Rs. 30,000.00
Profit or loss	= total income – total expenditure
	= 30000 - 17250
	= Rs. 12,750.00

4. CONCLUSION

The carp culture demonstrated in Palghar district showed that fish production from village ponds of the district could be enhanced through adoption of proper seed stocking, fertilisation and supplementary feeding. Establishment of a carp fingerling production unit to supply quality seed at required time and quantity would facilitate and accelerate farming in this region. Fish survival and thereby production from Malgund pond could be improved by elevating bund at a region where it get connected to stream and provision of protected overflow pipes would prevent access of undesired fish species. Carp culture activity demonstrated at both places indicated a possibility for augmenting socio-economic status of women through provision of livelihoods.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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