Community development of fisherfolk at Nagnathwada, Karwar through open water cage culture: A success story

P. P. Suresh Babu*[1], Jayasree Loka[2], A. Anuraj[1], Praveen Narayan Dube[1], N. G. Vaidya[1], Boby Ignatius[3] and Imelda Joseph[3].

[1] Karwar Regional Station of ICAR-Central Marine Fisheries Research Institute, Karwar, Uttara Kannada-581 301, Karnataka
[2] Visakhapatnam Regional Centre of ICAR-Central Marine Fisheries Research Institute, Visakhapatnam -530 003, Andhra Pradesh
[3] ICAR-Central Marine Fisheries Research Institute, Kochi-682 018, Kerala

*E-mail: sbabu78@yahoo.com

Abstract

Fisherfolk from Nagnathwada, Karwar were trained to take up open water cage culture in Kali estuary. Karnataka. Demonstration of Asian seabass farming in fixed cage and box type floating cage were carried out initially for technology dissemination. After attaining confidence, open water cage culture was taken up in commercial scale by the fisherfolk with the technical support from ICAR-CMFRI and financial assistance from National Fisheries Development Board, Hyderabad. Fisherfolk benefited from the cage farming and are continuing the activities for better livelihood. Issues such as fish seed and feed availability for farming and dealing with natural calamities need to be addressed for sustaining the farming practices.

Keywords: *Asian Seabass, Fixed cage, Box cage, Karwar.*

Introduction

Open water cage culture is an emerging aquaculture activity in maritime states of India that helps in the economic and social upliftment of coastal communities. ICAR-CMFRI has actively involved in the expansion of open water cage farming of several marine finfishes in different part of the country through various developmental schemes. Karwar regional station of ICAR-CMFRI successfully implemented the open water cage culture of finfishes in the coastal fishing village at Nagnathwada, Karwar of Uttara Kannada district. The village is well connected with Karwar Town by road with easy access to fish markets in Karwar and Goa. The village has around 108 fisherman families who are mainly depending on fishing in the Kali river and nearby estuarine areas for their livelihood. Fishermen are involved in inland fishing activities using different fishing gears such as cast nets, angling and gill netting. Most of the fisherwomen are involved in collection of oyster and other live molluscs and selling it in local markets for their daily monetary needs. Many of the fisherwomen are also involved in fish vending and fish cutting activities in and around Karwar. Most of the fisherfolk are also members of various local fisherman co-operative societies.

Phase I: Training the fisherfolk

During the financial year 2018-19, three training programmes were conducted at Karwar Regional Station of ICAR-CMFRI with fifty participants in each batch nominated by the Department of Fisheries, Govt of Karnataka. Hands-on training on various aspects of marine and coastal water cages with various topics such as site and species selection for marine and coastal cage culture, materials used for cage culture, cage designing and fabrication, mooring and deployment of cages, cage culture management, net exchange and feeding protocols, nursery rearing of fish seed, fish diseases and environment monitoring in cages, harvesting and marketing of farmed fish was imparted. Practical knowledge on marine cage

farm management by arranging field visits to the marine farm at Karwar was given to trainees with the hands on experience so that they can directly initiate cage culture activities at suitable sites near to them. Class room lectures and practical demonstrations were handled by various resource persons including scientists and technical staff of ICAR-CMFRI and experts from Department of Fisheries, Government of Karnataka. Of the 70 people (30 men and 40 women) who participated in the training programme, majority expressed their willingness to initiate coastal water cage farming in Kali estuary. Since they were residing on the banks of the river, accessibility to the site, ease of management and watch and ward, availability of cheap feed resources such as the by-catch and low value fishes from their daily fishing activities were favorable. The participants also ensured that they will form Self-Help Groups with 5 to 10 members and will voluntarily involve in all the activities starting from the site selection, cage installation and watch and ward for the cages.

Phase II: Open water cage culture demonstration

A team of scientists and technical staff visited the sites for demonstrations and assessed various parameters required for a good coastal water cage culture demonstration site. Two sites were identified based on the site survey and the willingness of fishermen to participate in the demonstration programme; one at Nagnathwada and the other at Small Masjid. At Nagnathwada, cages of 6 4 $\times$ 2 m made with galvanized iron frames were tied to casuarina poles erected on the estuarine bottom. The nets were placed about 0.5 m above from the estuarine bottom. The 4 m depth nylone net webbing was tied to the frame in such a way that at lowest low tide 1 m water will be retained in the cages and almost 1 m of the net will be always exposed above the water level in order to prevent the escapement of the fishes. Since the quantity of fouling was less, the net exchange was done rarely. The cages were stocked with 700 numbers of nursery reared Asian seabass fingerlings of 40 g size. The fishes were reared from February to July and they reached an average marketable size of 575 g in 133 days. The low value fishes collected by the fishermen as by-catch during their fishing cruises were chopped and fed to the farmed fishes at 5 to 7 % of their body weight daily in two rations (morning and evening). The fishes were stocked in the cages, such a way that the harvested fishes can fetch a better market price during the fishing ban period. A total production of 203 kg was obtained from the cage with a survival of 67 % and an FCR of approximately 1: 3.1 and the average weight of the fishes (575 g) was ideal for marketing. The harvested fishes were packed in crates with ice and transported to Goa fish market. A successful harvest could be taken from the demonstration yielding profit to the farmers.

At Small Masjid, a fishermen group led by Mr. Shyam Kumtekar achieved the successful farming of Asian seabass in box type cages. A cage of 2.5 m x 2.5 m x 2 m fabricated by the farmer using Galvanised iron pipes, Netlon net and nylon nettings was attached with floats and anchored to the bottom with anchors of 45 kg. The total volume of the cage was only 12.5 m^3. The cage was provided with a small door at the top for feeding and could be locked for security. The cage was stocked

Fig. 1. Seed stocking in the low cost fixed cages.

Fig. 2. Harvest obtained from the low cost fixed cage.

with nursery reared Asian seabass fingerlings of 40 g size at 32 numbers / m ^{3} supplied by ICAR-CMFRI for demonstration purpose (Fig.3). The fishes were reared from February to July and they reached an average marketable size of 575 g in 133 days. The fishes were fed with low value fishes collected by the fishermen as by-catch during their fishing cruises. The chopped fishes were given to the farmed fishes at 5 to 7 % of their body

Fig. 3. Seed stocking in box type floating cages.

weight daily in two rations (morning and evening). Partial harvesting of the cage was done twice depending on the market demand. The total production was 244 kg with 84 % survival rate which can be considered as a record production from a low volume cage for a carnivorous fish such as Asian seabass within a short duration of 133 days. The farming demonstrations turned into a huge success with good profit to the farmers and motivated them to expand the farming activities and undertake coastal water cage farming of Asian seabass at Nagnathwada.

Phase III. Popularisation of open cage farming through extension aids

On the occasion of the fish farmers day a Harvest Mela was organized at Naganathwada, and fishermen involved in the cage culture activity were felicitated during the function. Mr. Sudhir Sarang, fishermen group leader said that earlier they were only familiar with catching fish from the wild and acknowledged ICAR-CMFRI's efforts for bringing them towards fish farming. He also said that they are now confident enough to farm the fishes in cages and earn money for securing the future of their children. The Station has given wide publicity for the successful implementation of coastal water cage culture in Nagnathwada village through various local daily news papers covering all the relevant aspects of the farming (Fig.4).


ಜೆಲ್ಲೆಯ ಆಳವೆಯಲ್ಲಿ ಮಾಡಿದ ಮೊದಲ ಪ್ರಯೋಗದಲ್ಲೇ ಯಶಸ್ಸು: ವಿಜ್ಞಾನಿಗಳ ಸಂತಸ

ಪಂಜರದಲ್ಲಿ 2.5 ಕ್ವಿಂಟಲ್ ಮೀನು ಫಸಲು!

ಮುಖ್ಯಾಂಶಗಳು

- ಪ್ರತಿ ಚದರ ಮೀಟರ್‌ಗೆ 32 ಮರಿಗಳ ಸಾಕಣೆ
- ಜೆಲ್ಲೆಯಲ್ಲಿ 2009ರಲ್ಲಿ ಮೊದಲ ಪ್ರಯತ್ನವಿದೆ
- ₹ 15 ಸಾವಿರದಿಂದ ₹ 20 ಸಾವಿರ ಬಂಡವಾಳ ಅಗತ್ಯ

ಎಲ್ಲೆಲ್ಲಿ ಬೆಳೆಯಬಹುದು?

Fig. 4. Publicity in local newspapers for wider dissemination among stakeholders

Phase IV: Expansion of coastal water cage farming under NFDB subsidy scheme for open water cage culture

Trained fisher folk received subsidy for carrying out cage farming in Kali river estuary area from the National Fisheries Development Board, Hyderabad through the ICAR-CMFRI. The beneficiaries for the scheme was identified by the Department of Fisheries, Karnataka. The project was implemented as direct benefit transfer (DBT) to the farmers. A total of 18 fisher women who were otherwise involved in other fisheries related activities such as fish selling, oyster and clam collection were benefitted by the scheme.

For the project the farmers constructed square cages of 4m X 4m x 3m with galvanized iron frames supported with floats and anchors. The cages were deployed in identified sites at Kali estuary. The nets were placed about 0.5 m above from the estuarine bottom. The 4 m depth nylon net cage was

hung from the frame in such a way that at lowest low tide 1 m water will be retained near the cages and almost 1 m of the net will be always exposed above the water level in order to prevent the escapement of the fishes. The cages were stocked with Asian seabass fingerlings of 30 to 60 g size transported in syntax tanks from private firms at 30 numbers /m^3. The fishes were fed with low value fish procured from local market and were reared from November to July. The fishes were fed with chopped fishes at 6 % of their body weight daily in two rations (morning and evening). Water temperature and salinity near the cage site varied between 28-32^{0}C and 15-30 ppt respectively.

Even though, uniform stocking density was adopted for the farming, variation in the size and quality of the stocking material received effected the farming of Asian seabass. The production was also influenced by the perception and the proper adoption of the farming practices by the individual farmers. The farming practises varied among the farmers considerably and they have reached an average marketable size of 700 g to 1.2 kg in 6 to 8 months. A total of around 3 tonnes of fish production recorded from this village with a total revenue of Approximately Rupees 12 Lakhs. in one crop.

Technical assistance from the fabrication of cage till harvesting of the cages was provided by ICAR-CMFRI. At the end of the farming the fisherfolk opined that open cage culture activity is a success venture and they want to continue the same with the help of Department of Fisheries, Karnataka. According to the beneficiaries, the financial assistance for carrying out the cage culture was a great help for initiating a new venture for additional income other than fishing this will pave a new way for the social upliftment of their community and will help even the upcoming generation to have more livelihood options. Selected farmers from the group were felicitated at the centre during the National Fish Farmers day celebration.

Phase V: Present status of open water cage culture activities at Nagnathwada

After the completion of the subsidy scheme also many of the farmers have taken up the farming of Asian seabass in their cages with the financial aid for seed stocking from the Department of Fisheries, Govt. of Karnataka. Most of the farmers are interested to continue fish farming as a major stake for their livelihood. More over the farmers are interested to diversify farming by stocking various candidate species for open water cage culture such as red snapper, silver pompano and pearl spot since these fishes fetches good market price in this region.

A follow up survey was conducted among the NFDB beneficiaries of Open water cage culture of the village in December 2020. Majority of the beneficiaries were involving in inland fishing using various fishing gears

Fig. 5. Cage culture of Asian seabass: Inauguration to harvest

such as gill nets, cast nets and angling. Fisherwomen were involved in oyster collection and some of them were regular fish venders in the local market. They have informed that the daily earning for each family varies from these activities is only ₹ 200 to ₹ 500 which also varies seasonally. Family size of the participated beneficiaries range from 3 to 6.Majority of the beneficiaries have restocked the cages with Asian sea bass with varying stocking rates (700 to 2500 numbers per cage) with the financial assistance received from Department of Fisheries, Govt of Karnataka through blue revolution scheme during 2019–2020. The beneficiaries informed that the subsidy amount was limited up to ₹50000 per cage for seed stocking. Majority of the farmers have gone for partial harvesting of the fishes after attaining 700 g to 1 kg size. Most of the farmers informed that the farming practice is profitable and are willing to continue the farming in future years. But few of the farmers are still expecting financial assistance from Government to continue the farming. The major issues reported by the beneficiaries doing farming in Kali estuarine area are unexpected release of freshwater from the Khadri Dam in the upper stretches of Kali river, drifting of cages in monsoon season, net damage due to drift wood and otters, fluctuating feed availability and the marketing issues related to the present COVID 19 pandemic situation.

Prospects and Challenges

Market demand for fresh fishes at Uttara Kannada and Goa region is an added advantage for expanding the cage farming activities. Routine and daily availability of low value fish bye-catch for the fisherfolk will help to meet the much needed fish feed resources for the farming activities. Farmers can adopt Capture based Aquaculture (CBA) practices by stocking the live fishes caught in their gear. Availability of seed and fluctuating seed price are major bottleneck for the expansion of open water cage culture. By setting up commercial hatchery and nursery rearing facilities in public private partnership may be a viable solution to mitigate this issue. Exploitation of the farmers by middlemen involved in fish seed supply also need to be checked. Continuous supply of feed and storage of feed are major issues since presently majority of the farmers use low value fish as feed for cage farming. Development of commercial pellet feed in adequate quantity is the only sustainable solution for solving this problem. Carrying capacity studies to find out the potentials for expanding the farming activities need to be carried out to make the open water cage farming a sustainable practice. Environmental impact assessment studies also need to be taken up along way. Issue related to farming registration/ licence for farming and leasing policy for long term farming practices need to be legalised. Policies for utilising the open water resources need to be looked into before expanding the farming practices. Strong market supply chain and minimum support price need to be developed for making the open water cage farming a lucrative venture. Systems for intimating the environmental calamities and adverse climatic disasters well in advance need to be developed to avoid total loss for the farmers. Policies for crop insurance and other benefits for the farmers are required to safe guard the produce of the open water cage farmers.