

# AQUACULTURE ASIA

## Soft-shell mud crab production

Integrated mangrove-aquaculture systems

## Hilsa seed production

Highland recreational fisheries



# Sustainable livelihood model for coastal families through seabass fingerling production: A success story

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The fisheries sector is often referred to as a sunrise sector, due to its recent resurgence, and assumes significance in the Indian economy in several aspects<sup>1</sup>. This sector contributes to the livelihood of a large section of the economically underprivileged population of the country. Fisheries are an important source of food, nutrition, employment, and income in India. The sector provides livelihoods to about 16 million fishers and fish farmers at the primary level and almost twice that number along the value chain. Fish, being an affordable and rich source of animal protein, is one of the healthiest options to mitigate hunger and malnutrition. The sector has immense potential to more than double fisher and fish farmer incomes, as envisioned by the government (National Fisheries Policy 2020).

At present, the aquaculture sector contributes around 50 per cent of all seafood produced for human consumption, and this will continue to increase in the coming years. Although aquaculture is practised in all kinds of water resources, future aquaculture development is expected to be more prospective in brackishwater. This is because there are fewer competing uses for brackishwater, since it is seldom used for drinking water, crops or animal husbandry. In India, excluding the 1.2 million hectares of coastal land area identified as suitable for pond-based brackishwater farming, about 3.9 million ha of open brackishwater comprising estuaries, creeks, backwaters, and lagoons remain under-utilised for fish production (CIBA: <http://www.ciba.res.in/>). Successful utilisation of these water bodies for fish production through a participatory approach by coastal fishers can not only provide employment, but also help to meet food demand.

## Need for intervention

Kilarkollai Village in Chengalpattu District of Tamil Nadu is bestowed with open brackishwater sources around the village periphery which are under-utilised. The villagers believed that this resource could not be used for agriculture, washing, cooking, or other purposes. In line with the Union Government's mission of doubling fish production, the ICAR-CIBA team under the Scheduled Caste Sub Plan Scheme/Programme (SCSP) of the Government of India suggested to take up seabass fingerling production to provide livelihoods for the villagers. In this backdrop, the ICAR-CIBA team identified Kilarkollai Village and made a road map to improve the livelihoods of local people through brackishwater aquaculture technologies. To start with, the suitability of the site was assessed for its soil and water quality, and with regard to its potential for Asian seabass (*Lates calcarifer*) fingerling production.

An awareness programme was organised, which aimed at showcasing technology-based aquaculture development, backed by the Institute's technical expertise. Two group discussions were also held with farmers about the aquaculture scenario, their livelihood status, their expectations, and



Grading Asian seabass fingerlings.

the objectives of CIBA's technological interventions. The ICAR-CIBA team also provided knowledge empowerment to coastal villagers through capacity building programmes on brackishwater aquaculture, so as to adopt the latest technologies for the benefit of the individuals as well as the village as a whole.

Among the total population, around 168 (77%) families belong to scheduled castes and have dwelt in the village for the past 50 years. Out of them, 80.33% are landless poor and are economically and socially marginalised with a standard of living below the poverty line. A total of 61 coastal families attended the awareness programme, and four scheduled caste families enthusiastically came forward to adopt ICAR-CIBA technologies under the SCSP. A team of scientists along with the villagers identified a suitable location for demonstration of seabass nursery rearing in hapas. As mentioned earlier, this study aimed identify and document needs-based and sustainable livelihood interventions for coastal villagers. In this context, natural resource availability, the perceived needs of the respondents, skill development and training, scope of marketing, and sustainability issues were also addressed.

## Socio-economic profile of the coastal fish farmers

The results of the study showed that 75 % respondents belonged to the middle age group (46–50) followed by 25% older age. All of them underwent primary level education (II Std-V Std). All were married and living in large families with more than five members. They had access to public services including a ration card, voter ID and a primary health centre. Respondents generated their income by working as labourers in paddy and groundnut fields. All were dependent on agriculture and engaged in other activities such as masonry and coconut harvesting for income. They do not own fishponds nor have experience in fisheries/aquaculture related activities. They have not undergone any training nor were they aware of fish culture activities till ICAR-CIBA came to their village. After the 2004 tsunami, an NGO had provided inputs and assisted them to take up crab fattening as a livelihood. After two cycles, this activity was not continued due to the discontinuance of the support of the NGO. Other than these, none of the activities related to the fisheries sector was taken up. They borrowed from money lenders as well as informal sources. None had access to banks for loans or savings. The lack of savings and the need for the sustenance of livelihoods often led to indebtedness.

*Cleaning the hapa.*

## Livelihood for coastal families through seabass fingerling production

The ICAR-CIBA team found that the open brackishwater bodies were suitable for nursery rearing of seabass. The team, in consultation with the village leaders and beneficiaries, proposed to demonstrate seabass nursery rearing in hapas. Four families were trained on the nursery rearing of Asian Seabass. The training covered all aspects of nursery rearing including seed selection, seed stocking, feeding, grading, regular water quality management and harvesting. The bar mouth at the village was open for most of the year with good continuous water exchange, maintaining water quality suitable for nursery rearing. A nursery rearing unit composed of ten hapas (2x1x1m) was installed in a 120 m<sup>2</sup> backwater area, fenced with fenced HDPE-coated GI mesh. Hatchery-produced seabass fry in the size range of 1.2-1.8 cm were stocked @500/hapa. The fry was fed with formulated feed (Seabass Nursery Plus) developed by CIBA. The seed was graded to maintain uniform size in order to avoid cannibalism and differential growth. The nursery rearing period to grow from fry to fingerling size was 57-73 days. The total number of cultures taken were six, and out of 5,000 fry stocked for each culture, the survival of the fingerlings ranged



from 1,790 (36%) to 2,691 (54%). The size of the fingerlings was 3 cm to 17 cm. Nursery rearing is the first and critical stage in seabass culture since the stocking sized seed is produced during this phase. Four cycles of seabass nursery rearing can be taken up in a year if fry and seed are available on continuous basis.

An interesting thing to note here was that on an average one person spent one hour in the morning and one hour in the evening feeding the fry twice a day and monitoring. At the same time, they could very well attend their regular routine jobs which generated income for them earlier (labour in agricultural fields and coconut picking), and seabass nursery rearing was carried out without any difficulty. Hence nursery rearing can be taken up as an ancillary activity. The net income per cycle among the different families varied between Rs 28,000 and Rs 51,000 and each family made an income of Rs 7,000 to Rs 12,750 for two months effort. The cost of fingerlings is based on the size of the fishes. This model proved to be an ideal one to supplement livelihoods of villagers using natural brackishwater sources. All the input costs, i.e., cost of hapas, casuarina poles, seabass fish fry, feed, and labour charges were borne by ICAR-CIBA under the SCSP fund.

## Way forward: How to make the livelihood model sustainable?

This successful model included critical points such as awareness meetings, training, delivery of required inputs, monitoring, and marketing. It could be replicated in other places through Government of India schemes such as Pradhan Mantri Matsya Sampadan Yojana. With this experience, the State Department of Fisheries, Government of Tamil Nadu, can initiate specific schemes for these farmers and scale up the aquaculture activities in the village by including educated unemployed youth. This would immensely help this economically weaker section who is facing many challenges arising out of increasing expenditure on account of maintaining their living standards. Coastal villagers are still engulfed in a vicious cycle of poverty due to increased debt and lack of savings, which again affects their quality of life, and the nursery rearing of seabass model demonstrated in Kilarkollai Village is an ideal alternate livelihood option. Further due to the seasonality of fishing operations and higher gestation period in the culture sector, the activity has further diversified the incomes of coastal villagers, which also include fisheries, agriculture, labour, and other activities.

## Conclusion

Under the SCSP programme, ICAR-CIBA has played a proactive role in empowering coastal villagers and improving their socio-economic development. This technology encouraged them to engage in partnership farming with the financial and technical support of ICAR-CIBA and helped them to express their individuality, increasing self-confidence among members. Their technical knowledge in seabass nursery rearing has improved and their skill has been sharpened. This was one of the first of its kind activity in Chengalpattu District, which motivated them to participate in seabass nursery rearing in hapas to generate supplementary income. ICAR-CIBA's technology transfer mode has emerged as a

successful participatory model for providing alternate/supplemental income, and group activity through work-sharing employment which can be taken up throughout the year as a livelihood. There is ample scope for the state government to undertake policy measures through specific schemes in brackishwater aquaculture.

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