Mariculture: An Overview

Dr. A. Gopalakrishnan
Director
Central marine fisheries Research Institute
Post Box No. 1603, Cochin- 682 018
Kerala, India

Capture fisheries and aquaculture supplied the world with about 148 million tonnes of fish in 2010 (with a total value of US$217.5 billion). With sustained growth in fish production and improved distribution channels, world fish food supply has grown dramatically in the last five decades, with an average growth rate of 3.2% per year in the period 1961–2009, outpacing the increase of 1.7% per year in the world's population. World per capita food fish supply increased from an average of 9.9 kg (live weight equivalent) in the 1960s to 18.4 kg in 2009, and preliminary estimates for 2010 point to a further increase in fish consumption to 18.6 kg. China has been responsible for most of the increase in world per capita fish consumption, owing to the substantial increase in its fish production, particularly from aquaculture (FAO, 2012).

It is well recognised that many of our exploited marine fishery resources have already reached the maximum sustainable levels and hence, increasing the fishing pressure to augment the marine fishery resources may not be a viable proposition. In this context, for meeting our future additional demand for seafood, it is inevitable to venture into mariculture practises. The development and standardisation of commercially viable mariculture activities is the major prerequisite. Mariculture involves the cultivation of marine organisms in seawater for food and other products either in the open ocean, an enclosed section of the ocean, or in tanks, ponds or raceways. Examples for mariculture include, the farming of marine finfish, shellfish e.g. prawns, lobsters or oysters, mussels and seaweeds. Non-edible products produced by mariculture include: fishmeal, nutrient agar, jewellery (e.g. cultured pearls), and cosmetics.

About 600 aquatic species are cultured all over the world in a variety of farming systems and facilities of varying input intensities and technological sophistication, using freshwater, brackishwater and marine water. Aquaculture activities other than for human consumption include live bait farming for fishing; live ornamental animal and plant species and ornamental products (pearls and shells); fishes cultured as feed for certain carnivorous farmed species; culture of live feed organisms such as plankton, Artemia and marine worms for use as feed in hatcheries and grow-out systems; aquaculture hatchery and nursery outputs for on-growing in captivity or stocking to the wild; and capture based aquaculture. Asia accounted for 89% of world aquaculture production by volume in 2010, up from 87.7% in 2000.

In the world scenario, contribution of India in mariculture production is very negligible. In other countries in the Asia Pacific region significant advances have been taken place in the development and expansion of mariculture. Mariculture sector is looked forward as the sector for increasing seafood production in the coming years in all the countries. The Central Marine Fisheries Research Institute (CMFRI) is the pioneer in mariculture research in India, and many technologies have been developed by the Institute during the last five decades. Initial focus was only in enhancing shellfish production. During 1970s the technology for mussel farming was initiated and standardized in the country. Commercial mussel farming gained rapid strides since 1996 in India. In the recent years mussel farming showed spectacular improvements with the farmed mussel production of the country reaching a total of about 20,000 tonnes. Though efforts to popularize the technology were undertaken in the States of Kerala, Karnataka, Goa, Maharashtra and Tamil Nadu a quantum leap in the mussel production was observed only in the state of Kerala mainly due to the preference of mussel meat in Kerala. The availability of large extent of natural mussels beds along the Indian coast for sourcing the seeds; high price realized for the produce in domestic market; minimal operational expenditure and short term eco-friendly farming techniques are expected to encourage more farmers to come forward to adopt the practice in future years. Edible oyster farming practised on a very small scale at certain locations in Kerala also requires to be

expanded. The two major concerns which have to be addressed are the low value - high volume production of spat to cater to the seed requirement and the development of suitable marketing channel.

During the 1980s technologies pearl production and artificial seed production of Indian white prawn Fenneropenaeus indicus were developed. Recently only it was felt that fish seed production as also essential for the country. The concerted efforts of more than a decade or so, CMFRI could achieve the seed production of cobia Rachycentron canadum and silver pompano Trachinotus blochii during 2009-10. Among crustaceans, shrimp has been produced in coastal ponds in the country and about 100,000 tonnes of Americal white shrimp Penaeus vannamei is produced in the country outpacing the tiger shrimp P. monodon. However, the two promising marine crustacean species are the blue swimmer crab Portunus pelagicus and the sand lobster Thenus orientalis. Though seed production of these species has been developed by CMFRI, commercial level seed production technology for both the species are yet to be achieved.

The marine ornamental fish industry has been expanding globally in recent years and about 20 to 25 million marine ornamental fishes are traded annually. Nearly 98% of the marine ornamental species marketed are wild, collected mainly from coral reefs of tropical developing countries. This has been demonstrated as a viable enterprise in India threatening the long term sustainability of the trade due mainly to indiscriminate exploitation of coral reef areas, leading to degradation of coral reef habitat and overexploitation of desired species. In this context The Central Marine Fisheries Research Institute has been focusing on this aspect for the past few years and a variety of marine ornamental fishes have also been bred by the institute. Techniques for broodstock development, breeding and seed production of 12 species of pomacentrids were developed and standardized by CMFRI.

CMFRI has also pioneered in open sea cage culture during the last decade and has standardized cage design and mooring for Indian waters. Many species of finfishes like Asian seabass, cobia, mullets and pearlspot were successfully reared in cages in different maritime states of the country. Among shellfishes capture based aquaculture of spiny lobsters were found to be highly profitable. CMFRI has also set up a model for community development through cage culture as in the case for Sidi tribe from Africa, settled in Gujarat. It was developed as a social movement and the progress made in the community can be taken as a model for community development through PPP mode.

Since Maldives is a close associate of India, many of the mariculture technologies developed in India can be transferred easily. Capacity building is one such area where we can have association in the future also. Before going in a bigger scale, it should be borne in mind that mariculture activities should focus on development of sustainable and economically viable farming technologies, which can be easily adopted by the end user. Sustainable mariculture promises economic and environmental benefits. An object oriented development approach, coupled with appropriate policy formulations can lead to the emergence of mariculture as a substantial contributor to the seafood production of the country.