

# Development of seafarming in India – an export perspective

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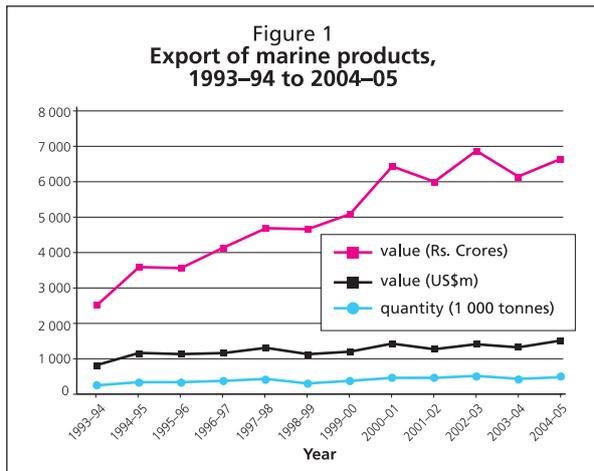
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## INTRODUCTION

Sea farming has become a promising area of aquaculture all over the world. It is one of the most important and rapidly growing components of Asian aquaculture, contributing substantially to the increased demand for high-value seafood items in the global market. India has a long tradition of aquaculture and is a world leader after the People's Republic of China, contributing about 5.2 percent of the total world production in 2003 (FAO, 2005). A subcontinent with seas on three sides, India has a long coastline of about 8 129 km. The country's continental shelf is estimated as 0.5 million km<sup>2</sup> and its Exclusive Economic Zone (EEZ) encompasses 2.2 million km<sup>2</sup>. The southern edge of the Indian Peninsula extends into the Indian Ocean, with the Bay of Bengal on its eastern part and the Arabian Sea on the west. The mainland is surrounded by groups of islands off both the east and west coasts. The Andaman and Nicobar Islands are located in the Bay of Bengal, while the Lakshadweep Islands are scattered in the Arabian Sea. The sea coast along the mainland and around the islands provides a vast scope for the development of sea farming, which has considerable potential to augment seafood production for domestic and export markets.

## STATUS OF COASTAL AQUACULTURE

Despite its huge potential, the development of coastal aquaculture in India has been mainly confined to brackishwater shrimp culture and freshwater scampi culture in the maritime states. In fact, the country has a rich tradition of shrimp culture, with various traditional practices followed in different regions to grow shrimp in their natural habitats. Taking a cue from the traditional practices, scientific systems have subsequently been evolved to culture shrimp in protected and manually controlled regimes. Presently over 167 500 ha are used for shrimp farming in the coastal states, with as much as 50 000 ha still being cultivated using traditional practices. Similarly, freshwater prawn farming is also becoming more popular in India, as its practice is not just restricted to the coastal states, but is also making inroads in the inland states. Currently about 42 000 ha are estimated to be under freshwater prawn farming, and with the standardization and stabilization of technology, this sector is poised to expand further.



The marine products export from India has been rising over the years, and the current export is worth about US\$1 478 million (Figure 1). Frozen shrimp is the largest export item in terms of value, contributing 64 percent of the total export earnings, followed by frozen cephalopods (15 percent), frozen fish (11 percent) and dried fish (2 percent). The European Union (EU) with a share of 26 percent is the largest market for seafood from India, followed by the United States of America (23 percent), Japan (18 percent), the People's Republic of China (10 percent) and Southeast Asia (9 percent). India has the

capacity to process 16 250 tonnes of seafood per day, as there are about 425 processing plants with modern facilities engaged in this sector. However, a lack of availability of raw material is one of the major problems faced by the seafood processing plants, as the average capacity utilization is only about 20 percent. In view of this situation, the Government of India is considering the creation of a "seafood hub" in order to handle the importation of raw materials for processing and re-export.

As stated above, shrimp play an important role in the seafood export earnings of the country. It is estimated that nearly 63 percent of the shrimp exported from India is sourced from coastal aquaculture (Figure 2). Hence, coastal aquaculture plays a significant role in marine products exports from the country.

The development of both brackishwater shrimp farming and freshwater prawn farming has been well supported by the process of backward and forward integration with necessary ancillary industries. Presently there are about 350 hatcheries in India with a built-in capacity of 14 billion seed per annum to supply quality seed for both shrimp and scampi culture. Broodstock collectors, nauplii producers, nurseries, water quality analysis laboratories, polymerase chain reaction (PCR) laboratories, etc. are also functioning to support the operations.

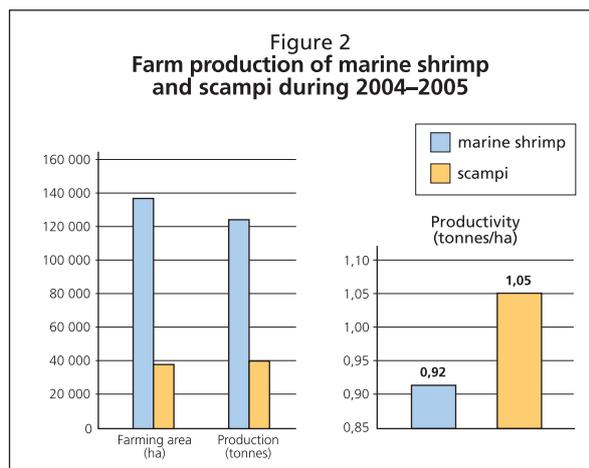
Another vital sector for the sustainable development of coastal aquaculture is the feed and feed inputs. Over 30 domestic feed mills are supplying shrimp feed to the farmers, apart from the imported brands. Various forms of other inputs such as probiotics, immunostimulants, Zeolite, benzalkonium chloride (BKC), etc. are also marketed to help produce successful crops. The country's shrimp farms have been periodically affected by white spot disease (WSD), and the farmers are adopting various management measures to prevent crop loss and ensure sustainable production levels.

The Marine Products Export Development Authority (MPEDA) of the Government of India has been playing a major role in promoting coastal shrimp and scampi cultivation in the country, as shrimp constitute the major revenue earner in the export market. The revolution in coastal shrimp culture started when MPEDA established two modern shrimp hatcheries on the east coast, with overseas technological tie-up. Subsequently, scientific commercial shrimp farming practices were also demonstrated to farmers through pilot projects. This sector, which has witnessed a sudden upsurge with large-scale development, faced several challenges from environmentalists, lawmakers, financiers, etc. apart from in-house problems such as the onslaught of diseases. However, the situation has stabilized and is now streamlined with the enactment of the Coastal Aquaculture Authority Act facilitating statutory and regulatory control over coastal aquaculture.

Small and marginal farmers largely run the shrimp culture sector in India. In order to empower these farmers, MPEDA has mooted the concept of forming "aquaculture societies" in various farming villages through a project undertaken by MPEDA in

association with the Network of Aquaculture Centres in Asia-Pacific (NACA) on Shrimp Disease Control and Coastal Management in India. Aquaculture societies are expected to improve the socio-economic condition of the small-scale and marginal farmers by assuring them sustainable production levels through adoption of Better Management Practices (BMPs) to reduce the risk of diseases and improve production and productivity.

The country is estimated to have about 1.2 million ha suitable for undertaking brackishwater aquaculture. However, only about 15 percent of the available area has been developed, and thus the scope for further expansion is enormous. In order to regulate the development of coastal aquaculture in an environmentally and sustainable manner, the Coastal Aquaculture Authority (CAA) has been authorized by the Government of India to license aquaculture in the coastal region, and the CAA has already framed the relevant norms and guidelines. This CAA, although national in character, will be working through the state governments for the governance of the coastal aquaculture sector.



## AQUACULTURE DIVERSIFICATION PROGRAMMES

### Attempts with mariculture in India

The development of coastal aquaculture in India has been concentrated mainly on shrimp or scampi, especially in the coastal areas on the landward side, due to their economic importance and the ready availability of technology and markets. Experimental trials have been attempted for other species of commercial importance. Indian research institutes have already standardized the breeding technologies for many potential species; however, commercialization has not materialized for various reasons. The potential candidates for Indian mariculture are listed in Table 1.

TABLE 1  
Potential aquatic species for mariculture in India

Common name	Scientific name
Asian seabass	<i>Lates calcarifer</i>
Grouper	<i>Epinephelus</i> spp.
Milkfish	<i>Chanos chanos</i>
Flathead mullet	<i>Mugil cephalus</i>
Silver pomfret	<i>Pampus argenteus</i>
Cobia	<i>Rachycentron canadum</i>
Tunas	<i>Thunnus</i> sp., <i>Euthunnus</i> spp.
Mud crab	<i>Scylla serrata</i>
Rock lobster	<i>Panulirus</i> spp.
Edible oyster	<i>Crassostrea</i> spp.
Pearl oyster	<i>Pinctada fucata</i> , <i>P. margaritifera</i>
Mussels	<i>Perna viridis</i> , <i>P. indica</i>
Clams	<i>Anadara granosa</i> , <i>Paphia malabarica</i>
Sea cucumber	<i>Holothuria scabra</i>
Seaweeds	<i>Gracilaria</i> , <i>Gelidiella</i> , <i>Kappaphycus</i> , etc.

As early as the 1970s pioneering experimental work on the breeding and rearing of various potential aquaculture species was carried out in India by the research institutes of the Indian Council of Agricultural Research (ICAR) such as the Central Marine

Fisheries Research Institute (CMFRI) and others. These pilot-scale attempts have proved that breeding and rearing of several species are possible, and the technology was made available for transferring to entrepreneurs. However, the transfer of technology did not result in large-scale development of mariculture activities due to lack of policy to attract investment. Hence, for nearly three decades coastal aquaculture has remained focused only on shrimp culture.

Private entrepreneurs have initiated some pond culture of finfishes such as Asian seabass and milkfish. Fattening of mud crabs and lobsters was also found to be feasible by local farmers. Further, a major project for cultivation and processing of seaweeds has recently started in the southeast coast by a private company. Although mollusc culture has been practiced primarily at the subsistence level by the local fisherman, attempts have already been made for more organized culture of mussels, oysters and clams in some coastal villages. Such projects generally face serious marketing problems due to the limited production levels. Besides, so far there has been no system in India to classify suitable water for shellfish culture based on water quality and the depuration measures needed to meet international product standards. Hence, more efforts are required in this direction.

## **MAJOR CONSTRAINTS**

### **Policy for mariculture**

Although enriched with vast natural resources and numerous species with mariculture potential, sea-farming has not become well established in the country, perhaps due to the lack of a policy on the use of open water bodies. The coastal areas of the country are densely populated and the major occupations of their residents are related to fishing and ancillary activities. Therefore, demarcation of suitable areas for a relatively new venture such as mariculture may invite multi-user conflicts. To initiate such projects, it is very important to involve the local community and frame suitable policy for aquaculture. Coastal aquaculture in the open waters requires statutory support, and the government has yet to make a major policy decision in this regard. Any major effort to commercialize the technology for mariculture will depend on the policy framework.

### **Technology**

Although a variety of native species are available in Indian waters, standardization of the requisite technology for their breeding and culture has yet to be done on a commercial scale. Therefore, streamlining the technology for commercially important species and identifying the products and markets for such species require special attention. If products are sourced from exotic aquatic animals, then their importation into India will require specific permission from a committee set up by the Government of India, *viz.* a "Committee for Introduction of Exotic Aquatics into Indian Waters". Similarly the technology for these projects will have to be borrowed from abroad through joint venture programmes or bilateral assistance.

### **Finance**

Coastal aquaculture enterprises in India are primarily operated by small and marginal farmers. The corporate bodies that earlier promoted semi-intensive farming with vertically integrated facilities had a slump and have almost withdrawn from this field. As a result, the financing sector is not too ambitious about aquaculture projects. Hence, government support and active participation of financial institutions may be essential to provide an initial thrust to new ventures.

### **Manpower**

The substantial manpower available in the subcontinent is comparatively cheaper, whether skilled or unskilled. However, to train the available human resources to meet

the desired standards of knowledge and technical capability will require considerable effort, especially for tuning to the demands of a new sector. Managing open-sea cage culture farms is one such area in which expertise is not readily available in India.

### **Environmental impacts**

Mariculture farms using offshore waters can be divided into land-based flow-through systems, land-based recirculation systems and offshore cage farms. The pollution load from each of these systems will depend upon the type of technology adopted and the intensity of operation. Moreover, some marine regions off the coast of the mainland and around the islands are protected due to their ecological sensitivity. Therefore, when planning any major endeavour in sea-based aquaculture, the potential environmental impacts should be studied to ensure both long-term ecological and economic sustainability.

### **Marketing issues**

Apart from shrimp and scampi culture, the isolated attempts at coastal aquaculture faced serious problems with regard to marketing their produce. While domestic marketing could be explored for value-added products from mariculture, the major projects must be planned using a market-driven strategy with an eye on the emerging markets and products. Fast-moving products in the international markets need to be identified when deciding upon the species suitable for mariculture so that such efforts are economically feasible.

### **Sea ranching and marine husbandry**

Apart from directly contributing to exports, sea farming programmes can also assist in the replenishment of natural resources by adopting suitable sea ranching and marine husbandry operations such as are practiced by some other countries to augment the sea catches. Such programmes, however, require cooperation from hatchery operators to supply disease-free seed and from fishers to protect the stocked animals until they reach a substantial size in natural waters before harvesting.

### **DIVERSIFICATION OF COASTAL AQUACULTURE – MPEDA'S INITIATIVES**

Shrimp remains the single largest and maximum value earner among the seafood exported from the country. It is estimated that cultured shrimp constitute 63 percent of the total quantity of shrimp exported from India. Therefore, in order to diversify the export basket, MPEDA has set out an action-oriented plan for the next five years. The plan envisages increasing the share of non-traditional cultured varieties to about 50 percent of the total production from aquaculture. In order to concentrate on the diversification of coastal aquaculture, MPEDA has therefore, constituted a separate society *viz.*, the Rajiv Gandhi Centre for Aquaculture (RGCA). RGCA has embarked upon various activities to standardize and popularize the culture of potential species that have commercial significance in Indian waters. The following are some of the activities recently taken up by the RGCA:

- breeding of Asian seabass;
- cage culture of Asian seabass;
- fattening of rock lobsters;
- breeding and culture of mud crabs;
- *Artemia* production;
- breeding and culture of groupers; and
- culture of tilapia.

MPEDA has been in regular contact with international organizations to bring in economically feasible technologies for adoption by Indian entrepreneurs. We have

also taken up a few demonstration projects in farmers' ponds to encourage farmers to take up the culture of species such as seabass, mullets, milkfish, mud crabs, mussels, oysters, clams, etc.

With a view to developing mariculture in the country, a detailed feasibility study was undertaken during the 1990s through an overseas agency to micro-survey the Indian coast for its potential for offshore farming. The survey revealed that there is great potential for offshore farming along the continental coast of south India and the island coasts. The meteorological and hydrographical data have shown that the maximum wave and current actions are compatible with the best offshore fish-farming equipment. Wave conditions in the Arabian Sea seemed to be a little tougher than in the Bay of Bengal.

The water quality along the coast was found to be stable and good except on the west coast during the southwest monsoon when upwelling is a common phenomenon, creating oxygen depletion zones followed by algal blooms that can adversely affect farming operations. The availability of suitable sea and land areas, service, transport facilities, etc., was found to be adequate except in remote island locations.

On the basis of this survey, it was concluded that about 2 000 km<sup>2</sup> of sea area is ideally available to take up offshore farming with the potential to produce some 8 million tonnes of high-quality marine fish through cage culture practices.

### **CONCLUSIONS**

According to a vision formulated by MPEDA, the seafood export from India is targeted to reach US\$4 billion by 2009/2010. To make this vision a reality, the contribution of the aquaculture sector is expected to rise from the current level of US\$0.7 billion to about US\$1.5–2.0 billion. There is a growing demand for marine finfish, and offshore fish farming can offer new vistas for Indian aquaculture to achieve the set target, advance national economic development and ensure the livelihoods of many more people. This, of course, calls for a positive strategy to formulate policies conducive for mariculture development. Sustainable development and the progress of marine farming will require substantial building of skills in health management and the diversification of markets, in addition to a smooth flow of finance. Concerted efforts from all sides may lead to such developments in the imminent future.

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