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Perspectives and future vision for augmenting seafood export from India

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India is bestowed with a long coastline of 8129 km, 0.5 million sq.km of continental shelf, 2.02 million sq.km of EEZ, and a catchable annual marine fishery potential of 4.41 million tons. India is the second largest fish-producing country in the world accounting for 7.56 percent of global production and 4th largest fish exporter. In 2021-22, India's total marine fish production stood at 3.05 million tons.

With the implementation of the New Economic Policy in July 1991 and the subsequent focus on terms of trade and gains from trade, seafood was identified as a major source of foreign exchange earner for the country. There has been a commendable increase in Indian fisheries export in terms of quantity, value, and unit value over the years. The country's fish export value has increased from INR 7,245 crore to INR 43,717 crore in the last 15 years, with a CAGR (Compound annual growth rate) of 12.73%. From 2020-21 to 2021-22 capture fisheries contribution to marine product export reduced from 56.03% to 53.56% in terms of quantity and reduced from 36.42% to 32.02% in terms of US\$ value¹.

India is among the top 5 fish exporting countries in the world. About 17% of India's agricultural exports are fish and fish products². During the financial year 2020-21, India exported 11, 49,510 MT of Seafood worth US\$ 5.96 Billion¹. The USA retained the title as the major importer of Indian seafood, followed by China and the European Union. Frozen shrimp continued to be the major item of export in terms of quantity and value, followed by frozen fish.

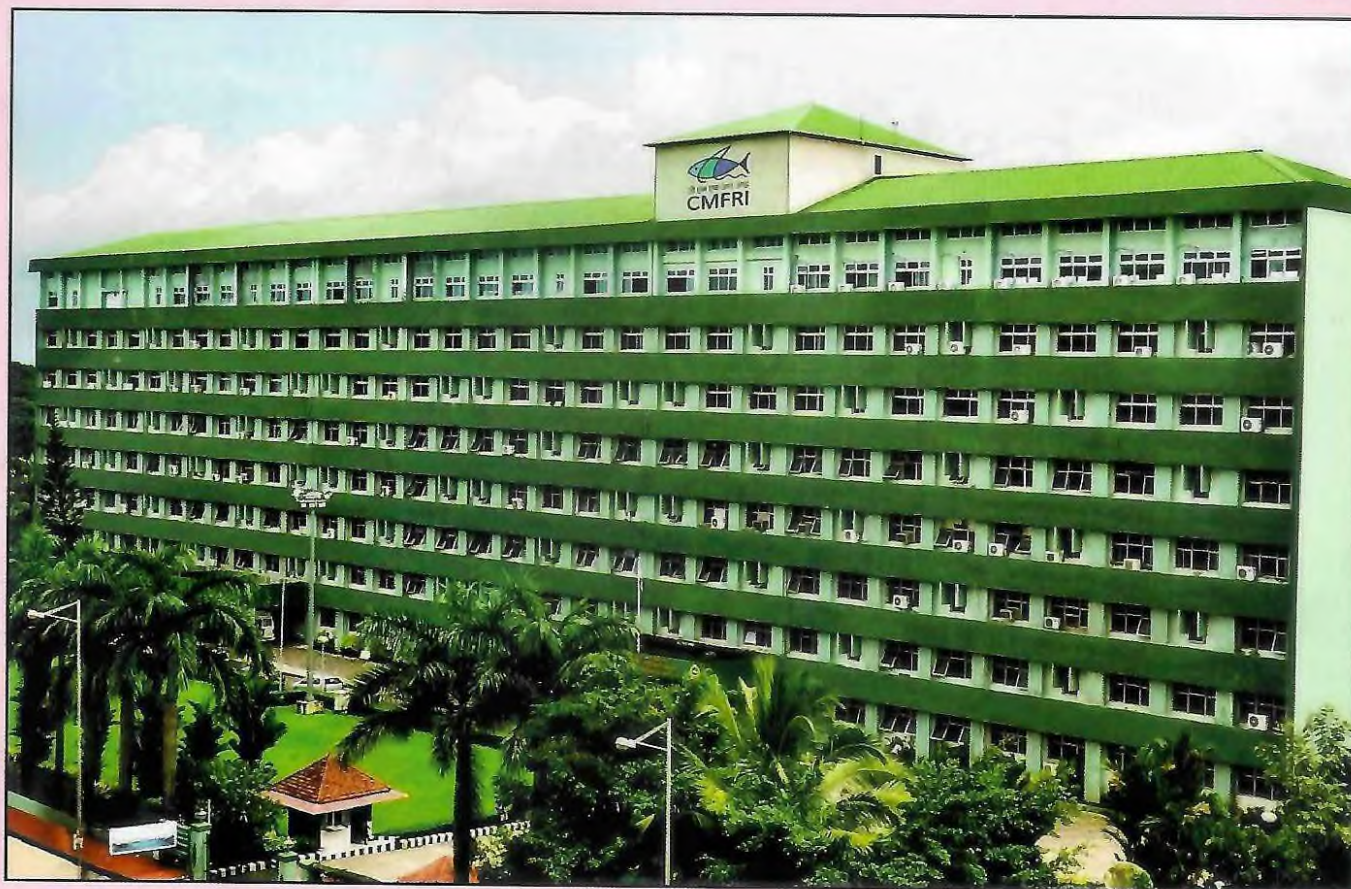
The Government of India (GoI) aims to increase fisheries exports to 1 trillion Indian rupees by the financial year 2025 by supporting the infrastructure development of fishing harbours and fish landing centres under its

schemes. In association with the private sector the future focus should be on developing export-oriented supply chain models with an emphasis on organized procurement, processing, certification, packaging, and branding³.

Research priorities for augmenting seafood

Given the sustained increase in demand for seafood in the domestic and export markets, while the fishing pressure in coastal waters is beyond optimal levels, there is a need to utilize the unexplored potential of offshore and deep-sea waters. Past studies conducted by ICAR-CMFRI have indicated the availability of several offshore and deep-sea resources which have high potential in the export market, if harvested in a viable and sustainable manner. ICAR-CMFRI is continuing research in this area with the objective of regular assessments of the stock status of these resources and to develop strategies and options for optimally harnessing the potential.

- Over the past two decades, there has been significant developments in the realm of mariculture, which involves the culture of marine species in enclosed structures in both in-shore and offshore waters. ICAR-CMFRI has been a frontrunner in the country's mariculture research, with significant milestones achieved during this period. ICAR-CMFRI has established hatchery and grow-out infrastructure for seed production and has achieved broodstock development, maturation, sex reversal, spawning, fertilization and hatching of potential marine fin fish species such as cobia, pompano, groupers, snappers and sea breams, at several locations in the east and west coasts. Research trials in this direction are progressing in the marine fish hatcheries at Mandapam, Vishakhapatnam, Vizhinjam, Karwar and



Tuticorin research centres of CMFRI. The institute has also made a breakthrough in the seed production and larval rearing of the sea cucumber *Holothuria scabra* and *H. spinifera*, items of high export demand⁴.

Apart from this, CMFRI has prioritized 76 fin fish and shell fish species that could be targeted for future expansion of mariculture production in the country, with potential prospects for enhancement of seafood export. A variety of grow-out farming technologies such as coastal and marine cage culture of finfish and shellfish, raft and longline culture of bivalves and seaweeds, integrated multi - trophic aquaculture (IMTA), re-circulatory aquaculture system (RAS) etc., have been standardized for Indian waters.

Seaweed farming is another prospective area wherein new research developments in culture technologies, and post-harvest product development can bring about a significant leap in domestic production and export of seaweed products. Breeding, seed production, and grow-out technologies for 23 high-value marine ornamental fishes with high export value is another emerging area. The institute is also promoting advanced

co-research areas (biotechnology, genetic engineering, physiology, pathology, nutrition, and endocrinology) of critical importance that can contribute to sustain future marine fish production.

- Lately, the export processing units in India are facing the problem of under-utilizing installed capacity due to shortages of raw materials. This has been linked to resource depletion due to overfishing and climate change-induced impacts. ICAR-CMFRI has been undertaking focused research to address resource depletion by managing fishing efforts. Recent stock assessment studies of 68 commercially important marine fish species indicated that 86% of these are sustainably exploited. The State Fishery Management Plans developed by ICAR-CMFRI incorporate several strategies and management options specific to each maritime state towards ensuring optimal exploitation of marine resources. This includes management plans to regulate growth and recruitment overfishing using non-selective fishing gears besides out-based controls.

The institute has been instrumental in the notification of minimum legal size (MLS) for 58 commercially important fish species in Kerala (2015) and 19 species

in Karnataka (2019) to check juvenile fishing. The CMFRI will focus greater attention on this important aspect in its research and extension activities, and strongly take up this issue with the state governments, the fishing industry and the community to implement the prescribed management measures more effectively.⁴ ICAR-CMFRI's Life Cycle Assessment (LCA) of Indian marine fisheries revealed that carbon and carbon dioxide emission/kg fish values were 17.5% lower than the global average, indicating that our marine fisheries are more environment friendly.

- Fishery interaction with marine mega fauna is a great cause of concern as export demand induces the application of fishing pressure over the marine ecosystem. In accordance with the import provisions stipulated by exporting nations especially by USA, CMFRI completed a project titled "Assessment of Marine Mammals stock and bycatch of Marine Mammals and Sea turtle" funded by MPEDA.

As part of the project CMFRI conducted Marine mammals stock assessment in the Indian EEZ by undertaking extensive surveys in the sea and applying standard methodologies, bycatch estimation of marine mammals and sea turtles in the fishery by collecting data on incidental capture in fishing gear and beach-cast samples; and identifying conservatory measures to protect the marine mammals and sea turtles; and to reduce incidental mortality and serious injury of each stock below the bycatch limit⁵.

Way forward

Given the increasing demand for seafood exports from India, the existing production basket needs to be diversified, including harnessing unexplored potential in offshore and deep-sea areas in the Indian EEZ and high seas. Further, to supplement the marine fish supply for exports, promising species that have high export potential can be farmed in open sea enclosures, after due assessments for their economic viability and profitability. Already remarkable progress has been made by ICAR-CMFRI in breeding of marine finfish, shellfish and ornamentals.

Further work will have to address the breeding, seed production and grow out of high value fishes such as pomfrets, seer fishes, tunas etc. that have high demand in the international seafood market. For large-scale open sea cage farming to be successful, further research is needed for identifying and mapping potential mariculture sites, stocking, feeding and

nutrition, management and husbandry, precision farming techniques and other advanced technological options. Another important pre-requisite is developing the export policy framework with the value chain interventions/ strategies for efficient and sustainable seafood marketing in alignment with Sustainable Development Goals (SDGs). The possibility of bringing Free Trade Agreements (FTA) with more countries can be considered. Certification of fishery and fish products may be more challenging for smaller enterprises in developing countries like India, especially given the relatively high costs associated with certification. Indigenous certification arrangements may be explored to address this gap.

Efforts for intensifying export-oriented fishery may be consistent with global and domestic ecosystem sustainability mandates, particularly in the context of stringent conditions set by major importers of Indian seafood. Priority areas in this regard include catch reporting and traceability of fish consignments, strict monitoring of fishery interaction with marine mega fauna and fishery induced by-catch reduction, particularly that of ETP species. Therefore, future marine fisheries and mariculture needs to usher in renewed emphasis on Ecosystem based responsible fisheries management and conservation.

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