

India's Marine Finfish Farming Revolution: Species, Challenges, and the Road Ahead

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As wild capture fisheries reach their sustainable limits, India is shifting from being a hunter of the seas to a cultivator of its resources. This is the story of marine finfish farming in India - a sector holding immense promise, yet remaining in its infancy. It is a tale of scientific breakthroughs, infrastructural bottlenecks, and the vision of a Blue Economy that could transform coastal livelihoods.

Understanding Marine Finfish Farming

Marine finfish farming, or mariculture, involves cultivating fish species that spend their entire life cycle in salt water, using coastal ponds, tanks, or open-sea cages. Unlike freshwater aquaculture, marine farming must contend with tides, currents, and salinity fluctuations, requiring specialised infrastructure and technical expertise.

The Pioneering Role of CMFRI

At the heart of India's marine finfish farming journey stands the ICAR-Central Marine Fisheries Research Institute (CMFRI). For decades, CMFRI has been the nation's premier institution for understanding and managing marine fisheries resources.

CMFRI's mandate extends far beyond research. The institute has taken on the critical task of developing captive breeding and seed production technologies for commercially important marine finfish. This is no small feat. Breeding marine fish in captivity requires understanding their reproductive physiology, creating optimal hatchery conditions, and nurturing fragile larvae through their earliest and most vulnerable stages.

As documented in CMFRI's official training manual, "In contrast to the global scenario, where mariculture of finfishes is a well-developed industry, in India, it is gradually emerging out from its infancy". The manual further notes that high-value marine species are "slightly difficult to breed" and require reproductive technologies and environmental conditions significantly different from freshwater species.

The Star Species: CMFRI's Mariculture Candidates

Through years of dedicated research, CMFRI has successfully developed seed production technology for several high-value marine finfish species. The institute's official publication "**Farmed Marine Finfish Species in Brief**" (2024) serves as a definitive guide to cultivable marine finfish species in India.

Cobia (*Rachycentron canadum*) stands out as the fastest-growing marine fish in cultivation. Under optimal conditions, cobia can reach 4-6 kilograms in just one year, making it exceptionally attractive for commercial farming. Its firm, steak-like flesh is prized in international markets.

Silver Pompano (*Trachinotus blochii*) has quickly become a farmer favourite. This species offers excellent meat quality, rapid growth, and remarkable adaptability to various culture systems. It can be farmed in coastal ponds, tanks, and cages, making it accessible to farmers with different resources.

Indian Pompano (*Trachinotus mookalee*), the native cousin of silver pompano, shows quick adaptability to culture conditions, readily accepts artificial feed, and tolerates a wide salinity range. CMFRI scientist Dr. Ritesh Ranjan and his team have been instrumental in standardising breeding protocols for this species.

Orange-spotted Grouper (*Epinephelus coioides*) commands premium prices in Asian markets. Prized for its firm texture and delicate flavour, grouper represents the high-value end of the market, though its slower growth rate requires longer culture periods. CMFRI's Visakhapatnam centre has achieved significant success in breeding this species, with captive broodstock developed in Recirculating Aquaculture Systems (RAS) and cages.



Cobia (*Rachycentron canadum*)



Silver Pompano (*Trachinotus blochii*)



Indian Pompano (*Trachinotus mookalee*)



**Orange-spotted Grouper
(*Epinephelus coioides*)**

Beyond these well-known species, CMFRI has expanded its mariculture candidate list. Research achievements include:

- **John's Snapper (*Lutjanus johnii*)** - CMFRI has developed captive broodstock and standardised induced breeding protocols for this species
- **Golden Trevally (*Gnathanodon speciosus*)** - Breeding and seed production protocols have been standardised
- **Picnic Seabream (*Acanthopagrus berda*)** - Shows excellent suitability for coastal culture
- **Giant Trevally (*Caranx ignobilis*)** - Research is ongoing with DBT funding support



John's Snapper (*Lutjanus johnii*)



Golden Trevally (*Gnathanodon speciosus*)



Picnic Seabream (*Acanthopagrus berda*)



Giant Trevally (*Caranx ignobilis*)

The Bottlenecks of Indian Mariculture

CMFRI has officially identified five major constraints limiting expansion, summarised by the acronym SFHMG. Seed availability remains the foremost constraint; commercial-scale hatchery production is insufficient to meet farmer demand. Feed presents another significant challenge, as marine finfish require expensive, high-protein diets. Health management in marine environments differs fundamentally from freshwater, with diseases spreading rapidly through cage networks. Marketing channels for farmed marine fish are still developing, creating price volatility. Genetics research remains in early stages, with most breeding programmes relying on wild broodstock rather than selectively improved lines.

Government Initiatives: A Historic Milestone

The most significant recent development came in **January 2026**, when the nation launched its **first-ever open sea marine fish farming project** in the Andaman Sea. Union Minister Dr. Jitendra Singh inaugurated the pilot initiative at North Bay near Sri Vijaya Puram, describing it as "one of the

first major steps in the direction of realising the Blue Economy through India's vast ocean resources". The project is being implemented through collaboration between the Ministry of Earth Sciences, the National Institute of Ocean Technology (NIOT), and the Andaman and Nicobar Islands administration. The pilot focuses on open-sea cultivation of marine finfish and seaweed using NIOT-developed cages designed for offshore environments. A senior NIOT official confirmed that **seabass and cobia** are being reared in the open-sea cages, along with experimental seaweed cultivation. During the launch, seaweed seeds and finfish seeds were distributed to local fishing communities, promoting deep-water cultivation and cage-based farming. Dr. Jitendra Singh emphasised that the experience gained could enable scaling up through **public-private participation models** in the future.

Infrastructure Development Needs

Despite scientific progress, one bottleneck persists: the availability of quality seed. This challenge is acutely felt along India's west coast, where much of the marine fish seed is transported from hatcheries on the east coast. This dependence creates higher input costs, transportation stress on fingerlings, and supply uncertainties. CMFRI's Visakhapatnam Regional Centre has been developing low-cost Recirculating Aquaculture Systems (RAS) for broodstock development and nursery rearing, successfully developing captive broodstock of orange-spotted grouper, Indian pompano, and John's snapper.

Research Thrust Areas and Future Directions

CMFRI's research centres are pursuing multiple thrust areas, including broodstock development, standardisation of breeding protocols, larval rearing optimisation, live feed culture innovations, nursery systems development, and AI applications in mariculture. The Visakhapatnam centre alone lists over 40 ongoing research projects, including externally funded work on health management and innovations in sea cage farming.

Policy Recommendations

A high-level policy workshop organised by NITI Aayog in collaboration with CMFRI in January 2024 resulted in eleven key recommendations for harnessing marine fisheries potential, focusing on ecosystem sustainability, tapping new resources, and encouraging a shift towards mariculture.

The Road Ahead

Despite the challenges, the trajectory for marine finfish farming in India is unmistakably upward. The upcoming Mariculture Leasing Policy promises to provide the legal framework necessary for farmers to invest confidently in marine areas. Regional hatcheries would address the seed bottleneck currently constraining west coast farming. The Andaman open-sea project is not an isolated event but a sign of a sector awakening to its potential.

Conclusion

Marine finfish farming in India stands at a pivotal moment. The scientific breakthroughs have been achieved. The species are identified. The hatchery technologies are proven. The market demand

is real. What remains is scaling up - building regional hatcheries, transferring technology to coastal communities, establishing clear leasing policies, and developing feed and health management infrastructure. As Dr. Grinson George, CMFRI Director, has noted, these technologies will boost production of commercially important fish, contributing to the nation's seafood security and blue economy. The revolution in marine finfish farming has begun, promising livelihoods for coastal communities, reduced pressure on wild stocks, and a significant contribution to India's Blue Economy.

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