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Marine Fisheries Information Service Technical & Extension Series

The Marine Fisheries Information Service, Technical & Extension Series (MFIS) is a quarterly publication of ICAR-Central Marine Fisheries Research Institute disseminating latest research information on marine fisheries and mariculture in India. Research based technical articles, reporting significant new information, knowledge and understanding of marine fisheries and ecosystems as well as new concepts/technologies in marine fish nutrition, hatchery and larval rearing, fish pathology, fish health management, application of genetics in fish conservation and farming, sea farming technologies, seafood trade and fisheries governance are published. To see all issues since 1978, visit:

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Multi-day fishing trawlers in Vanakbara Landing Centre, Diu
Photo credit: Vinaykumar Vase

Marine Fisheries Information Service Technical and Extension Series envisages dissemination of information on marine fishery resources based on research results to the planners, industry and fish farmers and transfer of technology from laboratory to the field.

Marine Fisheries Information Service
Technical & Extension Series

From the Editorial Board

Warm greetings to all our esteemed readers

India with its 11098 km coastline and a 2.4 million square km of Exclusive Economic Zone (EEZ) holds immense potential to transform the national economy by providing livelihoods, nutritional security and foreign exchange earnings through the sustainable harvests and processing of its living resources. To facilitate well informed and effective policies that will ensure the development and welfare of the stakeholders in the fisheries sector, databases are vital. The mammoth exercise of the Marine Fisheries Census 2025 aiming to cover around 1.2 million households in 3500 fishing villages led by ICAR-CMFRI and funded by the Department of Fisheries, Govt. of India is going to be unique in several ways. Eco-friendly sea-farming technologies with resources like seaweeds and shellfishes such as oysters and mussels are gaining traction and emerging as models for sustainable coastal livelihoods besides contributing to the Blue Economy goals. This issue of MFIS highlights some of the works in progress on these topics in ICAR-CMFRI.

Marine Fisheries Information Service
Technical & Extension Series

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Lead Article

Marine Fisheries Census- 2025: A comprehensive overview

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The Indian marine fisheries sector is a critical component of the nation's economy, food security, and coastal livelihoods. With a vast coastline and a large fishing population, accurate and up-to-date data are essential for effective policy-making, resource management, and the welfare of the fishing community. The Indian Marine Fisheries Census (MFC) 2025 is a comprehensive, multi-layered exercise designed to address this need by providing a complete and detailed enumeration of the sector.

Overarching Importance of Periodically Updated Data

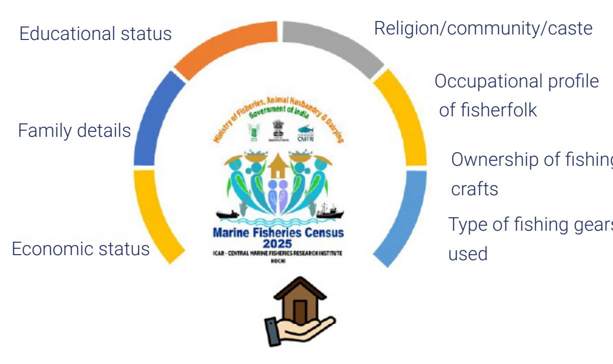
a. Foundation for Evidence-Based Governance: The census provides the fundamental data required for scientific and informed fisheries governance. Without a complete and regularly updated list of villages, households, and infrastructure, it is impossible to formulate effective policies that are tailored to the specific needs of the community.

b. Socio-Economic Profiling: The census moves beyond simple headcounts to capture the intricate socio-economic status of fishing families. This includes:

- Socio-demographic details of fisher households.
- Primary and secondary occupations to understand income diversification.
- Outstanding loans and indebtedness, which are critical indicators of financial vulnerability.
- The status of their housing and living conditions.

c. Infrastructure and Asset Mapping: The census provides a detailed inventory of the physical assets that underpin the fishing industry, including:

- Types and numbers of fishing units (boats, crafts, etc.).
- Fishing-related equipment and gears owned by households.
- The status of officially recognized marine fish landing centres. This data is vital for planning and enhancing infrastructure facilities, such as fisheries harbours, jetties, and cold storage units, to improve economic returns.



Role of the Coordinating Agency and Field-Level Data Collection

ICAR-CMFRI, with its long-standing presence and expertise, is uniquely positioned to coordinate this large-scale exercise. Its role as a "scientific watchdog" ensures that the data collection is rooted in robust scientific methodologies and validated on the field. It will coordinate the fieldwork in the nine maritime states. The Fishery Survey of India (FSI) will cover the four Union Territories, including the island territories, ensuring a comprehensive national reach. The MFC is being conducted with a single, unified agency-led approach. This ensures standardization of data collection, a consistent methodology across the country, and the ability to compare data points from different regions. This coordinated effort prevents duplication and ensures the integrity of the data.

New Ministry and a "Paradigm Shift" in Focus

The formation of the Ministry of Fisheries, Animal Husbandry and Dairying in 2018 marked a significant shift in the government's attention to the fisheries sector. This new administrative structure required a more granular and comprehensive structure required a more granular and comprehensive understanding of the sector to formulate targeted schemes and allocate resources effectively. The MFC 2025 is a direct response to this need, providing the foundational data to guide the ministry's initiatives.

Detailed Information on Professional Livelihoods: The census places a special focus on the professional details of fishermen households, which goes beyond previous censuses. This includes:

- A clear distinction between primary and secondary occupations to understand income sources and reliance on fishing.
- Outstanding loans, which helps in identifying financially distressed families and planning debt relief programs.
- Detailed information on the benefits received from central and state schemes like the Pradhan Mantri Matsya Sampada Yojana (PMSSY), allowing for a performance evaluation of these schemes and identification of areas for improvement.

Digital Transformation and Enhanced Data Collection

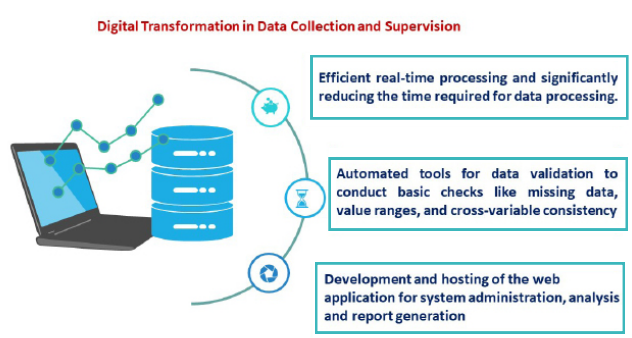
The Fully Digitalized and Multi-Layered Approach for the MFC involves the following

a. Web Interfaces and Special Apps: A significant leap from previous censuses, the MFC 2025 is a fully digitalized exercise. The use of specialized mobile applications and web interfaces for data collection and supervision is a key feature. This digital transformation aims to:

- Reduce manual errors and data entry mistakes.
- Accelerate the data collection and compilation process.
- Enable real-time data validation and monitoring.

b. GIS Integration: The data collected through the digital platforms will be populated into a Geographical Information System (GIS). This integration is crucial for:

- Spatially mapping fishing villages, landing centres, and other infrastructure.
- Visualizing the distribution of fishing households and assets.
- Conducting spatial analysis to identify clusters of poverty, infrastructure gaps, and areas needing specific interventions.
- Providing a powerful tool for planning and resource allocation.



Special Focus on New Data Points and Community Structures

a. Enumeration of FFPOs and SHGs: Unlike the previous three censuses, the MFC 2025 places a special emphasis on enumerating the details of Fish Farmer Producer Organsations (FFPOs) and Self-Help Groups (SHGs) in the coastal zone. This is vital for:

- Understanding the level of community organsation and collective action.
- Identifying strong community-led institutions that can be leveraged for implementing government schemes and development projects.
- Assessing the economic empowerment of fishing communities through these organsations.

provide a comprehensive view of the sector. The enumeration will take place in roughly 3000 fishing villages cover approximately 1.2 million households. The census leverages enormous human resources, within a digital supervisory framework. Around 3000 enumerators will be deployed on the ground who will be digitally supervised by a team of 300 officials from ICAR-CMFRI, FSI, and State Fisheries Departments, ensuring accountability and quality control. The census

Digital Transformation in Data Collection and Supervision

b. Wholesale Market Enumeration: The census also includes the enumeration of wholesale markets in the coastal zone. This data is essential for:

- Understanding the value chain and post-harvest infrastructure.
- Identifying bottlenecks in the supply chain.
- Planning for enhanced market connectivity and infrastructure, which can lead to better price realization for fishermen.

Scope, Structure and Timeline of the Census

The census is a massive undertaking, designed to

has a clear timeline and a significant financial outlay. The household enumeration is scheduled to be completed in November-December 2025 and the final reports are targeted for submission by March 2026. The exercise has a budget outlay of around INR 14 crores, highlighting the government's commitment to a detailed and accurate census.

Key Takeaways, Focal Areas and Strategic Benefits

a. Identification of Vulnerable Clusters: One of the most important outcomes of the census will be the identification of specific clusters of fishery families that are in need of government attention. This includes:

- Families with low income and high indebtedness.

- Communities lacking basic infrastructure and market access.
- Households that have not benefited from existing government schemes.
- The data will provide a clear picture of poverty hotspots and areas of socio-economic disparity, allowing for targeted policy interventions.

b. Infrastructure Enhancement and Upgrading: The census will provide a detailed, data-driven map of the infrastructure facilities that need to be enhanced and shored up. This includes:

- Identifying landing centres that require modernization.
- Determining the need for new fisheries harbours, cold storage facilities, and processing units.
- Planning for improved road and transport connectivity to markets.

This data will serve as a blueprint for future infrastructure development projects, ensuring that investments are made where they are most needed to maximize economic returns.

The Broader Strategic Significance of the MFC

a. Boosting Economic Returns: By providing a clear picture of the sector's strengths and weaknesses, the MFC will help in formulating strategies to improve the economic returns for fishermen. This includes:

- Promoting value addition and post-harvest management.
- Facilitating access to formal credit and financial services.
- Connecting fishermen to better markets and reducing the role of intermediaries.

b. Sustainable Marine Resource Management: The census data on fishing units and equipment, combined with other scientific data from ICAR-CMFRI, will be instrumental in developing and enforcing sustainable marine resource management plans. This will help in:

- Assessing fishing pressure and the health of fish stocks.
- Formulating regulations on fishing effort and gear types.
- Protecting marine biodiversity and ensuring the long-term viability of the sector.

c. Empowerment and Inclusivity: The detailed enumeration of FFPOs, SHGs, and the benefits from schemes like PMSSY is a step towards empowering the fishing community. The census data will help in:

- Measuring the impact of empowerment initiatives.
- Designing new schemes that are more inclusive and reach the most marginalized communities.
- Strengthening the role of community-based organsations in the development process.

Conclusion

The Indian Marine Fisheries Census 2025 represents a landmark effort to modernize and scientifically ground the understanding of India's marine fisheries sector. With its digital-first approach, enhanced data collection on socio-economic indicators and community structures, and the coordinated efforts of leading scientific and administrative bodies, the census will provide an invaluable dataset. The outcomes will not only serve as a critical tool for the newly formed Ministry of Fisheries but also as a strategic roadmap for fostering a more sustainable, prosperous, and equitable future for the millions of people who depend on the oceans for their livelihoods.

Research Communication

Revitalizing coastal livelihoods through capacity building in seaweed farming: A new hope for coastal communities in Kutch

D. Divu[1],Suresh Kumar Mojjada[2], P.S. Swathi Lekshmi [1], Jayesh D. Devaliya[1], Prachi S. Bagde[1],Sagar V. Jadav[1], T.S. Ramshad[1],Arsha Subramanian[1], Mayur S. Tade[1], V.V.R. Suresh[3] and Grinson George[3]

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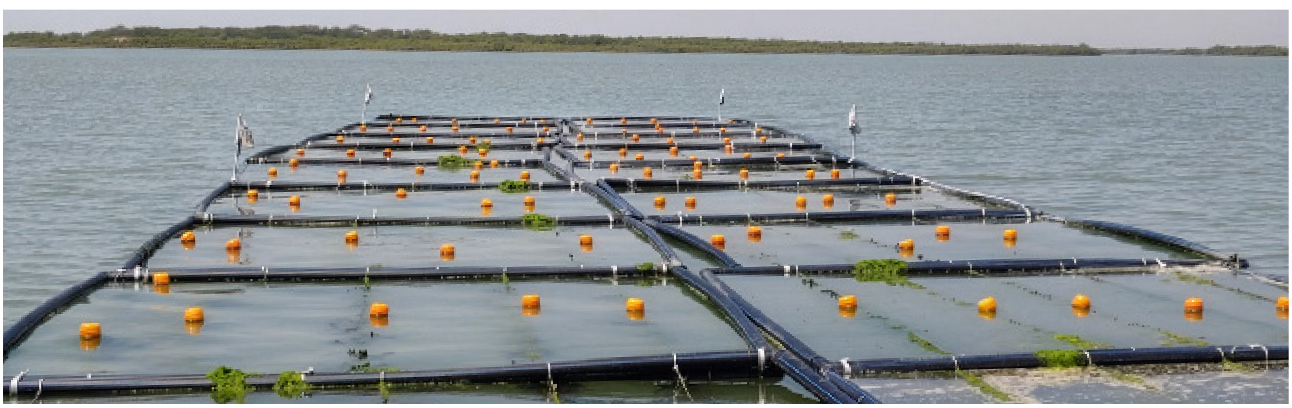

The seaweed sector in India is poised for significant growth, receiving dedicated attention under the strategic vision of the Government of India and close monitoring by the Hon'ble Prime Minister's Office (PMO). Among the coastal states, Gujarat holds a leading position, with approximately 23,970 hectares identified as suitable for seaweed farming (Johnson *et al.,* 2020). In Gujarat, the Kutch district emerges as a key region of interest, contributing the highest number of potential seaweed farming sites, about 1,500 hectares. While several challenges hinder the optimal utilization of its marine resources, the region's strategic location near the Indo-Pak border, which has resulted in security restrictions limiting fishing activities to designated areas is an important one. As a consequence, coastal communities, which have traditionally relied on fishing for their livelihoods, are often confined to small sections of the coastline leading to the underutilization of the region's abundant marine resources and limiting income-generating opportunities for local families. Combined with a lack of alternative livelihoods, it has led to seasonal migration of youth to urban centres in search of better economic prospects. The remoteness of these coastal villages, compounded by poor infrastructure and weak connectivity, further enhance vulnerability of the local communities. Given the various challenges faced by coastal communities, seaweed farming presents a sustainable and practical alternative livelihood. The region's natural coastal features, especially the high tidal amplitude and strong wave conditions make it suited for seaweed growth. Unlike other forms of aquaculture that may struggle in such environments, seaweed can grow well in areas with dynamic water movement. However, there is a need for region-specific technologies that address the local challenges and make the practice both viable and sustainable. For this, ICAR-CMFRI introduced a region-specific technological solution in the form of custom-designed High-Density Polyethylene (HDPE) rafts specifically developed to withstand the high tidal amplitude and harsh marine conditions along the Kutch coast in comparison to traditional farming methods which are often ineffective in such environments.

The widespread adoption of these innovations is contingent upon the local community's ability to understand and effectively implement them. Many coastal families still lack the necessary technical knowledge of seaweed cultivation, particularly about the use of HDPE rafts, limiting the potential for large-scale adoption and sustainability. In response to this knowledge gap, the Government of India, through ICAR-CMFRI, launched a comprehensive capacity-building initiative designed to raise awareness, enhance technical understanding, and encourage the adoption of seaweed farming as a viable livelihood option. The training programs emphasize hands-on learning, equipping local fisherfolk with practical skills and the confidence to use new, region-specific farming systems tailored to Kutch's unique marine conditions thereby securing sustainable livelihoods and enhancing regional resilience.

ICAR-CMFRI launched an extensive capacity-building initiative focusing on seaweed farming targeted over 26 remote and marginalized fishing villages along the Kutch coastline, including Lakhpat, Shinapar, Chher Nani, Narayan Sarovar, Koteshwar, Kathada, Salaya, Modhwa, Tragadi, Jarapara, Juna Bandar, Mandavi, and others. Recognizing the need for localized, hands-on support, a series of customized training programs that went beyond theoretical knowledge and provided direct, actionable skills were designed. The initiative included "door-to-door" campaigns and "step-by-step" demonstrations tailored to the cultural and linguistic needs of the fishing communities. Given the diverse nature of the region, the training was delivered in local languages, including Gujarati and Kutchi, ensuring that all participants could fully grasp the content.

The training sessions were practical, village-specific, and designed to be culturally sensitive. Over 92 fishing families, totaling nearly 492 coastal fishers, participated in the program. These families were introduced to the basics of seaweed farming, learning how to identify ideal farming locations, prepare and deploy custom-designed HDPE rafts, and understand the full cycle of seaweed cultivation, from seeding to harvesting. A key feature of the training was its focus on hands-on activities, where participants learned directly by doing, under the guidance of experts. This approach allowed participants to gain a deeper understanding of the raft installation process and the seaweed cultivation techniques. It also made them more confident in implementing the innovative technology on their own, empowering them to adapt the new methods to their specific needs and environments.

Beyond the technical aspects, the training also included crucial economic education, providing fishers with knowledge about market trends, potential returns, and the overall viability of seaweed farming as a sustainable livelihood. The economic component was designed to address the financial uncertainties of seaweed farming, offering guidance on how to manage risk, understand supply chains, and access markets for seaweed products. Additionally, environmental benefits such as the role of seaweed farming in mitigating coastal erosion and its potential for eco-friendly marine resource use were emphasized. This initiative helped families diversify their income sources, contributed to broader socio-economic benefits, such as reducing seasonal migration, combating poverty, and empowering women in the community. Women were particularly involved in the program, gaining practical knowledge and confidence to contribute to household income and take part in this emerging industry. As seaweed farming has a relatively low entry barrier and requires minimal capital investment, it has emerged as an ideal alternative livelihood for many families, especially in a region where traditional fishing and agricultural activities are becoming less viable. This initiative is laying the foundation for a sustainable seaweed farming industry along the Kutch coast. Over time, it is expected to contribute to a more resilient coastal economy, also aligning with national priorities such as marine conservation, climate adaptation, and sustainable development.

The initiative has played a key role in empowering local women by providing them with new skills and income-generating opportunities. Traditionally, women in these coastal communities had limited access to economic resources. Now, they have been trained in

various aspects of seaweed farming, including site preparation, raft management, and harvesting which has strengthened their roles within their families and communities. They have taken on leadership roles in marketing and distributing seaweed products, contributing to both their economic empowerment and an enhanced status in the local economy. Through these programs, women are emerging as important contributors to a sustainable industry, challenging traditional gender roles and promoting greater gender equality in coastal regions.

A series of advanced training and exposure visits to strengthen the practical knowledge of selected coastal fishers and women engaged in seaweed farming initiatives in Kutch was also done. The chosen participants identified based on their active involvement and their potential to become catalysts for change within their communities, were taken to Tamil Nadu, a leading region for seaweed cultivation in India to broaden their technical understanding. There, they observed successful large-scale farming models through hands-on demonstrations, interactive sessions with experienced cultivators, and detailed exposure to efficient cultivation, harvesting, and post-harvest handling techniques. After completing the training, these individuals were designated as master trainers and are now actively sharing their knowledge with other stakeholders across coastal villages. Through locally led training sessions and peer-to-peer learning, they are playing a key role in expanding seaweed farming capacity along the Kutch coast, promoting wider community participation and ensuring long-term sustainability of the initiative. Continued institutional engagement, robust policy support, and well-developed market linkages will be essential to ensure the long-term success of seaweed-based livelihoods. With consistent efforts and collaboration, seaweed farming in Kutch can evolve into a replicable model for sustainable coastal development.

Research Communication

Marine Fish Valuation in India: Empirical Insights from 2024

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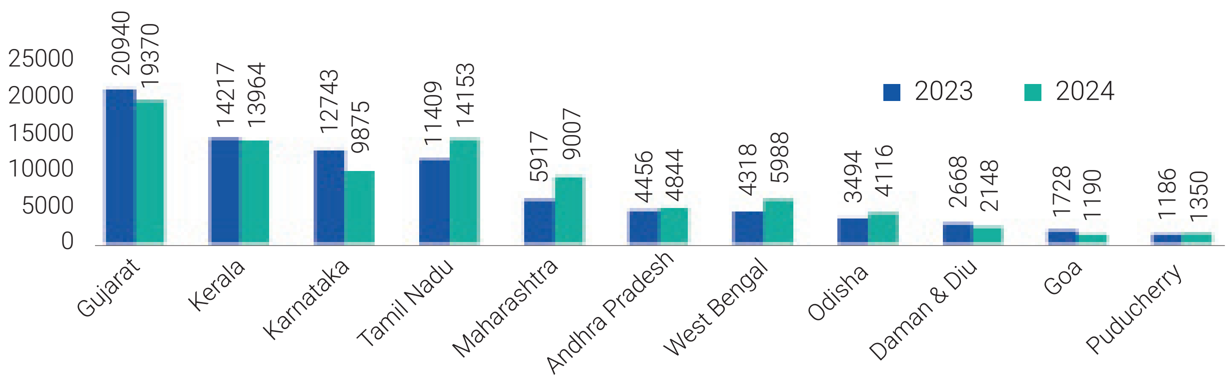
Valuation of marine fish refers to the process of assessing their economic worth at different stages of the supply chain, from the point of landing to the final retail market. At the landing centre, where fish are first brought ashore by fishers, the prices are typically lower due to bulk sales and minimal handling. As the fish move through wholesale and retail markets, their value increases due to added costs like transportation, storage, icing, labour, and profit margins. Accurate valuation is essential for understanding the contribution of marine fisheries to the economy, setting fair prices, ensuring better incomes for fishers, and framing effective fisheries policies. It also plays a crucial role in monitoring market trends, managing marine resources sustainably, and planning development initiatives in coastal and inland markets. This article presents an overview of the valuation of marine fish landings in 2024.

India's marine fisheries sector demonstrated resilience amid environmental and operational challenges, with notable increases in the valuation and pricing of marine fish landings. Despite a slight dip in overall catch volumes, both landing centre and retail market valuations witnessed significant growth, driven by strong consumer demand and escalating market prices. In 2024, the estimated value of marine fish landings in India reached ₹62,702 crores at the landing centre (LC) level, marking a 4.22% increase from 2023. At the retail centre (RC) level, the value rose more significantly to ₹90,104 crores, an 8.46% increase, reflecting stronger consumer demand and higher market prices. The unit price per kilogram of fish also saw notable growth, rising to ₹182.59 at the LC level (up 6.98%) and ₹262.38 at the RC level (up 11.33%). These increases indicate robust pricing trends across the value chain. However, despite the growth in prices and total valuation, marketing efficiency—which reflects how effectively value is added between the landing and retail points—declined slightly to 69.59%, down 3.19% from the previous year. Factors such as climate variability, including heatwaves and cyclones, particularly affected coastal states like Andhra Pradesh, where landings decreased but valuations still rose modestly. The data reflects a resilient marine fisheries sector adapting to environmental and economic challenges. This suggests that while the sector continues to generate higher revenues, there remains room for improvement in reducing intermediary costs and ensuring more equitable value distribution between fishers and sellers.

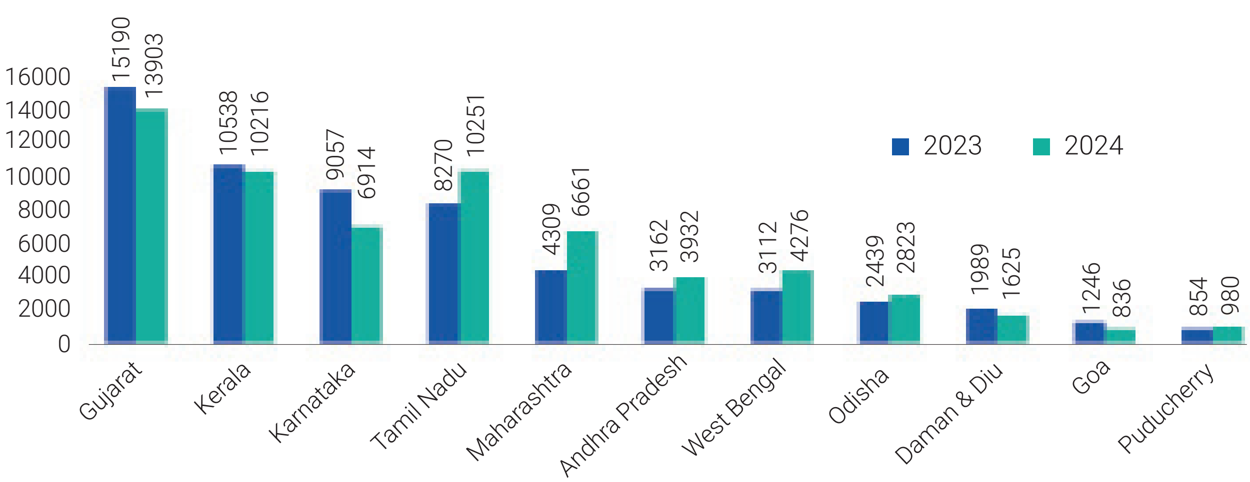
The Landing Centre (LC) and Retail Centre (RC) valuations for marine fish landings across Indian coastal states reveals that, both LC and RC valuations increased—LC rising by 4.22% to ₹62,702 crores, and RC by 8.46% to ₹90,104 crores—indicating higher unit prices and robust market demand despite a slight drop in total landings. Among the maritime states, Gujarat remained the top contributor in both LC and RC valuations, though it registered a decline at the LC level (from ₹15,190 crores to ₹14,523 crores) while

RC valuation remained nearly steady. Kerala, Maharashtra, and West Bengal showed consistent growth in both LC and RC valuations, signaling strong performance in fish landings and consumer market reach. Maharashtra, in particular, saw a sharp rise in RC valuation (₹15,138 crores to ₹19,517 crores), despite a more moderate increase at LC level.

The species-wise valuation analysis on Landing Centre (LC) and Retail Centre (RC) valuations indicates that penaeid prawns recorded the highest LC valuation at ₹5,384 crores and an RC valuation of ₹6,796 crores, with landings of 1.59 lakh tonnes. Indian mackerel, despite having the highest landings (3.43 lakh tonnes), had a relatively lower LC valuation (₹3,864 crores)



Lanidng Centre Valuation



Retail Centre Valuation

Fig. 1. State-wise Landing Centre & Retail Centre Valuation 2024 (₹ crores)

Conversely, Tamil Nadu, Karnataka, and Goa experienced decline in LC valuations, with Goa also showing a significant drop in RC valuation (₹1,728 crores to ₹997 crores), possibly due to environmental disruptions or market constraints. Andhra Pradesh showed modest gains in both LC and RC figures, while smaller territories like Daman & Diu and Puducherry displayed growth, especially in RC valuations, suggesting better price realization and market integration.

and RC valuation (₹5,583 crores), suggesting lower unit prices. Ribbon fishes and non-penaeid prawns followed in both valuation and volume, contributing significantly to total earnings. In contrast, species like scads and oil sardines had lower LC and RC valuations (LC: ₹1,268 crores, RC: ₹2,475 crores), indicating low price realization.

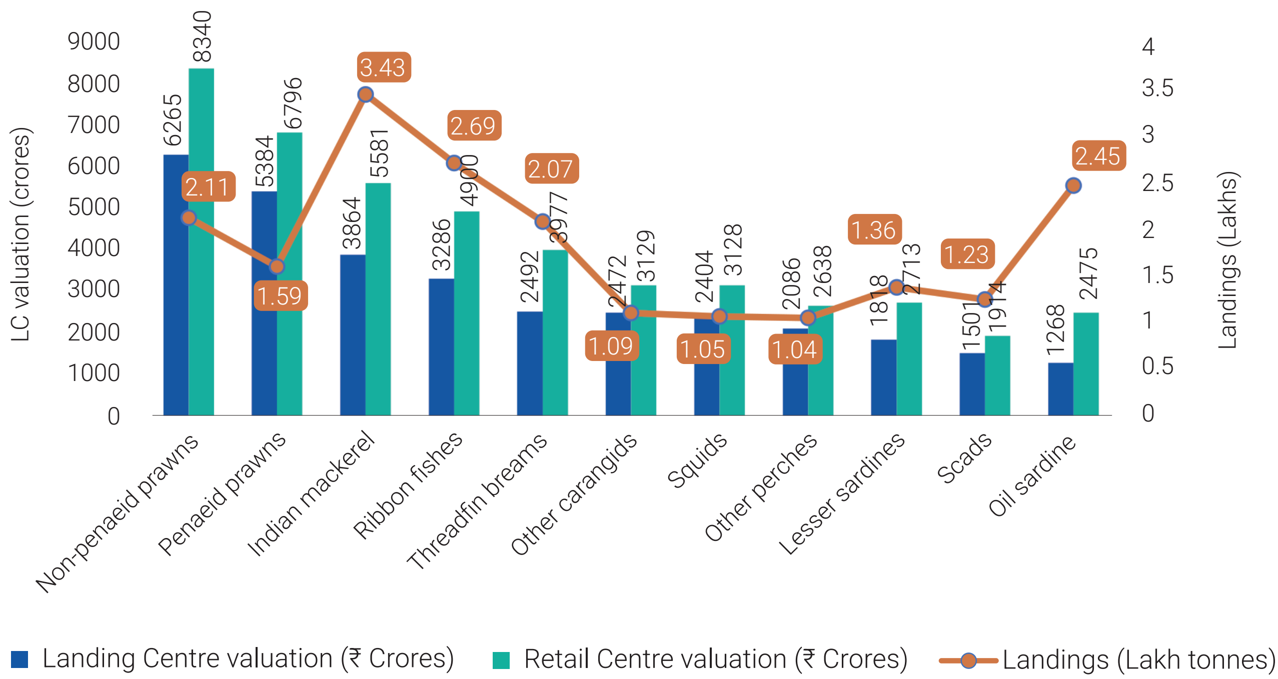


Fig. 2. Species wise landings and valuation of major marine fish species, 2024

The analysis of average Landing Centre (LC) and Retail Centre (RC) prices for major marine species in India reveals a clear value addition from harvest to market. Lobsters fetched the highest prices at both levels, with an LC price of ₹698/kg and a significantly higher RC price of ₹952/kg

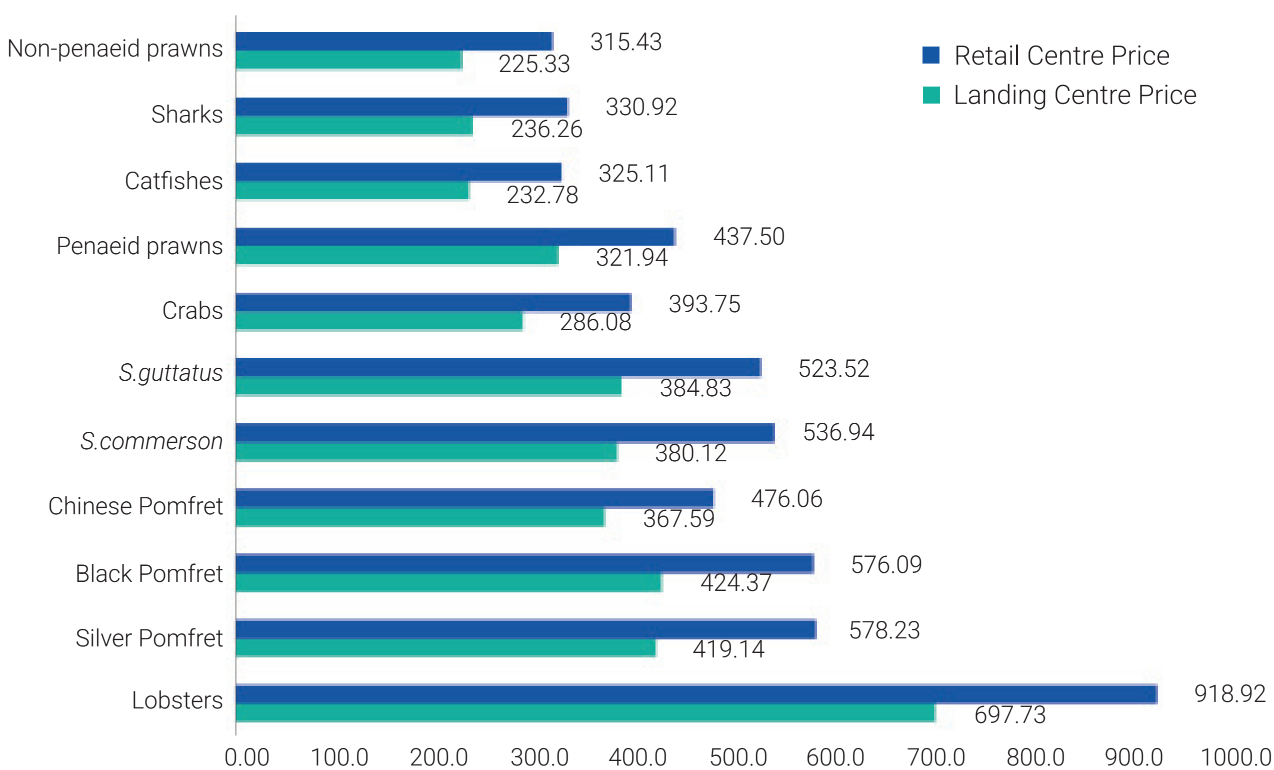


Fig 3. Price Behavior – average Landing and Retail centre prices

Silver pomfret followed, with ₹424/kg at LC and ₹624/kg at RC, while Black pomfret and Chinese pomfret also showed high values—₹419 and ₹385/kg at LC, and ₹614 and ₹524/kg at RC, respectively. Mid-range species like *Scomberomorus commerson* (₹380 to ₹520/kg), *S. guttatus* (₹368 to ₹508/kg), and crabs (₹322 to ₹426/kg) showed consistent price gains. Lower-priced species such as penaeid prawns (₹286 to ₹476/kg), catfishes (₹236 to ₹336/kg), sharks (₹233 to ₹334/kg), and non-penaeid prawns (₹138 to ₹288/kg) also experienced moderate markups. This comparison underscores the economic significance of high-value species and the role of post-harvest handling, distribution, and retail in enhancing profitability across the seafood supply chain

Kerala records the highest marketing efficiency at 71.59%, followed closely by Andhra Pradesh (70.48%) and Daman & Diu (70.05%). West Bengal (70.01%) and Maharashtra (69.99%) also perform well. States like Goa (69.60%), Gujarat (69.47%), Tamil Nadu (68.80%), Puducherry (68.49%), and Odisha (68.48%) fall in the mid-range. Karnataka records the lowest marketing efficiency at 67.54%, indicating scope for improvement compared to the other regions. Overall variations were relatively small, but coastal states with stronger infrastructure and market access performed better.

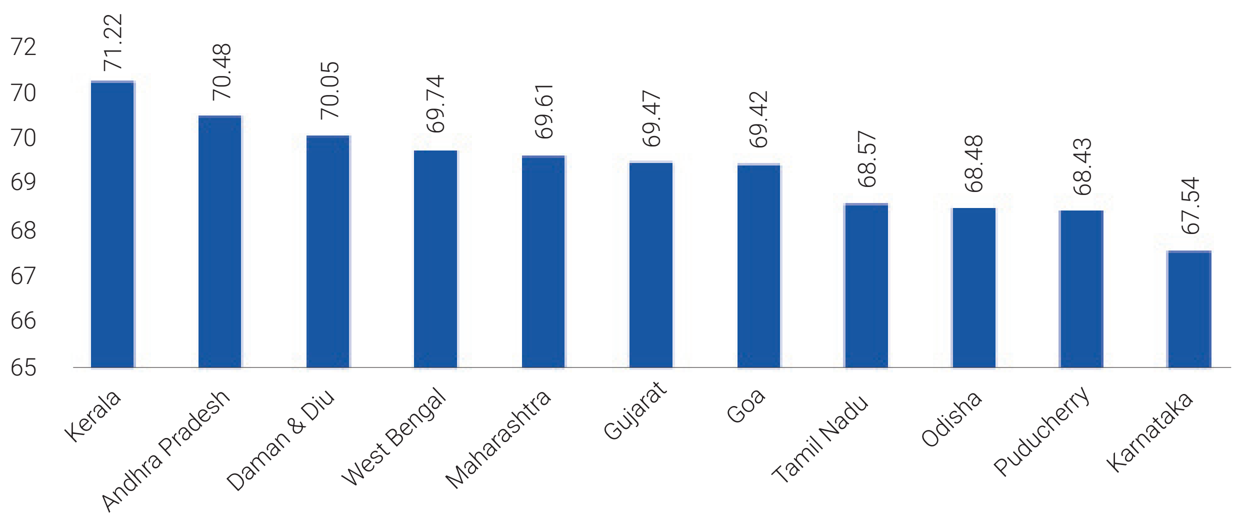


Fig 4. State-Wise Average Marketing Efficiency

Marketing efficiency of fish refers to how effectively the marketing system delivers fish from producers (fishers) to consumers, ensuring that a larger proportion of the final retail price—often expressed as the Fishers' Share of the Consumer's Rupee (FSCR)—goes back to the fishers. A high marketing efficiency indicates that the marketing channels are well-organized, post-harvest handling is efficient, intermediaries take a smaller share, and fish quality is preserved until it reaches consumers. This is often seen in high-value species or in regions with strong cold-chain infrastructure, auction systems, cooperative marketing and export linkages. The marketing efficiencies across states for various species in the year 2024 was recorded.

Marketing efficiencies assessed by the fishers' share of the consumers' rupee in 2024 were categorized as high (>75%), medium (65–75%), and low (<65%), with species grouped accordingly. High-value species such as lobsters (78.89%) and *S. lineolatus* (78.00%) exhibited the highest marketing efficiencies, likely due to their premium market demand, higher prices, and comparatively efficient supply chains that minimize intermediary margins. Other high-performing species in this category, including pomfrets, penaeid prawns, and cephalopods like squids and cuttlefish, benefit from strong domestic and export markets, better cold-chain handling, and consumer preference for quality seafood.

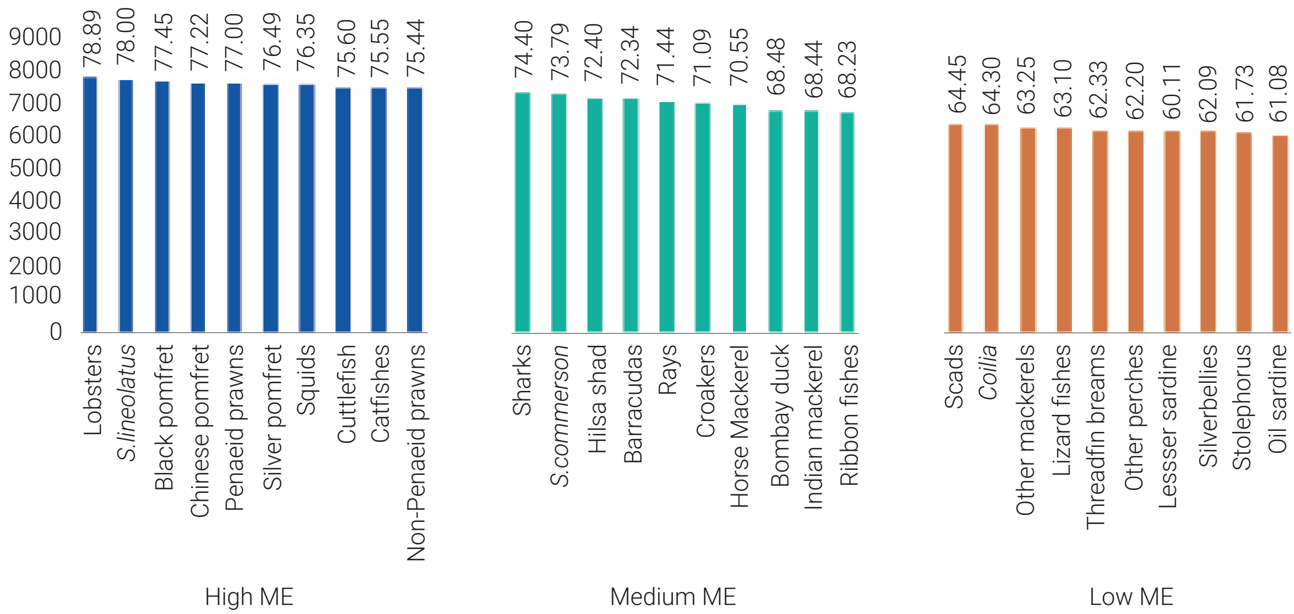


Fig. 5. Species with High/Medium/ Low market efficiencies – All India

Medium marketing efficiencies were recorded for species such as sharks (74.40%), *S. commerson* (73.79%), hilsa shad, barracudas, rays, croakers, horse mackerel, and Bombay duck. These species, though popular in certain regional markets, may face moderate marketing efficiency due to seasonal availability, fluctuating demand, or longer marketing channels that reduce fishers' net returns. Low marketing efficiencies were observed for scads (64.45%), *Coilia* (64.30%), threadfin breams, lizard fishes, silver bellies, and oil sardine (61.08%). These species are generally lower in market value, often sold in bulk for local consumption or processing, with limited price bargaining power for fishers. Additionally, high perishability, lower quality perception, and dependence on middlemen contribute to reduced fisher share in consumer prices. The study highlights that species with strong market branding, export potential, and efficient post-harvest handling achieve higher marketing efficiency, while low-value or bulk-consumed species remain disadvantaged due to structural and value-chain limitations. This pattern occurs because marketing efficiency depends on how much value a product retains from harvest to sale and how many intermediaries claim a share before it reaches the consumer. High-value species like lobsters, pomfrets, and penaeid prawns benefit from strong export demand, established market branding, and efficient supply chains with cold storage, rapid transportation, and specialized handling that preserve quality and price. They often move through shorter, more organized marketing channels, sometimes via direct contracts with exporters or wholesalers, ensuring a larger share of the consumer's rupee for fishers. Low-value or bulk-consumed species such as oil sardines, scads, and *Coilia* suffer from low initial prices, high perishability, bulk landings that require rapid sale, and longer marketing chains involving multiple intermediaries, which reduces the bargaining power and share of fishermen. To address these disparities, interventions could focus on strengthening cold-chain infrastructure, promoting value addition and product branding for low-value species, encouraging fisher cooperatives to improve bargaining power, and developing alternative marketing channels such as direct-to-consumer sales or digital fish markets. These measures could help improve the marketing efficiency of lower-value species and provide more equitable returns to fishers.

Brief Communication

Empowering coastal tribal communities with hatchery-produced shell-attached Indian backwater oyster seeds

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The production of attached spat is a crucial step in the aquaculture of *Crassostrea madrasensis* (*Magallana bilineata*), the Indian backwater oyster. Hatchery-produced oyster seed offers several advantages over wild-collected seed, making it the preferred choice for oyster farming worldwide. Hatchery-reared seed ensures uniform size, high survival rates, and disease-free stock, leading to better yield and predictable production cycles. Additionally, it helps conserve natural oyster beds by reducing overexploitation and supports selective breeding for improved growth and resilience. These oyster seeds were produced and supplied by the Vizhinjam Research Centre of ICAR-CMFRI for coastal tribal farmers of Maharashtra under the sponsorship and support of the Mangrove & Marine Biodiversity Conservation Foundation of Maharashtra. This initiative aims to enhance sustainable aquaculture practices, improve livelihood opportunities, and support the economic growth of tribal communities by providing high-quality hatchery-reared oyster seeds. Oyster farming is a significant global industry, valued at more than $7 billion, with increasing demand in markets such as the USA, Europe, and Asia. Oysters are highly sought after for their nutritional benefits, including high protein content, essential minerals, and omega-3 fatty acids. The rising demand for sustainable seafood and the gourmet food market further contributes to the expansion of oyster farming. Additionally, oysters play a critical role in marine ecosystems by improving water quality and providing habitat for various marine species. Economically, oyster farming provides livelihood opportunities to rural coastal communities. It is a low-investment, non-fed aquaculture practice with minimal pollution and high returns, enabling small-scale farmers to generate sustainable income. With proper support, including hatchery-produced seed, rural farmers can engage in profitable oyster cultivation, benefiting from both local and export markets. This report outlines the methodology adopted for attached oyster spat production, focusing on broodstock collection, spawning, larval rearing, spat attachment, and transportation.

Broodstock collection and spawning

Broodstock oysters were collected from Ashtamudi Lake, Kollam, Kerala, and transported to the ICAR-CMFRI hatchery on December 2, 2024. The oysters were strip-spawned and fertilized, producing 5 million D-shaped larvae with a size range of 60–75µm, which were stocked in FRP tanks for further rearing.

Larval rearing

The larvae were reared for 16 days until they developed a foot, indicating readiness for settlement at a size range of 200–320µm (average: 243.6µm). During this period, they were fed a diet of multi-species microalgae, including *Isochrysis galbana, Pavlova lutheri, Dicrateria* sp., and *Chaetoceros calcitrans*.

Selection of cultch material

The selection of appropriate cultch material is a crucial factor in the success of attached oyster production. Large and hard oyster shells provide a stable surface for larval attachment, while an irregular or rough surface enhances attachment and allows better water, air, and feed circulation. Conversely, small shells lack sufficient space for attachment, and old or brittle shells cannot support the weight of growing oysters, leading to reduced attachment rates and profitability. Proper cultch material selection increases attachment percentage, improves growth rates, and enhances overall profitability.

Seasoning of oyster shells

The preparation of oyster shells for spat settlement involves several steps. First, the shells are sun-dried for 2–3 months (or use already seasoned shells), then drilled at the anterior hinge area of the shell. They are then brushed, washed, and scraped to remove dirt, mud, borers, and foulers. Once cleaned, the shells are transferred to seawater for seasoning, with water exchanged thrice a week until calcium carbonate bleaching stops and the water clears. Before transferring the larvae, the shells are washed thoroughly with seawater. They are then strung on 1.4 m ropes (4 mm thickness), with 20–25 shells per rope, and left for a week to allow biofilm formation before larval introduction.

Cleaned shell rens

Spat attachment methods

Two methods were used for placing oyster shells in the tank. The first method, vertical hanging, allows for better water circulation, enhances feed and oxygen availability, and simplifies cleaning, reducing the risk of contamination. The second method, horizontal spreading (using old net bags), allows for easy handling and movement but poses a risk of anoxic conditions if not properly maintained. To prevent oyster larvae from attaching to the tank sides, a plastic liner could be used before introducing the larvae. This facilitated oyster attachment to the designated cultch material. Oyster rens were hung vertically using horizontal wooden sticks in the tank. A total of 6,500 oyster shells were cleaned, washed, and seasoned. One million larvae were evenly released into the tank.

Pouring ready to settle larvae

Feeding and water management

No water exchange was carried out for the first two days post-larval release. The larvae were fed a microalgae mixture consisting of *Isochrysis galbana, Chaetoceros* sp., *Pavlova* sp., *and Dicrateria* sp., with 60–120 L of microalgae supplied daily per million larvae. Water exchange was performed every alternate day, and larval attachment was monitored weekly. Larvae with well-developed foot structures attached within one to two days, and attached spat became visible to the naked eye after one week. The number of spat attached per shell ranged from two to twelve, with an average of 6.5 spat per shell. More than 95% of the shells had attached spat, indicating a high success rate and the overall health of the pediveliger larvae and spat attachment process.

Packing of attached spat in styrofoam boxes

Growth and transport

Ten days after larval release (26 days post-hatch, dph), the attached spat grew to an average size of 2.12 mm. By day 31 (47 dph), they reached 3.2 mm, and after 60 days of rearing (60 dph), the spat attained an average size of 8.5 mm. Styrofoam boxes measuring 74 × 54 cm were used for transportation, with each box accommodating 500 shells. The shells were arranged in five layers with seawater-soaked gunny bag pieces placed between the layers to maintain moisture. A total of 5,000 shells, containing an estimated 0.1 million spat, were packed. The boxes were sealed after providing a few holes for air circulation, labelled, and transported by train to Maharashtra. The 30-hour journey was successful, and the spat arrived safely for distribution among tribal self-help groups under the Mangrove & Marine Biodiversity Conservation Foundation of Maharashtra.

Transportation of the oyster spat

The successful implementation of attached oyster spat production ensures a reliable seed supply for aquaculture. The high survival rate and optimal growth conditions demonstrate the effectiveness of these practices. If self-help groups or the Mangrove Cell provide minimal facilities, packed larvae can be supplied for remote-setting at the destination. This technique, widely practiced in the USA and Europe, significantly reduces transportation costs while ensuring successful oyster seed production.

Brief Communication

Seagrass diversity along the southern coast of India and experimental restoration of seagrass meadows

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Human activities have significantly altered and degraded ecosystems, and ecological restoration is the process of repairing the damages by attempting to return these ecosystems back to their natural state. This differs from conservation which focuses on preventing further degradation of existing ecosystems. Restoring an ecosystem requires a comprehensive assessment of its current state of degradation, identifying the causes of damage and recognizing the potential threats. Effective restoration efforts must involve the active participation from local communities along with the involvement of government institutions in the planning, implementation and monitoring phases. For projects that involve active restoration such as soil rehabilitation and land stabilization, adequate funding, technical expertise and material support are essential. The ultimate goal of restoration should be to bring back the site to its natural physical, chemical and biological characteristics, ensuring long-term ecological balance and resilience. Seagrasses, seaweeds, mangroves, marshes and other tidal wetlands play vital roles in sequestering and storing significant amounts of carbon, protecting shorelines, and preserving ecosystem quality. Among these, seagrasses remain the least understood due the dynamic ecosystems they inhabit. Seagrasses evolved around 100 million years ago belong to four major groups. Being rooted plants, these marine autotrophs are highly influenced by the unique interactions between the water column and sediment. Consequently, their diversity varies significantly along the Indian coastline

In India, seagrasses belong to two families, with around 14 species reported. In this study, the seagrass beds located off Lakshadweep, Mandapam and Kozhikode along the southern coast of India were monitored during the period 2020-2024. The seagrass species display a range of forms, like the *Enhalus acoroides* which is endemic to Gulf of Mannar and has long strap-like leaves that can grow up to a length of 150 cm, while *Halophila ovalis* is much smaller with leaves measuring only 2-3 cm in length. *Halodule pinifolia* leaf blade length varies based on water column depth, with shorter lengths observed in shallow regions due to tidal exposure. Further, presence of rubbles hinders the growth of this species.

Presence of rubbles preventing the growth of *Halodule pinifolia*

In the present study, the maximum seagrass diversity was observed in the Gulf of Mannar, with 11 species recorded. *Cymodocea serrulata* was the most abundant species, forming 25-30% of the seagrass cover. *Thalassia hemprichii* was found to be restricted to areas with coralline debris. In the Kadulundy Estuary in Kozhikode, *Halophila beccarii* was the only species observed. The Lakshadweep islands are home to 6 species of seagrasses, but large-scale habitat loss has been reported from the region.

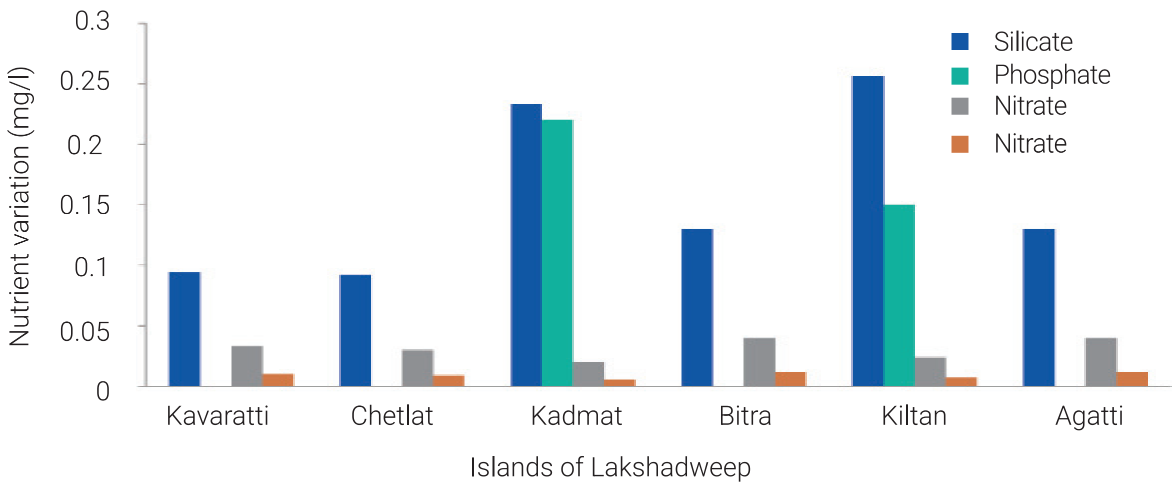
Fabrication of cage for seagrass restoration

Seagrass restoration efforts on an experimental scale for two species viz., *Cymodocea rotundata* and *Thalassia hemprichii* were initiated on 13th October 2022, in the three islands Kavaratti, Kadmat and Chetlat of Lakshadweep, an archipelago of 36 islands.

Securing seagrass plants to jute fabric for transplantation

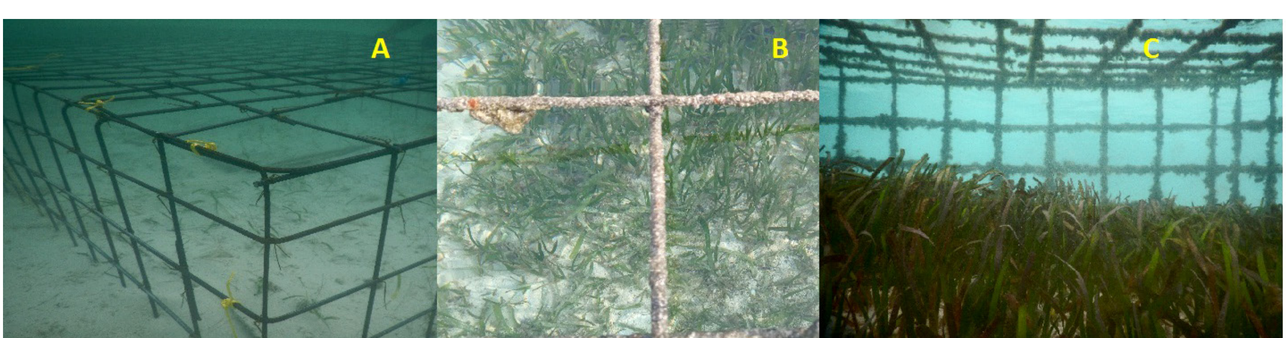
Site for transplantation of seagrass was selected based on prior knowledge of the habitat and hydrography of the region. To protect the transplanted seagrass from predators and wave action, cages of size 400 × 200 × 70 cm fabricated using iron rods of 8 mm diameter with 15 cm spacing were deployed. Healthy seagrass plants with intact rhizomes and roots having an average leaf blade length of 6.5 cm for *Thalassia hemprichii* and 11.5 cm for

Cymodocea rotundata selected from a natural habitat were used for transplantation. Initially, the plants were secured to jute fabric. The seagrass plants were inserted, positioning the rhizomes and roots below the fabric and the leaves, sheaths, and stems above. The planted jute fabric was then tied to the legs of the iron cage, covering only half of the cage area and ensuring contact with the sand below. After securing it tightly, a small amount of sand was spread



over the fabric. In the remaining half portion of the cage, seagrass plants were directly planted into the soil bed. Two such cages (each planted with *Cymodocea rotundata* and *Thalassia hemprichii*) were installed in lagoon of Kavaratti Island and one each in Chetlat and Kadmat.

The transplanted seagrasses established in all the four cages installed in the different islands. The well-protected transplanted plants successfully grew and began to colonize the adjacent area. The plants directly planted in the soil exhibited better growth than those planted using the jute fabric. During the period of observation, the surface water parameters such as temperature, pH, salinity and dissolved oxygen ranged between 27 to 28.2ºC; 7.70 to 8.10; 33.0 to 36.0 ppt and 5.8 to 8.14 mg/l, respectively. Nutrient levels in seawater were recorded from the transplanted sites and those directly planted in the soil exhibited better growth than those planted using the jute fabric. During the period of observation, the surface water parameters such as temperature, pH, salinity and dissolved oxygen ranged between 27 to 28.2ºC; 7.70 to 8.10; 33.0 to 36.0 ppt and 5.8 to 8.14 mg/l, respectively. Nutrient levels in seawater were recorded from the transplanted sites and other islands (Fig. 1). The growth of seagrass was unaffected by the onset of monsoon currents and from the impact of the Cyclone Biparjoy in the Arabian Sea in June 2023. Unlike conservation efforts, restoration initiatives are more labour-intensive and expensive, but definitely a way forward as coastal areas are physically vulnerable to increasing flooding, accelerated erosion, and seawater intrusion; issues that are expected to be exacerbated by climate change. The authors express their gratitude to ICAR-KVK Lakshadweep for extending all support in undertaking this work.



(A) Transplanted seagrass in cage 2022 (B) 2023 and (C) Seagrass growth observed presently at the transplanted sites

Brief Communication

Sea farming trials using hatchery-produced Brown mussel *Perna indica* seed along the Kanyakumari coast

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Mussels are regarded as excellent candidates for aquaculture due to their role as primary consumers, primarily feeding on phytoplankton. Their farming falls under non-fed aquaculture, as they require no additional feed or fertilisers. Embracing mussel farming can play a significant role in the blue transformation advocated by FAO, which recognizes aquatic food systems as catalysts for employment, economic growth, social development, and environmental recovery in pursuit of sustainable development goals.In India, the Brown mussel *(Perna indica)* and the Indian Peacock mussel or Green mussel *(P. viridis)* are available. *Perna indica* is limited to the southern coasts of India, spanning from Kollam in Kerala to Thiruchendur in Tamil Nadu. While both species can be farmed, the Brown mussel was preferred for sea farming due to its local availability and the favorable high salinity of the area, which is free from river inflow. There has been a recent surge in demand for mussels, causing the price to rise substantially to ₹15 per piece. Mussel meat is considered a delicacy in Kerala, Karnataka, Goa and Maharashtra. From capture fisheries, 420 tons of Brown mussels were landed in Vizhinjam, Kerala in 2020. Commercial fishing for mussels occurs only during the first and last quarters of the year due to the non-availability of larger-sized mussels during the rest of the period emphasizing the scope for farming mussels to meet the market demand.

Since the late 1970s, the ICAR-Central Marine Fisheries Research Institute made dedicated efforts to develop a viable mussel farming technology. In 1971 experimental mussel farming was initiated at Vizhinjam, using wild-collected Brown mussel *Perna indica* seed and employing floating raft culture techniques (Achari,1975). The study demonstrated enhanced growth rate and successful cultivation of mussels in sheltered waters. Furthered the research by studying Brown mussel farming with wild-collected seeds in Vizhinjam Bay and the open seas with a culture period of five months yielded an average production of 10-12 kg of mussels per meter length of rope (Appukuttan and Alagarsami, 1980). Since then, consistent endeavors were made to enhance mussel farming in marine and backwater environments. In addition to the challenges posed by the sporadic and unpredictable availability of wild mussel seed, farmers encounter significant issues such as poor seed quality, diseases, predation, and mussels dislodging from ropes due to rough sea conditions, including strong currents, wind, and wave actions. Moreover, the fast disintegration of mosquito netting used during the seeding process leads to the detachment of mussel seed from the ropes resulting in financial loss.Two trials were conducted at Kanyakumari waters to standardize culture techniques in open-sea conditions with innovations to overcome the above-mentioned problems and boost farming productivity. The first trial utilised wild-collected seeds, while the second used hatchery-produced seeds.

Innovative approaches and techniques

Custom-made combination rope

A specially crafted combination rope consisting of a nylon core and an outer coir rope layer was utilized as the branch lines. The inclusion of an inner nylon core significantly enhances the breaking strength of the ropes, allowing for the use of lengths exceeding 1 metre and thereby improving productivity per rope. The outer coir layer offers a fibrous surface area, facilitating better attachment of mussels and reducing slippage.

Custom-made cotton netting

The mosquito netting was replaced with custom-made cotton netting for seeding process. The cotton netting was specially designed to endure strong weather and sea conditions while ensuring a secure attachment of the seed to the rope. Mosquito netting deteriorates rapidly and resulting in seed loss due to slippage and non-attachment, while the new netting helped in proper attachment of the seed mussel leading to increased production.

Outer mesh cover/mesh screen

To prevent predation by fish and crabs, an additional outer mesh covering was provided for the seeded rope. This mesh acted as a protective barrier and also facilitated retrieval of any detached mussels. This outer mesh covering is particularly recommended in areas where predation rates are high and is necessary for hatchery-produced seeds, which tend to be smaller and more susceptible to predation. Favorable outcomes, with mussels exhibiting enhanced attachment and retention were recorded.

Experiment with wild-collected seed

A trial was conducted at Kanyakumari coast, where a 30-meter longline was installed in the open sea. To facilitate buoyancy, three 200-liter air-filled HDPE barrels were placed at both ends and in the middle of the line. Additionally, thirty 20 L cans were attached to the longline, corresponding to 30 sets of 2 m seeded branch lines. The longline itself was constructed using 28 mm nylon rope and secured with two 75 kg metallic anchors at either end. The farming trial incorporated innovative elements. Firstly, a custom-made combination rope was utilized as the branch line for seeding. Each branch line had a length of 4 meters, with mussels being seeded up to 2 meters. The seeded mussel ropes were made using wild-collected Brown mussel *Perna indica* spats. The specially designed cotton mesh with thicker twine was employed for seeding to ensure proper attachment of mussel seeds to the ropes under rough sea conditions. This enhanced special mesh could withstand weathering for approximately 14 days, providing sufficient time for mussel seed attachment to the combination ropes. Furthermore, an outer net cover made of nylon material and plastic line rings used as extenders to maintain a cylindrical shape for the outer cover effectively prevented the predation of mussel seeds by fish during the juvenile stage. After a four-month rearing period, the longline system yielded 1,050 kg of mussels. The mussel seed which had an initial average size of 45 mm and weight of 5.4 g reached an average length of 65 mm and weight of 16.4 g at harvest, resulting in an average production rate of 17.5 kg per metre.

(a) Mussel rope seeded with wild collected seed (b) Ropes with cover-net being tied to the long line (c) Harvested brown mussels from Kanyakumari District

Experiment with hatchery produced seed

The second farming trial used hatchery-produced seed measuring 9.1±1.1 mm in size and 0.1 g weight. The seed was stocked at a density of 2000 per meter of rope and nursery reared in Vizhinjam Bay from December to March, 2021. During this time, the seed grew to an average length of 38±5.4 mm and weight of 4.42±1.90 g. Subsequently, the mussel ropes were transferred to the sea in Kanyakumari district and were tied inside a cage used for rearing pompano, with the addition of an outer mesh screen/cover net in March 2022. Prior to the transfer, the seeded mussel ropes from the raft underwent a thorough washing and cleaning process to remove fouling organisms. Throughout the culture period, the water quality parameters remained within the following ranges: salinity between 35-38 ppt, pH between 7.7 and 7.9, and dissolved oxygen (DO) at 4.848 mg/L.

Mussel rope seeded with hatchery produced seed and cover net protection

Seeded ropes being taken to the sea for farming

Mussels were allowed to grow for 12 months and harvested in January 2023. Mussels grew to the size range of 68-106 mm with a weight range of 15.86-82.01 g (average length and weight were 83.68 ± 10.13mm & 48.73 ± 14.4 g). The average production rate of mussels achieved was 20.4 kg/meter rope. Flesh weight (wet weight) constituted 38.7% of the total weight of mussels.

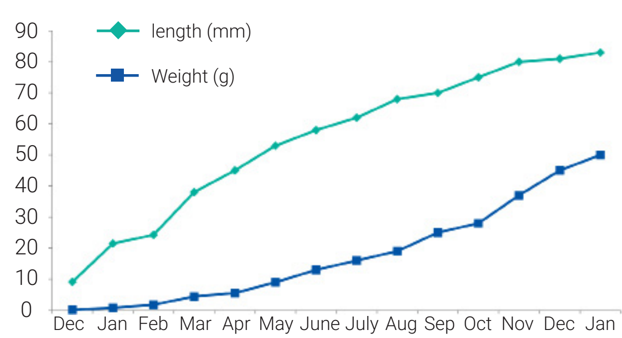

Fig. 1. Summary of an average growth of hatchery-produced brown mussel seed at sea

Harvested brown mussels from Kanyakumari District

Utilizing hatchery-produced seed offers numerous advantages. Firstly, it allows for the production of seed in the desired quantity and quality, addressing the limitations of wild-collected seed. Further, seeds can be made available for an extended period, and there is also a possibility to make genetic improvements through selective breeding and triploid production. Moreover, relying on wild seed collection can lead to conflicts with the fishing community, as overexploitation can negatively impact the fishery's health. As a result, mussel seed collection from wild is not recommended as a sustainable farming method. In contrast to mussel farming in estuaries, farming at sea offers a distinct advantage by providing an extended farming period, which allows for harvesting during non-fishing seasons. This flexibility is highly advantageous, especially compared to the typically restricted fishing timeframes along the brown mussel belt, such as December to February in Enayam and November to February in Thiruvananthapuram. Most of the world's mussel production occurs in temperate regions, which face challenges like low temperatures, slower growth rates, and higher labour costs, particularly in regions like Europe, America, Australia, and New Zealand. However, as a tropical country, India shows faster mussel growth, making it a highly advantageous location for mussel farming. The present study highlights the tremendous potential of mussel sea-farming in India, particularly as an export-oriented industry. By capitalising on hatchery-produced seed and the advantages of farming at sea, India can tap into sustainable and profitable mussel production, positively contributing to the country's aquaculture sector.

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Brief Communication

Pufferfish poses challenges to fishers of the Ratnagiri Coast

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Pufferfish, characterized by their unique ability to inflate and their potential toxicity due to tetrodotoxin, have historically been seen as a bycatch with limited commercial value. Parts of their body, particularly the liver and gonads, are also toxic to humans due to the presence of tetradotoxin (TTX), a neurotoxin causing asphyxiation and death. Although fishers have normally avoided targetting pufferfish, some states like Kerala and Tamil Nadu have integrated these species into their catch due to increasing domestic and export demands (Remya *et al*., 2024). Consumption of thoroughly processed pufferfish is a prevalent practice in Japan, China, and Korea, and increasingly being adopted in India. The burgeoning populations of pufferfish has been attributed to the overfishing of their natural predators highlighting the need for sustainable fishing practices and the conservation of predator species to maintain ecological balance. The damage caused by pufferfish to fish nets and other catches has not been formally estimated but is believed to be substantial (Mohamed *et al*., 2013). The coastal region of Ratnagiri has recently been facing a significant challenge due to the increasing presence of pufferfish, specifically *Lagocephalus spadiceus* and *Lagocephalus guentheri*. This phenomenon was first observed between August 15th and 17th, 2024 with moderate aggregation of pufferfish along the Jaigad coast. The intensity of their presence began to rise from the first week of October, peaking in the second week and then declining by the third week. By the first week of November, the aggregation had significantly decreased. Similar occurrences were noted at Mirkarwad and Zakimirya. Primarily observed at depths ranging from 7 to 20 meters in both southwest and northwest directions from the Ratnagiri coast it affected the operations of ring seiners and gill netters. Notably pufferfish menace in purse seiner and trawling operations were absent.

The pufferfish observed measured between 15 to 23 cm in total length and weighed between 150 g to 260 g. When encircled by outboard FRP ring seiners, pufferfish exhibited voracious predatory behaviour, preying on other fish caught within the nets and also caused significant damage to the net panels, gnawing through them to escape. Gillnetter fishers faced similar issues, although to a lesser extent. Hence, several catches of commercially valuable species such as Indian mackerel, seer fish, False trevally, and Indian silver pomfret were affected. Interestingly, species such as Indian oil sardine, Lesser sardines and *Thryssa* sp., were not preyed upon by the pufferfish. The fishes attacked by pufferfish had low market value, resulting in significant financial losses for fishers. During the pufferfish menace, there was a notable abundance of Indian oil sardine, Lesser sardine, and Indian mackerel along the Ratnagiri coast that could be tapped by seines. However, in the first week of October 50% of ring seiners suspended their operations due to the pufferfish menace, and further to 90% by the second week of October as damage to nets and resulting cost of repairs along with the low market value for damaged fishes discouraged fishers. There was also no provision for fishers to seek compensation for damaged nets. Fishers reported that approximately 15 to 30 percent portion of their nets were damaged by pufferfish bites. Replacing the damaged net panels with new ones cost around ₹450 to ₹600 per kilogram through the efforts of 7 to 10 net menders, with daily wages ranging from ₹600 to ₹800 per person. On average, 50 to 60 kg of new net panels were needed, and it took 3 to 4 days to repair the damaged nets that incurred losses ranging from ₹50,000 to ₹80,000. Most of the pufferfish escaped the ring seines by gnawing through them after voraciously preying on the caught fish. The remaining pufferfish in the nets were sold for fishmeal at rates between ₹14 to ₹19 per kilogram. The income from these sales could not cover the losses incurred due to net damage, ultimately leading fishers to suspend their operations.

At present, there is no policy support for financial assistance in cases of damaged fishing nets and catch due to pufferfish menace. Effective management and mitigation strategies to support the livelihoods of the local fishing communities while maintaining ecological balance is needed. Fishers of Kerala and Tamil Nadu are adopting ways to utilize the catch through processing and value addition for export to deal sudden rise of the puffer fish catches.

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Brief Communication

A note on the *Odonus niger* fishery along the Muttom- Colachel coast

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Odonus niger fishery has emerged prominently over the last 5 years becoming an economically significant seasonal resource for local fishers of Muttom- Colachel coast of Tamil Nadu. The fishery has exhibited significant landings, starting in late August each year, with expectations of continuing into January, similar to the trend observed in the previous year. The fishing is conducted between 7.46 °N latitude and 74.34 °E to 78.2 ° E longitude, about 60 nautical miles (nmi) offshore from the Muttom –Colachel coast. The targeted fishing grounds are situated at depths of approximately 30 meters, where the species is found in dense shoals. Fishing trips typically last 4 to 6 days, with trawlers returning

to coast with their catch and the harbours have developed a systematic landing mechanism with around 20 trawlers land their catch daily. Trawlers operated for the fishery are approximately 115 ft in length with each boat carrying a crew of 20 to 22 members who perform labour intensive fishing operations over multiday trips. Fishing is intensive during the season, with each day comprising three to four hauls per boat. The catch per haul ranges from 100 to 300 boxes, with occasional hauls reaching up to 500 boxes. Each box weighs 25- 35 kg, contributing to a total landing of 2000 – 2500 boxes per trip equivalently to approximately 50 to 70 metric tons. Among the catch, *O. niger* constitutes more than 95% of the total landings highlighting its significance in the fishery. Although *O. niger* dominates the landings, along with that, commercially important food fish such as snappers, pig face breams, monocanthids, cuttlefish, scads etc were landed and fetch an added benefit to them. Fishery established itself as a recurring seasonal phenomenon during August to January every year and provide substantial income to the fishers. However, the fishery is notably absent in subsequent months, as *O. niger* becomes unavailable in the same fishing grounds. This seasonal pattern, coupled with shifts in the catch composition, highlights the dynamic nature of the fishery in this region and deserves further study. During the off season, fishers opined that, from the same fishing ground, the landings comprised of species such as Nemipterids, Cuttlefish and other shoaling demersal resources. The transition of fishery may be attributed to changes in environmental conditions such as temperature, currents, or prey species availability which may influence the seasonal movement or dispersal of *O. niger* shoals. The absence of shoals in the post January months reflects its highly seasonal nature. The emergence of new resources in the same location indicates a shift in the ecosystem resource composition. The fishery also experienced noticeable changes in the size composition since its emergence approximately five years ago. According to fishers, the average size of the fish landed during the initial years was significantly larger compared to the sizes observed in recent years. The minimum and maximum length of fish landed during 2024 was 85 mm and 195 mm respectively and the total weight varies from 39 to 145 g. Almost all fishes were in indeterminate stage to identify the sex. Over the years the consistent targeting of fish during its seasonal aggregations may have reduced the proportion of larger individuals in the population. From the landings observation, it is clear about its recruitment overfishing where the capture of younger, immature fish limiting the population's ability to replenish itself. Size decline has an implication that a declining trend often signals overexploitation, as fewer individuals are reaching maturity and contributing to reproduction. Single trip of a vessel yielding 2000 to 2500 boxes of catch where each box weighing 30-35 kg is marketed. The price per kilogram of fish ranges from ₹ 7–10 depending up on the market demand and supply conditions. The fish is used as raw material for the fish meal industry, with most of the catch transported to processing plants at Mangalore. Fishers value this seasonal fishery, as it provides a stable income from fishing trip based earnings. Despite the relatively low market price per kilogram, the landing volumes ensure that every crew member earns a reasonable share from each trip, allowing them to sustain their livelihoods. Fishers emphasize that, *O. niger* fishery has alleviated financial challenges during its active months. The abundant shoals ensure good catch enabling them to cover their operational expenses. In addition to direct income for the fishers, the fishery supports a range of ancillary activities, including fish handling, processing and transportation which creates employment opportunities for others also.

So, to ensure long term sustainability, judicious exploitation of resource is critical. Stock monitoring is crucial for assessing population trends, size composition and recruitment dynamics enabling informed decision making. Ecological considerations must be integrated into the management plan to evaluate the predatory nature of fish on other species and prevent ecosystem imbalances. Last but not least fisher livelihood sustainability is imperative, with measures designed to minimize economic disruptions while promoting sustainable practices.

Brief Communication

Fishery and biology of Tomato hind, *Cephalopholis sonnerati* at Chennai

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The groupers form regular fishery in Chennai, comprising 2% to 3% of the perches landed in Kasimedu Landing Centre. They are landed by hooks and line, gillnets and trawl nets. The mechanised trawler fleet (multiday thangal trawlers) operated from Pudupattinam in the south to Nizampattinam in the north at 10-100 m depth to a distance of 50-60 km from the shore is a significant contributor. Sixteen species of groupers were recorded from Kasimedu landing centre, namely, *Cephalopholis formosa, C. sonnerati, Epinephelus areolatus, E. bleekeri, E. chlorostigma, E. coioides, E. epistictus, E. faveatus, E. heniochus, E. latifasciatus, E. longispinis, E. malabaricus, E. polyphekadion, E. radiatus, E. stictus and E. undulosus*. The head of large groupers are kept in baskets and sold separately in the market. The *Cephalopholis sonnerati*, commonly known as Tomato hind or Tomato rock cod forms regular fishery at Kasimedu Fisheries Harbour, Chennai. Locally called 'thakkali kalava' or 'sivappu kalava', *Cephalopholis sonnerati* was first formally described as *Serranus sonnerati* in 1828 by French zoologist Achille Valenciennes (1794-1864) with the type locality given as Puducherry in India. (https://www.inaturalist.org/taxa/97004-Cephalopholis-sonnerati)

Species composition studies during 2014-2018 showed that, *Cephalopholis sonnerati* dominated the grouper fishery during 2014-15 and 2016-17. During 2014-15, *Cephalopholis sonnerati* dominated the fishery with 40.9% of the grouper catch followed by *Epinephelus latifasciatus* (20.4%), *E. radiatus* (9.3%), *E. longispinis* (7.2%) and *E. coioides* (1.8%). During 2015-16, *Epinephelus malabaricus* dominated the grouper fishery with 42.8% of the grouper catch followed by *E. undulosus* (20.7%), *E. radiatus* (17.8%), *Cephalopholis sonnerati* (17.4%) and *E. epistictus* (1.3%). During 2016-17, *Cephalopholis sonnerati* dominated the fishery with 30.0 % of the grouper catch followed by *Epinephelus areolatus* (23.0 %), *E. longispinis* (14.9 %), *E. radiatus* (13.6 %) and *E. stictus* (5.5 %). During 2017-18, *Epinephelus areolatus* dominated the catch with 23.0 % followed by *Cephalopholis sonnerati* (16.1 %), *E. radiatus* (13.3 %), *E. epistictus* (10.4 %), *E. latifasciatus* (10.3 %), *E. longispinis* (9.3 %), *E. bleekeri* (8.4 %), *E. undulosus* (6.4 %), and *E. chlorostigma* (2.7 %).

Based on 164 specimens of *Cephalopholis sonnerati* collected from Kasimedu Fisheries Harbour during the 2014-2017 period, the length of the fish ranged from 120 mm to 400 mm and weight ranged from 31 g to 980 g. Females dominated the fishery (49.4%), followed by immature fish (42.1%) and males (8.5%). Among females, immature females constituted 91.4% stages while all the males were immature. The male: female ratio was 1:6.1. Empty stomachs were dominant (95.1%) and *Secutor ruconius* and *Nemipterus* sp. were noticed in the stomachs with food content. Due to its attractive appearance and taste, this fish has good export market, as well as local demand where catches are sold at ₹ 300-400 per kg. Due to market demand exploitation of juveniles is also very high forming almost 95% of the catch. Hence, suitable fisheries management plans are needed to ensure sustainable fisheries.

Brief Communication

From fishing to farming: A success story from Ramanathapuram district of Tamil Nadu

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Shri. V. Nagathass, 56 years old from Vedalai village in the Ramanathapuram district of Tamil Nadu had formal education up to 9th standard only. From the age of 12, he took to adventure by involving in fishing activities for his livelihood. Dwindling fish catches made him realise that there is an immediate need for a diversified livelihood option. At this juncture, the demonstration of lobster farming through Capture-Based Aquaculture in open sea cages by the Mandapam Regional Centre of ICAR-CMFRI in the year 2009 created awareness towards farming in the sea and gave him hope for the future. Through this demonstration, Shri. Nagathass learnt about lobster farming. After gaining more knowledge, he planned to undertake a trial by innovating his own design in erecting a pen (40 × 20 feet) covered by fish net on all sides supported by casuarina/iron poles on four sides with two compartments and introduced lobster seeds collected from the wild during 2010. After gaining confidence and experience, he narrowed down to one compartment (20 × 20 feet) in the subsequent year; however, there was a set-back in farming, since he could not get enough numbers of wild-collected lobster seeds and lost many grown lobsters as there were no hide-outs. With the technical support of ICAR-CMFRI, Mandapam, he could overcome many of these shortcomings and did a successful harvest. Providing hide-outs to prevent cannibalism and suggesting suitable feed, method and schedule of feeding were some major technical interventions provided by the institute to his farming. With the profit he accrued, he extended the farming with one more pen structure in the following year. At present, he is farming with two species of spiny lobsters namely *Panulirus ornatus* (locally called *mani singhi*) and *Panulirus homarus* (locally called *thaalai singhi*).

Shri V. Nagathass with his farmed lobsters

He is adopting two methods of pen structure in farming as mentioned below:

- Box method (20 × 20 feet): Pen covered by fish net on all four sides and also at the bottom and top. The advantage of this method is that the structure can be shifted to any place.
- Compound method (20 × 20 feet): Pen covered by fish net on all four sides and at the top, but excluding the bottom. This structure is permanent and cannot be shifted.

Introducing lobster seeds into the pen

Feeding the lobsters

Monitoring the lobsters in the cage farms

Table 1. Farming particulars

Stocking	600 numbers of 70g lobster seeds (@ 42 kg per pen of dimension 20 × 20 feet
Feeding	8% of body weight (fishes like Silverbellies, Sardine, Lesser sardine and Rabbit fish)
Culture period	8 months (June to January)
Average survival	92%
Harvestable size	200 g

Table 2. Economics of lobster farming in one pen structure of dimension 20 × 20 feet

Particulars	Amount (₹)
Fixed cost (A)	
30 kg fish nets; 4 PVC pipes of 20 ft each; 8 iron pipes of 8ft height & 3" thickness	25,000
Operational cost (B)	
Seeds (42 kg @ 1,100 per kg)	46,200
Feed	20,000
Labour	25,000
Total cost (A+B)	1,16,200
Income	
110 kg of lobsters @ ₹2,200 per kg (average)	2,42,000
Profit (Income – Total Cost)	1,25,800

Key to success

- During the initial days of his farming, he faced many setbacks, like crop loss, difficulty in getting the lobster seeds and feed, etc. In spite of his failure, he never gave up and continued the farming consistently and diligently.

- He developed contacts and rapport with fishers which ensured regular supply of wild collected lobster seeds.

- His meticulous planning in procuring the seeds (average 70 g), arranging feeds and farming operation schedules were very crucial in his success.

- As an illustration of his wisdom, the fact that he schedules his harvest for December and January because China and other South East Asian nations have high demand of lobsters during the Christmas eve and Lunar New Year (FAO, GLOBEFISH, Chinese Fish Price Report, Issue 1/2024).

- Daily visit to farm for feeding (morning 7 am) and maintenance such as removing the waste and damaged ones shows his hard work & dedication and interest in adopting best farming practices.

- An average survival of 92% and an average growth increment of 183.4 g from the initial stocking size of 70 g could be achieved in eight months of culture period.

- He is also a very good financial manager. With his earnings, he could establish a fishing accessories shop in Vedalai

- He could motivate his relatives and as a result, five of them are doing lobster farming in 10 pen structures.

His journey is a true inspiration to all artisanal fishermen, starting from fishing to farming and farming to a fish based entrepreneurship. While his key qualities allowed him to succeed. He could also motivate his fellow friends to adopt lobster farming. He won the State Level Best Farmer Award for his achievement in lobster farming in the 'Kisan Samriddhi Mela/Farmer's fair for Prosperity' during 24-26 August 2018. He also intends to engage in sea cage farming for cobia/lobster/seabass as well as pen farming for milkfish.

Recent landings on *Charybdis* (*Archias*) *omanensis omanensis* from southwest coast of India

Charybdis (Archias) omanensis omanensis Leene, 1938 collected from by-catch landings in Munambam mini harbour

A significant number of *Charybdis* (*Archias*) *omanensis omanensis* were collected from by-catch landings at Munambam during November-December 2024. A larger quantity was procured in December, with approximately 12 kg of specimens being handpicked from the landings.

Charybdis (*Archias*) *omanensis* has two known subspecies, i.e., *Charybdis* (*Archias) omanensis septentrionalis* previously reported from India and *C. (A.) omanensis omanensis*. The latter subspecies has been recorded in Indian waters for the first time. Hence detailed studies were carried out on morphometric and diagnostic characters and found the species descriptions were similar to those given by Türkay & Spiridonov (2006). The carapace is light brown in colour and anterolateral border bears with six teeth on either side, and among them sixth is the longest. Chelipeds are almost similar in size and bear granular reddish-brown patches. Second to fourth ambulatory legs are slender and the tips of the dactylus narrower than the other subspecies. Swimming legs with propodus and dactylus flattened and bear numerous fine setae along the borders. The identification of this species is confirmed through several morphological traits, which includes the most distinctive characters which separate from the closely related sub-species. They are, the pointed tips of the median frontal teeth, the twisted downward distal tip of gonopod 1 (a part of the male crab's reproductive system, which helps in transfer of sperms during mating) and the ratio of carapace width to carapace length. Earlier records on its distribution showed that the species is confined to the western Indian Ocean, specifically the Gulf of Oman and Gulf of Aden. Male and female specimens of the species have been deposited in the Designated National Repository (DNR) of ICAR-CMFRI, Kochi (ED: 5.5.1.10.2). This finding marks a significant addition to India's marine biodiversity and highlights the rich, yet unexplored diversity of the region's marine life

Despite its small size when compared to other portunid crabs in the region, *C. (A.) omanensis omanensis* holds an important role in the ecosystem, especially as a prey species in the food web. However, due to its small size, it currently holds no significant commercial value in the consumer market other than it being used for fishmeal preparation.

A closer view of *Charybdis (Archias) omanensis omanensis* Leene, 1938.

Adult male *Charybdis (Archias) omanensis omanensis* Leene, 1938.

Based on the samples collected, size range and maturity were recorded in the male and female crabs as given below.

Table 1. Details of *Charybdis (Archias) omanensis omanensis* Leene, 1938.

Sex	Carapace width (mm)	Carapace length (mm)	Total weight (g)	Mature %
Male	21.0 - 44.5	10.0 - 30.0	1.39 -12.89	94.0
Female	24.0 - 40.0	16.0 - 27.0	2.24 - 11.15	93.2

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A rare case of egg oozing from a deceased gravid Olive ridley turtle

Olive ridleys are considered the most abundant of the sea turtles (Pritchard, 1997) and found throughout the world. They are found primarily in the tropical regions of the Pacific, Indian, and Atlantic oceans. They are found all along the coast of India, including the Lakshadweep and Andaman & Nicobar Islands. Despite being the most abundant of all the sea turtles found globally, their numbers have been declining in the past few years, due to which they are currently categorized as Endangered on the IUCN Red List (IUCN, 2002). Olive ridley turtles are also listed in the Appendix I of CITES (Convention on International Trade in Endangered Species of Flora and Fauna) and thereby international trade of these turtles and their products are prohibited. All five species are included in Schedule I of the Indian Wild Life (Protection)

Act 1972, and thereby hunting of the turtles or damaging the eggs are strictly prohibited. Large mass nesting aggregations of this species over one lakh female occur in the coastal belt of Odisha in India, Costa Rica and Mexico in the eastern Pacific (Pritchard, 1997). Marine turtles are protected in Odisha under the state's Marine Fisheries Regulation Act which prohibit all mechanized fishing within 5 km of the coast and within 20 km of the Gahirmatha coast.

The nesting season of Olive ridley turtles along Maharashtra is from October to March with reports of sporadic nesting along the entire coast. They are known to nest along the coast of Maharashtra such as beach of Palshet, Ratnagiri (Katkar, 1991), Backbay, Juhu Chowpati, Girgoan Chowpati, Governor's Gate, Shivaji Park to Mahim, Juhu to Versova Mud Island, Gorai, Marve, Manori, Worli and Vashi Creek in Mumbai, Alibag, Dahanu, and in Ratnagiri (Giri and Chaturvedi, 2006). In Maharashtra Ratnagiri has the major nesting site followed by the Sindhudurg and Raigad. The major nesting was reported from Velas beach, Anjarle, (Ratnagiri), Dabholi-Wayangani, Achara Wayangani, (Sindhudurg). There are reports of accidental stranding and inadvertent landings of marine turtles along the Maharashtra coast but a majority of such instances have not been properly documented (Sundaram & Josekutty, 2009). A female turtle releases 100-150 eggs at a time, burying them deep in sand pits at beaches. It takes around 45 to 55 days for the eggs to hatch. On 22nd February 2024, we observed a moribund gravid Olive ridley turtle (carapace length: 105-110 cm, carapace width: 60-65 cm and weight approximate: 45-50 kg) stranded at Budal rocky shore (17^{o} 24' 24" N 73^{o} 10' 23" E) located just 50 km away from the nearest nesting site - Anjarle beach (17^{o} 50' 28"N 73^{o} 05' 30"E). The 17 eggs were oozed out in the tidal pool from this turtle. It seems that turtle might have come near to the shore for nesting and could have been trapped on the rocky shore due to the force of high waves splashing that resulted in multiple injuries on the body. There was no mark of entanglement of turtle in fishing gear or being struck by boat or cargo vessel. Due to decomposition subsequently gases produce bulged body abruptly, which pop-up the shell (a process where the outer layers of the shell break down, revealing the intricate structure within.) on the stranded Olive ridley. This is first instance of stranding of gravid Olive ridley turtle oozing egg due to decomposition observed along Maharashtra coast or along Indian coast. The observation of eggs oozing from a dead gravid Olive ridley turtle along the Maharashtra coast holds significant implications for understanding the decomposition process of stranded turtles, enhancing conservation efforts, and guiding future monitoring and research initiatives in the region. The Marine Fishing Regulation Acts (MFRAs) (1981) of Maharashtra have a provision for regulating fishing and conservation measures for the sea turtles in the territorial waters. These include the prohibition in operation of trawl net by mechanized fishing vessels from the seashore to 5 fathoms and 10 fathoms depth zones in specified areas; prohibition in fishing by mechanized fishing vessels of any type with more than 6-cylinder engines within the territorial waters up to 22 km; prohibition in operation of trawl gear by mechanized fishing vessels is prohibited between 6 pm and 6 am. Awareness programme on sea turtle conservation among fishers is important. Incentive schemes should be announced to protect the endangered sea turtle species. The annual Turtle Festival attracts more than 3000 tourists a year giving new income opportunities for the villagers. Raising public awareness could decrease threats and in the same time create positive actions such as rescuing, rehabilitating, and releasing the stranded sea turtles. There have been reports of stranded turtles in this area of Maharashtra. Enhancing the conservation efforts of citizen science groups and volunteers, along with implementing effective monitoring for deceased turtles and collecting relevant data, would help reveal the actual extent of strandings aiding in a better understanding of their occurrence and the challenges they encounter.

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Observation of a gorged stomach in Crimson jobfish

Crimson jobfish (*Pristipomoides filamentosus*), a member of the family Lutjanidae, are known to primarily consume teleost fishes and crustaceans, particularly shrimp and crabs. However, their dietary habits can shift significantly in response to ecological and reproductive cycles. In September 2024, a specimen of crimson jobfish was collected from the Munambam Fisheries Harbour in Kochi, India (10.18267 N, 76.17041 E). which was caught by a trawler operating at a depth of 80-200 meters off the Kochi coast, Kerala. This particular specimen was notable not only for its size but for having a fully engorged stomach with a record weight of 214.5 g. The fish itself measured 55.5 cm in total length and weighed 1.87 kg, with the stomach content accounting for a significant portion of its total body mass. The specimen was identified as an adult fish in the regenerating stage. Post-spawning behaviour in *P. filamentosus* typically involves migrating to deeper waters in search of food. This transition is linked to a change in feeding strategy, from the specialized diet observed during the breeding season to a more generalist, opportunistic feeding pattern post-reproduction.

Diverse range of prey from the stomach of *P. filamentosus*

The stomach contents analysed, indicated that the diet consisted predominantly of deep-water species. The prey items were identified to the species level are summarized in Table 1. The fish had consumed a diverse range of prey, including shrimps, flatheads, threadfin breams, and crabs. This varied diet is characteristic of *P. filamentosus* when it forages in deeper waters, reflecting its ability to adapt to different ecological niches based on life cycle stages, highlighting its resilience and versatility as a deep-water predator. This flexibility may contribute to its survival in dynamic marine environments, where prey availability can fluctuate due to environmental changes and anthropogenic impacts. Understanding such dietary adaptations is crucial for fisheries management, as it can inform sustainable harvesting practices and conservation strategies for deep-water snapper species. These findings contribute to our knowledge of the ecological behaviour of *P. filamentosus* and emphasize the importance of further studies on their seasonal feeding strategies and habitat utilization.

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Table 1. Composition of gut content

Sl. No.	Diet Content	Weight (g)	Length Range (mm)	No. of Individuals
1	*Metapenaeopsis andamanensis*	72	35-70	96
2	*Grammoplites suppositus*	16.82	38-75	20
3	*Cociella crocodilus*	37	72-100	10
4	*Nemipterus randalli*	24.6	27-83	9
5	*Monomia argentata*	4.2	16-21 (carapace width)	6

Report on Smooth-coated otters in urban Kochi

Otters are carnivorous mammals adapted for a semi-aquatic lifestyle. Being a piscivore, they mostly depend on aquatic habitats for their dietary requirements and normally rely on uncontaminated food sources which allow for considering them as one of the key indicator species of wetland habitats (Theng *et al*., 2016; Hussain *et al*., 2018; Wright *et al*., 2020). Habitat destruction, pollution, depletion of prey items, poaching, etc. are reported to be the major threats. Thirteen species of otters are found globally, of which three are reported from India, which includes the smooth-coated otter (*Lutrogale perspicillata*), Eurasian otter (*Lutra lutra*) and small-clawed otter (*Aonyx cinereus*).

The presence of Smooth-coated otters from the coastal waters of Kochi was confirmed from their colour patterns and body shape. They primarily inhabit freshwater systems but can thrive in estuarine environments characterized by mangroves and high salinity levels. The species is listed under Schedule II of the Wildlife Protection Act of India and classified as vulnerable on the IUCN Red List.The group of comprising six individuals, three of them being pups, were sighted in a freshwater pond close to a sewage channel near Queen's Walkway, Kochi on 13th June 2024. The availability of sufficient prey base for otters in the sighted waterbody is indicated. The water quality of the pond measured using an in-situ multiparameter probe, indicated 27°C, salinity was 2.34 PSU while the turbidity and TDS were 17.39 NTU and 2.81 PPT respectively. The length of the sewage channel was approximately 1.8 km, which is located near 'Mangalavanam Bird Sanctuary' and connected to the Kochi backwaters. The otters were sighted foraging and feeding fishes including Pearl spots and eels from the pond and escaping through the sewage channel. The observation lasted for more than 95 minutes. While observing they exhibited parental behavior where one adult was leading the way for the pups, towards the foraging pond. The observed sighting is the first photographic record of smooth-coated otters from the area and indicates its potential to thrive in the urban environment. While their occurrence in such areas indicates a degree of tolerance to pollution, it also

indicated water and prey availability for their survival. The otters might have been confined to that region due to the heavy urbanization of the surrounding areas, limiting their ability to explore new habitats. The smooth-coated otter is a social species that requires large stretches of river and estuarine ecosystems for their survival. Measures to protect the otters and their habitat to ensure their subsistence in the region is desirable.

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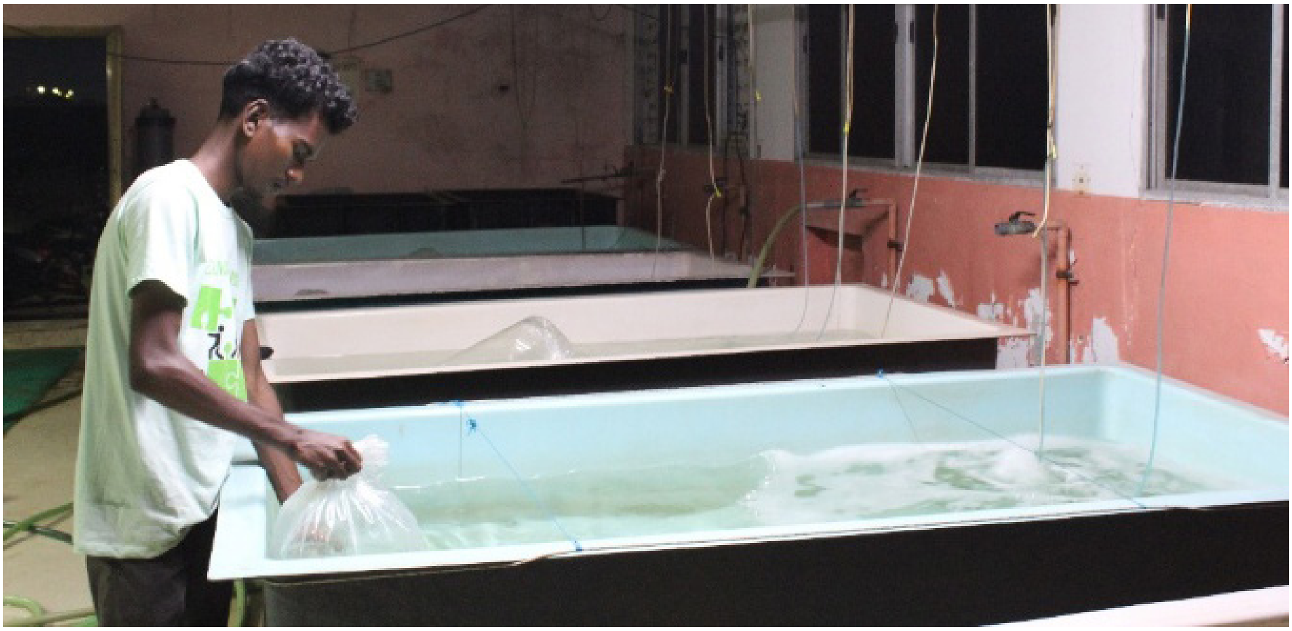
Picnic seabream seed transportation and nursery rearing



Fish seeds in the oxygenated pack are being released after acclimatized

Hatchery bred picnic seabream (*Acanthopagrus berda*) seeds of 1 inch size were transported from Karwar Regional Station of ICAR-CMFRI to its Tuticorin Regional Station in oxygen filled polythene bags of 10 L capacity filled with 5 L of water volume. The average weight of seeds was 0.6-0.8 g. Five hundred numbers of seeds were transported in 7 bags each with 70 numbers and one bag with 80 numbers. The picnic seabream seeds were starved for 24 hours prior to packing to reduce the metabolic waste especially ammonia load in the water. The seeds were packed in 35 ppt salinity seawater. The seeds were transported through air-conditioned train compartment at about 25°C. The duration of seed transportation was 25 hours from packing to releasing in the stocking tanks at Tuticorin Regional Station of ICAR-CMFRI, Thoothukudi and reached the destination with no mortality. On arrival, the seed packs were acclimatised in the hatchery water. After 30 minutes of acclimation, the seed packs were opened and the water quality parameters such as dissolved oxygen (DO), ammonia, nitrite and nitrate levels were monitored

The DO, ammonia, nitrite and nitrate levels were 2.12 mg/L, 0.12 mg/L, 0.06 mg/L and 3.20 mg/L, respectively after 25 hours of transportation. The seeds were stocked in 1.25 ton capacity FRP tanks at the rate of 100 numbers/ton water. The tanks were provided with adequate aeration and water 100% exchange was done in the next day morning with 35 ppt salinity water. The survival was recorded until 24 hours after release in to the tanks and it was 97.6%. The seeds were acclimatized at the hatchery for 30 days and reached the average size of 1.2-1.3 g. The seeds were anaesthetised using 2 phenoxyethanol at the rate of 250 ppm, weighed and stocked. The *Acanthopagrus berda* seeds were used for fish nutrition experiments to assess the dietary protein and dietary energy requirement.

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Plastic entangled juvenile Silky shark landed

The proliferation of anthropogenic debris, predominantly plastic, in the marine environment is a growing concern. While marine fish entanglement in such debris is widely reported, documentation of similar incidents involving sharks remains remarkably limited globally. Common items causing entanglement include discarded fishing lines, nets, ropes, plastic bands, and packaging straps. When these wound around the shark's fins, gills, or body, it leads to physical injuries causing restricted movement, impaired feeding, and in severe cases, death.

On 18th March 2025, a juvenile male Silky shark *Carcharhinus falciformis* entangled in plastic debris was recorded in the landings at Cochin Fisheries Harbour. The shark measuring 95 cm in total length was caught in a gillnet operated by a multiday fishing vessel at a depth of 2050 meters, off the coast of Kollam (8º 15'00 N and 69º 30' 00 E), Kerala. A hard, round plastic object, 37.5 cm in diameter, was deeply embedded just behind its head, causing a significant wound and had probably become entangled for several days. The object seems to be a washer cap. Juvenile sharks and smaller species are more susceptible to serious injury due to their thinner skin and smaller size. Entanglement often goes unnoticed in the wild, but when observed in captured specimens is usually evident through scarring or deep lesions around the affected area

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