



FISH TECH DIGEST

An E-Fisheries Science Quarterly Magazine

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[Former VC, TNJFU]

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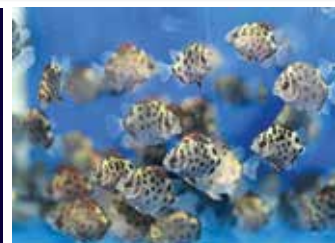
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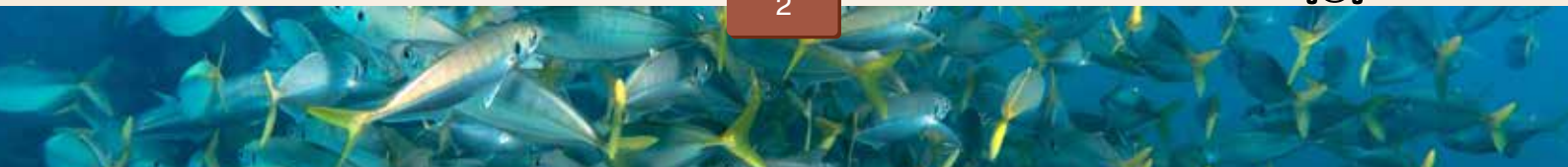
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**Editor,
Fish Tech Digest**



Foreword

It is with immense joy and gratitude to God that I extend my heartfelt greetings to all readers of Fish Tech Digest, a quarterly e-magazine by the St. Devasahayam Institute of Fisheries Science and Technology (DIFST). This magazine is a testament to the innovative spirit and our advancing knowledge and promoting sustainability in fisheries and aquaculture.

The fisheries sector is pivotal in ensuring global food security, enhancing livelihoods, and promoting sustainable aquatic ecosystems. As Chairman of DIFST, I am deeply proud of this initiative, which seeks to bridge the gap between scientific research and practical applications. Fish Tech Digest stands as a platform for sharing insights, innovations, and best practices that will empower students, researchers, fishers and industry professionals alike. This magazine will serve as a beacon of ideas, sharing cutting-edge research, technological advancements, and success stories that can inspire transformative growth in this vital sector.

I commend the editorial team, under the leadership of Prof. S. Felix, for their dedication and effort in crafting a magazine that reflects our mission and vision. Their work exemplifies the spirit of collaboration and academic excellence that defines our institution. I am confident that it will inspire, educate, and serve as a catalyst for growth in fisheries science and technology.

As we launch this magazine, I encourage readers to actively engage with its content, provide feedback, and contribute to its growth. Let us work together to create a sustainable future for the fisheries sector, ensuring that our actions today have a positive impact on generations to come.

May this publication continue to flourish, enlightening minds and fostering sustainable development in this vital field.

Blessings and best wishes,

Most Rev. (Dr.).Nazarene Soosai Th. D.D.D.

Chairman, DIFST

Bishop of R.C. Diocese of Kottar



From the Desk of the Dean

Dear Readers,

Greetings from the DIFST!

In today's rapidly advancing world, the role of technology in agriculture and fisheries has never been more crucial. To ensure that innovations reach their fullest potential, it is imperative for educational institutions, particularly state agricultural universities (SAUs), to actively focus on bridging the gap between laboratory research and real-world application. The dissemination of new knowledge, techniques, and technology must extend beyond academic circles and into the hands of the communities who can truly benefit from them.



Recognizing this, St. Devasahayam Institute of Fisheries Science and Technology (DIFST) is proud to introduce an initiative dedicated to knowledge-sharing and community empowerment: "Fish Tech Digest"—an e-magazine focused exclusively on the latest advancement in fisheries science and technology. This digital platform will showcase articles that cover a broad spectrum of topics, including aquaculture, aquatic environment, aquatic animal health, fish processing, fisheries engineering, fisheries economics, fisheries extension and fishing technology, presenting both research-backed insights and practical applications. Each issue will be carefully curated with high-quality articles supported by reliable national and international data, making Fish Tech Digest a trusted source of knowledge in the field.

Moreover, this e-magazine aims to highlight collaborative efforts within the fisheries sector, drawing contributions from esteemed research institutions, other universities and KVKs (Krishi Vigyan Kendras). We hope to provide a space where the best ideas and practices in fisheries can be shared, with a strong focus on making a positive impact on farming and fishing communities across the state and the nation. Our commitment to this goal is unwavering, as we believe that true progress comes from collective growth and the continuous exchange of knowledge.

Fish Tech Digest is more than just a publication—it is our commitment to serving the community and advancing the field of fisheries science. I look forward to seeing the impactful insights and valuable contributions that will shape each issue, and I am excited for all of you to be a part of this journey.

Thank you for your continued support and engagement.

Warm regards,

S. Felix

Dean, DIFST

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Conservation and Sustainable Utilization of Ocean Resources for Livelihood Development: Initiatives Of NBFGR

S. Akash, U. K. Sarkar and T. T. Ajith Kumar*

ICAR - National Bureau of Fish Genetic Resources

Lucknow - 226002, Uttar Pradesh

* Correspondence: ttajith87@gmail.com

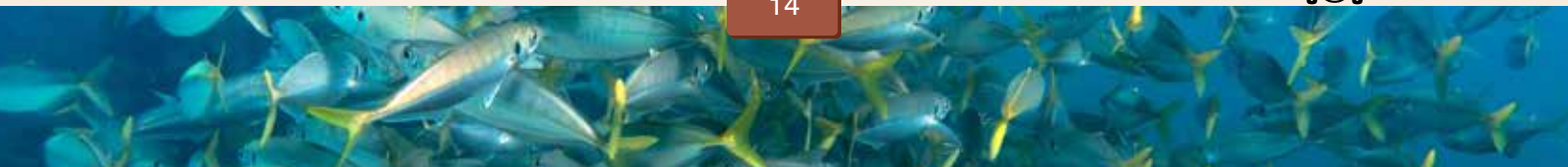
Abstract

India's Blue Economy is a cornerstone of its sustainable development vision, with coastal and marine resources vital for biodiversity and livelihoods. ICAR-NBFGR spearheads efforts to conserve these resources while supporting coastal communities through initiatives like aquaculture and germplasm resource centers. Marine ornamentals, a growing global market, offer opportunities for income generation while alleviating pressure on wild populations. Challenges like limited breeding success and environmental degradation are addressed through innovative practices and community engagement. By promoting captive propagation, training programs, and sustainable trade, these initiatives bolster conservation, create employment, and enhance local economies. Integrating sustainability with livelihoods ensures a balanced approach to marine biodiversity and economic growth.

Introduction

The Government of India's vision of new India by 2030, highlighted the Blue Economy as one of the ten core dimensions of growth. The blue economy was mentioned as the sixth dimension of this vision stressing the need for a coherent policy integrating different sectors, so as to improve the lives of the coastal and island communities, accelerate development and employment. India has a unique maritime position and its 7517 km long coastline is home to nine coastal states and 1382 islands. The country has 12 major and 187 minor ports, handling about 1400 million tons of cargo every year, as 95% of India's trade by volume transits by sea. India's Exclusive Economic Zone of over two million square kilometres is rich in living and non-living resources and the coastal economy also sustains over 4 million fishermen and other coastal communities. With these vast maritime interests, the blue economy in India has a vital relationship with the nation's economic growth. In recent years, there have been a series of initiatives for sustainable development in the maritime domain. These initiatives are catalysts to strengthen the growth of India's maritime interests and blue economy. In the post COVID-19 global scenario, India is likely to witness significant growth in the marine sector by efficient and sustainable utilization of ocean resources.

India should strive for efficient and sustainable utilization of ocean resources and to integrate and boost ocean related capabilities, capacities and skills, with a view to accelerate employment and gross value addition, while safeguarding the environment and in harmony with the UN Sustainable Development Goals (SDG). (Draft Policy Frame Work, Govt. of India). In this milieu,



the ICAR - National Bureau of Fish Genetic Resources (NBFGR) is taking initiatives to conserve the coastal and marine resources of our nation for intellectual property protection, sustainable utilization and posterity.

Marine resources

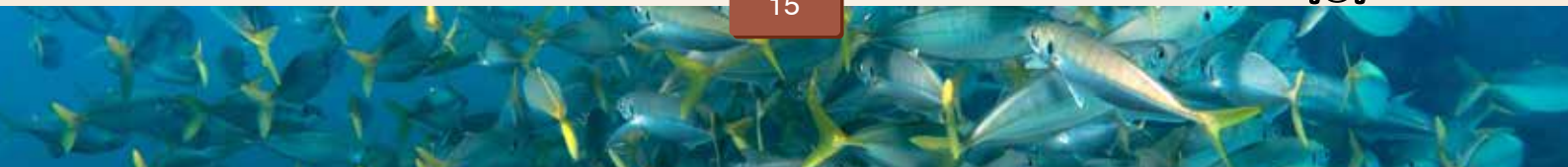
Coastal and marine resources, particularly ornamental organisms are the charming marvels of the oceans, found mainly in the coral reef regions. These organisms with bright colours and morphological peculiarities have always fascinated the hobbyists. The ornamentals are not only maintaining the ecological balance of marine and coastal ecosystems, besides supporting the livelihood of the coastal and island communities of maritime countries. Breeding and rearing of marine ornamentals not only provide an alternative supply to the aquarium market, but also provide new information to science. Recent advances in hatchery production technology and rearing systems, including improvements in feeds for different life cycle stages will enable more species to be cultured in controlled conditions. However, to date, successful rearing has been scientifically reported for only with few species.

The aquaculture production of seafood for domestic consumption and export have been in the spotlight for few decades, however, culture of marine ornamentals is relatively unknown. This is not, because of its lack of potential, as the global aquarium industry is currently valued at \$15 billion and it is expected to reach almost \$20 billion by 2026. The value is globally increasing with an average growth rate of 14% per year comprising retail and wholesale business. It is difficult to estimate the long-term effects of this capture fishery from the vulnerable reef ecosystem, which is already facing serious challenges of anthropogenic efforts, climate change and coral bleaching.

Challenges

The limited success in marine ornamental aquaculture is attributed with variety of causes and among them, two are the foremost; complex nutrition of early life stages and the husbandry requirements for many species. In addition, collection of marine ornamentals has become an important economic factor in some source regions, but detailed information on its contribution to the livelihoods of coastal and island communities is largely missing (For example, the adjacent villages / islands of Gulf of Mannar, Lakshadweep and Andaman & Nicobar).

Since, the trade on marine ornamental species has become a highly profitable and a fastest growing industry in the world, the pressure on wild populations is building up and creating a wide array of environmental implications. Therefore, it is need of the hour to promote captive propagation of marine ornamentals for commercial purposes. Further, the marine ornamental aquaculture provides employment opportunities to the coastal & island communities and also provides ways to have foreign exchange to many developing countries, alternatively adding colour to blue economy.



Long larval duration and/or low survival rates remain stumbling blocks for commercial rearing of highly priced lobsters, caridean and stenopodidean shrimps, however the recent successes in the captive culture of *Thor hainanensis* and *Ancylodarcis brevicarpalis* (courtesy: ICAR-NBFGR) is a promising scope for this sector to go forward. It is improbable that, aquaculture could fully replace the wild collection and trade, however, in appropriate conditions; sustainable production of marine ornamentals could be carried out simultaneously in popular collection areas. If this is envisaged, it could provide new employment opportunities, improve awareness of sustainable practices and enhance the economic infrastructure rather from wild collection.

Marine ornamentals in India

Indian reef regions possess a rich diversity of ornamental fishes covering around 400 indigenous varieties. However, more than 100 numbers of exotic species are also found in the aquarium trade. In India, the potentials of ornamental fishes and invertebrates and their stock need to be assessed for rational collection and export. About 44 species of marine ornamental fishes under aquarium trade from India that has been assessed for their conservation status by the IUCN.

In India, there is a good potential for culture, due to enormous geographical distribution and extensive species diversity. Our waters are blessed with a wide array of marine ornamentals, while our contribution is less in exports. Compared to other Asian countries, the Indian ornamental fish sector is small, but exciting with tremendous growth and large-scale gainful employment generation.



Fig1. *Thor hainanensis*, Candidate species for Community aquaculture at Laksahdweep

Initiatives of ICAR-NBFGR

The ICAR-National Bureau of Fish Genetic Resources (NBFGR) has established a Germplasm Resource centre for marine ornamental invertebrates is established at Agatti Island, Lakshadweep (courtesy: DBT & CMLRE), which is a new approach in the country as working model for harmonizing biodiversity conservation and livelihood promotion. Exploratory surveys conducted in different pristine reef islands of Lakshadweep, revealed hidden diversity with discovery of new shrimp species, which is new to Science (5 Nos.) and new distributional records (10 Nos.) and trials are on in bringing few of them to commercial aquarium trade through captive propagation with people participation. These fascinating ornamental shrimps exhibit myriad colors, semiotic association with other groups, behaviours and body forms, which make them attractive to the hobbyists, suggesting potential avenues for promoting marine ornamental trade, besides supporting the livelihood of the island community.

Two species of marine ornamental shrimps, *T. hainanensis* and *Ancyllocaris brevicarpalis* were acclimatized for broodstock and juveniles were raised in captivity and this is the first attempt in India and international. The rearing technology of them has been transferred to the islanders and beneficiaries are involved in culturing the captive raised ornamental shrimps in four community aquaculture units at Agatti island, Lakshadweep on cluster mode approach and generating regular income through established market channels.

Further, in collaboration with the Mangrove Cell of the Department of Forest, Government of Maharashtra, a demonstration ornamental fish hatchery was established on the premises of the coastal and marine biodiversity centre, Thane, Maharashtra, India. This facility was established for the supply of hatchery bred / metamorphosed clowns to the beneficiaries for further rearing in their cluster mode rearing units, which will help to improve the livelihood of the coastal community and help in conserve the marine biodiversity too. 15 cluster mode beneficiaries' units for clownfish aquaculture were established at Ratnagiri, Palghar and Sindhudurg districts of Maharashtra and captive raised clown juveniles were stocked, reared them and retail marketing is being practiced by the beneficiaries.

Aquaculture of aquatic organisms is a way to safeguard the bio-resources and maintain the ecological balance. In addition, captive propagation, adaptation and supply of organisms for consumption and aesthetic purposes will be created more employment opportunities in the coastal and island regions and it will raise the hope of the people and their living standard. The proposed model for establishing individual / small scale cluster mode rearing setup requires only a minimal investment, diminutive working area, limited water volume and very minimal manpower and this may be expanded as big enterprise also.





Fig 2. Beneficiaries unit at Sindhudurg, Maharashtra



Fig 3. Community aquaculture unit with beneficiaries and DG, ICAR at Lakshadweep

Conclusion

Ornamental aquaculture and trade are providing direct and indirect livelihood support to millions of people around the world. This sector is being emphasised as a priority area for reducing the pressures on coral reefs, arising from over exploitation and destructive fishing associated with the trade. Conservation and sustainable utilization of marine biodiversity depends on the successful development of captive rearing technologies. If this is achieved with a greater number of species, the increasing concern over the sensitive reef system could be subdued and the coral reefs could be protected worldwide.

Since, the coastal and island community are weak in financial system and depend on seasonal jobs, which leads them become dwellers of coral and mangrove ecosystems. Therefore, there is an urgent need to develop a long-term management strategy for regular employment and routine income generation. Further, the imminent global collapse of coral reef ecosystems is increasing the importance of marine ornamental aquaculture, not just to supply the aquarium trade, but also to possibly reintroduce species, which might become extinct in the wild. While the farming of marine ornamentals might not reach the same scale as conventional food fish production, the trade is starting to reward pioneers with considerable returns, while also benefitting local communities and, of course, the oceans.

Acknowledgements

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