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Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem

BOBP-IGO Office, Chennai I 11 April 2025

Bay of Bengal Large Marine Ecosystem Project Phase II (BOBLME II)

Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem

BOBP-IGO Office, Chennai | 11 April 2025

Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO)
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About the Organizers

Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO)

The BOBP-IGO is a regional fisheries advisory body with Bangladesh, India, Maldives and Sri Lanka as its contracting parties. It is mandated to enhance cooperation amongst its member countries and other countries (especially, Indonesia, Malaysia, Myanmar and Thailand) for sustainable fisheries management in the Bay of Bengal region. The BOBP-IGO Secretariat is located at Chennai. The Department of Fisheries, Government of India is the nodal agency from India and the hosting agency.

Preparation of Report

This report on the “Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem” has been prepared by BOBP-IGO under the Bay of Bengal Large Marine Ecosystem Project Phase II (BOBLME II).

The Workshop was held at the BOBP-IGO Office in Chennai on 11 April 2025 and was conducted in collaboration with FAO, NORAD, and other stakeholders including government departments, research institutions, and NGOs.

Core Team

Dr. P. Krishnan, Director, BOBP-IGO, Chennai

Dr. E. Vivekanandan, Senior Scientific Consultant, BOBP-IGO, Chennai

Mr. Rajdeep Mukherjee, BOBLME Consultant, BOBP-IGO, Chennai

Dr. T. Velumani, Project Scientist, BOBP-IGO, Chennai

Dr. Anisha Shafni John, BIMReN Coordinator, BOBP-IGO, Chennai

Preferred Citation

BOBP-IGO. (2025). Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem – Report. Bay of Bengal Programme Inter – Governmental Organisation (BOBP-IGO).

Executive Summary

On April 11, 2025, a consultative workshop titled " Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem" was held at the BOBP-IGO Office in Chennai under the Bay of Bengal Large Marine Ecosystem Project Phase II (BOBLME II). Organized by the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), the workshop brought together 12 participants from key institutions including the Department of Fisheries Tamil Nadu, Tamil Nadu Forest Department, ICAR-CMFRI, Annamalai University, and MSSRF. The event aimed to initiate the planning process for implementing the Ecosystem Approach to Fisheries Management (EAFM) in the ecologically significant Pichavaram mangrove ecosystem. Discussions focused on stakeholder identification, challenges in co-management, and integrating ecological, livelihood, and governance considerations. Experts highlighted issues such as invasive species, declining fish stocks, weak institutional structures, and the need for inclusive governance. Case studies and presentations emphasized participatory decision-making, sustainable livelihood diversification, and market linkages. The workshop concluded with a strong consensus on developing a detailed EAFM scoping report and EAFM plan through coordinated stakeholder action, scientific assessments, and alignment with national and regional fisheries management frameworks.

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1. Introduction

Under the BOBLME Project Phase II (BOBLME II), the Strategic Action Programme (SAP) of BOBLME Phase I is being implemented through the project titled, "Sustainable management of fisheries, marine living resources and their habitats in the Bay of Bengal region for the benefit of coastal states and communities". The project is funded by the Global Environment Facility (GEF) and the Norwegian Agency for Development Cooperation (NORAD) and implemented by the Food and Agriculture Organization of the UN (FAO). The International Union for Conservation of Nature (IUCN), Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO, for its member-countries), and Southeast Asia Fisheries Development Center (SEAFDEC, for countries part of BOBLME project) are the executing agencies of the project. BOBP-IGO is implementing the project in Bangladesh, India, Maldives and Sri Lanka.

To implement EAFM in the region, the BOBP-IGO conducted a series of workshops in the four countries for selection of Fishery Management Units (FMUs). In India, Fishery in Pichavaram Mangrove Ecosystem was selected as one of the FMUs for implementing EAFM. For scoping the FMU, the BOBP project team made the first visit on 3 & 4 March 2025, and the second visit along with FAO project support mission on 12 & 13 March 2025.

After the two visits, the BOBP-IGO conducted a Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem on April 11, 2025, in Chennai. The objectives of the Consultative Workshop are to

(i) Initiate the process of EAFM plan preparation;
(ii) Discuss the work plan for initiating and implementing EAFM in Pichavaram Mangrove Ecosystem;
(iii) Identify potential collaborators and stakeholders and connect them with the process; and
(iv) Identify the capacity development needs for implementing EAFM.

Twelve participants from India's leading institution participated in the workshop in addition to BOBP Team. The agenda and list of participants is placed in Annexures 1 and 2, respectively.

2. Opening Session

The BOBP-IGO, Director, Dr. P. Krishnan, welcomed the participants, setting the stage for a focused dialogue on implementing the Ecosystem Approach to Fisheries Management (EAFM) in the Pichavaram mangrove ecosystem. He emphasized that the EAFM is not just a conservation framework, but a holistic strategy that integrates ecological sustainability, community livelihoods and institutional collaboration. Dr. Krishnan highlighted the urgency of addressing localized challenges such as habitat degradation, invasive species, and fragmented governance through participatory and science-based planning. Framing the workshop as a foundational step forward for co-developing a scalable and inclusive fisheries management model, he encouraged all stakeholders to share their insights and commit to long-term ecosystem stewardship.

3. Introductory Presentation on BOBLME II and EAFM

Dr. E. Vivekanandan, Senior Scientific Consultant, BOBP-IGO made a presentation on the "Overview of EAFM".

3.1 Dr. P. Krishnan: BOBLME Project

Following the welcome address and self-introduction session, Dr. P. Krishnan, Director, BOBP-IGO set ground for the workshop through an introductory presentation on the BOBLME Project.The Bay of Bengal Large Marine Ecosystem (BOBLME) initiative, a collaborative undertaking involving seven countries and six international partners, marks a significant regional commitment toward sustainable marine resource management. The presentation opened with a retrospective of BOBLME Phase I (2009–2015), highlighting the endorsement of the Transboundary Diagnostic Analysis (TDA) in 2012 and the Strategic Action Programme (SAP) in 2015—key milestones that laid the scientific and institutional groundwork for the current phase. BOBLME Phase II (2024–2028), defined as the SAP Implementation Phase, is designed to advance the sustainable management of fisheries and marine living resources across the Bay of Bengal. With a total funding envelope of USD 13.83 million, the programme is led by the Food and Agriculture Organization (FAO) and executed in partnership with IUCN, BOBP-IGO, SEAFDEC, and national ministries responsible for fisheries, agriculture, and environment. Spanning five years, comprising inception, implementation, and monitoring phases—the project follows a structured and inclusive approach that emphasizes institutional strengthening, baseline assessments, stakeholder participation, and synergy with ongoing national and international efforts. The programme is organized around five interlinked components, reflecting a research-informed, coordinated methodology. A key feature of the presentation was the focus on the Pichavaram site, selected as a pilot for implementing the Ecosystem Approach to Fisheries Management (EAFM). The EAFM initiative in Pichavaram aims to promote biodiversity conservation, strengthen governance through stakeholder participation, improve livelihoods, enable fish product certification, and create a scalable framework for broader application. Anchored in scientific evidence and supported by policy alignment and local engagement, the BOBLME II project offers a model for ecosystem-based fisheries management in the region.

Dr. P. Krishnan *is currently serving as the Director of the Bay of Bengal Programme – Inter Governmental Organisation (BOBP-IGO), Chennai. His area of expertise is in sustainable livelihood development, coastal resource management, fisheries development, and agro-ecosystem management, coastal zone management, agricultural research, and multi-institutional projects focused on evidence-based decision-making, biodiversity conservation, and policy development.*

3.2 Dr. E. Vivekanandan: Overview of EAFM

The Ecosystem Approach to Fisheries Management (EAFM), represents a pivotal transition toward integrated and sustainable fisheries governance in the Bay of Bengal region. Anchored in the principles of ecological well-being, human well-being, and good governance, EAFM advances a holistic, inclusive, and adaptive management framework. It builds upon existing systems by promoting inter-agency coordination, enhancing stakeholder capacity, and integrating both traditional and scientific knowledge. Endorsed through global processes including the 1995 Reykjavik Declaration and the 2002 World Summit on Sustainable Development, EAFM is recognized as a key instrument for achieving sustainable development goals, and the Bay of Bengal is one of 66 large marine ecosystems identified globally for its application. The Theory of Change supporting EAFM addresses systemic issues such as overfishing, habitat degradation, and pollution, and aims to shift governance from fragmented to ecosystem-based models that deliver ecological integrity, food security, and resilient livelihoods.

In India, site selection for EAFM implementation followed a scientific and participatory process involving expert consultation and scoring across six coastal ecosystems. Three Fishery Management Units (FMUs) were identified: (i) Pichavaram Mangrove Ecosystem, (ii) Coringa Mangrove Ecosystem, and (iii) Grouper Fishery in South Andaman, with Pichavaram ranking first. The site was selected based on its ecological significance, traditional artisanal fisheries, and socio-economic dependence of marginalized communities. The EAFM implementation plan in Pichavaram is structured across four phases: (i) a two-month scoping study to document ecosystem characteristics, stakeholders, and threats; (ii) a two-month planning phase with expert and stakeholder inputs; (iii) a 24-month implementation period focused on co-management establishment, training, and monitoring; and (iv) a six-month evaluation and adaptation phase. The Centre for Advanced Study in Marine Biology, Annamalai University, leads the technical support for this process. Expected outcomes include enhanced biodiversity, strengthened governance, improved community livelihoods, and the potential for fishery product certification. Pichavaram is positioned to serve as a national model for scaling up EAFM implementation across India.

Dr. E. Vivekanandan *is currently working as a Senior Scientific Consultant at Bay of Bengal programme – Inter Governmental; Organisation (BOBP-IGO), Chennai. He belongs to the Agricultural Research Service of India. He has years of experience in marine fisheries research and development. He has pioneered the research on fish stock assessment, climate change, marine mammals and marine fisheries management.*

4. Remarks

Dr. S. T. Balasubramanian

The remarks delivered during the session underscore a visionary and long-standing commitment to ecosystem-based fisheries and mangrove conservation, with a specific focus on Pichavaram as a model site. He emphasized the potential of Pichavaram to serve as a national showcase for EAFM, not only for its rich biodiversity and traditional artisanal fishing practices but also for its suitability for marine ornamental aquaculture, mangrove restoration, and polychaete culture as

viable livelihood options. The need to protect the mangrove ecosystem from invasive species, while simultaneously expanding mangrove nurseries with carbon-sequestering multi-species plantations, was stressed as part of a broader climate resilience and biodiversity enhancement strategy. The speaker called for science-driven, community-supported, and policy-enabled interventions that integrate livelihood, conservation, and blue economy objectives, positioning Pichavaram and similar sites like Coringa Mangroves and Muthupet Mud flats as national flagships for EAFM and coastal ecosystem governance.

Dr. T. Balasubramanian *is a renowned marine biologist with extensive expertise in estuarine ecology, coastal ecosystem conservation, and marine biodiversity. He has made pioneering contributions to mangrove conservation and environmental impact assessments, significantly influencing sustainable coastal management practices in India. As a key academic and institutional leader, he played a vital role in establishing and strengthening marine research and education frameworks.*

Dr, P. Krishnan, Director of the BOBP-IGO outlined that the project is a collaborative vision for institutionalizing the Ecosystem Approach to Fisheries Management (EAFM) through Fishery Management Units (FMUs) by drawing inspiration from integrated models such as the ICZM framework. He emphasized that many valuable activities, ranging from mangrove restoration to academic research and departmental fisheries management are already underway across sectors, but often occur in isolation without inter-agency coordination. The project aims to create a shared platform where fisheries, forest, environment, academia, and research institutions converge to co-develop and implement multi-stakeholder fisheries management plans for each FMU, much like the integrated planning in coastal zone management. The goal is to foster a sense of collective ownership and institutional synergy, ensuring that each stakeholder recognizes and contributes to shared ecological and socio-economic outcomes. FAO, IUCN, BOBP-IGO, and SEAFDEC will play an enabling and knowledge-facilitating role, while ground-level implementation will remain with existing institutions, setting a precedent for continuous, collaborative governance beyond the project duration.

5. Lead Presentation

Following the Introductory session, Dr. A. Gopalakrishnan, Assistant Professor, Centre of Advanced Study in Marine Biology, Annamalai University made his presentation on the core theme of the project “Fishery in Pichavaram mangrove Ecosystem”

5.1 Fishery in Pichavaram Mangrove Ecosystem for EAFM Implementation

A comprehensive overview of the ecological, socio-economic, and governance aspects of the Pichavaram mangrove region (11°26’17’’N - 79°47’11’’E), which spans 1400 hectares comprising 700 ha of mangroves, 400 ha of water bodies, and 300 ha of mudflats. Declared a Ramsar site in April 2022, the area lies in a coastal semi-arid zone with an average annual rainfall of 1310 mm and features shallow, microtidal waters. The region supports 12 mangrove species and 23 associated species, hosting approximately 200 faunal species including mammals, birds, reptiles, finfish, shellfish, and insects, establishing it as a critical habitat with rich biodiversity. The fishing community includes eight tribal hamlets, six fishing hamlets, and five farming

hamlets, with non-traditional fishers such as the Irula tribe actively involved. Fishing practices involve the use of FRP canoes, catamarans, and OBM motorized boats.

Key fishery activities in the Pichavaram mangrove ecosystem include polychaete fishing, mud crab fattening through pen and box culture systems, and oyster harvesting. The sector, however, is confronted with significant challenges such as mass mortality in mud crab populations due to reovirus outbreaks following the tsunami and ecological disruption caused by the invasive Charru mussel (*Mytella strigata*). This mussel species not only displaces the native green mussel but also adheres to substrates and crustacean shells, inhibiting moulting and growth in crabs and reducing meat yield, making them less viable for the market. While crabs are known to consume Charru mussels, their declining population may be contributing to the unchecked spread of this invasive species. The ecosystem supports mangrove nursery development under CSR initiatives aimed at strengthening coastal bioshields. Mudflat conservation is emphasized due to increasing anthropogenic pressures and their ecological importance. In polychaete fisheries, conflict persists between traditional and non-traditional fishers due to overharvesting from the wild. It is recommended that indoor production technologies be transferred from laboratory settings to community-level field operations, particularly benefiting the Irula tribe, to promote sustainable livelihoods and reduce pressure on natural stocks. Oyster populations, which rely on Rhizophora mangroves for larval attachment, have also declined due to altered freshwater inflow, changes in mudflat conditions, and post-tsunami habitat shifts, despite their local economic significance.

The region's governance is multi-tiered, involving Panchayat Raj Institutions, traditional panchayats, grassroots institutions, NGOs (e.g., MSSRF, GREED), and line departments such as Forest, Fisheries, and Agriculture. The drawn back of the mentioned governance is that, they're not functioning or active in the locality or once the project is over, the purpose is forgotten. Data availability is drawn from the Marine Fishermen Census, CMFRI, state departments, and research institutions. Key issues highlighted include reduced fish catch due to poor freshwater inflow, defunct grassroots institutions, fisher indebtedness, intra-community conflict, occupational health hazards, limited marketing avenues, unsustainable fishing methods, and underutilization of mollusc resources.

The way forward recommends livelihood diversification, financial strengthening of SHG federations, improved market linkages, inclusive grassroots governance with equitable participation of women and tribes, enhanced coordination with line departments, and targeted skill training.

Dr. A Gopalakrishnan *is an Assistant Professor at Centre of Advanced Study in Marine Biology, Annamalai University. Prior to this, he has a decade of experience in MS Swaminathan Research Foundation (MSSRF). His area of expertise is aquaculture, clinical pathology, sustainable livelihood development particularly the Irula tribe.*

6. Discussion - I

Some of the questions put up for discussion are as follows:

- **What are the key issues in Pichavaram FMU?**
- **What are the opportunities for intervention in the project?**
- **What are the government measures and schemes that can be applied to implement EAFM in Pichavaram FMU in the project?**
- **What are the co-financing opportunities?**

The discussion by the participants is given in institutes / department and expert-wise:

Tamil Nadu Forest Department

Outlined the Forest Department's ongoing and proposed initiatives in the Pichavaram region, with a focus on integrating conservation, climate resilience, and community-based livelihood development. While traditionally focused on forest and wildlife, the department acknowledged the need to support fishing-related activities under broader ecosystem management frameworks. Key initiatives include the Coastal Bioshield Programme, which enhances tree and land cover for climate resilience, and the establishment of eco-division management committees involving three villages, with a community corpus of ₹80 lakhs used for wage-based forest activities benefiting tribal groups. The concept of Climate Smart Villages was introduced, currently implemented in 11 villages including Pichavaram, with support from the World Resources Institute and a baseline survey completed for a Detailed Project Report (DPR). Each village receives ₹80 lakhs for tailored interventions based on local vulnerabilities and needs.

Eight villages in the Pichavaram region have been selected to form Village Mangrove Councils (VMCs), with seed funding of ₹25,000, training support of ₹10,000, and a revolving fund of ₹5 lakhs per village over three years for sustainable livelihoods. Plans include establishing value addition and marketing centres for fishery products with ₹10 lakhs allocated per village. The department aims to strengthen backward and forward market linkages, alongside promoting eco-tourism infrastructure powered by solar boats. Efforts are underway to establish a ₹5 crore International Mangrove Conservation and Interpretation Centre in Pichavaram, supported by a five-year mangrove management plan and enforcement within a 2 km eco-sensitive zone, restricting industrial activities while permitting ecologically safe livelihoods. The need to align this effort with other ministries' climate-smart village initiatives and leverage tribal welfare budgets and research institution funding was emphasized.

Department of Fisheries, Tamil Nadu

They highlighted the key socio-economic and governance issues concerning fisheries and livelihoods in the Pichavaram region, home to 13 fishing villages, with recurring legal conflicts between traditional and non-traditional fishers, particularly involving the Irula community. These disputes are addressed through local peace meetings, emphasizing the need for native-specific conflict resolution mechanisms. Livelihood diversification was emphasized as a critical need, with suggestions including marine ornamental fish culture and pond-based seabass farming, the latter already under pilot implementation by the fisheries department with promising results. A

major environmental concern is the lack of freshwater inflow, which has led to ecosystem stress; this is being addressed through the planned reopening of the Chinna Vaikal channel, expected to improve freshwater availability within 8 to 10 months. Social networking, awareness building, and promotion of sustainable aquaculture practices were identified as essential for long-term community resilience. The fisheries department, in collaboration with agencies such as MSSRF and TADCO, is implementing various welfare schemes under PMMSY, including subsidized FRP boats, two-wheelers with ice boxes, dry fish value chain support, and microfinance through co-financing models. However, due to economic constraints, marginalized communities in Pichavaram are often unable to meet the beneficiary contribution requirements, unlike their counterparts in other parts of Cuddalore. Financial inclusion is facilitated through schemes like KCC (Kisan Credit Card), providing loans ranging from ₹30,000 for fish vendors to ₹1.5 lakh for boat owners. The need for awareness generation, elimination of middlemen, and the formation of cluster-based self-help groups was emphasized as a strategy for ensuring inclusive access to schemes and building collective marketing capacities.

ICAR-Central Marine Fisheries Research Institute (CMFRI)

The remarks provided valuable observations on sustaining fisheries in Pichavaram, appreciating BOBP-IGO's role in bringing together relevant stakeholders and acknowledging Dr. Gopalakrishnan's insights into the current status of the fishery. Several suggestions were put forth to enhance the effectiveness of EAFM implementation. One key recommendation was the integration of gender-sensitive approaches, particularly in benefit-sharing and access to institutional finance, recognizing disparities between men and women in accessing livelihood opportunities and co-financing mechanisms. The issue of community dependency on private moneylenders was highlighted, calling for improved access to institutional credit systems for both male and female fishers. In terms of governance, it was proposed that site-specific Fishery Regulation Acts could be developed for Ramsar-designated or ecologically critical zones like Pichavaram, addressing permissible gear types, optimal craft numbers, species conservation, and penalty structures for non-compliance. The speaker also drew attention to the invasive Charru mussel (*Mytella strigata*), noting past experiences in Ennore where its unchecked spread led to severe livelihood disruption across multiple villages. Women, especially those engaged in dry fish processing and prawn collection, were reported to face physical injuries and occupational displacement due to mussel infestation. The importance of early intervention was stressed, with recommendations including mechanical removal, ranching, and leveraging crab predation to control mussel populations. The remarks concluded by encouraging proactive, inclusive, and site-specific regulatory and livelihood strategies.

Centre of Advanced Study in Marine Biology, Annamalai University

Emphasized the importance of enhancing access to solar dryers as part of value addition and post-harvest support for fishing communities. Reference was made to an earlier initiative supported by the Department of Biotechnology (DBT), Government of India, which successfully established solar dryer units across five fishing villages in Nagapattinam district—marking the first pilot phase of this intervention. Notably, the Mudasalodai, under current departmental jurisdiction, has implemented both standard and compact ("baby") dryer models. The technology, once perfected, has been scaled beyond its initial research phase through effective

collaboration between MSSRF and the Fisheries Department, ensuring long-term community adoption.

Dr. T. Balasubramanian

Underscored the critical ecological issue of disrupted freshwater and seawater inflow in the Pichavaram mangrove ecosystem, primarily due to siltation in the Chinna Vaikal channel, exacerbated after the 2004 tsunami but persisting since the 1970s. Restoration through gravitational flow mechanisms was proposed, with recommendations to consult NCCR and IIT Madras, which have conducted prior studies and possess the technical expertise to address coastal erosion and accretion scientifically. Upgrading landing sites to align with international standards was suggested, urging departure from outdated practices. Emphasis was placed on eco-tourism development, advocating for a transition to battery-operated boats to prevent spillage and ecosystem degradation, with academic institutions encouraged to lead innovations in clean mobility. He suggested on the need to document and analyze species diversity and decadal ecological changes, from plankton to higher trophic levels, was also highlighted, linking biodiversity trends to fisheries health. Continuous monitoring was proposed to establish Pichavaram as a global model for biodiversity management, with collaborative roles for academic institutions, CMFRI, and state and central agencies.

Mr. Muralidharan

The remarks acknowledged the inclusive and evidence-based selection of Pichavaram as an ideal Ecosystem Approach to Fisheries Management (EAFM) pilot site, commending the collaborative role played by various stakeholders including the Forest Department, Fisheries Department, Annamalai University, MSSRF, NGOs, and SHGs. It was emphasized that the region offers all the essential components—resource diversity, community dependence, institutional presence, and research backing—necessary for developing a robust EAFM model. The need to shift from isolated interventions to coordinated, multi-stakeholder planning was highlighted, with a strong call for integrating academic insight, administrative execution, and primary stakeholder participation. He underscored the catalytic nature of GEF and FAO projects, stressing that these pilots are intended to demonstrate scalable and replicable models of balanced ecological and livelihood outcomes. A key suggestion was to structure the EAFM scoping study to align conservation with livelihood strategies, including capture fisheries, crab fattening, polychaete and ornamental fish culture, in a way that avoids environmental degradation. The importance of establishing strong market linkages was reiterated, based on prior experience with post-tsunami technology interventions like solar dryers, which failed due to the absence of distinct market niches and consumer awareness. The speaker concluded by stressing the need for strategic coordination, long-term sustainability planning, and integrated marketing approaches to ensure the success of EAFM implementation in Pichavaram.

7. Presentation

7.1 Dr. E. Vivekanandan: Identifying Stakeholders & their Role

The presentation titled *"Identifying Stakeholders and Establishing Co-management Arrangement"* provided an in-depth overview of co-management as a foundational element of the Ecosystem Approach to Fisheries Management (EAFM). Defined as a partnership between government agencies and local communities of resource users, co-management involves the joint development and implementation of laws and regulations. The approach fosters democratic and participatory governance, enabling stakeholders—particularly fishers—to design strategies tailored to local ecological and socio-economic conditions. Benefits include enhanced stewardship, shared responsibility, and sustainable resource management. The presentation references the World Bank-funded FIMSUL project, which recommended the creation of a transparent, multi-level governance structure in Tamil Nadu, resulting in the establishment of Co-management Committees at village, district, regional, and state levels. A case study of the Ashtamudi Lake Clam Governance Council in Kerala illustrates the practical application of co-management, highlighting decisions such as mandatory licensing, seasonal fishing closures, mesh size regulations, and a move toward quota-based management informed by Total Allowable Catch (TAC) assessments. This initiative led to certification of the fishery, the first in the country. The presentation outlined key challenges as well, including divergent views between scientists, officials, and resource users, flooding of the Lake that washed away the clam stock. Despite losing certification, the co-management council is active in revising the fishery get it re-certified. These challenges underscore the need for significant investments in time, capacity building, and institutional coordination.

The concluding session emphasized the design of a Pichavaram-specific co-management committee, distinct from existing panchayat structures and developed to address fisheries and ecosystem governance in a holistic and sustained manner. Discussions centered on identifying relevant stakeholders and determining the ideal leadership and operational structure of the committee. Participants acknowledged the potential overlap or concerns from village panchayats but clarified that the proposed co-management platform would function independently, with room for panchayat representation if needed. Drawing from national and international models, it was proposed that while the district collector could ideally chair the committee, a delegated official such as the RDO may function as an effective alternative for regular operations. The need to clearly map stakeholders across categories—including state departments (fisheries, forest, environment, tourism, and revenue), resource users (fishers, traders, vendors, and associations), monitoring and enforcement agencies, and advisory institutions (academia, NGOs, researchers)—was emphasized. A structured stakeholder typology was proposed to support the formation of a participatory and functional body. To facilitate finalization, the need for clarity on designations and representatives within each stakeholder group was highlighted.

8. Establishing Co-management arrangements – Experience sharing

Dr. K. Sunil Mohamed and Dr. S. Velvizhi have played pivotal roles in advancing fisheries co-management in India through innovative, community-inclusive approaches. Dr. Mohamed led the institutionalization of the Ashtamudi Lake Clam Governance Council in Kerala, a pioneering model of multi-stakeholder governance that is chaired by the District Collector, promoting

sustainable and equitable clam fisheries through consensus-based decision-making. Dr. Velvizhi's work with MSSRF emphasized grassroots engagement under the EAFM, forming village-level co-management committees in Tamil Nadu and Puducherry and addressing the complex governance challenges of integrating traditional systems with formal institutional mechanisms.

8.1 Dr. K. Sunil Mohamed: Establishment of co-management in Ashtamudi, Kerala

Dr. K. Sunil Mohammed *is a distinguished fisheries scientist known for his groundbreaking work in sustainable fisheries management and co-management approaches in India. He played a pivotal role for participatory fisheries governance in the country. His work emphasizes science-based decision-making, stakeholder inclusion, and equitable resource use, contributing significantly to policy and institutional reforms in the fisheries sector.*

He provided a detailed account of the institutional structure and functioning of the Ashtamudi Lake Clam Governance Council, a pioneering model of fisheries co-management in India. Established in Kollam, Kerala, the council is chaired by the District Collector and co-chaired by the District Panchayat President, with the Deputy Director of Fisheries serving as convener. Membership includes representatives from the Department of Fisheries, CMFRI, MPEDA, village panchayats, NGOs, seafood exporters, clam workers' unions, local fishers, marine enforcement, local police, and the Department of Mining and Geology, limited to a maximum of 18 members. The council operates with a quarterly meeting schedule and a mandate to ensure sustainable and equitable clam fishery yields using the best available scientific evidence. Its objectives include adherence to scientific advice, stakeholder-led rule-making, effective monitoring, capacity control, catch limits, precautionary approaches, habitat protection, and ecosystem considerations. Decisions are submitted to the Department of Fisheries for formalization through legally binding rules or ordinances. Although established over a decade ago, this model informed the broader Kerala State Fisheries Council, with administrative posts, dedicated offices, and funding. Despite initial progress, the integration of district and village councils remains gradual. Notably, decision-making in the council is consensus-based, avoiding voting even amid disagreement, with the District Collector playing a key mediating role. Stakeholder representation balances diverse interest groups, including politically affiliated associations, gear-specific user groups, and caste-based fishers' collectives.

8.2 Dr. S. Velvizhi: Establishment of co-management in MSSRF

Highlighted the field experiences and institutional lessons related to stakeholder engagement and co-management committee formation under the EAFM, with specific reference to Pichavaram and past efforts under the World Bank-supported FIMSUL project. The ecosystem comprises multiple resource user groups, including traditional fishers, Irula communities, and self-help groups involved in shellfish collection, each with distinct livelihoods requiring tailored consultation. Tourism is identified as a stakeholder due to its external environmental impacts, warranting inclusion in co-management dialogue. In Tamil Nadu and Puducherry, village-level co-management committees have been established by integrating a wide range of user groups—mechanized and non-motorized fishers, women vendors, and labourers—through participatory training, exposure visits, and legal awareness programs. However, significant challenges emerged at higher governance levels, particularly district and state committees, due to bureaucratic delays, political interference, and frequent turnover of officials, leading to

disinterest and declining participation among community members. A case in Mayiladuthurai district illustrated efforts to revive inactive committees through reconstitution, training, stakeholder mapping, and participatory prioritization of issues, though implementation remains constrained by the interlinked nature of problems requiring multi-village or district-level coordination. Importantly, traditional panchayat systems influence acceptance, and co-management must be framed as an added value rather than a parallel structure. The study underscores the need to strengthen all governance tiers—village, district, and state—for effective EAFM rollout, ensuring vertical and horizontal coherence.

Dr. S. Velvizhi, *a scientist cum practitioner, boasts 22 years of experience in small-scale fisheries development. Since 2002, she has worked tirelessly with small-scale marine fishing communities on India's South East coast, undertaking extensive research and developmental work. Her expertise spans livelihood development, biodiversity conservation, fisheries post-harvest management, value-added product development, ICT for development, climate change adaptation, and gender mainstreaming.*

9. Discussion

The presentations were followed by interaction among all the participants. The discussions were focused to find answers to the following questions:

- **Who are the key stakeholders in Pichavaram FMU?**
- **What should be the composition of co-management committee?**
- **What are the functions of co-management committee?**
- **What are the challenges of implementing co-management in Pichavaram?**
- **What is the training/capacity development requirements?**

The views of the participants and interactions are given below:

Mr. Muralidharan

The discussion highlights the critical need to ensure comprehensive representation of all resource user groups within the proposed co-management committee for the Pichavaram ecosystem under the EAFM framework. Building on earlier deliberations, the importance of including diverse stakeholders—ranging from small-scale fishers such as fish gropers, crab fatteners, and oyster collectors, to fishers using various craft and gear types including fiber boats and deep nets—is underscored. Acknowledging the layered and interdependent nature of these user groups, the speaker stressed that their inclusion is not only essential for equitable governance but also crucial to effectively address the existing intra-sectoral conflicts. The formation of a unified fisher association or platform within the co-management committee is suggested as a strategy to harmonize these varied interests and foster participatory decision-making.

Department of Fisheries, Tamil Nadu

During the implementation of the FIMSUL project, multi-tiered co-management structures were established in Tamil Nadu, encompassing village, district, regional, and state-level committees. These included active participation from local stakeholders, such as panchayat presidents and key community representatives, to address fisheries governance in a decentralized and participatory manner. As part of the initiative, specific schemes were introduced to meet the needs of the fishing communities, including maintenance of fishing harbours, for which funds were mobilized through a combination of community contributions (e.g., electric fees collected from fishers) and project-based financial support, with a cost-sharing arrangement of up to 50% sponsorship. These funds facilitated infrastructure upkeep and operational management during the project's duration. However, following the project's closure, the committees, while formally in place, have become largely non-functional in current conditions. This underscores a critical institutional gap in sustaining co-management mechanisms post-project and highlights the need for long-term governance continuity and support systems.

ICAR-Central Marine Fisheries Research Institute (CMFRI)

The observations emphasize the need to adopt a unified, ecosystem-wide governance framework tailored specifically to the Pichavaram ecosystem under the EAFM, in contrast to the four-tier committee system used in the FIMSUL project. This ecosystem-specific approach requires inclusive stakeholder identification following a clear demarcation of the EAFM boundary. Drawing from the Ashtamudi Lake model, the emphasis is on incorporating both primary and secondary stakeholders, such as fishers, clam pickers, market intermediaries, and other value chain actors. Further capacity development needs were identified across multiple domains: stakeholder sensitization on responsible fisheries and regulatory compliance; gender inclusion through post-harvest interventions and value addition; research and academic support in monitoring, evaluation, and impact assessment; and development of socio-economic indices to assess fisher aspirations and perceptions. Additionally, attention was drawn to the importance of aligning project outputs with policy frameworks, ensuring that co-management practices and EAFM recommendations inform and are integrated into government policies.

Centre of Advanced Study in Marine Biology, Annamalai University

The discussion highlighted actionable strategies and scientific interventions to support the sustainable development of the Pichavaram ecosystem under the Ecosystem Approach to Fisheries Management (EAFM). Key livelihood activities identified for immediate implementation include ornamental fish culture, seabass aquaculture, and polychaete conservation-based practices. Emphasis was placed on parallel execution of polychaete harvesting and in-situ conservation, in response to declining wild stocks due to overexploitation. Observations indicated a significant drop in harvestable biomass—from 0.5 kg in two hours to just 100 grams—underscoring the ecological shifts and spatial relocation of productive areas. This ecological degradation was also cited as a root cause of emerging conflicts between traditional and non-traditional fishers. Scientific interventions such as natural ranching and continuous in-situ stocking using healthy brooders were proposed as viable alternatives to conventional indoor breeding and release, minimizing pathogen transmission risks. The process would actively engage local and tribal fishers, thereby integrating community-based conservation with scientific

knowledge systems. The need for structured capacity development of officials on EAFM principles was also emphasized to support effective implementation.

M S Swaminathan Research Foundation (MSSRF)

The ongoing Integrated Irrigation Development Program implemented by MSSRF in five villages surrounding Pichavaram has yielded critical insights through a structured need assessment exercise, reflecting diverse community priorities. The findings categorize local needs into four primary domains. First, under resource enhancement and ecosystem management, communities highlighted a significant decline in fish diversity over the past 30 years and expressed interest in responsible fisheries and sustainable resource use. Second, for ongoing fishing practices, fishers—especially women engaged in hand-picking prawns—requested technological improvements and protective tools to mitigate occupational health risks. Third, for alternative or supplementary livelihoods, communities sought training and support in activities such as ornamental fish culture and crab fattening. Lastly, a segment of the population expressed desire to transition out of fisheries altogether, seeking vocational training in areas such as engine mechanics, electrical wiring, and computer literacy. These findings suggest the need for a multi-tiered capacity development strategy tailored to different fisher profiles and livelihood aspirations. A suggested visual includes a four-quadrant chart delineating capacity-building needs across resource management, livelihood enhancement, livelihood diversification, and vocational training for non-fishery livelihoods.

10. Way forward

- **Defining the FMU**

Pichavaram region lies within the Killai Revenue Village of Cuddalore District, Tamil Nadu, and is ecologically defined by its location between the Vellar and Coleroon rivers, opening into the Bay of Bengal. The FMU comprises a mosaic of interconnected ecosystems including mangroves, mudflats, sand dunes, and estuarine water bodies, many of which fall within designated Reserve Forests such as Killai RF, Pichavaram RF, and its extension. These habitats are not only ecologically sensitive but also support diverse fishery resources that are vital to the livelihoods of local fishing communities. It is evident that the area is inhabited by multiple settlements including Vadakku Pichavaram, Methapat Nagar, and Kanniyammal Nagar, whose residents are likely to engage in a variety of fishing activities using different types of gear and craft, targeting species across these dynamic habitats. Therefore, it is important to delineate the FMU boundaries clearly and understand the spatial distribution of resource use within these ecologically distinct zones. Doing so will support better planning and management of resources, especially in the context of co-management initiatives aimed at balancing livelihood needs with ecosystem sustainability.

- **Scoping Study and EAFM / EIFM Plan Development**

The next step involves a detailed scoping study, which will be carried out by Annamalai University. The plan is to complete this study and subsequently develop an EAFM plan that will be implemented over the next two years. This is a comprehensive exercise, expected to take around four months, with a target to have it finalized by August.

- **Economic Dependency Assessment of Fishers**

It is understood from the discussions that there are multiple fisher user groups in the Pichavaram region—such as polychaete collectors, shrimp groupers, and fishers using different types of gear and craft to target various species. These are small-scale fishers who depend solely on their daily catch for income. It is essential to profile their daily catch, income levels, and the number of people who depend on each individual resource. It is important to assess the economic dependency of fishers based on species targeted, gear used, and craft employed in the Pichavaram region.

- **Identifying the major stakeholders and their responsibility**

It is fundamental in establishing a functional co-management system for the Pichavaram Fishery Management Unit (FMU). The region comprises multiple user groups—including traditional fishers, the Irula tribal community, crab fatteners, oyster collectors, and women engaged in post-harvest activities—all of whom depend on the ecosystem for their livelihood. In addition to primary stakeholders, line departments such as Fisheries, Forests, Environment, Tourism, and Revenue must be actively engaged, given their statutory roles in regulation and enforcement. Academic and research institutions like Annamalai University and CMFRI can contribute to scientific assessments, monitoring, and ecosystem-based planning. Organizations such as MSSRF offer critical support for grassroots facilitation, capacity building, and alternative livelihoods. Private actors, including seafood traders and exporters, also have a stake in ensuring product quality and market linkages.

- **Mapping the activity in regard to co finance, scheme and programs available.**

It is essential to undertake a systematic approach that identifies and aligns existing financial instruments with the core objectives of EAFM. Programs such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY), the Kisan Credit Card (KCC) for credit-linked subsidies, and tribal development schemes supported by TADCO offer substantial potential for synergizing conservation and livelihood outcomes. Additionally, Corporate Social Responsibility (CSR) contributions toward mangrove restoration, solar-powered infrastructure, and eco-tourism facilities are already in operation and should be linked to scalable, community-centered interventions. Capacity-building programs must be tailored to equip fisherwomen, youth, and marginalized groups with knowledge about eligibility, access procedures, and utilization of these financial schemes. The development of a co-financing matrix that links each EAFM-aligned activity with corresponding funding sources, departments, and delivery mechanisms will be critical for operational clarity.

- **Scoping report and EAFM plan**

To effectively advance the development and implementation of EAFM in the project region, a sequence of coordinated steps is planned. The immediate priority is the preparation of the Scoping Report during May–June 2025, which will compile baseline ecological, social, and governance data, identify key issues, and map stakeholder dependencies on fisheries and ecosystem services. A standardized scoping survey template will be finalized and shared with project partners to support this process. This will be followed by a Consultative Workshop in June 2025, organized by BOBP-IGO, to validate scoping findings, define management objectives, and build consensus on the EAFM Plan. Concurrently, a Capacity Development Programme on EAFM will be designed and delivered to equip project partners with the skills and tools necessary to

support long-term EAFM planning and implementation. Dates for this programme will be finalized in consultation with partners to ensure full engagement and participation.

- **Approach and timeline**

Preliminary work, including initial visits, engagements, and stakeholder networking, has already been completed to support the implementation of the Ecosystem Approach to Fisheries Management (EAFM). A structured, time-bound roadmap has been laid out, beginning with the preparation of the scoping report in May–June 2025 to identify key ecological, social, and governance issues and map resource-use patterns within the Fisheries Management Unit (FMU). This will be followed by stakeholder identification and documentation of their roles and interests. The implementation phase will run for 24 months, emphasizing action on agreed priorities, stakeholder engagement, enforcement, and capacity building. A final six-month phase will be dedicated to evaluating outcomes, identifying lessons learned, and adapting the plan to ensure its long-term sustainability and effectiveness.

11. Conclusion

The Workshop fulfilled the objectives for which it was conducted and helped identifying the Way Forward for implementing EAFM in Pichavaram mangrove ecosystem. All the participants showed interest and actively participated in the discussion. They also assured support from their organisations for implementation of EAFM.

Annexure I

Bay of Bengal Large Marine Ecosystem Project Phase II (BOBLME II)

Consultative Workshop for Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem

Agenda

Venue: BOBP-IGO Office, Chennai **Date: 11 April 2025**

Time	Activity	Resource
1000-1120	*Session 1: BOBLME Project & EAFM Overview Session*	
1000 - 1010	Welcome & Workshop Context	Dr. P. Krishnan
1010 - 1015	Self-Introduction	Participants
1015 - 1045	BOBLME Project & Overview of EAFM	Dr. E. Vivekanandan
1045 - 1100	Remarks	Dr T Balasubramanian, Former Vice Chancellor & Advisor, Chettinad Academy of Research and Education
1100 - 1530	*Session 2: Scoping the Fishery Management Unit*	
1100-1130	Fishery in Pichavaram Mangrove Ecosystem for EAFM Implementation	Dr. A. Gopalakrishnan
1130 - 1145	*Coffee Break*	
1145 - 1245	Issues and Opportunities for intervention (Each presentation 15 min, followed by discussion)	Department of Fisheries, Department of Forest
1245 - 1345	*Lunch Break*	
1345-1500	Identifying stakeholders & their roles; Establishing Co-management Arrangement	Dr. E. Vivekanandan Dr. S. Velvizhi
1500-1530	Assessing Capacity Development Needs	Dr. E. Vivekanandan
1530-1545	*Session 3: Concluding Session*	
1530-1545	Way Forward & Closing Remarks	Dr. P. Krishnan
1545-1600	*Parting Coffee*	

Annexure II

Food and Agriculture Organization of the United Nations

Bay of Bengal Large Marine Ecosystem Project Phase II (BOBLME II)
Consultative Workshop for
Preparing EAFM Plan for Fishery in Pichavaram Mangrove Ecosystem

11 April 2025, BOBP-IGO Office

Participants List

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Annexure III

Brief Profile of the Speakers / Organisers / facilitators

Dr. T. Balasubramanian is a renowned marine biologist with extensive expertise in estuarine ecology, coastal ecosystem conservation, and marine biodiversity. He has made pioneering contributions to mangrove conservation and environmental impact assessments, significantly influencing sustainable coastal management practices in India. As a key academic and institutional leader, he played a vital role in establishing and strengthening marine research and education frameworks.

Dr. P. Krishnan is currently serving as the Director of the Bay of Bengal Programme – Inter Governmental Organisation (BOBP-IGO), Chennai. His area of expertise is in sustainable livelihood development, coastal resource management, fisheries development, and agro-ecosystem management, coastal zone management, agricultural research, and multi-institutional projects focused on evidence-based decision-making, biodiversity conservation, and policy development.

Dr. E. Vivekanandan is currently working as a Senior Scientific Consultant at Bay of Bengal programme – Inter Governmental; Organisation (BOBP-IGO), Chennai. He belongs to the Agricultural Research Service of India. He has years of experience in marine fisheries research and development. He has pioneered the research on fish stock assessment, climate change, marine mammals and marine fisheries management.

Dr. A Gopalakrishnan is an Assistant Professor at Centre of Advanced Study in Marine Biology, Annamalai University. Prior to this, he has a decade of experience in MS Swaminathan Research Foundation (MSSRF). His area of expertise is aquaculture, clinical pathology, sustainable livelihood development particularly the Irula tribe.

Dr. K. Sunil Mohammed is a distinguished fisheries scientist known for his groundbreaking work in sustainable fisheries management and co-management approaches in India. He played a pivotal role for participatory fisheries governance in the country. His work emphasizes science-based decision-making, stakeholder inclusion, and equitable resource use, contributing significantly to policy and institutional reforms in the fisheries sector.

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