



Food and Agriculture
Organization of the
United Nations



BOBP

Report of the Preparatory Workshop on

Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming

Exploring Implementation Pathways in
Andhra Pradesh, India

10 January 2026 | Chennai





Food and Agriculture
Organization of the
United Nations



Preparatory Workshop on Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming

*Exploring Implementation Pathways in Andhra
Pradesh, India*

BOBP-IGO Secretariat, Chennai

10 January 2026



Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO)
91, Saint Mary's Road, Abiramapuram, Chennai - 600 018. INDIA

Report Preparation

This report on the “Preparatory Workshop on Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming Exploring Implementation Pathways in Andhra Pradesh, India” is prepared by BOBP-IGO.

The designations employed and the presentation of material in this document do not imply the expression of any opinion whatsoever on the part of BOBP-IGO concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Core Team

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

Dr. E. Vivekanandan, International Consultant, BOBP-IGO, Chennai

Mr. Rajdeep Mukherjee, Policy Analyst, *BOBP-IGO, Chennai*

Dr. Ahana Lakshmi, Senior Consultant, BOBP-IGO, Chennai

Design and Layout

Dr. S Jayaraj, Publication Officer and Coordinator, BOBP Design Factory

Mr. M. Krishna Mohan, BOBP Design Factory

Preferred Citation

BOBP-IGO. (2025). Report of the Preparatory Workshop on Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming Exploring Implementation Pathways in Andhra Pradesh, India. Bay of Bengal Programme Inter-Governmental Organisation. 42 pp.

Executive Summary

In recognition of the growing need to align aquaculture development with environmental sustainability, livelihood security, and ecosystem resilience, the Preparatory Workshop on the Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming was held on 10 January 2026 at the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) Secretariat in Chennai. The workshop brought together twenty-five participants from research institutions, regulatory authorities, development agencies, farmer organisations, and the private sector to examine practical pathways for applying ecosystem-based approaches to shrimp farming in Andhra Pradesh. Discussions acknowledged that shrimp aquaculture in the state has expanded to a scale and intensity where farm-level measures alone are insufficient to address cumulative environmental impacts, disease risks, water-use conflicts, and climate-related challenges. In this context, the Ecosystem Approach to Aquaculture was viewed as an integrated planning and management approach that builds on existing practices such as cluster management, zoning, biosecurity, environmental quality and market-led sustainability initiatives, rather than as a new regulatory system.

The workshop highlighted cluster- and ecosystem-level governance as the most practical and effective pathways for operationalising EAA in shrimp farming systems. Key priorities identified included strengthening farmer organisations and collectivization, improving coordination among institutions, addressing groundwater use and interactions between aquaculture and agriculture, and closing regulatory gaps, particularly for inland aquaculture. Participants also emphasised the importance of planning based on environmental carrying capacity, regular monitoring of soil and water quality, and integrating climate risk considerations into aquaculture development. Social dimensions received significant attention, with particular emphasis on recognising and supporting the roles of women and family members in shrimp farming and allied activities as essential to sustaining livelihoods. The workshop recommended piloting EAA in selected shrimp farming clusters in Andhra Pradesh, with lessons from these pilots informing wider adoption at the state and national levels.

Acronyms

BMP	Better Management Practices
CAA	Coastal Aquaculture Authority
EAA	Ecosystem Approach to Aquaculture
ICAR-CIBA	ICAR – Central Institute for Brackishwater Aquaculture
MPEDA	Marine Products Export Development Authority
NaCSA	National Centre for Sustainable Aquaculture
NICRA	National Innovations in Climate Resilient Agriculture
NSPAAD	National Surveillance Programme for Aquatic Animal Diseases
SDG	Sustainable Development Goals
SHAPHARI	MPEDA’s aquaculture certification programme

Table of Contents

Executive Summary.....	iii
Acronyms	iv
1. Introduction	1
1.1. Rationale of the Workshop	1
2. Overview of the workshop.....	2
2.1 . Inaugural Session	3
2.2. Key Sectoral Challenges and Opportunities in Shrimp Farming	4
3. Technical Sessions.....	6
3.1 Ecosystem Approach to Aquaculture (EAA): Conceptual Foundations and Rationale	6
3.2 Ecosystem Approach to Aquaculture: Policy Perspective and Application Pathways.....	6
4. Panel Discussion: Making EAA in Shrimp Farming a Reality: Experiences to learn from and Build-on	6
4.1. NaCSA & Shrimp Farming: Community engagement experiences and new initiatives	6
4.2. Research and Technical Perspectives on EAA for Shrimp Farming in Andhra Pradesh	7
4.3. GEF-FAO Sustainable Aquaculture Initiative in Andhra Pradesh	10
4.4. Regulatory and Governance Perspectives on Ecosystem-based Aquaculture Management....	11
5. Conclusion.....	13
5. Way forward	14
Annexure I: Provisional Agenda	17
Annexure II: List of Participants	19



Participants at the Workshop

1. Introduction

The Ecosystem Approach to Aquaculture (EAA) is a strategy for the development and management of aquaculture that integrates ecological integrity, social equity, and economic viability within broader ecosystem and governance contexts. Proposed and promoted by the Food and Agriculture Organization of the United Nations (FAO) during 2010, out of concern of rapidly expanding aquaculture, EAA recognizes that aquaculture operates within interconnected social-ecological systems and therefore requires management beyond individual farms or species. It emphasizes appropriate siting and zoning, carrying capacity, cumulative impact management, biosecurity, and inclusive governance, while balancing production objectives with ecosystem health and community well-being.

Global experience indicates that EAA contributes to improved environmental performance, reduced conflict over resource use, enhanced resilience to climate and disease risks, and more stable long-term economic outcomes for aquaculture producers. FAO-supported initiatives have demonstrated the value of EAA in strengthening spatial planning, reducing environmental externalities, and improving coordination across sectors. However, these benefits typically materialise over time, as EAA relies on sustained institutional commitment, cross-agency coordination, and continuous stakeholder engagement.

However, in tropical developing country contexts, the application of EAA faces additional challenges. Aquaculture systems are often spatially dispersed, dominated by small and medium producers, and embedded within complex coastal livelihoods. Management systems are frequently oriented towards short-term production gains, while regulatory capacity, data availability, and inter-departmental coordination remain uneven. As a result, ecosystem-based practices are sometimes adopted in an ad hoc manner without being formally recognised or integrated into planning and regulatory frameworks. Moreover, many documented successes have emerged from time-bound pilot projects, with limited assessment of their durability once external support is withdrawn. This has contributed to a perception that ecosystem approaches are applicable only to small-scale or low-intensity systems, rather than to commercially significant sectors such as shrimp aquaculture, where cumulative environmental and social risks are often most pronounced.

1.1. Rationale of the Workshop

Shrimp aquaculture is a major contributor to India's food production, export earnings, and coastal livelihoods. In 2024–25, India recorded fish production of 197 lakh tonnes, while seafood exports generated approximately ₹62,408 crore, with frozen shrimp accounting for over 40 percent of export volumes and ₹40,013 crore in export earnings. Andhra Pradesh is the country's leading producer of Pacific white shrimp (*Litopenaeus vannamei*), supported by favourable climatic conditions, extensive coastal resources, and a dense concentration of small- and medium-scale farms. The sector plays a critical role in the state's rural economy and in sustaining India's position in global shrimp markets.

At the same time, the shrimp farming sector faces persistent and systemic challenges. Recurrent disease outbreaks, biosecurity risks, price volatility, export rejections, environmental pressures, and climate-related stresses pose risks to the continuity and sustainability of production. While good aquaculture practices have helped stabilise productivity in several clusters, these measures are often applied at the farm level and are insufficient to address cumulative impacts, spatial interactions, and shared risks across landscapes and watersheds. Ensuring long-term sustainability therefore requires approaches that extend beyond individual farms and integrate ecological, economic, and governance considerations at appropriate spatial scales.

EAA, as articulated by FAO, provides a structured framework to address these challenges by linking farm-level practices with area-based planning, carrying capacity considerations, biosecurity management, and stakeholder coordination. However, in South Asia, EAA has not yet been systematically embedded within mainstream shrimp aquaculture planning and management. This is not due to lack of relevance, but rather to the complexity of translating ecosystem principles into practical, context-specific management pathways that align with production objectives, regulatory realities, and market requirements.

Shrimp aquaculture presents a pragmatic entry point for advancing ecosystem-based management. Unlike capture fisheries, shrimp farming is largely practiced by individual producers with clear ownership and accountability and is supported by organised farmer associations that facilitate collective action. These features reduce coordination costs and create opportunities for aligning individual incentives with area-level sustainability outcomes. In Andhra Pradesh, where shrimp farms are predominantly small to medium in scale and geographically clustered, there is scope to examine how EAA principles can be operationalised in ways that strengthen biosecurity, reduce environmental risks, and enhance the resilience of farming systems without disrupting livelihoods or production.

Within this context, the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), through the BOBLME Phase II Project (2023–2028), is supporting member countries to operationalise ecosystem-based approaches and to integrate them into national management processes. Building on its regional experience and established institutional networks, BOBP-IGO seeks to explore the application of EAA in shrimp farming as part of a broader effort to strengthen sustainability across fisheries and aquaculture systems in the Bay of Bengal region.

Accordingly, the **Preparatory Workshop on the Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming: Exploring Implementation Pathways in Andhra Pradesh, India** is conceived as a technical and policy-focused forum to examine sustainability challenges in shrimp farming, assess how EAA principles can be applied to address these challenges, and identify feasible pathways for improving the environmental, economic, and social sustainability of shrimp aquaculture in the state.

2. Overview of the workshop

The Preparatory Workshop on the Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming was held on 10 January 2026 at the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) Secretariat, Chennai. The one-day workshop was organized to examine practical

pathways for operationalizing ecosystem-based approaches in shrimp aquaculture in Andhra Pradesh, with a focus on aligning environmental sustainability, livelihood security, and value-chain resilience. The programme followed the approved agenda and included an inaugural session, technical presentations, and a moderated panel discussion with open deliberations, designed to build a shared understanding of EAA and its application in shrimp farming systems. The workshop brought together about 25 participants.

2.1. Inaugural Session

In his opening remarks, Dr. Krishnan outlined the institutional evolution and mandate of BOBP-IGO, noting that the organisation began as a United Nations field office in 1978 and later evolved into an intergovernmental organisation in 2004, with Bangladesh, India, Sri Lanka, and Maldives as member countries.

He highlighted BOBP-IGO's long-standing contributions to fisheries and aquaculture development in the region, including early piloting of fibre-reinforced plastic (FRP) fishing vessels in India, introduction of shrimp hatchery technologies in South Asia, and support to agri-business and aquaculture systems in Sri Lanka and Bangladesh. He emphasised that the organisation continues to work closely with national governments through policy advocacy, capacity development, and implementation of regional and national projects in partnership with FAO.

Placing the workshop within the broader regional context, Dr. Krishnan referred to the Bay of Bengal Large Marine Ecosystem (BOBLME) programme, under which ecosystem-based approaches to fisheries management are being piloted through participatory and co-management frameworks. He noted that while ecosystem approaches have traditionally been applied at relatively small scales, there is a growing need to demonstrate their relevance and effectiveness in large-scale, commercially important sectors that align with national development priorities.

Against this backdrop, Dr. Krishnan explained the rationale for extending ecosystem approaches to aquaculture, particularly shrimp farming, which represents one of the most commercially significant and environmentally complex sectors in the region. He emphasised that shrimp aquaculture in Andhra Pradesh has reached a scale and intensity where isolated, farm-level interventions are no longer adequate to address cumulative environmental impacts, disease risks, and social externalities. Instead, coordinated, cluster- and landscape-level approaches are required.

He underscored that the EAA is not intended as a new regulatory framework, but rather as an integrative planning and implementation approach that builds on existing good practices such as cluster management, zoning, biosecurity protocols, and certification systems. The objective, he noted, is to develop an aquaculture development plan that integrates ecological integrity, environmental sustainability, economic viability, and social inclusion, and to implement this plan in close coordination with state administrations during the project phase.

Dr. Krishnan further highlighted that Andhra Pradesh offers a strong foundation for piloting EAA due to its organised shrimp farming clusters, experience with collective action, and established

institutional mechanisms. He emphasised the importance of synergy and complementarity among existing initiatives, including NaCSA's cluster-based approach, regulatory frameworks, and market-driven sustainability initiatives, in order to avoid duplication and maximise collective impact.

Dr. Krishnan noted that the purpose of inviting this reflection was to ground the EAA in the lived realities of the shrimp farming sector, and to ensure that discussions on EAA are informed by field experience, value-chain dynamics, and the practical challenges faced by farmers in Andhra Pradesh. As part of the context-setting, Dr. Krishnan invited Dr. Santhana Krishnan to reflect on: (i) key dimensions of the shrimp farming sector; (ii) prevailing structural and environmental challenges; (iii) the importance of farmer organisation and collective action; and (iv) the distinctive features and untapped opportunities within Andhra Pradesh's shrimp farming landscape.

2.2. Key Sectoral Challenges and Opportunities in Shrimp Farming

Dr. Santhana Krishnan, CEO, Marine Technologies, began with a reflection on the historical role of BOBP-IGO in supporting the early development of aquaculture in the region and welcomed the organisation's renewed engagement with the sector through an ecosystem-based lens. He cautioned against assessing sectoral success solely on the basis of increasing production volumes, noting that although shrimp production has grown steadily, average harvest sizes have declined over time, reducing farmer profitability and affecting the entire value chain. He emphasised that shrimp aquaculture operates as a highly interdependent and credit-driven system, where disease outbreaks or crop failures at the farm level disrupt cash flows and credit recovery across dealers, feed manufacturers, processors, and exporters. He said that during stakeholder consultations, it was essential to include feed millers as they are the ones driving credit flow. With prices controlled at the international level, looking at MSP was of not much use. Social equity and sustenance of farmers needed to be looked at.

Dr. Santhana Krishnan stressed that degradation of soil and water quality remains one of the most neglected aspects of shrimp farming, despite its direct link to disease prevalence and declining productivity. He observed that limited attention is given to long-term soil health, water quality monitoring, and environmental preparation, even though appropriate technologies and management tools are available. He suggested the use of tools such as CIBA's soil card for aquaculture. He emphasised that environmental impacts cannot be effectively managed by individual farmers acting alone and require coordinated, ecosystem-based approaches at the cluster level. He further highlighted that farmer unity remains a critical missing element in the sector. While cluster-based initiatives promoted by NaCSA have demonstrated clear benefits since the late 1990s, particularly during disease outbreaks, he emphasised that the next stage of evolution must focus on stronger farmer organisation through cooperatives and Farmer Producer Organisations (FPOs). Without collective platforms, he noted, it is difficult to establish common standard operating procedures, undertake environmental impact management, or implement ecosystem-based action plans effectively.

Responding to questions on social equity and resource-use conflicts, Dr. Santhana Krishnan noted that land-use conflicts between agriculture and aquaculture in Andhra Pradesh have largely been addressed through regulatory reforms and widespread farm registration as well as aqua zoning by the AP government. However, competition over shared water resources, particularly during critical agricultural seasons, continue to pose challenges. Water resources were declining and increasingly contested, with growing dependence on deeper groundwater extraction and competition for canal water. While major land-use conflicts have reduced, concerns of paddy farmers persist, particularly related to water sharing, drainage, and salinity impacts. He also highlighted interactions between shrimp farming and freshwater aquaculture systems in certain districts, reinforcing the need for integrated and ecosystem-based planning and regulation.

He also pointed out that the Coastal Aquaculture Act applies only to coastal aquaculture and does not cover inland aquaculture systems, which are increasingly reliant on groundwater resources. He emphasized that the absence of a dedicated Inland Aquaculture Act creates regulatory gaps, especially when Environmental Impact Assessment (EIA) requirements are considered, and may pose compliance challenges for farmers while implementing ecosystem-based approaches.

- Shift sustainability assessment away from production volumes towards farmer profitability, harvest size, and value-chain resilience.
- Address long-neglected soil and water quality degradation which are root causes of disease and declining productivity.
- Promote wider adoption of tools such as the ICAR-CIBA soil health card, while noting that uptake remains limited without institutional support.
- Establish a collective approach with shared laboratory facilities at cluster level to ensure all farmers have affordable access to soil, water, and disease testing.
- Manage groundwater extraction, including deep aquifer use (up to approximately 200 feet), through ecosystem- or cluster-level planning rather than individual decisions.
- Explicitly address long-standing conflicts between shrimp farming and paddy cultivation, particularly in the West Godavari delta, related to salinisation, freshwater competition, and altered drainage.
- Highlight the regulatory gap arising from the absence of a dedicated Inland Aquaculture Act, especially when Environmental Impact Assessment requirements are considered.

3. Technical Sessions

4. Panel Discussion: Making EAA in Shrimp Farming a Reality: Experiences to learn from and Build-on

Through a sequence of expert presentations and moderated discussion, the panel aimed to examine scientific, policy, regulatory, community, and market dimensions in the context of shrimp farming in Andhra Pradesh and identify practical pathways for operationalizing EAA at ecosystem and cluster levels, while addressing environmental sustainability, livelihoods, and value-chain resilience.

Dr E. Vivekanandan, Senior Consultant, BOBP IGO chaired and moderated the session. He said that the BOBP-IGO has gained experience from implementing Ecosystem Approach to Fisheries Management (EAFM) as part of the BOBLME project. He said that the principles remained the same whether it was the Ecosystem Approach in Fisheries Management (EAFM) or in Ecosystem Approach to Aquaculture (EAA).

4.1. NaCSA & Shrimp Farming: Community engagement experiences and new initiatives

Ms. Daiahun Khonglam, Chief Executive Officer of the National Centre for Sustainable Aquaculture (NaCSA), presented NaCSA's experience in supporting shrimp farming communities through community-based, cluster-oriented approaches. She explained that NaCSA primarily works with small and marginal shrimp farmers, who constitute over 90 percent of the farming community and contribute more than 70 percent of India's shrimp production, highlighting the importance of inclusive and collective models for sustainable aquaculture development. She described NaCSA's cluster-based model, under which shrimp farmers are organised into geographically contiguous societies or clusters. This model enables collective action in areas such as biosecurity, water management, disease control, stocking synchronisation, and harvesting practices. At present, NaCSA supports over 840 clusters across eight coastal states, involving approximately 9,600 farmers managing around 8,700 hectares of shrimp farming area.

Ms. Khonglam highlighted that the cluster approach has significantly improved the adoption of Better Management Practices (BMPs). Through regular training, peer learning, and field-level extension support, farmers are encouraged to follow standard protocols related to pond preparation, seed quality, feed management, water quality monitoring, and biosecurity. This has resulted in more uniform practices across clusters and reduced risks associated with unregulated and isolated farm operations.

She further explained NaCSA's role in providing technical and regulatory support through mechanisms such as Aqua One Centres, which offer soil, water, and microbiological testing services. NaCSA also facilitates disease surveillance, seed screening for major pathogens, compliance with regulatory requirements, and access to institutional support from agencies such as MPEDA and the Coastal Aquaculture Authority (CAA). These services help farmers make

informed management decisions and improve compliance with national standards. Sharing performance outcomes from NaCSA-supported clusters, Ms. Khonglam noted that sustained BMP adoption has led to measurable improvements in farm performance. Average shrimp productivity has reached around 5.6 MT/ha, with survival rates of nearly 79 percent. Disease incidence in NaCSA clusters has declined sharply, with reductions of up to 98 percent reported in recent years, contributing to greater production stability and income security for farmers.

In conclusion, Ms. Khonglam emphasized that NaCSA's community-based approach has played a vital role in strengthening sustainability, resilience, and livelihoods in shrimp farming. She noted that future priorities include strengthening existing clusters, expanding SHAPHARI-certified and antibiotic-free production zones, improving market linkages and traceability, and aligning NaCSA's field-level experience more closely with ecosystem-based and cluster-level management frameworks under the Ecosystem Approach to Aquaculture.

- Strengthen and scale cluster-based community organisation as the primary entry point for EAA implementation, especially for small and marginal farmers.
- Use clusters to improve biosecurity, disease surveillance, water management, and BMP adoption, while reducing risks from isolated farm operations.
- Align NaCSA's field-level experience more closely with ecosystem-level planning, traceability, and antibiotic-free production initiatives.

4.2. Research and Technical Perspectives on EAA for Shrimp Farming in Andhra Pradesh

Dr. M. Muralidhar, Principal Scientist, ICAR-CIBA made a detailed presentation on the Ecosystem Approach to Aquaculture (EAA) for Sustainable Shrimp Farming in Andhra Pradesh, drawing on the scientific and field experience of the ICAR-Central Institute of Brackish water Aquaculture (ICAR-CIBA). He explained that EAA provides a structured framework for integrating shrimp farming within broader ecological, social, and governance systems to ensure long-term sustainability, equity, and resilience.

Introducing the concept, he defined EAA as a strategy that integrates aquaculture activities within the wider ecosystem in a manner that promotes sustainable development, social equity, and resilience of interlinked social and ecological systems. He highlighted three core pillars of EAA: maintaining ecosystem integrity and ecological well-being, improving human well-being and equity, and promoting good governance.

Dr. Muralidhar emphasised the need for an EAA-based policy for shrimp aquaculture in Andhra Pradesh, noting that the state is India's leading shrimp-producing region, contributing nearly 70 percent of the country's farmed shrimp exports and providing significant rural employment and export earnings. However, he pointed out that shrimp aquaculture in the state faces multiple challenges, including high farm concentration in deltaic ecosystems such as Krishna, West Godavari, East Godavari, Konaseema, and Nellore districts, cumulative nutrient and organic

pollution in canals, creeks, and estuaries, recurrent disease outbreaks including White Spot Syndrome Virus (WSSV), *Enterocytozoon hepatopenaei* (EHP), and Running Mortality Syndrome (RMS), increasing climate risks such as cyclones, floods, and heat stress, salinisation-related conflicts with agriculture and drinking water sources, and fragmented regulation across departments including Fisheries, Coastal Aquaculture Authority, Agriculture, and the Andhra Pradesh Pollution Control Board. He underlined that these challenges necessitate a shift from farm-level regulation to ecosystem-level governance. In this context, EAA moves management away from isolated individual farms towards cluster-based and ecosystem-level planning, ensuring that shrimp production remains within environmental carrying capacity while remaining economically viable and climate-resilient.

Dr. Muralidhar outlined the overall goal of EAA for shrimp farming in Andhra Pradesh as achieving environmentally sound, economically resilient, and socially acceptable shrimp aquaculture through ecosystem-based planning and cluster governance. He elaborated on key EAA principles proposed for the state, including aligning shrimp farming intensity with ecosystem carrying capacity, adopting hydrologically connected clusters as the basic management unit, explicitly linking species, culture intensity, and zoning, collectively managing environmental, disease, and climate risks, improving coexistence between aquaculture, agriculture, and fisheries, applying adaptive management based on monitoring and scientific evidence, and institutionalising cluster-level governance and compliance mechanisms.

He proposed an EAA implementation framework structured across multiple interlinked levels. At the ecosystem planning level, he stressed the importance of zoning and carrying capacity assessments based on baseline studies of water quality, sediment quality, disease prevalence, greenhouse gas emissions, and the socio-economic profile of farmers. He highlighted the development of a GIS-based aquaculture atlas for Andhra Pradesh, incorporating species-wise and intensity-wise zoning maps, hydrological zoning of connected farm clusters, and carrying capacity assessments for major canals and estuarine segments. New farms and expansions, he noted, should be permitted only within approved ecosystem zones.

At the farm management level, Dr. Muralidhar described environmentally responsible practices such as enhanced biosecurity, use of reservoir ponds with adequate retention time, promotion of water reuse and low or zero exchange systems, and stocking densities aligned with carrying capacity. He highlighted ICAR-CIBA's expertise in geospatial planning tools for aquaculture zoning, online tools for carrying capacity assessment, district-level studies in Nellore, West Godavari, and East Godavari, and research on super intensive precision and natural shrimp farming, greenhouse gas emissions, and carbon footprints.

At the cluster level, he emphasised the need for formalisation of legally recognised EAA clusters through mandatory registration, including through Farmer Producer Organisations (FPO) or cooperative societies. He defined a cluster as a hydrologically connected group of shrimp farms sharing common water sources and discharge pathways, similar ecological conditions, and collective disease and pollution risks. Cluster-level governance mechanisms would include common water-use rules, synchronised stocking calendars, effluent management protocols, separate inlet and outlet systems where feasible, prevention of saline intrusion into agricultural lands, and mandatory cluster-level effluent treatment systems in line with CAA and Andhra

Pradesh Pollution Control Board (APPCB) standards. He also highlighted sludge and waste management measures such as sedimentation ponds, composting, reuse, and designated disposal sites. As an example, he referred to ICAR-CIBA's integrated farming model in Thanjavur, where low-salinity shrimp farm discharge water is used for irrigating crops such as paddy, Bengal gram, and coconut.

Dr. Muralidhar also addressed ecosystem-based health management, emphasising cluster-level disease surveillance, early warning systems linked to water quality and climate parameters, weather-linked alerts for cyclones and heat waves, and emergency harvest and containment protocols. He highlighted CIBA-led initiatives such as NSPAD for disease surveillance and NICRA projects for forecasting disease incidence using climate and water quality data.

He further discussed biodiversity and ecosystem services integration, including measures to prevent the escape of exotic species, protection of mangrove buffers in areas such as the Godavari estuary, Coringa, and Krishna district, and promotion of integrated multi-trophic aquaculture models such as shrimp-seaweed systems using species like *Gracilaria*. Climate resilience and risk management measures proposed under EAA include climate risk mapping, improved pond design standards in cyclone-prone districts, and promotion of cluster-level parametric insurance linked to extreme weather events.

On governance and compliance, he highlighted the need for inclusive capacity building, policy incentives for EAA-compliant clusters, infrastructure subsidies, insurance premium support, improved market and certification access, and a shift from farm-level inspections to cluster-level compliance audits. He also outlined monitoring, evaluation, and adaptive management frameworks, including the use of objectively verifiable indicators and means of verification, supported by ICAR-CIBA's environmental monitoring programmes and climate adaptation projects.

He concluded by highlighting super intensive precision and natural shrimp farming systems as being compatible with EAA principles when managed as controlled micro-ecosystems at the cluster level. He explained that such systems rely on precision-regulated stocking densities, in situ nutrient recycling through microbial communities, low-discharge farming, reduced energy use through IoT and solar technologies, improved feed conversion ratios, and lower environmental and carbon footprints.

- Adopt ecosystem-based zoning and carrying-capacity assessments using GIS tools and baseline environmental data before permitting new farms or expansion.
- Formalise hydrologically connected clusters as the basic management unit, with shared rules for water use, effluent management, and disease control.
- Promote cluster-level monitoring systems, climate risk mapping, and adaptive management, supported by research tools such as NASPAD and NICRA.
- Encourage integrated approaches, including reuse of low-salinity discharge water for agriculture and integrated multi-trophic systems where feasible.

4.3. GEF-FAO Sustainable Aquaculture Initiative in Andhra Pradesh

Mr. C. M. Muralidharan, Consultant, FAO, spoke (virtually) on the FAO-Global Environment Facility (GEF-8) India Sustainable Aquaculture Project, with specific reference to its implementation in Andhra Pradesh. He explained that the project aims to support the transition towards sustainable and climate-resilient aquaculture systems in the state while reducing environmental impacts and strengthening livelihoods linked to aquaculture.

He stated that the project forms part of the GEF-8 Food Systems Integrated Programme and follows a transformative approach that focuses on improving governance, strengthening policy coherence, encouraging private sector participation, and promoting inclusive engagement of stakeholders across the aquaculture value chain. Andhra Pradesh has been identified as the priority state for implementation under this project, with a proposed total investment of USD 13.16 million.

Mr. Muralidharan outlined the cluster-based implementation approach proposed under the project. Pilot aquaculture clusters have been identified across several coastal districts of Andhra Pradesh, including Kakinada, Konaseema, Eluru, Krishna, Bapatla, Nellore, and Srikakulam. These clusters are intended to function as demonstration sites for the adoption of ecosystem-based and climate-resilient aquaculture practices, with the objective of scaling up successful models across the state. He highlighted the key challenges faced by the aquaculture sector in Andhra Pradesh, including environmental pressures at the pond and cluster levels, disease risks, conflicts over land and water use, and gaps in governance and value-chain coordination. He noted that the project seeks to address these challenges through improved planning at the ecosystem level, capacity building of farmers and field-level officials, promotion of better management practices, and stronger coordination among institutions and stakeholders.

Mr. Muralidharan explained that the overall objective of the project is to promote responsible and sustainable aquaculture production systems in Andhra Pradesh, contributing to improved environmental performance, resilient livelihoods, and broader food system goals. To achieve this, the project is structured around four key components: strengthening food system governance for sustainable and climate-resilient aquaculture; scaling up incentives, investments, and financing mechanisms for sustainable aquaculture value chains; developing and demonstrating sustainable aquaculture production systems through pilot clusters; and supporting knowledge management, innovation, coordination, and scaling at national, regional, and global levels. He further elaborated on proposed interventions in Andhra Pradesh, including the preparation of EAA plans for pilot clusters, training and capacity building of farmers and extension personnel, awareness creation on regulatory and institutional frameworks, and facilitation of infrastructure development through convergence with existing government schemes. The project also proposes to promote best management practices, certification and traceability systems, and engagement with financial institutions to support sustainable finance and insurance products for the aquaculture sector.

In conclusion, Mr. Muralidharan emphasised that the project places strong emphasis on scaling up successful models within Andhra Pradesh, noting that lessons from the ten pilot clusters are expected to be expanded to around 500 clusters covering approximately 135,000 hectares

across the state. He underscored the importance of results-based management, knowledge sharing, gender mainstreaming, and environmental and social safeguards to ensure long-term sustainability and impact.

- Pilot EAA through GEF-FAO-supported shrimp farming clusters as demonstration sites for ecosystem-based and climate-resilient practices.
- Strengthen governance, financing, and institutional coordination through a cluster-based implementation model.
- Scale successful pilots from selected clusters to state-wide adoption, supported by results-based monitoring, safeguards, and gender mainstreaming.

4.4. Regulatory and Governance Perspectives on Ecosystem-based Aquaculture Management

Dr. V. Kripa, Former Member-Secretary of the Coastal Aquaculture Authority (CAA), in her presentation titled “Regulatory Perspectives on the Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming” outlined how the existing legal and institutional framework governing coastal aquaculture already incorporates several core principles of ecosystem-based management. She traced the evolution of the Coastal Aquaculture Authority from its establishment under the Coastal Aquaculture Authority Act, 2005, which was enacted following the Supreme Court judgment in *Sri Jegannathan vs Union of India (W.P. No. 561 of 1994)*. She explained that the Act mandates regulation of aquaculture activities within two kilometres of the High Tide Line, with the twin objectives of protecting coastal ecosystems and ensuring sustainable aquaculture development. Highlighting recent policy developments, Dr. Kripa noted that the amended CAA Act (2023), the revised Rules (2024), and updated guidelines represent the first major strengthening of the regulatory framework in nearly two decades. These instruments, she observed, emphasise precautionary environmental safeguards, participatory governance, and enhanced support for small-scale farmers through simplified registration and legal recognition of farms.

Focusing on Andhra Pradesh, Dr. Kripa described the state as India’s leading shrimp-producing region, accounting for nearly half of all CAA-registered shrimp farms in the country. She explained the role of District Level Committees and Sub-Divisional Level Committees in scrutinising farm registration applications, and highlighted the use of spatial zoning and digital platforms to regulate farm siting. Conversion of mangroves, ecologically sensitive areas, agricultural land, and salt pans for aquaculture is strictly prohibited under CAA guidelines. She further elaborated on environmental management measures, including mandatory effluent treatment systems for farms above five hectares and the promotion of integrated farming systems involving bivalves, seaweed, or finfish to improve waste assimilation. She also explained the tiered approach to environmental assessment, noting that large farms are required to undertake Environmental Impact Assessments and Environmental Monitoring and Management Plans, while smaller farms are regulated through proportionate safeguards.

Addressing biosecurity, Dr. Kripa highlighted the mandatory registration and regulation of hatcheries, strict controls on the import of Specific Pathogen Free bloodstock, and robust quarantine and disease surveillance mechanisms. She cited past instances where disease detection in imported broodstock led to immediate destruction of the stock and suspension of suppliers, underscoring the effectiveness of preventive regulation.

As part of her presentation, Dr. V. Kripa highlighted a SWOT analysis of shrimp farming in Andhra Pradesh. She noted that the sector has strong foundations, including an established regulatory framework, aquaculture zoning, streamlined farm registration, and access to technical support services such as seed and water quality testing. She also pointed out key weaknesses, including limited understanding of ecosystem carrying capacity, gaps in disease surveillance, dependence on informal credit, and high exposure to export market fluctuations. Dr. Kripa emphasised that significant opportunities exist due to increasing awareness of better management practices, strong institutional support, scope for value addition, and the substantial yet often under-recognised contributions of family members and women in farm operations, post-harvest handling, and allied activities. At the same time, she cautioned that threats such as poor-quality inputs, climate-related risks, disease outbreaks, and market rejections due to non-compliance need to be addressed. She underscored that recognising and supporting family- and women-based roles is essential while operationalising the Ecosystem Approach to Aquaculture for sustainable shrimp farming.

In conclusion, Dr. Kripa emphasised that the Coastal Aquaculture Authority performs both regulatory and developmental roles, combining enforcement with advisory support, dissemination of best management practices, and promotion of sustainable technologies. She underscored that while India's regulatory framework already aligns closely with EAA principles, further strengthening of ecosystem-level planning, surveillance, and climate resilience measures would be essential to fully operationalise the Ecosystem Approach to Aquaculture in shrimp farming.

- Leverage the strengthened CAA Act (2023) and Rules (2024) as a regulatory foundation aligned with EAA principles.
- Address weaknesses identified in the SWOT analysis, including limited understanding of carrying capacity, disease surveillance gaps, and dependence on informal credit.
- Recognise and support the roles of women and family members in farm operations, post-harvest handling, and allied activities as part of EAA implementation.
- Strengthen ecosystem-level planning, surveillance, and climate resilience measures while maintaining a balance between regulatory enforcement and developmental support.

5. Conclusion

Overall, participants agreed that farm-level compliance alone is not adequate to address cumulative environmental impacts, disease risks, water-use conflicts, and climate-related pressures. They pointed out that while several elements of EAA are already being practiced in shrimp farming in Andhra Pradesh through cluster-based farming, zoning, biosecurity measures, regulatory oversight, and market-led initiatives, these are currently implemented in isolation and are not fully integrated within a common ecosystem-level planning framework.

There was strong agreement that cluster-level governance provides a practical and workable entry point for applying EAA in shrimp farming. Strengthening farmer organisation through clusters, cooperatives, and Farmer Producer Organisations was considered essential for collective management of water resources, disease control, biosecurity, environmental monitoring, and compliance. Participants emphasised the importance of building on existing platforms, particularly NaCSA-supported clusters, rather than creating new parallel mechanisms.

The discussions underlined the need for improved ecosystem-level planning based on carrying capacity, baseline environmental data, and regular monitoring of soil and water quality. Particular attention was drawn to groundwater use, salinization, and interactions between shrimp farming and agriculture, especially in deltaic areas such as West Godavari. Participants noted that these issues must be explicitly addressed while scaling up shrimp farming under the Ecosystem Approach to Aquaculture. From a governance perspective, participants stressed the importance of better coordination among research institutions, regulatory authorities, farmer organisations, and market actors. Regulatory gaps, including the absence of a specific legal framework for inland aquaculture, were identified as areas requiring attention, particularly when environmental safeguards and Environmental Impact Assessment requirements are considered. Better alignment between regulatory measures and development programmes was seen as necessary for effective implementation.

Social aspects received significant attention during the discussions. Participants emphasised the need to recognise and support the roles played by women and family members in shrimp farming operations, post-harvest activities, and allied services. Integrating gender and social considerations into EAA planning was viewed as important for ensuring sustainable livelihoods and equitable sharing of benefits.

The experts recommended piloting the Ecosystem Approach to Aquaculture in selected shrimp farming clusters in Andhra Pradesh. These pilots should focus on ecosystem-level planning, farmer participation, coordinated institutional support, and monitoring and adaptive management. Lessons from these pilot initiatives could then be used to guide wider adoption of EAA in shrimp farming at the state and national levels.

5. Way forward

NaCSA has developed a community-based model for shrimp farming in Andhra Pradesh by systematically scaling up and forming 840 clusters and 15 cooperative societies covering 8719 ha over the years. Similar initiatives have been taken up by NaCSA in Tamil Nadu as well. The objectives are to (i) establish collective resource pooling; (ii) shared risk management; (iii) enhance the water quality; and (iv) adopt best practices.

In consultation with NaCSA, the BOBP-IGO shall select one or two clusters among these clusters and conduct scoping consultation and develop EAA plan. The EAA plan will provide the input for NaCSA to implement the plan at cluster level. This model can be scaled up by NaCSA from the lessons learned.

The specific requirements from NaCSA are as follows:

- Comprehensive list / summary of the shrimp farming clusters in Andhra and Tamil Nadu
- The criteria used for identifying the best performing shrimp farming clusters by NaCSA for recognizing them.
- Five consistently top performing clusters, along with their detailed characteristics (geographical, socio-cultural, ecological, environmental setting of the clusters; member and production characteristics and any other relevant details as readily available).

Based on these, the BOBP shall work on preparing a draft EAA plan for a chosen cluster based on the template suggested by the FAO considering environmental, social, economic and governance aspects keeping in mind the important outputs from the Workshop that could be considered for developing EAA Plan as follows:

1. Enhanced understanding of the Ecosystem Approach to Aquaculture (EAA) and its applicability for scaling up sustainable shrimp farming in Andhra Pradesh among key stakeholders.
 - Ecosystem Approach to Aquaculture (EAA) is an **integrative planning and management framework**, rather than a new regulatory system.
 - EAA can **build on existing practices** in Andhra Pradesh such as cluster-based farming, zoning, biosecurity protocols, certification systems, and regulatory oversight
 - Many elements of EAA exist but are **fragmented**
2. Compiled and assessed lessons learned and good practices from various organizations and initiatives aligned with EAA, providing evidence base for informed decision-making.

Key lessons learnt:

- **Environment** sustainability is highly neglected in AP shrimp farms.
- **Farmer unity** is missing – they come together to address issues related to pricing of shrimps, but do not to discuss other issues such as environment or social unity.
- **Seed quality:** There is a potential for collaborative approach to ensure seed quality, where a society can establish a laboratory as a collective approach

Good Practices

- NaCSA's cluster-based BMP adoption
 - ICAR-CIBA's work on carrying capacity, GIS-based zoning, disease surveillance (NSPAAD), and climate resilience (NICRA)
 - Market-driven certification and traceability initiatives including SHAPHARI
 - Regulatory mechanisms under the CAA Act and Rules
3. Identified appropriate scales for Aquaculture Management Units (AMUs) for shrimp farming through participatory brainstorming, along with clear identification of key stakeholders and their roles.

Key stakeholders and their roles

- Farmers and farmer organizations (clusters, FPOs, cooperatives) for collective action on water use, biosecurity, and BMPs;
- Research institutions (ICAR-CIBA) for carrying capacity assessment, monitoring, and decision-support tools;
- Regulatory bodies (CAA, APPCB, Fisheries Department) for zoning, compliance, and safeguards;
- Market actors and development partners for certification, finance, and scaling.

Scale of operation

- NaCSA clusters and cooperative societies
 - Potential zoning – by location / access to water
4. Prioritized key environmental, social, and economic issues affecting shrimp farming, enabling focused and strategic interventions.

Environmental issues

- Cumulative environmental impacts, disease risks, water-use conflicts, and climate variability – related to water quality
- Use of CIBA soil card
- Co-existence in some locations of fish and shrimp farms – fish farms use antibiotics, shrimps do not
- Groundwater usage

Social issues

- Migrant labour – language of communication
- Farmer profitability, conflicts with agriculture
- Role of women and family members in shrimp farming and allied activities

Economic priorities

- Value chain resilience (quality seed, quality feed, etc)
- Market volatility (prices determined by international market)
- Compliance related costs and risks

Governance

Legislation

- Jurisdiction of Coastal Aquaculture Authority is up to 2km from the coast, but many farms are located beyond 2 km from the coast.
4. Strengthening collaboration and institutional support among government agencies, research organizations, industry actors, and development partners, leading to a roadmap for implementing EAA-based shrimp farming in Andhra Pradesh.
- Desk exercise – analysis of relevant laws in AP related to shrimp farming, with focus on components, jurisdiction, and assess how do the laws align with EAA (FAO) principles and identify the components that need to be strengthened
 - Strengthen CAA ensuring adoption of EAA principles and carrying capacity requirements (through preparation of appropriate guidelines)
 - Mapping institutions, their roles – are there any gaps / overlaps?
 - Stakeholder consultation on practical action and capacity building.

Annexure I: Provisional Agenda



Preparatory Workshop on

Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming

Exploring Implementation Pathways in Andhra Pradesh, India

10 Jan 2026

BOBP-IGO Secretariat, Chennai

Provisional Agenda

Time	Activity	
0945 - 1000	Registration	Participants
1000 - 1010	Opening Remarks and Context Setting	Dr. P. Krishnan <i>Director, BOBP-IGO</i>
1010 - 1030	Current status of shrimp farming in Andhra: Key Issues	President / Executive from SAP
1030 - 1050	Ecosystem Approach to Aquaculture (EAA): FAO Initiatives and Key Learnings from Countries	Dr. Marcelo Vasconcellos <i>Fisheries Officer, FAO</i> Dr. Sunil Mohamed <i>Sr. Scientific Consultant, BOBP-IGO</i>
1050 - 1100	Advancing EAA in Shrimp Farming: Initial Thoughts	Dr. P. Krishnan <i>Director, BOBP-IGO</i>
1100 - 1130	Group Photo & High -Tea	
1130 - 1230	Panel Discussion: Making EAA in Shrimp Farming a Reality: Experiences to learn from and Build-on	Moderator: Dr. E. Vivekanandan <i>BOBP-IGO</i>
1135 - 1145	NACSA & Shrimp Farming: Community engagement experiences and new initiatives	Ms. Daiahun Khonglam <i>Chief Executive Officer, National Centre for Sustainable Aquaculture (NaCSA)</i>

Time	Activity	
1145 - 1155	GEF-FAO Initiative on Andhra Pradesh Shrimp Farming	Mr. C. M. Muralidharan <i>Consultant, FAO</i>
	End-to-end traceability of Andhra Pradesh produced shrimps; Walmart Initiative	Dr. Santhana Krishnan <i>CEO, Marine Technologies</i>
1205 - 1215	EAA in Shrimp Farming: Perspectives from a Research	Nominees from ICAR-CIBA
1215 - 1225	EAA in the CAA Context: Opening Thoughts	Dr. V. Kripa <i>Former Member Secretary, CAA</i>
1225 - 1320	Discussion / Interactions	Participants
1320 - 1330	Closing & way Forward	Dr. P. Krishnan <i>Director, BOBP-IGO</i>
1330 - 1430	Lunch	

Annexure II: List of Participants



**Preparatory Workshop on
Ecosystem Approach to Aquaculture (EAA) in Shrimp Farming
Exploring Implementation Pathways in Andhra Pradesh, India**

10 January 2026

PARTICIPANTS LIST

No.	Organization/ Institutions	Participants	Mobile/Email
1	CAA	Dr. V. Kripa Former Secretary Coastal Aquaculture Authority (CAA), Chennai – 600 035, Tamil Nadu.	Tel: +91 9495317931 Email: vasantkripa@gmail.com
2		Mr. Shijo Mathew. Consultant Coastal Aquaculture Authority (CAA), Chennai – 600 035, Tamil Nadu.	
3		Ms. R. D. Monica Consultant Coastal Aquaculture Authority (CAA), Chennai – 600 035, Tamil Nadu.	
4	EDIF	Dr. D. Vijai, Senior Manager, Environmental Défense India Foundation (EDIF), Videocon Tower – 110005, New Delhi.	Tel: + 91 6238706802 Email: vijaid@edif.org.in
5	FAO/IND	Mr. C. M. Muralidharan, Lead Technical Consultant, (GEF 8 Aquaculture Project),	Tel: +91 98408 59888 Email: cmmuralidharan@gmail.com

No.	Organization/ Institutions	Participants	Mobile/Email
		Food and Agriculture Organization of United Nations (FAO/UN) FAO India – 100 001, New Delhi.	
6	Global Aquaculture Alliance (GAA)	Dr. Panchu Duraisamy, BAP Country Coordinator (India), Global Aquaculture Alliance (GAA), Chengalpattu – 603002, Tamil Nadu.	Tel: +91 80561 43169 Email: panchu.duraisamy@gmail.com
7	ICAR-CIBA, Chennai	Dr. M. Muralidhar, Principal Scientist, ICAR-Central Institute of Brackishwater Aquaculture (CIBA), Raja Annamalai Puram, Chennai – 600 028, Tamil Nadu.	Email: Muralichintu.M@icar.org.in
8		Dr. K.P. Kumaraguru Vasagam, Principal Scientist, ICAR-Central Institute of Brackishwater Aquaculture (CIBA), Raja Annamalai Puram, Chennai – 600 028, Tamil Nadu.	Tel: +91 9025971743 Email: Kumaraguru.Vasagam@icar.org.in
9	ICAR-CIFE	Dr. P. S. Ananthan, Principal Scientist and BOB-Fellow, ICAR-Central Institute of Fisheries Education (CIFE), Mumbai – 400 061, Maharashtra.	Tel: +91 70218 87439 Email: ananthanps@gmail.com
10	Marine Technologies Pvt.Ltd.	Dr. Santhana Krishnan, Chief Executive Officer, Marine Technologies, Chennai – 600 040, Tamil Nadu.	Tel: +91 9444413709 Email: santhana@maritech.in
11	MPEDA-NaCSA	Ms. Daiahun Khonglam, Chief Executive Officer,	Email: ceo.nacsa@mpeda.gov.in

No.	Organization/ Institutions	Participants	Mobile/Email
		MPEDA-National Centre for Sustainable Aquaculture (NaCSA), Kakinada – 533005, Andhra Pradesh.	
12		Mr. Ravi Goda Chief Executive Officer, MPEDA-National Centre for Sustainable Aquaculture (NaCSA), Kakinada – 533005, Andhra Pradesh.	
13		Mr. S. Azhagar Chief Executive Officer, MPEDA-National Centre for Sustainable Aquaculture (NaCSA), Kakinada – 533005, Andhra Pradesh.	
14	MPEDA	Dr. A. Jayabal, Joint Director, Marine Product Export Development Authority (MPEDA), Chennai – 600010, Tamil Nadu.	Tel: +91 95004 49179 Email: jayabal@mpeda.gov.in
15	Sheng Long Bio-Tech (India) Pvt. Ltd.	Mr. N. Bhaskaran, Regional Manager, Sheng Long Bio-Tech (India) Pvt. Ltd., Chennai – 600102, Tamil Nadu.	Tel: +91 9487964879 Email: bhaski@shenglongindia.com
16	SIST	Dr. Inbakandan. D, Professor, Professor (Research) & Head of the Centre for Ocean Research at Sathyabama Institute of Science and Technology (SIST)	Phone: +91-44-24503067 Email: sathyabama.ocean@sathyabama.ac.in
Organizers			
17	BOBP IGO	Dr. P. Krishnan, Director, Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO),	Tel: +91 94980 50062 Email: krishnanars@bobpigo.org

No.	Organization/ Institutions	Participants	Mobile/Email
		Chennai – 600 018, Tamil Nadu.	
18		Dr. E. Vivekanandan , Senior Scientific Consultant, Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), Chennai – 600 018, Tamil Nadu.	Tel: +91 94442 38648 Email: evivekanandan@hotmail.com
19		Dr. K. Sunil Mohamed , Scientific Consultant, Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), Chennai – 600 018, Tamil Nadu.	Tel: +91 94442 38648 Email: ksmohamed@gmail.com
20-24	Rapporteur Team	Dr. Ahana Lakshmi , Senior Scientific Consultant, Dr. K. Nirmala , Project Scientist, Dr. T. Velumani , Project Scientist, and Ms. B. Smrithi, & Ms. D.P. Vinitha , BOBP Interns.	



BOBP

Bay of Bengal Programme
Inter-Governmental Organisation

91 St. Mary's Road, Chennai - 600 018, India. Tel: +91 44 42040024
Email: info@bobpigo.org | www.bobpigo.org