



BOBP

BREZZ

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Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) is a Regional Fisheries Advisory Body (RFAB) for promoting sustainable fisheries in the Bay of Bengal and associated regions. Its current members are Bangladesh, India, the Maldives, and Sri Lanka. It serves as the think tank on transboundary and contemporary national issues of the member countries concerning fisheries management.

In this issue...

- 02 - Viewpoint
- 04 - Reflections
- 06 - Salient Programs/Events
- 11 - Strengthening Cooperation
- 15 - Meetings/Events participated
- 21 - Study Report
- 26 - Perspective
- 31 - BOBP Impact
- 34 - BOBP-IGO in the Media
- 35 - New Publications



Navigating Towards a Blue Bay: The Renewed Tryst with the Bay of Bengal Large Marine Ecosystem Project

Imagine a Bay teeming with rich flora and fauna where fisheries flourish for eternity and where sustainability is ensured through collective action!

The Bay of Bengal, ecologists and oceanographers would say, is a large contiguous body of waters with high primary productivity, and one of the 66 Large Marine Ecosystems of the world. The marine flora and fauna of the Bay, whether available locally or distributed along the ecosystem, are part of the larger ecosystem. The word that encapsulates the nature of the Bay is “shared” – a shared system for the Bay of Bengal Rim countries and a shared system between the immediate users and the rest of the world. However, the Bay of Bengal we see is demarcated and divided, each area having its distinct socio-economic and governance elements. The resultant outcome is like that of hemi hyperplasia, with different parts of the Bay differently developed.

The Bay of Bengal Large Marine Ecosystem Project (BOBLME), which originated from the same root as the BOBP-IGO, the erstwhile Bay of Bengal Programme of the FAO (1979-2000), precisely aims to address this problem of differential development in the Bay. The project is a logical extension of the objectives of the BOBP-IGO that brings in the Large Marine Ecosystem (LME) approach aimed

at balancing conservation and human uses. From a governance perspective, the project involves both the Ministry of Fisheries and the Ministry of Environment in the implementation process, transcending the dichotomy between Regional Fisheries Bodies (with the Ministry of Fisheries as the main driver) and Regional Seas Organisations (where the Ministry of Environment is the main driver).

The first phase of the project was implemented during 2009-15 in eight countries surrounding the Bay, namely, Bangladesh, India (Focus: East Coast, A&N Island groups), Indonesia (Focus: stretch in Bay of Bengal), Malaysia (Focus: stretch in Bay of Bengal), Maldives, Sri Lanka, and Thailand. Possibly, the most significant outcome of phase 1 of the project is the popularization of the LME concept and underlining the need for collective action in securing the stream of benefits from the Bay. A transboundary diagnostic analysis (TDA) was also carried out to identify shared problems in the region. Based on it, a Strategic Action Programme (SAP) for recovery and sustainable use of the Bay was developed.

The implementation of the second phase of the BOBLME project started in 2023 and will go on till 2028. It draws its strength from the SAP and envisions a long-term regional mechanism to be in place to ensure the sustainability of the Bay before the end of the project cycle in 2028. Unlike the first phase, where BOBP-IGO played a supportive role, in the current phase, the Organisation has taken the onus of executing the project for the benefit of its member countries. There are three critical areas where BOBP-IGO will intervene: [1] establishing an ecosystem approach to fisheries management (EAFM) in the region; [2] curbing Illegal, unreported and unregulated (IUU) fishing; and [3] pollution control. The other components of the project are [2] establishing marine-managed areas and [4] enhancing livelihood resilience, which will be implemented by IUCN. In addition, the Organisation will also contribute to the development of the regional coordination mechanism and project communication. In the case of Southeast Asia, the Southeast Asian Fisheries Development Center (SEAFDEC) will reprise the role that BOBP is playing in South Asia.

IUCN is also responsible for regional coordination, while FAO will oversee the overall implementation of the project. The second phase of the BOBLME is funded by the Global Environment Facility (GEF) and the Norwegian Agency for Development Cooperation (NORAD) with co-finance from the project countries and the executing agencies (BOBP, SEAFDEC & IUCN).

Along the way to the launch of the BOBLME-2, many may have had apprehensions about the possibility of the project making any actual impact, particularly given the fact that none of the proposed activities is new to the region. The BOBP-IGO, from its experience in promoting the FAO Code of Conduct for Responsible Fisheries (CCRF) since 1995, which has seen some definite progress only in the recent past, recognises that bringing change at this scale takes time.

The confidence in making a positive change during the BOBLME-2 emanates from different developments and emerging opportunities. The first and foremost is the nature of governance of the Bay of Bengal. It is one of those water bodies where the issues of national maritime zones (EEZs) are fairly well-settled. This gives clear guidance on what is there and for whom. Secondly, an increasing emphasis is on an ocean-based economy and blue economy. While the blue economy is still an abstract idea, one of its cardinals is that growth can be optimised subject to a healthy ecosystem. This could be the possible way to escape the 'prisoner's dilemma', assuming that the Rim countries of the Bay accept this maxim.

In addition, changes in the fisheries governance space in the region during the last few years offer great promise. To start with, the Bay of Bengal Rim countries are parties to Life Below Water (SDG-14) and have demonstrated their commitment to the SDG through their support of WTO negotiations and later through their pronounced role in

the finalization of the Biodiversity Beyond National Jurisdiction (BBNJ) agreement. On the environmental side, the countries have subscribed to the Global Biodiversity Framework (GBF), re-establishing their commitment to conserve biodiversity in land and water.

Despite its ecological and economic importance, the Bay of Bengal faces significant challenges. Climate change, rising river basins, and inadequate management practices have led to overexploitation and the resultant collapse of fish stocks. Alarming, top-of-the-food-chain species have faced dramatic declines, with reports indicating 'near extinction' of key species like tiger prawn and Indian salmon. Overfishing, particularly by large vessels, exacerbates the problem, as do habitat degradation and the migratory nature of many fish stocks, which frequently move between the EEZs of different countries.

In fact, in the light of the growing evidence on stock status, plastic pollution, changing climate and the emergence of dead zones in the Bay, the situation can be considered dire and scary, demanding urgent attention. To effectively address the myriad challenges faced by the Bay of Bengal's marine ecosystem, the EAFM emerges as a pivotal strategy. This approach aligns seamlessly with the need for concerted and cooperative efforts from all bordering nations to safeguard this vital marine habitat for current as well as future generations.

EAFM is a comprehensive way of managing fisheries that takes into account the entire ecosystem in which fish live rather than focusing solely on individual fish species.

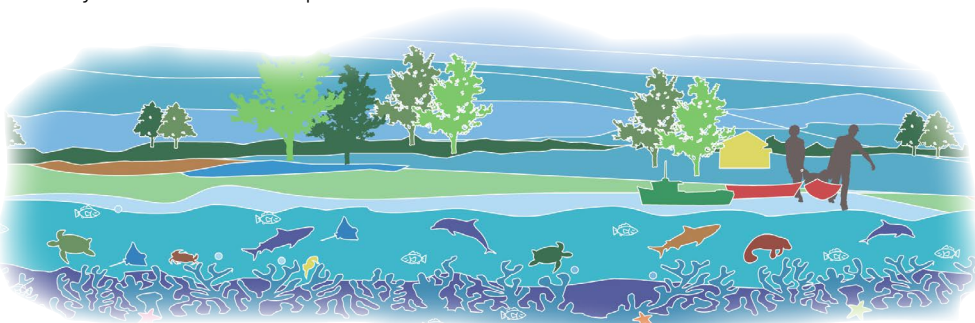
This approach is akin to managing a garden with the whole ecosystem in mind rather than just focusing on individual plants.

Global studies show (Sunken Billion Revisited), the rent loss from fisheries is the highest in Asia. An inadequate fisheries management regime is the primary factor behind this loss. The BOBLME project does not aim at fisheries reform, per se. Still, its trust is in progressive nudging for the gradual alignment of the current exploitation locus to an ideal exploitation locus.

To achieve this, the BOBP-IGO will work intensively and consistently with national and international organizations and primary stakeholders, bringing together all views on board and building capacity to change and sustain the change for the betterment of the region.

The journey towards implementing the LME approach in the Bay of Bengal is complex, marked by both promising opportunities and formidable challenges. Success hinges on the region's ability to navigate these challenges, fostering institutional resilience and adaptability.

As the Bay embraces this sustainable path, the potential for a balanced ecosystem, where fisheries and communities thrive together becomes increasingly tangible. It is a vision for the future that demands commitment, collaboration, and innovation, setting a precedent for sustainable fisheries management, globally.





A Hettiarachchi

*Ex-Director General,
National Aquatic Resources
Research and Development
Agency, Sri Lanka*

Support of BOBP/FAO for Culture of Penaeid Shrimps in Sri Lanka

BOBP contributed to the establishment of shrimp aquaculture in Sri Lanka through its technical support in the formative years of the early 1980s. Dr. Hettiarachchi, then Director General, NARA, who witnessed the development from the close quarters, reminisces about the developments in this arena and the role of BOBP in the process under his watch.

Penaeid shrimps have remained a popular food commodity in Sri Lanka for a long time. In 1977, the then government liberalized the economy and implemented, among other economic programs, one to promote the export of various commodities to increase foreign exchange earnings. Shrimp was one such commodity identified as suitable for export because it had a steadily increasing demand in the international market.

Until the early 1980s, most of the shrimp produced in Sri Lanka came from small-scale fishing operations conducted in the lagoons and the territorial sea. However, it was recognized that intensifying shrimp fishing operations to increase shrimp production might lead to a decline in shrimp resources. Therefore, the government decided to encourage shrimp farming to increase shrimp production. It provided credit, subsidies, suitable sites on land, technical know-how, and a package of incentives, such as tax holidays, exemption of inputs from duties, etc., to encourage entrepreneurs to invest in shrimp farming.

During the above period, state land suitable for conversion into shrimp farming ponds was available for a nominal lease rent. However, the construction costs of ponds were high due to the scarcity of earth-moving machinery, difficulty in providing facilities for the supply and drainage of water, lack of an assured seed supply, etc. As a result, small-scale investors were reluctant to invest in pond farming of shrimp. Other options available for farming shrimp were pen culture and cage culture in suitable locations in the lagoons. These farming operations were less costly compared to pond farming. The Negombo Lagoon and Chilaw Lagoon were identified as suitable for the installation of pens and cages for shrimp culture.

To promote the pen or cage culture of shrimp, it was necessary to have a reliable supply of shrimp seed (post-larvae). There was no shrimp hatchery in the country at that time. However, there was a government-owned coastal aquaculture station where fry of milkfish (*Chanos chanos*) collected from the wild were reared for use

as bait in pole and line tuna fishing operations. This station was at Pitipana, a village located in close proximity to the Negombo lagoon. The Ceylon Fisheries Corporation had established it in the 1960s with facilities such as cement tanks, a general store, a laboratory and a laboratory store, a hall, and a garage. The government decided to modify this station as a shrimp hatchery with the following objectives: (a) test the technical feasibility of producing shrimp seed under local conditions; (b) develop the competence of aquaculturists in the operation of a shrimp feed production facility; (c) demonstrate the operation of a small-scale shrimp larvae production unit; and (d) instil enthusiasm among people interested in shrimp culture. Modification of the station involved making spawning tanks, seawater storage tanks, nursery pools, and establishing an air supply system, etc.

Support from BOBP/FAO

The BOBP/FAO supported the shrimp culture program

by implementing a three-year project for the development and demonstration of coastal aquaculture techniques, which commenced in 1984. It provided the services of a consultant for a two-year period in breeding shrimps and adopting the pen culture of shrimp. The aquaculture station was modified as a shrimp hatchery by effecting the required changes in design, providing an air blower, a generator, several water pumps, and minor equipment and implements that were required. It also provided a week's training in the pen culture of shrimp in erstwhile Madras for the officer-in-charge of the program. BOBP/FAO support also included assistance for the installation of two culture pens of 0.1 ha each in the Negombo lagoon for conducting culture trials as well as the demonstration of culture techniques. Trials were conducted for four species, i.e., *Penaeus monodon*, *P. indicus*, *P. merguensis*, and *P. semisulcatus*.

Impact of the Program

Investors and aquaculture farmers developed an interest in shrimp

farming when they became aware of hatchery production and pen culture trials. Several farmers purchased post-larvae and started culturing them in pens installed in the Negombo and Chilaw Lagoons. Some commenced culture in small ponds. Three private sector companies established hatcheries at three different places (Talahena, Thoduwawa, and Karukkapone) and produced post-larvae for sale to those interested in engaging in culture operations. One investor commenced culture in ponds in the Batticaloa district. Towards the end of the 1980s, industrial shrimp farming commenced in Sri Lanka. In 1991, the Pitipana shrimp hatchery had to be closed and dismantled since the government made a policy decision not to provide support for aquaculture development. However, shrimp farming remains in the country as an important industry that earns foreign exchange and provides employment.

Acknowledgements

Information provided by Dr. R.A.D.B. Samaranayake, who was the Assistant Director in-charge of brackishwater aquaculture development in the Ministry of Fisheries, Sri Lanka, from 1984 to 1990 is thankfully acknowledged.

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Pen culture at Chilaw, Sri Lanka

Salient Programs/Events

Exposure-cum-Skill Development Workshop for Fisheries Science Students



BOBP-IGO conducted a workshop from 05 to 11 September 2023 for postgraduate and doctoral scholars from Cochin University of Science and Technology (CUSAT), Tamil Nadu J. Jayalalitha Fisheries University, and Andhra Pradesh Fisheries University. The workshop focused on developing skills among the research students on regional fisheries issues like shared fish stock management, IUU fishing, and climate change adaptation. Trainees were introduced to public databases

such as those maintained by FAO, IOTC, and the Sea Around Us Project. The workshop included hands-on training sessions, group exercises, individual assignments, and presentations to develop

critical thinking and scientific communication skills.

Mr. R. Mukherjee, Policy Analyst, and Dr. M. Sri Hari, Project Scientist, coordinated the workshop.



Feedback from participant

The BOBP-IGO exposure training was incredibly beneficial for me, as it not only helped me think from a wider perspective but also provided valuable insights into various datasets. The program equipped me with practical skills for effectively analyzing and interpreting such data, contributing significantly to my professional growth.



The interactive nature of the program fostered a collaborative environment, allowing participants to work together seamlessly. It facilitated the sharing of diverse ideas and experiences, leading to a deeper understanding of the subject matter.

Sruthi Sundar, (PhD (First Year) CUSAT)

International Conclave on Mainstreaming Climate Change in International Fisheries Governance

An International Conclave on Mainstreaming Climate Change in International Fisheries Governance was organized in Mahabalipuram, Tamil Nadu, India from 16 to 19 October 2023. The event, hosted by the Department of Fisheries, Government of India, and collaboratively organized by BOBP-IGO in conjunction with the National Fisheries Development Board (NFDB), India, drew the active participation of approximately 200 delegates from both India and abroad.

The diverse participant profile included representatives from esteemed government agencies such as the Department of Fisheries (Bangladesh, India, Maldives, and Sri Lanka). Also, prominent research institutions like ICAR-CMFRI, ICAR-CIFT, ICAR-CIBA, NIOT, NCCR, NCSCM and others in India, as well as NARA from Sri Lanka, participated in the event. Academic institutions from India, including TNJFU, APFU, CUSAT, and Sathyabama University, were well-represented. The conclave also had representations from regional fishery bodies like IATTC, IOTC, SEAFDEC, SIOFA, WCPFC, and NEAFC to address the challenges posed by climate change in the realm of international fisheries governance.

The conclave's significance was further underscored by the presence of representatives from the Food and Agriculture Organization (FAO), emphasizing the global importance of the discussions held during this impactful event.

The international conclave comprised multiple events:

1. Regional Workshop on Mainstreaming Climate Change into International Fisheries Governance – the Case of Regional Fisheries Bodies in the Indo-Pacific Region;
2. Brainstorming Session on India's Preparedness for Adapting to Climate Change in Marine Fisheries;
3. Scoping Event on Mainstreaming LiFE for Fisheries Management;
4. Thematic expo on Innovations in Adapting to Climate Change; and
5. Wave of Art's Session 4- A Live Sketching Event

Honourable Union Minister of Fisheries, Animal Husbandry, and Dairying, Shri Parshottam Rupala, inaugurated the event. Dr. Abhilaksh Likhi, IAS, Secretary (DoF); Dr. J.K. Jena, DDG (Fisheries), ICAR;

Ms. Neetu Kumari Prasad, IAS, Joint Secretary (Marine Fisheries); Dr. Takayuki Hagiwara, FAO Representative, India; Dr. Piero Mannini, Senior Fisheries Officer, FAO; Dr. Darius Campbell, Chair of the Regional Fisheries Bodies Secretariat Network (RSN); Dr. L. Narasimha Murthy, Chief Executive (i/c), NFDB; and Dr. P. Krishnan, Director, BOBP-IGO took part in the inaugural ceremony.

Speaking on the occasion, the Honorable Union Minister highlighted India's journey from a subsistence fishing nation to one of the major fishing nations of the globe, the government's effort towards sustainable development of the fisheries, and the challenges faced by the sector from the changing climate.



FAO Workshop on Mainstreaming Climate Change into International Fisheries Governance – the Case of Regional Fisheries Bodies in the Indo-Pacific Region

The 35th session of the Committee on Fisheries (COFI35) held in Rome from 05-09 September 2022, recognized that the Regional Fishery Bodies (RFBs) must effectively engage with the member countries on the topic of climate change and requested FAO to develop guidelines on climate resilient fisheries management, and as part of the solution, convene a workshop with RFBs. Responding to this, the FAO convened this Regional Workshop, “Mainstreaming Climate Change into International Fisheries Governance – the Case of Regional Fisheries Bodies in the Indo-Pacific Region”, involving the Regional Fishery Bodies (RFBs) from the Indo-Pacific region to develop guidelines for climate resilient fisheries management and strategize the integration of climate change into international fisheries governance.

The broad objectives of the workshop were (i) to take stock of good practices and lessons learned from Regional Fishery Bodies that have the most advanced experience in implementing risk-based management approaches to respond to changes in ecosystem states, including climate change impacts; (ii) to provide the basis for the development of a set of tailored solutions using the best available scientific inputs to implement risk-based management under data-poor contexts and regional differences; and (iii) to prepare a roadmap aided with a risk management/decision framework for climate resilient management and develop an outline for the capacity-building program in this arena.

Senior delegates from FAO, Rome, representatives from nine RFBs from the Indo-Pacific region, and subject matter experts on international law and fisheries governance participated in the Workshop.



The official nominees from the BOBP-IGO member countries viz., Bangladesh, India, Maldives and Sri Lanka also participated in the deliberations.

The event had different sessions, including technical presentations, plenary sessions, and group discussions. Technical presentations by Regional Fisheries Bodies (RFBs) showcased their activities, strategies, and initiatives in response to climate change. These presentations summarized good practices and lessons learned and identified entry points and opportunities for enhanced integration of climate change into the RFBs' work. Also, they addressed relevant gaps such as knowledge and data, capacity, and finance, along with other challenges.

Additionally, breakout groups were formed to delve into specific

topics, including monitoring climate change impacts, data collection and compilation, data analysis and reporting, formulation of Conservation and Management Measures (CMM), and technical/scientific advice. These groups also discussed cooperation among RFBs and legal challenges. The outcomes of these discussions were consolidated into recommendations focusing on the main elements of a risk management/decision framework for climate-resilient management. Furthermore, the recommendations included a roadmap for developing such a framework, an assessment of the need for a capacity-building program to support RFBs' responses to climate change and strategies for enhancing regional coordination to ensure effective fisheries management.

Brainstorming Session on India's Preparedness for Adapting to Climate Change in Marine Fisheries

The Brainstorming Session on 'India's Preparedness for Adapting to Climate Change in Marine Fisheries' was organized on 17 and 18 October 2023 to facilitate the exchange of knowledge, research findings, and best practices and to foster dialogue and collaboration among scientists from the countries of the region on climate-resilient strategies.

The event brought together a diverse group of experts, including researchers, policymakers, and professionals from India and South Asia, to discuss various research findings, challenges, and policies related to approaches to tackle climate change effects in fisheries.

The discussions were held over three sessions viz., [1] Status of Indian Fisheries with respect to Climate Change and Adaptation Strategies, [2] Knowledge Sharing and Capacity Development for Climate-Proofing Marine Fisheries in the BOB Region, and [3] Plenary Session on Climate-Resilient Fisheries Management.

The presentations focused on the prevailing reality of climate change impacts, which are evident in their widespread and expanding nature, necessitating a comprehensive and mindful research approach. Speakers emphasized a holistic perspective, underlining the urgency of constant adaptation



based on feedback in research and development endeavours. Also, the presentations from various South Asian countries underscored a shared commitment to addressing the challenges outlined in Sustainable Development Goal 14 (Life Below Water) while expressing deep concern over the sluggish progress in achieving it. The speakers emphasised an urgent

need for ocean literacy, capacity development, and collaborative efforts to bolster sustainability. The importance of citizen science and collaborative networks was underscored as instrumental in fostering effective responses to environmental challenges.

Scoping Event on Mainstreaming LiFE for Fisheries Management

A Scoping Workshop on "Mainstreaming LiFE (Lifestyle for Environment) for Fisheries Management" was also organized on 17th October 2023 as a side event. Mission LiFE, is an India-led global mass movement to nudge individual and community action to protect and preserve the environment. The overarching goal of the event is to popularize the idea of life in the realm of Fisheries Management, and to become a mass movement

for an Environmentally Conscious Lifestyle. Mrs. Neetu Kumari Prasad, Joint Secretary, DoF, GoI; Dr. J.K. Jena, DDG, ICAR and Dr. Raghavan, Scientist-B, MoEFCC discussed the importance of mainstreaming LiFE and the importance of conserving our precious natural resources by living in harmony with nature.

"Lifting LiFE" – an idea contest, was conducted as part of the

Scoping Workshop. This nationwide open contest welcomed students currently pursuing undergraduate or postgraduate courses. The competition was announced on September 5, 2023, with a submission deadline of September 30, 2023. Altogether, eighty-five entries were received; eighty-four from India and one from Sri Lanka. The top 25 entries were selected by a panel of experts, and the students were invited to present their ideas



during the International Conclave. These entries present a diverse range of strategies, encompassing innovative technology applications and community-based initiatives, all with the aim of nurturing aquatic ecosystems, supporting the livelihoods of communities dependent on fisheries, and ultimately forging a harmonious coexistence between humanity and nature. The top entries were compiled as a “Lifting LIFE – Compendium of Ideas” and the book was also released on the occasion.

Waves of Art Series 4: Live Painting Event on Climate Change and Fisheries

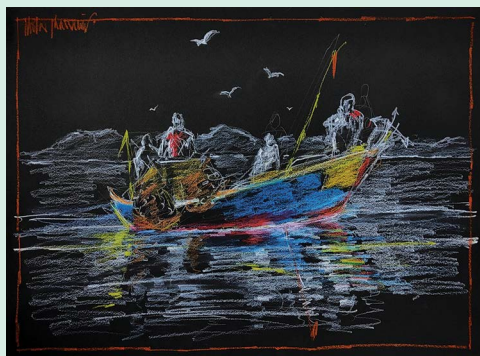
BOBP-IGO's Social Art Initiative, “Waves of Art”, was organised at Kanathur, Chennai, on 15th October 2023 on the theme “Climate Change and Fisheries”. Prominent artists from Chennai, including eminent Art Director and Production Designer Padmashri Thota Tharani, and urban sketchers from Kochi participated at the Kanathur event.

The participants started their day by joining a beach clean-up drive to raise awareness among the local people and beachgoers. The collected garbage was converted into a sculpture to serve as a visual reminder of the impact of pollution on our coastal environments. The Art-Cube Gallery co-organized the event and provided the venue.

The Waves of Art Series 4, centered around the theme “Climate Change and Fisheries,” extended from October 16 to 19 on the sidelines of the international conclave. During the event, over 50 artworks were created, and these will be compiled and published by the BOBP-IGO. The Honorable Union Minister and the Secretary of Fisheries actively engaged with the artists. The panel of artworks captured the attention of conclave participants, sparking a galvanizing discussion on various topics.



Artwork of
Padma Shri
Thota Tharani



Strengthening Cooperation

FAO-BOBP Explore Opportunities for Collaboration

A delegation from the Food and Agriculture Organization (FAO), led by Dr. Piero Mannini and Dr. Tarub Bahri, visited the BOBP-IGO Secretariat on 20th October 2023. They held a detailed discussion on the need for collaborative programs to strengthen the activities of the BOBP for building capacity in the region to mainstream climate change in fisheries governance and ensure sustainable fisheries management.

Director, BOBP-IGO presented potential projects that FAO & BOBP can jointly implement in the region, leveraging the BOBLME II project phase.



BOBP and FSF to Co-develop Accident Reporting System



BOBP-IGO and FISH Safety Foundation (FSF) have entered into an MOU to develop an AI-enabled accident data management system for improving the status of accident reporting in the marine fisheries sector in this region.

Marine fisheries are among the riskiest occupations in the world, recording over 100,000 deaths annually. However, systematic accident reporting remains a challenge, especially

in developing countries and the small-scale fisheries sector, such as the Bay of Bengal region.

The collaboration between BOBP IGO and FSF would aid in building regional capacity for ensuring that accidents in the sea are diligently recorded, analyzed, and used as

a basis for improvising preventive measures in the future. FSF is an international non-profit organization based in New Zealand, that works with FAO, IMO, ILO, and other international inter-governmental and non-governmental organizations.

BOB Global Biodiversity Framework Working Group (BOB-GBF WG)

The Secretariat of the Convention on Biological Diversity (CBD), in partnership with the Ministry of Oceans and Fisheries of the Republic of Korea and the National Biodiversity Institute of Korea, convened the Sustainable Ocean Initiative (SOI) Regional Capacity-building Workshop for East, South, and South-East Asia during 05-08, September 2023, in Seoul, Republic of Korea. The workshop had the primary focus of addressing the capacity-building needs of developing countries in the region, aligning national activities with the objectives and targets outlined in the Kunming-Montreal Global Biodiversity Framework (KM-GBF), which COP-15 adopted in December 2022. The participants included Heads of the Regional Fishery Bodies (RFBs) and Regional Seas Organizations (RSOs) and representatives from the countries of this region. Dr. P. Krishnan, Director, BOBP-IGO, co-chaired the sessions.

During his presentation, Dr. Krishnan provided an overview of the current state of marine fisheries in South and Southeast Asia and the challenges related to the sustainable management of fisheries resources in the region. He highlighted the need for close

coordination between RSOs and RFBs and among the member countries. BOBP-IGO has committed to collaborating with the representatives from Bangladesh, India, Maldives, and Sri Lanka to form a BOB Global Biodiversity Framework Working Group (BOB-GBF WG), which would serve as a platform for experience and knowledge sharing in mainstreaming fisheries in National Biodiversity Strategies and Action Plans of respective countries.



Expanding Network of Academic Institutions to Strengthen Fisheries Research and Education in BOB

BOBP-IGO has taken the initiative to forge collaboration among the researchers from the national labs and academic institutions in the BOB region. It is committed to create and nurture a network of institutions to facilitate the process.

Towards this initiative, BOBP-IGO signed an MOU with Andhra Pradesh Fisheries University on 20th September 2023 and with Berhampur University on 18th December 2023.

These arrangements underscore a shared commitment to advancing marine science research, conservation, and sustainable management of marine resources in the Bay of Bengal region. By pooling the intellectual and technological capacities of the academic network, BOBP-IGO aspires to drive innovation and promote environmental stewardship. Key areas of the collaboration include joint research, capacity building, and policy advocacy. The network will enable exchange of researchers and students from BOBP-IGO member countries to pursue collaborative research on regional issues related to sustainable fishing practices.



Exchange of MoU in the presence of Shri. Seediri Appalaraju, Fisheries Minister of Andhra Pradesh



Exchange of MoU in the presence of Prof. Geetanjali Dash, Vice Chancellor of Berhampur University



Regional Inception Meeting of the Bay of Bengal Large Marine Ecosystem Project (BOBLME) Phase II

The Phase II of the Bay of Bengal Large Marine Ecosystem (BOBLME-2) Project was launched from the Regional Workshop held in Bangkok during 12-14 December 2023. The BOBLME-2 is a step towards implementation of the Strategic Action Plan (SAP) developed during the Phase 1 (2009-15) of the project. The BOBLME-2 will take a five-pronged approach to make measurable developments in critical areas such as establishing EAFM, curbing IUU fishing; development of marine managed areas; pollution control; livelihoods and development of a coordinating mechanism. BOBP-IGO will be implementing the project components in Bangladesh, India, Maldives and Sri Lanka in collaboration with the national agencies in the respective countries.

Speaking during the inception meeting, Dr. P Krishnan, Director, BOBP-IGO said that the Organisation envisions “A Bay teeming with rich flora and fauna where both artisanal and industrial fisheries flourish for eternity and are ensured through collective action”. He elaborated that the BOBP-IGO will be implementing the project activities concerning establishing EAFM, curbing of IUU fishing and management of fisheries-related pollution in its member countries directly. BOBP-IGO will partner with IUCN for implementing the project components related to marine managed areas, and sustainable livelihoods.

Outlining their national priorities, the delegates from Bangladesh, Maldives and Sri Lanka said that they expect the project to contribute to the national fisheries and environmental initiatives, such as the management of major national fisheries and critical ecosystems. They also expected the project to delve into critical areas, develop mechanisms for regional collaboration, and look at the issues of undefined property rights issues.

About 40 participants representing the project countries: Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand; Donor agencies: GEF and NORAD; Implementing agency: FAO, and executing agencies: IUCN, SEAFDEC and BOBP-IGO participated. The plan, budget and project activities for the first year of the project activities were approved by the regional project steering committee, comprising senior officials from the Ministry/ Department of Fisheries and Environment of the partner countries.



Meetings/Events Participated

International Conference on Prospects and Challenges of Environment and Biological Sciences in Food Production System for Livelihood Security of Farmers



The 2nd International Conference on Prospects and Challenges of Environment and Biological Sciences in Food Production System for Livelihood Security of Farmers (ICFPLS-2023) was held at the Central Island Agricultural Research Institute (ICAR-CIARI), Port Blair, from 18 to 20 September 2023. Delivering the keynote address, Dr. Krishnan, Director of BOBP-IGO, provided an overview of the fisheries sector in South and Southeast Asia. He highlighted the opportunities for the Andaman & Nicobar Islands to emerge as a model for evidence-based regional fisheries management, leveraging the proximity to the Bay of Bengal rim countries.



Shri. Swatantra Dev Singh, Minister (Jal Shakti and Flood Control), Government of Uttar Pradesh inaugurated the Conference. Dr. Gaya Prasad, former Vice-Chancellor of SVPUAT, Meerut, and, Dr. E.B. Chakurkar, Director of ICAR-CIARI (Co-Chairperson in the Conference), Port Blair, were also present. A total of 125 scientists from all over India participated in the event.



Stakeholders' Consultation-cum-Consultative Workshop on Fish Conservation and Ranching in River Ganga

The Central Inland Fisheries Research Institute (ICAR-CIFRI) in association with the Namami Ganga project organized a "Stakeholders consultation cum consultative workshop on fish conservation and ranching in River Ganga" on 26th September 2023 and "Stakeholders consultation cum consultative workshop on Hilsa fisheries improvement for sustainable fisheries and conservation in River Ganga" on 27th September 2023 at its headquarter in Barrackpore, West Bengal.

Dr. Basanta Kumar Das, Director of ICAR-CIFRI, provided insights into the project's achievements and detailed the way forward. The workshops were the concluding events of the three-year National Mission for Clean Ganga (NMCG) project.

Mr. Rajdeep Mukherjee, Policy Analyst, BOBP-IGO, participated in both workshops. Congratulating ICAR-CIFRI on the successful implementation

of the project, Mr. Mukherjee highlighted that synergy can be built with neighboring countries for future work programs as they share the same concerns regarding the deterioration of the health of the riverine ecosystem and fish stocks, especially Hilsa. He called for cooperation to support the novel initiatives of the ICAR-CIFRI further and outlined the activities of the BOBP-IGO in this regard.



Intra-Regional Workshop on Developing Strategies to Support Dugong Conservation

The workshop was organised at Mahabalipuram by the Wildlife Conservation Society in partnership with the Tamil Nadu Forest Department and the OMCAR Foundation during 19-20 October 2023. The objective of the Workshop was to explore research, policy, and capacity development needs for dugong conservation in Palk Bay. Participating in the workshop on behalf of BOBP-IGO, Dr. Sri Hari M, Project Scientist, highlighted the necessity of regional cooperation for the conservation of dugongs because of their ecological

importance. He mentioned that there is currently a shortage of sufficient scientific data and information required for dugong conservation. Furthermore, scientific knowledge on this subject is fragmented and dispersed across various organisations in India & Sri Lanka. He said that BOBP-IGO is willing to cooperate with competent agencies from India and Sri Lanka to set up a Dugong Regional Conservation Network (DReCoN) for the conservation of dugongs in shared waters of India and Sri Lanka.



Mini-Symposium of the EAF-Nansen Program at Maputo

FAO, NORAD, and Institute of Marine Research (IMR) jointly organized a mini-symposium under the Nansen Program at Maputo, Mozambique, during 30 - 31 October 2023. The Program aimed at supporting the application of EAFM considering climate and pollution impacts. The EAF-Nansen Program Mini-symposium was committed to showcasing the accomplishments in the field of science and the endeavours to furnish essential data, information, and knowledge in support of sustainable fisheries within the ecosystem context.

Scientists and officers from over 30 partner countries and organizations from the Africa and Bay of Bengal region (Bangladesh, India, and Sri Lanka), participated in the meeting and presented the outputs from



their research activities across 11 research themes of the Nansen Program for promoting sustainable fisheries management and improved food and nutrition security.

Dr. P. Krishnan, Director, BOBP-IGO, participated in the Symposium, along with other inter-governmental regional organizations. He is part of the EAF Nansen Core Group, engaged in preparing the Nansen ProDoc 2024-2028.



NANSEN Forum Meeting: Planning Next Phase of the Nansen Program

The Ecosystem Approach to Fisheries (EAF)- Nansen Program Forum was held from 01 to 02 November 2023 at Maputo, Mozambique. The Program's accomplishments and outcomes were presented to the delegates from partner nations, regional

organizations, and members of the diplomatic community. The Forum provided a platform for the member countries from Africa and the Bay of Bengal region to share their experiences, best practices, and success stories, and highlight key elements to be addressed in the next phase of Nansen, starting in 2024.

A series of thematic panel discussions were held. Speaking during the panel discussion on capacity development, The Director, BOBP-IGO, highlighted the actionable points for sustaining the capacities built in fisheries research and management through the Nansen program.



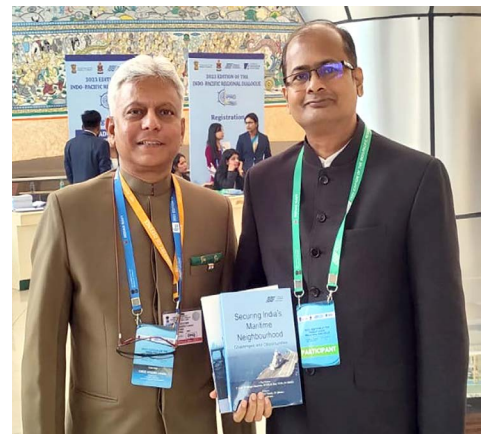
Indo-Pacific Regional Dialogue (IPRD-2023)

The 2023 Edition of the Indo-Pacific Regional Dialogue (IPRD-2023) was held in New Delhi, India, from 15 to 17 November 2023. This global event with the overarching theme of “Geopolitical Impacts Upon Indo-Pacific Maritime Trade and Connectivity” drew scholarships from India’s neighbouring countries: Bangladesh, Sri Lanka, and Nepal, as well as from Japan, the United Kingdom, Australia, Germany, Kenya, the Philippines, the United States, Russia, France, Vietnam, Malaysia, Singapore, and Italy.

The Vice President of India graced the event along with the senior ministers and highlighted India’s evolving maritime policy through SAGAR (Security and Growth for All in the Region) and ‘Vasudhaiva Kutumbakam’ (meaning ‘the Earth is one family’) - underscoring India’s commitment to inclusive regional maritime security and growth.



Mr. Rajdeep Mukherjee, Policy Analyst, BOBP-IGO, attended the event. He said that the highlight of the event is the global thrust for setting up a rule-based order for peace and security, which is an important aspect of evolving marine fisheries governance. He also thanked the presenters for bringing out the issue of IUU fishing and labour issues in fishing vessels.



Global Fisheries Conference 2023

Global Fisheries Conference 2023, organized by the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, from 21 to 22 November 2023, brought together foreign delegations, international organizations, entrepreneurs, and other stakeholders to discuss various issues concerning global fisheries. There was a diverse array of dignitaries and stakeholders, including state fisheries ministers, ambassadors and diplomatic delegations from different nations, global fisheries scientists, policymakers, fisheries communities, and investment bankers.

Director, BOBP-IGO participated in the Conference and also shared perspectives on cooperative regional fisheries management during the International Round Table Conference on 21st November 2023.



24th Odisha Bigyan 'O' Paribesh Congress-2023

The 24th Odisha Bigyan 'O' Paribesh Congress on the theme of Environmental Challenges: Role of Science and Technology was organised by Berhampur University and Orissa Environmental Society.

Director, BOBP-IGO participated in the Conference and delivered a lead talk on “Bay of Bengal Region-Issues in Marine Fisheries Sector & Perspectives for Greening”. During the presentation, the director elucidated a range of challenges afflicting the marine fisheries sector in the Bay of Bengal region, encompassing concerns such as overfishing, habitat degradation, and the overarching impacts of climate change. In an effort to provide actionable solutions, the director explained strategies for “Greening the fisheries sector”, emphasising sustainable practices and innovative approaches aimed at emission reduction.



International Training-cum-Workshop on “Sustainable Fisheries and Dairy”

The International Training-cum-Workshop on “Sustainable Fisheries and Dairy,” a 14-day training program from December 6th to 19th, 2023, aims to enhance capacity building for countries in the global south, particularly in the Indo-Pacific region. Twenty-four participants representing Cambodia, Lao PDR, Myanmar, and Vietnam (CLMV) are taking part in the program. The workshop is organized by the ICAR-Central Inland Fisheries Research Institute (ICAR-CIFRI) and sponsored by the Indian Technical and Economic Cooperation (ITEC) of the Ministry of External Affairs, Government of India.



The Director, BOBP-IGO delivered a lecture on the “Role of International Organisational Linkages towards Sustainable Fisheries Management.” In this presentation, the director discussed the significance of collaboration and partnerships between international organisations in the context of sustainable fisheries management. He also discussed about the global approach to address challenges and promote responsible practices in fisheries management, considering the interconnected nature of marine ecosystems and the shared responsibility in preserving them for future generations. The Director was also one of the Chief Guest during the Valedictory function of the workshop and distributed the certificates to the participants.



Other Events/Meetings Attended by BOBP-IGO Staff

Dr. P. Krishnan, Director

- Partners meeting of the BOBLME Project (Phase II).
- Brainstorming Session on “Greening of Livestock and Poultry Sector: Policy Options for Developing Sustainable Approaches” on 01 September 2023.
- Periodic meetings of the IFISH6 Committee.
- Workshop on “Writing Winning Proposals for Security International Grants” organized by Bihar Agricultural University on 12 September 2023 (a Guest Speaker).
- One-day workshop on “Energy, Water and Coastal Protection – A Climate Change perspective” organised by the National Institute of Ocean Technology on 03 October 2023.
- XVI Agricultural Science Congress held at Kochi on 10-12 October 2023.
- “EAF-Nansen Program (online) of Shared Fish Stock Management Training” on 04 October 2023.
- Online training on Competency Enhancement in Agricultural Research and Education at KUFOS, Kochi on 20 November 2023.
- 11th International Fisheries Symposium (IFS) organised by the Asian Institute of Technology in Bangkok, Thailand from 22 to 27 November 2023.

Dr. Sri Hari M, Project Scientist

- Delivered a lecture on “Approaches & Methods in Fish Stock Assessment” during the Training program on “Optimizing Fisheries: A comprehensive training on Fish Stock Assessment” organized by SKUAST, Kashmir during 25-26th September 2023.
- Delivered a lecture on “Towards Sustainable Fisheries Management Role of International Agreements & Guidelines” during the National Webinar on “Challenges and Opportunities for Sustainable Development and Management of Marine Fisheries in India”, organized by TNJFU-FCRI, Tuticorin on 21 December 2023.



Need for Improved Approach to Fish Stock Assessment in BOB Region

M. Sri Hari, R. Mukherjee and P. Krishnan

Fisheries play a crucial role in the socio-economic fabric of South Asian countries, providing livelihoods for millions and contributing significantly to the region's food security. However, the sustainable management of fisheries resources faces multifaceted challenges, necessitating a robust and adaptable approach. In a recent publication on the status of fish stocks in the Asian region, FAO (2023) revised the overfished component of marine fish stocks for Area 57 from 31 per cent to 28 per cent, following an improved approach to assessment. Considering the above, it is important to note that adopting the right type of fish stock assessment is crucial for evaluating the status of fish populations and ensuring their sustainable management. This article deals with the pivotal role of stock assessment in fisheries management, exploring its significance in understanding fish population dynamics and informing management decisions. We discuss here the major challenges faced in South Asian countries and possible solutions concerning data collection, model selection, time lag issues, and management compliance.

Stock Assessment as an Integral Tool of Fisheries Management

Stock assessment is a crucial component of fisheries management, involving the application of statistical and mathematical analyses to predict fish population responses to

different management choices. This process includes examining life history data, monitoring fishing activities, and conducting resource surveys to estimate stock size and harvest rates compared to sustainable reference points. The scientific goal is to understand the correlation between fishing quantity and fishing operation selectivity to plan for sustainable long-term catches. Instead of providing a definitive answer, effective stock assessments offer only a range of options, highlighting predicted outcomes and associated trade-offs. The results of stock assessments serve as the basis for both short-term and long-term decisions in fisheries management, also helping to evaluate whether underfishing or overfishing is occurring and determining the optimal fishing level for sustainable harvest.

The evolution of assessment techniques from basic descriptive models to sophisticated statistical models has become integral to many fishery management systems globally. Regularly conducted stock assessments provide critical insights into the stock status and offer management recommendations to achieve fishery and

conservation goals, though stock assessment is just one phase in a broader process aimed at striving to fulfil intended objectives in the face of uncertainty.

Challenges and Opportunities for Improving Stock Assessment in the BoB Region

In the countries around the Bay of Bengal, expertise in fish stock assessment is available and is further developing. A wide variety of stock assessment methods are being used, but, in general, they are



not well-connected to management decision-making and appropriate actions (FAO, 2023). Further findings of the FAO on stock assessment in the Asian region are: (i) the need for stronger linkage between stock assessment and harvest strategy, (ii) the need for adopting appropriate methods for assessing tropical stocks, (iii) the need for better data collection mechanisms; and (iv) better utilization of fishery-independent surveys.

BOBP-IGO has conducted stock assessment capacity development programmes in the member countries in the last several years. The training programmes and meetings have indicated several key areas in the region where the approach to stock assessment could be improved. The approach must be clear and apt to meet the intended objectives and problem statements. Methods of data collection, analysis, and interpretation will have to meet the objectives to facilitate the decision-making process (Fig. 1).

Identifying specific objectives

Fisheries is a dynamic system with several issues and opportunities. Stock assessments should have clear objectives and provide solutions to specific issues related to fisheries management. For example, the requirement for assessing the stock may be

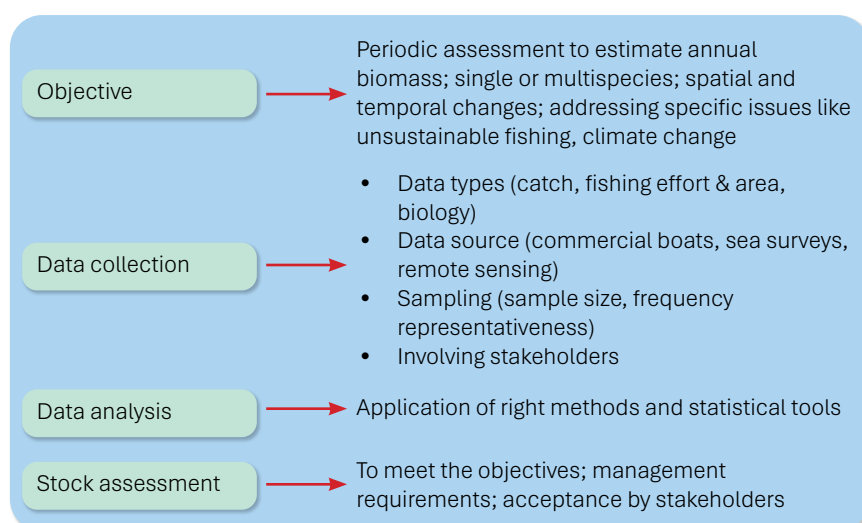
Table 1. Availability of data types for stock assessment in the BOB region

Data	Bangladesh	India	Maldives	Sri Lanka
Catch	Landing data	Landing data	Catch data (tuna)	Landing/Catch data
Biology and life trait	Sporadic			
Fishery-Independent Data	Available	Available	Not available	Available (Nansen)
Environmental data	Sporadic	Available	Sporadic	Sporadic
Fishing effort	For trawlers	Sample-based	Available	For multi-day vessels
Fishing area	Sporadic			
Discard	Not verifiable			
Tagging and Mark-Recapture	Sporadic (e.g. IOTC)			
Genetic data	Sporadic			
Observer data	Not available		Available	Available (High seas boats)
Climate data	Available			
Economic data	Available but may lack consolidation			

to (i) provide periodic advice on the quantum for the optimum exploitation, (ii) identify optimum fishing effort/capacity, (iii) manage a single species in multiple gears or multispecies in a single fishery, (iv) address fishing area

management; (v) address bycatch issue; (vi) address transboundary issues; and (vii) project fish abundance in relation to climate change. Setting clear objectives will determine the approach to stock assessment like sampling, data analysis and interpretation. For example, stock assessment for providing input to address transboundary issues will need data collection and sampling from the neighbouring countries sharing the same resource. For migratory fish, the migratory route has to be determined to collect samples covering different life stages of the species. For stock assessment of pelagic or demersal species, the samples have to be collected from the respective gear targeting the resource. Climate change can obliterate the estimates made from stock assessment. To address the issue of climate change effects, climate-smart stock

Fig 1. Approach to the stock assessment process



assessment has to be performed, where environmental variables are integrated within a population dynamics model assessment of biomass, fishing mortality and recruitment.

Data collection & availability

Fisheries researchers often encounter issues with data collection and data availability. Stock assessment is a data-intensive method and requires a comprehensive set of data to understand the dynamics of fish populations. While substantive research is going on to assess stock status in data-poor situations by leveraging the progress in computing power, the process remains relatively costly and time-consuming, needing high expertise and being persona non grata in fisheries policy-making of most of the developed countries. The process is further complicated, especially in the case of large pelagic fish stocks, which are largely straddling and transboundary, e.g. tuna. Table 1 shows the availability of information on various variables needed for stock assessment in the Region. The Table is only indicative, based on expert consultations, and may miss some of the measures being considered by certain countries to improve data collection.

The use of landing data in fisheries assessments introduces significant limitations and potential biases. Catch data, encompassing both landed and discarded components, provide a comprehensive perspective on fishing activities, including the spatial and temporal dynamics, biological composition, and the extent of illegal, unreported, and unregulated (IUU) fishing. Relying solely on landing data ignores valuable information regarding discards, bycatch and total fishing mortality, resulting in an incomplete assessment. However, collection of catch data from commercial fisheries is not easy unless the fishers cooperate. Submission of data log sheets by fishers has been made mandatory

in some countries, but that needs to be verified by inspection and observer programmes.

While data from commercial fisheries can provide large amounts of information, there could be bias in the data. Commercial boats fish in areas of abundance of the target resources. This can substantially inflate the abundance estimates of target species and diminish the same for non-target species. To address this issue, sea surveys have to be undertaken, and the data should be corrected for the bias arising due to data sourcing from commercial fisheries. Despite efforts to combine these data into an integrated statistical model, their coupling is frequently hampered due to differences in their sampling designs, which impose distinct biases in estimating abundance. Flexible species distribution models (SDM) are now available, that can integrate data sources while filtering out the bias. Though this method requires adequate planning and is expensive, it provides valuable information by evaluating the spatiotemporal dynamics of fish and strengthens forwarding science-based advice to marine policymakers.

Ocean observations and remote sensing provide valuable information on sea state,

oceanographic parameters and ocean colour that could be applied to correlate with fish abundance. While the environment largely influences the productivity of many fish populations, the current management of most commercial species does not consider this. When environmentally induced changes in stock productivity are not taken into account in assessments, bias can occur and affect the reliability of short-term catch advice. Therefore, it is critical to develop stock assessments that integrate environmental effects with fisheries data as a research priority.

The accuracy of stock assessment depends on how samples are collected. Strategy, frequency and sizes of samples can influence stock assessment with bias and uncertainty and hence, they need to be carefully planned. Sampling bias can influence fish life history, leading to uncertainty in stock estimates. The samples should be true representatives of the segments of populations. However, it is often difficult to obtain large sample numbers for less abundant species or when financial or other practical considerations constrain researchers. In such instances, quantifying the relationship between sample size and sampling strategy with bias and uncertainty of estimates can make rectifications.



Data analysis

The selection of an appropriate stock assessment model is a critical decision, particularly in South Asian countries with multi-gear, multi-species fisheries. Balancing model complexity with the available data poses a challenge, as sophisticated models necessarily demand a large set of data. Different stock assessment models offer different features and range of interpretations from simple to complex based from the available data for a given stock. It is important to choose the model best suited for a stock's life history and data availability and try multiple models to find the best possible fit. Nations with comprehensive datasets may opt for Biomass Dynamic Models, length-based models, or Bayesian approaches, gaining detailed insights into fish stock dynamics. Alternatively, countries facing data limitations should prioritise simpler, data-efficient approaches, such as Fishblicc and size-based catch curve models, to ensure practical applicability. The recent Length-Based Spawning Potential Ratio (LBSPR) approach calculates the Spawning Potential Ratio (SPR) using length composition data, offering a nuanced analysis. Additionally, Bayesian approaches like cMSY provide a flexible framework for updating models with new information, ensuring adaptability in the face of uncertainties. Attaining a balance between model complexity and available data is important in South Asia, where the choice of models directly impacts the accuracy of stock assessments.

For a comprehensive assessment of multispecies stocks, the application of aggregate production models becomes particularly valuable, especially when dealing with aggregate pools such as “demersal,” “pelagics,” or an overall category. These models offer a straightforward approach to identifying allowable catches at the system level. Additionally, the utilisation of Ecopath and Ecosim proves highly beneficial in this

Table 2. Summary of considerations and potential actions for the stock assessment initiatives at present prevailing in the BoB region.

Considerations	Potential actions
Source and method of data collection	Implement random sampling techniques. Use a combination of methods (e.g., trawl surveys, acoustic surveys) for a comprehensive view. Regularly update and validate data collection methods.
Alignment of Stock Assessment Methods with data collected	Tailor SA methods to match the characteristics of the collected data. Incorporate flexibility in models to adapt to diverse data types.
Alignment of Assessments with management objectives	Clearly define management objectives and questions to guide assessments. Regularly communicate with stakeholders to align assessments with their concerns.
Acceptability to fishermen	Establish collaborative platforms for communication between scientists and fishermen. Incorporate local knowledge and experience of fishermen appropriately into the assessment.
Inclusion of biological data in management suggestions	Collect and integrate data on juvenile bycatch, Lm, mid-length, number of spawners, etc. Regularly update biological data to improve the accuracy of suggestions.
Applicability of SA models to input control measures	Develop models specifically designed for input control measures. Collaborate with experts to create holistic models that suggest more input control measures.

context. Notably, Ecosim features a valuable tool known as the “Fishing policy search,” which permutes for optimisations to determine the optimal distribution of relative effort across various gears. This tool aims to maximise a predefined set of user-defined objectives, enhancing the efficiency of multispecies stock assessments.

Stock assessment and management

The stock assessment should match the objective for which the assessment was undertaken and provide implementable recommendations to the managers. If the objectives of stock assessment and management measures do not synchronise, there will be a mismatch, and these two elements will diverge from each other. In this

case, the stock assessment will remain only an academic exercise. Science-policy nexus should be established to make a mutually beneficial relationship.

The fishing community's views can be incorporated into the stock assessment by using information gathered through interviews. Even if some of the information is qualitative, there is a considerable advantage in involving fishers in an assessment where they can see that their views are being taken into account. The ParFish approach provides a framework for participatory stock assessment and co-management. In this approach, fishers are actively involved in the management process, and their knowledge may be incorporated

into stock assessments alongside more conventional fisheries data. Participation of fishers in data collection can be the first step for them to be involved in stock assessment and management.

Avenues for Improving Regional Stock Assessment

Developing a robust regional stock assessment framework necessitates a tailored approach that aligns with the distinctive characteristics and priorities of each country or region. This could be done by coordinating and cooperating with the neighbouring countries in sampling, data analysis, and stock assessments. By evaluating existing stock assessment frameworks, the focus can be on optimising the Target Frequency for delivering stock assessment advice while addressing logistical challenges.

The process prioritizes stocks based on economic, societal, and ecological factors, recognising the variability in data quality and species ecology. To enhance efficiency, a rational scheduling process is proposed, balancing the strategies for frequent assessments with human resource constraints. Stakeholder engagement, capacity building, and international collaboration are integral components, ensuring transparency, knowledge exchange, and a unified regional approach to sustainable fisheries management. Regular data collection and monitoring, adaptive management, and effective communication underpin the framework, fostering continual improvement and public awareness of the importance of fisheries sustainability.

Adopting the framework of RV Fridtjof Nansen

An FAO-managed Norway-sponsored research vessel (RV Fridtjof Nansen) carries out surveys in national and international waters. It has conducted periodic surveys in the BoB region since 1975. In the fifth phase (2017-2023), the Programme is assisting 32 partner countries and four regional

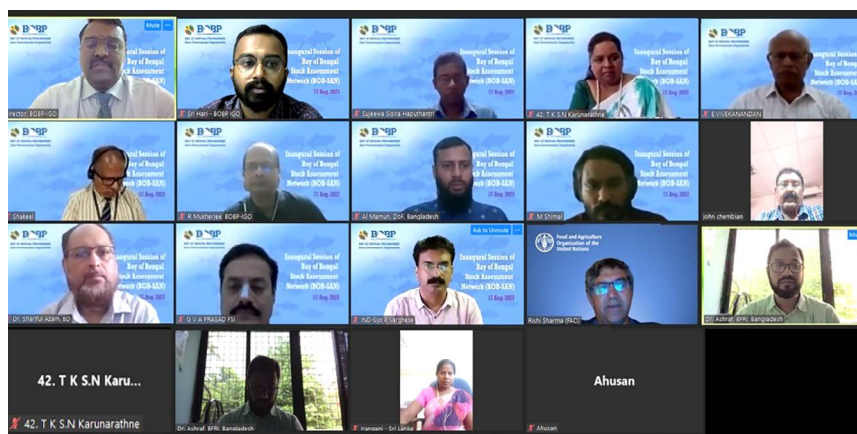


organisations in Africa and the Bay of Bengal to improve their capacity to implement the Ecosystem Approach to Fisheries (EAF), taking into consideration the impacts of climate change and marine pollution. The Programme supports these countries in sustainably managing their fisheries to improve food and nutritional security and reduce poverty.

India, which has more than 30 Research Vessels across various Ministries, can adopt the above-mentioned framework and conduct a Regional Research Programme. The data and results from the surveys of the vessels can be used for Evidence-based fisheries management, which will result in the establishment of fisheries management cycles, development of policy frameworks and also for better decision-making.

Bay of Bengal Stock Assessment Network (BOBSAN)

The establishment of BOBSAN by BOBP-IGO for its member countries is one of the Regional Stock Assessment Framework initiatives. BOBSAN plans to facilitate the process of promoting standard practices and enhancing the capacity of fisheries personnel through training programmes. Collaborative stock assessment projects will deepen the understanding of regional dynamics. In contrast, capacity building and development of a regional stock assessment model will further strengthen the scientific foundation for sustainable fisheries management.



Hamlet's Dilemma: It is High Time We Stop Contemplating and Start Acting on Fishermen's Safety

Rajdeep Mukherjee

It is often said that we should contemplate before taking action. An action could have irrecoverable consequences, often unintended. However, it also raises the question: is there a limit to contemplation? At what point does contemplation become indecisiveness? The interplay of rush action, unending contemplation, and prolonged indecisiveness, masterfully explored in Shakespeare's timeless classic "Hamlet," vividly illustrates the consequences of both extremes: the tragedy that ensues from impulsive actions and the missed opportunities and further complications arising from excessive hesitation, highlighting the importance of finding a middle ground between thoughtful consideration and decisive action.

The crucial question of safety at sea for fishermen, inarguably one of the riskiest occupations in the world, is trapped eternally in a similar dilemma. This dilemma is particularly evident in the implementation of strict safety regulations, which may hinder fishermen's ability to earn a living by imposing burdensome restrictions. On the other hand, prioritizing economic interests over safety measures can give way to tragic accidents and the loss of lives. Striking a balance between these two concerns is crucial for ensuring both the well-being of fishermen and the sustainability of their profession. However, we neither know where such a path lies nor do we know who can lead us to it.

Ironically, it is the 49th year since the adoption of the International Convention for the Safety of Life at Sea, or SOLAS, in 1974 by the International Maritime Organization (IMO). As UNCLOS is to ocean governance, so is SOLAS to maritime safety. It is the global guardian for maritime safety that sets minimum standards for robust vessel design and lifesaving equipment, clear communication protocols, and emergency preparedness measures.

Also, much like UNCLOS, SOLAS does not provide solutions for the fisheries sector except for navigation but rather serves as a base for the subsequent development of fisheries-specific instruments.

In this background, the objective of this paper is to trace the global development in safety standards for fishing vessels and fishermen and explore why most of these developments have remained in a state of contemplation with little or no action despite alarming figures on the number of deaths of fishermen from developed and developing countries alike.

Global Development on the Safety of Fishermen: Contemplation or Indecisiveness

As the fishing industry's particular difficulties are increasingly acknowledged, international efforts to increase fishermen's safety at sea have started to take the form of specific laws and regulations.

Acknowledging the need

Pre-1970s: Few international legislations expressly addressed safety issues in fisheries before the 1970s. Maritime safety was typically governed by more general shipping laws, which paid little attention to the circumstances and dangers associated with fishing operations. The Torremolinos International Convention for the Safety of Fishing Vessels, 1977, is acknowledged as the first significant global initiative to focus on fishing vessel safety. Unfortunately, its impact was limited due to low ratification percentages. Although operational safety and human issues were not substantially covered, the convention did define requirements for the design and equipment of fishing vessels.

Expanding the scope: Training and certification

1995 - STCW-F Convention: Addressing a critical gap left by the Torremolinos Convention, the International Convention on Standards of Training, Certification, and Watchkeeping for Fishing Vessel Personnel (STCW-F) established requirements for the training and certification of fishers. It aimed to ensure that fishers possessed the necessary skills and knowledge to operate safely at sea. However, gaps in enforcement and global uniformity persisted, particularly in regions with significant small-scale fishing activities.

Integrating safety management

1998 - ISM Code Application: Although primarily designed for the merchant fleet, the extension of the International Safety Management (ISM) Code to fishing vessels (especially those over 500 gross tonnage) marked a pivotal shift towards systematic safety management. It introduced the concept of a Safety Management System (SMS), emphasizing the importance of management responsibility in ensuring safety. The applicability to smaller vessels, however, remained a gap.

Protection and standards for labour

2007 - Convention on Work in Fishing (ILO No. 188): This treaty filled in another crucial void by establishing guidelines for working aboard fishing vessels that included social security, medical care, accommodations, occupational safety and health, and working conditions. Although there are still obstacles in the way of its widespread adoption and enforcement, it offers a holistic approach to the safety and well-being of fishermen.

Recent developments: Enhancing compliance and safety

2012 - Cape Town Agreement: An attempt to address the low ratification and implementation issues of the Torremolinos Convention, the Cape Town Agreement of 2012, which updates and amends the original convention, has yet to enter into force. It emphasizes the safety of fishing vessels with more contemporary standards and detailed requirements but still awaits sufficient ratification to become globally effective.

Taking care of small-scale fisheries

In 2014, the FAO issued The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) after realizing that small-scale fisheries, which

account for a sizable amount of world fishing activity, lacked adequate safety regulations. The SSF Guidelines represented a significant advancement in taking into account the safety aspect of small-scale fisheries along with the standard socioeconomic and environmental sustainability issues of small-scale fisheries. However, because they are voluntary, there are considerable variations in how they are implemented.

The following table (Table 1) provides a concise overview of the international instruments/agreements, the responsible international agencies, the corresponding national agencies typically representing countries in these organizations, the broad provisions of each instrument, and their applicability to different classes of fishing vessels. It aims to give a clear understanding of the framework set by international guidelines to ensure the safety and welfare of fishermen at sea.

Summing up, the above analysis shows the following critical issues with setting safety standards in the marine fisheries sector:

Out of about 4.1 million fishing vessels in the world, 88% do not have adequate safety coverage as these vessels are below 12 metres in OAL (overall length).

Even when covered, fisheries instruments are often voluntary, making safety a choice rather than a mandatory obligation, which can be challenging to enforce. Finally, the fisheries' position at the intersection of commerce, livelihoods, and ecosystem health has necessitated the involvement of multiple agencies in safety at sea.

While the collaborative safety framework appears effective globally, the scenario often differs nationally. Beyond the fisheries ministry, departments like labor and shipping play minimal roles, leaving the fisheries department—a



Table 1. Overview of international instruments/agreements on safety at sea in fisheries

Instrument/ Agreement	International Agency	Corresponding National Agency	Broad Provisions	Applicability (Vessel Class Covered)
International Convention for the Safety of Life at Sea (SOLAS), 1974	International Maritime Organization (IMO)	Ministry of Shipping or its equivalent	Minimum safety standards for construction, equipment, and operation. Emergency procedures and lifesaving appliances.	Passenger and cargo ships, including those refurbished for commercial fishing.
International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995	IMO	Ministry of Shipping or its equivalent	Standards for training, certification, and watchkeeping for fishing vessel personnel.	Fishing vessels of 24 metres or above in length.
International Safety Management (ISM) Code, 1998	IMO	Ministry of Shipping or its equivalent	Management of safety and pollution prevention, including the development of a safety management system (SMS).	Applicable to passenger ships, including those refurbished for fishing and other cargo ships of 500 gross tonnage and above.
Torremolinos International Convention for the Safety of Fishing Vessels, 1977 (2012 Cape Town Agreement updates)	IMO	Ministry of Shipping or its equivalent	Standards for the construction and equipment of fishing vessels, including stability, seaworthiness, and maintenance of lifesaving appliances.	Fishing vessels of 24 metres or above in length.
Torremolinos Protocol	IMO	Ministry of Shipping or equivalent	Amendments to the 1977 Torremolinos International Convention for the Safety of Fishing Vessels aimed to facilitate the convention's entry into force with updated safety standards for fishing vessels.	Fishing vessels of 24 meters in length and above
Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (VG-SSF), 2014	Food and Agriculture Organization (FAO)	Ministry of Fisheries or its equivalent	Sustainable small-scale fisheries, support for livelihoods, sustainable use of aquatic resources, and ensuring safety at sea. Specifically, Chapter 6, 'Social Development and Decent Work,' refers to the importance of safety at sea (6.16)	Small-scale and artisanal fishing vessels without a specific length criterion.
Code of Safety for Fishermen and Fishing Vessels, 2005	IMO & FAO	Ministry of Shipping or Ministry of Fisheries or equivalent	Safety and health requirements for the construction and equipment of fishing vessels. Guidelines for the safety of fishermen.	Fishing vessels of various sizes, with specific parts applicable to vessels below 24 metres in length.
Work in Fishing Convention, 2007 (No. 188)	International Labor Organization (ILO)	Ministry of Labour or equivalent	Standards for work on fishing vessels, including conditions of service, accommodation, occupational safety, health and medical care, and social security.	Applies to all fishing vessels, with provisions for implementation varying by vessel size and trip duration.
Code of Conduct for Responsible Fisheries (CCRF), 1995	FAO	Ministry of Fisheries or its equivalent	Promotes responsible fisheries and aquaculture practices, including sustainable resource management, and addresses safety and health aspects of fishery workers.	All fishing and aquaculture operations

As the table 1 shows, international instruments differ for different classes of fishing vessels. The following table (Table 2) summarizes coverage for different classes of fishing vessels based on overall length.

Table 2. Vessel class wise international safety guidelines

Vessel Class/ Length	Applicable International Instruments	Approximate Number of Fishing Vessels
Under 12 metres	Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (VG-SSF), 2014	3,606,000
12 to 24 metres	Code of Safety for Fishermen and Fishing Vessels, 2005 Work in Fishing Convention, 2007 (No. 188)	449,000
24 metres and above	International Convention on Standards of Training, Certification and Watch-keeping for Fishing Vessel Personnel (STCW-F), 1995 Torremolinos International Convention for the Safety of Fishing Vessels, 1977 (2012 Cape Town Agreement updates) Work in Fishing Convention, 2007 (No. 188) Code of Safety for Fishermen and Fishing Vessels, 2005	45,000

primarily technical body designed for managing fisheries production—overburdened with labor welfare and safety inspection tasks. This imbalance highlights the need for a more integrated approach to safety and labor welfare within national fisheries management.

Comparison with the Shipping Industry

Although *prima facie*, fishing, and shipping seem to be closely related, there are many differences in practice. As mentioned above, while fishing is a multi-dimensional activity, shipping is a purely commercial activity. This clarity in the function of shipping is helpful in defining various responsibilities for shipping. For example, one may fondly remember the Captain's Code, where the captain goes down with the ship, as portrayed in many stories and movies like Titanic. In the US, there is no explicit law requiring a captain to remain on their boat. Still, they could face criminal charges if they acted with negligence or extreme disregard for human life in abandoning a vessel in distress or causing a maritime accident in the first place. In 1991, the captain and crew of a Greek cruise ship were the first to leave the vessel following an accident, drawing criticism, though acquitted by the Court of Law ([https://www.dw.com/en/when-is-a-captain-allowed-to-abandon-](https://www.dw.com/en/when-is-a-captain-allowed-to-abandon-ship/a-15674434)

[ship/a-15674434](https://www.dw.com/en/when-is-a-captain-allowed-to-abandon-ship/a-15674434)). The fishermen, who possibly do more rescue operations, and where the captain or skipper has full authority, no such tale of bravery or 'inappropriate behaviour' could be heard.

However, marine fisheries remain much riskier than shipping. Despite periodic sparks, death in shipping has historically come down over time. However, in the case of fishing, the mortality rate is persistent. A study by the Fish Safety Foundation, with support from the Pew Foundation, revealed a significant underestimation in the reporting of casualties at sea. While traditionally reported figures stood at 24,000 per year, the study estimates the actual number to

be as high as 100,000. This finding points to a critical gap in the global understanding and documentation of the risks associated with fishing, underscoring the need for improved safety measures and reporting mechanisms in the industry.

Table 3 aims to provide a clear comparison of the regulatory landscape governing safety standards across these two maritime domains of shipping and fishing.

In essence, the fishing sector is governed by a mix of specific safety conventions (like the Torremolinos Convention and its Cape Town Agreement update), training and certification standards (STCW-F),



Labour standards (ILO No. 188), and voluntary guidelines (VG-SSF) aimed at promoting sustainable and safe fishing practices. The inclusion of the Code of Conduct for Responsible Fisheries (CCRF) reflects the sector's focus on sustainability alongside safety. For the shipping sector, on the other hand, the regulatory framework is more consolidated, with SOLAS providing comprehensive safety standards, the STCW convention covering training and certification, and the ISM Code ensuring safety management. The Maritime Labour Convention addresses Labour standards, while MARPOL focuses on environmental protection. This comparative analysis demonstrates the broader scope of international instruments in the fishing sector, reflecting its unique challenges, coupling the sustainability of fisheries with the safety of small-scale fishers. Conversely, the shipping sector has benefited from a more unified regulatory approach, with a strong focus on comprehensive safety standards, pollution prevention, and seafarer welfare.

Conclusion

The price of the life of a fisherman is just 900 tonnes of fish.

This ratio starkly illustrates the human cost behind our seafood, emphasizing the dire need for safer fishing practices globally. This staggering loss underlines an urgent need for enhancing safety measures in the fishing industry worldwide. However, the responsibility for ensuring this safety is often blurred due to undefined institutional boundaries. The lack of clear accountability in the marine fishing sector hinders effective oversight and enforcement of occupational safety measures for fishers. However, the sacrifice of 100,000 Lives for 90 million tonnes of fish cannot be the tagline of the fisheries sector. It's a wake-up call to stop contemplation and start ACTION as soon as possible to ensure the utmost safety of fishermen.

Table 3. Comparative regulatory framework and guidelines for fishing and shipping

Category	Fishing Sector Instruments	Shipping Sector Instruments
Safety of Life at Sea	Torremolinos International Convention for the Safety of Fishing Vessels, 1977 (not widely ratified, updated by the 2012 Cape Town Agreement) Cape Town Agreement, 2012 (updates the Torremolinos Convention, awaiting entry into force) Code of Safety for Fishermen and Fishing Vessels, 2005	International Convention for the Safety of Life at Sea (SOLAS), 1974
Training and Certification	International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978
Labour Standards	Work in Fishing Convention, 2007 (ILO No. 188)	Maritime Labour Convention, 2006 (ILO No. 186)
Safety Management	Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (VG-SSF), 2014 (focuses on sustainability and safety, but is not a binding instrument)	International Safety Management (ISM) Code, 1993 (mandatory under SOLAS)
Environmental Protection	Code of Conduct for Responsible Fisheries (CCRF), 1995 (covers sustainable fishing practices and is indirectly related to safety)	International Convention for the Prevention of Pollution from Ships (MARPOL), 1973/1978
Total Number of Instruments	5	4

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Institutionalizing CCRF Guidelines in South Asia: Role of BOBP-IGO

M. Sri Hari, R. Mukherjee and P. Krishnan

The Code

The Code of Conduct for Responsible Fisheries (CCRF), endorsed by over 170 FAO members on October 31, 1995, stands as a pivotal voluntary international framework for the sustainable management of the world's aquatic resources. It comprises a set of principles, objectives, and actionable elements designed to establish ethical standards for responsible fisheries practices, with the primary objective of ensuring the effective conservation, management, and development of aquatic resources.

The genesis of this Code can be traced back to a multitude of contemporary global endeavors, all expressing alarm over the rampant overexploitation of critical fish stocks, the resultant ecological harm, economic losses, and issues impacting the fish trade. The Code is voluntary and targets all stakeholders engaged in fisheries, including those involved in its production, processing, and marketing, as well as its governance and administration.

The contribution of fisheries to the countries in the Bay of Bengal region is substantial. Any decline

in fisheries would severely impact the food security and national economy of the BOB countries. While governments in the region have recognized the need for better fisheries management and adoption of the Code, they have taken limited actions.

Challenges in the Adoption of the Code

There are many challenges in adopting and implementing the Code with the fisheries guidelines of these countries.

Lack of Awareness: Many stakeholders, including fishermen,



are unaware of the Code's existence and its importance in sustainable fisheries management. Their proper understanding and acceptance are crucial for implementing the Code.

Capacity Building: There is a shortage of trained personnel and institutions capable of promoting and enforcing responsible fisheries practices.

Enforcement: Enforcing regulations and monitoring compliance can be complex, especially in regions with vast and diverse fisheries.

BOBP'S Role in Promoting CCRF

Capacity building

BOBP-IGO actively engages in capacity building by organizing training programs and workshops aimed at sensitizing stakeholders in countries around the Bay of Bengal to the principles of the CCRF. These programmes serve as crucial platforms, providing participants with systematic exposure to the principles outlined in the Code. The overarching goal is to facilitate the national implementation of the Code by fostering collaboration among various stakeholders. Through a collaborative approach, these programmes not only enable the identification of common challenges but also contribute to the development of joint solutions. Moreover, the direct participation of stakeholders in these initiatives fosters a heightened commitment to national governments, emphasizing the importance of adherence to best practices in responsible fisheries.

The Regional Training Course on the CCRF (RTC-CCRF)

The RTC-CCRF was one of the most popular training programs of the BOBP-IGO. Initiated in 2008 and continued till 2013, the training programme was aimed at junior and middle-level fisheries officials. It armed them with the knowledge of international development in fisheries management, as well as application of knowledge in their sphere of activities. The two-week long, fully residential, and fully



funded training program was a mix of lectures, hands-on activities, creative activities, rigorous tests, and field trips, exposing the participants to the diversity of fisheries issues. The participants not only learned from eminent scholars in the field, but for most of the trainees, it was an opportunity to meet and get to know fisheries officials from the other countries in the region, making friends and sharing experiences. Looking back, trainees say that the course was a game changer for them and felt that it was worthwhile paying a fee for such a course.

Policy advocacy

BOBP-IGO plays a pivotal role in policy advocacy by actively sensitizing governments across the Bay of Bengal about the vital need to adopt relevant policy measures. Specifically, the organization focuses on the institutionalization of the CCRF within national policies. Through its efforts, BOBP-IGO assesses the endeavours of national governments in incorporating the Code into their policy frameworks, thereby highlighting its advocacy role

in influencing and shaping fisheries-related policies.

Awareness building

BOBP-IGO is actively involved in awareness-building initiatives, demonstrating a proactive approach to promote understanding of the Code. The organization has undertaken various measures to disseminate information widely. These include the publication and distribution of informative booklets that encapsulate the key principles of the Code, offering a concise version in English for broader accessibility.

Extending the outreach

BOBP-IGO demonstrates a commitment to extending outreach through a strategic initiative – translation of the concise versions of the Code into diverse vernacular languages. These translations, in languages such as Tamil, Telugu, Malayalam, Oriya, Gujarati, Marathi, Kannada, Bengali, as well as Sinhala and Divehi, reflect a thoughtful approach to address the linguistic diversity prevalent in South Asia.

More than
15 Training
Programmes

More than
350
Participants

Six
Countries
Covered

Feedback on BOBP'S Regional Training Course on CCRF (RTC-CCRF)



Dr. Md Sharif Uddin

*Former Director,
Department of Fisheries, Bangladesh.
RTC-CCRF, 2008*

FAO's CCRF is an indispensable tool for managing global marine fisheries resources. As a trainee and trainer for the Regional Training Course on CCRF, the course broadened my understanding of international developments in marine resource management, including MCS. As a trainer, it also gave me the opportunity to mentor young officials in the field. I strongly believe that the Training Courses on CCRF should continue for the next generation working in this sector for responsible and sustainable management of marine resources.



Ms. K. T. Deshani Lasanthika

*Development Officer,
Department of Fisheries & Aquatic
resources, Government of Sri Lanka,
RTC-CCRF, 2010*

The CCRF training program was a fantastic experience that has significantly benefited my work in combating IUU (Illegal, Unreported, and Unregulated fishing) and promoting responsible fisheries. The comprehensive approach, covering a wide range of relevant topics, has empowered me to apply what I've learned directly to my duties. Every aspect of the programme, from the hands-on activities to the theoretical knowledge, was incredibly well-executed. Reflecting on the value it provided, the idea of a \$500 fee seems reasonable, considering the immense benefits and improvements it has brought to my professional capabilities. Great work all around!



Mr. Sadhan Chandra Sarker

*Assistant Director (ICT),
Department of Fisheries, Matsya
Bhaban, Dhaka, Bangladesh,
RTC-CCRF 2011*

The BOBP CCRF training program was an exceptional experience, combining educational sessions with practical explorations like focus group discussions, institutional visits, and a delightful houseboat excursion. Visits to the CMFRI, fishing villages, and cultural programs were highlights, offering both pleasure and profound insights into the fisheries sector. The program's organization was impeccable, leaving me with lasting nostalgia. The knowledge gained, especially on the effectiveness of fishers' cooperatives and their activities, was transformative. This program should be restarted even if trainees need to pay a fee for availing the course.



Dr. Aruna Maheepala

*Researcher, National Aquatic
Resources Research and Development
Agency (NARA),
Sri Lanka, RTC-CCRF 2013*

I am a senior researcher specializing in Socio-Economics at NARA. With over 14 years of experience in the field of fisheries socioeconomics and marketing, I actively engage in numerous local and international research projects within the fisheries sector. The knowledge gained from the RTC-CCRF continues to be integral to my research, expanding my understanding of fisheries. It has proven valuable not only in my ongoing studies but also in subsequent research endeavours as well.

BOBP's Impact

Bangladesh

The country has developed an NPOA to eliminate IUU fishing in its maritime boundaries in response to and compliance with the FAO-CCRF. Bangladesh also acknowledges the CCRF in most of its fisheries-related policies.

India

India's National Fisheries Policy has referred to the Code, stating that 'The Government will ensure that the Code and its principles are well-integrated into all its activities related to the marine fisheries sector.' In 2017, Scientists of two

of India's major fisheries research institutes developed a guidance, called the Indian Marine Fisheries Code (IMFC), on how the Code can be put into practice in the country.

Maldives

Most of the marine resource management in the Maldives incorporates elements outlined in the FAO-CCRF. The country also has NPOA-IUU and NPOA-Sharks in place, both of which are part of the recommendations of the IPOA (International Plan of Action), a voluntary international instrument developed by the FAO in 2001 in the context of the CCRF.

Sri Lanka

Sri Lanka is also in compliance with the FAO-CCRF. The country has prepared and implemented the Sri Lanka National Plan of Action (SLNPOA) – IUU, aligning it with the FAO IPOA to prevent, deter, and eliminate IUU fishing.

BOBP-IGO in the Media





New Publications



Visitors



Dr. Maarten Bavinck, Retd. Professor, University of Amsterdam



Dr. Piero Mannini and Dr. Tarub Bahri, FAO



Dr. Felix, Former Vice Chancellor, TNJFU



Dr. R. Ramesh, Former Director, NCSCM



Artists, Waves of art team



Scientists, ICAR-CIARI & ICAR-CIFE



Dr. V. Rama Rao, Former Director, NAARM



Dr. B. Meenakumari, Former DDG, ICAR



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