

**Brainstorming Session on** 

## Greening the Fisheries Sector Innovations and Solutions from the Industry 17 February 2023

## **Event Report**



Understanding the drivers of greenhouse gas emissions in food production systems is becoming urgent. The emission of greenhouse gasses from the marine capture fisheries sector is continuously increasing over time. Continuous but scattered efforts to managing the technical solutions for fuel savings and reducing GHG emissions are currently underway in different parts of the world. The event will explore can technology play a role in mitigating it and what management support will be required to make the technological solution effective.

## About the Organizers

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

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

### National Maritime Foundation (NMF)

National Maritime Foundation (NMF) was established, in 2005, as the nation's first maritime think-tank for the conduct of independent and policy-relevant research on all 'matters maritime'. It provides a provide a common platform for advocacy, discourse, and debate, between maritime-related national and international institutions, organisations, and academic establishments

### ICAR - Central Institute of Fisheries Technology (ICAR-CIFT)

The ICAR - Central Institute of Fisheries Technology (ICAR-CIFT) set up in 1957 is the only national centre in the country where research in all disciplines relating to fishing and fish processing is undertaken. CIFT offers its premier technical expertise and advice for entrepreneurship development in the form of developing food safety standards for the fishing and fish processing industries.

### Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU)

Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU) was established in 2012, is the State-funded professional Fisheries University in India imparting education, research and training to enhance fish productivity and utilization. This University has several colleges and para-professional institutes offering several courses in the field of fisheries science, fishing technology etc.

### Cochin University of Science and Technology (CUSAT)

Cochin University of Science and Technology is a state government-owned autonomous university in Kochi, Kerala and was founded in 1971. School of Industrial Fisheries was established in 1976 as the Department of Industrial Fisheries. Research areas of the school include Aquaculture, Fishery Biology, Craft and Gear Technology, fisheries economics, fisheries management, Fish Processing Technology, Seafood safety, Ornamental Fisheries and Fish Marketing & Trade etc.



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17 February 2023

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Bay of Bengal Programme Inter-Governmental Organisation 91, Saint Mary's Road, Abhiramapuram Chennai - 600 018, Tamil Nadu, India



### **Preparation of Report**

This report on "Brainstorming Session on Greening the Fisheries Sector Innovations and Solutions from the Industry" is jointly prepared by BOBP-IGO, NMF, ICAR-CIFT, TNJFU, and CUSAT

The Brainstorming Session was conducted alongside the 23rd Working Group Meeting of the International Council for the Exploration of the Sea (ICES) - Food and Agricultural Organization (FAO) on Fishing Technology and Fish Behaviour (ICES-FAOWGFTFB-23).

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

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Global fishing fleet annually consumes about 30–40 million tonnes of fuel and accounts for more than 1% of the global marine fuel demand. There is a conscious effort on the part of the Government and the fishers to use mechanical power for fishing leading to increase fuel consumption. As the resources are depleting over time, people are using higher engine power to reach far-flung fishing grounds implying that fuel consumption will likely rise further in the future. In addition, there is a growing realization of the importance of onboard handling and processing of fish. While this has led to value addition and better price realization, the environmental cost is increased for refrigeration and other freezing techniques. Moreover, the BOB countries, in general, aim at increasing, fish production, especially from the deeper waters. A holistic policy and management solution is required to address the problem, from a pure technology perspective and therefore the challenge is, ceteris paribus, what can be done to reduce carbon and GHG emissions from the marine fisheries sector.

Governments in the region may consider prioritizing research and development initiatives in green fisheries infrastructure, technology, and innovative practices to reduce environmental risks and ecological stress. Countries importing fishery products prefer a low-energy fish catch tag on the products which emphasizes the need for green fishing methods such as the utilization of alternate marine fuels and incorporation of renewable energy in fishing vessels in the form of solar panels. Through a holistic, cross-domain effort, the fishing endeavour in the Bay region could be made sustainable, energyefficient, environment-friendly, more affordable, and profitable in the long-run.

The side event aimed at promoting and identifying issues related to green fishing in the Bay of Bengal Region. It brought various stakeholders associated with developing energy-efficient fishing vessels and promoting green fishing operations with the following objectives:

- Promote sustainable fishing practices in the Bay of Bengal Region;
- · Develop strategies for decarbonization of the fisheries sector; and
- Share experiences on development and implementation issues with Green Fishing activities.





## 2. Opening Session: Greening the Fisheries

### 2.1. Opening remarks

Dr. P. Krishnan, Director, BOBP-IGO welcomed the gathering for the "Brainstorming Session on Greening the Fisheries Sector - Innovations and Solutions from the Industry". He informed that the brainstorming session is the sequel to the session on "Energy" during ICES-FAO Symposium. He emphasized research should be focussed on reducing GHG emissions by incorporating necessary modifications in fishing gears and crafts and also advanced technologies should be used to reduce the scouting time, which would in turn save fuel.

### 2.2. De-Carbonization of the Fisheries Sector



**Commodore Debesh Lahiri** is now the Executive Director of the National Maritime Foundation, Delhi. He was the Deputy Naval Attaché at the Embassy of India, Moscow, and has been at the helm of developing two Naval ship Repair Yards, one at Port Blair and the other at Karwar. He has a wide experience in maritime issues, having been Engineer Officer and also been Fleet Engineer Officer in Western Fleet.

Fisheries ecosystems are complex and diverse and are in interactions with fisheries and fishing communities, fishing vessels, fishing areas, development of post-harvest facilities at land, weather information, legislation, and enforcement. To decarbonize the fisheries sector, we should not only focus on the fishing vessels but also the entire fisheries ecosystem.

Decarbonisation of the fisheries sector is not a quick process and will take an ample amount of time. Researchers need to define the boundaries and goals of their targeted levels of emissions and also steady progress should be shown over established baselines. Further, the research results and lessons learned must be shared with the fishing community. Also, third-party certification is needed to validate the process.

Green landing points/harbour – It will help encourage environment-friendly & sustainable operations and it should adopt green technologies for power consumption. Digitalisation is the major factor that helps in the decarbonisation of the fisheries sector, and for example, by digitalizing fishing operations, vessels can spend reduced time at sea, thereby reducing fuel consumption. Also, emphasis should be given to spatial planning, climate change adaptation, mitigation strategies, transport facilities, etc.

Green Fishing Areas: COP26 climate conference in Glasgow launched a new initiative on establishing global "green shipping" corridors through which ships can navigate, burning

zero emissions from fuels. In fisheries also, the same initiative can be implemented by declaring Green Fishing Areas, which are specific areas, where zero-emission solutions will be supported.

Fuel pathways: Most fishing vessels used kerosene and diesel as their major fuels. There should be a shift towards biomass-based fuels, only which can be used during the transition period. Other fuels like Green Ammonia, Green Methanol, Green Hydrogen, and Synthetic diesel are also being considered.

## 2.3. Greening the Fisheries Sector: Innovations and Ideas from INCOIS



**Dr. T Srinivasa Kumar,** is the Director of the Indian National Centre for Ocean Information Services (INCOIS). He was instrumental in strengthening the regional tsunami early warning systems in active collaboration with 28 member states, global harmonization of tsunami watch operations, and implementation of the Tsunami ready community recognition programme.

INCOIS's mission is to provide ocean information and advisory services to society, industry, government agencies, and the scientific community. India implemented various ocean observation platforms like Argo, drifters, current meter, and glider to provide essential oceanographic variables like SST, Ocean colour, Wind speed, Sea level, etc. India currently launched OCEANSAT-3 which helps the fisher community by providing PFZ advisories.

The ocean prediction system of INCOIS helps to predict waves, tsunamis, cyclones, and storm surges and provides forecast advisory services.

Potential Fishing Zone: The data on Sea Surface Temperature (SST) and Chlorophyll, retrieved regularly from thermal-infrared channels of NOAA-AVHRR (USA) and Eumetsat (ESA) Met-Op series satellites along with optical bands of Oceansat (India) and MODIS Aqua (USA) satellites, are used for the identification of Potential Fishing Zones (PFZ) along the Indian coastline. PFZ advisories are disseminated to fishermen in their local languages and also are checked with feedback for their viability.

Coral Bleaching Alerts: Coral bleaching occurs when corals degrade or expel their dinoflagellate symbionts in response to environmental stressors such as elevated sea surface temperature. INCOIS provides maps that indicate the condition of corals, density, etc., and serve as baseline information. It is proposed to bring out such maps at a periodical frequency for comparing the stress conditions and the extent of their influence on the corals for taking appropriate actions to protect the coral ecosystem.

HAB alerts: The increasing frequency of algal blooms is a major concern due to their ill effects on the fishery, marine life, and water quality. INCOIS has developed a service for "Detection and Monitoring of Blooms in the Indian Seas". The targeted users are fishermen, fishery resource managers, researchers, ecologists, and environmentalists.

The duration and magnitude of algal blooms provide essential information for fishery management. The INCOIS Algal Bloom Information Service (ABIS) provides near real-time information on the spatio-temporal existence and spread of phytoplankton blooms.

Ocean state Forecasts: The forecasts are generated by a suite of state-of-the-art numerical models, which are customized to simulate and predict the Indian Ocean features. These forecasts are generated operationally using the latest Information and Computational Technology tools. Even though the primary dissemination mode is the INCOIS website, it also provides these services through other modes like e-mail, mobile phones, TV, Radio, and Electronic Display Boards to all the Stakeholders.

Information Dissemination: GAGAN-based GEMINI: It is a device developed to effectively disseminate emergency information and communication to fishermen on Ocean States Forecasting and Mapping of Potential Fishing Zones. GEMINI is a portable receiver that is linked to ISRO satellites. With this device, the fishermen outside the signal range of their phone companies can get warnings and alerts, as the device can send signals up to 300 nautical miles.

### 2.4. Special Remarks

Mr. Sagar Mehra CSS, Joint Secretary, in his special remarks stated that fisheries and aquaculture in India are among the sunrise sectors and make a significant contribution to the national economy and also provide livelihoods for more than a million people along the coastal line.

Developing countries in the BOB region should come together to address climate change impacts in a resilient manner in the fisheries sector. By 2030, 50% of India's energy requirements will be met using renewable energy sources, and also the country will become carbon neutral and achieve net zero emissions by the year 2070. Researchers need to have innovative ideas to make Greening the Fisheries sector - A reality.



# 3. Industrial Innovations & Solutions for the harvest sector

### 3.1. Recycling of Fishing Gear



**Georg Haney** is the new Environmental Director at Hampiðjan group, and he has ten years of working experience in fishing gear research at Iceland's Marine and Freshwater Research Institute.

Hampiðjan has placed a strong emphasis on the collection and grading of fishing gear and ensuring that it is recycled. Recycling routes have now been established for all of the materials used in fishing gears with the exception of ropes that are manufactured using a mix of materials, but new rope constructions are to be made available early next year, which will solve this problem.

The key collaborators are Plastix which companies take delivery of all the polyethylene trawl netting waste in Denmark and Polivektris in Lithuania, which recycles nylon in cooperation with Norwegian company Nofir. These companies clean the used trawl gear material, reduce it and produce granules sold to manufacturers, which then produce new yarns from the recycled material or use it to mould items. Hampiðjan also recycles its own waste from the production of fishing gear. Last year, Hampiðjan sent mostly the fishing gear made up of PE and Nylon.

Countries around the world should develop their own recycling process to maintain a circular economy.



Recycling of PE in Hampidjan Baltic

### 3.2. PingMeTM – Ocean Space Acoustics



*Mr. Ulf Lundvall* is now holding the position of Chairman of the Board in Ocean Space Acoustics. He has 26 years of experience in the Fishing Industry and has Long-term cooperation with SINTEF and the Norwegian Institute of Marine Research.

Ocean Space Acoustics is a visionary new company from SINTEF (Norway's largest research institution) with patented technology based on many years of research. Its vision is to contribute to a cleaner and more sustainable ocean as well as make fisheries more efficient and profitable by providing critical data.

Norway has been at the forefront of retrieving ghost fishing gear. Over 600 kilometres of gill nets and tremendous quantities of pots, longlines, seines, and wire have been removed since 1980. In Norway, when a fisher set or hauls long lines of nets or pots, they are mandated to report necessary info to the coast guard. This information is accessible at https://www.barentswatch.no/. Tracking and marking lost gear helps avoid additional loss by collision with ghost nets when fishing.

Retrieval of ALDFG: The Norwegian Directorate of fisheries uses this information to help conduct their annual 5-week retrieval survey. Retrieved gear is delivered for recycling. The process is done by towing an anchor rig in specific locations where gear has been reported lost. The recovery of gill nets is about 80% with this method. Experimentation with ROV has also been tested but proved very costly and time-consuming. With more efficient ways of detecting fishing gear, the recovery process time can be dramatically reduced, and the recovery success rate improved.

#### **PingMeTM: The solution**

PingMe<sup>™</sup> is a patented, smart, and modern solution that solves the problem of ghost fishing and makes vessels more efficient and profitable by giving critical information about the fisheries to the skipper. It is an advanced localization, position, and identification (unique ID) system for tagging fishing gear/objects and giving the location of the gear underwater. It is also designed to withstand the harsh and tough conditions on a fishing vessel. PingMe<sup>™</sup> can also be applied to moorings and anchor handling to see that everything is stable and not moving.

It also provides demanded/required information during fishing operations (location, depth, temperature, current, etc.). Fish and crustaceans are often found in specific conditions of temperature, depth, and current. With PingMe<sup>™</sup> the fishermen can see exactly where the gear lands and where it is fishing as well as information about these conditions. The fishermen can also log the data for season planning.

Ghost fishing is a huge problem, killing aquatic life for no reason as well as leaving plastic in the ocean. It is bad for the environment and it is bad for the fishermen's economy, long-



Pictorial representation of the operation of PingMeTM

term and short-term. PingMe<sup>™</sup> provides a solution regarding helping fishermen find their gear even when it seems lost. It also gives access to data in a cloud service which can be individually set up so it either shares the location of the fishermen's gear with others or just shows their own gear.

## 3.3. Improving energy efficiency and tackling seabed impact in deep-sea shrimp trawl fishery



*Mr. Ignacio soler Martinez* is currently serving as a Fisheries Advisor at Kongsberg Maritime, Spain.

Economic analysis of representative vessels from various harbours of Spain indicated that nearly 40% of the operating cost goes for Fuel. Improving the efficiency of the fishing gear is mainly related to reducing the resistance caused by the Net (Trawl) and the Trawl Doors (Otter Boards) which cause at least 80% of the resistance. To reduce fuel consumption by 15-20% without reducing the catch of the gear, Kongsberg marine has undertaken different trials:

- Measuring the current energy efficiency and designing the changes;
- Replacing the fishing net with a new one with at least 20% less resistance;
- Replacing the existing trawl doors with the same type but with at least 20% less resistance; and
- Trying a new type of flying trawl door with at least 50% less resistance.

Greening the Fisheries Sector Innovations and Solutions from the Industry

Reduced netting, use of the knotless net, use of Dyneema, and replacement of headrope material with Dyneema reduced the Net resistance by 60%. Further, by reducing the weight of the trawl doors, the resistance has come down significantly. Pelagic trawl doors are used to catch pelagic species.

Flying trawl doors are being towed behind the vessel as bottom trawl doors, but they are flying in the water and do not have direct contact with the seabed. Using these trawl doors, instead of conventional ones resulted in a reduction of resistance by 60%.

Combining all these changes, one can reach a reduced resistance of 27%, which ultimately results in reduced fuel consumption.



Operation of Flying Trawl doors in the Bottom trawl

## 3.4. Incentives and monitoring to empower fishers and protect our oceans through market access and digitizing fishing



**Mr. Alfredo Sfeir** is the founder and president of Shellcatch, which provides a monitoring platform with software, hardware, and IT support to transform the way fisheries are monitored and managed, and how fishers engage customers.

Fishers usually have problems related to payments, intermediaries, certifications, working capital, and environmental issues. More intermediaries in the market chain result in low quality of the product and limited traceability.

An important proportion of the fisheries use nets to capture their resources and are responsible for high volumes of unwanted fishing, affecting the conservation of highvalue species such as marine mammals and turtles. On larger-scale vessels, onboard observers have played an important role in describing, monitoring, and reducing bycatch. However, it is currently required to incorporate technologies that help automate fishing monitoring, optimizing the quality of onboard monitoring and reducing associated costs. Also, market applications on mobile phones directly connect fishermen with buyers, especially restaurants. Field trials in Chile have proven financial sustainability with improved income by up to 15% and the fishermen are serving 100+ restaurants. Local market incentives and monitoring might lead to creating standards which further results in fisheries segmentation.

Government and NGOs should take this technology to the bottom of the chain, i.e., artisanal fishers to strengthen them economically. Further, the government should also move towards cloud-based infrastructure for transferring information related to fish catch.



eReporting platform created by Shellcatch

### 3.5. Fishing Net Meets Internet-Built by fishermen for fishermen



*Mr. Xavier Lawrence* is the founder of Odaku Online Services, India. He has 13 years of Experience in IT and built over 100+ android apps and 25+ iOS apps. Being from a fisher family, he has ten years of experience in the fishing industry.

Odaku's Marine GPS and Vessel Tracking System provides safety, economic, and sustainable marine fishing through hi-tech solutions. Odaku provides benefits to fishermen, the government, and trade.



Different types of OdakMoniu systems installed in fishing boats

### Benefits to different sectors

Fishers	Government	Trade
Marine Navigation System with Localization	Data Collection & Visualisation	Direct market access to buyers
Secured Data Storage on Cloud	Vessel Tracking System for Monitoring, Control, and Surveillance	Seafood Traceability via QR Code
Fishing Zones from INCOIS	Fishing Zone Management	
Cyclone Alerts using GAGAN, NAVIC	Vessel Log sheet	

Camera for boat safety

AIS for fishermen's safety from ship accidents

Reduced loss due to damage to fishing nets

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The interface of the Odaku application

Currently, Odaku has 3000+ customers in India throughout the coast from Gujarat to Andhra Pradesh. Further, in Kanyakumari 350 fishing boats are using the Odaku vessel tracking system. Vizhinjam Port uses the system to monitor their Ships/Barges and Tugs. It provides Port Insights for their operation by digitizing the entire operation & automating it.

### 3.6. Innovations in Fishing Gear – Garware Technical Fibres



*Mr. Jitendra Soni* is the Product manager (Domestic fisheries) at Garware Technical Fibres Ltd. He has 17 years of experience in sales and Product management and a rich experience in all of Indian domestic fisheries product management.

Garware Technical Fibres is India's leading provider of fishing nets, ropes, and twines for the deep-sea fishing industry and offer customized and differentiated products to cater to the needs of the fishing industry across India's vast coastline. Major challenges in Indian marine fisheries are rising fuel costs/fuel consumption, increased marine pollution, less fish catch, and low-quality fish catch.

### **Products from Garware**

NOTUS Trawl Master sensors: To check the mouth opening of the trawl (i.e., Trawl Door Spread, Wing Spread, and Vertical opening of Trawl);

Fuel Flow Meter: To check the fuel consumption of the boat and helps in fuel consumption;

Sapphire Next Generation: Specially designed for the mouth portion of a trawl (It has a better vertical mouth opening for trawl and also has less drag resulting in fuel saving and higher boat speed); and

X2 NGB - Bridles application in Trawl fishing (It results in uniform and controlled elongation of the trawl and longer life of the trawl).



NOTUS Trawl Master Sensors



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# 4. Closing Session

Dr. S. Sabu, Director & Associate Professor, School of Industrial Fisheries, summarized the presentations during the sessions and thanked all the participants and co-organizers for making the deliberations very productive.

Dr. B.K. Das Director, ICAR-CIFRI

**DECEMPTOTION** 

Greening the Fisheries Sector Innovations and Solutions from the Industry

## 5. Recommendations for Greening the Fisheries Sector

The brainstorming session arrived at the following recommendations for Greening the Fisheries Sector:

- Focus across the value chain: The use of fuel or energy needs to be reduced in every stage of the fisheries value chain i.e., from capture to consumption, including postharvest activities, distribution, and retailing. To achieve this goal, it is necessary for the government to formulate a tailor-made sustainable consumption and production policy for the fisheries industry. This can include incentives for the use of renewable energy sources and the adoption of energy-efficient technologies, as well as penalties for non-compliance with sustainable practices.
- Recycling of fishing gear: In order to transition towards a circular economy, it is crucial to reuse and recycle fishing gear materials. The government can encourage this by offering incentives such as subsidies to fishermen and reduced tax rates on machinery for industries involved in the collection and recycling of fishing gear. Additionally, collection facilities should be established in landing centres and harbours.
- Encourage the use of alternative fuels: Significant part of the greenhouse gas emissions from fishing vessels could be attributed to the use of powerful diesel engines that have low efficiency, resulting in excessive fuel consumption and cost. Therefore, it is crucial to explore alternative fuels such as LPG and LNG for fishing vessels and scale up their use for commercial purposes. Additionally, the development and promotion of hybrid engines should be encouraged to reduce carbon emissions further.
- **Optimization of engine capacity:** It is important to determine the optimum engine capacity for vessels of different sizes based on scientific research. Further, governments can set standards and regulations for the maximum engine capacity of fishing vessels based on their size and intended use. Ensuring that vessels operate within a suitable range of engine capacity can aid in decreasing fuel consumption and emissions.
- Regional Fishing Zone Advisories: Potential Fishing Zone and Tuna Fishing advisories issued by INCOIS can be shared among the neighbouring countries. Sharing these advisories can foster collaboration and cooperation among neighbouring countries in the fishing industry, thereby promoting sustainable and responsible fishing practices. This can lead to a more coordinated approach to fishing, reducing overfishing and the carbon footprint of the industry.
- **Mainstream e-Logbooks:** Electronic logbooks should be popularized among the fishermen by linking with appropriate social security programs like insurance. Electronic logbooks would aid in implementing catch regulations based on evidence-based monitoring and traceability of fishing activity. It also ensures compliance with international instruments concerning fisheries management and trade.

- **Promote the use of solar energy:** Government Schemes can be designed in order to encourage the use of solar panels to power small auxiliary machinery, which is currently being run by engine power or fuel energy, which can help reduce fuel consumption during fishing operations.
- **Popularizing Energy efficient Fishing Accessories:** In India, Rectangular flat otter boards are commonly used in demersal trawls. The government may phase out these traditional otter boards and provide different types of otter boards e.g., lightweight plastic trawl doors, V-form double-slotted otter boards, semi-pelagic self-adjusting otter boards, flying otter boards, and rubber ticklers, at a subsidized rate.
- **Green fishing corridors:** The possibility and merits of establishment of green fishing corridors, like shipping corridors, may be investigated and a reliable strategy need to be evolved.

Green corridors are specific shipping routes where the feasibility of zero-emission shipping is catalysed by a combination of public and private actions. In the case of fishing, Green Fishing corridors may be a spatial zone, where only passive gears such as traps and gill nets of a specific mesh size can be deployed for fishing operations coupled with zero-emission fishing. Necessary incentives, product certifications and possibilities of export markets may be explored by the government.

- Scientific Study on Efficiency of Multi-day fishing: Multiday fishing on one hand would aid in reducing fuel consumption in fishing operations, while on the other hand would use larger boats with greater engine power, thus increasing the fuel use. Hence, systemic studies need to be commissioned in order to determine the net benefit of multi-day fishing in terms of energy use.
- Addressing ALDFG: Abandoned, Lost or otherwise Discard Fishing Gear (ALDFG) and associated ghost fishing is a huge problem, killing aquatic life as well as leaving plastic in the ocean. It has a negative impact on marine life/environment and on the livelihoods of the fishers. In order to effectively address this issue, it is necessary to understand the scale of the problem. To this end, it is recommended to conduct FAO ALDFG surveys for all major fishing gear. The results of the survey will guide activities/projects/resources aimed at addressing ALDFG and plastic waste. Such activities may include; recycling programmes, port reception facilities for end-of-life fishing gear, innovative fishing gear design to reduce the risk of ghost fishing, gear location and retrieval tools, and marking of fishing gear to aid responsible ownership and facilitate control measures.

### Annexure I

### List of Participants

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### Side Event On

### Greening the Fisheries Sector in Innovations and Solutions from the Industry

### 17 February 2023

### Programme

09.00 - 09.30	Registration	
09.30 - 10.30	Greening the fisheries	
09.30 – 09. 35	Opening Remarks	<b>Dr. P. Krishnan</b> Director, BOBP-IGO
09. 35 – 09.55	De-Carbonization of the Fisheries Sector	Commodore Debesh Lahiri NMF, New Delhi
09.55 – 10.15	Greening the Fisheries Sector: Innovations and Ideas from INCOIS	<b>Dr. Srinivasa Kumar</b> Director, INCOIS, Hyderabad
10.15 – 10. 30	Special Remarks	<b>Shri. Sagar Mehra</b> Joint Secretary, DoF, Gol
10.30 - 11.00	Coffee Break	
11.00 – 12.45	Industrial Innovations & Solutions for ha	rvest sector
	Co-Chairs:	
	1. <b>Dr. Md. Shainee</b> , <i>Former Minister of Fisherie</i> 2. <b>Mr. Dhammika Ranatunga</b> , <i>Director General</i>	s, Maldives I (Technical), MFARD, Sri Lanka
11.15 – 11.25	Hambidgan Group, Iceland	Mr. Georg Haney Director, Environmental Group
11.25 – 11.35	OSAC, Norway	<b>Mr. Ulf Lundvall</b> Chairman of the Board
11.35 – 11.45	Kongsberg Maritime, Spain	Mr. Ignacio Soler Martinez Fishery Advisor
11.45 – 11.55	Shellcatch, USA	Mr. Alfredo Sfeir CEO
11.55 – 12.05	Odaku Online Services, India	Mr. Xavier Lawrence CEO
12.05 – 12.15	Garware technical Fibres, India	Mr. Jitenda Soni Product Manager
12.15 – 12.45	Discussion (Q&A)	Participants
12. 45 – 13.00	Closing Session	
12.45 – 12.55	Summary & Conclusions	Co-Chairs
12.55 — 13.00	Words of Thanks	<b>Dr. S. Sabu</b> Director, School of Industrial Fisheries

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