



WORKSHOP REPORT

EVENT TITLE:

Regional Workshop on Developments in Deep-Sea Resource Exploration and Endangered, Threatened, Protected (ETP) Species Conservation: Awareness and Way Forward

Date: 05 July 2025

Venue: Hotel A J Grand Elite, Yekkur, Mangaluru

Organized Jointly By:

- **ICAR–Central Marine Fisheries Research Institute**, Mangalore Regional Centre
- **Department of Fisheries**, Government of Karnataka
- **Small Pelagic Purse Seine Fisheries – Karnataka State FIP**





1. Objectives of the Workshop

The workshop was conducted to:

- Raise awareness about the protection of Endangered, Threatened, and Protected (ETP) marine species.
- Share updates on deep-sea resource exploration initiatives.
- Introduce and promote the adoption of Standard Operating Procedures (SOPs) for the safe handling of ETP species accidentally caught during fishing.
- Bring together stakeholders to discuss challenges and strategies for sustainable deep-sea fisheries development in Karnataka.

2. Dignitaries and Chief Guests:

The event was inaugurated in the presence of eminent dignitaries who also led critical technical sessions and stakeholder interactions:

- **Shri Dinesh Kumar Kaller**, Director, Department of Fisheries, Government of Karnataka
- **Dr. Grinson George**, Director, ICAR–Central Marine Fisheries Research Institute
- **Dr Pravin Puthran**, ADG (M.Fy.), ICAR
- **Shri Udaya Kumar Salian**, Lead, Small Pelagic Purse Seine Fisheries – Karnataka State FIP
- **Dr. Sujitha Thomas**, Head & Principal Scientist, ICAR–CMFRI, Mangalore Regional Centre
- **Shri Yakub F M**, Member, Steering Committee, Small Pelagic Purse Seine Fisheries – Karnataka State FIP
- **Shri Dayananda Suvarna**, President, Fishermen's Association Malpe

"The presence of these distinguished leaders—including senior officials from the Department of Fisheries, Government of Karnataka; scientists from ICAR–Central Marine Fisheries Research Institute (CMFRI) and ICAR–Central Institute of Fisheries Technology (CIFT); representatives from the Marine Products Export Development Authority (MPEDA) and Export Inspection Agency (EIA); faculty members from the College of Fisheries, Mangalore; Officers from Department of

Forest and Coastal Police and leaders of the Small Pelagic Purse Seine Fisheries—Karnataka State FIP and local fishermen's associations—underscored a strong, collective commitment to sustainable marine resource management. Their active engagement throughout the workshop highlighted the critical importance of inter-institutional collaboration in advancing responsible fishing practices, enhancing conservation efforts for endangered marine species, and securing the long-term sustainability of fisheries in the region."



Ensuring Sustainability...

3. Special Highlight: Release of ETP Species Identification Poster

One of the most significant highlights of the *Regional Workshop on Developments in Deep-Sea Resource Exploration and Endangered, Threatened, Protected (ETP) Species Conservation* was the **formal release of the bilingual ETP Species Identification Poster**. This event symbolized a major step in advancing on-ground awareness and operational compliance toward marine species conservation.

Release Ceremony

The ETP poster was ceremonially unveiled on stage by a panel of esteemed chief guests, including:



- **Shri Dinesh Kumar Kaller**, Director, Department of Fisheries, Government of Karnataka
- **Dr. Grinson George**, Director, ICAR–Central Marine Fisheries Research Institute
- **Dr Pravin Puthran**, ADG (M.Fy.), ICAR
- **Shri Udaya Kumar Salian**, Lead, Small Pelagic Purse Seine Fisheries – Karnataka State FIP
- **Dr. Sujitha Thomas**, Head & Principal Scientist, ICAR–CMFRI, Mangalore Regional Centre
- **Shri Yakub F M**, Member, Steering Committee, Small Pelagic Purse Seine Fisheries – Karnataka State FIP
- **Shri Dayananda Suvarna**, President, Fishermen’s Association Malpe

The dignitaries jointly released the poster during the inaugural session, applauding its potential to enhance awareness and support legal compliance within the fishing sector.





Purpose and Features of the Poster

The **ETP Species Identification Poster** was developed by ICAR–CMFRI in consultation with marine biologists, fisheries experts and Small Pelagic Purse Seine Fisheries-Karnataka State FIP. It serves as an essential field tool for fishers and vessel operators, specifically designed for onboard use.

Key features include:

- **Bilingual Format:** The poster is printed in **Kannada and English** to ensure accessibility for local fishers across Karnataka's coastal regions.
- **Visual Identification Aids:** High-resolution images of various **Endangered, Threatened, and Protected species** such as whale sharks, sawfish, wedgefish, manta rays, Dolphins, sea turtles etc. are included.
- **Conservation Relevance:** The poster highlights species listed under **Schedule I and II** of the **Indian Wildlife Protection Act (1972)**, indicating that capture or harm to these species is strictly prohibited.

Use and Impact

The poster is intended for **display on fishing vessels, landing centers, and fisheries society offices**, with the following goals:

- **Quick and Easy Identification:** Enables fishers to distinguish ETP species from commercially targeted species during fishing operations.
- **Support for SOP Implementation:** Reinforces the Standard Operating Procedures (SOPs) for the safe handling and release of ETP species when caught as bycatch.
- **Education and Sensitization:** Acts as a visual training aid during crew education sessions, promoting sustainable and responsible fishing practices.

Distribution

As part of the ETP Awareness Program conducted during the Regional Workshop, each fisheries association leader in attendance was formally provided with a **laminated and photo-framed copy** of the newly launched **ETP Species Identification Poster**.



These framed posters are intended for prominent display in **fisheries association offices**, thereby serving as a constant visual reminder and educational resource for the fishing community. Their strategic placement will support ongoing efforts to raise awareness and promote compliance with marine species conservation regulations.

This distribution marks a significant step toward strengthening outreach at the grassroots level, ensuring that information on **Endangered, Threatened, and Protected species** reaches both individual fishers and the broader community through institutional touchpoints.

Additional dissemination to fishing vessels, landing centers, and local fisheries cooperatives is also planned in the subsequent phase to ensure widespread coverage and accessibility across all operational levels of the sector.



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4. Training Content and Distribution

Scientific Presentations and Discussions

Session Title: *“Understanding Marine Biodiversity and the Importance of Protecting Elasmobranchs and ETP Species in Karnataka Waters”*

Speaker: Dr. G.B. Purushothama, Senior Scientist, ICAR–CMFRI, Mangalore

Overview

As part of the technical training sessions during the regional workshop, Dr. G.B. Purushothama delivered an insightful presentation focused on the **conservation importance of marine biodiversity**, with a specific emphasis on **elasmobranchs**—a group that includes sharks, rays, and skates. His session was aimed at sensitizing fishers and stakeholders to the ecological role and conservation status of these vulnerable marine species in Karnataka waters.

Key Highlights of the Session

1. Significance of Marine Biodiversity

- Dr. Purushothama emphasized that oceans cover more than **70% of Earth's surface** and are home to over **71% of the planet's biodiversity**.
- He highlighted that more than **5 million marine species** exist, many of which are still unclassified, making **marine conservation critical for global biodiversity**.

2. Focus on Elasmobranchs (Sharks, Rays, Guitarfish)

- Karnataka's coastal waters host over **1,200 species** of sharks, rays, and related species.
- He presented alarming data showing that **a third of elasmobranchs are under threat** due to overfishing, habitat loss, and pollution.
- Specific endangered species mentioned included:
 - *Carcharhinus hemiodon* (Pondicherry shark)

- *Rhynchobatus laevis* (Smoothnose wedgefish)
- *Pristis pristis* (Largetooth sawfish)
- *Rhincodon typus* (Whale shark)



3. Legal Protection and Policy Framework

- Dr. Purushothama reviewed the inclusion of **26 elasmobranch species under Schedule I and II** of the **Indian Wildlife (Protection) Act, 1972**, making their capture or harm illegal.
- He explained the role of this legal framework in guiding responsible fishing practices and enforcement.

4. Causes of Population Decline

- **Overfishing** and **incidental bycatch** during commercial fishing were identified as the major threats.
- Other contributing factors included:
 - Destruction of marine habitats
 - Climate change



- Pollution and invasive species

5. Awareness and Action

- Dr. Purushothama stressed the need for **fisher-level awareness**, explaining that many ETP species are accidentally caught due to lack of identification knowledge.
- He encouraged adoption of tools like the **ETP Species Identification Poster** and training on **Standard Operating Procedures (SOPs)** for safe handling and release.

Session Title: “Standard Operating Procedures (SOP) for Handling of Endangered, Threatened and Protected (ETP) Species”

Speaker: Dr. Rajesh K. M., Principal Scientist, ICAR–CMFRI, Mangalore Regional Centre

Overview

Dr. Rajesh K. M. delivered a comprehensive and action-oriented training session focused on **Standard Operating Procedures (SOPs)** for the **safe handling, documentation, and release** of ETP marine species encountered accidentally during fishing activities. His presentation aimed to equip fishers, vessel captains, and FIP stakeholders with **practical knowledge and procedures** aligned with conservation mandates and scientific best practices.

Key Elements of the SOP Training

1. Objectives of the SOP

- Ensure **humane and safe release** of accidentally caught ETP species.
- **Minimize injury and mortality** during release and handling.
- Enable **systematic documentation and reporting** for scientific and regulatory use.
- Promote **coordination among fishers, researchers, and authorities**.

2. Step-by-Step Guidelines for Handling ETP Species



- **Prioritize human safety:** Avoid entering the water or making sudden movements near large marine species.
- **Identify the species and condition:** Observe whether the animal is calm, injured, entangled, or alive.
- **Use proper gear and assistance:** Use trained crew and safe gear to disentangle or lift the animal gently.
- **Release with caution:** Avoid dragging the animal; release it from the boat's side if possible, minimizing further harm.



3. Documentation Requirements

- Record **species name, location (with GPS), date, time, and fishing gear used.**
- Capture **photos or videos** where feasible.
- Use **ETP incident log sheets**, which were also distributed during the event.
- Submit records to designated authorities or FIP coordinators.

4. Do's and Don'ts

Dr. Rajesh provided clear behavioral guidelines to avoid common mistakes:



Do's:

- Keep the animal wet and shaded if held briefly.
- Document incidents responsibly.
- Maintain minimum human interference.

Don'ts:

- Never stand on or drag the animal.
- Avoid loud noises or crowding.
- Do not collect samples unless authorized.

5. Special Focus on Beached or Stranded ETP Species

- Secure the area to prevent crowds.
- Splash water or cover the animal with a wet cloth.
- Inform marine rescue or veterinary teams immediately.
- Follow ethical and legal procedures for dead specimens (documentation, burial, or authorized disposal).

5. Key Outcomes:

- Enhanced awareness on ETP species and legal responsibilities among fishing community leaders.
- Adoption of SOPs for accidental ETP encounters onboard.
- Distribution of tools and materials to support onboard crew training and compliance monitoring.
- Strong consensus to improve documentation and reporting of ETP captures via dedicated logs.



Ensuring Sustainability...

6. Next Steps

• Training to Fishing Vessel Captains (Train the Trainer):

As a first step toward enhancing awareness among fishers, a dedicated training program will be organized for all fishing vessel captains. The training is planned to be conducted in **July 2025**, with the venue and schedule to be finalized shortly. Captains will be sensitized on the identification and safe handling of Endangered, Threatened, and Protected (ETP) species, and will be equipped to train their crew members effectively.



- **Onboard Crew Training:**

Following the “train-the-trainer” model, trained vessel captains will conduct **onboard awareness sessions** using the distributed ETP kits. This initiative aims to reach and educate over **8,000 fishers** across all participating vessels on ETP species recognition, handling protocols, and reporting procedures.

- **ETP Interaction Reporting:**

Each vessel will be supplied with the **bilingual ETP Identification Poster** and **simplified log sheets** to record any accidental encounters with ETP species. The documentation will include details such as species name, time, location (GPS), and outcome of the release or handling effort, ensuring proper tracking and accountability.

- **Recognition:**

Fisheries associations, vessel owners, and crews who demonstrate active participation and maintain accurate ETP reporting will be **recognized during upcoming review meetings and training workshops**. These acknowledgments aim to foster a culture of conservation, accountability, and responsible fishing practices within the fleet.

7. Conclusion

The *Regional Workshop on Developments in Deep-Sea Resource Exploration and Endangered, Threatened, Protected (ETP) Species Conservation: Awareness and Way Forward*, held on 05 July 2025 in Mangaluru, marked a pivotal step in promoting sustainable and responsible fishing practices along the Karnataka coast. Jointly organized by ICAR–CMFRI Mangalore Regional Centre, the Department of Fisheries, Government of Karnataka, and the Small Pelagic Purse Seine Fisheries–Karnataka State FIP, the event brought together stakeholders from science, policy, and the fishing community in a meaningful dialogue.

The workshop achieved its core objectives by fostering awareness on the conservation of ETP species and sharing recent scientific and policy developments in deep-sea fisheries management. The presence of senior dignitaries, including directors, FIP leaders, and fisher association heads, lent strong institutional support and legitimacy to the initiatives discussed.



One of the most notable highlights was the **release of the bilingual ETP Species Identification Poster**, a crucial educational and compliance tool that visually guides fishers in identifying protected species under the Indian Wildlife Protection Act. This initiative was well-received and is expected to have a lasting impact on improving awareness at the grassroots level.

The training sessions conducted by **Dr. G.B. Purushothama** and **Dr. Rajesh K.M.** provided valuable scientific insight and practical guidance. Dr. Purushothama's presentation on marine biodiversity and the vulnerability of elasmobranchs laid the foundation for understanding the broader ecological implications of unsustainable fishing. Dr. Rajesh K.M.'s session on **Standard Operating Procedures (SOPs)** equipped participants with actionable steps for the safe handling, release, and documentation of ETP species, thereby aligning field practices with national conservation laws.

To support implementation, all vessel captains were provided with **ETP awareness kits**, including the poster, SOP manual, and sample log sheets. The upcoming **"Train the Trainer" program** scheduled for July 2025 will further reinforce this initiative, preparing captains to conduct **onboard crew training** that will eventually reach an estimated **8,000 fishers**.

Clear mechanisms have also been established for **ETP interaction reporting**, ensuring proper documentation and submission of field data to relevant authorities. Additionally, recognition and appreciation of proactive vessels and associations in upcoming review forums are expected to incentivize better compliance and wider participation.

In conclusion, the workshop has laid a strong foundation for a more informed, accountable, and conservation-minded fisheries sector in Karnataka. It represents a collaborative milestone, where the commitment of fishers, policymakers, scientists, and FIP stakeholders converged toward a shared goal—to **safeguard marine biodiversity while securing the future of sustainable fisheries**.

END OF REPORT

Proceedings of the Regional Workshop on Developments in Deep-sea Resource Exploration and Endangered, Threatened, and Protected (ETP) Species Conservation: Awareness and Way Forward.

Inaugural Session

The programme was conducted on 5th July 2025 at A. J. Grand Elite Hotel, Mangaluru, in collaboration with the Department of Fisheries, Government of Karnataka, and the Karnataka State Fishery Improvement Plans (FIP) for Small Pelagic Purse Seine Fisheries. Registration of participants commenced at 9:00 AM. Around seventy stakeholders from various sectors of the fisheries industry attended, including officials from the Department of Fisheries and Marine Products Export Development Authority (MPEDA), Karnataka Fisheries Development Corporation Ltd., (KFDC), Export Inspection Agency (EIA), Indian Coast Guard, Coastal Security Police, Department of Forest, researchers from ICAR-CIFT, ICAR-CMFRI, and College of Fisheries as well as fishers and representatives from boat owners' associations.

The chief guests for the meeting were Shri. Dinesh Kumar Kaller, Director of Fisheries, Department of Fisheries, Government of Karnataka; Dr. Grinson George, Director, ICAR-Central Marine Fisheries Research Institute, Kochi; Dr. Praveen Puthran, Former ADG, ICAR, New Delhi; Shri. Uday Kumar Salian, FIP, Yashaswi Fish meal; Mr. Yakoob, Member, Steering Committee, FIP; Shri. Dayanand Suvarna, President of Malpe Fishermen's Association.

The event began with the ICAR and CMFRI theme songs. Dr Sujitha Thomas, Head, Mangalore Regional Centre, welcomed the gathering and emphasized the importance of the programme. She highlighted the ongoing efforts of the Mangalore Regional Centre in advancing deep-sea resource exploitation for enhancing the nation's fish production. At the same time, she described the importance of conserving Endangered, Threatened, and Protected (ETP) species through the promotion of sustainable and responsible fishing practices in line with ecosystem-based management principles. She elaborated the ethical need and importance of the ETP species.

This was followed by the inaugural ceremony comprising of lighting the lamp by Mr. Dinesh Kumar Kaller, Director of Fisheries, Government of Karnataka and in his inaugural address, appreciated the initiative of ICAR-CMFRI in organizing the regional workshop. He announced that a sea ambulance equipped with paramedical staff and a mortuary, powered by an 800 HP engine, will be operational by 2026 to respond swiftly to distress calls from fishers at sea. He also informed that the government will distribute over 2,000 Turtle Excluder Devices (TEDs) free of cost to trawl boat owners. Each device, costing Rs. 23,500/-, will be jointly funded by the Union and State governments. Stressing Karnataka's commitment to marine conservation, he stated that the State is willing to extend the annual fishing ban from the current 61 days to 90 days, contingent upon consensus among all West Coast states. Mr. Kaller further highlighted that the Department of Fisheries has officially notified the Minimum Legal Size (MLS) for 19 commercially important fish species, based on ICAR-CMFRI's scientific advisories. He commended ICAR-CMFRI's efforts in exploring deep-sea resources, which has helped reduce fishing pressure in coastal waters up to 100 meters depth. He also reiterated that light fishing and pair trawling are strictly banned in Karnataka. During the event, awareness posters on Endangered, Threatened, and Protected (ETP) species were released and distributed among the fishermen, with instructions to display them on their boats to aid in the identification and safe release of protected species back into the sea. The posters were distributed to representatives of the following fisheries associations from Dakshina Kannada, Udupi, and Uttara Kannada districts –

1. Purse seine association, Mangaluru
2. Fishermen's Association, Malpe
3. Deep Sea Association, Malpe
4. Purse seine Association, Malpe
5. Deep Sea Driver's Association, Malpe
6. Honnavar Taluk Purse seine Union, Honnavar
7. Ring seine Association, Malpe
8. Small Boat (370) Fishermen's Association, Malpe

9. Fish Merchant's Association, Malpe
10. The Malpe Fishermen's Primary Co-Operative Society Ltd., Malpe
11. Purse seine Fishermen's Association, Tadadi
12. The Kumta Fisheries Co-Operative Society Ltd., Kumta
13. The Fisheries & Fish Products Manufacturing Co-Operative Society, Karnataka
14. All India Purse seine Association, Karnataka

Shri Arun Kumar from Malpe was felicitated for his significant contribution in initiating deep-sea exploration efforts providing the services of *Bharadhwaj* and *Jamadagni* vessels along with the crews. The fishers — Nagesh Korga Moger, Vasanth Moger, Govardhan Moger, Krishna Kharvi, and Krishn Irayya Moger — who actively participated in these exploratory trials were also honoured for their involvement. These efforts formed the basis for the development of the *Handbook on Deep-Sea Resources of Karnataka*, which was formally released during the event.

This was followed by an overview of the workshop by Dr. Grinson George, Director, ICAR-Central Marine Fisheries Research Institute stated that the institute, in collaboration with the ICAR-Central Institute of Fishing Technology (CIFT), Kochi, has launched a pilot study to evaluate the feasibility of deep-sea resource exploitation. This initiative is being supported by the National Fisheries Development Board (NFDB), Hyderabad, under the Pradhan Mantri Matsya Sampada Yojana (PMMSY). Preliminary assessments indicate that the maritime states of Gujarat, Kerala, Karnataka, and Tamil Nadu have already demonstrated their potential to harvest deep-sea fishery resources within India's Exclusive Economic Zone (EEZ) using vessels below 20 meters in length, with minor modifications to craft and gear. The institute has also estimated the potential yield estimate of key deep-sea resources, including oceanic squid (0.63 million metric tonnes), oceanic tuna (0.213 million metric tonnes), tuna-like fishes (0.33 million metric tonnes), mesopelagic fishes (1.7 million metric tonnes), and ribbonfishes (0.3 million metric tonnes). Currently, over 90% of India's marine fish catch is derived from depths up to 50 meters, and most fishing activity is limited to within 100 meters. This heavy concentration on coastal waters has led to increasing pressure on shallow-water resources. However,

due to technological limitations and financial barriers, fishers are unable to venture into deeper waters where untapped resources exist. Mesopelagic fishes, though not suitable for direct human consumption due to their high wax ester content, can help meet the growing demand for fish-based products if harnessed effectively. To sustainably exploit these deep-sea resources, it is essential to upgrade India's fishing fleet with modern vessels equipped with advanced harvesting, processing, and storage technologies. Furthermore, scientific studies on Maximum Sustainable Yield (MSY), as well as ecological and biological assessments, must inform the development of a comprehensive deep-sea fisheries management framework. This framework should also mandate the sharing of fishing logbook data with researchers and authorities to support evidence-based decision-making. Equally important is the capacity building of traditional fishing communities. Training programs and technological support must be provided to empower fishers to safely and effectively adopt deep-sea fishing practices. A large-scale stakeholder consultation involving policymakers, researchers, industry, and fisher folk is vital to ensure an inclusive and sustainable deep-sea fishery strategy for India. Given the current shortage of technologically advanced fishing vessels in the country, investment in the construction of modern, multi-functional deep-sea fishing boats is imperative to realize this potential.

Technical Session

The event's technical session included expert presentations on Marine Resource Conservation Awareness on Elasmobranchs, Marine Mammals and Turtles, Handling of Stranded ETP Species – Standard Operating Procedures, Deep Sea Resource Exploration: Opportunities and Challenges and Harvesting Technologies for Deep-Sea Resources, followed by in-depth discussions. This session was coordinated by Dr Rajesh, K. M., Principal Scientist at the Mangalore Regional Centre of ICAR-CMFRI.

Distinguished Panellists:

1. Dr. Grinson George, Director, ICAR-Central Marine Fisheries Research Institute, Kochi, Kerala.

2. Mr. Dinesh Kumar Kaller, Director of Fisheries, Department of Fisheries, Govt. of Karnataka
3. Dr Pravin Puthran, Former ADG (Marine Fisheries), ICAR, New Delhi.
4. Dr Sujitha Thomas, Principal Scientist and Head, Mangalore Regional Centre of ICAR-CMFRI, Mangaluru.

Session I:

Topic: Marine Resource Conservation Awareness on Elasmobranchs

Dr. G. B. Purushottama, Senior Scientist, Finfish Fisheries Division, Mangalore Regional Centre of ICAR-CMFRI, Mangaluru, delivered an insightful talk on Marine Resource Conservation Awareness with a focus on elasmobranchs. He introduced the group, comprising sharks, rays, and skates—encompassing around 1,199 species globally—and underscored their ecological significance in marine ecosystems. Dr. Purushottama emphasized the urgent need for sustainable management and protection of these species in Indian waters, given their vulnerability to overfishing. He highlighted key findings on population declines and distributed educational materials to fishers and stakeholders. Interactive sessions included species identification, safe handling practices, and awareness of legal protections under the Indian Wildlife (Protection) Act, 1972 (Amendment, 2022), which currently lists 18 species under Schedule-I and 8 under Schedule-II. The session aimed to foster responsible fishing and active community involvement in elasmobranch conservation.

Session II:

Topic: Marine Resource conservation awareness on Mammals and turtles

Dr. Bindu Sulochanan, Principal Scientist, Marine Biodiversity and Environment Management Division, Mangalore Regional Centre of ICAR-CMFRI, Mangaluru, delivered an engaging and informative talk on the conservation of marine mammals and sea turtles. She emphasized the ecological importance of these vulnerable species and outlined the major threats they face, including bycatch, habitat degradation, and marine pollution. The session highlighted the critical need for enhanced awareness, systematic data collection, and active community participation in conservation initiatives. She also

discussed the legal safeguards provided under the Indian Wildlife (Protection) Act, 1972, and shared best practices for the safe handling and release of these species. The talk underscored the role of responsible fisheries and stakeholder collaboration in safeguarding marine biodiversity.

Session III:

Topic: Handling of Stranded ETP Species – Standard Operating Procedures

Dr. K. M. Rajesh, Principal Scientist, Finfish Fisheries Division, Mangalore Regional Centre of ICAR-CMFRI, Mangaluru, delivered a detailed talk on the "Handling of Stranded Endangered, Threatened, and Protected (ETP) Species – Standard Operating Procedures (SOPs)." He emphasized the importance of timely and scientifically guided response to strandings of marine species such as dolphins, sea turtles, and dugongs. The talk outlined key steps in identifying species, ensuring safety, and minimizing stress during rescue or necropsy. He stressed the need for capacity building among coastal communities, fishers, and frontline staff. Proper documentation, use of protective gear, and immediate reporting to relevant authorities were highlighted as critical components of the SOPs for effective conservation action.

Session IV:

Topic: Deep Sea Resource Exploration: Opportunities and Challenges

Dr. Sujitha Thomas, Principal Scientist & Head, Mangalore Regional Centre of ICAR-CMFRI, Mangaluru, delivered an enlightening session on "Deep Sea Resource Exploration: Opportunities and Challenges," highlighting the vast untapped potential of deep-sea fisheries beyond the continental shelf. She discussed the importance of sustainable exploitation, advanced vessel technology, and scientific data to ensure responsible harvesting. Emphasizing ecosystem-based approaches, she pointed out the challenges such as limited infrastructure, high operational costs, and lack of trained manpower. Dr. Sujitha also shared insights from three recent deep-sea fishing trial operations conducted in Karnataka, which demonstrated the feasibility of targeting oceanic species especially mesopelagic resource and provided valuable information for framing future deep-sea fishery development strategies.

Session V:

Topic: Development of Harvest Technology for Mesopelagic resources

Dr. M. P. Ramesan, Principal Scientist and Head of the Fishing Technology Division at ICAR-CIFT, delivered a detailed and structured overview on the development of harvest technologies for mesopelagic resources. He began by highlighting the vast global potential of mesopelagic fishes—particularly myctophids—estimated at over 350 million metric tonnes, comprising around 137 species found at depths beyond 350 meters. He noted that FAO Fishing Area 51 (Western Indian Ocean) holds one of the highest densities, with biomass up to 263 million metric tonnes and density ranging from 0.5 to 60 grams per square meter.

He then delved into global fishing trends, presenting case studies where mesopelagic fishing was discontinued due to poor economic returns and low catch densities. Notably, operations in Iran, the Soviet Union, Iceland, and Norway were halted, reflecting the need for high catch rates (2–5 t/hr) to ensure commercial viability. Dr. Ramesan shared that although mesopelagic species are widespread across the world's oceans, they currently do not support active fisheries due to technological and economic constraints. The talk proceeded to discuss India's initiatives, particularly the "Operation Meso" program launched by the Ministry of Earth Sciences and implemented by CMLRE. Under this program, CMFRI and FSI have mapped mesopelagic hotspots in Gujarat, Maharashtra, and Karnataka, with resource densities between 300–800 metric tonnes. He presented data from Indian fishing trials conducted using vessels like *Sagar Sampada* and *Matsyakumari-2*, showcasing the feasibility of harvesting these deep-sea species.

Dr. Ramesan emphasized the urgent need for advanced harvest technologies, including midwater trawls, light-assisted capture methods, and acoustic gear such as 360° sonar and net sonde echo sounders. He explained that existing vessels require significant retrofitting—larger trawl nets (98 m), cod-end pumping systems, high-capacity engines, and specialized otter boards—to operate effectively at mesopelagic depths.

Further, he outlined trawl gear specifications, including mesh sizes (cod-end down to 10 mm), use of 700 kg otter boards, nylon inner linings, and rigging with 100 m bridles and depressors to maintain depth. He stressed the role of diel vertical migration in fishing

strategies, noting that mesopelagics rise to the upper layers at night, necessitating night-time operations and specific vessel speeds (3.5–20 knots).

He also addressed species composition from Indian surveys: 48% swimming fishes, 24% deep-sea myctophids (11 species), 10% crustaceans, along with cephalopods and jellyfish. Dr. Ramesan underscored the importance of minimizing bycatch, improving gear selectivity, enhancing energy efficiency, and ensuring proper post-harvest handling, particularly given the short shelf life of mesopelagic fishes and the high cost of ice and storage.

Concluding his talk, he highlighted the economic and operational challenges in mesopelagic exploitation—high diesel consumption, expensive equipment, and low catch risks—which demand thorough techno-economic evaluation. He stressed the need for ecosystem-based management, international collaboration, stakeholder training, and consistent data collection by crews to refine and scale India's mesopelagic fishery sustainably.

Discussion

The discussion session aimed to address various aspects and concerns related to the harvesting and utilization of mesopelagic resources and ETP species conservation efforts. Key stakeholders, including fishermen, researchers, and policymakers, participated in an engaging dialogue to explore the potential and challenges of this emerging fishery sector. Topics covered included sustainable harvesting practices, economic viability, market demand, regulatory frameworks, and future government initiatives. This session provided a platform for stakeholders to voice their concerns, share insights, and collaboratively seek solutions to ensure the responsible and profitable exploitation of mesopelagic resources.

During the interactive session, participants engaged in meaningful discussions on various aspects of marine resource management and conservation. Queries were raised about the incidental capture of Endangered, Threatened, and Protected (ETP) species and the legal consequences outlined under the Indian Wildlife (Protection) Act, 1972, including enforcement measures and penalties. Clarifications were provided on the ecological

importance of releasing protected species and the need for strict compliance with relevant conservation laws.

Concerns were also voiced regarding the declining prawn prices in global markets, prompting a detailed explanation of shifting export patterns and international demand. Fishers further requested the deployment of a sea ambulance equipped with paramedical facilities to ensure timely medical support and enhance safety during fishing operations. Stakeholders actively participated, and experts responded with informative and practical suggestions. Discussions also touched upon the challenges faced in deep-sea fishing, including low returns at landing centres, vessel registration restrictions—where only state-registered boats can operate within 12 nautical miles—and the requirement of central authorization for deep-sea exploitation. Additional constraints such as high fuel consumption, lack of trained manpower, and increasing operational costs were identified as barriers to sustainable offshore ventures.

As part of the deliberations, it was announced that a targeted training programme would commence from August 2025 for trawl operators, focusing on the identification of ETP species commonly encountered in Indian waters. This capacity-building effort will cover identification features, safe handling and release protocols, and relevant legal frameworks to promote conservation-friendly fishing practices and reduce unintentional impacts on vulnerable marine fauna.

Conclusion and Recommendations

The technical sessions and discussions underscored the urgent need for integrated efforts to conserve marine biodiversity, particularly Elasmobranchs, marine mammals, sea turtles, and other Endangered, Threatened, and Protected (ETP) species. Presentations highlighted their ecological importance, threats from bycatch and overfishing, and the necessity for compliance with legal frameworks such as the Indian Wildlife (Protection) Act, 1972. The sessions on deep-sea resource exploration and mesopelagic fisheries revealed promising opportunities, contingent upon addressing infrastructure gaps, technological challenges, and market uncertainties. It was recommended to prioritize ecosystem-based management, strengthen harvest technologies, and conduct more

region-specific assessments. Stakeholders emphasized the need for policy clarity, improved post-harvest handling, and economic viability. The announcement of targeted training for trawl operators from August to improve ETP species identification and handling was welcomed. Regular data collection, awareness campaigns, and multi-stakeholder collaboration were strongly encouraged to ensure sustainable utilization of deep-sea resources and long-term marine conservation outcomes.

Recommendations of the Workshop

1. Integrated Mesopelagic Fisheries Development Programme: ICAR-CMFRI, in collaboration with ICAR-CIFT, develop a comprehensive mesopelagic fisheries programme that integrates both harvest and post-harvest technologies. This initiative should aim to provide technical support and capacity-building for fishermen, enabling them to undertake deep-sea resource exploration in a scientifically informed and economically viable manner.
2. Awareness campaigns on ETP species: Conduct region-specific awareness campaigns on ETP species identification, ecology, and legal protection, targeting fishers and coastal communities. A collaborative framework involving fisheries departments, research bodies, and enforcement agencies should be established to ensure coordinated conservation, promote responsible fishing, and support sustainable marine biodiversity management.
3. Incentives to Fishers for releasing ETP species caught accidentally: A decision was made to form a committee to explore providing incentives to fishers, similar to the support extended by the Maharashtra Government, for those who lose their fishing gear while safely releasing accidentally caught Endangered, Threatened, and Protected (ETP) species.

The programme concluded with a Vote of Thanks delivered by Dr. K.M. Rajesh, Principal Scientist at the Mangalore Regional Centre. He expressed sincere gratitude to all participants, resource persons, and organizers for their significant contributions towards the successful conduct of the workshop. The event concluded with the rendition of the National Anthem.



A regional workshop held in Mangaluru to raise awareness about deep-sea resource exploration and the conservation of Endangered, Threatened, and Protected (ETP) species highlighted the need for exploring India's vast and largely unexploited deep sea resources. The event was a collaborative effort of the Mangalore Regional Centre of ICAR-CMFRI, the Department of Fisheries, Government of Karnataka, and Small Pelagic Purse Seine Fisheries: Karnataka State FIP.

Shri. Dinesh Kumar Kaller, Director of Fisheries, Government of Karnataka, inaugurated the workshop. Dr. Grinson George, Director of ICAR-CMFRI, delivered the presidential address, highlighting the importance of training and equipping traditional fishermen for deep-sea fishing. The workshop featured a panel discussion with fishermen, offering them a platform to voice their concerns and practical challenges. Scientists and experts addressed their queries ensuring a two-way dialogue between researchers and the fishing community.

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