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Proceedings of the
National Stakeholder Consultation for Finalization of

National Plan of Action for Conservation and Management of Sharks in India (NPOA-Sharks-India)

Proceedings of the
National Stakeholder Consultation for Finalization of

National Plan of Action for Conservation and Management of Shark Fishery in India

(NPOA-Sharks-India)

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

National Board of Fisheries Development
(NFDB), Hyderabad

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The technical presentations made during the National Stakeholder Consultation and the images of the event are available at: https://shorturl.at/aktEF.

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Preface

The " Proceedings of the National Stakeholder Consultation for Finalization of National Plan of Action for Conservation and Management of Shark Fishery in India (NPOA-Sharks-India)" showcases a pivotal step in India's commitment to sustaining marine biodiversity and meeting its obligations under several significant international agreements. Developed through the collaborative efforts of the Government of India through its line agencies and the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), this document embodies a comprehensive strategy aimed at the conservation of sharks—collectively referring to true sharks, rays, and chimeras. These species, vital as apex predators in marine ecosystems, are currently facing critical threats from overexploitation and habitat degradation. It is also a testament of the concerted efforts of government agencies, non-governmental organizations, academic institutions, and the fishing communities themselves, all united in their commitment to sustainable shark management.

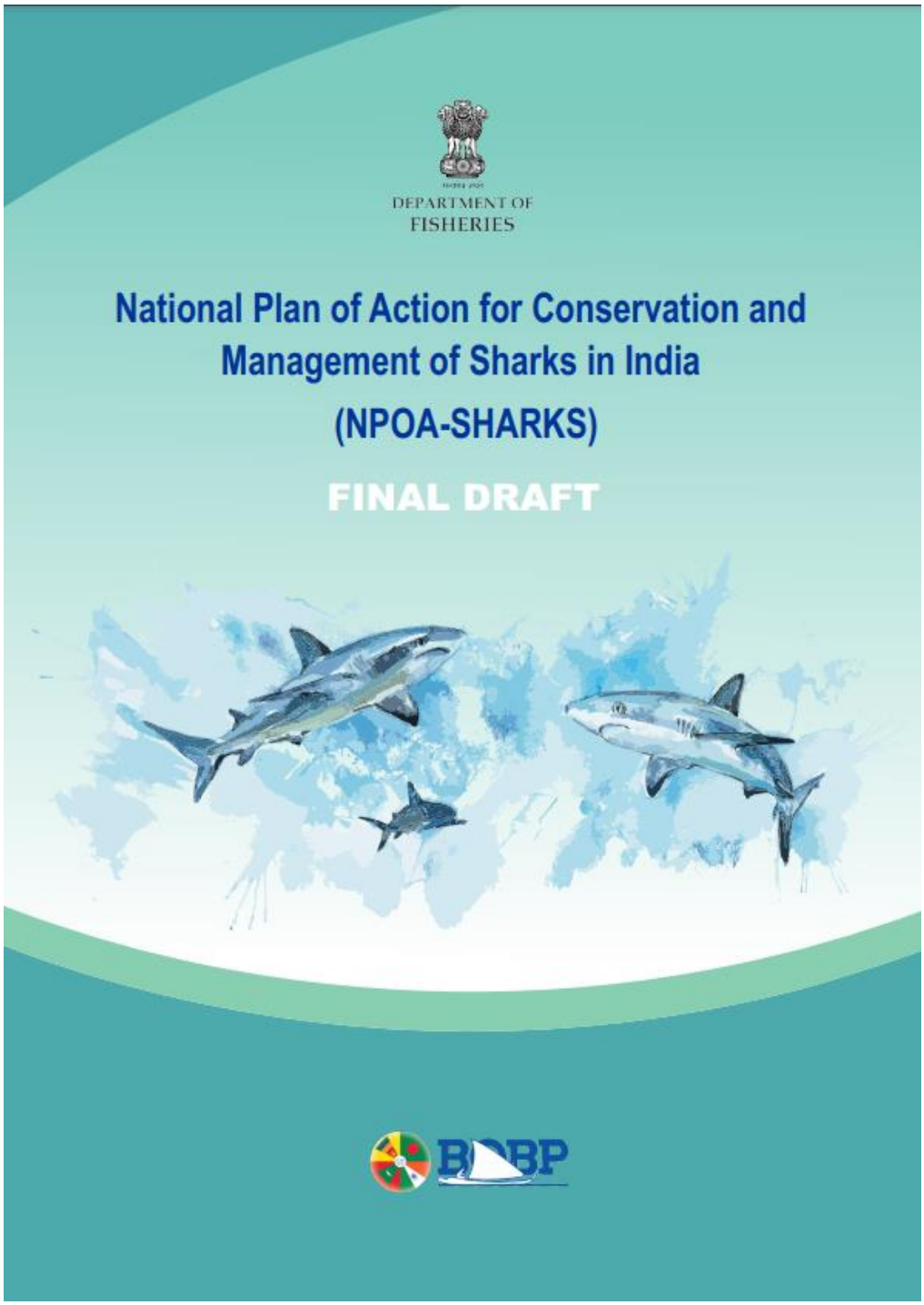
In aligning with the Food and Agriculture Organisation's (FAO) International Plan of Action for the Conservation and Management of Sharks (IPOA–SHARKS), the National Plan of Action on conservation and Management of Sharks (NPOA-SHARKS) underscores India's proactive role in global sustainable fisheries. The NPOA also aligns with pivotal international frameworks, including the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the United Nations Fish Stocks Agreement (UNFSA), and the Convention on Migratory Species (CMS). These commitments collectively enhance India's efforts to regulate trade and ensure the sustainable use of marine species. Furthermore, the NPOA supports the goals of the United Nations Sustainable Development Goals (SDGs), especially Goal 14, which advocates for the conservation and sustainable use of oceans, seas, and marine resources, affirming India's dedication to safeguarding its marine biodiversity.

Preparing the NPOA-SHARKS was complex due to several challenges such as institutional capacity, livelihood concerns, and the effects of climate change. To tackle these issues effectively, the development of the Plan was supported by detailed consultations with many different stakeholders, gathering a wide range of opinions and expertise. These interactions have enriched the plan with a diverse array of insights, ensuring that the proposed approach institutionalize a robust framework for action, integrating legal, scientific, and community-based strategies to effectively manage and protect shark populations.

This strategic document would serve as the foundation for sustainable production techniques that safeguard the long-term survival of shark populations and the people that rely on them. It emphasizes the importance of ongoing multi-stakeholder engagement and adaptive management solutions for overcoming possible implementation challenges. Moreover, the forward-thinking strategy taken in this plan aims to not only preserve the biological balance of marine ecosystems, but also to improve fisheries' economic sustainability, guaranteeing that future generations may inherit and profit from these precious natural resources. This comprehensive, inclusive strategy offers a sustainable future for India's marine habitats, cementing the country's position as a global leader in responsible marine resource management.

We extend our heartfelt thanks to all stakeholders who contributed their time, expertise, and insights throughout the development of this plan. Your valuable input has been instrumental in shaping a comprehensive and actionable strategy for shark conservation and management in India. We are deeply grateful for your dedication and continued support as we move towards implementing these strategies to ensure sustainable and prosperous marine ecosystems.

Dr. P. Krishnan
Director



The Final Draft of NPOA-Sharks which was discussed during the National Stakeholder Consultation

Executive Summary

The National Stakeholder Workshop

The National Stakeholder Consultation for Finalization of National Plan of Action for Conservation and Management of Shark Fishery in India (NPOA-Sharks-India) was conducted on 19th February 2024 in Kochi, India. It marks the successful completion of an extensive development process for the conservation and management of shark fisheries in India, the foundations of which were laid in 2008.

A total of 44 key stakeholders were present, including government officials from the Department of Fisheries at both the national and state levels, as well as representatives from various coastal states and Union Territories. Additionally, the event was attended by scientists from national institutes and experts from non-governmental organizations (NGOs) and regional organizations, emphasizing a broad interdisciplinary and intersectoral collaboration.

The key output of the consultation is the finalization of the NPOA-Sharks-India. The workshop facilitated a robust exchange of ideas across four thematic sessions, each focusing on critical aspects of shark conservation and management. The Research and Development session underscored the necessity for improved taxonomic clarity, detailed habitat mapping, and comprehensive age and growth studies, which are vital for crafting effective management strategies. In the Socioeconomics and Trade session, stakeholders stressed the importance of addressing socio-economic disparities, refining trade regulations, and bolstering livelihood opportunities through sustainable practices. The Monitoring and Reporting session saw participants advocating for stronger monitoring, control, and surveillance systems to ensure adherence to conservation measures. Finally, the Capacity Building session highlighted a unanimous agreement on the urgent need to enhance capacity in species identification, understanding legal frameworks, and implementing sustainable management practices.

The Feedback on the NPOA-Shark presented in the national stakeholder workshop was overwhelmingly positive, with stakeholders endorsing the plan and offering valuable insights for its enhancement. Key recommendations included the improvement of data collection methods through standardized approaches and increased allocation of resources. There was consensus on the importance of evaluating the implementation of e-logbooks before adoption. Stakeholders emphasized the necessity of coordination among maritime state departments and called for enhanced capacity building in species identification, particularly among Forest Department officials. Additionally, there was a strong push for habitat mapping to aid conservation efforts and the utilization of traditional knowledge from fishermen. Co-management was recognized as an essential tool for sustainable shark fisheries, alongside the adoption of robust monitoring, control, and surveillance measures throughout fishing activities. Overall, stakeholders demonstrated a commitment to sustainable shark management and conservation in India through their active participation and valuable feedback.

NPOA-Sharks-India

India's marine waters is home to an estimated 169 elasmobranch species from 91 genera, categorized under 43 families. The NPOA-Shark is proposed as a comprehensive strategy in response to the global and national challenges faced by shark populations. The document is designed to ensure the conservation and sustainable management of sharks within India's maritime zones, as well as for species that migrate through the Indian Exclusive Economic Zone (EEZ) or are captured by Indian-flagged vessels in international waters. The plan addresses critical issues such as the decline in shark

biomass, the need for improved monitoring, control, and surveillance, gaps in data collection and species identification, the establishment of agreed conservation measures, and a comprehensive framework for these actions. This initiative aligns with the ecosystem approach to fisheries management (EAFM), which is central to the National Policy on Marine Fisheries (NPMF) of 2017.

Development of the NPOA-sharks was characterized by an inclusive and extensive stakeholder engagement process, ensuring a diverse range of perspectives were considered. Consultations were held across all maritime states, involving: (i) Government agencies, (ii) Non-governmental organizations, (iii) Academic and research institutions, and (iv) Fishing communities and industry representatives. The BOBP-IGO coordinated the process with extensive supports from the full range of stakeholders. The engagement process was crucial in building consensus and ownership among stakeholders, fostering a cooperative approach to the plan's implementation.

The NPOA-Sharks is structured around several strategic pillars, each addressing key aspects of conservation and management including:

- **Legal and Regulatory Enhancements:**
    - Revision of existing laws and introduction of new regulations to provide a robust legal framework for shark conservation.
    - Specific measures include the prohibition of shark finning, establishment of shark sanctuaries, and the regulation of trade in shark products.
- **Data Collection and Monitoring**
    - Strengthening of data collection networks to ensure accurate and comprehensive data on shark populations and fisheries.
    - Implementation of monitoring programs to assess the effectiveness of the management measures and compliance with regulations.
- **Research and Development**
    - Support for scientific research to address knowledge gaps in shark biology, ecology, and fisheries impact.
    - Promotion of research initiatives aimed at developing sustainable fishing technologies and practices.
- **Community Engagement and Livelihoods**
    - Initiatives to involve local communities in conservation efforts, including education and awareness programs.
    - Development of alternative livelihood programs to reduce dependency on shark fisheries.
- **Capacity Building**
    - Training programs for fisheries managers, enforcement officials, and community leaders to enhance their capabilities in managing and conserving shark populations.
    - Establishment of a national shark research and conservation centre as a hub for training, research, and policy development.

Implementation Strategy

The implementation of the NPOA-Sharks is envisioned through a phased approach:

- Short-term Actions (1-2 years): Focus on legal reforms, establishment of monitoring systems, and initiation of pilot projects for community engagement.
- Medium-term Actions (3-5 years): Expansion of research programs, scaling up of successful pilot projects, and strengthening of international collaboration.

- Long-term Actions (5 years and beyond): Continual assessment and adaptation of strategies based on scientific evidence and stakeholder feedback, aiming for the sustainable management of shark populations.

The NPOA-Sharks advocates for the ecosystem approach to fisheries (EAF) and adopts a precautionary approach to manage shark populations responsibly, particularly given the limited data on various shark species. Management actions include sustainable harvesting strategies, protection of critical habitats, and the development of effective consultation frameworks involving all stakeholders.

The final draft NPOA-Shark is submitted to the Government of India for its consideration and further action.

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DEPARTMENT OF FISHERIES
Stakeholder Consultation on

Proceedings of the National Stakeholder Consultation

1. Introduction

Sharks, comprising true sharks, rays, guitarfishes, skates, sawfishes and chimaeras (chondrichthyans), are traditionally caught in India. *At the national level, India harvested about* 1,08,000 tonnes of sharks in 2021 *(Source: Handbook of Fisheries Statistics, 2022; Government of India).* Trawls, drift gillnets, longlines and hooks & lines contribute about 95% to the shark landings. Although India is a major player in the exploitation of sharks, it remains a minor player in shark export. The total value of export of shark products is US$ 8.30 million.

Recent reports put the number of shark species occurring in the EEZ of India at 169 from 91 genera *(Source: ICAR-CMFRI)*. It includes 88 species of true sharks from 49 genera; 46 species of rays from 23 genera; and 9 species of guitarfishes from 3 genera. Sharks are particularly vulnerable to over-exploitation because of their life-history traits characterized by slow growth, late attainment of sexual maturity, long life span and low fecundity. Of the 169 species, 63% of sharks are under IUCN Red List categories of 'critically endangered', 'endangered' and 'vulnerable' species.

To conserve the shark species, the Ministry of Environment, Forest and Climate Change, Government of India placed 10 species under Schedule 1 (Part IIA) of the Indian Wildlife (Protection) Act, 1972, and the list was updated to 18 species in 2023. In 2013, India prohibited shark finning at sea and also prohibited the export and import of shark fins.

Expanding global catches of sharks and potential negative impacts on shark populations prompted the Food and Agriculture Organisation of the United Nations (FAO) to develop the International Plan of Action for Conservation and Management of Sharks (IPOA-Sharks) in 1998. The objective of the IPOA-SHARKS is to ensure the conservation and management of sharks and their long-term sustainable use. States should adopt and implement a National Plan of Action for Conservation and Management of Shark Stocks (NPOA-Sharks) if their vessels conduct directed fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries.

The International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks), developed by the Food and Agriculture Organization of the United Nations (FAO) in 1999, was a response to growing global concerns over declining shark populations. The Shark Plans are voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d). Prompted by overexploitation and the high demand for shark products, this voluntary initiative aimed to encourage nations to adopt National Plans of Action (NPOAs) for sustainable shark management.

2. Objectives and Agenda of the Workshop

The Stakeholder Consultation Workshop for Finalization of the National Plan of Action for Conservation and Management of Sharks in India was held in Hotel Crowne Plaza, Kochi on 19 February 2024. The Workshop was jointly organized by the Bay of Bengal Programme Inter Governmental Organization (BOBP-IGO) and National Fisheries Development Board (NFDB) on behalf of the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.

The objective of the terminal stakeholder consultation workshop was to finalize the NPOA-Shark document for its adoption by the Government of India.

The Workshop was conducted in 4 Sessions. It commenced with a preparatory session where participants discussed the global context of shark management. Session II (Opening Session) of the workshop focused on the National Plan of Action for Sharks in India, beginning with context setting and the importance of the NPOA. This was followed by a detailed presentation on the conservation and management initiatives in India, highlighting practical efforts and ongoing projects. Subsequently, a discussion on the government's policy towards sustainable management of shark fisheries underscored the necessity for the NPOA to align with national sustainability goals. The session concluded with an overview of the planned activities under the NPOA, mapping out strategic actions intended to address various aspects of shark conservation and management. This session was followed by focused breakout group discussions on specific thematic areas: Research & Development, Socioeconomics & Trade, Monitoring & Reporting, and Capacity-building Needs & Strategies. The core of the workshop, the strategizing session, involved synthesizing these discussions into a cohesive strategy, followed by presentations from each group to share findings and recommendations. The event concluded with a closing session that summarized the outcomes and outlined the future steps for the implementation of the plan. The Agenda of the Workshop is placed in Annex I.

A total of 42 key stakeholders representing government and non-government organisations, research and academic institutions, and fisher associations participated in the Workshop. The list of participants is placed in Annex II.

3. Preparation of DRAFT NPOA-Sharks

The NPOA-Sharks for India has been developed through an extensive consultative process spanning over 15 years, wherein the BOBP IGO, played a pivotal role. A brief on the activities undertaken towards the development of the Draft NPOA-Sharks and the critical role played by BOBP-IGO is summarized in Annex III.

Based on the extensive information collected from various sources and extensive stakeholder consultations, a comprehensive draft document was submitted by the BOBP-IGO to the Department of Fisheries, Government of India in December 2015. The DoF posted the draft NPOA-Sharks on the website of the Ministry and further comments and suggestions were received from the stakeholders.

A series of national development since 2015 necessitated the revision of the document apart from updation of facts and figures in the light of the latest scientific research. These include notification of the National Policy on Marine Fisheries in 2017 and constitution of the Department of Fisheries carving out Fishery Division from the erstwhile Department of Animal Husbandry, Dairying and Fisheries vide Cabinet Secretariat's Notification F.No.1/21/21/2018-Cab dated 05.02.2019.

Subsequently, in 2023, following a detailed review by the ICAR-CMFRI of the NPOA-Shark at the behest of the Department of Fisheries, BOBP-IGO and ICAR-CMFRI worked together to update the NPOA-Shark. The Department of Fisheries commissioned BOBP-IGO to plan and conduct a National Stakeholder Consultation to present the revised draft and finalize the Draft NPOA-Sharks for India which was the present workshop.

4. Deliberations

4.1. Preparatory Session: Status of Shark Fishery

In the Preparatory Session, Dr. Sanjay Pandey, Deputy commissioner, Department of Fisheries, Government of India briefed the participants about the initiatives taken by the DoF, Govt of India on the development of the fisheries sector in the country in the last few years. He informed the details on 'Sagar Parikrama' initiatives in which Shri Parshottam Rupala, Hon'ble Minister, Ministry of Fisheries, Animal Husbandry & Dairying, Govt of India travelled widely and discussed with a large number of stakeholders including fishermen along the entire coast of India. He also screened a video film on the recent activities of the DoF.

Dr. Kim Friedman, Senior Fishery Resources Officer, FAO, Rome made an online presentation "Management of Sharks: Global Perspective". He provided a broad perspective on how the IPOA for sharks developed and its outlook for the future. While there is a push to say that global fisheries are unsustainable, there is a need for positive narratives for fishery contributions. It is important to decide on the next investment in policy that will lead to implementation. It is also important to work with fishing communities and raise awareness of the status of fish stocks and market behavior to consolidate improvements. He highlighted how conservation and management are making and measuring progress and the challenges inherent in this process due to the extensive value chain. This can only be ensured if we have the right statistics to report not just by shark groups but by species to pinpoint needs that require funding to put in place appropriate measures. Tools and guidance must be upgraded to the right format and languages to work on management, stock assessment, ongoing fishery effort, information on species ID and trade, food security, and livelihood materials. It is important to improve what we understand about sharks and make sure that the documentation is useful for people on the ground. He emphasized that the NPOA process should make sure that objectives are specific and measurable, and that recommendations are time-bound.

Following Dr. Friedman's presentation, Dr. Shoba J. Kizhakudan, Principal Scientist, ICAR-CMFRI delivered a talk "Status of Shark Fisheries in India". She narrated the volume of landings of elasmobranchs, the contribution by different craft and gear, species diversity, and biological characteristics. Salient characteristics of the elasmobranch fisheries are: (i) Most of them are bycatch of other fish groups (such as from trawls); however, targeted seasonal fishing occurs in a few locations, and fishery for larger sharks is operated by longliners. (ii) In general, sharks are constituents of multi-gear, multi-species fisheries, making it difficult to arrive at specific management plans. (iii) The landed catch is fully utilized, and finning on the boat is not practiced. She also cautioned about the large amounts of individuals being caught before attaining size-at-first maturity which will have a negative impact on the population. Identification of shark species is complex and there is a need for capacity building at various levels. She outlined the conservation measures undertaken by the government. She emphasized the need for awareness raising on shark conservation among the stakeholders and integration of research with management and enforcement.

After the presentations, the participants interacted on multiple aspects related to shark fishery. The major views of the participants were:

(i) The data collection method needs to be improved by following coordinated, standard methodologies and strengthening staff and finance allocation.

(ii) GoI is planning the implementation of e-log book. The benefits, disadvantages, and issues of introducing an e-log book need to be discussed and evaluated for arriving at decisions.

(iii) Coordination of maritime state departments is essential for shark conservation.

(iv) Capacity building of species identification to Forest Department officials is needed.

(v) Mapping of shark congregation habitat and seasons of juvenile abundance is required.

(vi) Traditional knowledge of fishermen in the fishery is to be utilised.

(vii) A status report on all major species is required for the preparation of the IUCN Red List at the national level.

(viii) Co-management of the fishery is an important tool for sustainable shark fishery.

(ix) MCS should be adopted before, during, and post-fishing.

(x) Complying with international obligations is mandatory; at least 6 resolutions of IOTC on shark fishery are binding on India.

4.2. Opening Session: NPOA Shark -India

Dr. Sanjay Pandey, Deputy Commissioner, Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India welcomed the participants. He outlined the importance of preparation of NPOA-Sharks and the initiatives taken by the Department to prepare the Plan.

Dr. P. Krishnan, Director, Bay of Bengal Programme Inter-Governmental Organisation presented the context to the Workshop. He stated that preparation of NPOA-Sharks is necessitated because the sharks are vulnerable and they need to be managed from increasing fishing pressure, and other anthropogenic impacts. Sharks are important ecologically as well as for the livelihood of dependent communities. In 1999, FAO called for preparing and notifying NPOA-Sharks by shark fishing nations. Since then, more than 60 countries have adopted NPOA-Sharks and 54 countries are partners in RPOA-Sharks. While India has provided legal protection by way of a ban on fishing of 18 species of sharks and shark finning, preparation and notification of NPOA-Sharks are necessary for the effective management of this important group. Dr. Krishnan highlighted the role played by the BOBP-IGO in the preparation of NPOA-Sharks for India.

Dr. A. Gopalakrishnan, Director, ICAR-Central Marine Fisheries Research Institute briefed the participants about the research undertaken by the CMFRI on sharks. The Institute has been carrying out research on elasmobranch fisheries and biology since its inception in 1947. Several research articles have been published by the Institute on elasmobranch resources from Indian waters including new reports, taxonomic re-descriptions, DNA bar-coding, biology and stock assessment. A major output was the publication of “Guidance on National Plan of Action for Sharks in India” which provided a framework for developing an NPOA for Sharks in India. Several stakeholder meetings and awareness campaigns on elasmobranch conservation in all the maritime states, has resulted in the increasing instances of live release of accidentally- caught protected species such as the whale shark.

After these presentations, Ms Neetu Kumari Prasad, IAS, Joint Secretary, Dept of Fisheries, Government of India delivered the Address, “Government of India's Policy Towards

Sustainable Management of Shark Fishery in India and Need for NPOA-Sharks". She said that any Policy/Plan should have the following 5 key ingredients, which are essential for the NPOA Sharks as well.

(i) Easily implementable: Use of simple measures that can be implemented by making use of technology such as mobile phones, AI, etc;

(ii) Enforceable: Good enforcement measures at various levels should be in place;

(iii) Data collection and analysis: For scientific decision-making, good quality datasets are important, and the institutions need to synchronize the data collection process;

(iv) Awareness & Capacity building: Identify areas that need attention on awareness of fishermen and capacity building of trainers.

(v) Milestones, indicators, and monitoring the progress are important components of the Policy/Plan.

After the Jt. Secretary's address, Dr. E. Vivekanandan, BOBLME International Consultant, BOBP-IGO, presented the Plan of Activities of the NPOA-Sharks. He stated that it is an umbrella document with an operational plan. However, the Plan needs to be customized to develop specific management plans for given situations. It is stakeholder-centric with emphasis on ecological well-being and human well-being facilitated by good governance at its core.

An implementation framework with a description of the activity, agencies responsible for implementation, indicators of progress, associated actions, and approximate cost of implementation are also given in the document, he said.

4.3. Strategizing Session: Adoption of NPOA Sharks

In the Strategizing Session, the participants were divided into 4 break-out groups for discussion on NPOA-Sharks.

Discussion points for the breakout groups	
Group 1. Research & Development - Gaps in knowledge - Addressing the gaps - Linking management plans and development	*Group 2. Socioeconomics & Trade* - Identifying inequalities - Measures to reduce inequalities - Enhancing livelihood by improving trade
Group 3. Monitoring & Reporting - Improving MCS mechanism - Finding ways for compliance to MCS - Improving data reporting mechanism	*Group 4. Capacity building needs & strategies* - What capacity to be improved; to whom? - Strategies to improve capacity - Monitoring & Evaluating training outputs.

The participants in each group were engaged in intense discussion and the outputs were presented by a representative from each group, which are summarised below.

<u>Group 1. Research and Development:</u>

(i) Taxonomic ambiguity in species identification to be resolved;

(ii) Habitats of major species to be mapped;

(iii) Age and growth studies to be undertaken and applied for stock assessment and identifying vulnerable species;

(iv) Longline gear to be modified to exclude juveniles;

(v) Value-added shark meat, and by-products from sharks to be developed; and

(vi) Research results on temporal and seasonal closures, vulnerable and resilient species, zonal licensing, and periodic assessment of ETP species to be informed to managers.

Group 2. Socioeconomics & Trade:

(i) Financial support to be extended to the fishermen to compensate for the loss due to fishing ban;

(ii) IUU fishing needs to be regulated within the EEZ; destructive fishing gear to be effectively banned;

(iii) Discrimination between owners and fishermen and gender inequalities to be addressed;

(iv) Awareness programmes on sharks to be conducted at the species level in local languages;

(v) Fishermen to be given incentives for sustainability practices such as avoiding bycatch and juvenile exploitation;

(vi) Habitat map to be prepared with the fishermen community;

(vii) Import and export to be regulated;

(viii) Value chain to be improved;

(ix) New markets to be developed for shark products;

(x) Socio-economic status of fishing communities to be analysed for upliftment;

(xi) MFRA needs to be amended; and

(xii) Alternate livelihood of shark fishers to be promoted;

Group 3. Monitoring & Reporting:

(i) MCS to be implemented effectively by constituting a task force with members from State and Central Govt. agencies, and empowered with proper infrastructure, training, and delegated legal powers;

(ii) Legal provisions like Wildlife Protection Act to be implemented effectively;

(iii) Strong networking between fishers, traders, and government and non-government organisations to be established;

(iv) Compliance with respect to provisions on fishing craft & gear; fishing grounds and boundaries, resource exploitation and supply chain to be ensured;

(v) Data reporting mechanism to be improved by introducing user-friendly e-platforms to all stakeholders to facilitate transparent and voluntary data reporting; and

(vi) Data collection, analysis, and reporting to be improved through a single central agency.

Group 4. Capacity Building Needs and Strategies

(i) Actors in the shark value chain to be mapped and their training needs assessed;

(ii) Fishermen, women, fisher associations, non-governmental organisations, and traders to be trained in (a) Identification of shark species; (b) legal/regulatory frameworks; (c) sustainable management of stocks and their habitat conservations; and (d) value addition of shark products;

(iii) Staff of DoF and other management agencies to be trained in (a) shark species identification; (b) co-management/co-learning on the importance of working with and mobilising fishers' participation; (c) identification of shark habitats, breeding grounds, catch trends, implementation of management plans, etc; and (d) MCS; (e) learning from success stories;

(iv) Fishers-led/ fishers-inclusive process that includes co-production of knowledge, co-learning, and cooperative management to be encouraged through co-management;

(v) Volunteer-driven citizen science to be leveraged;

(vi) User-friendly, illustrated, and multi-lingual (in local languages) knowledge products/ training materials to be produced;

(vii) Targeted advertisements and campaigns to be initiated for shark conservation;

(viii) Social audit/impact audit of the training and capacity building to be integrated into the

(ix) capacity building programs; and

(x) International/regional conservation-based NGOs and Volunteers groups to be involved in the training programs.

The technical presentations made during the earlier sessions and presentations by the break-out groups can be downloaded from the following link: https://shorturl.at/aktEF.

5. Closing Session: Adoption and Way Forward

The BOBP-IGO and NFDB drafting team integrated all the inputs provided by the stakeholders during the National Consultation and finalized the Final Draft of the NPAO Sharks for India (Annex IV).

The NPOA-Sharks seeks to address the following issues in order to ensure their conservation and sustainable management.

(i) Arresting decline in shark biomass;

(ii) Improving monitoring, control and surveillance, narrowing the gaps in data collection and updating the skill in identification of species;

(iii) Setting the stage for agreed conservation measures;

(iv) Identifying research needs; and

(v) Setting a holistic framework to address all conservation issues.

The NPOA-Sharks-India is a comprehensive document providing most of the relevant information to the practitioners of marine fisheries in general, and of shark fisheries, in particular in the country. It provides wholesome coverage of the issues concerning the plan of action. It is an umbrella document with an operational plan. However, the plan needs to be

customized to develop specific management plans for given situations. It is stakeholder-centric with ecological well-being and human well-being facilitated by good governance at its core. It provides plan of action for 8 thematic areas, namely,

(i) Legal, institutional and management framework requirements;

(ii) Human resources and capacity building requirements;

(iii) Data collection and management requirements;

(iv) Scientific research requirements;

(v) Options for regulating fishing;

(vi) Encouraging full utilization of dead sharks;

(vii) Biodiversity and ecological considerations; and

(viii) Building regional cooperation.

An implementation framework with activity details, agencies responsible for implementation, indicators of progress, associated actions and approximate cost of implementation are also given in the document.

Dr. P Krishnan, Director, BOBP-IGO summarized the events and stated that the Workshop has fulfilled its objective and the stakeholders have endorsed the need for early adoption of the NPOA-Sharks by the Government. All the participants actively participated and engaged in the discussion. The inputs from the participants were very useful and the BOBP-IGO will incorporate the suggestions into the document and submit it to the Government of India for adoption.

Dr. Sanjay Pandey, Deputy Commissioner, DoF, Govt of India said that the DoF will take necessary steps for adopting the NPOA-Sharks document in its final form after it is received from the BOBP-IGO.

6. Epilogue

The report of the Stakeholder Consultation Workshop for Finalization of the National Plan of Action for Conservation and Management of Sharks in India and the final draft NPOA-Shark are submitted for consideration and further action of the Government of India.

Annex I

BOBP

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DEPARTMENT OF
FISHERIES

NFDB
National Fisheries
Development Board
Department of Fisheries
Government of India

Stakeholder Consultation on

National Plan of Action for Conservation and Management of Sharks in India (NPOA-Sharks, India)

19 Feb 2024 | Kochi, India

Provisional Agenda

0900 - 0930
Registration

Session I:
Preparatory Session: Status of Shark Fishery

0930 - 0940
Self-Introduction of Participants

0940 - 1000
Management of Sharks: Global Perspective
Dr. Kim Friedman
Sr. Fishery Resources Officer, FAO, Rome

1000 - 1020
Status of Shark Fishery in India
Dr. Shoba Joe Kizhakudan
Principal Scientist & Head FFD, ICAR-CMFRI

1020 - 1045
Status of Shark Fishery: Issues, Practices and Challenges toward conservation
Perspective from practitioners

1045 - 1115
Group Photo & Hi Tea

Session II:
Opening Session: NPOA Shark -India

1115 - 1125
Setting the Context
Dr. P. Krishnan
Director, BOBP-IGO

1125 - 1140
Shark Conservation and Management - Initiatives by CMFRI
Dr. A. Gopalakrishnan
Director, ICAR-CMFRI

1140 - 1155
Government of India's Policy Towards Sustainable Management of Shark Fishery in India and Need for NPOA-Sharks
Ms. Neetu Kumari Prasad, IAS,
Joint Secretary, DoF, GoI

1155 - 1225
NPOA-Shark: Plan of Activities
Dr. E. Vivekanandan
Senior Scientific Consultant, BOBP-IGO

1225 - 1230
Introduction to Breakout Sessions
BOBP-IGO

NPOA-Sharks is India's major step towards ensuring the sustainability of the ecological and economic services of the sharks and their fishery.

Session III:
Strategizing Session: Adoption of NPOA Sharks

1230 - 1300
Breakout discussion on NPOA Shark

- Research & Development
- Socioeconomics & Trade
- Monitoring & Reporting
- Capacity-building Needs & Strategies

Breakout groups

1300 - 1400
Lunch

1400 - 1500
Strategizing Session Continues…

1500 - 1530
Presentation by breakout groups Participants

1530 - 1600
Refreshments

Session IV:
Closing Session: Adoption and Way Forward

1600 - 1615
Workshop Summary – Finalization & Adoption of NPOA-Shark
Dr. P. Krishnan
Director, BOBP-IGO

1615 - 1625
Way Forward & Closing Remarks
Mr. Sanjay Pandey
DC (Fy), DoF, GoI

1625 - 1630
Vote of Thanks
Mr. P Pradeep Kumar
ED, NFDB

Annex II

List of Participants

	Government of India	
1.	Neetu Kumari Prasad, IAS	Joint Secretary (Marine Fisheries), DoF, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India
2.	Sanjay Pandey	Deputy Commissioner (Fisheries), DoF, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India
3.	H.D. Pradeep	Sr. Fisheries Scientist, Fishery Survey of India, Goa Base
4.	G.V.A. Prasad	Jr. Fisheries Scientist, Fishery Survey of India, Visakhapatnam Base, Andhra Pradesh
5.	Hans Raj Bhagat	Regional Fisheries & Environment Officer, Commander Coast Guard Region (East), Indian Coast Guard
6.	Johnson D'Cruz	Deputy Director, Regional Division, Marine Products Export Development Authority, Kerala
	Coastal provinces and Union Territories	
7.	V.V.R. Babu	Assistant Director of Fisheries, Department of Fisheries, Government of Andhra Pradesh
8.	Preetam Naik	Superintendent of Fisheries, Directorate of Fisheries, Government of Goa
9.	Varsha Naik Dessai	Superintendent of Fisheries, Directorate of Fisheries, Government of Goa
10.	Abhay Deshpande	Regional Deputy Commissioner of Fisheries, Konkan Region, Department of Fisheries, Government of Goa
11.	K.R. Patani	Deputy Director of Fisheries, Government of Gujarat
12.	S. Mahesh	Joint Director Fisheries, Department of Fisheries, Government of Kerala
13.	K. Ganesh	Managing Director, Karnataka Fisheries Development Corporation Ltd. Karnataka
14.	R. Mini	Chief Veterinary Officer, Animal Husbandry Dept. Kerala
15.	T. Jafer Hisham	Assistant Director of Fisheries, Directorate of Fisheries, Lakshadweep Administration, UT of Lakshadweep
16.	M. Chinnakuppan	Deputy Director, Department of Fisheries and Fishermen Welfare (Regional), Kanyakumari, Government of Tamil Nadu
17.	K. Deivasigamani	Joint Director of Fisheries, Department of Fisheries and Fisherman Welfare, Government of Puducherry
	National Institutes	
18.	A. Gopalakrishnan	Director, ICAR-Central Marine Fisheries Research Institute, Kerala
19.	Shoba Joe Kizhhakudan	Principal Scientist & Head, FFD, ICAR-Central Marine Fisheries Research Institute, Kerala

20.	Sujitha Thomas	Principal Scientist & Head, Mangalore RC of ICAR-Central Marine Fisheries Research Institute
21.	J. Jayasankar	Principal Scientist & Head, FRAEED, ICAR-Central Marine Fisheries Research Institute
22.	P.S. Ananthan	Principal Scientist, ICAR-Central Institute of Fisheries Education
23.	M. Habibullah	Director, Central Institute of Fisheries Nautical and Engineering Training, Kerala
24.	M. Neelakandan	Chief Instructor (Fishing Technology), Central Institute of Fisheries Nautical and Engineering Training
25.	K.R. Sreelakshmi	Scientist, Fish Processing Division, ICAR-Central Institute of Fisheries Technology, Kerala
26.	K.M. Sandhya	Scientist, Fishing Technology Division, ICAR-Central Institute of Fisheries Technology
27.	C.S. Shine Kumar	Director, National Institute of Fisheries Post Harvest Technology and Training, Kerala
28.	K. Kamal Raj	National Institute of Fisheries Post Harvest Technology and Training, Kochi
29.	Madhivanan	Wildlife Inspector, Wildlife Crime Control Bureau
30.	Chinmaya Ghanekar	Scientist-C, Wildlife Institute of India
	NGOs/Regional Organisations/Experts	
31.	C.M. Muralidharan	Regional Coordinator, ISLME Project
32.	Archana Chatterjee	Project Manager, International Union for Conservation of Nature
33.	Vinod Malayilethu	Associate Director, Marine Conservation Programmes, WWF-India
34.	N. Venugopalan	Programme Manager, International Collective in Support of Fishworkers
35.	Sunil Mohammed	Chair, Sustainable Seafood Network of India
36.	Vincent Jain	Deputy Chief Executive, South Indian Federation of Fishermen Societies
37.	Arjili Dasu	General Secretary, District Fishermen's Youth Welfare Association
38.	Susanth Mallya	Sea Food Exporters, Kochi
	Organisers	
39.	P. Krishnan	Director, Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), Chennai
40.	E. Vivekanandan	International Consultant, BOBP-IGO
41.	M. Krishna Mohan	Information Assistant, BOBP-IGO
42.	Sakshi Venkateswaran	Research Assistant, BOBP-IGO
43.	Pradeep Kumar	Executive Director, National Fisheries Development Board
44.	J. Deepa Suman	Sr. Executive, National Fisheries Development Board

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Annex III

NPOA-Shark: Development Process & Role of BOBP-IGO

The BOBP-IGO, which started as a FAO programme in 1979 was long involved in promotion of the FAO-CCRF. Upon its institutionalization as a regional fisheries advisory body (RFAB) in 2003, the Organisation was entrusted with promoting responsible fisheries in the region. The key initiatives initiated during this period by the Organisation include: (i) call for development of national and regional fisheries monitoring control and surveillance (MCS) measures; a regional training course on CCRF and regional action plan to conserve and manage important fisheries such as sharks and hilsa.

In 2007, the Governing Council of the BOBP-IGO approved the work program for sharks, requiring the organization to assist member countries in developing NPOA-Sharks and a Regional Plan of Action on Sharks (RPOA-Sharks). The initial work plan entailed compiling, collating, and disseminating scientific data on shark fisheries, studying and compiling the socioeconomics of shark fisheries in Bangladesh, India, Maldives, and Sri Lanka, and suggesting management options aimed at maintaining sustainable fisheries of sharks in the Bay of Bengal.

The First Regional Consultation on 'Preparation of Management Plan for Shark Fisheries' was convened in Beruwala, Sri Lanka from 24 – 26 March 2008. This was followed by the Second Regional Consultation in Kulhudhuffushi, Maldives from 9 -11 August 2009. At the Second Regional Consultation, the Bay of Bengal Large Marine Ecosystem Project (BOBLME) also joined the initiative, and suggested that the BOBLME Project could assist the BOBP-IGO member-countries, who were also members of the BOBLME, in areas such as capacity building, data collection, etc.

Following two regional consultations, the Central Marine Fisheries Research Institute (CMFRI) and the Fishery Survey of India (FSI) prepared the first status report on shark fisheries in India, identifying the state of knowledge, knowledge gaps, and management options for sustainable exploitation of sharks. The BOBP-IGO further engaged with shark fishing communities in India, such as the deep-sea fishermen operating from the Thoothoor area in the southernmost district of Kanyakumari in Tamil Nadu. The objective of this engagement, through the Association of Deep Sea Going Artisanal Fishermen (ADSGAF), was to raise awareness of sustainable exploitation of shark resources and move toward a consensus in the management of shark fisheries.

The BOBP-IGO, in cooperation with the Association of Deep Sea Going Artisanal Fishermen (ADSGAF), initiated the 'National Mission on Conservation of Sharks' involving representatives of the Department of Fisheries (DoF) of the State/UT Governments, academia, NGOs and Community-based Organizations (CBOs). The Mission organised consultations in all the nine coastal States, the outcomes of which contributed to the process of development of NPOA-Sharks. The timeline of activities is given in **Table 1** and the stakeholder consultations is given in **Table 2**.

Table 1: NPOA-Shark: Timeline

Year	Activity	Objective	Outcome/Goal Achieved
2007	Governing Council Directive (BOBP-IGO)	To initiate regional efforts for sustainable shark fisheries management.	Set the foundation for NPOA and regional collaboration.
2008	First Regional Consultation in Sri Lanka	To discuss initial strategies and gather input for the NPOA.	Informed the initial framework for national shark management plans.
2009	Second Regional Consultation in Maldives	To further refine strategies and incorporate broader regional insights.	Enhanced regional cooperation and strategy alignment.
2012	Signing of Letter of Agreement (BOBLME & BOBP-IGO)	To undertake socio-economic assessments and draft an initial NPOA for sharks.	Provided a structured approach to address socio-economic aspects of shark fisheries.
2015	Submission of Draft NPOA	To present a comprehensive plan for shark conservation to the Government of India.	Draft NPOA submitted for governmental review.
2015	Initiation of the Ocean Partnership Project	To focus on sustainable tuna fisheries while collecting data on sharks as an associated fishery.	Enhanced understanding of tuna and shark fisheries interactions.
2016-2018	Workshops and Stakeholder Meetings and continued Data Collection (Sharks and Tuna)	To engage stakeholders in discussions on sustainable practices and data findings.	Stakeholder buy-in and feedback on proposed management practices.
2017	***National Policy on Marine Fisheries notified***		
2018-2020	Improving Tuna Value Chain with NFDB	To evaluate the economic and ecological viability of tuna fisheries and scope of shifting effort from shark to tuna fisheries.	Developed potential alternatives for fishermen, reducing reliance on shark fisheries.
2019	***Department of Fisheries was established***		
2020	Communication from DoF on Meeting and Review	To coordinate further review and revision of the NPOA with governmental bodies.	Facilitated ongoing communication and preparation for final revisions.
2020-22	***COVID-19 Pandemic***		

2022	Comments and Revisions Requested by DoF from CMFRI	To refine the draft NPOA based on expert feedback from CMFRI.	Directed improvements and updates to the NPOA draft.
2023	Revised Draft Submission	To submit an updated draft of the NPOA incorporating all feedback from CMFRI and new data.	Prepared the draft for final review and consultation.
2024	Final Consultation and Submission for Adoption	To finalize and adopt the NPOA, integrating final stakeholder suggestions.	Final NPOA submitted for governmental adoption, marking the culmination of a 17-year process.

Table 2: List of stakeholder consultation under the NPOA-Shark initiative

Date & Venue	Meeting/Workshop/ Consultation	Outcome
24-26 March 2008, Beruwala, Sri Lanka	1st Regional Consultation on Sharks	National and regional statuses of shark fisheries were discussed. Needs identified.
9-11 August 2009, *Kulhudhuffushi*, Maldives	2nd Regional Consultation on Sharks	Roadmap for preparation of N/ROPA-Sharks developed. BOBLME joined the initiative.
1 October 2009, Thoothoor, Kanyakumari	Interaction with Association of Deep Sea Going Artisanal Fishermen (ADSGAF) No. of participants = 40	Fishermen informed that they were now seeking opportunities in tuna longlining and shark fishing was not the only source of livelihoods. However, it is shark fishing that brought them prosperity and they would like to continue fishing sharks.
June-August 2010, Chennai, Tamil Nadu	Interaction with shark traders No. of participants = 5 trading houses	Traders informed that shark fin trade was growing at a steady rate. The material was sourced from all around India, though the major share of the raw material came from Gujarat, Tamil Nadu and Andhra Pradesh.
14 July 2013, Thoothoor, Kanyakumari, Tamil Nadu	Interaction with Association of Deep Sea Going Artisanal Fishermen (ADSGAF) No. of participants = 45	Fishermen informed that they understand the need to conserve sharks. On pilot experiment of using shark identification guide prepared by IOTC, fishermen said actual picture of the species and local name could be more useful. In addition, some basic training in shark identification would be useful as fishermen liked rapid identification of sharks (spending least time in such activities). However, a formal logbook system could not be developed.

4-7 September 2013, Veraval, Gujarat	Stakeholder Interaction No. of participants = 60 (different meetings)	Fishermen informed that post fishing ban of whale shark, new fisheries were developed along the Gujarat coast and sharks are mostly coming as a by-catch. However, since considerable volumes of sharks were landed along the coast, post-harvest activities such as drying, shark in brine and finning were popular activities.
25th March 2014, Trivandrum, Kerala	First Meeting of the National Mission for Conservation of Sharks-India (NMCSI) No. of participants = 85	The Mission recommended the (i) need for improved data collection and analysis and targeted research and development. Research should not be the sole responsibility of the Government alone; independent researchers, NGO's and fishermen associations should also be involved in the process; (ii) review the existing conservation and management measures on sharks with support from community associations; (iii0 document best practices followed by other countries and customize it to meet the local needs; (iv) identify the gaps in existing conservation measures and improve it to increase shark population; (v) initiate focused education and awareness programmes and create awareness amongst community members; and (vi) improved coordination and consultation among all stakeholders, including merchants.
15 May 2014, Visakhapatnam, Andhra Pradesh	Meeting with members of the District Fishermen's Youth Welfare Association (DFYWA), Visakhapatnam and Department of Fisheries, Andhra Pradesh No. of participants = 54	The DFYWA members informed that while targeted fishing for shark was not carried out in the area, large quantities of small sharks came as by-catch in the gill nets, trawls and in hook and line fishing. These sharks were not much in demand for their fins (due to the small-size) but were in good demand as fresh fish and also after drying. The Association were also willing to participate in awareness programmes conducted by the DoF or any other agency.
25 July 2014, Chennai, Tamil Nadu	Second Meeting of NMCSI No. of participants = 81	Shark Merchants expressed their concern on banning of export of shark fins, which according to them enjoyed a good market in Singapore, Taiwan, China, Hong Kong, Japan, etc. and generated considerable revenue. They were also concerned that in a highly competitive market, competitors would only benefit from such measures with no real benefit to the shark stocks. The merchants further said that they collected shark products such as fins in processed form and at that level it was not possible for them to distinguish between prohibited and non-prohibited species. Fishermen said that it was difficult to identify

		endangered species while fishing or practice selective fishing. The fishermen were also of the view that releasing endangered species was not possible because there is no provision in the nets and long lines to release the species. Fishermen also suggested holistic measures and controlling of poaching in Indian water as against stock specific approach. Fishermen were also concerned whether the officials inspecting the catch had enough skills to identify different species. The fishermen and merchants also suggested having seasonal fishing bans to avoid fishing of sharks while they were breeding or in areas identified as hot spots of shark populations. For educating and creating awareness among fishermen and the traders, it was suggested that there should be information displayed on banned species at the fishing harbours, fish landing centres, etc. CMFRI suggested that to ensure catching/landing of only adult sized sharks, large hooks or large mesh-size nets should be used and breeding areas of sharks could be avoided during breeding period. CMFRI is also working on these aspects to provide guidance to the fishers. The workshop also suggested involving fishermen associations in monitoring shark catch and providing such data for better monitoring of the stocks.
20 November 2014, Mangalore, Karnataka	Third Meeting of NMCSI No. of participants = 40	Representative from National Fishworkers Forum said that while fishermen were not against shark conservation, however, conservation measure or policies should be made after consulting fishermen to ensure their support. The workshop further recommended that (i) feasible conservation measures should be evolved and should be adopted for saving sharks: (ii) data regarding sharks under viviparous, oviparous, and ovoviviparous categories should be collected to design shark conservation measures; (iii) special programmes should organized for conservation organizations, environmentalists, media to provide field-level inputs on conservation of sharks; (iv) fisheries colleges and use of information and communication technology (ICT) will facilitate conservation drive; (v) Government may consider giving a permanent structure to community-driven NMCSI and incorporating it within the

		shark conservation measures to establish a link between the government and the community.
22 January 2015, Mumbai, Maharashtra	Fourth Meeting of NMCSI No. of participants = 130	The Workshop recommended that the consumption of shark and shark products should be discouraged at the consumer end. It also suggested proper implementation of CCRF at the State/UT fisheries level; conducting regular meetings with all stakeholders and creating village level awareness programmes.
24 April 2015, Nellore, Andhra Pradesh	Fifth Meeting of NMCSI No. of participants = 40	The Workshop encouraged the regulation of hooks and line in fisheries sector. It also suggested that fishermen must be involved in policy and decision-making. On conservation of sharks, the Workshop suggested that training should be provided to fishermen and enforcement officials on identification of scheduled or protected species of sharks. The Workshop further suggested that fishermen should try to avoid catching baby or juvenile sharks. It was also suggested that a dedicated law could be considered for conservation of sharks in lieu of their protection under Wildlife (Protection) Act.
17 June 2015, Veraval, Gujarat	Sixth Meeting of NMCSI No. of participants = 70	It was informed that there was 64 percent reduction in the shark landings in Gujarat since 1990s. Rapid Stock Assessments conducted by CMFRI also showed declining stock of sharks. In addition, it was informed that majority of sharks caught in Gujarat consisted of pregnant sharks. Therefore, studies on identification of breeding areas and the time of breeding should be promoted and regulatory measures such as area and seasonal closures for shark fishing, gear restrictions, etc. should be considered. Fishermen said that they were incurring losses due to ban on export of shark fins as value of shark catch was declining. The Workshop recommended that (i) data on breeding seasons and breeding grounds should be collected; (ii) all data must be reported species /group wise; (iii) data should be collected on various shark-based products and their trade values; (iv) there should be efforts made to provide real-time data on status of protected species and (vi) all measures must be reviewed for practicality and acceptability by stakeholders and it must be ensured that it benefits the community as a whole.

13 August 2015, Paradip, Odisha	Seventh Meeting of NMCSI No. of participants = 45	In Odisha, sharks constituted only 0.3---0.5 percent of the total marine fish landing. Fishermen said that they considered sharks as *'Sagar Kanya'* (Daughter of the Sea) and did not target sharks. They were also willing to release any sharks that were accidentally caught on the hook---lines or nets and release them back to the sea, if they were still in good condition. For those sharks that were caught and not released, the local fishermen would learn how to better utilize the entire fish.
5 November 2015, Kolkata, West Bengal	Eighth Meeting of NMCSI No. of participants = 65	The Workshop recommended that there was a need for shark identification guide for awareness creation. The Workshop also emphasized on curbing pollution of seas and oceans and uniform ban to save the sharks and other marine species. The Workshop also suggested that alternate livelihood such as making handicraft items from shell, skeleton, etc could be considered for promotion.
19 February 2024 Kochi, Kerala	Terminal Workshop No. of Participants = 44	The draft document was presented to the terminal national stakeholder Consultation. The Feedback was overwhelmingly positive, with recommendations on the improvement of data collection methods through standardized approaches and increased allocation of resources.

The underlying purpose of the extensive engagement was to get information from the stakeholders on the characteristics of shark fisheries; understand the issues and opportunities; and get the views and acceptance of the stakeholders on the potential management and conservation measures by improved communication.

In addition, the information required for assessing the status of shark fishery in India was collected from different sources, listed below:

(i) Reports published by the ICAR - Central Marine Fisheries Research Institute (ICAR-CMFRI) based on the results of their in-house projects including a five-year research programme on "Assessment of Elasmobranch Resources in the Indian Seas" that provided detailed information on the distribution of sharks, and the biological, economic attributes and status of shark fisheries in India;

(ii) "Guideline for development of NPOA-Sharks" published by the ICAR-CMFRI in 2015;

(iii) Exploratory survey data on sharks from different publications of FSI, to understand the status of resources;

(iv) Information on fisheries characteristics from the marine fisheries census (2016) carried out by the Department of Fisheries, Government of India;

(v) Potential Yield estimates (2018) from the Report of Department of Fisheries, Government of India;

(vi) Information from India's reports submitted to the IOTC;

(vii) Information on international fishery and trade dimensions of sharks from the FAO database; and

(viii) Information on shark trade, dependence of fishermen on shark fisheries, and their views on the management of sharks from focus group discussions.

As part of the process of engagement with different stakeholders, several initiatives were undertaken. These included sharing the 'Atlas of Elasmobranch Fishery Resources of India' published by the ICAR-CMFRI with the fishing community in India to set up a process of developing field identification procedures. Additionally, a pilot testing of the 'Species Identification Card' developed by the Indian Ocean Tuna Commission (IOTC) was shared with the fishermen from Thoothoor (Kanyakumari District) to measure the efficacy of such guidebooks and identify the scope of improvement in field identification of the shark genera/species. Finally, the FAO's 'International Plan of Action for the Conservation and Management of Sharks' was translated into six vernacular languages and distributed in the coastal areas for better access to information amongst the fishers (Image 1).

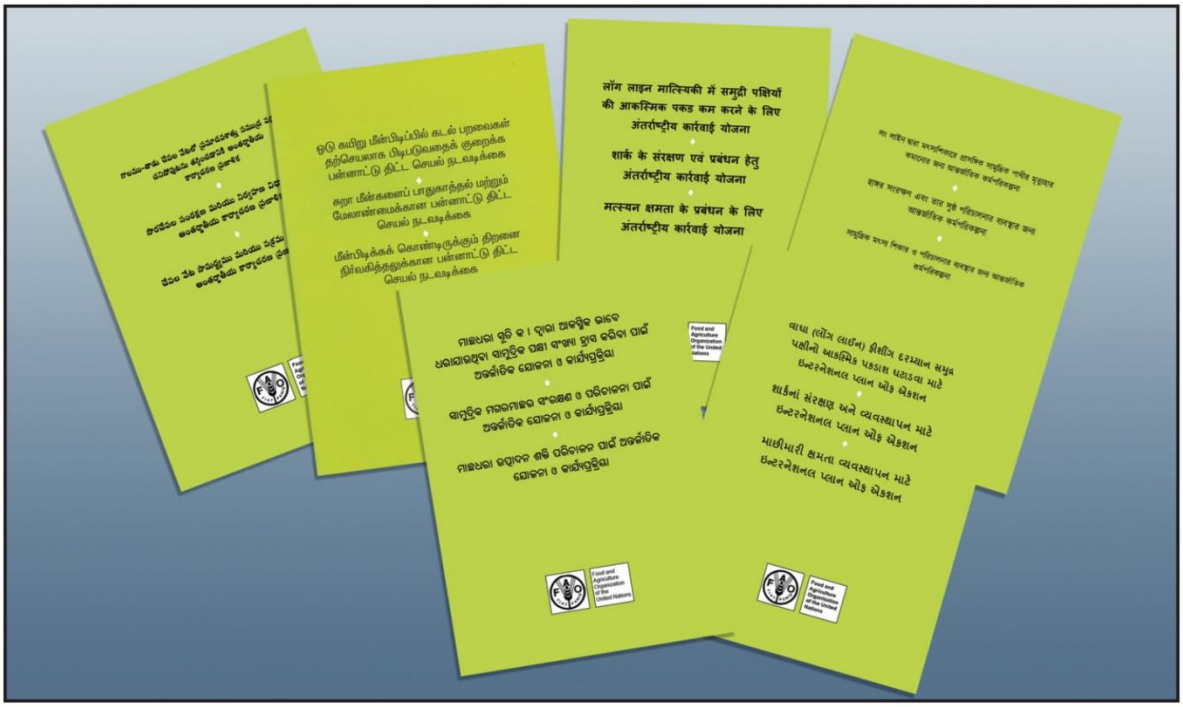

Image 1. Vernacular versions of IPOA-Shark prepared by the BOBP-IGO for outreach

In 2012, a pivotal Letter of Agreement was signed between the BOBLME and BOBP-IGO to undertake socio-economic assessments and draft an initial National Plan of Action (NPOA) for sharks. This agreement provided a structured approach to addressing the socio-economic aspects of shark fisheries, setting the stage for more focused conservation efforts. Subsequently, in 2015, the draft NPOA was submitted to the Government of India, marking a

significant step in formalizing shark conservation plans. That same year, the Ocean Partnership Project funded by the World Bank was initiated, emphasizing sustainable tuna fisheries while also collecting data on sharks as an associated fishery, which enhanced the understanding of interactions between tuna and shark fisheries. From 2015 to 2017, continuous data collection efforts supported the management of both shark and tuna fisheries. Between 2016 and 2018, several workshops and stakeholder meetings were conducted to understand the nature of tuna fishing in India and the associated issues and the feasibility of enhanced tuna fisheries as an alternative livelihood, demonstrating economic incentives and conservation benefits were explored and policies developed. Following the Ocean Partnership Project, BOBP and NFDB together worked further on developing tuna business models for the east coast of India and Lakshadweep.

Annex IV

National Plan of Action for Conservation and Management of Sharks in India

(NPOA- Sharks)

(FINAL DRAFT - 2024)

Executive Summary

The marine fisheries sector occupies a significant place in the socio-economic development of India. Apart from the prime consideration of securing food, nutritional, and livelihood requirements of the population, the fisheries sector plays an important role in trade and commerce. With a coastline of 8,118 km and an Exclusive Economic Zone of 2.02 million sq. km, and a continental shelf area of 0.53 million sq. km, India is one of the largest fish producers in the world. Marine fisheries landings increased from 23.0 lakh tonnes (2.30 million tonnes) in 1990-91 to 41.27 lakh tonnes (4.13 m t) in 2021-22. The estimated potential yield of the country is 53.1 lakh tonnes (5.31 m t), constituting about 43.3 percent demersal, 49.5 percent pelagic, and 4.3 percent oceanic groups. Mechanized fishing vessels constitute only 19% of the fishing fleet. Marine fisheries employ 3.77 million people along the Indian coast. Export earnings from the fisheries sector were to the tune of Rs. 57,586.48 crores (6.94 billion US$) during 2021-22.

Sharks, comprising true sharks, rays, guitarfishes, skates, sawfishes, and chimaeras (chondrichthyans), are traditionally caught in coastal artisanal fisheries in India. At the national level, India harvested about 1,08,000 tonnes of sharks in 2021 *(Source: Handbook of Fisheries Statistics, 2022; Government of India).* The trawls, drift gillnets, and hooks & lines contribute about 95% to the shark landings. Although India is a major player in the exploitation of sharks, it remains a minor player in shark export. The total value of the export of shark products is US$ 8.30 million.

Recent estimates put the number of shark species occurring in the Indian commercial fisheries at 169 from 91 genera. It includes 88 species of true sharks from 49 genera; 46 species of rays from 23 genera; and 9 species of guitarfishes from 3 genera *(Source: ICAR-CMFRI)*. Sharks are particularly vulnerable to over-exploitation because of their life-history strategy characterized by slow growth, late attainment of sexual maturity, long life span, and low fecundity. Of the 169 species, 63% of elasmobranchs are under IUCN Red List categories of 'critically endangered', 'endangered', and 'vulnerable' species.

To conserve the endangered elasmobranch species, the Ministry of Environment, Forest and Climate Change, Government of India placed 10 such species under Schedule 1 (Part IIA) of the Indian Wildlife (Protection) Act, 1972, and the list was updated to 18 species in 2023. The 18 species are the Pondicherry shark (*Carcharinus hemiodon*), Ganges shark (*Glyphis gangeticus*) and whale shark (*Rhincodon typus*), the sawfishes (*Anoxypristis cuspidata, Pristis pristis, P. clavata* and *P. zijsron*), the rays (*Himantura fluviatilis*, *Urogymnus asperrimus*, and *U. polylepis*), the wedgefishes *(Rhynchobatus djiddensis, R. australiae*, and *R. laevis*), the guitarfishes *(Rhina ancylostomus, Glaucostegus thouin*, and *G. obtusus*) and the mantas *(Manta alfredi* and *Mobula birostris).* These species should not be caught, harvested, or traded. In 2013, India prohibited shark finning at sea and also prohibited the export and import of shark fins, which has led to a substantial decline in the price of the sharks.

India has a legal and policy framework to manage fisheries. Marine fisheries come under the governance of both the coastal States (waters up to 12 nautical miles) and the Union Government (12 – 200 nautical miles and international waters). At the State/Union Territory (UT)-level, the Marine Fishing Regulation Act (MFRA) provides the necessary legal

framework for licensing fishing vessels, zonation and gear regulation, etc. Restriction of the number of days of fishing during monsoon and fish spawning seasons is the most common management method followed in India. The maritime States/UTs along the west coast follow closed fishing for mechanized vessels for 61 days during the southwest monsoon months of June and July, and the maritime States/UTs along the east coast also follow 61 days of closure, but during mid-April to mid-June. At the Union level, though no such Act exists, the National Policy on Marine Fisheries of 2017 has outlined the mission for the sector as follows: "While keeping the sustainability of the resources at the core of all actions, the policy framework will meet the national, social and economic goals, livelihood sustainability and socio-economic upliftment of the fisher community".

The NPOA-Sharks is informed by the community-driven 'National Mission on Conservation of Sharks' initiated by the Association of Deep Sea Going Artisanal Fishers (ADSGAF) of Thothoor in cooperation with the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO). The Mission involving representatives of the Department of Fisheries (DoF) of the State/UT Governments, academia, NGOs, and Community-based Organizations (CBOs) was conducted from 2013-15 during which nine stakeholder meetings and field visits in all the maritime states was organized. In addition, focused community-level appraisals were carried out in Gujarat and Tamil Nadu with fishers group engaged primarily in shark fishing. During the consultations carried out with fisher groups and other primary stakeholders, fishermen pointed out that they understood and support the need to conserve sharks, while they also needed to ensure that their livelihoods were secured. The fishermen suggested that a realistic and scientific plan should be adopted to conserve sharks with active stakeholder participation. The outcomes of all those consultations contributed to the development of NPOA-Sharks. The final draft of NPOA-Sharks was presented, discussed, and finalised in a National Consultation Workshop attended by 42 key stakeholders on 19 February 2024.

Based on the review of the literature and extensive discussions with fishers and scientists along the Indian coastline on matters relating to shark fisheries, five major issues have been identified, which are envisioned to be addressed through the National Plan of Action for Conservation and Management of Sharks (NPOA-Shark).

To ensure the conservation and sustainable management of sharks, the NPOA-Sharks seeks to address five issues:

(i) Arresting decline in shark biomass;
(ii) Improving monitoring, control, surveillance, narrowing the gaps in data collection, and updating the skill in identification of species;
(iii) Setting the stage for agreed conservation measures;
(iv) Identifying research needs; and
(v) Setting a holistic framework to address all conservation issues.

The NPOA-Sharks outlines the following eight necessities:

(1) Legal, institutional, and management framework requirements:

- Enactment of law for waters between 12 and 200 nm;

- Revisiting MFRAs considering contemporary challenges;
- Setting up of Coordination Committee with representatives from MoFAH&D, MoEF&CC, Ministry of Commerce & Industry, Ministry of Defence, DoF of Coastal States & UTs, research organizations, and fisher associations - for monitoring, harmonizing & reporting progress of NPOA-Sharks;
- Developing formal mechanism for stakeholder engagement, with representation from various sections including women;
- Reviewing shark trade policy in view of the requirements stipulated under international agreements such as CITES, and the livelihood needs of fishers; and
- Setting up an effective MCS and co-management system.

(2) Human resources and capacity building requirements comprising, among others, improving taxonomic skills at the ground-level and improving data collection procedures:

- Training for improving the taxonomic skills of field investigators;
- Imparting skill in data collection techniques for field investigators;
- Awareness building of fishermen and leadership building for monitoring fisheries activities, conservation needs, and reporting;
- Preparation of awareness materials;
- Training programmes on the Code of Conduct for Responsible Fisheries (CCRF), Ecosystem Approach to Fisheries Management (EAFM), and familiarisation with International Agreements/Arrangements; and
- Post-harvest value addition of sharks.

(3) Data collection and management requirements suggesting a coordinated approach among ICAR-CMFRI, ICAR-CIFT, FSI, and DoF:

- Developing, implementing, and coordinating data collection framework and dissemination mechanism (from exploratory surveys and commercial fisheries, including data declaration through logbook);
- Recording and reporting of biological data, bycatch, and incidental capture; and Collecting trade details.

(4) Scientific research focusing on taxonomic gaps, stock assessment, socio-economics, and moving towards EAFM:

- Conducting periodic shark resource assessments;
- Publishing the National Shark Identification Kit or Guide;
- Developing methodology and evaluating indicators for rapid assessment of the status of populations of different shark species to assess and monitor the NPOA- Sharks for its effectiveness;
- Revalidating species listing under different vulnerability categories and revising the status, if necessary;
- Identifying shark hotspots and congregation zones (habitat mapping);

- Developing DNA sequences of all species of sharks and establishing a DNA referral library;
- Developing effective shark by-catch reduction measures; and
- Research on post-harvest value addition of sharks.

(5) Options for regulating fishing:

- Encouraging fishermen to follow gear regulations and make an effort to control through awareness-building;
- Ensuring effective implementation of MCS measures by community participation;
- Identifying shark breeding grounds and season(s), in consultation with the fishermen and research institutions, and sensitizing the fishers to avoid these places through awareness building or seasonal/area closure;
- Introducing a logbook system starting with mechanized fishing vessels and ensuring regular inspection of the logbooks by DoF officials;
- Developing effective shark bycatch reduction measures;
- Ensuring that management arrangements for targeted shark species include a precautionary approach; and
- Developing mechanisms for labelling the products to avoid illegal trade on protected species as well as to facilitate genuine trade in domestic and export markets.

(6) Encouraging full utilization of dead sharks:

- Placing posters in the fishing harbours and fish landing centres of major shark landing areas about the condition of the fish which can be finned and exported without any detrimental impact; and
- Encouraging post-harvest value addition of sharks.

(7) Biodiversity and ecological considerations:

- Adopting EAFM;
- Improving the monitoring of anthropogenic impact on fisheries resources and habitats;
- Improving the monitoring of reefs and reef-based fisheries resources and discourage using reefs for dumping;
- Encouraging eco-tourism (e.g., shark dives) with the active participation and building of entrepreneurial skills among marginalized local communities, including fishermen;
- Developing and regular updating of ecosystem health indicators; and
- Encouraging research on the impact of climate change and pollution on the ecosystems.

(8) Regional cooperation, especially, in view of the transboundary and migrating nature of sharks:

- Contributing to the development of RPOA-Sharks in coordination with BOBP-IGO;

- Developing regional collaborative research and information exchange protocols in coordination with BOBP-IGO;
- Report on the progress of NPOA-Sharks to IOTC/FAO/CITES; and
- Building the required political environment in support of regional action through regional forums like BOBP-IGO.

An Implementation Framework with the following details is provided in the NPOA – Sharks document:

- Description of activity;
- Responsible agency/person(s);
- Indicators of progress;
- Associated actions/issues/risks; and
- Approximate cost of implementing each activity.

The implementation challenges mainly include ensuring effective coordination between the Union and the States; between different Ministries and Departments; and between the community, scientists, and Government. Recent policy measures by the Government of India show increasing concern over shark fisheries and it is expected that a holistic approach in the form of NPOA-Sharks will create necessary initiatives within the Government for discussion and adoption of the same.

The timeline of activities for a 3-year period is given in the document.

The Government notifies the NPOA Shark, recognizing that the measures outlined shall have fishery-wide positive impacts.

Abbreviations

ADSGAF	Association of Deep Sea-Going Artisanal Fishers
APFIC	Asia-Pacific Fishery Commission
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BOBLME	Bay of Bengal Large Marine Ecosystem
BOBP-IGO	Bay of Bengal Programme Inter-Governmental Organisation
CAU	Central Agricultural University
CBO	Community-based organization
CCRF	Code of Conduct for Responsible Fisheries
CIFRI	Central Inland Fisheries Research Institute
CIFT	Central Institute of Fisheries Technology
CITES	Convention on International Trade in Endangered Species
CMFRI	Central Marine Fisheries Research Institute
CMS	Convention on the Conservation of Migratory Species of Wild Animals
DoF	Department of Fisheries
EAFM	Ecosystem Approach to Fisheries Management
EEZ	Exclusive Economic Zone
FAO	Food and Agricultural Organization of the UN
FSI	Fishery Survey of India
ICAR	Indian Council of Agricultural Research
IORA	Indian Ocean Rim Association
IOTC	Indian Ocean Tuna Commission
IPOA-Sharks	International Plan of Action for the Conservation and Management of Sharks
IUCN	International Union for Conservation of Nature
IUU Fishing	Illegal, Unreported and Unregulated (IUU) fishing
MCS	Monitoring, Control, and Surveillance
MFRA	Marine Fishing Regulation Act
MoEF&CC	Ministry of Environment, Forest and Climate Change
MoFAH&D	Ministry of Fisheries, Animal Husbandry and Dairying
NGO	Non-governmental Organization
NIFPHTT	National Institute of Fisheries Post Harvest Technology and Training
NPMF	National Policy on Marine Fisheries
NPOA	National Plan of Action
RPOA	Regional Plan of Action
RSA	Rapid Stock Assessment
SAARC	South Asian Association for Regional Cooperation
SACEP	South Asia Co-operative Environment Programme
SAU	State Agricultural University
SEAFDEC	Southeast Asian Fisheries Development Center
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement relating to Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
UT	Union Territory
VMS	Vessel Monitoring System
WWF	World Wildlife Fund

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1. INTRODUCTION

1.1. Background

Sharks, rays, guitarfishes, skates, sawfishes, and chimaeras (belonging to the class Chondrichthyes), hereafter collectively referred to as 'sharks', play an important ecological role in the marine food web as top predators and contribute to significant marine landings around the world. Sharks are harvested primarily for their meat, fins, skin, cartilage, and liver (oil). Over the last few decades, the increasing exploitation of sharks owing to the rising demand for shark products, particularly fins, and meat, coupled with improved fishing technology and a weak regulatory regime, has led to the decline in many shark populations. Sharks are highly vulnerable to over-exploitation because of their K-selected life-history strategy characterized by slow growth, late attainment of sexual maturity, long life span, low fecundity, and a close relationship between the number of young ones produced and the size of the breeding biomass. An analysis of threat for a globally distributed lineage of 1,199 species of sharks found that one-fourth of the species could be termed as 'Threatened' according to IUCN Red List criteria due to overfishing (targeted and incidental) (Dulvy et al., 2021). Overall, the extinction risk for sharks is substantially higher than most other vertebrates, and only one-third of shark species are considered safe. Due to widespread concern over improper management of shark fisheries, the Food and Agriculture Organization (FAO) adopted and endorsed the International Plan of Action for the Conservation and Management of Sharks (IPOA–SHARKS) in 1999 for long-term sustainable conservation and management of sharks.

The NPOA-Sharks of the Government of India is the first step towards ensuring the continuity of ecological services supported by sharks and also its economic services. It is also a step towards meeting India's commitment to the 1973 Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES); the 1979 Convention on the Conservation of Migratory Species of Wild Animals (CMS); the 1982 United Nations Convention on the Law of the Sea (UNCLOS); the 1992 Convention on Biological Diversity (CBD); the 1995 United Nations Fish Stocks Agreement relating to Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA); the 1995 FAO Code of Conduct for Responsible Fisheries (CCRF); the 1999 International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks); and the resolutions of the regional fisheries bodies - the Indian Ocean Tuna Commission (IOTC) and BOBP-IGO.

1.2. Approach to the Preparation of NPOA-Sharks

The IPOA–Sharks is a voluntary instrument that directs FAO Member States to 'adopt a National Plan of Action for the Conservation and Management of Sharks (NPOA–Sharks), if their vessels conduct targeted fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries'. The IPOA–Sharks directs those States that implement an NPOA–Sharks to assess it regularly (at least once in every four years) to identify cost-effective strategies for increasing its effectiveness. The NPOA-Sharks is India's commitment to the IPOA-Sharks.

The information required for assessing the status of shark fishery in India was collected from different sources, as shown below:

(i) India's submission to IOTC and reports published by ICAR - Central Marine Fisheries Research Institute (ICAR-CMFRI) provided fishery-related data on shark fishery;

(ii) Fishery-independent data on shark fishery was collected from different publications of FSI, which is responsible for conducting exploratory surveys in the Indian Exclusive Economic Zone (EEZ) at regular intervals to gauge the status of resources;

(iii) Information on international fishery and trade dimensions of sharks was collected from the FAO database; and

(iv) Information on shark trade, the dependence of fishermen on shark fisheries, and their views on the management of sharks were collected through focus group discussions and workshops involving fishermen from across the country.

The NPOA-Sharks is the outcome of several consultations among stakeholders and experts, spearheaded by BOBP-IGO. BOBP-IGO in cooperation with the Association of Deep Sea Going Artisanal Fishers (ADSGAF) initiated the 'National Mission on Conservation of Sharks' involving representatives of the Department of Fisheries (DoF) of the State/UT Governments, academia, NGOs, and Community-based Organizations (CBOs). Nine stakeholder meetings were conducted and field visits were undertaken in all the maritime states during 2013-15. In addition, a few focused community-level appraisals were carried out in Gujarat and Tamil Nadu. The final draft of NPOA-Sharks was presented, discussed, and finalised in a National Consultation Workshop attended by 42 key stakeholders on 19 February 2024.

For the preparation of the document, information on fisheries characteristics was collected from the marine fisheries census (2016) carried out by the Department of Fisheries, Government of India, ICAR-CMFRI, and Fishery Survey of India. Information on fisheries status was collected from a literature review and analysis of landings data and other related fishery and non-fishery data documented regularly by the ICAR-CMFRI. Potential Yield estimates were accessed from the Report of the Department of Fisheries, Government of India (DoF, 2018). Further, relevant information was drawn from several research projects conducted by the ICAR-CMFRI and Fishery Survey of India. The document published by ICAR-CMFRI, "Guidance on National Plan of Action for Sharks in India" (Kizhakudan et al., 2015), provided support and important input for the preparation of India's NPOA-Sharks. The NPOAs of some of the major shark harvesting countries were also consulted to understand the best practices.

1.3. Objectives of NPOA-Shark

The prime objective of this document is to fulfil India's commitment and responsibility towards conservation and sustainable fishery and the use of sharks as delineated in different international voluntary and non-voluntary agreements and arrangements.

This report is organized into five sections. Section 1 provides background information and the process followed to develop the NPOA-Sharks. Section 2 presents the salient features of the marine fisheries sector in India. Section 3 is an assessment of shark fisheries in India from both biological and trade aspects. This assessment also covers the views of stakeholders and their livelihood aspects. Section 4 outlines the NPOA-Sharks developed based on the needs

identified during the assessment of shark fishery in India. Section 5 presents the implementation plan, providing who should do what, timelines, outputs, and the indicative budget. The Report is further supplemented by additional information in the Annexure.

The NPOA-Sharks is a living document and periodic review is necessary in light of the new information gathered on the status of shark fisheries. Therefore, the NPOA has an inherent feedback loop to deal with future possibilities and requirements.

2. MARINE FISHERIES OF INDIA

2.1. Marine Fisheries Sector in India

The marine fisheries sector occupies a significant place in the socio-economic development of India. Apart from the prime consideration of securing food, nutrition, and livelihood requirements of the population, the fisheries sector plays an important role in trade and commerce. With a coastline of 8,118 km and an Exclusive Economic Zone of 2.02 million sq. km, and a continental shelf area of 0.53 million sq. km (Fig. 1), India is one of the largest fish producers in the world. Marine fisheries landings increased from 23.0 lakh tonnes (2.30 million tonnes) in 1990-91 to 41.27 lakh tonnes (4.13 m t) in 2021-22 (Fig. 2). The estimated potential yield of the country is 53.1 lakh tonnes (5.31 m t). Mechanized fishing vessels contribute substantially to the landings although they constitute only 19% of the fishing fleet. Marine fisheries employ 3.77 million people along the Indian coast.

India is the second largest fish-producing country in the world accounting for 7.56% of global production and contributing about 1.24% to the country's Gross Value Added (GVA) and over 7.28% to the agricultural GVA. Export earnings from the fisheries sector were Rs. 57,586.48 crores (6.94 billion US$) during 2021-22. In the early years, the developmental approaches to the fisheries sector, in general, have remained 'production-driven'. This is logical, given the low production and localized nature of fisheries during the early years. However, with marine fisheries having grown in leaps and bounds in the last four decades, a greater emphasis is now required for conservation and good governance of the sector. Along with stock depletion, habitat degradation, pollution, and climate change impacts are also emerging as major challenges for the marine fisheries sector and future development will much depend on effectively tackling these challenges. Considering these challenges, the National Policy on Marine Fisheries (NPMF)-2017 and National Fisheries Policy (NFP)-2020 were developed to guide sectoral development.

The policy mission of the government is to "meet the national, social and economic goals, livelihood sustainability and socio-economic enrichment of the fisher community and to guide the coordination and management of marine fisheries in the country during the next ten years".

The major fisheries in India during 2010-2021 consisted of Indian oil sardine, other clupeids, croakers, Bombay duck, decapods, ribbonfishes, Indian mackerel, anchovies, catfishes, perches, silverbellies, carangids, cephalopods, sharks, rays and skates. These groups contributed about 60% to the overall marine fisheries landings.

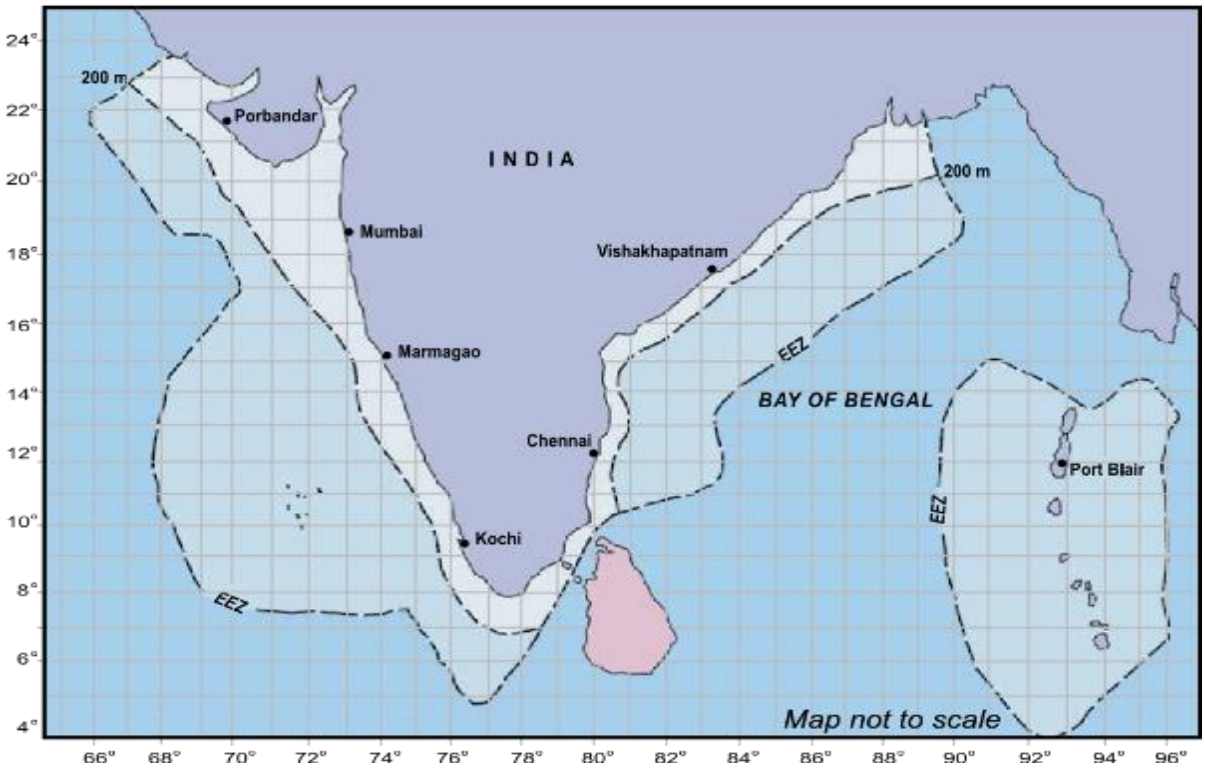


Figure 1: Exclusive Economic Zones of India

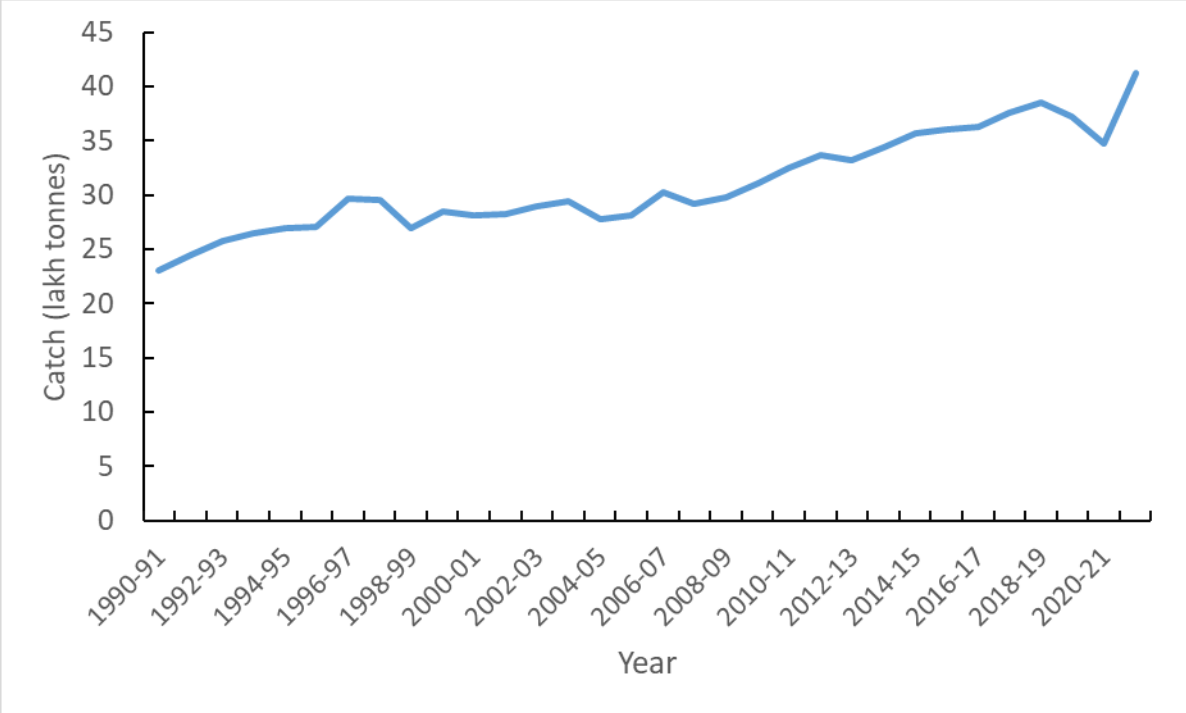


Figure 2: Marine fish landings during 1990-91 to 2021-22 (Source: DoF, GoI)

There were 3288 coastal fishing villages and 1511 fish landing centres according to the Marine Fisheries Census 2016. The marine fishing fleet comprised 2,30,210 fishing craft (Table 1) of which 12% were traditional craft (without any type of mechanical device) and 68% were

motorized traditional craft (with outboard motors fitted to small boats). The remaining boats (44,475) were mechanized fishing vessels (MFVs), which are larger and fitted with inboard engines and a wheelhouse. Of the mechanized boats, trawlers are by far large in numbers, followed by gillnetters (Table 2). Trawlers contribute about 40% to the total landings. In recent years, there has been an active promotion of longlining in India to target deep-sea fishes such as tunas.

Table 1: Numbers of marine fishing boats in India (Source: DoF, GoI)

Category	East Coast	West Coast	Andaman & Nicobar & Lakshadweep Islands	Total
Mechanized (With in-house engine)	13,200	29,785	1,490	44,475
Motorized (With outboard engine)	1,15,961	40,698	591	1,57,250
Non-motorized	15,468	10,221	2,796	28,485
Total	1,44,629	80,704	4,877	2,30,210

Table 2: Numbers of mechanized boats operating different types of gear in the mainland (Source: ICAR-CMFRI)

No	Craft/Gear	East Coast	West Coast	Total
1	Trawlers	10,071	20,701	30,772
2	Gillnetters	2,563	3,985	6,548
3	Dol/Bagnetters	191	3,122	3,313
4	Liners	42	98	140
5	Ring seiners	297	646	943
6	Purse seiners	0	1,189	1,189
7	Others	31	49	80

One of the most significant characteristics of the Indian fisheries sector is its small-scale nature. The overall length of even the mechanized boats rarely exceeds 20 m. Further, the major fishing activities are still concentrated in the areas within the 80-metre depth zone.

2.2. Fish Export from India

The export of marine products (including export from aquaculture) increased from a meagre 15,732 tonnes in 1961-62 to a record 13,69,264 tonnes in 2021-22. This added USD 7.76 billion to the GDP. India is the fourth largest exporter in terms of average value of export and one of the eight countries that has exported fish worth over US$ 5 billion during the last five years. Apart from the quantitative growth, there is also improvement in the product basket with the

addition of commercially important species such as tunas, squids, etc. This growth trajectory has also led to the creation of a large processing capacity following global standards, which can further fuel the export of fish and fisheries products from India. In terms of export earnings, frozen shrimp is the maximum exported item (75% in value), followed by frozen fish (6%), squid (5%), and cuttlefish (4%).

2.3. Fisheries Potential

In 2018, the Working Group set up for Revalidating the Potential Yield (PY) of Fishery Resources in the EEZ of India estimated the PY as 53.1 lakh tonnes (5.31 million tonnes) (Table 3), constituting about 43.3 percent demersal, 49.5 percent pelagic and 4.3 percent oceanic groups. About 60% of the resources are located along the west coast covering the states of Gujarat, Maharashtra, Goa, Karnataka, and Kerala and the UT of Daman & Diu. On the east coast, Tamil Nadu, with its relatively longer coastline has the largest share of the resources. In terms of depth-wise allocation of the resources, 93 % of the resources are within a 0 – 200-metre depth zone. Owing to the rich coastal waters, the Indian marine fisheries have traditionally concentrated on the near-shore waters.

Table 3: Potential yield estimates of fish resources in the EEZ of India

(Source: Handbook of Fisheries Statistics, 2018; Department of Fisheries, Government of India)

Resource	Potential Yield (t)	Contribution (%)
Demersal (Mainland)	22,98,281	43.28
Pelagic (Mainland)	26,31,827	49.56
Lakshadweep (ex. Oceanic)	14,490	0.27
A&N islands (ex. Oceanic)	43,794	0.82
Oceanic (for the entire EEZ)	2,30,832	4.35
Others	91,369	1.72
Total	53,10,593	100

3. SHARK FISHERIES IN INDIA

3.1. Species Diversity

The number of elasmobranch species occurring in the Indian commercial fisheries has been estimated as 169 from 91 genera under 43 families. It includes 88 species of true sharks from 49 genera; 46 species of rays from 23 genera; and 9 species of guitarfishes from 3 genera (Table 4). Species of the family Carcharhinidae (requiem sharks), Sphyrnidae (hammer-head sharks), Alopiidae (thresher sharks), Lamnidae (mackerel sharks), Hemiscyllidae (bamboo sharks), Triakidae (hound sharks) are the significant contributors to the shark fishery in India.

Table 4: Numbers of elasmobranch species occurring in the EEZ of India

(Source: ICAR-CMFRI)

Group	Order	Family	Genus	Species
Chimaeras	Chimaeriformes	Rhinochimaeridae	2	2
		Chimaeridae	1	1
Sharks	Hexanchiformes	Hexanchidae	2	2
Sharks	Echinorhiniformes	Echinorhinidae	1	1
Sharks	Squaliformes	Squalidae	1	2
		Centrophoridae	2	6
		Etmopteridae	2	5
		Somniosidae	3	3
Sharks	Squatiniformes	Squatinidae	1	1
Sharks	Orectolobiformes	Hemiscylliidae	1	7
		Stegostomatidae	1	1
		Ginglymostomatidae	1	1
		Rhincodontidae	1	1
Sharks	Lamniformes	Odontaspididae	2	3
		Pseudocarchariidae	1	1
		Megachasmidae	1	1
		Alopiidae	1	3
		Lamnidae	1	2
Sharks	Carchariniformes	Scyliorhinidae	5	6
		Proscylliidae	2	2
		Pseudotriakidae	1	1
		Triakidae	3	3
		Hemigaleidae	4	4
		Carcharhinidae	9	27
		Galeocerdondidae	1	1
		Sphyrnidae	2	4
Sawfishes	Rhinopristiformes	Pristidae	2	4
Wedgefishes		Rhinidae	2	4
Guitarfishes		Rhinobatidae	2	4
		Glaucostegidae	1	5
Numbfishes	Torpediniformes	Narcinidae	2	5
		Narkidae	2	2
		Torpedinidae	1	4
Skates	Rajiformes	Rajidae	2	2

Group	Order	Family	Genus	Species
		Gurgesiellidae	2	2
Rays	Myliobatiformes	Hexatrygonidae	1	1
		Gymnuridae	1	3
		Dasyatidae	16	27
		Plesiobatidae	1	1
		Myliobatidae	1	4
		Aetobatidae	1	2
		Rhinopteridae	1	2
		Mobulidae	1	6
Total	**12**	**43**	**91**	**169**

Full list of elasmobranch species occurring in the EEZ of India is presented in the Annexure I.

3.2. Sources of Information on Sharks

Three main sources of fisheries-related information are the Department of Fisheries (DoF) of the Government of India and of coastal States/UTs; the Fishery Survey of India (FSI); and ICAR-CMFRI. The DoF and ICAR-CMFRI collect primary data on fish landings and related biological parameters, while the FSI monitors stocks through 'at-sea' exploratory surveys. Apart from these sources, information is also collected by other agencies (such as fisheries academic institutions) for projects and research-based works. The main sources and the information available from these sources are given in Table 5. The DoF of coastal states and UTs and ICAR-CMFRI use a multi-stage stratified random sampling method, developed by ICAR-CMFRI to collect fisheries data.

For assessing shark fisheries in India in this report, data from all the major sources were used and as mentioned above, while the data from different sources may not match exactly, importance is given t in this document o the trend it suggests.

3.3. Distribution and Status of Stocks

Sharks are widely distributed in the Indian EEZ and are caught in shallow waters by near-shore artisanal fisheries to deeper water mechanized gillnet, trawler, and logline fishery. Trawl and longline surveys carried out by the FSI during 1985 – 2014 show that sharks occur throughout the EEZ. Over the period, shark fishing has progressed from "incidental" to "targeted" fishing. India is the second-largest shark fishing nation in the world (FAO, 2020). Due to the increase in international demand, targeted shark fishery started with an increase in the number and efficiency of boats. Global decline in shark landings has been recorded since 2003, and Indian shark landings also declined during the same period (FAO, 2022) (except in 2020 and 2021).

The landings data from commercial fisheries and anecdotal information from fishermen confirm that there has been considerable decline over the last two decades in shark populations in the Indian waters. In a recent publication, ICAR-CMFRI (2023) noted that, of the 5 species analysed, 2 species are 'overfished' along the Indian coast. In another recent publication, Akhilesh et al (2023) have recommended management strategies for elasmobranch conservation in India.

Table 5: Sources of fishery-related information in India

Source	Information available	Frequency
Department of Fisheries, Government of India	Handbook on Fisheries Statistics containing information on State/UT-level production - Data for sharks as a group	Bi-annual
	Fisheries Census (number of fishermen, craft & gear)	5-yearly (jointly with CMFRI and FSI)
Departments of Fisheries of Coastal States and Union Territories	Fish landing data – Data for sharks as a group	Monthly/annual district and State/ UT-level data
	Number of fishing craft	Periodic district and State/UT-level data
	Government policies and schemes	Periodic
Fishery Survey of India	Survey data from longline and trawling, including hooking rate; catch composition; species and their length, weight, etc.	Monthly from the Indian EEZ – Latitude-Longitude-wise
	Research papers, Reports, etc.	Periodic
ICAR-Central Marine Fisheries Research Institute	Fish landing and fishing effort data at State/UT- and species level (more than 1000 species annually in the database)	Annual/Monthly
	Price of fish in different landing centres	Daily/Web-based Periodic
	Research papers, Reports, etc.	Periodic
ICAR-Central Institute of Fisheries Technology	Information on fishing practices from research papers, reports	Periodic
Marine Products Export Development Authority	Trade statistics, especially port-wise and country-wise export; shark fin trade, etc.	Annual
Ministry of Environment, Forest and Climate Change, Government of India	Policy, Schemes, Guidelines, Information on protected areas and species, information on climate change, etc.	Periodic
Indian National Centre for Ocean Information Services	Potential Fishing Zone Notification	Daily

Note: Information sources mentioned here are available publicly and accessible through the internet without any protocol. More detailed data can be accessed from these agencies on request.

Many of the shark species are highly migratory and the global statuses of many species are also of concern. Analysing the IUCN Red List status for 169 species of elasmobranchs occurring in India, ICAR-CMFRI has reported that 63% of the species of elasmobranchs are categorized as 'critically endangered', 'endangered' and 'vulnerable' species (Table 6).

Table 6: IUCN Red List status of sharks occurring in Indian waters*

IUCN status	Sharks	Skates	Rays	Total
Critically Endangered	11	11	0	22
Endangered	19	1	19	39
Vulnerable	27	0	18	45
Near Threatened	20	4	4	28
Data Deficient	2	2	6	10
Least Concern	9	2	5	16
Not Estimated	4	1	4	9
Total	92	21	56	169

*as of January 2023

The ICAR-CMFRI also carried out a Rapid Stock Assessment (RSA) of sharks based on data for the period 1985-2013 in the coastal States and the UT of Puducherry. The RSA was done by comparing the historic high catch with the average catch of the previous three years. The RSA showed that shark fishery was, on average, declining all along the Indian coastline. However, skate and guitarfish fisheries seemed to be still abundant in Gujarat, Karnataka, and Goa. On the other hand, the shark fishery had entered a depleted phase in Tamil Nadu and Puducherry and the skate fishery entered into a collapse or depleted phase in Orissa and West Bengal (Table 7).

Table 7: Rapid Stock Assessment (RSA) of sharks, skates, and rays along the Indian coast

(Reproduced from Kizhakudan et al., 2015)

Category	Coast	HMC (t)	3YA (T)	% of HMC	Status
Sharks	Gujarat	27,985	11,069	39.6	DC
	Maharashtra	12,929	4,034	31.2	DC
	Karnataka & Goa	2,829	749	26.5	DC
	Kerala	5,151	2328	45.2	DC
	Tamil Nadu & Puducherry	10,934	827	7.6	DP
	Andhra Pradesh	6,871	1572	22.9	DC
	Orissa	3,077	1128	36.6	DC
	West Bengal	5,482	3196	58.3	LA

Category	Coast	HMC (t)	3YA (T)	% of HMC	Status
Guitarfishes	Gujarat	1412	1132	80.2	A
	Maharashtra	1927	131	6.8	DP
	Karnataka & Goa	307	229	74.6	A
	Kerala	875	257	29.4	DC
	Tamil Nadu & Puducherry	1613	426	26.4	DC
	Andhra Pradesh	685	119	17.4	DC
	Orissa	351	6	1.6	C
	West Bengal	601	57	9.4	DP
Rays	Gujarat	7012	2446	34.9	DC
	Maharashtra	2660	498	18.7	DC
	Karnataka & Goa	2398	345	14.4	DC
	Kerala	4070	1082	26.6	DC
	Tamil Nadu & Puducherry	16429	10487	63.8	LA
	Andhra Pradesh	9971	6746	67.7	LA
	Orissa	1971	906	45.9	DC
	West Bengal	2059	831	40.4	DC

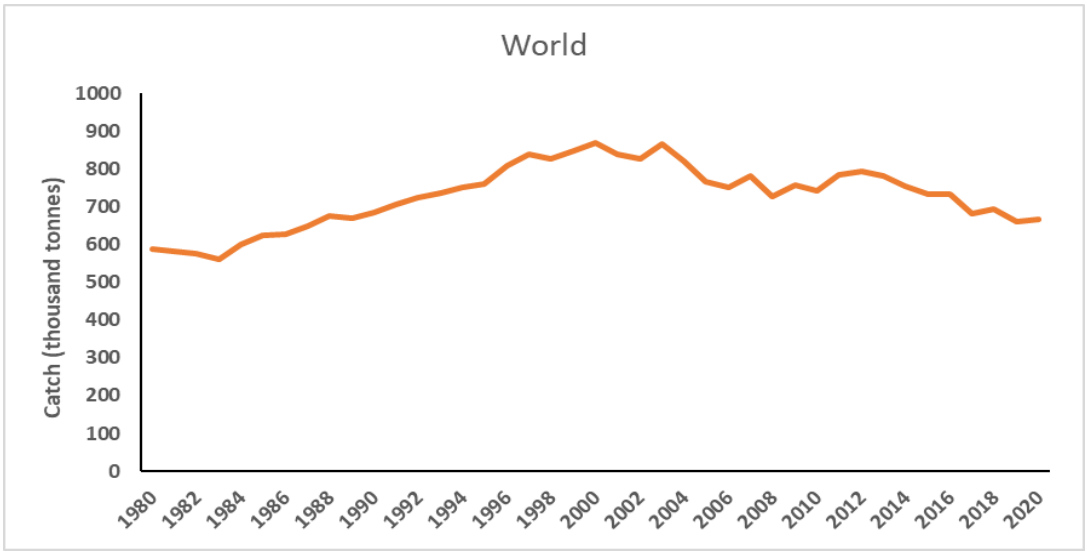
HMC - Historic Maximum Catch (1985-2013); 3YA - 3-year average (2011-13)
A-Abundant LA-Less abundant; DC-Declining; DP-Depleted; C-Collapsed

3.4. Shark Catches and Trade

3.4.1. Trends in Shark Catches

Global shark landings had increased until 2003 but declined thereafter. The annual shark landings in India increased from 50,012 tonnes in 1980 to an all-time high of 1,32,160 tonnes in 1996, but subsequently with fluctuatuations it was 1,08,000 t in 2021 (Fig. 3). The contribution of sharks to the total marine capture fisheries production declined from 4% during 1950-59 to 2% during 2010-2021, indicating that the growth of shark landings is declining in proportion to the growth of total landings (Table 8).

Gujarat, Maharashtra, Tamil Nadu, and Andhra Pradesh contribute substantially to shark landings in India.



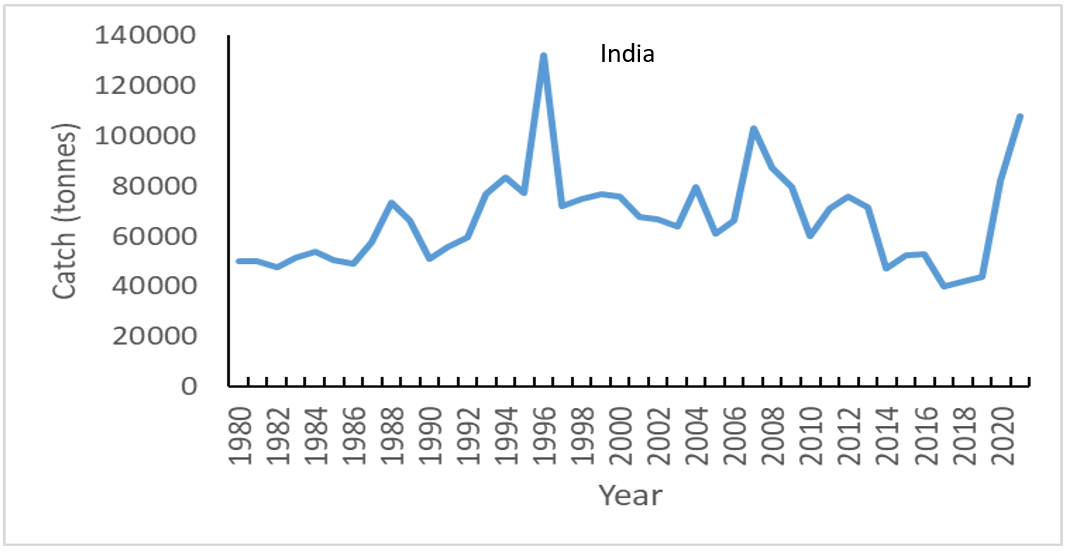


Figure 3: Trend in the landings of sharks during 1980-2021

Table 8: Decadal average landings of sharks and their contribution to the total marine fish landings

Period	Annual average landings of sharks (tonnes)	Share (%) of sharks in total landings
1950-1959	24,310	4
1960-1969	35,280	4
1970-1979	49,713	4
1980-1989	55,006	4
1990-1999	75,991	3
2000-2009	75,222	3
2010-2019	58,083	2

The trawls, drift gillnets, and hooks & lines contribute about 95% to the shark landings. While the drift gillnets and hooks & lines contribute to the landings along the entire coast, the shark landings by the trawlers are mostly along the northwest coast. While the targeted fishery of sharks operates in a few stretches along the Indian coast, the sharks are caught as by-catch in other locations.

3.4.2. Shark Trade

Although India is a major player in the exploitation of sharks, its trade remains low. However, the export of shark products increased in value terms from US$ 0.65 million in 1976 to a maximum of US$ 13.27 million in 2012 and then declined to US$ 297 thousand in 2017 (Fig. 4). In 2021, the total value of export of shark products was US$ 973 thousand. Shark fins were the trade drivers until 2015 when they contributed up to 99% of the trade revenue. However, since then frozen shark is contributing to the trade revenue.

The following four shark species were usually harvested for their fins for the export market: hammerheaded shark, *Sphyrna zygaena*; grey dog shark, *Rhizoprionodon acutus*; spade-nosed dog shark, *Scoliodon laticaudus*; and black tip shark, *Carcharhinus melanopterus*. However, after the ban on the export of shark fins in 2015, frozen rays and guitarfishes took the lead by contributing 87% to the export earnings (2019).

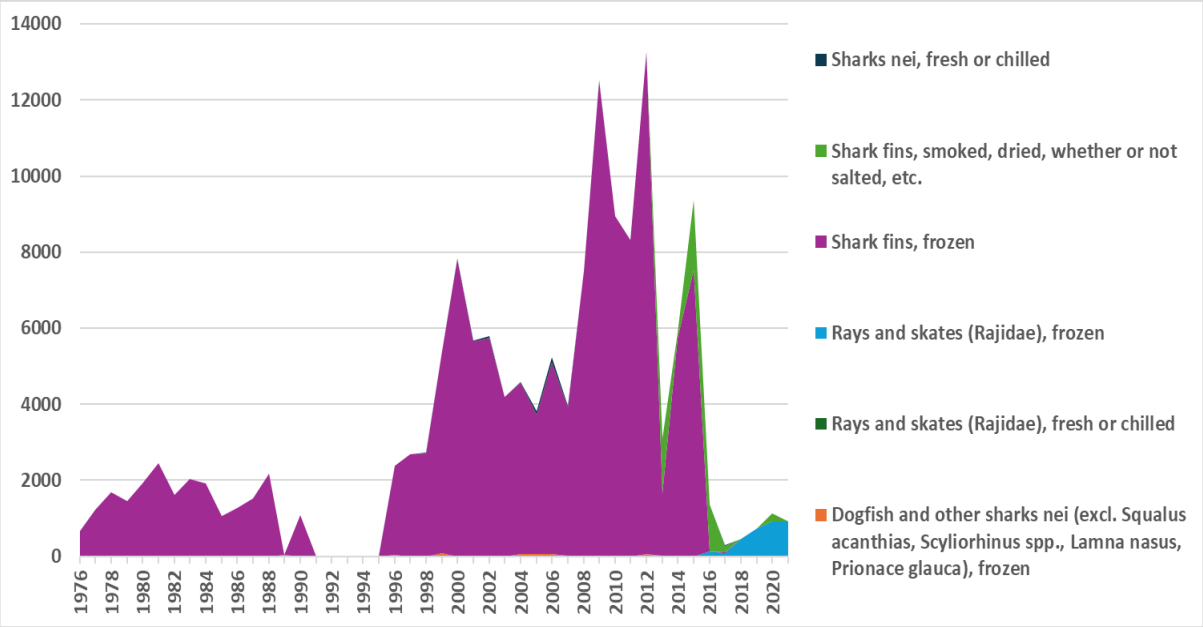


Figure 4: Export of sharks and shark products from India

3.5. Fishermen Groups Engaged in Shark Fishing

In India, fisheries are largely practiced as a traditional activity with population groups identified as fishermen. Shark fishing, which was developed and practiced as a specialized form of fisheries in certain parts of coastal India, also gave rise to distinct socio-economic

identities with many fishermen identifying themselves as 'shark fishermen' – the prominent amongst them are the fishermen from Thoothoor in Kanyakumari district of Tamil Nadu. The following fishermen groups carry out shark fishing in the country:

- Traditional catamaran fishers of Kanyakumari who conduct seasonal shark fishing along the east coast.
- Motorized canoe (*nava*) operating fishers of Kakinada who use bottom set gill nets and hooks & lines.
- Motorized wooden and FRP catamaran fishers of Andhra Pradesh who conduct seasonal shark fishing between Visakhapatnam and Puri.
- Traditional long-line fishers of north Kerala.
- Trawl operators who bring in sharks as by-catch.
- Fishermen of Thoothoor in Tamil Nadu who operate a specialized shark fishing mechanized fleet all along the Indian coast.
- Fishermen of Gujarat who employ gill nets, hooks & lines, and trawls for shark fishing.

3.6. National Institutional Mechanism

Entry 57 of List 1 of the Seventh Schedule of the Constitution of India specifies Fishing and Fisheries beyond Territorial Waters as 'Union Subject', whereas Entry 21 of List II speaks of Fisheries as 'State Subject'. Reading both entries together, it follows that control and regulation of fishing and fisheries within territorial waters is the exclusive province of the State, whereas, beyond the territorial waters, it is the exclusive domain of the Union. The Central Government acts as a facilitator and coordinator responsible for policy formulation, carrying out fishery research, and channelling funding support to the States/UTs in line with the national priorities and the commitments made to the State/UT Governments as also in meeting India's obligation to international commitments. The MoFAH&D within the purview of its allocated business helps the coastal States/UTs in the development of fisheries within the territorial waters, besides attending to the requirements of the sector in the EEZ. Therefore, management of fishery exploitation in the EEZ requires close coordination between the Union and the States/UTs.

While at the Union-level, the DoF, MoFAH&D is the focal point, it is the Departments of Fisheries (DoF) in the States/UTs (Table 9). Other Central Ministries/Departments, like the Ministry of Commerce and Industry (MoCI), Ministry of Earth Sciences (MoES), Ministry of Environment, Forest & Climate Change (MoEF&CC), and the Department of Agricultural Research & Education (DARE) through the Indian Council of Agricultural Research (ICAR), play important roles in various aspects of fisheries resources management. At the national level, the Ministry of Defence (MoD) through the Indian Coast Guard (ICG) is also associated with the management of fisheries in the EEZ. In recent years, the Ministry of Home Affairs (MHA) is also engaged in coastal affairs through the setting up of Coastal Marine Police (CMP). While the larger mandate of MHA is 'internal security', it is likely to play an important role in the coming years in the implementation of fisheries monitoring, control, and surveillance.

DoF formulates strategies for the national development plans for the sector and issues policy guidelines for fisheries development and management. It also provides technical and financial

assistance to various states/UTs for fisheries development and management. The financial assistance is over and above the budgetary support that the States/UTs receive directly from the Union Government.

The State/UT Governments are the principal custodians of fisheries in their respective jurisdictions (land as well as the territorial waters). In the marine sector, they are responsible for fisheries development and management with the main objectives of planning and developing infrastructure facilities for landing and berthing of fishing craft, creating suitable marketing facilities, and implementing various fisheries development programmes, viz., channelizing financial assistance for the purchase of fishing implements, implementing socio-economic programmes, and interacting with the Government of India and other agencies for technical and financial assistance. Each State/UT has a DoF, which functions as the main implementation agency for fisheries and aquaculture development programmes. The Marine Fishing Regulation Act (MFRA) enacted by all the coastal States/UTs came as a response to the growing conflicts in the coastal waters.

Table 9: Institutional arrangements for marine fisheries management in India

Agency / Ministry / Department	Agency / Department	Management areas
Ministry of Fisheries, Animal Husbandry & Dairying	Department of Fisheries Fisheries Survey of India, National Fisheries Development Board Central Institute of Coastal Engineering of Fishery	▪ Deep sea fishing (List I) ▪ Survey & assessment of fisheries resources ▪ Training & Extension ▪ Fisheries development ▪ Fishing harbours ▪ Fish processing
Ministry of Agriculture – Indian Council of Agriculture Research	ICAR Institutes (CMFRI, CIFRI, CIFT), SAUs, CAUs	▪ Research
Ministry of Defence	Coast Guard	▪ Monitoring of fishing by foreign vessels (List I) ▪ Prevention of marine pollution by ships
Ministry of Commerce and Industry	Marine Products Export Development Authority Export Inspection Council (MPEDA)	▪ Seafood exports (List I) ▪ Quality control ▪ Processing units
Ministry of External Affairs	-	▪ Law of the Sea negotiations (List I)
Ministry of Earth Sciences	Indian National Centre for Ocean Information Services Centre for Marine Living Resources and Ecology National Centre for Coastal Research	▪ Potential fishing zones ▪ Monitoring ocean pollution
State Governments	Department of Fisheries	▪ Management and MCS of Fisheries in territorial waters (List II)

Agency / Ministry / Department	Agency / Department	Management areas
Ministry of Environment and Forest & Climate Change (MoEF&CC)	-	▪ Protection of endangered species (Wildlife (Protection) Act, 1972) ▪ Protection of marine biodiversity (List III) ▪ Protection of coastal habitats (List III) ▪ Focal point for Ramsar, CITES, CMS & CBD Conventions (List III)
Ministry of Home Affairs	-	▪ Internal Security (Lists I & II)

3.7. Review of Management of Shark Fisheries in India

Restriction of the number of days of fishing during monsoon and fish spawning seasons is the most common management method (input control) followed in India. The maritime States/UTs along the west coast follow closed fishing for mechanized vessels for 61 days during the southwest monsoon months of June and July, and the maritime States/UTs along the east coast also follow 61 days of closure, but from mid-April to mid-June.

At the Union level, no such Act exists, and there is a need to have legislation for waters between 12 and 200 nm. The National Policy on Marine Fisheries of 2017 outlined the mission for the sector as follows: "While keeping the sustainability of the resources at the core of all actions, the policy framework will meet the national, social and economic goals, livelihood sustainability and socio-economic upliftment of the fisher community".

To conserve the elasmobranch species, the Ministry of Environment, Forest and Climate Change placed 18 species under Schedule 1 (Part IIA) of the Indian Wildlife (Protection) Act, 1972 (Table 10). These species should not be caught, harvested, or traded. Further, killing or unauthorized possession of the prohibited species is a non-bailable offence, attracting imprisonment for a period ranging from three to five years, and a penalty of Rs 25,000 (about US $ 305). However, as no fishing device is available to exclude these species selectively from the catch, especially from gillnet and hooks & lines, they are incidentally caught in those fishing gear.

In August 2013, the MOEF&CC issued a Policy Circular (F. No. 4-36/2013 WL) under the Indian Wildlife (Protection) Act, 1972 prohibiting on-board finning of sharks. The circular states that "any possession of shark fins that is not naturally attached to the body of a shark would amount to the hunting of a Schedule I species". The burden of proof will lie on the accused and failing to do so by the accused will attract a penalty as per the Act.

After the listing of certain species of sharks in CITES, the Ministry of Commerce and Industry issued two notifications (Notification No 110 (RE – 2013)/2009-2014 Dated: 6 February 2015) on "Prohibition on export of shark fins of all species of Shark" and another Notification on "Prohibition on import of shark fins of all species of Sharks" with immediate effect. However, for sustaining and effective management of shark populations, a comprehensive plan needs to be developed taking into consideration the livelihoods of the dependent fishermen.

Table 10: List of species protected under Schedules I and II of the Indian Wildlife (Protection) Act, 1972

Common name	Scientific name
SCHEDULE I	
Sharks	
Gangetic shark	*Glyphis gangetics*
Pondicherry shark	*Carcharhinus hemiodon*
Whale shark	*Rhincodon typus*
Rays, Wedgefishes	
Ganges stingray	*Himantura fluviatilis*
Giant freshwater whipray	*Urogymnus polylepis*
Porcupine whipray	*Urogymnus asperrimus*
Smoothnose wedgefish	*Rhynchobatus laevis*
Bottlenose wedgefish	*Rhynchobatus australiae*
Guitarfishes	
Giant guitarfish	*Rhynchobatus djiddensis*
Bowmouth guitarfish	*Rhina ancylostomus*
Clubnose guitarfish	*Glaucostegus thouin*
Widenose guitarfish	*Glaucostegus obtusus*
Mantas	
Giant manta	*Mobula birostris*
Reef manta	*Manta alfredi*
Sawfishes	
Common sawfish	*Pristis pristis*
Dwarf sawfish	*Pristis clavata*
Green sawfish	*Pristis zijsron*
Narrow sawfish	*Anoxypristis cuspidata*
SCHEDULE II	
Sharks	
Great hammerhead	*Sohyrna mokarran*
Oceanic whitetip	*Carcharhinus longimanus*
Smooth hammerhead	*Sphyrna zygaena*
Winged hammerhead	*Eusphyra blochii*
Rays	
Sicklefin devil ray	*Mobula tarapacana*
Mottled eagle ray	*Aetomylaeus maculatus*
Ocellate eagle ray	*Aetomylaeus milvus*
Ornate eagle ray	*Aetomylaeus vespertilio*

3.8. Perception of Stakeholders about NPOA-Sharks

A series of stakeholder consultations were carried out with the fishermen and traders across India during the preparation of the NPOA-Sharks. The final series of stakeholder consultations were organized through a community-driven initiative under the 'National Mission on Conservation of Sharks in India' spearheaded by the Association of Deep Sea Going Artisanal Fishermen (ADSGAF) of Thoothoor, Kanyakumari – one of the prominent shark fishing groups and supported by the BOBP-IGO. Eight consultations were held, one in each of the coastal states. Apart from representatives of the fisher community, these consultations were also attended by research organizations including ICAR-CMFRI, ICAR-CIFT, FSI, ICAR-CIFE, Fisheries colleges of State Agricultural Universities (SAUs), trade unions and associations, and NGOs.

From the many suggestions that emanated from these consultations, it was clear that the fishers and traders are of the firm opinion that a rational and participatory livelihood-centric plan of action is required to conserve shark resources in the Indian seas. While they have strongly emphasized the need for the conservation of sharks, they have viewed existing conservation measures as arbitrary and not in tune with their experiences at sea, consequently adversely impacting their livelihoods.

The fishers and traders disagree with the measures in vogue to prohibit the export of fins. They are of the view that while every part of the shark is useful, fins extract the highest revenue for the fishers and the processors. Given the ban on the export of fins, prices of sharks have gone down and this could be counter-productive as fishermen will increase their efforts to compensate for the income loss.

Fishermen, on their part, have also sought attention to the following aspects:

- Participatory research and monitoring;
- Broad policy on sharks through consultations;
- Improving the capacity of the fishermen to identify different species of sharks, as well as, distribute a guide on images of sharks to the officials from MoEF&CC and Indian Coast Guard;
- Data and research-driven conservation measures;
- Promotion of eco-friendly fishing gear; and
- Improving coordination amongst all stakeholders.

3.9. Issues

Based on the review of the literature and extensive discussions with the fisher community along the Indian coastline on matters relating to shark fisheries, the following major issues have been identified, which shall be addressed through the National Plan of Action for Conservation and Management of Sharks (NPOA-Shark):

- Indications of decline in shark biomass and species diversity (however, the catch has shown an upward trend in 2020 and 2021);
- Inadequate monitoring, control, and surveillance, including gaps in data collection and identification of species;

- Differences in the views of different stakeholder groups on the status of sharks and developing acceptable conservation measures;
- Research gaps on identification, spatial distribution, biological aspects, real-time data, and socioeconomic aspects; and
- Lack of a holistic framework to address the above issues.

4. NATIONAL PLAN OF ACTION ON SHARKS – INDIA

4.1. Purpose and Scope of NPOA-Sharks

The purpose of the NPOA-Sharks for India is to ensure the conservation and sustainable management of sharks. It applies to species that are found within the maritime zones of India, species that migrate through the Indian EEZ, and species captured by Indian-flagged vessels fishing on the High Seas.

The NPOA-Sharks seeks to address five issues: (i) arresting the decline in shark biomass; (ii) improving monitoring, control, and surveillance, and eliminating gaps in data collection and identification of species; (iii) setting the stage for agreed conservation measures; (iv) identifying research needs; and (v) setting a holistic framework to address these issues. The NPOA-Sharks follows the ecosystem approach to fisheries management (EAFM), which is the cornerstone of the National Policy on Marine Fisheries (NPMF), 2017.

In this regard, the NPOA-Sharks outlines eight necessities, namely, (i) Legal, institutional, and management framework requirements, comprising setting up of an effective MCS system and joint policy paper from the Fisheries and Environment Ministries; (ii) Human resources and capacity building requirements comprising, among others, improving taxonomic skills at the ground-level and improving data collection procedures; (iii) Data collection and management requirement suggesting a coordinated approach among ICAR-CMFRI, ICAR-CIFT, FSI, DoF (iv) Scientific research, focusing on taxonomic gaps, stock assessment, socio-economics, and moving towards EAFM; (v) Options of regulating fishing; (vi) Encouraging full utilization of dead sharks; (vii) Biodiversity and ecological considerations - while making policy at any level, and (viii) Regional cooperation, especially, because of the transboundary and migrating nature of sharks.

- The purpose of the NPOA-Sharks for India is to ensure the conservation and management of sharks and their long-term sustainable use.
- In the context of the NPOA-Sharks, ‘sharks’ are defined as all species in the class Chondrichthyes and include sharks, rays, skates, guitarfishes, sawfishes, and chimaeras.
- The NPOA-Sharks applies to species that are found within India’s Exclusive Economic Zone (EEZ), species that migrate through the Indian EEZ, and species captured by Indian-flagged vessels fishing on the High Seas.
- The NPOA-Sharks is an operational plan. It does not seek to revise the institutional mechanism, unless necessary, rather aims to contribute to it to enhance the conservation and management of sharks in India.
- The primary focus of NPOA-Sharks, at this stage, is to (i) bridge the research and information gaps on the status of sharks at the species level; (ii) understand socio-economic implications of conservation and management of sharks to design sustainable exploitation policies; and (iii) manage the negative impacts of fishing as it is assumed to be the biggest factor affecting sharks. Impacts from other anthropogenic activities and climate change are not dealt with in the present NPOA. These issues should be addressed in the future revision of the NPOA with enough information.

- The NPOA-Sharks is stakeholder-centric and take into account their concerns while also ensuring due concerns for the maintenance of the ecosystem integrity.
- Implementing EAFM and co-management is at the core of the NPOA-Sharks.
- The NPOA-Shark will lead to the development of a shark fisheries management plan customized for each State and Zone.
- The NPOA-Sharks will be reviewed and revised periodically (at least once in five years) to ensure ongoing effectiveness of the national efforts to address the conservation and management of shark species.

4.2. Management Principles

The NPOA-Sharks is based on the Ecosystem Approach to Fisheries (EAF). The FAO Technical Guidelines on the Ecosystem Approach to Fisheries define EAF as follows (Garcia et al., 2003):

> *"An ecosystem approach to fisheries strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries."*

Considering the data limitation and limited knowledge of the status of different shark species, the NPOA-Sharks also adopts a 'Precautionary Approach' for the time-being to manage sharks in the Indian EEZ.

4.3. Actions Suggested to Address the Issues in Shark Fisheries

The actions suggested under NPOA-Sharks take into consideration the issues experienced in shark fisheries in India, the principles of EAF, and their relation to IPOA-Sharks (Table 11).

Table 11: Actions suggested under the NPOA-Sharks in India

IPOA-Sharks	Action suggested in NPOA-Sharks
Ensure that shark catches from directed and non-directed fisheries are sustainable.	Any new policy on increasing fisheries production within or outside the 12 nautical miles (i.e., States' and Union Government' policies) should not promote direct catch of sharks until sufficient scientific evidence is available to increase exploitation. Initiate implementation of comprehensive fisheries MCS Plan at the earliest.
Assess threats to shark populations, determine and protect critical habitats, and implement harvesting strategies consistent with the principles of	Scientists and fishermen should work together to identify and ascertain shark breeding grounds and shark breeding period and agree on conservation measures, such as seasonal bans or area closures. The use of circle hooks should be promoted as a precautionary measure.

IPOA-Sharks	Action suggested in NPOA-Sharks
biological sustainability and rational long-term economic use.	Mesh size and opening of trawl nets, if suggested in the corresponding MFRA, should be strictly followed. In case such measures are not clarified in certain MFRAs, the same should be amended to include these measures.
Identify and provide special attention, in particular to vulnerable or threatened shark species/stocks.	Develop species-specific indicators using fisheries and exploratory survey data, wherever feasible. Initiate research to delineate shark populations along the Indian coast
Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management, and educational initiatives within and between States.	Initiate awareness drive among different stakeholders including fishermen; share research findings with fishermen and encourage fishermen associations/cooperatives to monitor and report shark catch. Implement the MCS Plan for fisheries at the earliest.
Minimize un-utilization of incidental catches of sharks.	Initiate research on value addition for sharks and share the findings with the community.
Contribute to the protection of biodiversity and ecosystem structure and function.	Ensure effective implementation of fisheries MCS Plan; encourage ecotourism and reef shark diving.
Minimize waste and discards from shark catches with the following article 7.2.2(g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed).	Ensure effective implementation of the fin-attached policy of the Government initiate research on value addition for sharks and share the findings with the community.
Encourage full use of dead sharks.	Review shark export policy, and encourage value addition.
Facilitate improved species-specific catch and landings data and monitoring of shark catches.	Introduce a logbook system; develop a national shark identification kit; build awareness; mobilize fishermen association and build research skills in taxonomy as well as data collection skills of enumerators from agencies involved in data collection.

IPOA-Sharks	Action suggested in NPOA-Sharks
Facilitate the identification and reporting of species-specific biological and trade data.	Introduce logbook system and voluntary reporting by fishermen; review policy on reporting of catch of prohibited species or species protected under the Wild Life (Protection) Act, 1972; encourage regional integration.

4.4. Legal, Institutional, and Management Framework Requirements

- There is a need for enactment of the law for waters between 12-200 nautical miles in consultation with the stakeholders.
- Shark fishing by Indian fishermen has extended beyond the Indian EEZ and into the high seas. There is a need to develop a management framework for fishing in ABNJ (Area beyond National Jurisdiction).
- The MFRAs of the coastal States/UTs may be reviewed in terms of 'lessons learned' and the contemporary challenges faced by the marine fisheries sector. The MFRAs in their present form do not address many such requirements. A fresh model Bill may assist the coastal States/UTs in re-visiting their MFRAs and bringing in the necessary changes.
- The management framework shall address the requirements of balancing conservation and sustainable fishing. Wherever required, a 'precautionary approach' will be adopted to discourage direct fishing of sharks.
- A Coordinating Committee shall be set up involving representatives from the following Ministries of the Union Government: Ministry of Fisheries, Animal Husbandry and Dairying; Ministry of Agriculture and Farmers Welfare; Ministry of Environment, Forest and Climate Change; Ministry of Commerce and Industry and Ministry of Defence; Departments of Fisheries of the coastal States/UTs; fisheries research organizations and representatives from fishermen associations to monitor the efforts of different states, suggesting harmonization of activities as well as reporting on progress of implementation of NPOA-Sharks.
- The Government shall mainstream co-management to ensure effective stakeholder participation, with due representation from various sections, including women.
- The shark trade policies shall be reviewed in view of the requirements stipulated under international agreements such as CITES and the livelihood needs of fishers.
- An effective MCS framework shall be formulated to address the above-mentioned issues.

4.5. Human resources and capacity building requirements

To ensure effective implementation of the NPOA-Sharks, human resource development, and capacity building need to be carried out (Table 12).

Table 12: Human resources and capacity building requirements

Activity level	Description of activity	Expected Outcome	Responsible Agency
Medium	Awareness building of fishermen and leadership building for monitoring fisheries activities.	Improved scope of community participation. This needs to be done with sustained efforts. Few fishermen groups are more progressive than others; such fishermen groups could be tapped to reach the other fishermen groups. Ultimately, the exercise will be fisher-to-fisher with backstopping by research institutes.	To be identified. However, NGOs or CBOs could be effective in this exercise.
High	Improved research activity and skills.	Better knowledge products on sharks.	ICAR-CMFRI, CIFT, FSI
High	Improving skills in MCS	Better fisheries MCS. This activity will primarily target Government officials engaged in MCS and related management functions.	BOBP-IGO
Medium	Training programme on the Code of Conduct for Responsible Fisheries and Ecosystem Approach to Fisheries for fisheries officials and other stakeholders.	Improve the understanding of sustainable fishing practices and global instruments; appreciate the need for better management measures for fisheries; develop skills for extension to fishermen.	BOBP-IGO/ ICAR-CMFRI/ CIFT/FSI/ DoF
High	Improving understanding of international agreements/ arrangements.	Better informed on the duties and responsibilities under such agreements/arrangements. This activity will primarily target Government officials and other concerned stakeholders.	BOBP-IGO

4.6. Data Collection and Management Requirement

- A coordinated approach shall be applied among different government agencies to provide concrete and reliable data, which will be used for further studies.
- Gaps in existing monitoring and data collection programmes for commercial fisheries and exploratory surveys shall be identified.
- Mechanisms shall be evolved for reporting the catches by fishermen involved in directed and non-directed fisheries, especially through logbooks.

- Data necessary for risk assessment of shark species, such as availability, catchability, productivity, and distribution shall be collected.
- Sound management norms for databases for easy retrieval and analysis shall be adopted and subjected to internal verification and validation checks.
- Protocols shall be developed whereby data can be shared between relevant agencies/stakeholder groups yet remain secure.
- Appropriate data on fishing mortality shall be collected as inputs for stock assessment and risk assessment.
- Where a species is taken in two or more fisheries within a jurisdiction or in two or more jurisdictions, it shall be ensured that (a) processes are in place to collect/report data from all fisheries and jurisdictions involved in the management of that species uniformly, and (b) are included, when data become available, in subsequent stock assessments or risk assessments conducted for that species.
- DNA barcodes of all species of sharks shall be developed and a DNA referral library established. This would assist in resolving issues related to taxonomic ambiguities.
- Methodologies for risk assessment shall be evaluated and a single national risk assessment framework, consistent across species and fisheries shall be adopted.
- Species listing under different vulnerability categories shall be revalidated; and revised, when necessary.
- Opportunities for better utilization and post-harvest value addition of sharks from the harvested species shall be increased, and commercial fisheries to use these opportunities shall be encouraged subject to the long-term ecologically sustainable harvest of shark species.
- Evaluation of methodology shall be initiated, and where possible, applied to assess the impact of shark management and conservation measures on ecosystem structure and function.
- The process to collect data on the impact of natural and anthropogenic impact (pollution and climate change) on the stocks, their migration, and abundance shall be initiated.
- Indigenous shark fishing practices, highlighting the traditional, cultural, and spiritual significance of sharks to local people shall be documented to be accommodated for developing management arrangements.
- Data collection on shark biology and population dynamics of sharks shall be strengthened to develop a basis for distinguishing the natural variation and trends in the system to assist in understanding population status, rates of recovery, population structure, and distribution.
- A framework to collect species-level data and assess the recovery of listed threatened species shall be developed.
- A review of shark handling practices to identify areas of concern and possible solutions for the conservation and management of sharks shall be prepared.

4.7. Scientific Research

- Research shall be strengthened to pave the way for (1) developing SMART (Specific, Measurable, Achievable, Realistic, and Time-bound) indicators; (2) stock assessment; and (3) moving towards an ecosystem approach to fisheries.
- Research findings shall be widely disseminated among all stakeholders.
- Effective by-catch reduction devices, especially in longline fisheries, shall be developed by undertaking planned research in gear technology.
- Shark hotspots and aggregation sites shall be mapped to develop strategies to effectively protect these sites with minimum impact on fishing.
- Trade-off between shark fishery and conservation shall be analysed and findings disseminated to create awareness on effective management of sharks.
- Periodic reports to international agencies such as FAO and IOTC on the progress of NPOA-Sharks shall be submitted.

4.8. Options for Regulating Fishing

- Fishermen shall be encouraged to follow gear regulation and effort control through awareness building.
- Effective implementation of MCS measures shall be ensured by creating the scope for community participation, which will make implementation cost-effective.
- Fishermen shall be encouraged to avoid shark hotspots and aggregation sites through awareness building or seasonal/area closure.
- Fishermen shall be educated on the use of recording shark fisheries data.
- A logbook system starting with mechanized fishing vessels shall be introduced, and regular inspection of logbooks by DoF officials shall be ensured.
- Effective shark bycatch reduction measures shall be undertaken.
- Management arrangements for target shark species shall include precautionary management.
- A mechanism for certification of products shall be developed to facilitate genuine trade in domestic and export markets as well as to avoid illegal trade on protected species.
- Hesitance of the fishermen in reporting accidental catches of protected species shall be addressed creating awareness of the merit and supportive attitude.
- A community education strategy aimed at the general public, commercial, and indigenous fishermen shall be introduced to raise national awareness of the vulnerability of sharks and in particular their role in the marine ecosystem, current threats, and status.
- Awareness of the provisions of the protected and threatened species, reporting requirements, and penalties for clandestine exploitation shall be developed amongst all resource users.

- Use of techniques to improve shark species identification (for example, the use of photos, and retention of rare species for confirmation of species identification) by user groups shall be encouraged.
- Print, electronic, and social media shall be engaged effectively to create awareness.

4.9. Encouragement of Full Utilization of Dead Sharks

Sharks are usually fully utilized in India, as shark meat is popular in many parts of coastal India in both fresh and dried forms. However, the following action may be considered:

- The livelihoods of people dependent on sharks shall be kept in consideration while implementing NPOA-Sharks.
- Interviews shall be conducted with fishermen to know the proportion of time spent in shark fishing and the proportion of income received from shark fishing.
- Posters of protected and CITES-listed species shall be placed in the fishing harbours and fish landing centres of major shark landing areas to improve awareness.
- Given the difficulties in species identification, trained staff from the DoF/MPEDA shall be deputed to certify shark catches.
- Post-harvest value addition of sharks shall be encouraged.

4.10. Biodiversity and Ecological Considerations

- Fisheries policies at the Union and State level shall adopt Ecosystem Approach to Management
- Anthropogenic impact on fisheries resources and habitats shall be monitored.
- Monitoring of reefs and reef-based fisheries resources shall be improved and using the reefs for dumping shall be discouraged.
- Eco-tourism, such as shark dives with the active participation and building of entrepreneurial skills among marginalized local communities, including fishermen shall be encouraged.
- Developing and regular updating of ecosystem health indicators shall be considered.
- Research on the impact of climate change and pollution on the ecosystem shall be encouraged.

4.11. Regional Cooperation

- Regional cooperation is important for ensuring optimal results from national efforts as many shark species are shared and straddling stocks.
- India shall contribute to the development of a Regional Plan of Action for Management of Sharks (RPOA-Sharks) through information exchange; policy dialogues; multilateral and bilateral forums and collaborative research.

- A national agreement on the scope of regional cooperation shall be made, protocols for regional cooperation developed, and the same shared in international and regional forums to reach regional agreement.
- Regional drive on environmental issues, especially on the health of the oceanic ecosystem shall be promoted along with fisheries.
- The issue of the need for regional cooperation in the management of sharks in political and development forums such as the South Asian Association for Regional Cooperation (SAARC); Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) and Indian Ocean Rim Association (IORA) shall be raised.
- Active participation in international and regional fisheries and environmental forums such as FAO, IOTC, Asia-Pacific Fishery Commission (APFIC), South Asia Cooperative Environment Programme (SACEP), Southeast Asian Fisheries Development Centre (SEAFDEC), BOBP-IGO, and IUCN will be encouraged, and policy initiatives and scientific findings shall be shared.
- Discussion on fisheries issues and exchanging best solutions as a part of Governmental initiatives towards South-South Cooperation shall be encouraged.

5. IMPLEMENTATION FRAMEWORK

The framework with the set of activities designed to put into practice the NPOA-Sharks is provided below (Table 13). The framework emphasizes the importance of adopting the interventions and their continuous improvement throughout implementation.

Necessary mechanisms shall be put in place to continually monitor the barriers and enablers of implementation, and evaluate the reach, effectiveness, and adoption of NPOA-Sharks.

Table 13: Implementation Framework for the National Plan of Action for Conservation and Management of Sharks (Years 1-3)

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
1. Preparatory Activities					
1.	Acceptance and Notification on the Implementation of the National Plan of Action for Conservation and Management of Sharks (NPOA-Sharks).	The first and foremost requirement is to ensure the acceptance (ownership) of the NPOA-Sharks. In line with the Allocation of Business Rules of the Government of India, MOFAH&D will be the lead Government agency and assume the responsibility of implementing the NPOA-Sharks.	Joint Secretary (Marine Fisheries), MoFAH&D.	• Notification of NPOA-Sharks, including its Implementation Plan. • Nomination of Focal Point in MoFAH&D and a core team for day-to-day implementation work. • Setting up of coordination mechanism with relevant Government and Non-governmental Organizations/ Agencies.	DoF in GoI and States
2.	Setting up of an Inter-Ministerial Coordination Committee.	This activity should be carried out simultaneously with Activity #1. The purpose of this activity is to mitigate the risk of working in a multi-agency environment. In addition, this activity will ensure an oversight of the implementation process.	Secretary (MOFAH&D); Joint Secretary (Marine Fisheries, MOFAH&D); Secretary (MoEF&CC); Chairperson, MPEDA; Director General, ICAR; Joint Secretary (Borders), MHA; Inspector General of Forests (WL); Secretary/Director of Fisheries of all coastal States/ UTs; The Chief Wildlife Warden of all Coastal States.	• Order issued on setting up of the Committee along with the Terms of Reference. • Minutes of the Meetings.	The relative importance of sharks in the overall scope of work of the Ministries/Departments is low.
3.	Publication of the National Shark Identification Kit or Guide.	Preparation of the National Shark Identification Kit or Guidelines. The document *inter alia* will contain relevant details of the species and their local names.	ICAR-CMFRI; Fishery Survey of India; DoFs; Fisher Associations/ Cooperatives	• Publication of the Guide.	Mislabelling; lack of coordination amongst different agencies; lack of information to generate details.
		From the user perspective, the document should comprise two parts: species allowed to be caught and	ICAR-CMFRI, FSI and DoF to collaborate to prepare the guide	• Distribution of copies of the guide to all users.	Low priority by the R&D Institutions.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
		species prohibited from being caught. Currently, ICAR-CMFRI has recorded 169 species of sharks. If it is not possible to collect information on all of them, species not allowed to be caught should be prioritized.	and to collect information on local names.		
2. Setting up of MCS Frameworks (01 – 36 Months)					
1.	Notification on Implementation of the National Plan of Action on Monitoring, Control and Surveillance (NPOA-MCS).	Many aspects of implementation of NPOA-Sharks, such as gear regulation, data collection, protected areas, etc. depends on finalising, notifying and implementing NPOA-MCS and also the Marine Fishing Regulation Act of the coastal States/UTs.	Secretary (MoFAH&D); Joint Secretary (Fisheries, MoFAH&D); Indian Coast Guard; Ministry of Home Affairs; DoF; Coastal Police; Fisher associations/ Cooperatives.	• Notification of the NPOA-MCS, including its Implementation Plan. • Setting up of an empowered committee to oversee the implementation of the NPOA-MCS. • Setting up of a MCS Cell in MoFAH&D for day-to-day implementation work. • Setting up of coordination mechanism with relevant Government and Non-government Organizations/ Agencies.	Involvement of multiple Ministries/Departments that would be dealing with different aspects of MCS, such as Ministry of Defence through the ICG; Ministry of Home Affairs for involvement of Coastal Marine Police- CMP; DoF of the coastal States/UTs; concerned NGOs/CBOs; and Representatives of Fisher Associations/ Cooperatives. Multi-agency coordination and networking.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
2.	Setting up of MCS Division at the Central level (MoFAH&D) and in each coastal State and UT for effective implementation of the scheme.	Monitoring implementation of MCS scheme	-Do-	• Notification/Order. • Placement of staff.	Coordination and networking to ensure smooth functioning in a multi-agency environment. Sanction of additional posts, if required.
3.	Establishment and maintenance of systems for acquisition, storage and dissemination of MCS data.	Part of standard MCS measures.	-Do-	• Notification. • Implementation of log books.	--
4.	Promotion of industry knowledge and understanding of the need for, and their cooperative participation in MCS activities to prevent, deter and eliminate IUU fishing.	Building awareness amongst stakeholders on the importance of MCS and how it will help fisheries business, especially the small-scale fishermen.	-Do-	• Annual MCS Reports. • Number of consultations and awareness programmes held.	--
5.	Planning and provision of funds for MCS operations.	A dedicated funding mechanism is needed as MCS is a continual process. It is suggested that an appropriate scheme is designed to implement MCS system.	MoFAH&D;ICG; DoF	• Budget Plan/ Scheme	Approval of the Niti Aayog and Ministry of Finance.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
6.	Provision of training and education to all persons involved in MCS operations.	To build human resources	MoFAH&D; DoF; ICG; MPEDA; Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO).	• Training programmes conducted (nos). • Persons trained (nos).	--
7.	Implementation of Vessel Monitoring System (VMS).	To ensure fishing is carried out in accordance with the license.	MoFAH&D; MHA; DoF; ICG.	• Annual MCS Reports.	Availability of satellite time for the purpose.
8.	Implementation of the log book system.	To encourage recording of catch and self-reporting by the fishermen. This is especially essential for mechanized fishing vessels.	MoFAH&D; DoF; ICG; ICAR-CMFRI/FSI (for designing of logbook and data processing).	• Preparation of log books and their translation in the vernacular. • Annual MCS Reports.	Cooperation of DoF; Fisher Associations/ Cooperatives in recording of catch information through use of log books.
9.	Maintenance of records of all boat building yards and their operation and construction of boats.	This would help in ensuring the quality and safety of fishing vessels as well as a tool for verification of new fishing vessels being constructed. In the long-run, also an effective mechanism for input control.	MoFAH&D; DoF.	• Notification. • Coverage of boatyards in the registration scheme. • Annual MCS Reports.	-Do-
10.	Record of fishing vessels.	Maintenance of records of all vessels (through appropriate registration and licensing) and their current owners and operators authorized to undertake fishing subject to their jurisdiction	MoFAH&D; DoF.	• Coverage of boatyards in the registration scheme. • Annual MCS Reports.	-Do-

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
11.	Review of policies and Acts and preparation of a Joint Policy Paper.	The review needs to be done from two perspectives: (1) whether existing policies and Acts including the Marine Fishing Regulation Acts and Wildlife (Protection) Act, 1972 are sufficient to cover international institutional requirements that India is a party to; and (2) whether existing policies and Acts are creating hurdles for livelihood development of fishermen and fisheries sector.	Concerned Ministries may set up a Committee comprising experts and stakeholders to deliberate on the issues.	• Notification. • Harmonized national policies and laws with international instruments/arrangements. • Review Reports.	Revision/formulation of new policies and/ or laws are usually time-consuming and multi-stakeholder exercises. Building consensus in such an environment can be a hurdle.
3. Human resources and capacity building requirements (06 – 12 Months)					
1	Building better taxonomic skills of field investigators and scientists.	Sharks are one of the lesser- known species in terms of taxonomy. India has a poor species-wise data collection system and the objective of this activity is to improve the scenario.	MoFAH&D/ ICAR-CMFRI/ FSI/ FAO/ Universities/ National Bureau of Fish Genetic Resources (NBFGR)	• Training Plans. • Reports	--
2.	Building skills in data collection techniques for field investigators.	This is a training programme on sampling and data collection. Different agencies collecting primary data report considerably different estimates. The objective is to develop skills to standardize data collection system.	MoFAH&D /ICAR-CMFRI/ FSI/ DoF.	• Agreement between different agencies. • Reports.	--
3.	Awareness building of fishermen and leadership building for monitoring fisheries activities.	Fishermen are often not clear about the ecological importance of sharks and question the need for conserving sharks specifically. In addition, to effectively integrate them with the monitoring system, training should be provided to build leadership skills and participatory skills	BOBP-IGO/ ICAR-CMFRI / FSI/ DoF/ NGO/ CBO.	• Agreement between different agencies. • Reports	--

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
4.	Training programme on the Code of Conduct for Responsible Fisheries and Ecosystem Approach to Fisheries Management	The objective of this programme is to improve the understanding of sustainable fishing practices and global instruments; appreciate need for better management measures for fisheries; and develop skills for extension to fishermen.	BOBP-IGO/ ICAR-CMFRI/CIFT/FSI/ DoF	• Report on Training programmes; • Pre and post-training evaluations	
4. Management, research, ecological and biodiversity related requirements (04 – 36 Months)					
1.	Developing methodology and indicators for rapid assessment of status of different shark species.	A suitable methodology, based on available data and the flow of data from ongoing research activities needs to be developed. At the same time, SMART indicators should be a part of this methodology. The indicators should be interpretable by lay person.	ICAR-CMFRI/FSI/FAO/ Universities/NBFGR.	• Reports. • Peer-reviewed papers.	Balancing scientific rigor with available resources.
2.	Identification of shark hotspots and congregation zones.	Identification of shark hotspots and congregation zones is necessary to design strategies to effectively safeguard these zones with minimum impact on fishing	ICAR-CMFRI/FSI/ Universities	• Reports. • Peer-reviewed papers.	On-going activity of ICAR-CMFRI.
3..	Developing DNA sequences of all species and establishing DNA referral library.	To resolve taxonomic ambiguities	ICAR-CMFRI/FSI/FAO/ Universities/NBFGR	• Reports. • Peer-reviewed papers.	On-going activity of NBFGR.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
4.	Evaluating methodologies for risk assessment and adopting a single national risk assessment framework, consistent across species and fisheries.	This activity will ensure consistent reporting.	ICAR-CMFRI/FSI/FAO/ Universities	• Reports	--
5.	Revalidating species listing under different vulnerability categories; and revise the status, if necessary	There is a long-standing demand from fishermen to revalidate the status of different species. In addition, this activity is necessary to meet CITES trade requirements if in the future India would like to review its trade policies. This activity will also include setting benchmarks at species-level against which the status will be compared. ICAR-CMFRI has in the past carried out a similar exercise.	ICAR-CMFRI/FSI/ Universities/ MOFAH&D/ MPEDA/Fishermen Associations	• Reports. • Peer-reviewed papers.	--
6.	Developing effective shark by-catch reduction measures.	Since majority of the sharks land as by-catch, without a viable strategy controlling shark catch will be difficult. Part of the problem will be addressed if and only if there is a better MCS system. However, at the same time options should be explored to design better gear that are eco-friendly but with comparable catching efficiency of existing gear. In longline, more studies are needed on the use of 'J' hooks versus 'O' hooks	ICAR-CMFRI/FSI/ CIFT/Universities/MOFAH&D/ MPEDA/Fishermen Associations	• Reports. • Peer-reviewed papers.	Acceptance by fishermen

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
7.	Review of shark trade policies.	Although shark fin trade is a small percentage of the total revenue from fish trade; the uniqueness of sharks in creating multiple times revenue in post-harvest should be noted. This is also an important activity for women. It also needs to be ascertained whether such policies will benefit the stocks as most sharks are landed as by-catch.	ICAR-CMFRI/FSI/ Universities/MoFAH&D/MPEDA/Fishermen Associations /Merchants/ BOBP-IGO	• Reports. • Peer-reviewed papers.	--
8.	Research on value addition from sharks.	The IPOA-Shark emphasizes on full-utilization of sharks.	NIFPHTT/ICAR-CIFT/Universities	• Reports • Field trials	--
9.	Creation of awareness material.	Creation of awareness material for fishermen and policymakers	ICAR-CMFRI/ FSI/ Universities/ MoFAH&D/ MPEDA/ Fishermen Associations/ BOBP-IGO	• Distribution of Material	--
10	Assessment of NPOA-Shark.	This is the final activity to review the progress under NPOA-Sharks and revise the Plan accordingly	FAO/IOTC/BOBP-IGO	• Report	--
5. Building regional cooperation (6 – 36 Months)					
1.	Contribution towards development of RPOA-Sharks.	Many shark species, especially the large pelagic sharks are straddling and shared stocks. Therefore, it is beyond the scope of a country to manage them successfully without regional cooperation. IOTC is the concerned fisheries management agency with the power to implement a regional management plan. In addition, IOTC also covers areas that are most important for the management of sharks in the region.	MOFAH&D; MPEDA; MOEF&CC; FAO/ APFIC; BOBP-IGO; IOTC; IUCN; WWF; SACEP; Conservation International (CI)	• Meeting Reports. • RPOA-Shark in place.	Will require multi-country and multi-agency cooperation.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
		Apart from IOTC, other regional fisheries and environmental agencies will also play an important role in policy harmonization, capacity building and the development of an information base. These agencies are BOBP-IGO; SEAFDEC; APFIC and SACEP. The activity includes participation in regional consultations; working towards policy harmonization and sharing of information. RPOA-shark is also highlighted as important by fishermen's community			
2.	Development of regional collaborative research and information exchange protocols.	The aim of this activity is to promote south-south cooperation in information exchange and research. However, since most of the research and information generated for research or through research are proprietary assets, agencies are not often agreeable to share them. In case of collaborative research; funding is a major issue. It is proposed that MoFAH&D will first carry out an internal discussion with national agencies and develop a strategy for regional cooperation. This strategy then can be presented for larger consideration through different regional forums including BOBP-IGO; APFIC and IOTC towards development of an agreed regional protocol.	MoFAH&D; ICAR; MPEDA; MoEF&CC; APFIC; BOBP-IGO; IOTC; IUCN; WWF; SACEP	• Agreement on Regional Research and Information Exchange Protocol adopted. • Interim: MoU between regional research institutes.	While there are many examples of North-South Cooperation and South-South Cooperation through external funding; examples of South-South Cooperation with self-funding/ national funding are scanty. Cost for this activity is towards arrangement of meetings at national and regional level.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/ Issues/ Risks
3.	Reporting to IOTC/ FAO/ CITES on the progress of NPOA-Sharks.	The objective of this activity is to inform the international community on India's efforts, which is necessary (i) to demonstrate India's commitment towards global sustainability initiatives; (ii) informing global community about the challenges being faced and efforts to overcome them; and (iii) receiving feedback from the international community to improve implementation.	MoFAH&D; FSI; ICAR-CMFRI; MPEDA; MoEF&CC; BOBP-IGO.	• Participation in international events and presentation of reports in appropriate forums.	--
4.	Building required political environment in support of regional action through regional forums	Apart from regional fisheries and environmental organizations; regional political and development organizations may also be considered for involvement to create the necessary political and developmental mandate to support RPOA-Sharks. Such political and development agencies are South Asian Association for Regional Cooperation (SAARC); Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC); Indian Ocean Rim Association (IORA)	Ministry of External Affairs; MOFAH&D; BOBP-IGO (Advocacy); IUCN (Advocacy); WWF (Advocacy).	• Adoption of regional resolutions.	--

6. REFERENCES

Akhilesh, K.V., Kizhakudan, S.J., Muktha, M., Najmudeen, T.M., Thomas, S., Karnad, D., Sutaria, D., Fernandes, M., Gupta, T., Namboothri, N., Patankar, V., Dash, S.S., Varghese, S.P., Biju Kumar, A., Barnes, A., Bineesh, K.K., John, S., Gangal, M., Manjebrayakath, H., Malayilethu, V., Tyabji, Z., Malaika, V., Sukumaran, S., Purushottama, G.B., Wilson, L., Mahesh, V., Nair, R.J., Remya, L., Rahangdale, S., Manojkumar, P.P., Sivakumar, K., Vivekanandan, E., Zacharia, P.U. & Gopalakrishnan, A. 2023. Elasmobranch conservation, challenges and management strategy in India: recommendations from a national consultative meeting. *Current Science,* 124(3), 292–303.

CMFRI, 2023. Marine Fish Stock Status of India, 2022. CMFRI Booklet Series 32. ICAR- Central Marine Fisheries Research Institute, Kochi, pp. 1-22.

Dulvy, N.K., Pacoureau, N., Rigby, C.L., Pollom, R.A., Jabado, R.W., Ebert, D.A., Finucci, B., Pollock, C.M., Cheok, J., Derrick, D.H., Herman, K.B., Sherman, C.S., VanderWright, W.J., Lawson, J.M., Walls, R.H.L., Carlson, J.K., Charvet, P., Bineesh, K.K., Fernando, D., Ralph, G.M., Matsushiba, J.H., Hilton-Taylor, C., Fordham, S.V. and Simpfendorfer, C.A. 2021. Overfishing drives over one-third of all sharks and rays toward a global extinction crisis. *Current Biology*, 31: 1-15.

Kizhakudan, S.J., Zacharia, P.U., Thomas, S., Vivekanandan, E. and Muktha, M., 2015. CMFRI marine fisheries policy series-2; guidance on national plan of action for sharks in India. CMFRI Marine Fisheries Policy Series, (2), pp.1-102.

DoF., 2018. Handbook of Fisheries Statistics – 2018. Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India. pp. 1-190.

FAO. 2020. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO. pp. 1-224.

FAO. 2022. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO. p266

Annexure 1

List of Elasmobranch Species Occurring in the EEZ of India (Source: ICAR-CMFRI)

No.	Order /Family	Species	Common Name
1	RHINOCHIMAERIDAE	*Neoharriotta pinnata* (Schnakenbeck, 1931)	Sicklefin Chimaera
2		*Rhinochimaera africana* Compagno, Stehmann & Ebert, 1990	Paddlenose Chimaera
3	CHIMAERIDAE	*Hydrolagus africanus* (Gilchrist, 1922)	African Chimaera
4	HEXANCHIDAE	*Heptranchias perlo* (Bonnaterre, 1788)	Sharpnose Sevengill Shark
5		*Hexanchus griseus* (Bonnaterre, 1788)	Bluntnose Sixgill Shark
6	ECHINORHINIDAE	*Echinorhinus brucus* (Bonnaterre, 1788)	Bramble Shark
7	SQUALIDAE	*Squalus mitsukurii* Jordan & Snyder, 1903	Shortspine Spurdog
8		*Squalus hemipinnis* White, Last & Yearsley, 2007	Indonesian Shortsnout Spurdog
9	CENTROPHORIDAE	*Centrophorus atromarginatus* Garman, 1913	Dwarf Gulper Shark
10		*Centrophorus moluccensis* Bleeker, 1860	Smallfin Gulper Shark
11		*Centrophorus granulosus* (Bloch & Schneider, 1801)	Gulper Shark
12		*Centrophorus squamosus* (Bonnaterre, 1788)	Leafscale Gulper Shark
13		*Centrophorus uyato* (Rafinesque 1810)	Little Gulper Shark
14		*Deania profundoroum* (Smith & Radcliffe, 1912)	Arrowhead Gulper Shark
15	ETMOPTERIDAE	*Centroscyllium ornatum* (Alcock, 1889)	Ornate Dogfish
16		*Centroscyllium kamoharai* Abe, 1966	Bareskin Dogfish
17		*Centroscyllium fabricii* (Reinhardt, 1825)	Black Dogfish
18		*Etmopterus pusillus* (Lowe, 1839)	Smooth Lanternshark
19		*Etmopterus granulosus* (Günther, 1880)	Southern Lanternshark
20	SOMNIOSIDAE	*Centroselachus crepidater* (Bocage & Capello, 1864)	Longnose Velvet Dogfish
21		*Zameus squamulosus* (Günther, 1877)	Velvet Dogfish
22		*Scymnodon ichiharai* Yano and Tanaka, 1984	Japanese Velvel Dogfish
23	SQUATINIDAE	*Squatina leae* Weigmann, Vaz, Akhilesh, Leeney & Naylor, 2023	Lea's Angel Shark
24	HEMISCYLLIIDAE	*Chiloscyllium arabicum* Gubanov, 1980	Arabian Carpet Shark

No.	Order /Family	Species	Common Name
25		*Chiloscyllium griseum* Müller & Henle, 1838	Grey Bamboo Shark
26		*Chiloscyllium indicum* (Gmelin, 1789)	Slender Bamboo Shark
27		*Chiloscyllium plagiosum* (Bennett, 1830)	Whiespotted Bamboo Shark
28		*Chiloscyllium punctatum* Müller & Henle, 1838	Brown Banded Shark
29		*Chiloscyllium hasselti* Bleeker, 1852	Hasselt's Bamboo Shark
30		*Chiloscyllium burmensis* Dingerkus & DeFino, 1983	Burmese Bamboo Shark
31	STEGOSTOMATIDAE	*Stegostoma fasciatum*(Hermann, 1783)	Zebra Shark
32	GINGLYMOSTOMATIDAE	*Nebrius ferrugineus* (Lesson, 1831)	Bamboo Shark
33	RHINCODONTIDAE	*Rhincodon typus* Smith, 1828	Whale Shark
34	ODONTASPIDIDAE	*Carcharias taurus* Rafinesque, 1810	Sand Tiger Shark
35		*Odontaspis ferox* (Risso, 1810).	Smoothtooth Sand Tiger Shark
36		*Odontaspis noronhai* (Maul 1955)	Bigeye Sand Tiger Shark
37	PSEUDOCARCHARIIDAE	*Pseudocarcharias kamoharai* (Matsubara, 1936)	Crocodile Shark
38	MEGACHASMIDAE	*Megachasma pelagios* Taylor, Compagno & Struhsaker, 1983	Megamouth Shark
39	ALOPIIDAE	*Alopias pelagicus* Nakamura, 1935	Pelagic Thresher Shark
40		*Alopias superciliosus* (Lowe, 1841)	Bigeye Thresher Shark
41		*Alopias vulpinus* (Bonnaterre, 1788)	Thresher Shark
42	LAMNIDAE	*Isurus oxyrinchus* Rafinesque, 1810	Shortfin Mako Shark
43		*Isurus paucus* (Guitart Manday, 1966)	Longfin Mako
44	SCYLIORHINIDAE	*Apristurus investigatoris* (Misra, 1962)	Broadnose Cat Shark
45		*Apristurus breviventralis* Kawauchi, weigmann & Nakaya, 2014	Shortbelly Catshark
46		*Atelomycterus marmoratus* (Bennett, 1830)	Coral Catshark
47		*Cephaloscyllium silasi* (Talwar, 1974)	Indian Swellshark
48		*Halaelurus quagga* (Alcock, 1899)	Quagga Catshark
49		*Bythaelurus hispidus* (Alcock, 1891)	Brstly Catshark
50	PROSCYLLIIDAE	*Eridacnis radcliffei* Smith, 1913	Pygmy Ribbontail Catshark
51		*Proscyllium magnificum* Last & Vongpanich, 2004	Magnificent Catshark

No.	Order /Family	Species	Common Name
52	PSEUDOTRIAKIDAE	*Planonasus indicus* Ebert, Akhilesh & Weigmann, 2018	Eastern Dwarf False Catshark
53	TRIAKIDAE	*Hemitriakis indroyonoi* White, Compagno & Dharmadi, 2009	Indonesian Houndshark
54		*Iago omanensis* (Norman, 1939)	Bigeye Houndshark
55		*Mustelus mosis* Hemprich & Ehrenberg, 1899	Arabian Smoothhound Shark
56	HEMIGALEIDAE	*Chaenogaleus macrostoma* (Bleeker, 1852)	Hooktooth Shark
57		*Hemigaleus microstoma* Bleeker, 1852	Sicklefin Weasel Shark
58		*Paragaleus randalli* Compagno, Krupp & Carpenter, 1996	Slender Weasel Shark
59		*Hemipristis elongata* (Klunzinger, 1871)	Snaggletooth Shark
60	CARCHARHINIDAE	*Carcharhinus albimarginatus* (Ruppel,1837)	Silvertip Shark
61		*Carcharhinus altimus* (Springer, 1950)	Bignose Shark
62		*Carcharhinus amblyrhynchoides* (Whitley, 1934)	Graceful Shark
63		*Carcharhinus amblyrhynchos* (Bleeker,1865)	Blacktail Reef Shark
64		*Carcharhinus amboinensis* (Müller & Henle, 1839)	Pigeye Shark
65		*Carcharhinus brevipinna* (Müller & Henle, 1839)	Spinner Shark
66		*Carcharhinus dussumieri* (Müller & Henle, 1839)	Whitecheek Skark
67		*Carcharhinus falciformis* (Müller & Henle, 1839)	Silky Shark
68		*Carcharhinus hemiodon* (Müller & Henle, 1839)*	Pondicherry Shark
69		*Carcharhinus leucas* (Müller & Henle, 1839)	Bull Shark
70		*Carcharhinus limbatus* (Müller & Henle, 1839)	Blacktip Shark
71		*Carcharhinus longimanus* (Poey, 1861)	Ocean Whitetip Shark
72		*Carcharhinus macloti* (Müller & Henle, 1839)	Hardnose Shark
73		*Carcharhinus melanopterus* (Quoy & Gaimard, 1824)	Blacktip Reef Shark
74		*Carcharhinus obscurus* (Lesueur,1818)	Dusky Shark
75		*Carcharhinus plumbeus* (Nardo, 1827)	Sandbar Shark
76		*Carcharhinus sealei* (Pietschmann, 1913)	Blackspot Shark

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77		*Carcharhinus sorrah* (Müller & Henle, 1839)	Spottail Shark
78		*Glyphis gangeticus* (Müller & Henle, 1839)	Ganges Shark
79		*Lamiopsis temminckii* (Müller & Henle, 1839)	Broadfin Shark
80		*Loxodon macrorhinus* Müller & Henle, 1839	Sliteye Shark
81		*Negaprion acutidens* (Rüppell, 1837)	Sicklefin Lemon Shark
82		*Prionace glauca* (Linnaeus, 1758)	Blue Shark
83		*Rhizoprionodon acutus* (Rüppell, 1837)	Milk Shark
84		*Rhizoprionodon oligolinx* Springer, 1964	Grey Sharpnose Shark
85		*Scoliodon laticaudus* Müller & Henle, 1838	Spadenose Shark
86		*Triaenodon obesus* (Rüppell, 1837)	Whitetip Reef Shark
87	GALEOCERDONDIDAE	*Galeocerdo cuvier* (Péron & Lesueur, 1822)	Tiger Shark
88	SPHYRNIDAE	*Eusphyra blochii* (Cuvier, 1817).	Winghead Shark
89		*Sphyrna lewini* (Griffith & Smith, 1834)	Scalloped Hammerhead
90		*Sphyrna mokarran* (Rüppell, 1837)	Great Hammerhead
91		*Sphyrna zygaena* (Linnaeus, 1758)	Smalleye Hammerhead
92	PRISTIDAE	*Anoxypristis cuspidata* (Latham, 1794)	Pointed sawfish
93		*Pristis pristis* (Linnaeus, 1758)	Common Sawfish
94		*Pristis zijsron* Bleeker, 1851	Longcomb sawfish
95		*Pristis clavata* Garman 1906	Dwarf Sawfish
96	RHINIDAE	*Rhina ancylostomus* Bloch & Schneider, 1801	Bowmouth Guitarfish
97		*Rhynchobatus laevis* (Bloch & Schneider, 1801)	Smoothnose Wedgefish
98		*Rhynchobatus australiae* Whitley, 1939	Bottlenose Wedgefish
99		*Rhynchobatus djiddensis* (Forsskål 1775)	Giant Guitarfish
100	RHINOBATIDAE	*Acroteriobatus variegatus* Nair & Lal Mohan, 1973	Stripnose Guitarfish
101		*Rhinobatos annandalei* Norman, 1926	Annandale's Guitarfish
102		*Rhinobatos lionotus* Norman, 1926	Smoothback Guitarfish
103		*Rhinobatos punctifer* Compagno & Randall, 1987	Spotted Guitarfish
104	GLAUCOSTEGIDAE	*Glaucostegus granulatus* (Cuvier, 1829)	Granulated Guitarfish

No.	Order /Family	Species	Common Name
105		*Glaucostegus halavi* (Forsskål, 1775)	Halavi Ray
106		*Glaucostegus obtusus* (Müller & Henle, 1841)	Widenose Guitarfish
107		*Glaucostegus thouin* (Anonymous, 1798)	Thouin Ray
108		*Glaucostegus typus* (Anonymous [Bennett] 1830).	Giant Shovelnose Ray
109	NARCINIDAE	*Benthobatis moresbyi* Alcock, 1898	Dark Blind Ray
110		*Narcine lingula* Richardson, 1840	Chinese Numbfish
111		*Narcine maculata* (Shaw, 1804)	Darkfish Numbfish
112		*Narcine prodorsalis* Bessednov, 1966	Tonkin Numbfish
113		*Narcine timlei* (Bloch & Schneider, 1801)	Spotted Numbfish
114	NARKIDAE	*Heteronarce mollis* (Lloyd,1907)	Soft Electric Ray
115		*Narke dipterygia* (Bloch & Schneider, 1801)	Numb Ray
116	TORPEDINIDAE	*Torpedo panthera* Olfers, 1831	Panther Electic Ray
117		*Torpedo sinuspersici* Olfers, 1831	Variable Torpedo Ray
118		*Torpedo fuscomaculata* Peters, 1855	Black-Spotted Torpedo
119		*Torpedo marmorata* Risso, 1810	Marbled Electric Ray
120	RAJIDAE	*Dipturus johannisdavisi* (Alcock 1899).	Travancore Skate
121		*Orbiraja powelli* (Alcock, 1898)	Indian Ring Skate
122	GURGESIELLIDAE	*Fenestraja mamillidens* (Alcock, 1889)	Prickly Skate
123		*Cruriraja andamanica* (Lloyd, 1909)	Andaman Leg Skate
124	HEXATRYGONIDAE	*Hexatrygon bickelli* Heemstra & Smith, 1980	Sixgill Stingray
125	GYMNURIDAE	*Gymnura zonura* (Bleeker, 1852)	Zonetail Butterfly Ray
126		*Gymnura poecilura* (Shaw, 1804)	Long-tailed Butterfly Ray
127		*Gymnura tentaculata* (Müller & Henle, 1841)	Tentacled Butterfly Ray
128	DASYATIDAE	*Brevitrygon manjajiae* Last, Weigmann & Naylor	Sandwich-tail Whipray
129		*Brevitrygon imbricata* (Bloch & Schneider, 1801)	Bengal Whipray
130		*Brevitrygon walga* (Müller & Henle, 1841)	Scaly Whipray
131		*Hemitrygon bennetti* (Müller & Henle, 1841)	Bennett's Stingray
132		*Himantura leoparda* Manjaji-Matsumoto & Last, 2008	Indo-Pacific Whipray
133		*Himantura uarnak* (Forsskål, 1775)	Honeycomb Stingray

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134		*Himantura undulata* (Bleeker, 1852)	Leopard Stingray
135		*Maculabatis arabica* Manjaji-Matsumoto & Last, 2016	Arabic Whipray
136		*Maculabatis bineeshi*Manjaji-Matsumoto & Last, 2017	Short-tail Whipray
137		*Maculabatis gerrardi* (Gray, 1851)	Shorpnose Stingray
138		*Megatrygon microps* (Annandale, 1908)	Smalleye Stingray
139		*Neotrygon caerulopunctata* Last, White, Seret, 2016	Bluespotted Maskray
140		*Neotrygon indica* Pavan-Kumar, 2018	Indian Bluespotted Maskray
141		*Pastinachus ater* (Macleay, 1883)	Broad Cowtail Ray
142		*Pastinachus gracilicaudus* Last & Manjaji-Matsumoto, 2010	Narrowtail Stingray
143		*Pastinachus sephen* (Forsskål, 1775)	Cowtail Stingray
144		*Pateobatis bleekeri* (Blyth, 1860)	Bleeker's Whipray
145		*Pateobatis fai* (Jordan & Seale, 1906)	Pink Whipray
146		*Pateobatis jenkinsii* (Annandale, 1909)	Jenkins Whipray
147		*Pteroplatytrygon violacea* (Bonaparte, 1832)	Pelagic Stinray
148		*Taeniura lymma* (Forsskål, 1775)	Ribbontail Stinray
149		*Taeniurops meyeni* (Müller & Henle, 1841)	Round Ribbontail Ray
150		*Telatrygon crozieri* (Blyth, 1860)	Indian Sharpnose Ray
151		*Trygon marginata* (Blyth, 1860)	Blackedge Whipray
152		*Urogymnus asperrimus* (Bloch & Schneider, 1801)	Porcupine Whipray
153		*Urogymnus granulatus* (Macleay, 1883)	Mangrove Whipray
154		*Urogymnus polylepis* Bleeker, 1852	Giant Freshwater Whipray
155	PLESIOBATIDAE	*Plesiobatis daviesi* (Wallace, 1967)	Deep-water Stingray
156	MYLIOBATIDAE	*Aetomylaeus maculatus*(Gray, 1832)	Mottled Eagle Ray
157		*Aetomylaeus milvus* (Müller & Troschel 1841)	Brown Eagle ray
158		*Aetomylaeus nichofii* (Bloch & Schneider, 1801)	Nieuhof's Eagle Ray
159		*Aetomylaeus vespertilio* (Bleeker 1851)	Ornate Eagle Ray
160	AETOBATIDAE	*Aetobatus flagellum* (Bloch & Schneider, 1801)	Longheaded Eagle Ray
161		*Aetobatus ocellatus* (Kuhl, 1823)	Spotted Eagle Ray
162	RHINOPTERIDAE	*Rhinoptera javanica* Müller & Henle, 1841	Flapnose Ray
163		*Rhinoptera jayakari* Boulenger, 1895	Oman Cownose Ray

No.	Order /Family	Species	Common Name
164	MOBULIDAE	*Mobula alfredi* (Kreft,1868)	Reef Manta Ray
165		*Mobula birostris* (Walbaum, 1792)	Giant Manta Ray
166		*Mobula kuhlii* (Müller & Henle 1841).	Shortfin devil Ray
167		*Mobula mobular* (Bonnaterre, 1788)	Devil Fish
168		*Mobula tarapacana* (Philippi 1892).	Chilean Devil Ray
169		*Mobula thurstoni* (Lloyd, 1908)	Smoothtail Mobula

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

The BOBP-IGO is a regional fisheries advisoy body with Bangladesh, India, Maldives, and Sri Lanka as its contracting parties. It is mandated to enhance cooperation amongst its member countries and other countries (especially Indonesia, Malaysia, Myanmar, and Thailand) for sustainable fisheries management in the Bay of Bengal region. The organisation evolved from the erstwhile Bay of Bengal Programme of the Food and Agriculture Organization of the United Nations (FAO), founded in 1979. The BOBP-IGO Secretariat is hosted by the Government of India and is located in Chennai.

National Fisheries Development Board (NFDB)

The National Fisheries Development Board (NFDB) was established in 2006 as an autonomous organization under the administrative control of the Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India to enhance fish poduction and productivity in the country and to coordinate fishey development in an integrated and holistic manner.

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