



(NPOA- Sharks)

Government of India

Advisory on the use of the document

This document outlines the National Plan of Action for the Conservation and Management of Sharks, with specific reference to the sovereign waters of India. The contents herein are for informational and advisory purposes only and do not constitute a binding agreement or official policy unless notified so in the Official Gazette of the Government of India. The document is prepared by the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) for the Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India based on scientific advisories, primarily the Guidance on National Plan of Action for Sharks in India by ICAR-Central Marine Fisheries Research Institute, survey reports of the Fishery Survey of India stakeholder consultations, coordinated by the Bay of Bengal Programme Inter-Governmental Organisation and scientific advisories, primarily the Guidance on National Plan of Action for Sharks in India by ICAR-Central Marine Fisheries Research Institute. While every effort has been made to ensure the accuracy and completeness of the information at the time of publication, it does not address all potential legal implications or interpretations regarding sovereignty and maritime boundaries.

The coastal States and Union territories are advised to adopt the provisions within their corresponding marine fisheries management acts and rules. Other concerned agencies and ministries shall take note of the measures suggested in this NPOA accordingly.

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 marine fisheries sector plays an important role in trade and commerce. With a coastline of 8,118 km, having 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 in India increased from 23.0 lakh tonnes (2.30 million tonnes) in 1990-91 to 44.32 lakh tonnes (4.13 m t) in 2022-23 (DoF, 2023). The estimated potential yield of the marine fishery resources of the country is 53.1 lakh tonnes (5.31 m t), constituting about 43.3% demersal, 49.5% pelagic, and 4.3% oceanic groups (DoF, 2018). 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. 63969.14 crores (8.09 billion US\$) during 2022-23.

Sharks, comprising 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 (DoF, 2022). 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 was US\$ 8.30 million.

Recent estimates put the number of shark species occurring in the Indian commercial fisheries at 183 from 12 orders, 46 families, 90 genera. It includes 91 species of sharks from 50 genera in 27 families; 89 species of batoids from 17 families and genera; including 9 species of guitarfishes from 3 genera (*Source: ICAR-CMFRI, database 2024*). 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 118369 species, 63% of elasmobranchs are under IUCN Red List categories of ‘Critically Endangered’ (15.3%), ‘Endangered’ (25.7%), and ‘Vulnerable’ (22.4%) 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 through the Amendment Bill in 2022, notified in 2023. The 18 species are the Pondicherry shark (*Carcharhinus 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 (*Mobula alfredi* and *Mobula birostris*). These species should not be caught, harvested, or traded. In 2013, India prohibited shark finning at sea and subsequently prohibited the export and import of shark fins.

India has a legal and policy framework in place 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 seasonal fishing closure for mechanized vessels for 61 days during the southwest monsoon months of June and July. The maritime States/UTs along the east coast also follow 61 days of closure, but during mid-April to mid-June. Although no such Act exists at the Union level, 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 first step towards the scripting of an NPOA-Sharks for India began in 2015 with the “Guidance on National Plan of Action for Sharks in India” brought out by ICAR-Central Marine Fisheries Research Institute which presented a structure and actional for the NPOA-Sharks in the country. Parallel to the scientific efforts, community-driven efforts mainly, the ‘National Mission on Conservation of Sharks’ initiated by the Association of Deep Sea Going Artisanal Fishers (ADSGAF) of Thoothoor in cooperation with the Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO) also added impetus to the formation of the NPOA-Sharks. 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 were organized. In addition, focused community-level appraisals were carried out in Gujarat and Tamil Nadu with fisher groups engaged primarily in shark fishing. During these consultations, fishermen pointed out that they understood and supported 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 and scientific inputs from various institutions 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 literature and extensive discussions with fishers and scientists along the Indian coastline on matters relating to shark fisheries, five major issues have been identified to ensure the conservation and sustainable management of sharks, which are envisioned to be addressed through the National Plan of Action for Conservation and Management of Sharks (NPOA-Sharks) -

- (i) Arresting decline in shark biomass;
- (ii) Improving monitoring, control, and surveillance, narrowing gaps in data collection, and updating skills 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:

- Regulatory frameworks for waters between 12 and 200 nm;
- Revisiting MFRAs considering contemporary challenges;
- Setting up of Coordination Committee with representatives from MoFAHD, 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
- Training and awareness on post-harvest value addition of sharks.

(3) Data collection and management requirements suggesting a coordinated approach among ICAR-CMFRI, ICAR-CIFT, FSI, MPEDA 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;
- Promoting the use of 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 of protected species as well as to facilitate genuine trade in domestic and export markets.

(6) Encouraging best harvest and post-harvest practices for shark species which can be sustainably fished:

- Placing posters in the fishing harbours and fish landing centres of major shark landing areas about the shark species which can be sustainably harvested and traded within the ambits of national and international regulations; and
- Encouraging post-harvest value addition of sharks.

(7) Biodiversity and ecological considerations:

- Improving the monitoring of anthropogenic impact on coastal resources and habitats;
- Improving the monitoring of reefs and reef-based fisheries resources and discourage using reefs for dumping of fish waste.
- Enhancing research on the impact of climate change and pollution on marine habitats, especially those known to support shark populations.
- Encouraging eco-tourism (e.g., shark dives) with the active participation and building of entrepreneurial skills among marginalized local communities, including fishermen;

(8) Regional cooperation in collaboration with RFBs/RFMOs and other such regional arrangements, especially, in view of the transboundary and migrating nature of sharks:

- Promote regional projects on sharks with funding from RFBs/RFMOs with focus on shared stocks
- Capacity building of key stakeholders in shark fisheries and research in the region through programs funded by RFBs/RFMOs
- Contributing to the development of RPOA/Regional Guidelines on Sharks;
- Developing regional collaborative research and information exchange protocols;
- Report on the progress of NPOA-Sharks to IOTC/FAO/CITES; and
- Building the required political environment in support of regional action.

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;

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
MoFAHD	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 weak regulatory regimes, has led to the decline in many shark populations. Sharks are highly vulnerable to over-exploitation because of their 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 an important step towards ensuring the continuity of ecological and economic services supported by sharks. It is also one step further 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, the Guidance on National Plan of Action for Sharks in India (Kizhakudan *et al.*, 2015) and reports published by ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI) provided fishery-related data on shark fishery;
- (ii) Fishery-independent data on sharks 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, which 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.

The "Guidance on National Plan of Action for Sharks in India" (Kizhakudan *et al.*, 2015), published by ICAR-CMFRI, provided support and important input for the preparation of India's NPOA-Sharks. 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 project reports and research publications of ICAR-CMFRI and Fishery Survey of India. The NPOAs of some of the major shark harvesting countries were also consulted to understand the best practices.

1.3. Objectives of NPOA-Sharks

The prime objective of this document is to fulfil India's commitment and responsibility towards conservation and sustainable fishery and utilization 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, and outputs. 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 11098.81 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 44.32 lakh tonnes (4.13 m t) in 2021-22 (Fig. 2) (DoF, 2023). The estimated potential yield of the country is 53.1 lakh tonnes (5.31 m t) (DoF, 2018). 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 8.56% of global production and contributing about 1.34% to the country's Gross Value Added (GVA) and over 7.08% to the agricultural GVA. Export earnings from the fisheries sector were Rs. 63969.14 crores (8.09 billion US\$) during 2022-23. 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 depend on effectively tackling these challenges. Considering this, the National Policy on Marine Fisheries (NPMF)-2017 and National Fisheries Policy (NFP)-2020 were developed by the Government of India 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 and cephalopods. These groups contributed about 60% to the overall marine fisheries landings. Sharks, rays and guitar fishes form a minor fishery of less than 1% (*Source: CMFRI Annual Report 2023*).

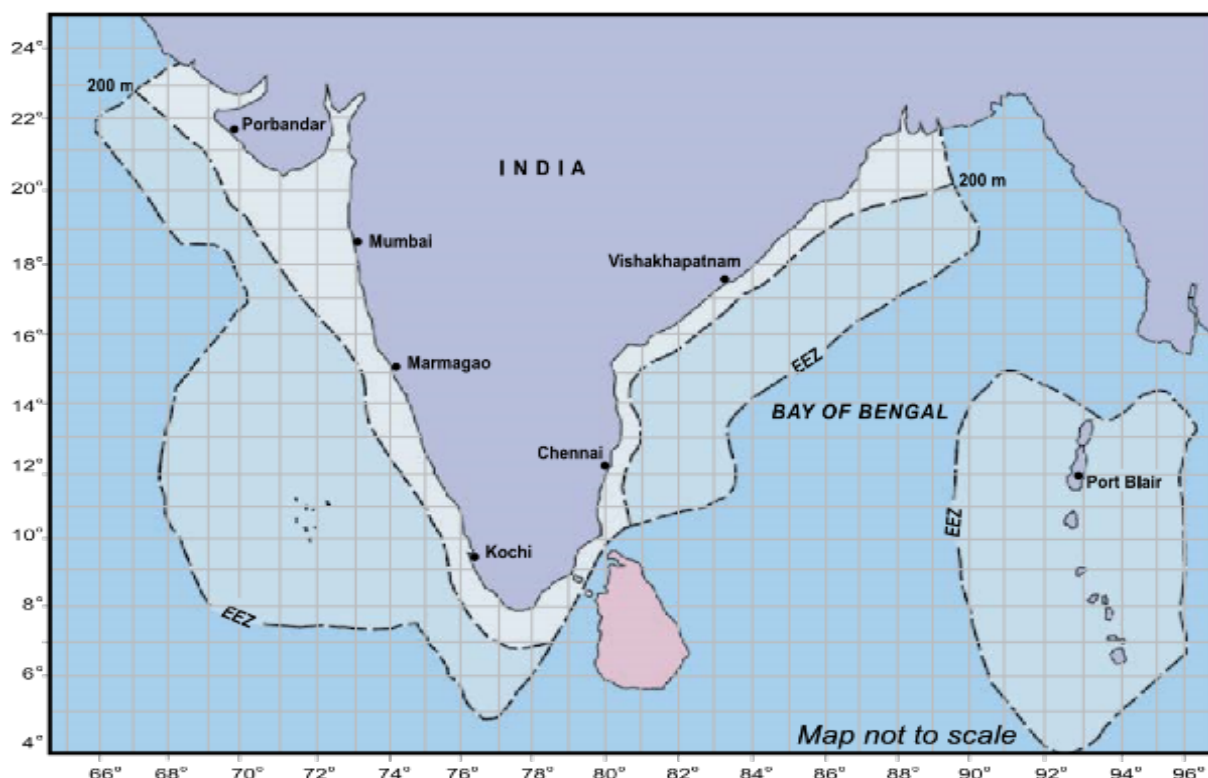


Figure 1: Exclusive Economic Zone of India

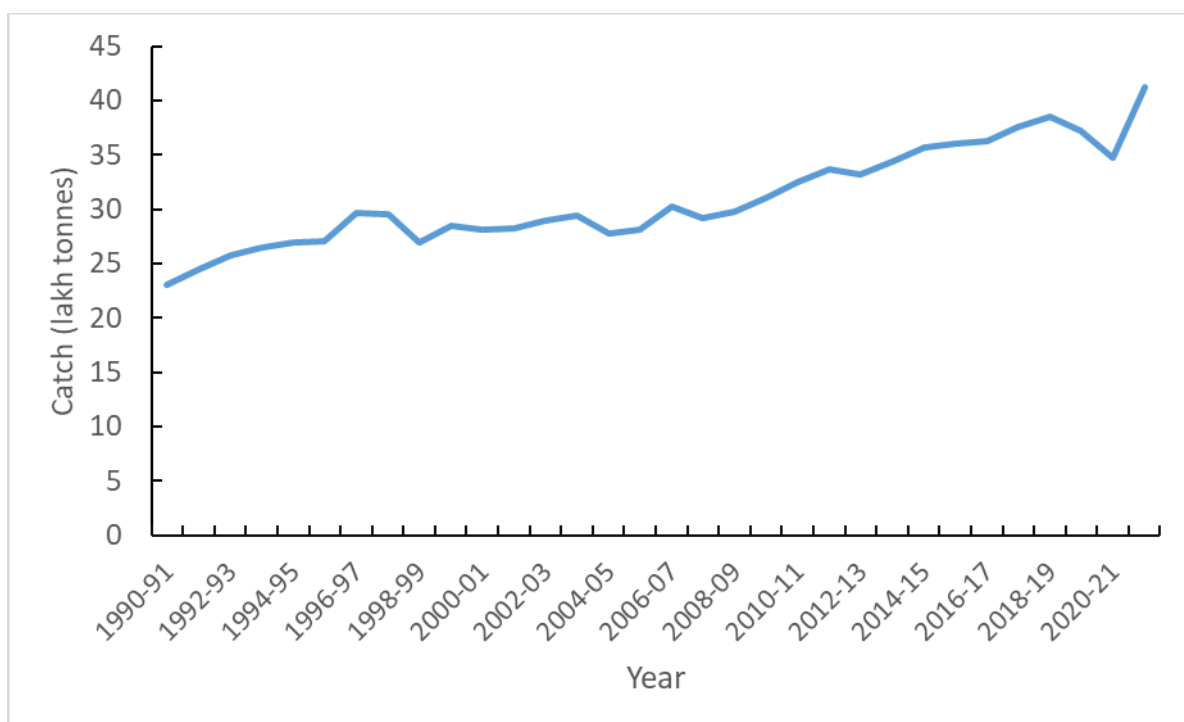


Figure 2: Marine fish landings during 1990-91 to 2021-22 (Source: DoF, GoI)

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: Realcraft 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: CMFRI-FSI-DoF, 2020)

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 17,35,286 tonnes in 2022-23. This added USD 8.09 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 (67% in value), followed by frozen fish (8.6%), cuttlefish (8.2%), and squid (8%). cuttlefish (5.6%).

2.3. Fisheries Potential

In 2018, the Working Group set up for Revalidating the Potential Yield (PY) of marine 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 to 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

Recent estimates put the number of shark species occurring in Indian waters at 183 species from 12 orders, 46 families. It includes 90 species of sharks from 27 families; 53 species of rays from 14 families; and 9 species of guitarfishes (*Source: ICAR-CMFRI, database 2024, unpubl.*). 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 183 species, 63.4% of elasmobranchs are under IUCN Red List categories of ‘Critically Endangered (15.3%)’, ‘Endangered (25.7%)’, and ‘Vulnerable (22.4%)’ species.

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

(Source: ICAR-CMFRI unpublished database, 2024)

Group	Order	Family	Genus	Species
Chimaeras	Chimaeriformes	Rhinochimaeridae	2	2
		Chimaeridae	1	1
Sharks	Hexanchiformes	Hexanchidae	2	2
	Echinorhiniformes	Echinorhinidae	1	1
	Squaliformes	Squalidae	1	2
		Centrophoridae	2	6
		Etmopteridae	2	4
		Somniosidae	4	4
	Squatiniiformes	Squatinae	1	1
	Orectolobiformes	Hemiscylliidae	1	7
		Stegostomatidae	1	1
		Ginglymostomatidae	1	1
		Rhincodontidae	1	1
	Lamniformes	Carchariidae	1	1
		Odontaspidae	1	2
		Pseudocarchariidae	1	1

		Megachasmidae	1	1
		Alopiidae	1	3
		Lamnidae	1	2
	Carcharhiniformes	Scyliorhinidae	1	1
		Pentanchidae	3	4
		Atelomycteridae	1	1
		Proscylliidae	2	2
		Pseudotriakidae	1	1
		Triakidae	3	4
		Hemigaleidae	4	5
		Carcharhinidae	9	27
		Galeocerondidae	1	1
		Sphyrnidae	2	5
Sawfishes	Rhinopristiformes	Pristidae	2	4
Wedgefishes		Rhinidae	2	4
Guitarfishes		Rhinobatidae	2	4
		Glaucostegidae	1	5
Numbfishes	Torpediniformes	Narcinidae	2	9
		Narkidae	2	2
		Torpedinidae	1	3
Skates	Rajiformes	Rajidae	2	3
		Gurgesiellidae	2	2
Rays	Myliobatiformes	Hexatrygonidae	1	1
		Gymnuridae	1	3
		Dasyatidae	14	33
		Plesiobatidae	1	1
		Myliobatidae	1	4
		Aetobatidae	1	2

		Rhinopteridae	1	2
		Mobulidae	1	7
Total	12	46	90	183

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 given in this document is of 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 longline 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 the recent Marine Fish Stock Status Report of India 2022 (CMFRI, 2023), of the 5 shark species assessed, 2 species are denoted as ‘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 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.

The global status of many species of sharks are of concern. Analysing the IUCN Red List status for 183 species of elasmobranchs occurring in India, 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*

	<i>Chim aeras</i>	<i>Shar ks</i>	<i>Sawfi shes</i>	<i>Wedge fishes</i>	<i>Guitar fishes</i>	<i>Numb fishes</i>	<i>Ska tes</i>	<i>Rays</i>	<i>Total</i>
<i>Not Evaluated (NE)</i>		<i>4</i>				<i>1</i>		<i>4</i>	<i>9</i>
<i>Data Deficient (DD)</i>		<i>3</i>				<i>4</i>	<i>2</i>	<i>1</i>	<i>10</i>
<i>Least Concern (LC)</i>	<i>2</i>	<i>12</i>				<i>1</i>	<i>2</i>	<i>6</i>	<i>23</i>
<i>Near Threatened (NT)</i>	<i>1</i>	<i>19</i>			<i>1</i>		<i>1</i>	<i>3</i>	<i>25</i>
<i>Vulnerable (VU)</i>		<i>25</i>				<i>6</i>		<i>10</i>	<i>41</i>
<i>Endangered (EN)</i>		<i>20</i>				<i>2</i>		<i>25</i>	<i>47</i>
<i>Critically Endangered (CR)</i>		<i>8</i>	<i>4</i>	<i>4</i>	<i>8</i>			<i>4</i>	<i>28</i>
<i>Total species</i>	<i>3</i>	<i>91</i>	<i>4</i>	<i>4</i>	<i>9</i>	<i>14</i>	<i>5</i>	<i>53</i>	<i>183</i>

*as of November 2024

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 (Kizhakudan *et al.*, 2015). 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 wedgefish and guitarfish fishery entered into a collapse or depleted phase in Orissa and West Bengal (Table 7).

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

(Reproduced with modification 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
Wedgefishes & 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 Landings 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 fluctuations it was 1,08,000t 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.

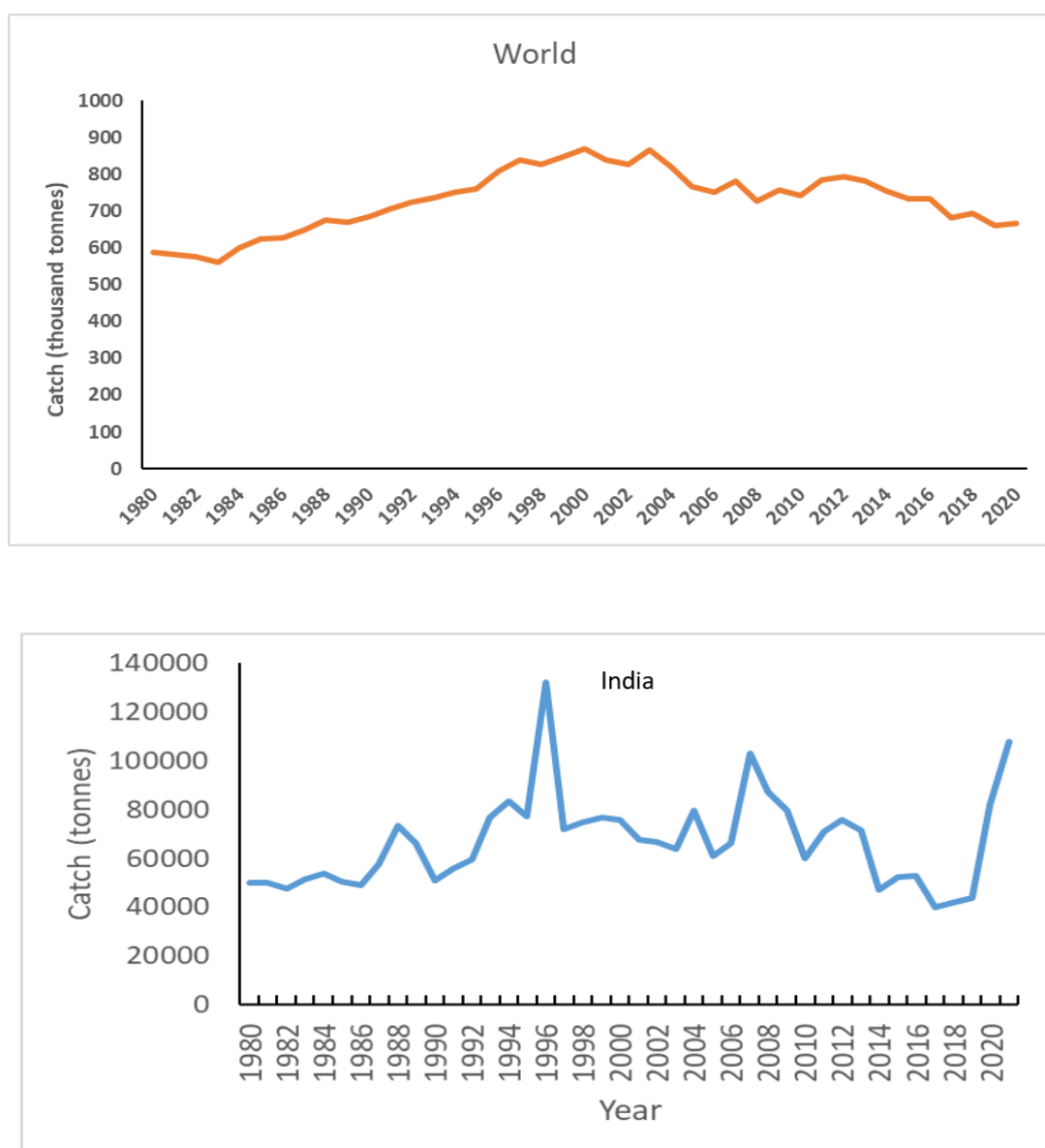


Figure 3: Trend in the landings of sharks during 1980-2021

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
2010-2021	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 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) (*Source: FAO database*). 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 limbatus*. 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).

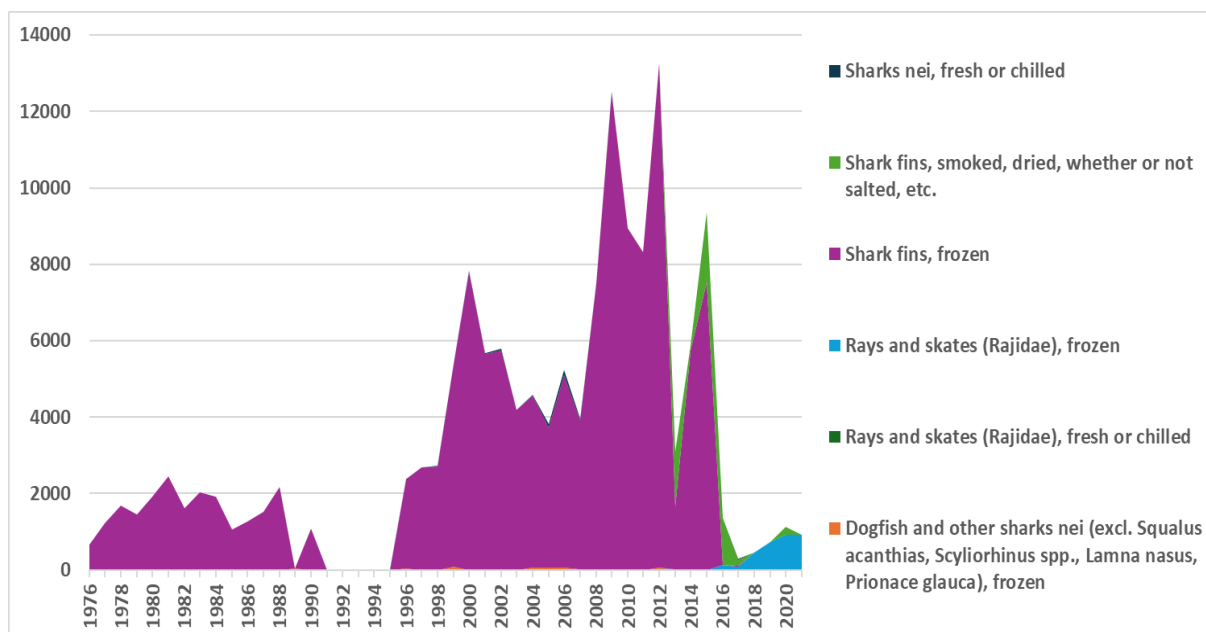


Figure 4: Export of sharks and shark products from India

3.5. Fishermen Groups Engaged in Shark Fishing

In India, fisheries are largely practiced as a traditional activity. 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 (Vivekanandan, V. 2001):

- Traditional catamaran fishers of Kanyakumari who conduct seasonal shark fishing mainly along the west coast.
- Motorized canoe (*nava*) operating fishers of Kakinada who use bottom set gillnets 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 MoFAHD 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, MoFAHD 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 Fishery Survey of India, National Fisheries Development Board,	■ Deep sea fishing (List I) ■ Survey & assessment of fisheries resources ■ Training & Extension ■ Fisheries development

Agency / Ministry / Department	Agency / Department	Management areas
	Central Institute of Coastal Engineering of Fishery	■ Fishing harbours ■ Fish processing
Ministry of Agriculture – Indian Council of Agriculture Research	ICAR Institutes (CMFRI, CIFT, NBFGR), SAUs, CAUs	■ Research & Development ■ Resource assessment ■ Technology development ■ Formulation of policy advisories for resource management & conservation
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 NIOT?	■ Potential fishing zones ■ Monitoring ocean pollution
State Governments	Department of Fisheries	■ Management and MCS of Fisheries in territorial waters (List II)
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)

Agency / Ministry / Department	Agency / Department	Management areas
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 follow 61 days of closure, from mid-April to mid-June.

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”. In furtherance of this vision, the Sustainable Harnessing of Fisheries in the Exclusive Economic Zone Rules, 2025 seeks to bring deep-sea fishing within a regulated and accountable framework, thereby advancing a sustainable, ecosystem-based marine fisheries regime.

To conserve the elasmobranch species, the Ministry of Environment, Forest and Climate Change placed 10 species under Schedule 1 (Part IIA) of the Indian Wildlife (Protection) Act, 1972. Subsequently amendments to the Act have been proposed through the recent Wildlife (Protection) Amendment Bill, 2022 (Bill No. 159 C of 2021) and the total elasmobranch species protected under Schedule I increased to 18 and that under Schedule II to 8 (Table 10). In 2022, the Amendment of WPA included CITES-listed species, providing legal support in the conservation of these species also. The species listed in Schedule I and II 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 (Notification No. 60/2023 dated 13 February 2024, on the subject “Indian Trade Classification (Harmonised System) of Export Items 2023 (chapter 3 of chapters 1-39 of Schedule 2, Export Policy of ITC (HS), 2023)).

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 Wildlife (Protection) Amendment Act, 2022

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

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 attract 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. However, encouraging a revision of the existing policy of ban on fin exports is not advisable, as high demand and price for fins in international markets will become the major driver for shark fishing, which will lead to unsustainable exploitation.

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-Sharks):

- Indications of decline in shark biomass and changes in species diversity with several species not being encountered in the fishery over the last two decades (e.g. sawfishes).

- Need to strengthen monitoring, control and surveillance to ensure compliance with management and conservation measures and transparent data reporting through logbook system.
- Ensure participation of all stakeholders in the process of developing and implementing shark fishery management and conservation actions.
- Implement more outreach and awareness generation programs to ensure dissemination of recent advances in shark research particularly addressing species identification, spatial distribution, biological aspects, trade and socio-economic dimensions.
- Need to integrate existing and new measures into 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 and their long-term sustainable use. 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) decline in shark biomass and changes in species diversity with several species not being encountered in the fishery over the last two decades (e.g. sawfishes); (ii) strengthen monitoring, control and surveillance to ensure compliance with management and conservation measures and transparent data reporting through logbook system; (iii) participation of all stakeholders in the process of developing and implementing shark fishery management and conservation actions; (iv) outreach and awareness generation programs to ensure dissemination of recent advances in shark research particularly addressing species identification, spatial distribution, biological aspects, trade and socio-economic dimensions; (v) integration existing and new measures into a holistic framework to address the above issues. The NPOA-Sharks encourage to the extent possible 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 field identification skills at the ground-level and improving data reporting procedures; (iii) Data collection and management requirements suggesting a coordinated approach among ICAR-CMFRI, ICAR-CIFT, FSI and DoF (iv) Scientific research, focusing on taxonomic gaps, stock assessment, socio-economics, and moving towards EAFM; (v) Options of regulating fishing; (vi) Encouraging best harvest and post-harvest practices for shark species which can be sustainably fished. (vii) Biodiversity and ecological considerations - while making policy at any level, and (viii) Regional cooperation, especially because of the transboundary and migratory 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-Sharks will support shark fisheries management and conservation by all the coastal States and UTs in India through necessary provisions in their respective MFRAs.
- 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’s policies) should not promote direct catch of sharks until sufficient scientific evidence is available to increase exploitation. Initiate

IPOA-Sharks	Action suggested in NPOA-Sharks
	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 biological sustainability and rational long-term economic use.	Scientists and fishermen should work together to identify and ascertain shark breeding grounds and shark breeding periods and agree on conservation measures, such as seasonal bans or area closures. The use of circle hooks should be promoted as a precautionary measure. 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. Intensify research to delineate shark populations along the Indian coast. Although studies have been carried out in some of the species that contribute to shark landings in country, such needs to be extended to as many species as possible, with known distribution 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.	Enhance awareness activities among different stakeholders including fishermen; share research findings with fishermen and encourage fishermen associations/cooperatives to monitor and report shark catch. Strengthen fisheries MCS.
Minimize non-utilization of incidental catches of sharks.	Initiate research on value addition for sharks and share the findings with the community to promote trade of value-added products.
Contribute to the protection of biodiversity and ecosystem structure and function.	Ensure effective implementation of fisheries MCS Plan; encourage ecotourism and reef shark diving.

IPOA-Sharks	Action suggested in NPOA-Sharks
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).	In August 2013, the MoEF&CC (Wildlife Division) adopted a policy advisory on shark finning (vide F. No4-36/2013WL, 21 August 2013), prohibiting the removal of shark fins from live sharks in the sea and advocated landing of the whole shark with fins intact in the body. Additionally, there is prohibition for export of shark fins as enforced through Ministry of Commerce & Industry; Department of Commerce Notification No 110 (RE – 2013)/2009-2014).
Encourage full use of dead sharks.	Shark meats is in demand in the local markets (in fresh, salted and dried forms and hence it is utilised fully. However, initiate research on value addition for sharks and share the findings with the community for diversified use of shark meat and byproducts.
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 associations and build field identification and data reporting skills of enumerators engaged for data collection.
Facilitate the identification and reporting of species-specific biological and trade data.	Introduce logbook system and encourage voluntary reporting by fishermen; encourage reporting of accidental catch of protected species to Government research institutions to enable gathering of relevant biological information that are otherwise difficult to obtain. Encourage regional integration.

4.4. Legal, Institutional, and Management Framework Requirements

- The management framework developed for shark fishing through this NPOA-Sharks must necessarily extend to all boats engaged in directed or non-directed shark fishing in Indian waters. In the event of such activity by Indian fishermen in any areas beyond national jurisdiction, the framework must be applied within the ambit of regulatory measures specified by regional management bodies. 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 Committees hall 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 practices shall be reviewed and regulated in view of the requirements stipulated under international agreements such as CITES, RFMOs etc., duly considering 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
High	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	Intensification of research activity and skill development.	Better knowledge products on sharks.	ICAR-CMFRI, CIFT, FSI
High	Strengthening skills in MCS	Better fisheries MCS. This activity will primarily target Government officials engaged in MCS and related management functions.	ICAR-CMFRI, CIFT, FSI, BOBP-IGO

Activity level	Description of activity	Expected Outcome	Responsible Agency
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, ICAR-CIFT, FSI, DoF
Medium	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, IOTC, MoFCC, FSI, CMFRI, ZSI, DoF

4.6. Data Collection and Management Requirement

- A coordinated approach shall be applied among different government agencies to provide concrete and reliable data, which can support periodic assessments and revisions of the shark management and conservation action advisories as necessary.
- 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 and accounted for while 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 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 management.
- 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 may 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 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 approaches.
- 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, fishermen shall be introduced to raise national awareness of the vulnerability of sharks and 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. Continue Full Utilization of Harvested 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 to encourage adoption of Ecosystem Approach to Fisheries Management to the extent possible while formulating and implementing shark fisheries management and conservation actions.
- Anthropogenic impact on coastal shark species and habitats shall be monitored.
- Monitoring of reefs and reef-based fisheries resources shall be improved and using the reefs for dumping fish waste shall be discouraged.
- Enhancing research on the impact of climate change and pollution on marine habitats, especially those known to support shark populations
- Eco-tourism activities, such as shark dives with the active participation and building of entrepreneurial skills among marginalized local communities, including fishermen 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 may 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 may 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 assessment and 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, SIOFA, IORA, CITES, CMS, Asia-Pacific Fishery Commission (APFIC), South Asia Cooperative Environment Programme (SACEP), 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, MoFAHD will be the lead Government agency and assume the responsibility of implementing the NPOA-Sharks.	Joint Secretary (Marine Fisheries), MoFAHD.	- Notification of NPOA-Sharks, including its Implementation Plan. - Nomination of Focal Point in MoFAHD 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 (MoFAHD); Joint Secretary (Marine Fisheries, MoFAHD); 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.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/Issues/Risks
3.	Publication of the National Shark Identification Kit or Guide.	Preparation of the National Shark Identification Kit or Guidelines. The document <i>inter alia</i> will contain relevant details of the species and their local names. From the user perspective, the document should comprise two parts: species allowed to be caught and species prohibited from being caught.	ICAR-CMFRI; Fishery Survey of India; DoF.	• Publication of the Guide. • Distribution of copies of the guide to all users.	
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 (MoFAHD); Joint Secretary (Fisheries, MoFAHD); Indian Coast Guard; Ministry of Home Affairs; DoF; Coastal Police.	• 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 MoFAHD 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 and other stakeholders.
2.	Setting up of MCS Division at the Central level (MoFAHD) and in each coastal State and UT for effective	Monitoring implementation of MCS scheme	-Do-	• Notification/Order. Placement of staff.	Coordination and networking to ensure smooth functioning in a multi-agency environment.

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/Issues/Risks
	implementation of the scheme.				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.	Reluctance of stakeholders to share fishing locations with respect to IUU fishing; building trust among stakeholders regarding IUU fishing and its implications
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.	Reluctance of stakeholders to share fishing locations with respect to IUU fishing; building trust among stakeholders regarding IUU fishing and its implications
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.	MoFAHD; ICG; DoF	• Budget Plan/ Scheme	Approval of the Niti Aayog and Ministry of Finance.
6.	Provision of training and education to all persons involved	To build human resources	MoFAHD; DoF; ICG; MPEDA; BOBP-IGO.	• Training programmes conducted (nos). • Persons trained (nos).	--

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/Issues/Risks
	in MCS operations.				
7.	Implementation of Vessel Monitoring System (VMS).	To ensure fishing is carried out in accordance with the license.	MoFAHD; 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.	MoFAHD; 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.	MoFAHD; 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	MoFAHD; 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.	Field identification of the sharks is very important to characterise the diversity in Indian waters. Hence, regular capacity building programmes are to be conducted.	MoFAHD/ICAR-CMFRI/FSI/ Universities/National Bureau of Fish Genetic Resources (NBFGR)	• Training Plans. • Reports	--
2.	Building skills in data collection techniques for field investigators.	Training programmes on sampling and data collection need to be conducted with the objective of developing skills to standardize the data collection system.	MoFAHD/ICAR-CMFRI/FSI/DoF	• Training Plans. • Reports.	--
3.	Awareness building of fishermen and leadership building for monitoring fisheries activities.	Effective integration of primary stakeholders into the fisheries monitoring system should be supported through targeted training programmes designed to build leadership and participatory skills.	ICAR-CMFRI / FSI / MoFAHD/DoF / NGOs / CBOs / BOBP-IGO	• Training Plans. • 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/ ICAR-CIFT/FSI/ MoFAHD DoF	• Training Plans. • Report on Training programmes; • Pre- and post-training evaluations	--
4. Management, research, ecological and biodiversity related requirements (04 – 36 Months)					
1.	Assessment of status of different shark species.	A suitable methodology may be considered, drawing on available data and the flow of information from ongoing research activities. As part of this approach, the inclusion of SMART indicators could be explored, ensuring that such indicators remain easily interpretable by non-specialists.	ICAR-CMFRI/FSI	• Reports. • Peer-reviewed papers.	On-going activity of ICAR-CMFRI and FSI.
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	• 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/NBFGR	• Reports. • Peer-reviewed papers.	On-going activity of ICAR-CMFRI, 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	● Reports	On-going activity of ICAR-CMFRI.
5.	Reviewing species listing under different vulnerability categories; and revise the status, when necessary	The Regional Red List assessment of sharks in Indian waters, aligned with IUCN categories, is considered essential for guiding effective management and conservation measures.	ICAR-CMFRI/FSI/ZSI /MoFAHD/MoEF&CC	● Reports. ● Peer-reviewed papers.	--
6.	Developing effective shark by-catch reduction measures.	Since majority of the sharks are landed as by-catch, effective and viable bycatch reduction measures are essential to ensure sustainability.	ICAR-CIFT/ ICAR-CMFRI/FSI/ MoFAHD/MPEDA/Fishermen Associations	● Reports. ● Peer-reviewed papers.	Acceptance by fishermen
7.	Review of shark trade policies.	The uniqueness of sharks in creating multiple times revenue in post-harvest should be noted. This is also an important activity for women. Trade policy could also emphasize the need for traceability across the value chain.	ICAR-CMFRI/FSI/ /MoFAHD/MPEDA/ ICAR-CIFT	● 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	--

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/Issues/Risks
9.	Creation of awareness material.	Creation of awareness material for fishermen and policymakers	ICAR-CMFRI/FSI/ MoFAHD/MPEDA/ BOBP-IGO	- Type/number of awareness materials - Number of stakeholders covered	--
10	Impact assessment of NPOA-Sharks.	The final activity involves reviewing progress following the notification of the NPOA-Sharks and considering revisions to the Plan as appropriate.	MoFAHD/DoF/ICAR-CMFRI/FSI.	Report	--
5. Building regional cooperation (6 – 36 Months)					
1.	Contribution towards development of RPOA-Sharks.	Large pelagic sharks are straddling and shared stocks, making regional cooperation beyond national management important. The development of an RPOA-Sharks is considered essential, and the process for its formulation is currently underway.	MoFAHD; MPEDA; MOEF&CC; FAO/ APFIC; BOBP-IGO; IOTC; SIOFA; IORA; IUCN; CITES; SACEP.	- Meeting Reports. - RPOA-Shark in place.	Will require multi-country and multi-agency cooperation.
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, with a view to developing an agreed regional protocol.	MoFAHD; ICAR; MPEDA; MoEF&CC; APFIC; BOBP-IGO; IOTC; SIOFA; IUCN; CITES; SACEP.	- Agreement on Regional Research and Information Exchange Protocol. - Interim: MoU between regional research institutes.	While there are several examples of North-South and South-South cooperation supported through external funding, instances of South-South cooperation based on self-funding or national resources remain limited. The costs associated with this activity relate primarily to the organization of meetings at both

#	Activity	Description of Activity	Responsible Agency/Person (Proposed)	Indicator(s) of Progress	Associated Actions/Issues/Risks
					national and regional levels.
3.	Reporting to IOTC/FAO/CITES on the progress of NPOA-Sharks.	The objective of this activity is to inform the international community about India's efforts, with the aim of (i) demonstrating India's commitment to global sustainability initiatives; and (ii) sharing the challenges being faced and the measures undertaken to address them;	MoFAHD/MoEF&CC;	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.	Ministry of External Affairs; MoFAHD; BOBP-IGO (Advocacy); IUCN (Advocacy);	Adoption of regional resolutions.	--

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Annexure 1

List of Elasmobranch Species Occurring in the EEZ of India

(Source: ICAR-CMFRI database 2024)

No.	Order /Family	Species	Common Name
1	RHINOCHIMAERIDAE	<i>Neoharriotta pinnata</i> (Schnakenbeck, 1931)	Sickle fin Chimaera
2		<i>Rhinochimaera africana</i> Compagno, Stehmann & Ebert, 1990	Paddlenose Chimaera
3	CHIMAERIDAE	<i>Hydrolagus africanus</i> (Gilchrist, 1922)	African Chimaera
4	HEXANCHIDAE	<i>Heptranchias perlo</i> (Bonnaterre, 1788)	Sharpenose Sevengill Shark
5		<i>Hexanchus griseus</i> (Bonnaterre, 1788)	Bluntnose Sixgill Shark
6	ECHINORHINIDAE	<i>Echinorhinus brucus</i> (Bonnaterre, 1788)	Bramble Shark
7	SQUALIDAE	<i>Squalus hima</i> Sweta and Bineesh, 2024	Indian spurdog
8		<i>Squalus hemipinnis</i> White, Last & Yearsley, 2007	Indonesian Shortsnout Spurdog
9	CENTROPHORIDAE	<i>Centrophorus atromarginatus</i> Garman, 1913	Dwarf Gulper Shark
10		<i>Centrophorus granulosus</i> (Bloch & Schneider, 1801)	Gulper Shark
11		<i>Centrophorus moluccensis</i> Bleeker, 1860	Smallfin Gulper Shark
12		<i>Centrophorus squamosus</i> (Bonnaterre, 1788)	Leafscale Gulper Shark
13		<i>Centrophorus uyato</i> (Rafinesque 1810)	Little Gulper Shark
14		<i>Deania profundorum</i> (Smith & Radcliffe, 1912)	Arrowhead Gulper Shark

15	ETMOPTERIDAE	<i>Centroscyllium ornatum</i> (Alcock, 1889)	Ornate Dogfish
16		<i>Centroscyllium fabricii</i> (Reinhardt, 1825)	Black Dogfish
17		<i>Etmopterus pusillus</i> (Lowe, 1839)	Smooth Lanternshark
18		<i>Etmopterus granulosus</i> (Günther, 1880)	Southern Lanternshark
19	SOMNIOSIDAE	<i>Centroscymnus owstonii</i> Garman 1906	Roughskin dogfish
20		<i>Centroselachus crepidater</i> (Bocage & Capello, 1864)	Longnose Velvet Dogfish
21		<i>Scymnodon ichiharai</i> Yano and Tanaka, 1984	Japanese Velvet Dogfish
22		<i>Zameus squamulosus</i> (Günther, 1877)	Velvet Dogfish
23	SQUATINIDAE	<i>Squatina leae</i> Weigmann, Vaz, Akhilesh, Leeney & Naylor, 2023	Lea's Angel Shark
24	HEMISCYLLIIDAE	<i>Chiloscyllium arabicum</i> Gubanov, 1980	Arabian Carpet Shark
25		<i>Chiloscyllium burmensis</i> Dingerkus & DeFino, 1983	Burmese Bamboo Shark
26		<i>Chiloscyllium griseum</i> Müller & Henle, 1838	Grey Bamboo Shark
27		<i>Chiloscyllium hasselti</i> Bleeker, 1852	Hasselt's Bamboo Shark
28		<i>Chiloscyllium indicum</i> (Gmelin, 1789)	Slender Bamboo Shark
29		<i>Chiloscyllium plagiosum</i> (Bennett, 1830)	Whiespotted Bamboo Shark
30		<i>Chiloscyllium punctatum</i> Müller & Henle, 1838	Brown Banded Shark
31	STEGOSTOMATIDAE	<i>Stegostoma tigrinum</i> (Forster 1781)	Zebra Shark
32	GINGLYMOSTOMATIDAE	<i>Nebrius ferrugineus</i> (Lesson, 1831)	Bamboo Shark

33	RHINCODONTIDAE	<i>Rhincodon typus</i> Smith, 1828	Whale Shark
34	CARCHARIIDAE	<i>Carcharias taurus</i> Rafinesque, 1810	Sand Tiger Shark
35	ODONTASPIDIDAE	<i>Odontaspis ferox</i> (Risso, 1810).	Smoothtooth Sand Tiger Shark
36		<i>Odontaspis noronhai</i> (Maul 1955)	Bigeye Sand Tiger Shark
37	PSEUDOCARCHARIIDAE	<i>Pseudocarcharias kamoharai</i> (Matsubara, 1936)	Crocodile Shark
38	MEGACHASMIDAE	<i>Megachasma pelagios</i> Taylor, Compagno & Struhsaker, 1983	Megamouth Shark
39	ALOPIIDAE	<i>Alopias pelagicus</i> Nakamura, 1935	Pelagic Thresher Shark
40		<i>Alopias superciliosus</i> (Lowe, 1841)	Bigeye Thresher Shark
41		<i>Alopias vulpinus</i> (Bonnaterre, 1788)	Thresher Shark
42	LAMNIDAE	<i>Isurus oxyrinchus</i> Rafinesque, 1810	Shortfin Mako Shark
43		<i>Isuru spaucus</i> (Guitart Manday, 1966)	Longfin Mako
44	SCYLIORHINIDAE	<i>Cephaloscyllium silasi</i> (Talwar, 1974)	Indian swellshark
45	PENTANCHIDAE	<i>Apristurus investigatoris</i> (Misra, 1962)	Broadnose Cat Shark
46		<i>Apristurus breviventralis</i> Kawauchi, weigmann & Nakaya, 2014	Shortbelly Catshark
47		<i>Bythaelurus hispidus</i> (Alcock, 1891)	Bristly Catshark
48		<i>Halaehurus quagga</i> (Alcock, 1899)	Quagga Catshark
49	ATELOMYCTERIDAE	<i>Atelomycterus marmoratus</i> (Bennett, 1830)	Coral Catshark
50	PROSCYLLIIDAE	<i>Eridacnis radcliffei</i> Smith, 1913	Pygmy Ribbontail Catshark

51		<i>Ctenacis magnificum</i> (Last & Vongpanich, 2004)	Magnificent Catshark
52	PSEUDOTRIAKID AE	<i>Planonassus indicus</i> Ebert, Akhilesh & Weigmann, 2018	Eastern Dwarf False Catshark
53	TRIAKIDAE	<i>Hemitriakis indroyonoi</i> White, Compagno & Dharmadi, 2009	Indonesian Houndshark
54		<i>Iago mangalorensis</i> (Cubelio, Remya and Kurup, 2011)	Mangalore houndshark
55		<i>Iago omanensis</i> (Norman, 1939)	Bigeye Houndshark
56		<i>Mustelus mosis</i> Hemprich & Ehrenberg, 1899	Arabian Smooth hound Shark
57	HEMIGALEIDAE	<i>Chaenogaleus macrostoma</i> (Bleeker, 1852)	Hooktooth Shark
58		<i>Hemigaleus microstoma</i> Bleeker, 1852	Sicklefin Weasel Shark
59		<i>Hemipristis elongata</i> (Klunzinger, 1871)	Snaggletooth Shark
60		<i>Paragaleus longicaudatus</i> (Bessednov, 1966)	Slender weasel shark
61		<i>Paragaleus randalli</i> Compagno, Krupp & Carpenter, 1996	Slender Weasel Shark
62	CARCHARHINID AE	<i>Carcharhinus albimarginatus</i> (Ruppel, 1837)	Silvertip Shark
63		<i>Carcharhinus altimus</i> (Springer, 1950)	Bignose Shark
64		<i>Carcharhinus amblyrhynchoides</i> (Whitley, 1934)	Graceful Shark
65		<i>Carcharhinus amblyrhynchos</i> (Bleeker, 1865)	Blacktail Reef Shark
66		<i>Carcharhinus amboinensis</i> (Müller & Henle, 1839)	Pigeye Shark
67		<i>Carcharhinus brevipinna</i> (Müller & Henle, 1839)	Spinner Shark
68		<i>Carcharhinus dussumieri</i> (Müller & Henle, 1839)	Whitecheek Skark

69		<i>Carcharhinus falciformis</i> (Müller & Henle, 1839)	Silky Shark
70		<i>Carcharhinus hemiodon</i> (Müller & Henle, 1839)*	Pondicherry Shark
71		<i>Carcharhinus leucas</i> (Müller & Henle, 1839)	Bull Shark
72		<i>Carcharhinus limbatus</i> (Müller & Henle, 1839)	Blacktip Shark
73		<i>Carcharhinus longimanus</i> (Poey, 1861)	Ocean Whitetip Shark
74		<i>Carcharhinus macroti</i> (Müller & Henle, 1839)	Hardnose Shark
75		<i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 1824)	Blacktip Reef Shark
76		<i>Carcharhinus obscurus</i> (Lesueur, 1818)	Dusky Shark
77		<i>Carcharhinus plumbeus</i> (Nardo, 1827)	Sandbar Shark
78		<i>Carcharhinus sealei</i> (Pietschmann, 1913)	Blackspot Shark
79		<i>Carcharhinus sorrah</i> (Müller & Henle, 1839)	Spottail Shark
80		<i>Glyphis gangeticus</i> (Müller & Henle, 1839)	Ganges Shark
81		<i>Lamiopsis temminckii</i> (Müller & Henle, 1839)	Broadfin Shark
82		<i>Loxodon macrorhinus</i> Müller & Henle, 1839	Sliteye Shark
83		<i>Negaprion acutidens</i> (Rüppell, 1837)	Sicklefin Lemon Shark
84		<i>Prionace glauca</i> (Linnaeus, 1758)	Blue Shark
85		<i>Rhizoprionodon acutus</i> (Rüppell, 1837)	Milk Shark
86		<i>Rhizoprionodon oligolinx</i> Springer, 1964	Grey Sharpnose Shark

87		<i>Scoliodon laticaudus</i> Müller & Henle, 1838	Spadenose Shark
88		<i>Triaenodon obesus</i> (Rüppell, 1837)	Whitetip Reef Shark
89	GALEOCERDONTIDAE	<i>Galeocerdo cuvier</i> (Péron & Lesueur, 1822)	Tiger Shark
90	SPHYRNIDAE	<i>Eusphyra blochii</i> (Cuvier, 1817).	Winghead Shark
91		<i>Eusphyra laticeps</i> (Cantor, 1837)	Winghead Shark
92		<i>Sphyrna lewini</i> (Griffith & Smith, 1834)	Scalloped Hammerhead
93		<i>Sphyrna mokarran</i> (Rüppell, 1837)	Great Hammerhead
94		<i>Sphyrna zygaena</i> (Linnaeus, 1758)	Smalleye Hammerhead
95	PRISTIDAE	<i>Anoxypristis cuspidata</i> (Latham, 1794)	Pointed sawfish
96		<i>Pristis clavata</i> Garman 1906	Dwarf Sawfish
97		<i>Pristis pristis</i> (Linnaeus, 1758)	Common Sawfish
98		<i>Pristis zijsron</i> Bleeker, 1851	Longcomb sawfish
99	RHINIDAE	<i>Rhina ancylostomus</i> Bloch & Schneider, 1801	Bowmouth Guitarfish
100		<i>Rhynchobatus australiae</i> Whitley, 1939	Bottlenose Wedgefish
101		<i>Rhynchobatus djiddensis</i> (Forsskål 1775)	Giant Guitarfish
102		<i>Rhynchobatus laevis</i> (Bloch & Schneider, 1801)	Smoothnose Wedgefish
103	RHINOBATIDAE	<i>Acroteriobatus variegatus</i> Nair & Lal Mohan, 1973	Stripnose Guitarfish
104		<i>Rhinobatos annandalei</i> Norman, 1926	Annandale's Guitarfish

105		<i>Rhinobatos lionotus</i> Norman, 1926	Smoothback Guitarfish
106		<i>Rhinobatos punctifer</i> Compagno & Randall, 1987	Spotted Guitarfish
107	GLAUCOSTEGID AE	<i>Glaucostegus granulatus</i> (Cuvier, 1829)	Granulated Guitarfish
108		<i>Glaucostegus halavi</i> (Forsskål, 1775)	Halavi Ray
109		<i>Glaucostegus obtusus</i> (Müller & Henle, 1841)	Widenose Guitarfish
110		<i>Glaucostegus thouin</i> (Anonymous, 1798)	Thouin Ray
111		<i>Glaucostegus typus</i> (Anonymous [Bennett] 1830).	Giant Shovelnose Ray
112	NARCINIDAE	<i>Benthobatis moresbyi</i> Alcock, 1898	Dark Blind Ray
113		<i>Narcine atzi</i> Carvalho & Randall, 2003	Oman numbfish
114		<i>Narcine brevilabiata</i> Bessednov, 1966	shortlip electric ray
115		<i>Narcine brunnea</i> Annandale, 1909	Brown numbfish
116		<i>Narcine lingula</i> Richardson, 1840	Chinese Numbfish
117		<i>Narcine maculata</i> (Shaw, 1804)	Darkfish Numbfish
118		<i>Narcine oculifera</i> Carvalho, Compagno & Mee, 2002	Bigeye numbfish
119		<i>Narcine prodorsalis</i> Bessednov, 1966	Tonkin Numbfish
120		<i>Narcine timlei</i> (Bloch & Schneider, 1801)	Spotted Numbfish
121	NARKIDAE	<i>Heteronarce mollis</i> (Lloyd, 1907)	Soft Electric Ray
122		<i>Narke dipterygia</i> (Bloch & Schneider, 1801)	Numb Ray

123	TORPEDINIDAE	<i>Torpedo fuscomaculata</i> Peters, 1855	Black-Spotted Torpedo
124		<i>Torpedo panthera</i> Olfers, 1831	Panther Electric Ray
125		<i>Torpedo sinuspersici</i> Olfers, 1831	Variable Torpedo Ray
126	RAJIDAE	<i>Dipturus johannisdavisi</i> (Alcock 1899).	Travancore Skate
127		<i>Dipturus springeri</i> (Wallace, 1967)	Roughbelly skate
128		<i>Orbiraja powelli</i> (Alcock, 1898)	Indian Ring Skate
129	GURGESIELLIDAE	<i>Cruriraja andamanica</i> (Lloyd, 1909)	Andaman Leg Skate
130		<i>Fenestraja mamillidens</i> (Alcock, 1889)	Prickly Skate
131	HEXATRYGONIDAE	<i>Hexatrygon bickelli</i> Heemstra & Smith, 1980	Sixgill Stingray
132	GYMNURIDAE	<i>Gymnura poecilura</i> (Shaw, 1804)	Long-tailed Butterfly Ray
133		<i>Gymnura tentaculata</i> (Müller & Henle, 1841)	Tentacled Butterfly Ray
134		<i>Gymnura zonura</i> (Bleeker, 1852)	Zonetail Butterfly Ray
135	DASYATIDAE	<i>Bathytoshia lata</i> (Garman, 1880)	Brown stingray
136		<i>Brevitrygon imbricata</i> (Bloch & Schneider, 1801)	Bengal Whipray
137		<i>Brevitrygon heterura</i> (Bleeker 1852)	Dwarf whipray
138		<i>Brevitrygon manjajiae</i> Last, Weigmann & Naylor	Sandwich-tail Whipray
139		<i>Brevitrygon walga</i> (Müller & Henle, 1841)	Scaly Whipray
140		<i>Hemitrygon bennetti</i> (Müller & Henle, 1841)	Bennett's Stingray

141		<i>Himantura fava</i> (Annandale, 1909)	honeycomb whipray
142		<i>Himantura leoparda</i> Manjaji-Matsumoto & Last, 2008	Indo-Pacific Whipray
143		<i>Himantura marginata</i> (Blyth, 1860)	Blackedge whipray
144		<i>Himantura uarnak</i> (Forsskål, 1775)	Honeycomb Stingray
145		<i>Himantura undulata</i> (Bleeker, 1852)	Leopard Stingray
146		<i>Himantura tutul</i> Borsa, Durand, Shen, Alyza, Solihin & Berrebi, 2013	
147		<i>Maculabatis arabica</i> Manjaji-Matsumoto & Last, 2016	Arabic Whipray
148		<i>Maculabatis bineeshi</i> Manjaji-Matsumoto & Last, 2017	Short-tail Whipray
149		<i>Maculabatis gerrardi</i> (Gray, 1851)	Shorpnose Stingray
150		<i>Maculabatis randalli</i> (Last, Manjaji- Matsumoto & Moore 2012)	Arabian banded whipray
151		<i>Megatrygon microps</i> (Annandale, 1908)	Smalleye Stingray
152		<i>Neotrygon caerulopunctata</i> Last, White, Seret, 2016	Bluespotted Maskray
153		<i>Neotrygon indica</i> Pavan-Kumar, 2018	Indian Bluespotted Maskray
154		<i>Pastinachus ater</i> (Macleay, 1883)	Broad Cowtail Ray
155		<i>Pastinachus gracilicaudus</i> Last & Manjaji-Matsumoto, 2010	Narrowtail Stingray
156		<i>Pastinachus sephen</i> (Forsskål, 1775)	Cowtail Stingray
157		<i>Pateobatis fai</i> (Jordan & Seale, 1906)	Pink Whipray

158		<i>Pateobatis bleekeri</i> (Blyth, 1860)	Bleeker's Whipray
159		<i>Pateobatis jenkinsii</i> (Annandale, 1909)	Jenkins Whipray
160		<i>Pateobatis uarnacoides</i> (Bleeker, 1852)	Whitenose whipray
161		<i>Pteroplatytrygon violacea</i> (Bonaparte, 1832)	Pelagic Stinray
162		<i>Taeniura lymma</i> (Forsskal, 1775)	Ribbontail Stinray
163		<i>Taeniurops meyeri</i> (Müller & Henle, 1841)	Round Ribbontail Ray
164		<i>Telatrygon crozieri</i> (Blyth, 1860)	Indian Sharpnose Ray
165		<i>Urogymnus asperrimus</i> (Bloch & Schneider, 1801)	Porcupine Whipray
166		<i>Urogymnus granulatus</i> (Macleay, 1883)	Mangrove Whipray
167		<i>Urogymnus polylepis</i> Bleeker, 1852	Giant Freshwater Whipray
168	PLESIOBATIDAE	<i>Plesiobatis daviesi</i> (Wallace, 1967)	Deep-water Stingray
169	MYLIOBATIDAE	<i>Aetomylaeus maculatus</i> (Gray, 1832)	Mottled Eagle Ray
170		<i>Aetomylaeus milvus</i> (Müller & Troschel 1841)	Brown Eagle ray
171		<i>Aetomylaeus nichofii</i> (Bloch & Schneider, 1801)	Nieuhof's Eagle Ray
172		<i>Aetomylaeus vespertilio</i> (Bleeker 1851)	Ornate Eagle Ray
173	AETOBATIDAE	<i>Aetobatus flagellum</i> (Bloch & Schneider, 1801)	Longheaded Eagle Ray
174		<i>Aetobatus ocellatus</i> (Kuhl, 1823)	Spotted Eagle Ray
175	RHINOPTERIDAE	<i>Rhinoptera javanica</i> Müller & Henle, 1841	Flapnose Ray

176		<i>Rhinoptera jayakari</i> Boulenger, 1895	Oman Cownose Ray
177	MOBULIDAE	<i>Mobula alfredi</i> (Kreft, 1868)	Reef Manta Ray
178		<i>Mobula birostris</i> (Walbaum, 1792)	Giant Manta Ray
179		<i>Mobula eregoodoo</i> (Cantor 1849)	Longhorned pygmy devil ray
180		<i>Mobula kuhlii</i> (Müller & Henle 1841).	Shortfin devil Ray
181		<i>Mobula mobular</i> (Bonnaterre, 1788)	Devil Fish
182		<i>Mobula tarapacana</i> (Philippi 1892).	Chilean Devil Ray
183		<i>Mobula thurstoni</i> (Lloyd, 1908)	Smoothtail Mobula



National Marine Turtle Action Plan

Government of India
Ministry of Environment, Forest & Climate Change

(2021-2026)



National Marine Turtle Action Plan

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Ministry of Environment, Forest & Climate Change
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मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन,
सूचना एवं प्रसारण और
भारी उद्योग एवं लोक उद्यम
भारत सरकार



MINISTER
ENVIRONMENT, FOREST & CLIMATE CHANGE,
INFORMATION & BROADCASTING AND
HEAVY INDUSTRIES & PUBLIC ENTERPRISES
GOVERNMENT OF INDIA

प्रकाश जावडेकर
Prakash Javadekar



MESSAGE

India is blessed with its rich and varied biodiversity. We have always taken pride in conserving this natural heritage. Our marine biodiversity is no exception to this. Marine Turtles have always captured our imagination and has been conserved since the ages. Marine Turtles are considered to be flagship species in various marine habitats such as coral reefs, sea grass meadows, sandy beaches, etc.

Besides being home to one of the largest congregations of nesting of the Olive Ridley Turtles, five species of marine turtles are found in India. These species found in Indian waters have been listed in the Schedule-I of the Wild Life (Protection) Act, 1972 and therefore, accorded very high protection status. Considering the importance of conservation of marine turtles, the Ministry had included marine turtles as one of the 22 species for taking up focussed conservation programme under the Centrally Sponsored Scheme- Development of Wildlife Habitats.

I am happy to note that the Ministry has now prepared a 'National Marine Turtle Action Plan' through an extensive consultative process with relevant stakeholders. This Action Plan focuses on reducing threats, conserving critical habitat, exchanging scientific data, increasing public awareness and most importantly emphasizes on a participatory approach in conservation of marine turtles and its habitats. The Action Plan will enable the stakeholders to perform their roles in a coordinated manner and take effective measures for the conservation of marine turtles.

I am confident that this 'National Marine Turtle Action Plan' will provide a fresh impetus to work towards conserving these magnificent species and their habitats and provide them with safe havens for their future and for a healthy planet.

With best wishes.

Date: 19.01.2021

(Prakash Javadekar)

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सत्यमेव जयते



बाबुल सुप्रियो

केन्द्रीय राज्य मंत्री

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
भारत सरकार



MESSAGE

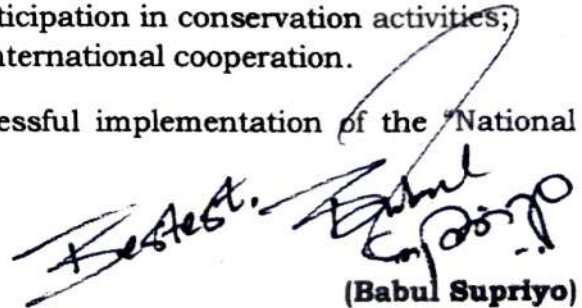
Marine turtles play a variety of ecological roles like controlling prey populations, supporting coastal vegetation through their hatchlings etc. in maintaining healthy marine habitats. They are key indicators of healthy marine habitats.

Numerous direct and indirect pressures arising from various factors adversely impact marine turtle populations and their habitat. This includes man made factors such as pollution, habitat destruction, bycatch, etc. and also includes natural disasters such as tsunamis, cyclones, hurricanes and storms. With a view to conserve marine turtles, associated species and their habitats, the Ministry of Environment, Forest and Climate Change, Government of India has prepared this "National Marine Turtle Action Plan, 2021-2026" with a vision to create a viable and healthy marine ecosystem for marine turtles and associated species through a coordinated and participatory mechanism to ensure long term survival of marine turtles.

The National Marine Turtle Action Plan, 2021-2026 would be implemented at the National and State Government level with the following objectives:

- Reduce direct and indirect causes of marine turtle mortality;
- Protect, conserve and rehabilitate marine turtle habitats;
- Improve understanding of marine turtle ecology and populations through research, monitoring and information exchange;
- Increase public awareness of the threats to marine turtles and their habitats, and enhance public participation in conservation activities;
- Enhance national, regional and international cooperation.

I wish all the best for the successful implementation of the "National Marine Turtle Action Plan, 2021-2026".


(Babul Supriyo)

Background

India has a vast coastline of more than 7,500 km, of which, about 5,400 km belong to Peninsular India and about 2,000 km to the Andaman, Nicobar, and Lakshadweep Islands, and with an EEZ (Exclusive Economic Zone) of 2.02 million sq. km. Five species of sea turtles are found in Indian waters. The marine biodiversity including marine turtles in India is one among the richest in the Indian Ocean.

Marine turtles have a major influence on the structure and function of marine biodiversity and play an important role in shaping the behavior and life history traits of prey species and predators that is critical for the sustainability of fisheries in the region. Factors like climate change, unsustainable resource use, marine litter and pollution affect marine turtles and their habitats.

Constitution of India recognizes the need to protect wildlife that include marine life and their environment. The provision under Article 48 A mandates the state to protect, safeguard and improve the environment with the corresponding duty under Article 51 A (g) to the citizen to protect and improve the natural environment. This clearly supports the need to carry out all necessary steps to not only protect but also improve the marine environment.

Marine turtles play a variety of ecological roles for maintaining healthy marine habitats like controlling prey populations, supporting coastal vegetation through their hatchlings etc. Their presence is an indicator of healthy marine ecosystems and provide a source of revenue for local communities through tourism. Marine turtles thus present themselves as a key indicator of healthy marine habitats and an opportunity for conservation of associated species.



Goal

1. **Conserve** Species, their habitat and reduce negative impacts on survival of marine turtles;
2. **Improve** the understanding of marine turtles and their habitats, through a coordinated mechanism;
3. **Promote** Awareness and Education on conservation of marine turtles and their habitats;
4. **Enhance** livelihoods of coastal communities through promoting sustainable ecotourism;
5. **Increase** national, regional and international cooperation on marine turtle conservation.

Vision

Create a viable and healthy marine ecosystem for marine turtles and associated species through a coordinated and participatory mechanism to ensure long term survival of marine turtles.

Mission

The Action Plan aims to conserve marine turtles and their habitats for maintaining a healthy marine ecosystem.





Clockwise: Hawksbill turtle, Olive ridley turtle, Green turtle, Loggerhead Sea Turtle (Wikimedia commons), Leatherback turtle (Dakshin foundation)

Marine Turtle Action Plan

The Indian coastal waters supports five species of sea turtles found worldwide. These are the Olive ridley (*Lepidochelys olivacea*), Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Leatherback (*Dermochelys coriacea*) and Loggerhead (*Caretta caretta*). These five species of sea turtles that occur in Indian coastal waters are protected under Schedule I of the Wildlife (Protection) Act, 1972.

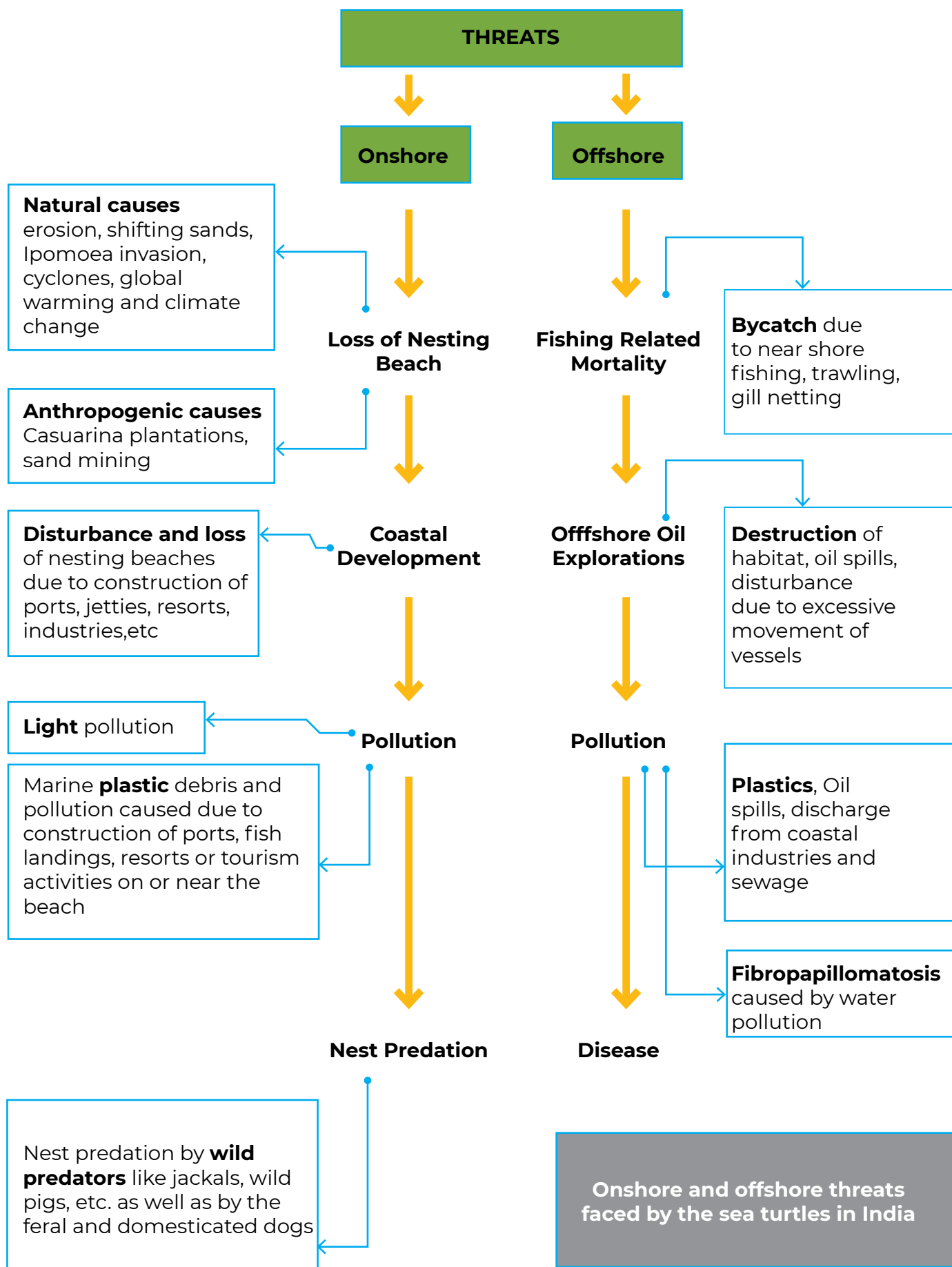
India is home to the largest known nesting population of olive ridley turtles. Except Loggerhead turtles, the remaining four species (Leatherback, Hawksbill, Green and Olive ridley turtles) nest along the Indian coastline and islands of India. About 40,000 to 11,00,000 turtles nest every year on the beaches of India. Number of turtles nesting varies between years and the success of sporadic nests have been observed to decline due to predations and habitat degradation.

Numerous direct and indirect pressures arising from various factors adversely impact marine turtle populations and their habitat. This also includes natural disasters such as tsunamis, cyclones, hurricanes and storms.

With a view to conserve marine turtles in India, various measures have been adopted by the Ministry of Environment, Forest and Climate Change, Government of India, the coastal State/UT Governments, civil society organizations, experts and local communities. India has identified all its important sea turtle nesting habitats as 'Important Coastal and Marine Biodiversity Areas' of India and included in the Coastal Regulation Zone (CRZ) -1.

With a view to conserve marine turtles, associated species and their habitats, the following action plan is proposed to be adopted at the National and State Government level.

a. To reduce direct and indirect causes of marine turtle mortality, the possible threats to marine turtle populations and their habitats are to be identified, documented and best practice approaches to mitigate those threats to be implemented. It is proposed to undertake management of oceanic marine plastic debris and coastal clean-up for enabling the survival of marine turtles.



b. Protection, conservation and rehabilitation of marine turtle habitats is key for long term survival of marine turtles. Towards meeting this objective, areas of critical habitat such as migratory corridors, nesting beaches, inter-nesting and feeding areas to be identified and managed, while degraded marine turtle habitats are to be rehabilitated.

c. In order to improve the understanding of marine turtle ecology and populations, studies on marine turtles and their habitats targeted towards conservation and management through research, monitoring and information exchange to be taken up through involvement of scientific institutes and universities. It is proposed that proper exchange of scientific and technical information and expertise among scientific institutions, civil society and other agencies is ensured, in order to develop and implement best practice approaches to conservation of marine turtles and their habitats.

d. People's participation is imperative for successful conservation interventions. It is therefore envisaged to increase awareness of marine turtles and their habitats, conservation needs and threats, amongst the wider public to enhance public participation in conservation activities. Setting up of turtle conservation clubs at taluk or district or state levels, declaration of marine turtle day, conduct special events related to marine turtle conservation are few activities proposed in this direction. In addition, developing alternate livelihood opportunities and better fishing practices for local communities to be encouraged for active participation in conservation efforts that also generate livelihoods like eco-tourism (e.g. turtle tourism). All relevant stakeholders, including local communities should be involved in planning and implementation of conservation and management measures.

e. National, regional and international cooperation is an integral part of marine turtle conservation. The existing mechanisms for cooperation at the sub-regional level to be strengthened to enhance coordination in management of turtle habitats. A web-based information resource for marine turtle conservation to be developed, besides creating networks for cooperative management of shared populations, within or across sub-regions, and, where appropriate. Adequate and regular training on marine turtle conservation and management techniques to relevant agencies, individuals and local communities to be provided through identified scientific institutes.

f. To strengthen law enforcement activities, a coordinated effort to be taken up amongst relevant stakeholders

Important Marine Turtle Habitats in India

State	Important Turtle Habitats (Catchment District)	Remarks / Clarification	Major Threats
Odisha	Rushikulya river (Kandhamal and Ganjam)	Mass nesting ground of Olive Ridley	Erosion, Nest predation, plastic pollution, light pollution and bycatch
Odisha	Gahirmatha river (Kandhamal and Ganjam)	Mass nesting ground of Olive Ridley	Erosion and Nest predation, bycatch
Odisha	Devi River (Jagatsinghpur, Puri)	Sporadic mass nesting ground of Olive ridley	Nest predation, plastic pollution, light pollution, plantation and bycatch
Andaman & Nicobar Islands	Galathea bay, Indira point, Hingloi, Alexandria, Dagmar, and Renhongbeaches (Great Nicobar Island)	Largest Leatherback turtle nesting ground in India	Nest predation
Andaman & Nicobar Islands	Bahua, Muhincohn and Kiyang beaches (Little Nicobar Island)	Leatherback, Green, Hawksbill and Olive ridley	Nest predation and bycatch
Andaman & Nicobar Islands	West Bay, Jackson Creek beaches (Little Andaman Island)	Leatherback nesting ground, currently largest in the Andaman group	Nest predation and bycatch
Andaman & Nicobar Islands	Cuthbert Bay, (Middle Andamans)	Leatherback, Green, hawksbill, and Olive ridley	Nest predation
Andaman & Nicobar Islands	South Reef Island, (Middle Andamans)	Best hawksbill turtle nesting ground in India	Nest predation
Lakshdweep Islands	Lagoons of Lakshdweep Islands (Agatti, Kadmat, Kavaratti and other islands)	Foraging ground of Green turtle	Erosion, over grazing, conflict with fishermen, nest predation and bycatch
Lakshdweep Islands	Suheli Island, (Lakshadweep)	Olive ridley / Hawksbill / Green turtle nesting ground (sympatric habitat for three species)	Erosion and bycatch
Andhra Pradesh	Godavari River Mouth (Sacramentoshoal, East Godavari)	Very high sporadic nesting of Olive ridleys (approx. 500 to 1000/year),	Nest predation, plastic pollution, light pollution, habitat degradation and bycatch
Andhra Pradesh	Kapasukuddi (Bahuda river mouth), Nagavali, Bamsadhara (Srikakulam)	High sporadic nesting of Olive ridleys	Nest predation, plastic pollution, light pollution, habitat degradation and bycatch
Andhra Pradesh	Beaches along Krishna River and Penneru river mouth (Nellore)	Moderate sporadic nesting of Olive Ridley	Nest predation, plastic pollution, light pollution, habitat degradation and bycatch

Important Marine Turtle Habitats in India

Puducherry	Nallavadu, Pannithittu, Narambi and Moorthikuppam villages (Puducherry) and beaches around Arasalar River (Karaikal)	High sporadic nesting of Olive Ridley	Nest predation, bycatch, erosion, habitat degradation, plantation, plastic and light pollution
Tamil Nadu	Gulf of Mannar Biosphere Reserve (Thoothukkudi and Ramanathapuram)	Foraging ground of green and Olive ridley, good seagrass beds	Nest predation, plastic pollution, habitat degradation, poaching, bycatch
Tamil Nadu	Chennai coast, (northern Tamil Nadu)	Sporadic nesting ground of Olive ridley turtles with conservation programmes from 1973	Nest predation, bycatch, plastic pollution, light pollution, egg poaching, habitat degradation
Gujarat	Western Saurashtra coast, Gujarat (Junagadh, Jamnagar and Porbandar)	Green and -Olive ridley turtle nesting grounds	Nest predation, bycatch, plastic pollution, habitat degradation
Maharashtra	Sindhudurg Coasts (Raigad and Ratnagiri)	Sporadic nesting of Olive ridley and Green	Nest predation, bycatch, plastic pollution, habitat degradation
Goa	Galgibaga beach (South Goa)	Sporadic nesting of Olive Ridley	Nest predation, bycatch, plastic pollution, lighting, tourism, habitat degradation



Asit Kumar/AFP

Marine Turtle Action Plan

Objective 1. Reduce direct and indirect causes of marine turtle mortality

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
1.1 Identify and document the threats to marine turtle populations and their habitats	a) Collate and organise existing data on threats to marine turtle populations b) Establish baseline data collection and monitoring programmes to gather information on the nature and magnitude of threats c) Determine those populations affected by incidental capture in fisheries, and other sources of mortality	MoEF&CC, State/UT Forest and Fisheries Departments, WII, ZSI, CMFRI, NCSCM, IISc, FSI, NIOT, ICMAM, ANCOST, Universities, State level research institutions, NGOs etc.	All coastal States and UTs	To be initiated in 2021; to be repeated every 5 year thereafter
1.2 Determine and apply best practice approaches to minimising those threats to marine turtle populations and their habitats	1.2 Determine and apply best practice approaches to minimising those threats to marine turtle populations and their habitats	Erosion and Nest predation, bycatch State/UT Forest and Fisheries Departments MoEF&CC and MoES, WII	All coastal States and UTs	To be initiated in 2021 and to be continued thereafter



Objective 2. Protect, conserve and rehabilitate marine turtle habitats

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
2.1 Establish necessary measures to protect and conserve marine turtle habitats	a) Identify areas of critical habitat such as migratory corridors, nesting beaches, inter-nesting and feeding areas. b) Designate and manage protected/ conservation areas, sanctuaries or temporary exclusion zones in areas of critical habitat, or take other measures (e.g. modification of fishing gear, restrictions on vessel traffic) to remove threats to such areas c) Develop incentives for adequate protection of areas of critical habitat outside protected areas d) Undertake assessments of the environmental impact of marine and coastal development and other human activities that may affect marine turtle populations and their habitats e) Manage and regulate within each jurisdiction the use of beaches and coastal dunes, for example location and design of buildings, use of artificial lighting, and transit of vehicles in nesting areas f) Monitor and promote the protection of water quality from land-based and maritime pollution, including marine debris, that may adversely affect marine turtles g) Strengthen the application of existing bans on the use of poisonous chemicals and explosives in the exploitation of marine resources. h) Mainstream the turtles and their habitats conservation into the production sectors with active participations of industrial sectors including financial supports from their CSR Fund.	State/UT Forest and Fisheries Departments and MoEF& CC	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
2.2 Rehabilitate degraded marine turtle habitats	a) Re-vegetate, where appropriate, frontal dunes at nesting beaches, with indigenous flora as far as possible, in order to provide visual barriers to coastal development and to restore appropriate beach temperature regimes b) Remove casuarinas from the important nesting beaches c) No plantation on Sand Dune d) Remove debris that impedes turtle nesting and hatchling production e) Enhance recovery of degraded coral reefs f) Enhance recovery of degraded mangrove and seagrass habitats	MoEF&CC, State/UT Forest Departments, NGOs etc	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in FY 21-22 and to be continued thereafter



Objective 3.Improve understanding of marine turtle ecology and populations through research, monitoring and information exchange

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
3.1 Conduct studies on marine turtles and their habitats targeted to their conservation and management	a) Conduct baseline studies or gather secondary information on marine turtle populations and their habitats b) Initiate and/or continue long-term monitoring of priority marine turtle populations in order to assess conservation status c) Characterise genetic identity of marine turtle populations d) Identify migratory routes through the use of tagging, genetic studies and/or satellite tracking e) Carry out studies on marine turtle population dynamics and survival rates f) Conduct research on the frequency and pathology of diseases of marine turtles g) Promote the use of traditional ecological knowledge in research studies h) Review periodically and evaluate research and monitoring activities	MoEF&CC, State/UT Forest and Fisheries Departments, ICMAM, WII, IISc, NIOT,/ANCOST, ZSI, CMFRI, CMLRE, NIO, SAC, Universities, NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and end by 2022
3.2 Conduct collaborative research and monitoring	a) Identify and include priority research and monitoring needs in National and sub-regional action plans b) Conduct collaborative studies and monitoring on genetic identity, conservation status, migrations, and other biological and ecological aspects of marine turtles	MoEF&CC, State/UT Forest and Fisheries Departments, ICMAM, WII, IISc, IISER, NIOT,/ANCOST, ZSI, CMFRI, CMLRE, NIO, SAC, NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
3.3 Analyse data to support mitigation of threats and to assess and improve conservation practices	a) Prioritise populations for conservation actions b) identify population trends c) Use research results to improve management, mitigate threats and assess the efficacy of conservation activities (e.g. hatchery management practices, habitat loss, etc.)	MoEF&CC, State/UT Forest and Fisheries Departments, ICMAM, WII, IISc, IISER, NIOT, / ANCOST, ZSI, CMFRI, CMLRE, NIO, SAC, NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter
3.4 Exchange information	a) Standardise methods and levels of data collection and adopt or develop an agreed set of protocols for inter alia monitoring of nesting beaches, feeding ground studies, genetic sampling, and collection of mortality data b) Determine the most appropriate methods for information dissemination c) Exchange at regular intervals scientific and technical information and expertise among nations, scientific institutions, non-governmental and international organisations, in order to develop and implement best practice approaches to conservation of marine turtles and their habitats d) Disseminate traditional knowledge on marine turtles and their habitats for conservation and management e) Compile on a regular basis data on marine turtle populations of regional interest	MoEF& CC, State/UT Forest and Fisheries Departments, IOSEA, BOBP, ICMAM, CSIR, WII, IISc, IISER, NIOT, / ANCOST, ZSI, CMFRI, CMLRE, NIO, SAC, NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Objective 4. Increase public awareness of the threats to marine turtles and their habitats, and enhance public participation in conservation activities

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
4.1 Establish public education, awareness and information programmes	a) Setting up of turtle clubs at taluk or district or state levels b) Declaration of National Marine Turtle Day may be coinciding with mass nesting season c) Collect, develop and disseminate education materials d) Establish community learning / information centres e) Develop and implement accurate mass media information programmes f) Develop and implement guidelines for hatchery programmes for conservation and environmental education g) Develop and conduct focused education and awareness programmes for target groups (e.g. policy makers, teachers, schools, fishing communities, media) h) Encourage the incorporation of marine turtle biology and conservation issues into school curricula i) Organise special events related to marine turtle conservation and biology (e.g. Turtle Day, Year of the Turtle, symposia, Track-a-turtle)	MoEF&CC, State/UT Forest and Fisheries Departments and NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
4.2 Develop alternative livelihood opportunities for local communities to encourage their active participation in conservation efforts	a) Identify and facilitate alternative livelihoods (including income generating activities) that are not detrimental to marine turtles and their habitats, in consultation with local communities and other stakeholders. Undertaking turtle based tourism programme like Turtle Festival b) Bring in ecotourism (turtle tourism) and interpretation centres in an organized fashion.	MoEF& CC, State/UT Forest and Fisheries Departments, ICSF, NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter
4.3 Promote public participation	Involve stakeholders, and local communities in particular, in planning and implementation of conservation and management measures Encourage the participation of Government institutions, non-governmental organisations, the private sector and the general community (e.g. students, volunteers, fishing communities, local communities) in research and conservation efforts Implement, where appropriate, incentive schemes to encourage public participation (e.g. T-shirts for tag returns, public acknowledgement, certificates) National Marine Turtle Seminar needs to be conducted annually to review the entire issues related to conservation of marine turtles in India.	MoEF&CC, State/UT Forest and Fisheries Departments, NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Objective 5. Enhance national, regional and international cooperation

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
5.1 Enhance mechanisms for cooperation and promote information exchange	a) Develop regional database of relevant information in relation to marine turtles conservation and management b) Identify and strengthen existing mechanisms for cooperation at the sub-regional level c) Develop/strengthen a website and/or newsletter to facilitate networking and exchange of information d) Develop/strengthen a web-based information resource for marine turtle conservation (including data on populations, nesting, migration, on-going projects) e) Create a directory of experts and organisations concerned with marine turtle conservation f) Develop networks for cooperative management of shared populations, within or across sub-regions, and, where appropriate, formalise cooperative management arrangements g) Cooperate where possible in the establishment of transboundary marine protected areas using ecological rather than political boundaries h) Develop a streamlined format for reporting and exchanging information (through the IOSEA MoU) on the state of marine turtle conservation at the national level i) Creation of network of NGO's in supporting forest departments marine turtles conservation. For example, coordination with Turtle Action Group (TAG) etc.	MoEF&CC, State/UT Forest and Fisheries Departments and NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Programme	Activity	Implementation Agencies	Sites/ States	Timeline
	j) Encourage IOSEA MoU signatory States that have not already done so to become Parties to the Convention on Migratory Species (CMS) k) Establish relationships with regional fisheries bodies with a view to obtaining data on incidental capture and encourage them to adopt marine turtle conservation measures within EEZs and on the high seas	MoEF&CC, State/UT Forest and Fisheries Departments and NGOs	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter
5.2 Strengthen and improve enforcement of conservation legislation	a) Review domestic policies and laws to address gaps or impediments to marine turtle conservation b) Cooperate in law enforcement to ensure compatible application of laws across and between jurisdictions (including through bilateral/multilateral agreements and intelligence sharing) c) Include turtle breeding/foraging habitats as important marine habitat. d) Constitution and Periodic review on the National Marine Turtle Action Committee e) State Level Marine Turtle Action Committee under the chairmanship of the Chief Secretary. f) Development of compensation schemes for loss of fishing gear due to incidental capture of marine turtles. g) Promotion of TED and by-catch reduction policy and smart gear use. h) Establishment Marine Biodiversity Cell to implement various conservation action plans related to marine biodiversity including marine turtles i) Mapping and monitoring of important turtle nesting sites in context with CRZ	MoEF&CC, State/UT Forest and Fisheries Departments	All coastal States and UT especially those important sites mentioned in this action plan.	To be initiated in 2021 and to be continued thereafter

Government of India
Ministry of Environment, Forest & Climate Change