

**DRAFT**

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

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# 1. INTRODUCTION

## 1.1. Background

Sharks, rays and skates (belong to the class Chondrichthyes), hereafter 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. Over the last few decades, the increasing exploitation of sharks owing to the rising demand for shark products, particularly fins and meat, coupled with improved fishing technology and a weak regulatory regime, has led to the decline in many shark populations. Sharks are vulnerable to over-exploitation because of their K-selected life-history strategy characterized by slow growth, late attainment of sexual maturity, long life span, low fecundity, and a close relationship between the number of young ones produced and the size of the breeding biomass. An analysis of threat for a globally distributed lineage of 1,041 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., 2014). 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) has adopted and endorsed International Plan of Action for the Conservation and Management of Sharks (IPOA–SHARKS) in 1999 for long-term sustainable conservation and management of sharks.

## 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 shark (NPOA–Sharks), if their vessels conduct directed 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 every four years) to identify cost-effective strategies for increasing its effectiveness. The NPOA-Sharks is India’s commitment to the IPOA-Sharks.

NPOA-Sharks is India’s major step towards ensuring the sustainability of the ecological and economic services of the sharks and their fishery. For preparation of the document, information on fisheries characteristics was collected from the marine fisheries census carried out by the Department of Fisheries, Government of India and ICAR-Central Marine Fisheries Research Institute; fisheries status was arrived at from literature review and analysis of landings data and other related fishery and non-fishery data documented regularly by ICAR-CMFRI; and Potential Yield estimates from the Report of Department of Fisheries, Government of India (DoF, 2018). Further, information was drawn from several research projects conducted by the ICAR-Central Marine Fisheries Research Institute and Fishery Survey of India (Government of India). The document published by ICAR-CMFRI “Guidance on National Plan of action for Sharks in India” (Kizhakudan et al., 2015) provided support and important input for preparation of India’s NPOA-Sharks. As adopting a broad consultative approach for development of NPOA-Sharks is essential

for a polycentric country like India, the viewpoints of the community and fisheries researchers and managers were collected from extensive stakeholder consultations along the coasts of India. A few focused community-level appraisals were carried out in Gujarat and Tamil Nadu. The NPOAs of some of the major shark harvesting countries were also consulted to understand the best practices.

### **1.3. Objectives of NPOA-Shark**

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

The Report is organized in five sections. Section 1 provides background information and the process followed to develop the NPOA-Sharks. Section 2 presents the salient features of 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 needs identified during the assessment of shark fishery in India. Section 5 presents the implementation plan, providing who does what, timelines, outputs and the indicative budget. The Report is further supplemented by additional information in the form of References and Annexure.

The NPOA-Sharks is a living document and periodic review is necessary considering the new information on the status of shark fisheries. Therefore, a broadly defined feedback loop has been integrated with the NPOA-Sharks to deal with future possibilities.

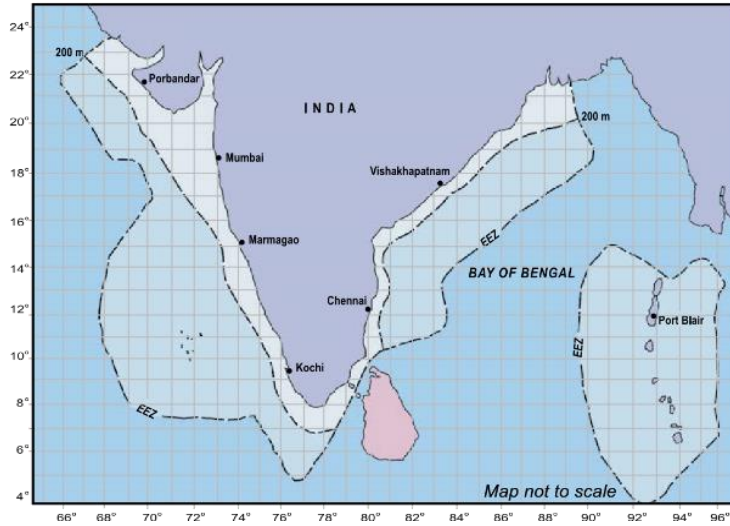
## 2. MARINE FISHERIES OF INDIA

### 2.1. Marine fisheries sector in India

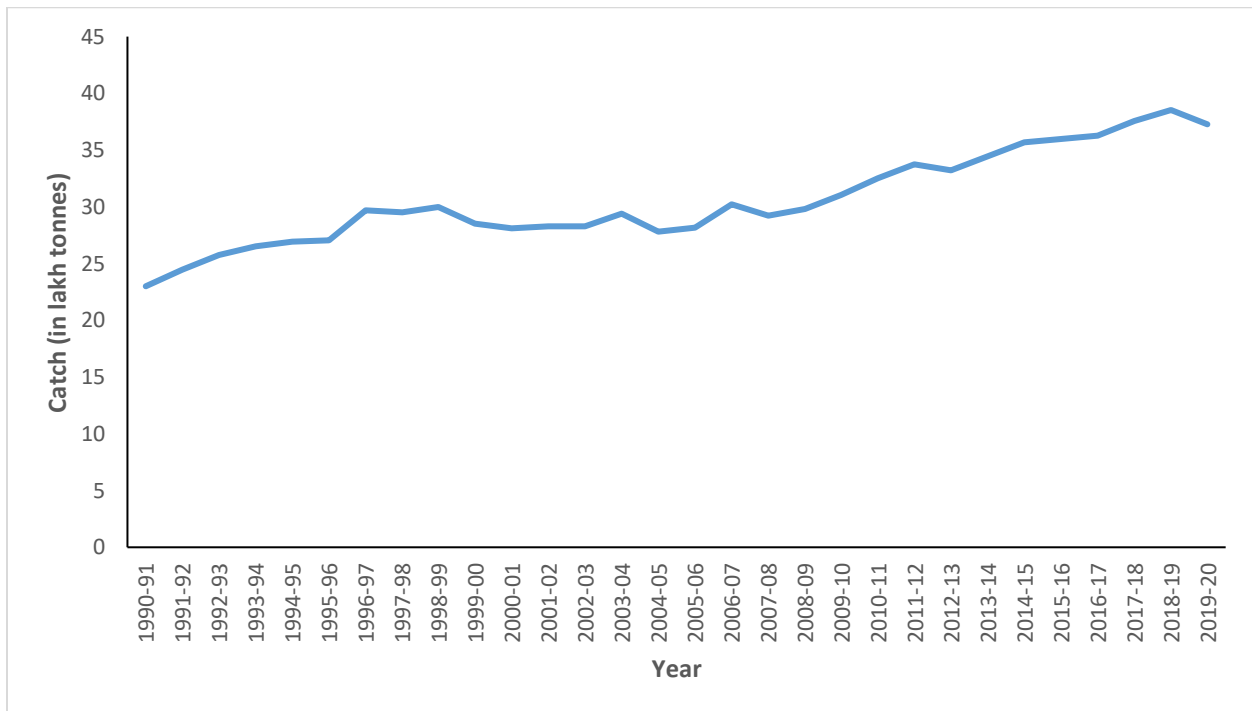
The marine fisheries sector occupies a significant place in the socio-economic development of India. Apart from the prime consideration of securing food, nutritional and livelihood requirements of the population, the fisheries sector plays an important role in trade and commerce. With a coastline of 8,118 km and an Exclusive Economic Zone of 2.02 million sq. km (Fig. 1), India is one of the largest fisheries producers in the world. The marine fisheries landings increased from 1.55 million tonnes in 1980 to 3.72 million tonnes in 2020 (Fig. 2). The highest landings were in 2017 when the volume increased to 3.85 million tonnes. The estimated potential yield of the country is 5.31 million tonnes. Mechanized fishing vessels make 80% of the landings although they constitute only 20% of the fishing fleet. The marine fisheries provide employment to 3.77 million people along the Indian coast. India is the second largest fish producing country in the world accounting for 7.56% of global production and contributing about 1.24% to the country's Gross Value Added (GVA) and over 7.28% to the agricultural GVA. Export earnings from the fisheries sector was Rs.46,662.85 crores during 2019-20. Much of the development of the sector can be attributed to the sound planning processes, which includes the National Policy on Marine Fisheries (NPMF)-2017 and the draft National Fisheries Policy (NFP)-2020 to guide the sectoral development. In early years, the developmental approaches to 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 and pollution, climate change is emerging as a major challenge for the marine fisheries sector and future development will much depend on tackling these challenges.

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 2010-2019 consisted of Indian oil sardine, other clupeids, croakers, Bombay duck, decapods, ribbonfishes, Indian mackerel, anchovies, catfishes, perches, silverbellies, carangids, cephalopods, sharks, rays and skates. These groups contributed about 60 % to the overall marine fisheries landings.



**Figure 1. Exclusive Economic Zone of India**



**Figure 2. Trend in marine fish landings (Source: DoF, GoI)**

The marine fishing fleet comprises 2,30,210 fishing craft (Table 1) of which 12% are traditional craft (without any type of mechanical device) and 68% are motorized traditional crafts (with outboard motor fitted to small boats) as per the Marine Fisheries Census 2016. The remaining boats (44,475) are mechanized fishing vessels (MFVs) which are larger in size and fitted with inboard engine and a wheelhouse. Eighty percent of the marine fish production comes from the MFVs. These boats contribute 19 percent to the total (Table 1). Of the mechanized boats, trawlers

are by far in large numbers, followed by gillnetters (Table 2). Trawlers contributed more than 50% to the total landings (Table 3). As compared to the west coast, concentration of traditional craft (including motorized) is more on the east coast (about 57 % of the total crafts in the coast). The scale of mechanization is also reflected in the total fish landings of the two coasts.

In terms of fishing gear, mechanized liners land about 49 percent of the production followed by trawlers (37 %) and gillnetters (8%). Dol/bag netters and ringseines contribute about 04 % and 01% respectively (Table 2). In the recent years, there is an active promotion of longlining in India to target deep sea fishes such as tunas.

**Table 1. Number of marine fishing vessels in India**

| Category                         | East coast | West coast | Andaman & Nicobar & Lakshadweep Islands | Total    |
|----------------------------------|------------|------------|---|----------|
| Mechanized (With inhouse 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. Number of mechanized boats operating different types of gear in the mainland**

| S.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/Bag netters | 191        | 3,122      | 3,313  |
| 4    | Liners          | 12,825     | 27,808     | 40,633 |
| 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 0-to-80-meter depth zone.

## 2.2. Fish export in India

The export of marine products (including export from aquaculture) has increased from a meagre 15,732 tonnes in 1961-62 to a record 13, 69, 264 tonnes in 2021-22. This has added USD 7.76 billion to the GDP. India is the fourth largest exporter in terms of average value of export and one of the eight countries which 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 addition of commercially important species such as tuna, squids, etc. This growth trajectory has also led to the creation of a large processing capacity in accordance with global standards, which can further fuel the export of fish and fisheries products from India. In terms of export earnings, frozen shrimp continue to be the largest export item (75% in value), followed by frozen fish (6%), squid (5%) and cuttlefish (4%).

## 2.3. Fisheries potential

In 2018, the Working Group set up for Revalidating the Potential Yield (PY) of Fishery Resources in the EEZ of India estimated the PY as 5.31 million tonnes (Table 4). Demersal and pelagic resources contribute 43.3% and 49.5% respectively to the potential yield. About 60% of the resources are located along the west coast covering the states of Gujarat, Maharashtra, Goa, Daman and Diu, Karnataka and Kerala. 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 0 – 200-meter depth zone. Owing to the rich coastal waters, the Indian marine fisheries traditionally concentrated on the near-shore waters.

**Table 4. Potential yield estimates of fish resources in the EEZ of India (Source: Handbook of fisheries statistics, 2018)**

| 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 entire EEZ)  | 2,30,832            | 4.35         |
| Others                    | 91,369              | 1.72         |
| <b>Total</b>              | <b>53,10,593</b>    | <b>100</b>   |



### 3. SHARK FISHERIES IN INDIA

#### 3.1. Species diversity

The number of shark species occurring in the Indian commercial fisheries has been estimated as 160 from 73 genera. It comprises 88 species of true sharks from 44 genera; 53 species of rays from 19 genera and 19 species of skates from 10 genera (Table 5). Species of the family such as Carcharhinidae (requiem sharks), Sphyrnidae (hammer-head sharks), Alopiidae (thresher sharks), Lamnidae (mackerel sharks), Hemiscyllidae (bamboo sharks) Triakidae (hound sharks) are the significant contributors to the shark fishery in India.

**Table 5. Number of shark species occurring in India's maritime zone (Kizhakudan et al., 2015)**

|               | Others           | Family              | Genus | Species |
|---------------|------------------|---------------------|-------|---------|
| <b>Sharks</b> | Hexanchiformes   | Hexanchidae         | 2     | 2       |
|               | Squaliformes     | Centrophoridae      | 2     | 6       |
|               |                  | Echinorhinidae      | 1     | 2       |
|               |                  | Etmopteridae        | 1     | 2       |
|               |                  | Somniosidae         | 2     | 2       |
|               |                  | Squalidae           | 1     | 2       |
|               | Orectolobiformes | Hemiscyllidae       | 1     | 5       |
|               |                  | Ginglymostomatidae  | 1     | 1       |
|               |                  | Rhincodontidae      | 1     | 1       |
|               |                  | Stegostomatidae     | 1     | 1       |
|               | Lamniformes      | Alopiidae           | 1     | 3       |
|               |                  | Lamnidae            | 1     | 2       |
|               |                  | Odontaspidae        | 2     | 3       |
|               |                  | Pseudocarcharhiidae | 1     | 1       |
|               | Carcharhiniforms | Carcharhinidae      | 10    | 31      |
|               |                  | Hemigaleidae        | 4     | 4       |
|               |                  | Proscyllidae        | 2     | 2       |
|               |                  | Scyliorhinidae      | 4     | 4       |
|               |                  | Sphyrnidae          | 2     | 5       |
|               |                  | Triakidae           | 2     | 5       |

|               | Others          | Family         | Genus | Species |
|---------------|-----------------|----------------|-------|---------|
|               | Pristiformes    | Pristidae      | 2     | 4       |
|               | Total           |                | 44    | 88      |
| <b>Rays</b>   | Torpedeniformes | Narcinidae     | 2     | 4       |
|               |                 | Narkidae       | 1     | 1       |
|               |                 | Torpedinidae   | 1     | 4       |
|               | Myliobatiformes | Hexatrygonidae | 1     | 1       |
|               |                 | Plesiobatidae  | 1     | 1       |
|               |                 | Dasyatidae     | 7     | 23      |
|               |                 | Gymnuridae     | 1     | 4       |
|               |                 | Myliobatidae   | 2     | 6       |
|               |                 | Mobulidae      | 2     | 7       |
|               |                 | Rhinopteridae  | 1     | 2       |
|               | Total           |                | 19    | 23      |
| <b>Skates</b> | Rajiformes      | Rajidae        | 6     | 7       |
|               |                 | Rhinidae       | 1     | 1       |
|               |                 | Rhinobatidae   | 2     | 8       |
|               |                 | Rhynchobatidae | 1     | 3       |
|               | Total           |                | 10    | 19      |
|               | Grant total     |                | 73    | 160     |

The full list of sharks, rays and guitarfishes species occurring in the EEZ of India along with the magnitude of catches, status, gears catching these species are presented in Annexure 1.

### 3.2. Sources of information on sharks

Three main sources of fisheries-related information are the Department of Fisheries (DoF) of the governments of India and coastal States/UTs; Fishery Survey of India (FSI); and ICAR-CMFRI. The DoF and ICAR-CMFRI collect primary data on fish landings and related biological parameters, while 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 the following Table 6. The DoF and ICAR-CMFRI use a multi-stage stratified random sampling method, developed by ICAR-CMFRI to collect fisheries data.

While both DoF and ICAR-CMFRI presumably use the same sampling design, the final estimates often differ. There is a need to establish a procedure by the Government to address the differences, and avoid duplication. For assessing shark fisheries in India, data from all the major sources were used and as mentioned above while the data from different sources may not match exactly, importance in this document is given to the trend it suggests.

**Table 6. 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   |
| Department of Fisheries, 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 – Latitude-Longitude-wise from the Indian EEZ |
|   | Research paper, Reports, etc.   | Periodic  |
| ICAR-Central Marine Fisheries Research Institute                        | Fish landing data at State/UT- and species level  | Annual  |
|   | Number of fishermen, craft and gear   | 5-Yearly Census                                       |
|   | Price of fish in different landing centres  | Daily/Web-based Periodic                              |
|   | Research paper, Reports, etc.   | Periodic  |
| Marine Products Export Development Authority                            | Trade statistics, especially port-wise and country-wise export; shark fin trade, etc.                                     | Annual  |
| Ministry of Environment, Forest and Climate Change, Government of India | Policy, Schemes, Guidelines, Information on protected areas   | Periodic  |

| Source  | Information available                            | Frequency |
|---|--|-----------|
|   | and species, information on climate change, etc. |           |
| Indian National Centre for Ocean Information Services | Potential Fishing Zone Notification              | Daily     |

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

### 3.3 Distribution and status of stocks

Sharks are widely distributed in the Indian EEZ and are caught in shallow waters by near-shore artisanal fisheries to deeper water mechanized gillnet, trawler, and logline fishery. Trawl and longline surveys carried out by the FSI during 1985 – 2014 show that sharks occur throughout the EEZ. Over the period, the sharks 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 increase in number and efficiency of boats. Global decline in shark landings has been recorded since 2003, whereas Indian shark landings also declined during the same period (FAO, 2022).

The landings data from commercial fisheries and anecdotal information from fishermen confirm that there is considerable decline in shark population in the Indian waters over the last two decades. In addition, the ICAR-CMFRI has noted that most of the shark species (59%) occurring in the Indian waters are globally threatened. Many of the shark species being highly migratory, the global status of the species is also of concern.

According to ICAR-CMFRI, out of 160 species of sharks in India, nearly 64% of the species of elasmobranchs are categorized as “Threatened” species, according to IUCN Red List (Table 7).

**Table 7. IUCN Red List status of sharks occurring in Indian waters**

| IUCN status           | Shark     | Skates    | Rays      | Total      |
|-----------------------|-----------|-----------|-----------|------------|
| Critically Endangered | 11        | 10        | 0         | 21         |
| Endangered            | 18        | 1         | 18        | 37         |
| Vulnerable            | 25        | 0         | 17        | 45         |
| Near Threatened       | 19        | 3         | 4         | 26         |
| Data Deficient        | 2         | 2         | 5         | 9          |
| Least Concern         | 9         | 2         | 5         | 16         |
| Not Estimated         | 4         | 1         | 4         | 9          |
| <b>Total</b>          | <b>88</b> | <b>19</b> | <b>53</b> | <b>160</b> |

As of 07/01/2023

The ICAR-CMFRI also carried out a Rapid Stock Assessment (RSA) of sharks based on data for the period 1985-2013 in the coastal States and the UT of Puducherry. The RSA was done by comparing historic high catch with the average catch of the last three years. The RSA shows that shark fishery is, on an average, declining all along the Indian coastline. However, skate fishery seems to be still abundant in Gujarat, Karnataka and Goa. On the other hand, shark fishery has entered depleted phase in Tamil Nadu and Puducherry and skate fishery has entered into collapse or depleted phase in Orissa and West Bengal (Table 8).

**Table 8. Rapid Stock Assessment (RSA) of sharks, skates and rays along the Indian coast (Reproduced from Kizhakudan et al., 2015)**

| Category      | Coast           | HMC (t) | 3YA (T) | % of HMC | Status |
|---------------|-----------------|---------|---------|----------|--------|
| <b>Sharks</b> | 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 |
| <b>SKATES</b> | 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 |
| <b>RAYS</b>   | 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 |

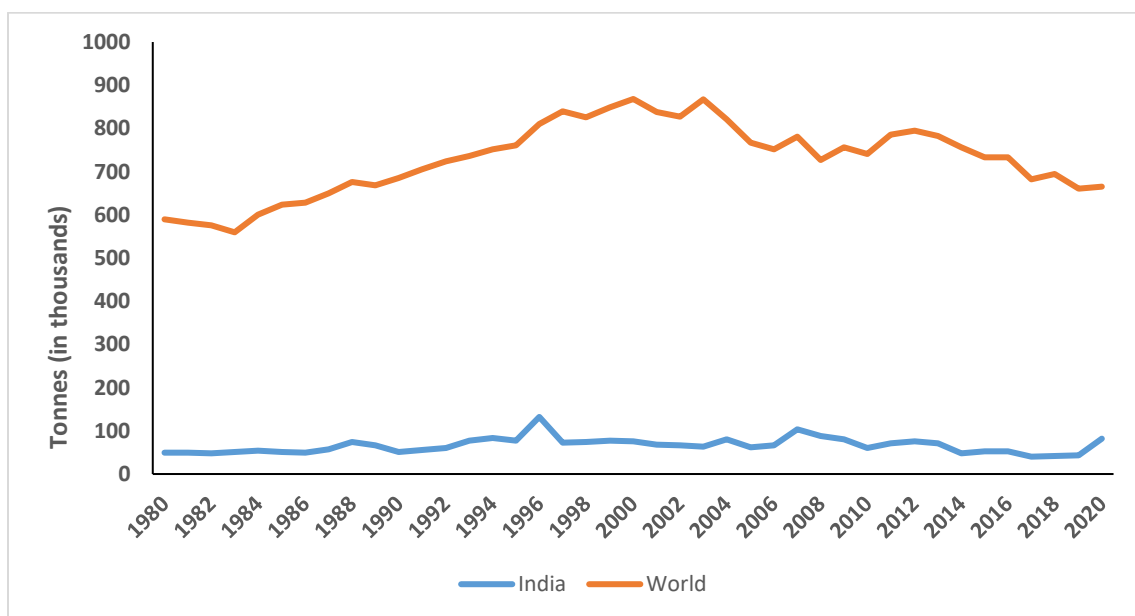
HMC - Historic Maximum Catch (1985-2013); 3YA - 3-year average (2011-13)

A-Abundant LA-Less abundant; DC-Declining; DP-Depleted; C-Collapsed

### 3.4 Shark catch and Trade

#### 3.4.1. Trends in sharks catch

During the last seven decades (1950-2020), the annual shark landings in India increased until early 2000s after which it declined. The landings increased from 15,900 tonnes in 1953 to an all-time high of 1,32,160 tonnes in 1996, but subsequently decreased to about 82,000 t in 2020 (Fig. 6). Parallel to this decline, the contribution of sharks to the total marine capture fisheries production has also declined from 4 % during 1950-1959 to 2 % during 2010-2019, indicating that the growth of shark landings is falling short of growth of total landings (Table 9). Gujarat, Maharashtra, Tamil Nadu, and Andhra Pradesh contribute mostly to the shark landings in India.



**Figure 6. Trend in the landings of sharks during 1950-2020**

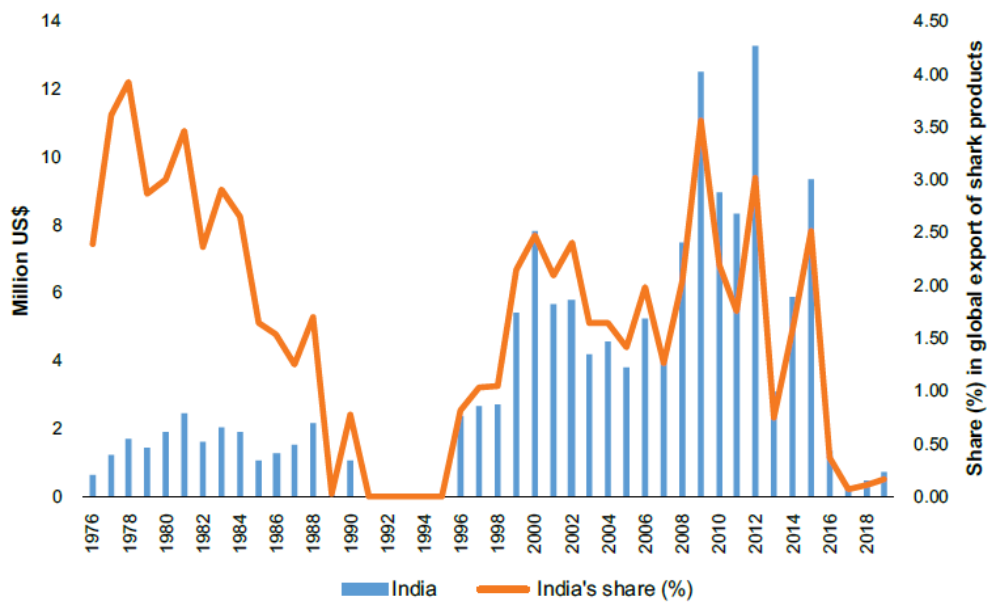
**Table 9. Decadal average landings of sharks and their contribution to the total marine fish landings**

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

In respect of fishing gear, the trawls, drift gillnets and hooks & line contribute about 95 % to the shark landings. Whereas the drift gillnets and hooks & line contribute to the landings along the entire coast, the shark landings by the trawlers are mostly along the northwest coast. While target fishery of sharks operate 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 exploitation of sharks, it remains a minor player in shark trade. However, the export of shark products increased in value terms from US\$ 0.65 million in 1976 to a maximum of US\$ 13.27 million in 2012 and then declined (Figure 7). In 2019, the total value of export of shark products stood at US\$ 8.30 million. Shark fins were the trade drivers until 2015 when they contributed up to 99% to the trade revenue. The following four shark species were usually harvested for their fins for the export market: hammerhead shark, *Sphyrna zygaena*; grey dog shark, *Rhizoprionodon acutus*; spade-nosed dog shark, *Scoliodon laticaudus*; and black tip shark, *Carcharhinus melanopterus*. However, after the ban on export of shark fins in 2015, frozen rays and skates are contributing 87% to the export earnings (2019).



**Figure 7. Export of sharks and shark products from India**

### 3.5 Fishermen groups engaged in shark fishing

In India, fisheries are largely practiced as a hereditary activity with population groups identified as fishermen. Shark fishing, which was developed and practiced as a specialized form of fisheries in certain parts of coastal India, also gave rise to distinct socio-economic identities with many fishermen identifying themselves as ‘shark fishermen’ – the prominent amongst them are the fishermen from Thoothoor in Kanyakumari district of Tamil Nadu. The following fishermen groups carry out shark fishing in the country:



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

### **3.6 National institutional mechanism**

Entry 57 of List 1 of 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 the 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 channeling funding support to the States/UTs in line with the national priorities and the commitments made to the State/UT Governments as also in meeting India's obligation to international commitments. The MoFAH&D within the purview of its allocated business helps the coastal States/UTs in 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 Central-level, the DoF, MoFAH&D is the focal point, in the State/UTs, it is the Department of Fisheries (DoF). 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 role 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). The larger mandate of MHA is 'homeland security' but in the coming years they are likely to play an important role in 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 for fisheries development and management to various states/UTs. 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 development of infrastructure facilities for landing and berthing of fishing craft, creating suitable marketing facilities, implementation of various fisheries development programmes viz., channelizing financial assistance for purchase of fishing implements, implementation of socio-economic programmes and interactions with the Government of India and other agencies for technical and financial assistance. Each State/UT has a DoF, which functions as 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 10. Institutional arrangement for marine fisheries management in India**

| Agency / Ministry / Department                     | Agency / Department  | Management areas   |
|--|--|--|
| Ministry of Fisheries, Animal Husbandry & Dairying | Department of Fisheries<br>Fisheries Survey of India,<br>National Fisheries<br>Development Board<br>Central Institute of Coastal<br>Engineering of Fishery | <ul style="list-style-type: none"> <li>▪ Deep sea fishing (List I)</li> <li>▪ Survey &amp; assessment of fisheries resources</li> <li>▪ Research</li> <li>▪ Training &amp; extension</li> <li>▪ Fisheries development</li> </ul>   |
| Indian Council of Agricultural Research            | ICAR Institutes, SAUs, CAUs  | <ul style="list-style-type: none"> <li>▪ Fishing harbours</li> </ul>   |
| Ministry of Defence                                | Coast Guard  | <ul style="list-style-type: none"> <li>▪ Monitoring of fishing by foreign vessels (List I)</li> <li>▪ Prevention of marine pollution by ships</li> <li>▪ Protection of endangered species (WildLife (Protection) Act, 1972)</li> <li>▪ Fish processing</li> <li>▪ Processing units</li> <li>▪ Exports</li> </ul> |
| Ministry of Commerce and Industry                  | Marine Products Export Development Authority<br>Export Inspection Council  | <ul style="list-style-type: none"> <li>▪ Seafood exports (List I)</li> <li>▪ Quality control</li> </ul>  |
| Ministry of External Affairs                       | -  | <ul style="list-style-type: none"> <li>▪ Law of the Sea negotiations (List I)</li> </ul>   |
| Ministry of Earth Sciences                         | Indian National Centre for Ocean Information Services  | <ul style="list-style-type: none"> <li>▪ Potential fishing zones</li> <li>▪ Monitoring ocean pollution</li> </ul>  |
| State Governments                                  | Department of Fisheries  | <ul style="list-style-type: none"> <li>▪ Fisheries in territorial waters (List II)</li> </ul>  |

|   |   |  |
|---|---|--|
| Ministry of Environment and Forest & Climate Change (MoEF&CC)<br>MoES | - | <ul style="list-style-type: none"> <li>▪ Protection of marine biodiversity (List III)</li> <li>▪ Protection of coastal habitats (List III)</li> <li>▪ Focal point for Ramsar, CITES, CMS &amp; CBD Conventions (List III)</li> </ul> |
| Ministry of Home Affairs  | - | <ul style="list-style-type: none"> <li>▪ Homeland Security (Lists I &amp; II)</li> </ul>   |

### 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 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 to August, and the maritime States/UTs along the east coast also follow 61 days of closure during April – June.

To conserve the elasmobranch species, Ministry of Environment, & Forest and Climate change placed 10 species under Schedule 1 (Part IIA) of Indian Wildlife (Protection) Act, 1972 (Table 11). These species should not be caught, harvested, or traded. Further, killing or unauthorized possession of the prohibited species is a non-bailable offence, attracting imprisonment for a period ranging from three to five years, and a penalty of Rs 25,000 (US \$ 305). All the listed species except for the guitarfish, *Rhynchobatus djiddensis* are very rare in the fishery. However, as no device is available to exclude these species selectively from the catch, especially from gillnet and hooks & line, they are occasionally caught in the fishing gear.

**Table 11. List of species protected under Indian Wildlife (Protection) Act, 1972**

| Common name        | Scientific name                |
|--------------------|--------------------------------|
| Whale shark        | <i>Rhincodon typus</i>         |
| Knifetooth sawfish | <i>Anoxypristis cuspidata</i>  |
| Pondicherry shark  | <i>Carcharinus hemiodon</i>    |
| Gangetic shark     | <i>Glyphis gangeticus</i>      |
| Spear tooth shark  | <i>Glyphis glyphis</i>         |
| Ganges sting ray   | <i>Himantura fluviatilis</i>   |
| Freshwater sawfish | <i>Pristis microdon</i>        |
| Green sawfish      | <i>Pristis zijsron</i>         |
| Giant guitarfish   | <i>Rhynchobatus djiddensis</i> |
| Porcupine ray      | <i>Urogymnus asperrimus</i>    |

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

hunting of a Schedule I species”. The burden of proof will lie on the accused and failing so the accused will attract penalty as per the Act.

Subsequent to 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 Notification of even number and date on “Prohibition on import of Shark fins of all species of Shark” with immediate effect. However, for sustaining and effective management of shark populations, a comprehensive plan needs to be developed taking into consideration the livelihoods of the dependent fishermen.

### **3.8. Perception of Stakeholders about NPOA-Sharks**

A series of stakeholder consultations were carried out during the preparation of the NPOA-Sharks with the fishermen and traders across India. The final series of stakeholder consultations were organized through 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 fisher community, these consultations were also attended by research organizations including ICAR-CMFRI, FSI, ICAR-Central Institute of Fisheries Education (CIFE), Fisheries colleges of State Agricultural Universities (SAUs), trade unions and associations, NGOs.

Of the many suggestions emanating from these consultations, 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 both the groups have strongly emphasized the need for conservation of sharks, they have viewed existing conservation measures as arbitrary and not in accordance with their experiences at sea, adversely impacting their livelihoods.

The fishers and traders disagree with the measures in vogue to prohibit shark fishing and imposing ban on export of fins. They are of the view that while every part of shark is useful, fins extract the highest revenue for the fishers and the processors. In view of the ban on export of fins, prices of sharks have gone down and this could be counter productive as fishermen will increase their effort to compensate for the loss. Both fishers and traders are also of the view that IPOA-Sharks calls for full utilization of sharks and wastage of expensive shark products such as fins is contrary to the spirit of the IPOA-Sharks.

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

- Participatory research and monitoring;
- Broad policy on sharks through consultations;
- Improving capacity of the fishermen and as well as officials from MoEF&CC and Indian Coast Guard to identify different species of sharks;
- 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 literature and extensive discussions with fisher-community along the Indian coastline on matters relating to shark fisheries, the following major issues have been identified, which need to be addressed through the National Plan of Action for Conservation and Management of Sharks (NPOA-Shark):

- Indications of decline in shark biomass and species diversity;
- Inadequate monitoring, control and surveillance, including gaps in data collection and identification of species;
- Fractured view of different stakeholder groups on the status of shark and developing acceptable conservation measures;
- Research gaps on spatial distribution, biological aspects, real-time data and socioeconomic aspects; and
- Lack of a holistic framework to address the above issues.

## 4. NATIONAL PLAN OF ACTION ON SHARKS – INDIA

### 4.1. Purpose and scope of NPOA-Sharks

The purpose of the NPOA-Sharks for India is to ensure conservation and sustainable management of sharks. It applies to species that are found within the maritime zones of India, species that migrate through Indian EEZ and species captured by India-flagged vessels fishing on the High Seas. The NPOA-Sharks seeks to address five issues: (i) arresting decline in shark biomass; (ii) improving monitoring, control and surveillance, including gaps in data collection and identification of species; (iii) setting the stage for agreed conservation measures; (iv) identifying research needs; and (v) suggesting a holistic framework to address these issues. The NPOA-Sharks follows ecosystem approach to fisheries management (EAFM), which is the corner stone of the NPMF, 2017.

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

- The purpose of the NPOA-Sharks for India is to ensure 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, skates, rays and chimaeras.
- The NPOA-Sharks applies to species that are found within India’s Exclusive Economic Zone (EEZ), species that migrate through Indian EEZ, and species captured by India-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 aim to contribute to it to enhance 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 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. If necessary, these issues could be addresses in the future revision of the NPOA with enough information.

- The NPOA-Sharks is stakeholder-centric and takes into account their concerns while also ensuring due concerns for the maintenance of the ecosystem integrity.
- The NPOA-Sharks will be reviewed and revised periodically (at least once in five years) to ensure on-going 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 on the status of different shark species, the NPOA-Sharks also adopts a ‘Precautionary Approach’ 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 12).

**Table 12. Actions suggested under the NPOA-Sharks in India**

| IPOA-Sharks   | Action suggested in NPOA-Sharks   |
|---|---|
| Ensure that shark catches from directed and non-directed fisheries are sustainable.   | Any new policy on increasing fisheries production within or outside the 12 nautical miles (i.e., States and Union government policies)) should not promote direct catch of sharks until sufficient scientific evidence is available to increase exploitation. Initiate implementation of comprehensive fisheries MCS Plan at the earliest.  |
| Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use. | Scientists and fishermen should work together to identify and ascertain shark breeding grounds and shark breeding period and agree on conservation measures, such as the seasonal ban or area closer.<br>Use of circle hooks should be promoted as precautionary measures.<br>Mesh size and opening of trawl nets, if suggested in corresponding MFRA, should be strictly followed. In case such measures are not clarified in certain MFRAs, the same should be amended to include these measures. |
| Identify and provide special attention, in particular to vulnerable or threatened shark species/stocks.   | . Develop species-specific indicators using fisheries and exploratory survey data, wherever feasible. Initiate  |



|   |  |
|---|--|
|   | research to delineate shark populations along the Indian coast   |
| Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States.                 | Initiate awareness drive among different stakeholders including fishermen; share research findings with fishermen and encourage fishermen associations/cooperatives to monitor and report shark catch. Implement MCS Plan for fisheries at the earliest. |
| Minimize unutilized incidental catches of sharks.   | Initiate research on value addition for sharks and share the findings with the community.  |
| Contribute to the protection of biodiversity and ecosystem structure and function.  | Ensure effective implementation of fisheries MCS Plan; encourage ecotourism and reef shark diving.   |
| Minimize waste and discards from shark catches in accordance with article 7.2.2(g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed). | Ensure effective implementation of the fin-attached policy of the Government and initiate research on value addition for sharks and share the findings with the community.   |
| Encourage full use of dead sharks.  | Review shark export policy, encourage value addition.  |
| Facilitate improved species-specific catch and landings data and monitoring of shark catches.   | Introduce logbook system; develop national shark identification kit; build awareness; mobilize fishermen association and build research skills in taxonomy as well as data collection skills of enumerators from agencies involved in data collection.   |
| Facilitate the identification and reporting of species-specific biological and trade data.  | Introduce logbook system and voluntary reporting by fishermen; review policy on reporting of catch of prohibited species or species protected under the Wild Life (Protection) Act, 1972; encourage regional integration.                                |

#### 4.4. Legal, institutional and management framework requirements

- Presently, there is a legal void to regulate wholly Indian-owned Indian fishing vessels in areas beyond 12 nautical miles in the EEZ. There is a need for enactment of the law for waters between 12 – 200 nautical miles in consultation with the stakeholders.
- The MFRA of the coastal States/UTs may be reviewed in terms of ‘lessons learned’ and the contemporary challenges faced by the marine fisheries sector. The MFRA in their present form do not address many such requirements. A fresh model Bill may assist the coastal States/UTs in re-visiting their MFRA and bringing in the necessary changes.



- A joint policy paper on sharks from MOFAH&D and MoEF&CC may be issued highlighting the dual requirements of balancing conservation and sustainable harvesting. Such a policy paper should weigh international rules and regulations on one hand and the livelihood issues on the other, to arrive at socially and ecologically acceptable trade-offs. The policy paper should also address guiding rules for increasing fisheries production, which is one of the major objectives of fisheries policies of coastal states, with a particular reference to adopting a ‘precautionary approach’ to discourage direct fishing of sharks and consider impact on shark stocks as by-catch from efforts to boost fisheries production.
- A Coordinating Committee may be set up comprising the four concerned 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; Department 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.
- While stakeholder participation is being increasingly practiced in policy making, there is yet to be a formal mechanism to ensure stakeholder engagement, especially the marginal groups. The Government needs to consider this to ensure stakeholder participation, with due representation from various sections, including women.
- There is a need to review the shark trade policies in view of the requirements stipulated under international agreements such as CITES and the livelihood needs of fishers.
- An effective MCS framework needs to be formulated in order 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:

| Activity level | Description of activity  | Expected Outcome  | Responsible Agency   |
|----------------|--|---|--|
| Medium         | Awareness building of fishermen and leadership building for monitoring fisheries activities. | Improved scope of community participation. This needs to be done with sustained efforts. Few fishermen groups are more progressive than others; such fishermen groups could be tapped to reach to 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. |

| <b>Activity level</b> | <b>Description of activity</b>  | <b>Expected Outcome</b>   | <b>Responsible Agency</b>      |
|-----------------------|---|---|--------------------------------|
| High                  | Improved research activity and skills.  | Better knowledge products on sharks.  | ICAR-CMFRI, FSI                |
| High                  | Improving skills on MCS   | Better fisheries MCS. This activity will primarily target Government officials engaged in MCS and related management functions.   | BOBP-IGO                       |
| Medium                | Training programme on the Code of Conduct for Responsible Fisheries and Ecosystem Approach to Fisheries for fisheries officials and other stakeholders. | Improve the understanding of sustainable fishing practices and global instruments; appreciating the need for better management measures for fisheries; develop skills for extension to fishermen. | BOBP-IGO/ ICAR-CMFRI/ FSI/ DoF |
| High                  | Improving understanding of international agreements/ arrangements.  | Better informed on the duties and responsibilities under such agreements/arrangements. This activity will primarily target Government officials and other concerned stakeholders.                 | BOBP-IGO                       |

#### **4.6. Data collection and management requirement**

- A coordinated approach is required among different government agencies to provide concrete data, which will be used for further studies.
- Identify gaps in existing monitoring and data collection programmes for commercial fisheries and exploratory surveys.
- Evolve mechanisms of reporting the catches by fishermen involved in directed and non-directed fisheries, especially through logbooks.
- Ensure collection of data necessary for risk assessment of shark species, such as availability, catchability, productivity and distribution.
- Ensure sound management norms for data bases for easy retrieval and analysis, and are subjected to internal verification and validation checks.

- Develop protocols whereby data can be shared between relevant agencies, yet remain secure.
- Ensure that appropriate data on fishing mortality are collected as inputs for stock assessment and risk assessment.
- Ensure that where a species is taken in two or more fisheries within a jurisdiction or in two or more jurisdictions: (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.
- Develop DNA barcodes of all species and establish DNA referral library. This would assist in resolving issues related to taxonomic ambiguities.
- Evaluate the methodologies for risk assessment and adopt a single national risk assessment framework, consistent across species and fisheries.
- Revalidate species listing under different vulnerability categories; and revise the status, if necessary.
- Increase opportunities for better utilization and value addition of shark products from currently harvested species and encourage commercial fisheries to use these opportunities subject to the long-term ecologically sustainable harvest of shark species.
- Initiate an evaluation of the methodology, and where possible, apply the methodology to assess the impact of shark management and conservation measures on ecosystem structure and function.
- Initiate a process to collect data on the impact of natural and anthropogenic impact (pollution and climate change) on the stocks, their migration and abundance.
- Document indigenous shark fishing practices, highlighting the traditional, cultural and spiritual significance of sharks to local people so as to accommodate these issues in the development of management arrangements.
- Strengthen research on shark biology and develop appropriate methods for modelling the population dynamics of sharks in the ecosystem and develop a basis for distinguishing between the natural variation and trends in the system so as to assist in understanding population status, rates of recovery, population structure and distribution.
- Develop a quantitative framework to assess the recovery of listed threatened species.
- Prepare a review of shark handling practices to identify areas of concern and possible solutions for the conservation and management of sharks.

#### 4.7. Scientific research

- Research should pave the way for (1) developing SMART (Specific, Measurable, Achievable, Realistic and Time-bound) indicators; (2) stock assessment; and (3) moving towards ecosystem approach to fisheries.
- Ensure dissemination of research findings
- Properly planned research needed in fishing gear technology to develop effective by-catch reduction devices, especially in the longline fisheries.
- Identification of shark hotspots and aggregation zones is necessary to design strategies to effectively safe guard these zones with minimum impact on fishing.
- Trade off analysis and dissemination of finding to create awareness on effective management of sharks.
- Submit periodic Report to international agencies such as FAO and IOTC on the progress of NPOA-Sharks.

#### 4.8. Options for regulating fishing

- Encourage fishermen to follow gear regulation and effort control through awareness building.
- Ensure effective implementation of MCS measures. Create scope for community participation in MCS, which will make implementation cost-effective.
- Identify, in consultation with the fishermen and the FSI, shark breeding grounds and season(s) and encourage them to avoid these places through awareness building or through seasonal and area closure.
- Introduce logbook system starting with mechanized fishing vessels and ensure regular inspection of logbook by DoF officials.
- Develop effective shark bycatch reduction measures
- Ensure that management arrangements for target shark species include precautionary management.
- Develop mechanism for certification of products to avoid illegal trade on protected species as well as to facilitate genuine trade in domestic and export markets.
- Address fear of the community in reporting catching of protected species accidentally.
- Introduce a community education strategy aimed at the general public, commercial, and indigenous fishermen and raise national awareness of the vulnerability of sharks and in particular their role in the marine ecosystem, current threats and status.
- Educate resource users about the rationale for and use of recorded shark catch data.
- Develop awareness amongst all resource users of the protected and threatened species provisions, reporting requirements and penalties.

- Encourage use of techniques to improve shark species identification (for example, use of photos, retention of rare species for confirmation of species identification), by user groups.
- Engage print media effectively and make full use of the electronic and social media to create awareness.

#### **4.9. Encouragement of full utilization of dead sharks**

- Sharks are usually fully utilized in India, as shark meat is popular in many parts of the coastal India in both fresh and dried forms. However, the following action may be considered:
- Livelihoods of people dependent on sharks should be kept into consideration while implementing NPOA-Sharks.
- An interview survey may be conducted with fishermen to know the proportion of time spent in shark fishing and proportion of income received from shark fishing.
- Posters of species which can be finned and exported without any detrimental impact should be placed in the fishing harbours and fish landing centres of major shark landing areas.
- Given the difficulties in species identification, trained staff from the DoF/MPEDA should be deputed to certify shark catches fit for finning.
- Encourage value addition in shark products.

#### **4.10. Biodiversity and ecological considerations**

- Fisheries policies at Union and State level should adopt EAF for designing fisheries policies.
- Improve monitoring of anthropogenic impact on fisheries resources and habitats.
- Improve monitoring of reefs and reef-based fisheries resources and discourage using reef for dumping.
- Encourage eco-tourism; shark dives with the active participation and building of entrepreneurial skill among marginalized local communities, including fishermen.
- Consider development and regular updating of ecosystem health indicators.
- Encourage research on impact of climate change and pollution on ecosystem.

#### **4.11. Regional cooperation**

- Regional cooperation is must for ensuring optimal results from national effort as many shark species are shared and straddling stocks.
- Consider contributing to development of Regional Plan of Action for Management of Sharks (RPOA-Sharks) through information exchange; policy dialogues; multilateral and bilateral forums and collaborative research.

- Create national agreement on scope of regional cooperation and develop protocols for regional cooperation and share the same in international and regional forum to reach regional agreement.
- Along with fisheries, create regional drive on environmental issues, especially on the health of oceanic ecosystem.
- Raise the issue of need of regional cooperation in 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).
- Actively participate in international and regional fisheries and environmental forums such as FAO, IOTC, Asia-Pacific Fishery Commission (APFIC), South Asia Cooperative Environment Programme (SACEP), Southeast Asian Fisheries Development Centre (SEAFDEC), BOBP-IGO, and IUCN and share policy initiative and scientific findings.
- Encourage discussion of fisheries issue as a part of Governmental initiative towards South-South Cooperation.

## **5. Implementation Framework**

### **5.1. Implementation of NPOA-Shark**

It is important that implementation activities appropriate to each stage, understanding implementation barriers or enablers, and creating implementation teams are finalized. It is also necessary to evaluate the reach, effectiveness, adoption, implementation and maintenance of NPOA-Sharks. The framework suggested below is a set of activities designed to put into practice the NPOA-Sharks. It emphasizes the importance of adapting the interventions and continuous improvement throughout implementation.

### Implementation Framework for 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  | Approximate Cost (Rs.) |
|----|---|--|--|--|--|------------------------|
| 1. | Acceptance and Notification on the Implementation of the National Plan of Action for Conservation and Management of Sharks (NPOA-Sharks). | The first and foremost requirement is to ensure the acceptance (ownership) of the NPOA-Sharks. In line with the Allocation of Business Rules of the Government of India, MOFAH&D will be the lead Government agency and assume the responsibility of implementing the NPOA-Sharks. | Joint Secretary (Marine Fisheries), MoFAH&D.   | <ul style="list-style-type: none"> <li>• Notification of NPOA-Sharks, including its Implementation Plan.</li> <li>• Nomination of Focal Point in MoFAH&amp;D and a core team for day-to-day implementation work.</li> <li>• Setting up of coordination mechanism with relevant Government and Non-governmental Organizations/ Agencies.</li> </ul> | Involvement of multiple Ministries/Departments that deal with aspects such as conservation (the Ministry of Environment, Forest & Climate Change– MoEF&CC; the Ministry of Commerce and Industry– MoCI; Ministry of Defence through the Indian Coast Guard- ICG; Ministry of Home Affairs for involvement of Coastal Marine Police- CMP; Department of Fisheries-DoF of the coastal States/Union Territories(UTs); concerned Non-Governmental Organizations (NGOs) and Community-Based Organizations (CBOs); and Representatives of Fisher Associations/ Cooperatives. | 6,00,000.00            |
| 2. | Setting up of an Inter-Ministerial Coordination Committee.  | This activity should be carried out simultaneously with Activity #1. The purpose of this activity is to mitigate the risk of working in a multi-agency environment. In addition, this activity will ensure an oversight of the implementation process.                             | Secretary (MOFAH&D); Joint Secretary (Marine Fisheries, MOFAH&D); Secretary (MoEF&CC); Chairperson, MPEDA; | <ul style="list-style-type: none"> <li>• Order issued on setting up of the Committee along with the Terms of Reference.</li> <li>• Minutes of the Meetings.</li> </ul>   | Relative importance of sharks in overall scope of work of the Ministries/Departments is low.   | 0                      |



| #                             | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)  | Indicator(s) of Progress  | Associated Actions/Issues/Risks   | Approximate Cost (Rs.) |
|-------------------------------|--|--|---|---|---|------------------------|
|                               |  |  | Director General, ICAR;<br>Joint Secretary (Borders), MHA;<br>Inspector General of Forests (WL);<br>Secretary/Director of Fisheries of all coastal States/ UTs;<br>The Chief Wildlife Warden of all Coastal States. |   |   |                        |
| 3.                            | Publication of the National Shark Identification kit or Guide. | Preparation of the National Shark Identification Kit or Guidelines. The document inter alia will contain relevant details of the species and their local names.  | ICAR-CMFRI;<br>Fishery Survey of India- FSI; DoFs;<br>Fisher Associations/ Cooperatives   | <ul style="list-style-type: none"> <li>Publication of the Guide.</li> </ul>                         | Mislabelling; lack of coordination amongst different agencies; lack of information to generate details. | 19,00,000.00           |
|                               |  | From the user perspective, the document should comprise two parts: species allowed to catch and species prohibited for catching.<br>Currently, ICAR-CMFRI recorded 160 species of sharks. If it is not possible to collect information on all of them, species not allowed to catch should be prioritized. | ICAR-CMFRI, FSI and DoF to collaborate to prepare the guide and to collect information on local names.  | <ul style="list-style-type: none"> <li>Distribution of copies of the guide to all users.</li> </ul> | Low priority by the R&D Institutions.   | 0                      |
| <b>Preparatory Activities</b> |  |  |   |   |   | <b>25,00,000.00</b>    |

| #   | Activity  | Description of Activity   | Responsible Agency/Person (Proposed)   | Indicator(s) of Progress  | Associated Actions/Issues/Risks   | Approximate Cost (Rs.) |
|---|---|---|--|---|---|------------------------|
| <b>2. Setting up of MCS Frameworks (01 – 36 Months)</b> |   |   |  |   |   |                        |
| 1.  | Notification on Implementation of the National Plan of Action on Monitoring, Control and Surveillance (NPOA-MCS).                     | The NPOA-MCS finalized and agreed through a National-level Workshop held in New Delhi in early 2022. Many aspects of implementation of NPOA-Sharks, such as gear regulation, data collection, protected areas, etc. will depend on the implementation of the provisions under the NPOA- MCS and also the Marine Fishing Regulation Act of the coastal States/UTs. | Secretary (MOFAH&D); Joint Secretary (Fisheries, MOFAH&D); Indian Coast Guard; Ministry of Home Affairs; DoF; Coastal Police; Fisher associations/ Cooperatives. | <ul style="list-style-type: none"> <li>Notification of the NPOA-MCS, including its Implementation Plan.</li> <li>Setting up of an empowered committee to oversee the implementation of the NPOA-MCS.</li> <li>Setting up of a MCS Cell in MOFAH&amp;D for day-to-day implementation work.</li> <li>Setting up of coordination mechanism with relevant Government and Non-government Organizations/ Agencies.</li> </ul> | Involvement of multiple Ministries/Departments that would be dealing with different aspects of MCS, such as Ministry of Defence through the ICG; Ministry of Home Affairs for involvement of Coastal Marine Police- CMP; DoF of the coastal States/UTs; concerned NGOs/CBOs; and Representatives of Fisher Associations/Cooperatives. Multi-agency coordination and networking. | 6,00,000.00            |
| 2.  | Setting up of MCS Division at the Central level (MoA&FW) and in each coastal State and UT for effective implementation of the scheme. | Annex : provides the details.   | -Do-   | <ul style="list-style-type: none"> <li>Notification/Order.</li> <li>Placement of staff.</li> </ul>  | Coordination and networking to ensure smooth functioning in a multi-agency environment. Sanction of additional posts, if required.  |                        |
| 3.  | Establishment and maintenance of systems for acquisition, storage and   | Part of standard MCS measures.  | -Do-   | <ul style="list-style-type: none"> <li>Notification.</li> <li>Implementation of log books.</li> </ul>   | --  | 0                      |

| #  | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)  | Indicator(s) of Progress  | Associated Actions/Issues/Risks                     | Approximate Cost (Rs.)   |
|----|--|--|---|---|---|--|
|    | dissemination of MCS data.   |  |   |   |   |  |
| 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-  | <ul style="list-style-type: none"> <li>Annual MCS Reports.</li> <li>Number of consultations and awareness programmes held.</li> </ul> | --  | 0  |
| 5. | Planning and provision of funds for MCS operations.  | A dedicated funding mechanism is needed as MCS is a continual process. It is suggested that an appropriate scheme is designed to implement MCS system. | MOFAH&D;ICG; DoF  | <ul style="list-style-type: none"> <li>Budget Plan/ Scheme</li> </ul>   | Approval of the Niti Aayog and Ministry of Finance. | Budget to be identified based on the scope and extent of the scheme. |
| 6. | Provision of training and education to all persons involved in MCS operations.   | To build human resources   | MOFAH&D; DoF; ICG; MPEDA; Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO). | <ul style="list-style-type: none"> <li>Training programmes conducted (nos).</li> <li>Persons trained (nos).</li> </ul>                | --  | -Do-   |
| 7. | Implementation of Vessel Monitoring System (VMS).  | To ensure fishing is carried out in accordance with the license.   | MOFAH&D; MHA; DoF; ICG.   | <ul style="list-style-type: none"> <li>Annual MCS Reports.</li> </ul>   | Availability of satellite time for the purpose.     | -Do-   |

| #   | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)   | Indicator(s) of Progress   | Associated Actions/Issues/Risks   | Approximate Cost (Rs.) |
|-----|--|--|--|--|---|------------------------|
| 8.  | Implementation of the log book system.   | To encourage recording of catch and self-reporting by the fishermen. This is especially essential for mechanized fishing vessels.  | MOFAH&D; DoF; ICG; ICAR-CMFRI/FSI (for designing of logbook and data processing).                            | <ul style="list-style-type: none"> <li>• Preparation of log books and their translation in vernacular.</li> <li>• Annual MCS Reports.</li> </ul>   | Cooperation of DoF; Fisher Associations/ Cooperatives in recording of catch information through use of log books.   | -Do-                   |
| 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 tools for verification of new fishing vessels being constructed. In the long-run also an effective mechanism for input control.   | MOFAH&D; DoF.  | <ul style="list-style-type: none"> <li>• Notification.</li> <li>• Coverage of boatyards in the registration scheme.</li> <li>• Annual MCS Reports.</li> </ul>                              | -Do-  | -Do-                   |
| 10. | Record of fishing vessels.   | Maintenance of records of all vessels (through appropriate registration and licensing) and their current owners and operators authorized to undertake fishing subject to their jurisdiction  | MOFAH&D; DoF.  | <ul style="list-style-type: none"> <li>• Coverage of boatyards in the registration scheme.</li> <li>• Annual MCS Reports.</li> </ul>   | -Do-  | -Do-                   |
| 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 Marine Fishing Regulation Acts and Wildlife (Protection) Act, 1972 are sufficient to cover for international institutional requirements that India is party to; and (2) whether existing | Concerned Ministries may set up Committee comprising experts and stakeholders to deliberate over the issues. | <ul style="list-style-type: none"> <li>• Notification.</li> <li>• Harmonized national policies and laws with international instruments/arrangements.</li> <li>• Review Reports.</li> </ul> | Revision/formulation of new policies and or laws are usually time-consuming and multi-stakeholder exercises. Building consensus in such an environment can be hurdle. | 15,00,000.00           |

| #   | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)  | Indicator(s) of Progress  | Associated Actions/Issues/Risks | Approximate Cost (Rs.) |
|---|--|--|---|---|---------------------------------|------------------------|
|   |  | policies and Acts are creating hurdles for livelihood development of fishermen and fisheries sector.   |   |   |                                 |                        |
| <b>Setting up of MCS Frameworks</b>   |  |  |   |   |                                 | <b>30,21,00,000.00</b> |
| <b>3. Human resources and capacity building requirements (06 – 12 Months)</b> |  |  |   |   |                                 |                        |
| 1   | Building better taxonomic skills of field investigators; scientists.                         | Sharks are one of the little known species in terms of taxonomy. India has poor species-wise data collection system and objective of this activity is to improve the scenario.   | MOFAH&D/ICAR-CMFRI/FSI/FAO/Universities/National Bureau of Fish Genetic Resources (NBFGR) | <ul style="list-style-type: none"> <li>• Training Plans.</li> <li>• Reports</li> </ul>                        | --                              | 75,00,000.00           |
| 2.  | Building skill on data collection techniques for field investigators.                        | This is a training programme on sampling and data collection. Different agencies collecting primary data report considerably different estimates. The objectives is to develop the skill to standardize data collection system.            | MOFAH&D/ICAR-CMFRI/FSI/DoF.   | <ul style="list-style-type: none"> <li>• Agreement between different agencies.</li> <li>• Reports.</li> </ul> | --                              | 75,00,000.00           |
| 3.  | Awareness building of fishermen and leadership building for monitoring fisheries activities. | Fishermen are often not clear of the ecological importance of sharks and question the need for conserving sharks specifically. In addition, to effectively integrate them with the monitoring system, training should be provided to build | BOBP-IGO/ ICAR-CMFRI/FSI/DoF/NGO/ CBO.  | <ul style="list-style-type: none"> <li>• Agreement between different agencies.</li> <li>• Reports</li> </ul>  | --                              | 1,00,00,000.00         |

| #   | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)    | Indicator(s) of Progress  | Associated Actions/Issues/Risks                      | Approximate Cost (Rs.) |
|---|--|--|---|---|--|------------------------|
|   |  | leadership skills and participatory skills   |   |   |  |                        |
| 4.  | Training programme on the Code on 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; appreciating need for better management measures for fisheries; develop skills for extension to fishermen.                      | BOBP-IGO/ ICAR-CMFRI/FSI/DoF            | <ul style="list-style-type: none"> <li>• Report of Training programmes;</li> <li>• Pre and post training evaluations</li> </ul> |  | 50,00,000.00           |
| <b>Human resources and capacity building requirements</b>   |  |  |   |   |  | <b>3,00,00,000.00</b>  |
| <b>4. Management, research, ecological and biodiversity related requirements (04 – 36 Months)</b> |  |  |   |   |  |                        |
| 1.  | Developing methodology and indicators for rapid assessment of status of different shark species.                   | Suitable methodology, based on available data and flow of data from ongoing research activities is needed to be developed. At the same time SMART indicators should be a part of this methodology. The indicators should be interpretable by lay person. | ICAR-CMFRI/FSI/FAO/ Universities/NBFGR. | <ul style="list-style-type: none"> <li>• Reports.</li> <li>• Peer-reviewed papers.</li> </ul>                                   | Balancing scientific rigor with available resources. | 20,00,000.00           |
| 2.  | Identification of shark hotspots and congression zones.  | Identification of shark hotspots and congression zones is necessary to design strategies to effectively safe guard these zones with minimum impact on fishing  | ICAR-CMFRI/FSI/ Universities            | <ul style="list-style-type: none"> <li>• Reports.</li> <li>• Peer-reviewed papers.</li> </ul>                                   | On-going activity of ICAR-CMFRI.                     | 0                      |

| #   | Activity  | Description of Activity  | Responsible Agency/Person (Proposed)                             | Indicator(s) of Progress  | Associated Actions/Issues/Risks | Approximate Cost (Rs.) |
|-----|---|--|--|---|---------------------------------|------------------------|
| 3.. | Developing DNA sequences of all species and establish DNA referral library.   | To resolve taxonomic ambiguities   | ICAR-CMFRI/FSI/FAO/Universities/NBFGR                            | <ul style="list-style-type: none"> <li>• Reports.</li> <li>• Peer-reviewed papers.</li> </ul> | On-going activity of NBFGR.     | 60,00,000.00           |
| 4.  | Evaluating methodologies for risk assessment and adopting a single national risk assessment framework, consistent across species and fisheries. | This activity will ensure consistent reporting.  | ICAR-CMFRI/FSI/FAO/Universities                                  | <ul style="list-style-type: none"> <li>• Reports</li> </ul>                                   | --                              | 10,00,000.00           |
| 5.  | Revalidating species listing under different vulnerability categories; and revise the status, if necessary                                      | There is a long standing demand from fishermen to revalidate the status of different species. In addition, this activity is necessary to meet CITES trade requirements; if in future India likes to review its trade policies. This activity will also include setting benchmarks at species-level against which the status will be compared. ICAR-CMFRI has in the past carried out a similar exercise. | ICAR-CMFRI/FSI/Universities/MOFAH&D/MPEDA/Fishermen Associations | <ul style="list-style-type: none"> <li>• Reports.</li> <li>• Peer-reviewed papers.</li> </ul> | --                              | 10,00,000.00           |
| 6.  | Developing effective shark by-catch   | Since majority of the sharks land as by-catch, without a viable strategy   | ICAR-CMFRI/FSI/Universities/MOFAH                                | <ul style="list-style-type: none"> <li>• Reports.</li> </ul>                                  | Acceptance by fishermen         | 20,00,000.00           |

| #  | Activity                                | Description of Activity   | Responsible Agency/Person (Proposed)   | Indicator(s) of Progress  | Associated Actions/Issues/Risks | Approximate Cost (Rs.) |
|----|---|---|--|---|---------------------------------|------------------------|
|    | reduction measures.                     | controlling shark catch will be difficult. Part of the problem will be addressed if and only if there is a better MCS system. However, at the same time options should be explored to design better gear – eco-friendly but with comparable catching efficiency of existing gear. In longline, more studies are needed on the use of ‘J’ hooks versus ‘O’ hooks       | &D/MPEDA/Fishermen Associations  | <ul style="list-style-type: none"> <li>Peer-reviewed papers.</li> </ul>                   |                                 |                        |
| 7. | Review of shark trade policies.         | Although shark fin trade is a small percentage of the total revenue from fish trade; the uniqueness of shark in creating multiple times revenue in post-harvest should be noted. This is also an important activity for women. It also needs to ascertain that whether such policies will be actually benefitting the stocks as most sharks are landed as a by-catch. | ICAR-CMFRI/FSI/Universities/MOFAH &D/MPEDA/Fishermen Associations /Merchants/ BOBP-IGO | <ul style="list-style-type: none"> <li>Reports.</li> <li>Peer-reviewed papers.</li> </ul> | --                              | 10,00,000.00           |
| 8. | Research on value addition from sharks. | The IPOA-Shark emphasis on full-utilization of sharks.  | NIFPHTT/Universities   | <ul style="list-style-type: none"> <li>Reports</li> <li>Field trials</li> </ul>           | --                              | 15,00,000.00           |
| 9. | Creation of awareness material.         | Creation of awareness material for fishermen and policy makers  | ICAR-CMFRI/FSI/Universities/MOFAH&D/MPEDA/Fishermen                                    | <ul style="list-style-type: none"> <li>Distribution of Material</li> </ul>                | --                              | 20,00,000.00           |



| #   | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)   | Indicator(s) of Progress   | Associated Actions/Issues/Risks                          | Approximate Cost (Rs.) |
|---|--|--|--|--|--|------------------------|
|   |  |  | Associations/ BOBP-IGO   |  |  |                        |
| 10  | Assessment of NPOA-Shark.                        | This is the final activity to review the progress under NPOA-Sharks and revise the Plan accordingly  | FAO/IOTC/BOBP-IGO  | <ul style="list-style-type: none"> <li>Report</li> </ul>   | --   | 0                      |
| <b>Management, research, ecological and biodiversity related requirements</b> |  |  |  |  |  | <b>1,65,00,000.00</b>  |
| <b>5. Building regional cooperation (6 – 36 Months)</b>                       |  |  |  |  |  |                        |
| 1.  | Contribution towards development of RPOA-Sharks. | Many shark species, especially the large pelagic sharks are straddling and shared stocks. Therefore, it is beyond the scope of a country to manage them successfully without regional cooperation. IOTC is the concerned fisheries management agency with the power to implement a regional management plan. In addition, IOTC also covers areas, which are most important for management of sharks in the region. Apart from IOTC, other regional fisheries and environmental agencies will also play an important role in policy harmonization, capacity building and development of information base. These agencies are BOBP-IGO; SEAFDEC; APFIC and | MOFAH&D; MPEDA; MOEF&CC; FAO/ APFIC; BOBP-IGO; IOTC; IUCN; WWF; SACEP; Conservation International (CI) | <ul style="list-style-type: none"> <li>Meeting Reports.</li> <li>RPOA-Shark in place.</li> </ul> | Will require multi-country and multi-agency cooperation. | 10,00,000.00           |

| #  | Activity   | Description of Activity  | Responsible Agency/Person (Proposed)  | Indicator(s) of Progress  | Associated Actions/Issues/Risks   | Approximate Cost (Rs.) |
|----|--|--|---|---|---|------------------------|
|    |  | SACEP. The activity includes participation in regional consultation; working towards policy harmonization and sharing of information. RPOA-shark is also highlighted as important by fishermen community   |   |   |   |                        |
| 2. | Development of regional collaborative research and information exchange protocols. | The aim of this activity is to promote south-south cooperation in information exchange and research. However, since most of the research and information generated for research or through research are proprietary assets; agencies are not often agreeable to share them. In case of collaborative research; funding is a major issue. It is proposed that MOFAH&D will carry out first an internal discussion with national agencies and develop a strategy for regional cooperation. This strategy then can be presented for larger consideration through different regional forums including BOBP-IGO; APFIC and IOTC towards | MOFAH&D; ICAR; MPEDA; MOEF&CC; APFIC; BOBP-IGO; IOTC; IUCN; WWF; SACEP; CI. | <ul style="list-style-type: none"> <li>• Agreement on Regional Research and Information Exchange Protocol adopted.</li> <li>• Interim: MoU between regional research institutes.</li> </ul> | While there are many examples of North-South Cooperation and South-South Cooperation through external funding; examples of South-South Cooperation with self-funding/national funding are scanty. Cost for this activity is towards arrangement of meetings at national and regional level. | 20,00,000.00           |

| #  | Activity  | Description of Activity   | Responsible Agency/Person (Proposed)   | Indicator(s) of Progress   | Associated Actions/Issues/Risks | Approximate Cost (Rs.) |
|----|---|---|--|--|---------------------------------|------------------------|
|    |   | development of an agreed regional protocol.   |  |  |                                 |                        |
| 3. | Reporting to IOTC/FAO/CITES on the progress of NPOA-Sharks.                                   | The objective of this activity is to inform the international community on India's efforts, which is necessary (i) to demonstrate India's commitment towards global sustainability initiatives; (ii) informing global community about the challenges being faced and efforts to overcome them; and (iii) receiving feedback from international community to improve implementation. | MOFAH&D; FSI; ICAR-CMFRI; MPEDA; MOEF&CC; BOBP-IGO.  | <ul style="list-style-type: none"> <li>Participation in international events and presentation of reports in appropriate forums.</li> </ul> | --                              | 10,00,000.00           |
| 4. | Building required political environment in support of regional action through regional forums | Apart from regional fisheries and environmental organizations; regional political and development organizations may also be considered for involvement to create the necessary political and developmental mandate to support RPOA-Sharks. Such political and development agencies are South Asian Association for Regional Cooperation (SAARC); Bay of Bengal                      | Ministry of External Affairs; MOFAH&D; BOBP-IGO (Advocacy); IUCN (Advocacy); WWF (Advocacy). | <ul style="list-style-type: none"> <li>Adoption of regional resolutions.</li> </ul>  | --                              |                        |

| #                                    | Activity | Description of Activity   | Responsible Agency/Person (Proposed) | Indicator(s) of Progress | Associated Actions/Issues/Risks | Approximate Cost (Rs.) |
|--------------------------------------|----------|---|--------------------------------------|--------------------------|---------------------------------|------------------------|
|                                      |          | Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC); Indian Ocean Rim Association (IORA) |                                      |                          |                                 |                        |
| <b>Building regional cooperation</b> |          |   |                                      |                          |                                 | <b>40,00,000.00</b>    |
| <b>Total (1 – 5)</b>                 |          |   |                                      |                          |                                 | <b>35,51,00,000.00</b> |
| <b>In US\$</b>                       |          |   |                                      |                          |                                 | <b>47,32,142.86</b>    |

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## Annexure 1 : List of Shark species in India

| Family                | Genus+species                        | Common Name            |
|-----------------------|--------------------------------------|------------------------|
| <b>Alopiidae</b>      | <i>Alopias pelagicus</i>             | Pelagic Thresher Shark |
|                       | <i>Alopias superciliosus</i>         | Big-Eye Thresher Shark |
|                       | <i>Alopias vulpinus</i>              | Thresher Shark         |
| <b>Carcharhinidae</b> | <i>Carcharhinus albimarginatus</i>   | Silvertip Shark        |
|                       | <i>Carcharhinus altimus</i>          | Bignose Shark          |
|                       | <i>Carcharhinus amblyrhynchoides</i> | Graceful Shark         |
|                       | <i>Carcharhinus amblyrhynchos</i>    | Blacktail Reef Shark   |
|                       | <i>Carcharhinus amboinensis</i>      | Pigeys Shark           |
|                       | <i>Carcharhinus brachyurus</i>       | Copper Shark           |
|                       | <i>Carcharhinus brevipinna</i>       | Spinner Shark          |
|                       | <i>Carcharhinus dussumieri</i>       | Whitecheek Shark       |
|                       | <i>Carcharhinus falciformis</i>      | Silky Shark            |
|                       | <i>Carcharhinus galapagensis</i>     | Galapagos Shark        |
|                       | <i>Carcharhinus hemiodon</i>         | Pondicherry Shark      |
|                       | <i>Carcharhinus leucas</i>           | Bull Shark             |

| Family | Genus+species                    | Common Name            |
|--------|----------------------------------|------------------------|
|        | <i>Carcharhinus limbatus</i>     | Blacktip Shark         |
|        | <i>Carcharhinus longimanus</i>   | Oceanic Whitetip Shark |
|        | <i>Carcharhinus macloti</i>      | Hardnose Shark         |
|        | <i>Carcharhinus melanopterus</i> | Blacktip Reef Shark    |
|        | <i>Carcharhinus obscurus</i>     | Dusky Shark            |
|        | <i>Carcharhinus plumbeus</i>     | Sandbar Shark          |
|        | <i>Carcharhinus sealei</i>       | Blackspot Shark        |
|        | <i>Carcharhinus sorrah</i>       | Spot-Tail Shark        |
|        | <i>Galeocerdo cuvier</i>         | Tiger Shark            |
|        | <i>Glyphis gangeticus</i>        | Ganges Shark           |
|        | <i>Glyphis glyphis</i>           | Speartooth Shark       |
|        | <i>Lamiopsis temminckii</i>      | Broadfin Shark         |
|        | <i>Loxodon macrorhinus</i>       | Sliteye Shark          |

| <b>Family</b>          | <b>Genus+species</b>           | <b>Common Name</b>    |
|------------------------|--------------------------------|-----------------------|
|                        | <i>Negaprionacutidens</i>      | Sicklefin Lemon Shark |
|                        | <i>Prionace glauca</i>         | Blue Shark            |
|                        | <i>Rhizoprionodon acutus</i>   | Milk Shark            |
|                        | <i>Rhizoprionodon oligoinx</i> | Grey Sharpnose Shark  |
|                        | <i>Scoliodon laticaudus</i>    | Spadenose Shark       |
|                        | <i>Triaenodon obesus</i>       | Whitetip Reef Shark   |
| <b>Lamnidae</b>        | <i>Isurus oxyrinchus</i>       | Shortfin mako Shark   |
|                        | <i>Isurus paucus</i>           | Longfin Mako          |
| <b>Rhincodontidae</b>  | <i>Rhincodon typus</i>         | Whale Shark           |
| <b>Stegostomatidae</b> | <i>Stegostomafasciatum</i>     | Zebra Shark           |
| <b>Squalidae</b>       | <i>Squalus acanthias</i>       | Piked Dogfish         |
|                        | <i>Squalus mitsukurii</i>      | Shortspine Spurdog    |
|                        | <i>Chaenogaleus macrostoma</i> | Hooktooth Shark       |



| Family              | Genus+species                | Common Name               |
|---------------------|------------------------------|---------------------------|
| <b>Hemigaleidae</b> | <i>Hemigaleus microstoma</i> | Sicklefin Weasel Shark    |
|                     | <i>Paragaleus randalli</i>   | Slender Weasel Shark      |
|                     | <i>Hemipristis elongata</i>  | Snaggletooth Shark        |
| <b>Traikidae</b>    | <i>Iago omanensis</i>        | Bigeye Houndshark         |
|                     | <i>Iago mangalorensis</i>    | Mangalore Houndshark      |
|                     | <i>Mustelus mosis</i>        | Arabian Smoothhound Shark |
|                     | <i>Mustelus sp.</i>          | -                         |
| <b>Sphyrnidae</b>   | <i>Eusphyra blochii</i>      | Winghead Shark            |
|                     | <i>Sphyrna lewini</i>        | Scalloped Hammerhead      |
|                     | <i>Sphyrna mokarran</i>      | Great Hammerhead          |
|                     | <i>Sphyrna tudes</i>         | Smalleye Hammerhead       |
|                     | <i>Sphyrna zygaena</i>       | Smalleye Hammerhead       |
| <b>Proscyllidae</b> | <i>Eridacnis radcliffei</i>  | Pygmy Ribbontail Catshark |

| Family                    | Genus+species                     | Common Name               |
|---------------------------|-----------------------------------|---------------------------|
|                           | <i>Proscyllium magnificum</i>     | Magnificent Catshark      |
| <b>Echinorhinidae</b>     | <i>Echinorhinus brucus</i>        | Bramble Shark             |
|                           | <i>Echinorhinus cookei</i>        | Prickly Shark             |
| <b>Hexanchidae</b>        | <i>Heptranchias perlo</i>         | Sharpnose Sevengill Shark |
|                           | <i>Hexanchus griseus</i>          | Bluntnose Sixgill Shark   |
|                           | <i>Chiloscyllium arabicum</i>     | Arabian Carpetshark       |
| <b>Hemiscyllidae</b>      | <i>Chiloscyllium griseum</i>      | Grey Bambooshark          |
|                           | <i>Chiloscyllium indicum</i>      | Slender Bambooshark       |
|                           | <i>Chiloscyllium plagiosum</i>    | Whitespotted Bambooshark  |
|                           | <i>Chiloscyllium punctatum</i>    | Brownbanded               |
| <b>Ginglymostomatidae</b> | <i>Nebrius ferrugineus</i>        | Bambooshark               |
| <b>Pseudocarchariidae</b> | <i>Pseudocarcharias kamoharai</i> | Crocodile Shark           |
| <b>Odontaspidae</b>       | <i>Carcharias taurus</i>          | Sand Tiger Shark          |

| Family                | Genus+species                      | Common Name                  |
|-----------------------|------------------------------------|------------------------------|
|                       | <i>Odontaspis ferox</i>            | Small-Tooth Sand Tiger Shark |
|                       | <i>Odontaspis noronhai</i>         | Bigeye Sand Tigershark       |
| <b>Scyliorhinidae</b> | <i>Apristurus investigatoris</i>   | Broadnose Cat Shark          |
|                       | <i>Bythaelurus hispidus</i>        | Bristly Cat shark            |
|                       | <i>Cephaloscyllium silasi</i>      | Indian Swellshark            |
|                       | <i>Halaelurus quagga</i>           | Quagga Cat shark             |
| <b>Somniosidae</b>    | <i>Centroscymnus crepidator</i>    | Longnose Velvet Dogfish      |
|                       | <i>Zameus squamulosus</i>          | Velvet Dogfish               |
| <b>Etmopteridae</b>   | <i>Etmopterus lucifer</i>          | Blackbelly Lanternshark      |
|                       | <i>Etmopterus pusillus</i>         | Smooth Lanternshark          |
|                       | <i>Centrophorus atromarginatus</i> | Dwarf Gulper Shark           |
| <b>Centrophoridae</b> | <i>Centrophorus granulosus</i>     | Gulper Shark                 |
|                       | <i>Centrophorus moluccensis</i>    | Smallfin Gulper Shark        |

| <b>Family</b>        | <b>Genus+species</b>          | <b>Common Name</b>     |
|----------------------|-------------------------------|------------------------|
|                      | <i>Centrophorus squamosus</i> | Leafscale Gulper Shark |
|                      | <i>Centrophorus uyato</i>     | Little Gulper Shark    |
|                      | <i>Deania profundorum</i>     | Arrowhead Dogfish      |
|                      | <i>Aetobatus flagellum</i>    | Longheated Eagle Ray   |
|                      | <i>Aetobatus ocellatus</i>    | Spotted Eagle Ray      |
| <b>Myliobatidae</b>  | <i>Aetomylaeus maculatus</i>  | Mottled Eagle Ray      |
|                      | <i>Aetomylaeus milvus</i>     | Brown Eagle Ray        |
|                      | <i>Aetomylaeus nichofii</i>   | Nieuhof's Eagle Ray    |
|                      | <i>Aetomylaeus vesperilio</i> | Ornate Eagle Ray       |
| <b>Rhinopteridae</b> | <i>Rhinoptera javanica</i>    | Flapnose Ray           |
|                      | <i>Rhinoptera jayakari</i>    | Oman Cownose Ray       |
| <b>Mobulidae</b>     | <i>Manta birostris</i>        | Giant Manta Ray        |
|                      | <i>Manta alfredi</i>          | Reef Manta Ray         |

| Family            | Genus+species               | Common Name         |
|-------------------|-----------------------------|---------------------|
|                   | <i>Mobula thurstoni</i>     | Smoothtailmobula    |
|                   | <i>Mobula japanica</i>      | Spinetailmobula     |
|                   | <i>Mobula tarapacana</i>    | Chilean Devil Ray   |
|                   | <i>Mobula kuhlii</i>        | Shortfin Devil Ray  |
|                   | <i>Mobula eregoodonteke</i> | Longhornedmobula    |
| <b>Dasyatidae</b> | <i>Dasyatis centroura</i>   | Roughtail Sting Ray |
|                   | <i>Dasyatis microps</i>     | Smalleye Sting Rays |
|                   | <i>Dasyatis zugei</i>       | Pale Edged StingRay |
|                   | <i>Himantura fai</i>        | Pink Whipray        |