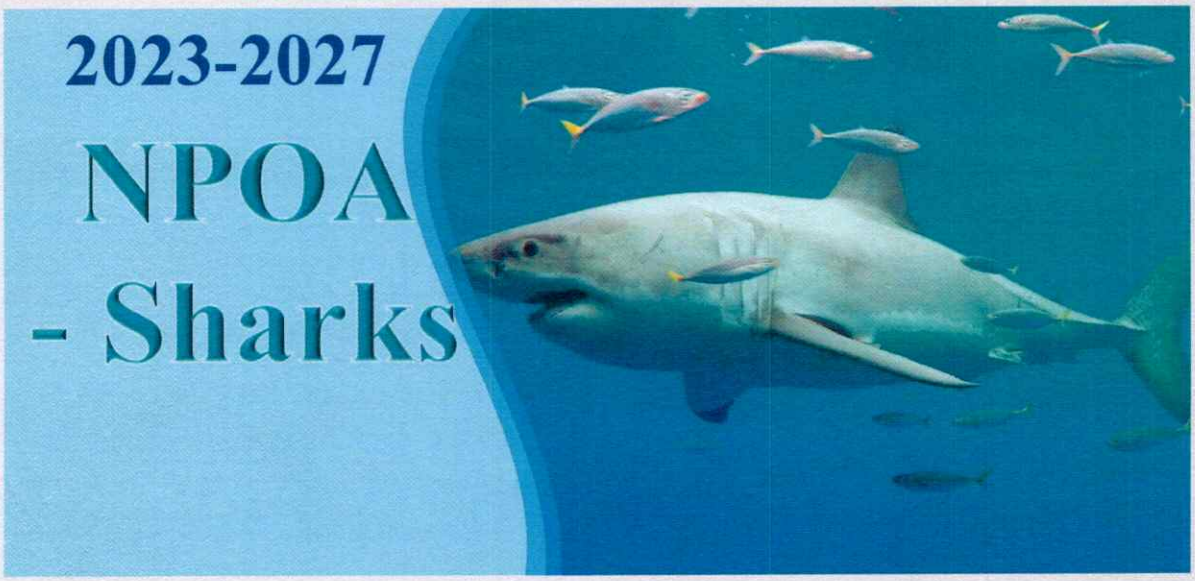
Draft

National Plan of Action for Conservation and Management of Sharks and Rays [NPOA-Sharks] in Bangladesh



Department of Fisheries
Bangladesh Fisheries Research Institute
Ministry of Fisheries and Livestock, Bangladesh

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Acronyms and Abbreviations

BCGs	By-catch Group Shark Fishers
BDT	Bangladeshi Taka
BFDC	Bangladesh Fisheries Development Corporation
BFD	Bangladesh Forest Department
BFRI	Bangladesh Fisheries Research Institute
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BoB	Bay of Bengal
BOBLME	Bay of Bengal Large Marine Ecosystem
BOBP-IGO	Bay of Bengal Programme-Intergovernmental Organization
CCAMLR	Convention on the Conservation of Antarctic Living Resources
CCRF	Code of Conduct for Responsible Fisheries
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
COFI	Committee on Fisheries
CU	Chittagong University
DoE	Department of Environment
DoF	Department of Fisheries
ECAs	Ecologically Critical Areas
EEZ	Exclusive Economic zone
EIA	Environmental Impact Assessment
EoI	Expression of Interest
ESAs	Ecologically Sensitive Areas
ESBNs	Estuarine Set Bag nets
ETP	Effluents Treatment Plant
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FRSS	Fisheries Resources Survey SystemGEF Global Environment Facility
GoB	Government of Bangladesh
GOs	Government Organizations
h	Hour
IMS&F	Institute of Marine Sciences and Fisheries
IOTC	Indian Ocean Tuna Commission
IPOA	International Plan of Action
ITLOS	International Tribunal for the Law of the Sea
IUCN	International Union for the Conservation of Nature
IUU	Illegal, unregulated and unreported

MCPAs	Marine and Coastal Protected Areas
MCS	Monitoring, Control and Surveillance
MFF	Mangrove for the Future
MFSMU	Marine Fisheries Survey Management Unit
MMAs	Marine Managed Areas
MoEFCC	Ministry of Environment, Forest and Climate Change
MoFL	Ministry of Fisheries and Livestock
MoL	Ministry of Land
MoWR	Ministry of Water Resources
MPAs	Marine Protected Areas
MSBNs	Marine Set Bag Nets
MSY	Maximum Sustainable Yield
NGOs	Non-Government Organizations
NPOA	National Plan of Action
NWMP	National Water Management Plan
NWP	National Water Policy
OSH	Occupational Safety and Health
RF	Reserved Forest
RFMO	Regional Fisheries Management Organization
RPOA	Regional Plan of Action
SAARC	South Asian Association for Regional Cooperation
SEAFDEC	South East Asian Fisheries Development Center
SFTWA	Shark Fishers' and Traders' Welfare Association
TAC	Total Allowable Catch
TDA	Transboundary Diagnostic Analysis
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Seas
UNFSA	United Nations Fish Stocks Agreement
WCPFC	Western and Central Pacific Fisheries Commission
WG	Working Group
WSSD	World Summit on Sustainable Development

Executive Summary

In collaboration with the Bay of Bengal Large Marine Ecosystem (BOBLME) project under the Food and Agriculture Organization of the United Nations (FAO), the Bangladesh Fisheries Research Institute (BFRI) undertook an evaluation of shark fisheries. In 2014, aligned with FAO's International Plan of Action for Sharks (IPOA-Sharks), BFRI crafted a draft National Plan of Action (NPOA) for the Conservation and Management of Shark Resources in Bangladesh. Following a validation workshop at the Department of Fisheries in Dhaka on April 20, 2014, the draft NPOA-Sharks was submitted to the Department of Fisheries (DoF) for further processing and awaited approval from the Ministry of Fisheries and Livestock. Due to the closure of the BOBLME project in June 2014, the approval process for the draft NPOA-Sharks faced delays. However, in 2021, the Ministry of Fisheries and Livestock (MoFL) established a Working Group (WG) led by the Director-General of DoF to update the draft NPOA for the conservation and management of Sharks and Rays in Bangladesh, aligning it with national, regional, and international considerations.

The WG convened five meetings from April 6, 2021, to October 18, 2023, with the objective of updating information on sharks and rays, reviewing actions and measures, and formulating recommendations for their conservation and management.

While shark and rays are not the primary targets of fishing activities along the Bangladesh coast, significant by-catches occur, particularly during small-scale hilsa and Indian salmon fisheries deploying drift gill nets, bag nets, hook and lines, and trammel nets. The catches predominantly consist of small-sized individuals due to the gear design. Shark catches are seasonal, peaking from January to March during the main season of October to March, with reduced catches from July to September due to rough seas. Sharks are captured along the entire coast and in defined fishing grounds such as South patches, South of South patches, Middle Ground, and Swatch of No Ground. Major landing centers include Cox's Bazar, Teknaf, Chittagong, Khulna, Bagerhat, Dublar Char, Kuakata, Patharghata, and Barisal.

The key focus areas for the NPOA are:

1. State responsibilities
2. Awareness building for fishers, traders, NGOs, and the general public
3. Capacity building of DoF, BFRI, BFDC, Customs, DoE, and BFD
4. Data collection
5. Monitoring, Control, and Surveillance
6. Research
7. Legislation and regulations
8. Management measures
9. International, regional, and national cooperation and coordination
10. Regular updating of the NPOA

The updated draft, termed the National Plan of Action for the Conservation and Management of Sharks and Rays (NPOA-Sharks) in Bangladesh, will undergo revision every five years based on evolving needs and available data.

1. Background

Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand were working together through the Bay of Bengal Large Marine Ecosystem Project (GCP/RAS/236/GFF) toward a coordinated programme of action designed to improve the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries. The Project's Subcomponent 2.3, "Collaborative Regional Fishery Assessments and Management Plans", supports the introduction and promotion of collaborative fisheries management approaches for selected key transboundary species through the development of regional and sub-regional management plans and harmonization of data collection and standardization.

The BOBLMEP Work plan 2012, adopted by the Project Steering Committee in March 2012, includes the following activities:

"Sharks: *Targeted research (studies) are undertaken to address knowledge gaps (taxonomy, life cycle and reproduction information, information from small-scale fisheries, monitoring of effectiveness of conservation measures, and alternative livelihoods). Work is undertaken in support of strengthening NPOA's and a regional synthesis to produce a framework for a Regional Plan of Action. Partnerships developed with BOBP-IGO and SEAFDEC for the development of the RPOA."*

For the implementation of the BOBLME Work Plan in Bangladesh, an agreement was reached with Bangladesh Fisheries Research Institute. BFRI agreed to carry out a survey on shark fisheries and in a consultative manner formulate a draft National Plan of Action for the conservation and management of shark resources in Bangladesh.

Little is known about shark fisheries in Bangladesh. Most of the catches, in the order of 3000-4000 t/yr, are caught as by-catch in driftnet and long-line fisheries targeting other species, such as Hilsa and Indian salmon. Official statistics show a small decline in the catches the last few years (2009-2012). There is also anecdotal information that the catches of under-sized sharks have increased recently. This indicates that stocks are overexploited. However, all information needs verification. There are no systematically gathered data available on abundance, species, catches and utilization.

The International Plan of Action for the Conservation and Management of Shark Resources (IPOA-Sharks) were adopted by FAO's Committee on Fisheries in 1999, in line with the provisions in the Code of Conduct for Responsible Fisheries (CCRF). The IPOA-Sharksstipulates that FAO member countries shall assess their shark fisheries and if required prepare a National Plan of Action. Bangladesh had not formulated and adopted a NPOA- Sharks, largely because of a lack of data and information about fisheries with the shark by-catches.

A Letter of Agreement between FAO, Dhaka on behalf of BOBLME and Bangladesh Fisheries Research Institute was negotiated in 2012 to address the lack of information on shark and shark fisheries and to prepare a NPOA-Sharks.

With financial and technical assistance from the Bay of Bengal Large Marine Ecosystem (BOBLME) project of the Food and Agriculture Organization of the United Nations (FAO), the Bangladesh Fisheries Research Institute (BFRI) carried out an assessment of shark fisheries and formulated a draft National Plan of Action (NPOA) for Conservation and Management of Shark Resources in Bangladesh in 2014 in line with FAO's International Plan of Action (IPOA-Sharks). After the validation workshop which was convened at the Department of Fisheries in Dhaka on 20 April 2014, the draft NPOA-Sharks was handed over to the DoF for further necessary actions and _ approval from the Ministry of Fisheries and Livestock. As the BOBLEM project was closed in June, 2014 the progress of approval of the draft NPOA-Sharks got delayed but in 2021 the MoFL has formed a Working Group led by the Director General of DoF for updating the draft NPOA for conservation and management of Sharks and Rays in Bangladesh in accordance with national, as well as regional and international aspects.

The WG has been met three meetings from 6 April 2021 to 18 October 2023 aiming to update the information on sharks and rays, review the actions and measures, and make recommendations for the conservation and management of sharks and rays.

2. Introduction

The International Plan of Action for the Conservation and Management of Sharks (IPOA- Sharks) was adopted by the 23 Session of the Committee on Fisheries (COFI) of FAO in 1999. The IPOA-Sharks is a voluntary international instrument for nations to take positive action to ensure the conservation and management of sharks and their long-term sustainable use. The NPOA-Sharks have been formulated in line with the provisions in the IPOA-Sharks. The overall objective of the NPOA- Shark is sustainable production and harvest and conservation of species diversity

The term 'sharks' includes all species of sharks, as well as related species of skates and chimeras (class *Chondrichthyes*) unless otherwise mentioned. Indonesia and India rank highest in FAO statistics for shark landings in the BOBLME region. Historical data on landings of sharks in Bangladesh reveals that both catch volume and size of harvested sharks have decreased gradually. Unless regulatory measures are taken to improve their conservation and management, these top predators will be overexploited and the balance in the marine biodiversity would be in jeopardy.

Up to date knowledge on the history and development of the shark fishery, its status, stakeholders, the scale of operation and legislative and administrative framework in Bangladeshwere gathered to enable a situation analysis. The NPOA-Sharks focuses on the most commonly found species, which include 34 species of sharks, 6 species of skates and 29 species of rays (no chimeras are yet reported from Bangladesh's waters). The majority of species are caught as by-catch. This document provides an overview of shark stocks in Bangladesh's waters, identifies priorities for the NPOA, highlights the current legislative framework and international commitments, and outlines measures to monitor, assess and manage these populations and their related fisheries. Recommendations for possible enhancements to existing conservation and management practices are presented.

The draft was prepared by the *Support to Sustainable Management of the BOBLME (SBOBLME) Project* of the Bangladesh Fisheries Research Institute (BFRI). Outcomes of the National consultation workshop on *Shark fisheries in the Bay of Bengal, Bangladesh: Status and potentialities* in November 2010 and three stakeholders' consultations at major shark landing centers (Patharghata, Chittagong and Cox's Bazar,) sponsored by BOBLME during 2013, were the main basis of the plan.

In the National consultation workshop and three stakeholders' consultations representatives of the Department of Fisheries (DoF), Bangladesh Fisheries Development Corporation (BFDC), Bangladesh Fisheries Research Institute (BFRI), Department of Environment (DoE), Forest Department (FD), Institute of Marine Sciences of the Chittagong University, Shark Fishers & Traders Association, and NGOs took part. Besides, NPOAs of Canada, Malaysia and Seychelles were consulted. Later the draft NPOA-shark was reviewed in a *National Shark Stakeholders' Consultation Workshop* for its validation and finalization. A total of 29 participants were represented by various stakeholders (2 participants from the MoFL, 12 from the DoF, 2 from the BFDC, 3 from the BFRI, 1 from the Institute of Marine Sciences, Chittagong University; 1 from the Department of Zoology, Dhaka University; 1 from the Marine Fisheries

Academy, Chittagong; 2 from the Forest Department, 2 from the Department of Environment, 1 from the IUCN, Dhaka office, 1 from the WorldFish Center, Dhaka office and 1 from the Shark Fishers' & Traders' Welfare Association (SFTWA), Cox's Bazar). The workshop proposed certain refinements in the consultation process.

International commitments

The Government of Bangladesh recognizes that the sustainability of fisheries is an international as well as a national challenge. To ensure the conservation and sustainable use of fisheries resources in international waters, Bangladesh participates in various international and regional organizations concerned with fisheries management and negotiations of trade agreements and has ratified and supported various agreements/treaties:

- United Nations Convention on the Law of the Sea (UNCLOS), 1982
- International Tribunal for the Law of the Sea (ITLOS), 1982
- United Nations Fish Stocks Agreement, 1995
- FAO Code of Conduct for Responsible Fisheries, 1995.

3. Status of shark fisheries in Bangladesh

Sharks have been harvested and traded in Bangladesh since time immemorial, although they are not economically important. The consumption of sharks is limited mainly to tribal people in coastal regions and hilly areas. The flesh, fins and skins are mostly sun-dried and exported. There is no comprehensive study or report on the status of the shark fishery in Bangladesh. Apart from sporadic works of Hussain (1969 and 1971), Quddus and Shafi (1983), Ahmed and Sarker (1984), Quddus *et al.* (1988), Sarker (1989), Huda *et al.* (2003), Roy *et al.* (2007), Krajangdara *et al.* (2008) and Rahman *et al.* (2009) there is no document on the taxonomy and fishery of the Elasmobranch fishes. There has been no attempt to describe in detail the taxonomy, biology and ecology of the estuarine and marine elasmobranchs.

In Bangladesh, it is not a targeted fishery, rather a bycatch in hilsa and Indian salmon fisheries and there is no fishing zone demarcation for shark fisheries. There are no reported landings from the industrial fisheries, which by law should fish beyond 40 m depth. However, there is anecdotal information that considerable amounts of sharks are landed by the industrial fleet. Sharks are mainly caught by the artisanal fisheries with drift gill nets, set bag nets, long lines and trammel nets within 10-80 m depth ranges. In Cox's Bazar-Chattogram area sharks are caught at greater depths and the bulk of the landings are in Cox's Bazar area (Table 1). In Cox's Bazar- Chattogram most catches come from long lines and hooks, estuarine set bag nets (ESBN) and marine set bag nets (MSBN), shark nets and gill nets. In t h e Barisal region, the most catch comes from the gill nets and ESBN/MSBN. Mostly small-sized sharks and rays are caught because the gears are mostly less than 30 cm, while skates and rays are caught at bigger (>50 cm) sizes.

Artisanal fisheries in the Bay of Bengal of Bangladesh contribute to the high levels of global fishing pressure on elasmobranchs. However, it is one of the most data-poor regions of the world, and the diversity, occurrence and conservation needs of elasmobranchs in this region have not been adequately assessed. Findings show that elasmobranch diversity in Bangladesh has previously been underestimated. In our study, over 160000 individual elasmobranchs were recorded through landing site monitoring, comprising 88 species (30 sharks and 58 rays) within 20 families and 35 genera. Of these, 54 are globally threatened according to the IUCN Red List of Threatened Species, with ten species listed as Critically Endangered and 22 species listed as Endangered. Almost 98% juvenile catch (69–99% for different species) for large species sand a decline in numbers of large individuals were documented, indicating unsustainable fisheries. Several previously common species were rarely landed, indicating potential population declines. The catch pattern showed seasonality and, in some cases, gear specificity. Overall, Bangladesh was found to be a significant contributor to shark and ray catches and trade in the Bay of Bengal region. Effective monitoring was not observed at the landing sites or processing centres, despite 29 species of elasmobranchs being protected by law, many of which were frequently landed (Haque et al. 2021).

3.1 Harvesting seasons and grounds: Seasonal abundance reveals that shark harvesting gains momentum in the October-December period and peaks during January-March, while catches gradually fall in April-June, with the lowest catches during July-September. Prime fishing grounds are in the southwest region are Kuakata, Sonar char (island), Ruper char, Fatrar char, Char Gongmoti and Dublar char in Patuakhali district and Asar Char, Patharghata areas of Barguna district and the coastal areas of the Sunderbans. In the southeast, catching grounds are Sandwip, Kutubdia, Moheshkhali, Cox's Bazar and Teknaf coasts. Besides, sharks are also harvested from the four identified fishing grounds like South Patches, South of South Patches, Middle Ground and Swath of No Ground. Major landing centers of sharks are Cox's Bazar, Teknaf, Chattogram, Khulna, Bagerhat, Dublar char, Kuakata, Patharghata, Barisal and some small markets along the coasts (Haroon, 2011).

Table 1. Location-wise harvesting depth, catch percentages of sharks and rays

Location	Depth (m)	Catch %	Gears used
Cox's Bazar	10-50	35.0	Estuarine and marine set bag nets, gill nets,hooks and lines and trammel net.
Chattogram	10-50	21	Estuarine and marine set bag nets, gill nets,hooks and lines and trammel net.
Patharghata, Kuakata	5-30	15.0	Mostly caught with hilsa net.
Barisal, Pirojpur, Bhola	5-30	12.0	Mostly caught with hilsa net.
Dublar char, Bagerhat	10-30	16.0	Mostly caught with hilsa net.

3.2 Harvest trends: In the early 2000's catches were around 5,000-6,000 t/yr. (about 1-1.5% of the total marine catch), in the mid-2000s catches were a little over 4,000 t/yr. (0.8-0.9% of the total marine catch) and it declined to 3,373 MT/yr. during 2019-20, only 0.50% of the total marine catch. (Fig.1). Catch records reflect a declining trend.

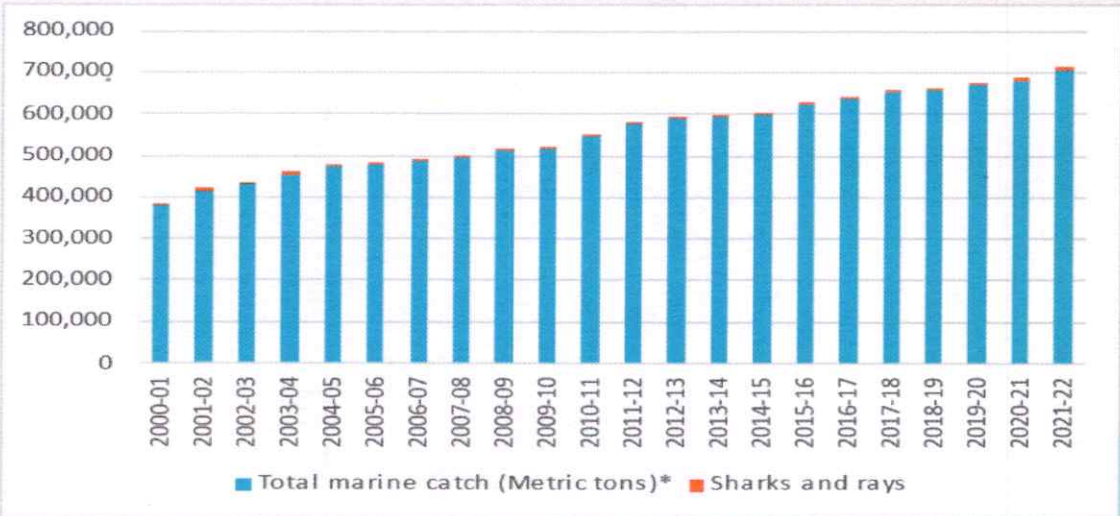

Fig. 1. 20-year time-series landing data of Elasmobranchs in Bangladesh [*Source:* FRSS, DoF 2022].

Table 2. Year-wise catch records (in metric tons) of sharks and rays in respect to total marine catch, Bangladesh. Figures in the parenthesis are percentages of marine harvest

Year/Fishery	Total marine catch (t)*	Sharks and rays (t) & % ofmarine catch
2021-22	706,030	**7,017 (0.99)**
2020-21	681,239	**8,228 (1.21)**
2019-20	671,104	**3,373 (0.50)**
2018-19	659,911	**4,274 (0.64)**
2017-18	654,687	**3,974 (0.60)**
2016-17	637,476	**4,495 (0.70)**
2015-16	626,528	**4,622 (0.73)**
2014-15	599,846	**5,093 (0.85)**
2013-14	595,385	**5,648 (0.95)**
2012-13	588,988	**5,017 (0.85)**
2011-12	578,620	**3,865 (0.67)**
2010-11	546,333	**4,205 (0.77)**
2009-10	517,282	**4,033 (0.78)**
2008-09	514,644	**3,933 (0.76)**
2007-08	497,573	**4,767 (0.96)**
2006-07	487,438	**4,790 (0.98)**
2005-06	479,810	**4,448 (0.93)**
2004-05	474,597	**4,085 (0.86)**
2003-04	455,207	**4,946 (1.09)**
2002-03	431,908	**5,063 (1.17)**
2001-02	415,420	**6,234 (1.50)**
2000-01	**379,497**	**5,162 (1.36)**

Source: Year Book of Fisheries Statistics of Bangladesh 2021-22, DoF, Dhaka

***3.3 Species diversity*:** Haque, A.B (2021) showed that Among all the elasmobranchs that were counted, 94.24% (n = 152849) were sharks, and 5.76% (n = 9349) were rays since rays were more challenging to identify as a result of being landed on their ventral side except for Rhinopristiformes rays which were landed on their dorsal side making it easier to identify. Almost 29.26% of sharks were identified to species level as piles of smaller individuals were virtually impossible to identify in the landing sites. Additionally, 55.57% Rhinopristiformes rays and 82.8% other rays were identified to species level (Table 3).

\\Table 3: Evaluating artisanal fishing of globally threatened sharks and rays in the Bay of Bengal, Bangladesh

Family	Scientific name	Common name	Local name (Bangla)	Number	CITES	IUCN (Year of last assessment	National protection	CMS
Sharks								
Carcharhinidae	*Scoliodon laticaudus*	Spadenose Shark and New Spadenose Shar	Churi hangor, Kala hangor	26280	Not listed	NT (2005)	Schedule I (Scoliodon laticaudus)	Not listed
Carcharhinidae	*Carcharhinus sorrah*	Spottail Shark	Lota hangor	4596	Not listed	NT (2007)	Schedule I	Not listed
Carcharhinidae	*Lamiopsis temmincki*	Broadfin Shark		16	Not listed	NT (2008)	Not protected	Not listed
Carcharhinidae	*Galeocerdo cuvier*	Tiger Shark	Bagha hangor	2496	Not listed	NT (2008)	Schedule I	Not listed
Carcharhinidae	*Carcharhinus amboinensis*	Pigeye Shark	Bhota/Moilla/ Mohila /Goh/Gundum/ Gongi/ Boli hangor	1909	Not listed	DD (2008)	Not protected	Not listed
Carcharhinidae	*Carcharhinus leucas*	Bull Shark	Bhota hangor	123	Not listed	NT (2005)	Not protected	Not listed
Carcharhinidae	*Carcharhinus melanopterus*	Blacktip reef shark	Illissha boli hangor	10	Not listed	VU (2020)	Not protected	Not listed
Carcharhinidae	*Rhizoprionodon actutus*	Milk Shark	-	25	Not listed	VU (2020)	Schedule I	Not listed
Carcharhinidae	*Rhizoprionodon oligolinx*	Grey Sharpnose Shark	Shonali hangor/shonali lota	147	Not listed	LC (2003)	Schedule I	Not listed
Carcharhinidae	*Carcharhinus limbatus*	Blacktip Shark	Lota boli hangor/bhota hangor	117	Not listed	NT (2005)	Schedule I	Not listed
Carcharhinidae	*Carcharhinus brevipinna*	Spinner Shark	Athailla/illissha boli hangor	45	Not listed	VU (2020)	Not protected	Not listed
Carcharhinidae	*Glyphis gangeticus*	Ganges Shark	Bhota/illissha hangor	3	Not listed	CR (2007)	Schedule I	Not listed
Carcharhinidae	*Carcharhinus amblyrhynchoides*	Graceful shark	-	1	Not listed	NT (2005)	Not protected	Not listed
Carcharhinidae	*Carcharhinus falciformis*	Silky shark	Lota hangor	1	App. II	VU (2017)	Schedule I	Schedul e 1
Carcharhinidae	*Carcharhinus macloti*	Hardnose Shark	-	15	Not listed	NT (2003)	Schedule I	App. II
Sphynidae	*Sphyma mokarran*	Great Hammerhead shark	Haturi hangor/Kaunna	3	App. II	CR (2018)	Schedule I	App. II
Sphynidae	*Sphyrna lewini*	Scalloped Hammerhead Shark	Haturi hangor/Kaunna	8611	App. II	CR (2007)	Schedule I	App. II
Rhincodontidae	*Rhincodon typus*	Whale Shark	Timi hangor	5	App. II	EN (2016)	Schedule I	App. I&II
Alopiidae	*Alopias sp.*	Thresher Shark	-	2	App. II	VU (2018)	Not protected	App. II
Stegostomatidae	*Stegostoma fasciatum*	Zebra shark	-	1	Not listed	EN (2015)	Schedule I	Not listed
Triakidae	*Iago cf. omanensis*	Bigeye Houndshark	-	37	Not listed	LC (2008)	Not protected	Not listed
Hemigaleidae	*Chiloscyllium hasseltii*	Hasselt's bambooshark	Bashpata hangor/Bash hangor/Hanno/ Bang	129	Not listed	EN (2020)	Not protected	Not listed

Family	Scientific name	Common name	Local name (Bangla)	Number	CITES	IUCN (Year of last assessment	National protection	CMS
Hemiscyllidae	*Chiloscyllium hasseltii*	Burmese bambooshark	-	3	Not listed	VU (2020)	Not protected	Not listed
Hemiscyllidae	*Chiloscyllium griseum*	Grey Bamboo Shark	-	102	Not listed	VU (2020)	Schedule I	Not listed
Hemiscyllidae	*Chiloscyllium cf. arabicum*	Arabian carpetshark	-	31	Not listed	NT (2017)	Not protected	Not listed
Hemiscyllidae	*Hemipristis sp.*	Snaggletooth shark	-	3	Not listed	VU (2015)	Not protected	Not listed
Rhinopristiformes rays								
Pristidae	*Pristis pristis*	Largetooth sawfish	Khotok/Khorkhor/Aissha/Koratmach	32	App. I	CR (2013)	Schedule I	Not listed
Pristidae	*Pristis zijsron*	Green sawfish	Khotok/Khorkhor/Aissha/Koratmach	1	App. I	CR (2012)	Schedule I	Not listed
Rhinobatidae	*Rhinobatos annandalei*	Bengal Guitarfish	Pitambori/Gerenja	35	Not listed	DD (2008)	Not protected	Not listed
Rhinobatidae	*Rhinobatos lionotus*	Smooth back guitarfish	Pitambori/Gerenja	1	Not listed	DD (2008)	Not protected	Not listed
Rhinobatidae	*Rhinobatos ranongensis*	Ranong guitarfish	Pitambori/Gerenja	300+	Not listed	NE	Not protected	Not listed
Glaucostegidae	*Glaucostegus granulates*	Sharp nose Guitarfish	Pitambori/Gerenja/Nangla	897	App. II	CR (2018)	Schedule I	Not listed
Glaucostegidae	*Glaucostegus cfgranulatus*	Sharp nose Guitarfish	Pitambori/Gerenja/Nangla	-	-	-	-	-
Glaucostegidae	*Glaucostegus obtusus*	Widenose Guitarfish	Pitambori/Gerenja/Nangla	282	App. II	CR (2018)	Not protected	Not listed
Glaucostegidae	*Glaucostegus typus*	Giant Shovelnose Ray	Pitambori/Gerenja/Nangla	28	App. II	CR (2018)	Not protected	Not listed
Rhinidae	*Rhina ancylostoma*	Bow mouth Guitarfish	Bang hangor	113	App. II	CR (2018)	Not protected	Not listed
Rays								
Dasyatidae	*Urogymnus granulates*	Mangrove whipray	-	12	Not listed	VU (2015)	Not protected	Not listed
Dasyatidae	*Urogymnus polylepis*	Giant freshwater whipray	-	52	Not listed	EN (2016)	Not protected	Not listed
Dasyatidae	*Urogymnus lobistoma*	Tube mouth Whipray	-	68	Not listed	EN (2020)	Not protected	Not listed
	Urogymnus asperrimus	Porcupine Ray	-	1	Not listed	VU (2015)	Not protected	Not listed
Dasyatidae	*Maculabatis bineeshi*	Short-tail whipray	Shaplapata	65	Not listed	NE	Not protected	Not listed
Dasyatidae	*Maculabatis gerrardi*	Whitespotted Whipray	Fut shaplapata	54	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Maculabatis Arabica*	Pakistan/Arabic whipray	-	14	Not listed	CR (2017)	Not protected	Not listed
Dasyatidae	*Maculabatis pastinacoides*	Round whip ray	-	12	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Pastinachus ater*	Broad cowtail ray	-	2	Not listed	LC (2015)	Not protected	Not listed
Dasyatidae	*Pastinachus cf. Gracilicaudus*	Narrow cowtail ray	-	2	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Pastinachus gracilicaudus*	Narrow cowtail ray	-	8	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Pastinachus cf.*	Cowtail ray	-	4	Not	NT (2017)	Not	Not

Family	Scientific name	Common name	Local name (Bangla)	Number	CITES	IUCN (Year of last assessment	National protection	CMS
	sephen				listed		protected	listed
Dasyatidae	*Pastinachus solocirostris*	Roughnose cowtail ray	-	18	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Brevitrygon imbricata*	Bengal whipray	-	64	Not listed	VU (2020)	Not protected	Not listed
Dasyatidae	*Brevitrygon walga*	Scaly whipray	-	34	Not listed	NT (2017)	Not protected	Not listed
Dasyatidae	*Brevitrygon heterura*	Dwarf whipray	-	8	Not listed	NE	Not protected	Not listed
Dasyatidae	*Himantura leoparda*	Leopard whipray	Bagha shaplapata	560	Not listed	VU (2015)	Not protected	Not listed
Dasyatidae	*Himantura uarnak*	Coach Whipray	Bagha shaplapata	452	Not listed	VU (2015)	Not protected	Not listed
Dasyatidae	*Himantura undulata*	Honeycomb whipray	Bagha shaplapata	487	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Pateobatis jenkinsii*	Jenkins' whipray	-	23	Not listed	VU (2015)	Not protected	Not listed
Dasyatidae	*Pateobatis uarnacoides*	Whitenose whipray	-	21	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Pateobatis bleekeri*	Bleeker's whipray	-	61	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Taeniurops meyeni*	Round ribbontail ray	-	21	Not listed	VU (2015)	Not protected	Not listed
Dasyatidae	*Neotrygon cf. Caeruleopunctata*	Bluespotted maskray	-	11	Not listed	NE	Not protected	Not listed
Dasyatidae	*Neotrygon indica*	Indian Ocean blue-spotted maskray	-	24	Not listed	NE	Not protected	Not listed
Dasyatidae	*Neotrygon kuhlii*	Blue-spotted stingray	-	5	Not listed	DD (2017)	Schedule II	Not listed
Dasyatidae	*Neotrygon spp.*	Mask rays (Bay of Bengal variants)	Nil fut shaplapata	649	Not listed	NE	Not protected	Not listed
Dasyatidae	*Hemitrygon bennetti*	Bennett's stingray	-	13	Not listed	VU (2020)	Not protected	Not listed
Narcinidae	*Narcine prodorsalis*	Tonkin numbfish	-	4	Not listed	DD (2007)	Not protected	Not listed
Narcinidae	*Narcine brunnea/timlei*	Brown numbfish	-	1	Not listed	DD (2007)	Not protected	Not listed
Narcinidae	*Narcine sp.*	Andaman numbfish	-	1	Not listed	NE	Not protected	Not listed
Gymnuridae	*Gymnura poecilura*	Long-tailed butterfly ray	Podoni/Projapoti	1321	Not listed	NT (2006)	Schedule II	Not listed
Mobulidae	*Mobula kuhlii*	Shortfin Devil Ray	Shing Chowain/Badura	117	App. II	EN (2020)	Not protected	App. I & II
Mobulidae	*Mobula Mobular*	Giant Devil Ray	Shing Chowain/Badura	380	App. II	EN (2018)	Not protected	App. I & II
Mobulidae	*Mobula birostris*	Giant Manta Ray	Shing Chowain/Badura	4	App. II	EN (2019)	Not protected	App. I & II
Mobulidae	*Mobula eregoodoo*	Longhorned Pygmy Devil Ray	Shing Chowain/Badura	4	App. II	EN (2020)	Not protected	App. I & II
Mobulidae	*Mobula tarapacana*	Sicklefin Devil Ray	Shing Chowain/Badura	26	App. II	EN (2018)	Not protected	App. I & II
Mobulidae	*Mobula thurston*	Bentlin Devil Ray	Shing Chowain Badura	54	App. II	EN (2018)	Not protected	App I & II
Aetobatidae	*Actobatus ocellatus*	Spotted eagle ray	-	45	Not listed	VU (2015)	Not protected	Not listed

Family	Scientific name	Common name	Local name (Bangla)	Number	CITES	IUCN (Year of last assessment	National protection	CMS
Aetobatidae	*Aetobatus flagellum*	Longhead Eagle Ray	-	21	Not listed	(2006)	Not protected	Not listed
Aetobatidae	*Aetobatus spp.*	Whitespotted Eagle Ray	-	34	Not listed	NT (2006)	Schedule II	Not listed
Myliobatidae	*Actomylaeus maculatus*	Mottled eagle ray	-	12	Not listed	EN (2020)	Not protected	Not listed
Rhinopteridae	*Ritinoptera javanicu*	Javanese Cownose Ray	Chowain	252	Not listed	VU (2006)	Not protected	Not listed
Rhinopteridae	*Rhinoptera jayakari*	Oman cownose ray	Chowain	154	Not listed	NE	Not protected	Not listed
Species needing further photographic and genetic evidences								
Carcharhinidae	*Laxodon macrorhinus*	Sliteye shark	-	10	Not listed	LC (2003)	Not protected	Not listed
Hemiscyllidae	*Chiloscyllium indicum*	Ridgebacked Bamboo Shark	-	1	Not listed	VU (2020)	Not protected	Not listed
Hemiscyllidae	*Chiloscyllium punctatum*	Brownbanded bamboo shark		1		NT(2015)	Not protected	Not listed
Dasyatidae	*Maculabatis macrura*	Sharpnose whisray	-	23	Not listed	EN (2020)	Not protected	Not listed
Dasyatidae	*Telatrygon zugei*	Pale-edged stingray	-	13	Not listed	NT (2016)	Not protected	Not listed
Dasyatidae	*Telatrygon cf. crozieri*	Indian sharpnose ray	-	2	Not listed	NE	Not protected	Not listed
Narkidae	*Narke dipterygia*	Numbray	-	1	Not listed	DD (2007)	Not protected	Not listed
Dasyatidae	*Pateobatis fai*	Pink whipray	-	4	Not listed	VU (2015)	Not protected	Not listed
Mobulidae	*Mobula alfredi*	Alfred manta	Shing Chowain/ Badura	5	App. II	VU (2018)	Not protected	App. I & II
Myliobatidae	*Aetomylaeus nichofii*	Banded eagle ray	-	1	Not listed	VU (2015)	Schedule II	Not listed

Unidentified individuals to the species level

Sharks	Scientific name	Common name	Local name (Bangla)	Number
	Aetobatus sp.			243
	Mobula sp.			243
	Maculabatis sp.			324
	Pateobatis sp.			265
	Glaucostegus sp./ Rhinobatos sp.			1350
	Gymnura sp.	Butterfly ray		11
	Chiloscyllium spp.	Bamboo shark		159
		Small unidentified requiem sharks		107743
		Unidentified large requiem shark		225

Table 3: List of all Shark and Ray species recorded between January 2016 and December 2019, Global IUCN Red List of Threatened status (EN: Endangered; NT: Near Threatened; VU: Vulnerable; DD: Data Deficient; LC: Least Concern); NE: Not Evaluated). Assessment dates, CITES, CMS and National protection status are given with commented on their identifications.

According to the Schedules no 1 and 2 of the Bangladesh Wildlife (Conservation and Security) Act 2012 and amendment on 13 September 2021 current status of sharks and rays are as follows;

Table 4. List of shark species occur in Bangladesh as per Bangladesh Wildlife (Conservation and Security) Act 2012 and amendment on 13 September 2021.

Scientific Name	**Common/English Name**	**Schedule in Wildlife Act**
Confirmed		
Alopias pelagicus	Pelagic thresher	I
Carcharhinus amboinensis	Pig eye shark	I
Carcharhinus leucas	Bull shark	I
Carcharhinus amblyrhynchoides	Graceful shark	II
**Carcharhinus longimanus*	Oceanic whitetip shark	I
Carcharhinus brevipinna	Spinner shark	II
Carcharhinus falciformis	Silky shark	II
Glyphis gangeticus	Ganges shark	I
Carcharhinus limbatus	Black tip shark	II
Carcharhinus melanopterus	Blacktip reef shark	II

Scientific Name	Common/English Name	Schedule in Wildlife Act
Carcharhinus sorrah	Spottail shark	II
Lamiopsis temminckii	Broadfin shark	I
Galeocerdo cuvier	Tiger shark	II
Negaprion acutidens	Sharptooth lemon shark	I
Prionace glauca	Blue shark	II
Nebrius ferrugineus	Tawny nurse shark	II
Hemipristis elongata	Snaggletooth shark	II
Isurus oxyrinchus	Shortfin mako shark	I
Isurus paucus	Longfin mako shark	I
Rhincodon typus	Whale shark	I
Eusphyra blochii	Winghead shark (Slender hammerhead)	I
Sphyrna lewini	Scalloped hammerhead	I
Sphyrna mokarran	Great hammerhead	I
Sphyrna zygaena	Smooth hammerhead	I
Stegostoma fasciatum	Zebra shark	I
Triaenodon obesus	Whitetip reef shark	II

Table 5. List of ray species occur in Bangladesh as per Bangladesh Wildlife (Conservation and Security) Act 2012 and amendment on 13 September 2021.

Scientific Name	Common/English Name	Schedule in Wildlife Act
Confirmed		
Aetomylaeus nichofii	Banded eagle ray	II
Rhinobatos annandalei	Bengal guitarfish (Annandale's guitarfish)	I
Glaucostegus granulatus	Sharpnose guitarfish	I
Pateobatis bleekeri	Bleeker's whipray	I
Taeniurops meyeni	Blotched stingray	II
Glaucostegus obtusus	Widenose guitarfish	I
Narcine timlei	Brown numbfish	II
Glaucostegus typus	Giant guitarfish	I
Himantura uarnak	Coach whipray (Reticulated whipray)	II
Glaucostegus thouin	Clubnose guitarfish	I
Himantura undulata	Honeycomb whipray (Bleeker's variegated whipray)	II
Mobula birostris	Giant manta ray	I
Urogymnus polylepis	Giant freshwater whipray	I
Mobula eregoodootenkee	Longhorned pygmy devilray	I
Mobula kuhlii	Shortfin devilray (Kuhl's devilray)	I
Pristis zijsron	Green sawfish	I
Pateobatis jenkinsii	Jenkin's whipray	II
Rhinoptera javanica	Javan cownose ray	I
Himantura leoparda	Leopard whipray	II

Scientific Name	Common/English Name	Schedule in Wildlife Act
Mobula mobular	Giant devilray	I
Pristis pristis	Largetooth sawfish	I
Gymnura poecilura	Longtail butterfly ray	II
Aetobatus flagellum	Longhead eagle ray	I
Mobula tarapacana	Sicklefin devilray	I
Urogymnus granulatus	Mangrove whipray	II
Urogymnus asperrimus	Porcupine ray	II
Aetomylaeus maculatus	Mottled eagle ray	I
Aetomylaeus milvus	Ocellate eagle ray	I
Anoxypristis cuspidata	Narrow sawfish	I
Maculabatis pastinacoides	Round whipray	II
Pastinachus solocirostris	Rough nose cowtail ray	I
Narcine brevilabiata	Shortlip numbfish	II
Mobula thurstoni	Bentfin devilray	I
Rhina ancylostoma	Bowmouth guitarfish (Shark ray)	I
Megatrygon microps	Smalleye stingray	II
Rhinoptera jayakari	Shorttail cownose ray	I
Aetobatus ocellatus	Spotted eagle ray	II
Rhinobatos lionotus	Smoothback guitarfish	I
Rhynchobatus australiae	Bottlenose wedgefish	I
Urogymnus lobistomus	Tubemouth whipray	II
Pateobatis uarnacoides	Whitenose whipray	II
Maculabatis gerrardi	Whitespotted whipray	I
Rhynchobatus laevis	Smoothnose wedgefish	I
Gymnura zonura	Zonetail butterfly ray	II
Narcine lingula	Chinese numbfish	II
Gymnura tentaculata	Tentacled butterfly ray	II

***3.4 Shark products*:** Besides meat being used as food, fins are a delicacy for making soups and fins are a valuable export commodity for Asian markets. Flesh, fins and skins are mostly sun-dried and exported. Oil extracted from sharks and skates are of medicinal and industrial significance. Shark meat is a good source of poultry feed. Shark meat contains up to 2.5% urea and has high nitrogen content in the form of volatile bases, ammonia and trimethylamine. The utilization of elasmobranch fishes for food is mostly by the tribal people in Bangladesh, and poor people in Myanmar, India, Sri Lanka and the Maldives. Small species of sharks are used for preparing shark meat. The fish is not filleted and the preparation is limited to the removal ofguts, fins, skin and head. The shark meat is packed either fresh or frozen or salted dry according to the requirements of the customer. Market prices of raw shark meat vary between Tk. 70 and 100/kg (Tk. 78 = 1 US$) (Haroon, 2011).

***3.5 Export trends*:** Shark product exports from Bangladesh show irregular ups and downs from 1992-93 (Table 6). Shark product exports from Bangladesh during 2008-09 were around 266-276 t with a value of around 17.7-18.2 million (Table 6). There was

a big volume of export for consecutive 4-5 years and then a drop for 1-2 years. Significant amounts of shark products are informally traded from Bangladesh to neighboring countries.

Shark fins, fin rays and dorsal skin of sharks and rays are exported to Singapore, Hong Kong, China and USA (Roy 2011). Statistics show that export earnings of shark products from Bangladesh have decreased rapidly since 1999-2000.

Table 6. Time series data of shark exports from in Bangladesh

Year	Export (metric tons)*	Value (million Taka)
2021-22	3407.7	804.6
2020-21	2175.73	181.6
2019-20	2296	293.9
2018-19	2134.23	265.4
2017-18	0.5	01.2
2016-17	0.16	00.8
2015-16	0	0
2014-15	0	0
2013-14	0	0
2012-13	1	0.9
2011-12	0	0
2010-11	0	0
2009-10	955.0	126.6
2008-09	276.0	17.70
2007-08	266.0	18.20
2006-07	244.0	41.10
2005-06	78.0	8.00
2004-05	1.0	3.90
2003-04	4.0	15.30
2002-03	172.0	223.50
2001-02	263.0	270.70
2000-01	181.0	206.30
1999-2000	262.0	311.70
1998-99	154.0	174.00
1997-98	155.0	107.90
1996-97	113.0	85.5
1995-96	56.0	42.10
1994-95	212.0	166.00
1993-94	45.0	27.90
1992-93	238.4	142.50

* Also includes some amount of air bladder of fin-fishes, US$ 1= Taka 82.00

***3.6 Present situation*:** Sharks' catches and their size at harvest are decreasing. This indicates that sharks are overexploited in Bangladesh waters. Elasmobranchs (sharks and rays) are the most threatened marine megafauna: around 36% face extinction and 17% are critically endangered, according to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2020). Elasmobranch diversity in Bangladesh has previously been underestimated. The recent study confirmed 88 species (30 sharks and 58 rays) within 20 families and 35 genera. Of these, 54 are globally threatened according to the IUCN Red List of Threatened Species, with ten species listed as Critically Endangered and 22 species listed as Endangered. Almost 98% juvenile catch (69–99% for different species) for large species sand a decline in numbers of large individuals were documented, indicating unsustainable fisheries (Haque et al. 2021). Ecosystem models and field studies suggest that the removal of top predators has the potential to negatively impact marine ecosystems (Myers *et al.* 2007; Polovina *et al.* 2009). Removal of sharks may drive an increase in prey abundance, which can cause a cascade of indirect effects, including changes to the abundance of other organisms (Myers *et al.* 2007). Bycatches raise ecological concerns, as some bycatch species are sensitive to increased mortality above the natural level because of their life-history traits. It is our urgent need to conserve a healthy and balanced marine ecosystem by protecting and conserving sharks.

4. Bangladesh's legislative and regulatory framework

Bangladesh's approach to managing its inland, coastal and marine fisheries resources is based on a commitment to ecological sustainability, integrated fisheries management and the precautionary approach. There are a number of legislative measures, enacted by the Government of Bangladesh for conservation management and maintaining the long-term sustainability of fisheries and related aquatic biodiversity including elasmobranchs populations. Various acts and policies were enacted, not only by the Ministry of Fisheries & Livestock (MoFL) but also by the Ministry of Environment ,Forests and Climate Change (MoEFCC), Ministry of Land (MoL), Ministry of Water Resources (MoWR), Ministry of Shipping, etc. that work together in an integrated way for habitat and aquatic resources conservation and management. Overall conservation and management of Bangladesh's fisheries are guided by:

i. *The Protection and Conservation of Fish Act, 1950 (East Bengal Act 18 of 1950) and its subsequent amendments of 1963, 1970, 1982, 1985, 1987, 2002, 2005, 2006, 2007, 2011, 2013* and

ii. The '*Marine Fisheries Ordinance, 1983'* which was promulgated for conservation, management and development of marine fisheries resources. Marine Fisheries Ordinance, 1983 is applied through the rules and regulations, which were enacted in the same year as *Marine Fisheries Rules, 1983* and further amended in 1993, 2000, 2004, 2005, 2006, 2007 and 2010 [prevention of illegal, unreported and unregulated fishing (IUU), considering the international (European Union) regulations]. In 2020, Marine Fisheries Ordinance' 1983 has been upgraded as the 'Marine Fisheries

Act'2020' and for the execution of the Act subsequent Rules has been upgraded as 'Marine Fisheries Rules' 2023'.The act now responsible for the conservation, management and development of marine fisheries resources.

The Department of Fisheries (DoF) in collaboration with the MoFL developed a comprehensive fisheries policy, '*National Fishery Policy, 1998'* (MoFL 1998), through intensive processes of consultation with various stakeholders at different levels. The policy includes a 'marine fisheries resource development, exploitation and management policy' subset. There are several encouraging elements in the policy; however, some inconsistencies still remain in those policy objectives, specifically conflict between the need to increase fish production, the recognition that marine stocks are already being overfished, lack of a dependable database to establish the status of the target and non-target stocks and the need to increase employment opportunities in a region with few livelihood options. Besides, no mention of FAO's-CCRF (FAO 1996) was made, although agreed by Bangladesh. The policy emphasizes 'gradually moving' from producing greater quantities of fish to concepts such as 'responsible fishing' and 'sustainable management' of inland, brackish water and marine environment, infrastructure, post-harvest and market support, socio-economic aspects of fishers and related issues, 'wealth and revenue generation' and their appropriate distribution.

The DoF prepared a '*National Fisheries Strategy'* in January 2006 forecasting the ways in which the '*National Fisheries Policy'* can be implemented and support can be offered to guide the sector. The strategy encompasses eight sub-strategies including the *Marine sector sub-strategy*. The DoF undertook a review of the marine fisheries sub-sector while producing a 'Marine Fisheries Sector sub-strategy (DoF 2006) as part of a wider 'National Fisheries Strategy and Action Plan'. The *Marine sub-strategy* signifies sustainable management of the marine sector through the allocation of fishing rights and its management by communities and relevant fishing groups through govt. regulatory framework.

In 2004 the Ministry of Environment, Forests and Climate Change (MoEFCC) prepared a National Programme of Action for Protection of the Coastal and Marine Environment from Land-Based Activities(MoEFCC 2004). Seven broad strategies have been identified to protect the coastal and marine environment and resources from land and land-based activities. Other major policies and legislations which are sustentative to coastal and marine fisheries management and conservation are as follows: All those legislative instruments, along with the policies, strategies and programs that support them, are consistent with the principles of the IPOA-Sharks and FAOs-CCRF.

- *The Forest Act, 1927 (Amendment 1990, 2000)* - The act empowers the Government to declare any area of forest as Reserved and by doing that it may take measures for in situ conservation of biodiversity.
- *The Wildlife (Preservation) Order, 1973 and Wildlife Preservation (Amendment) Act 1973.* The wildlife laws provide for the protection of wildlife as well as their habitats. In 2012, the Wildlife (Conservation and Security) Act'2012 enacted for the protection of wildlife as well as their habitats.

- *The Territorial waters and Maritime Zones Act, 1974* and The Territorial Waters and Maritime Zones Rules, 1977. Various maritime zones like internal waters, territorial sea, exclusive economic zone and continental shelf were defined; to regulate the activities of foreign ships in territorial waters and the EEZ.
- *Water Prevention and Control of Pollution Act, 1974.* This Act aims to prevent and control water pollution as well as restoration of water quality, through the establishment of Pollution Control Boards.
- *The Bangladesh Merchant Shipping Ordinance, 1983.* The ordinance details requirements of registration and vessel certification; certifies skippers and drivers.
- *Environmental Conservation Act, 1995 (amendment 2000, 2002).* It is a powerful law for ensuring the conservation and sustainable use of the biological resources of the country and the protection of its environment.
- *Environmental Conservation Rules, 1997.* Under the provisions of the ECR 1997, it is mandatory for industries to carry out an EIA (Environmental Impact Assessment), ETP (Effluents Treatment Plant) confirm to the environmental quality standards, report accidents or unfortunate unforeseen discharges of pollutants and take remedial measures, as warranted.
- *National Water Policy (NWP), 1999.* It works for the development and safety of water resources.
- *Environmental Court Act, 2000 (Amendment 2002).* The act provides for the establishment of one or more Environmental Courts, initially in every division of the country, with specific terms of reference to deal with environmental offenses.
- *National Water Management Plan (NWMP), 2001.* The aim of the NWMP was to ensure, clean water, and the protection of water ecosystems (Environment and Aquatic Resources).
- *Coastal Zone Policy and Strategy, 2005.* The aims are Economic growth; basic needs and opportunities for livelihoods; reduction of vulnerabilities; sustainable management of coastal natural resources; equitable distribution; empowerment of communities; women's development and gender equity; and conservation and enhancement of critical ecosystems; while acknowledging the CCRF as a key goal, otherwise refer to the '*National Fisheries Policy, 1998*' for matters related to coastal and marine fisheries.
- *Biosafety Guidelines of Bangladesh, 2007.* To save the country's biological base from the possible negative impact of biotechnology highly advanced over the past decade, biodiversity guidelines entitled "Biosafety Guidelines of Bangladesh" has been formulated by the Ministry of Science and Technology in 1999 and updated by the Ministry of Environment and Forest in 2007 in line with the Cartagena Protocol on Biosafety- 2000.
- *Bangladesh Climate Change Strategy and Action Plan, 2008.* Prepared by the MoEF, to combat problems associated with climate change. This includes the development of adaptation strategies in the fisheries sector.

Other Ordinance, Rules and Guidelines that are in the pipe-line, and pertinent to fisheriesand aquatic resources management, are as follows:

- *Ship Breaking and Hazardous Waste Management Rule, 2010*
- *Biosafety Ordinance, 2010*
- *Ecologically Critical Area (ECA) management Ordinance, 2010*
- *Durable Development and Tourism Policy of St. Martin Island 2010*
- *Environmental Impact Assessment (EIA) Guidelines* for other Sectors
- *Guidelines on Environmental Management, Waste treatment and Workers Occupational Safety and Health (OSH)* for Ship Breaking Yards in Bangladesh, 2010.

The exploitation of coastal and marine fishery resources in Bangladesh fisheries waters is controlled through general licensing provisions of the *Marine Fisheries Act,2023.* Except for Marine Protected Areas (MPAs), Marine Managed Areas (MMAs), Marine Reserves (MRs)

there are no fishing restrictions, as per *The Protection and Conservation of Fish Act, 1950* and the *Marine Fisheries Ordinance*, on any particular species or sizes of sharks in any area. *The Protection and Conservation of Fish Act* have no specific rules or laws regarding the harvesting/ catching of sharks (regarding sizes, areas, sex/condition, and season). *Marine Fisheries Act, 2020'* and '*Marine Fisheries Rules, 2023'* also have no specific indications regarding shark catching and harvesting. Fisheries Resources Survey Unit of the Marine Fisheries Wing at Chittagong regularly records and monitors elasmobranch fish catches both at Chittagong and Cox's Bazar. Catch records and monitoring of sharks from the entire coastal areas are not covering all landings and are mostly supplied by the respective Senior Upazila Fishery Officer via the concerned District Fishery Officer.

Only *The Forest Act* bans catching/harvesting sharks from in and around the Sundarbans reserve forest. This Act would also cover the reserved forest and coastal area of Cox's Bazar-Teknaf which is to be declared. As per the *Bangladesh Wildlife (Preservation) (Amendment) Act, 1974* all fishing is prohibited in the three Wildlife Sanctuaries Sundarbans East Sanctuary, Sundarbans South Sanctuary and Sundarbans West Sanctuary) declared by the Forest Department in the Sundarbans. Amendment of *Bangladesh Wildlife Preservation Act, 1974* has given blanket protection to all wildlife. Besides, 18 canals within the Sundarbans are kept completely free from fishing by the FDs *Khal closure Regulation, 1989.*

In the absence of specific legislation (except for *The Forest Act*) and a management plan, the sharks are overexploited indiscriminately. As a result the catch volumes are gradually falling and m o s t l y smaller sizes are caught. In recent days, only rays are harvested as a targeted fishery by special nets and longlines (See BOBLME web- country page Bangladesh (*www.boblme.org/bangladesh.html*) for the report on *Shark Fisheries in the Bay of Bengal, Bangladesh: Status & Potentialities*).

5. Regional and national initiatives

Bangladesh is a signatory to the United Nations Convention on the Law of the Sea

(UNCLOS), United Nations Fish Stocks Agreement (UNFSA) and Regional Fisheries Management Organizations (RFMOS), and supports FAOs CCRF. UNCLOS provides a basis for the improved management of marine resources, by extending rights and setting out obligations with regard to EEZ, establishing a framework for the exploitation of high seas fisheries and jurisdictional waters and further development of the Convention. In 1995, under the UNCLOS framework, the United Nations Agreement on Straddling and Highly Migratory Fish Stocks (SSA) was adopted by the U.N. General Assembly, and the FAOs CCRF was finalized. These instruments, prepared in parallel are intended to be complementary and refer to each other extensively. The SSA was a major advance in enabling international cooperation and addresses issues of key importance to shark population management, many of which are straddling and migratory in nature. The Johannesburg World Summit on Sustainable Development (WSSD) in 2002 reviewed the process initiated through the United Nations Conference on Environment and Development (UNCED) of 1992 and agreed to encourage the application of the ecosystem approach for fisheries management, restoration of depleted fishing stocks on an urgent basis, effectively implement UNCLOS and the SSA, establish marine protected areas consistent with international laws and called upon States to urgently develop and implement NPOAs to put into effect the FAO IPOAs – *inter alia* IPOA-Sharks. The issue of shark conservation and management has also been addressed by two global biodiversity-related Conventions, namely, the Convention on the International Trade in Endangered Species (CITES) and the Convention on Migratory Species (CMS).

All these Conventions establish the requirements for signatories to conserve and manage targeted and associated species within EEZ waters and to cooperate with other States in the conservation and management of living resources. They also oblige States to minimize pollution, waste, and discards of fish and to exercise effective control over their fishing vessels/efforts in high seas and shallow waters.

Bangladesh regularly takes part in international fora related to coastal and marine fisheries resources development and conservation management. Such activities are of particular importance for marine fisheries' resources development, conservation and management. Work on coordinated national and regional management of shark populations in the region was initiated through the Bay of Bengal Programme-Intergovernmental Organization (BOBP-IGO) in 2008, but setbacks have delayed the process. The BOBLME project and its member countries (Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand) have initiated the work to manage the shark populations within the region through National and Regional Plans of Action (NPOA-sharks and RPOA- sharks).

Of the eight BOBLME member countries, Indonesia and Malaysia have already published but not fully implemented their NPOA-sharks, Maldives, Myanmar and Thailand have drafted NPOA-sharks, and Bangladesh, India and Sri Lanka are in the process of finalizing draft plans.

The first BOBLME Regional workshop of the Working Group on Sharks was held in the Maldives, from 5 to 7 July 2011, with the participation of the member countries of

the BOBLME project, plus shark specialists and facilitators. Key findings from the workshop included identification of issues that were common to all member countries such as lack of human resources and trained personnel, poor stakeholder awareness, poor communication skills (e.g. scientists to politicians) and shortage of funding.

There are few studies on the biology of elasmobranch fishes in Bangladesh and this is probably because of the difficulty in getting adequate statistics, samples and correct identification. A review of stock assessments and the present stock status of sharks is essential with a National Plan of Action (NPOA-shark) for introducing and promoting collaborative fisheries management approaches in the BOBLME region.

6. National Plan of Actions (NPOA)

As per FAOs guidelines, an initial Shark Assessment Report (SAR) was prepared and reported on in the Final Report on Survey of Shark Fisheries and Preparation of a National Plan of Action (NPOA) for Conservation and Management of Shark Resources in Bangladesh, May 2014. This was a preliminary assessment and the NPOA-Sharks have provisions for regular updates of the assessment (every four years).

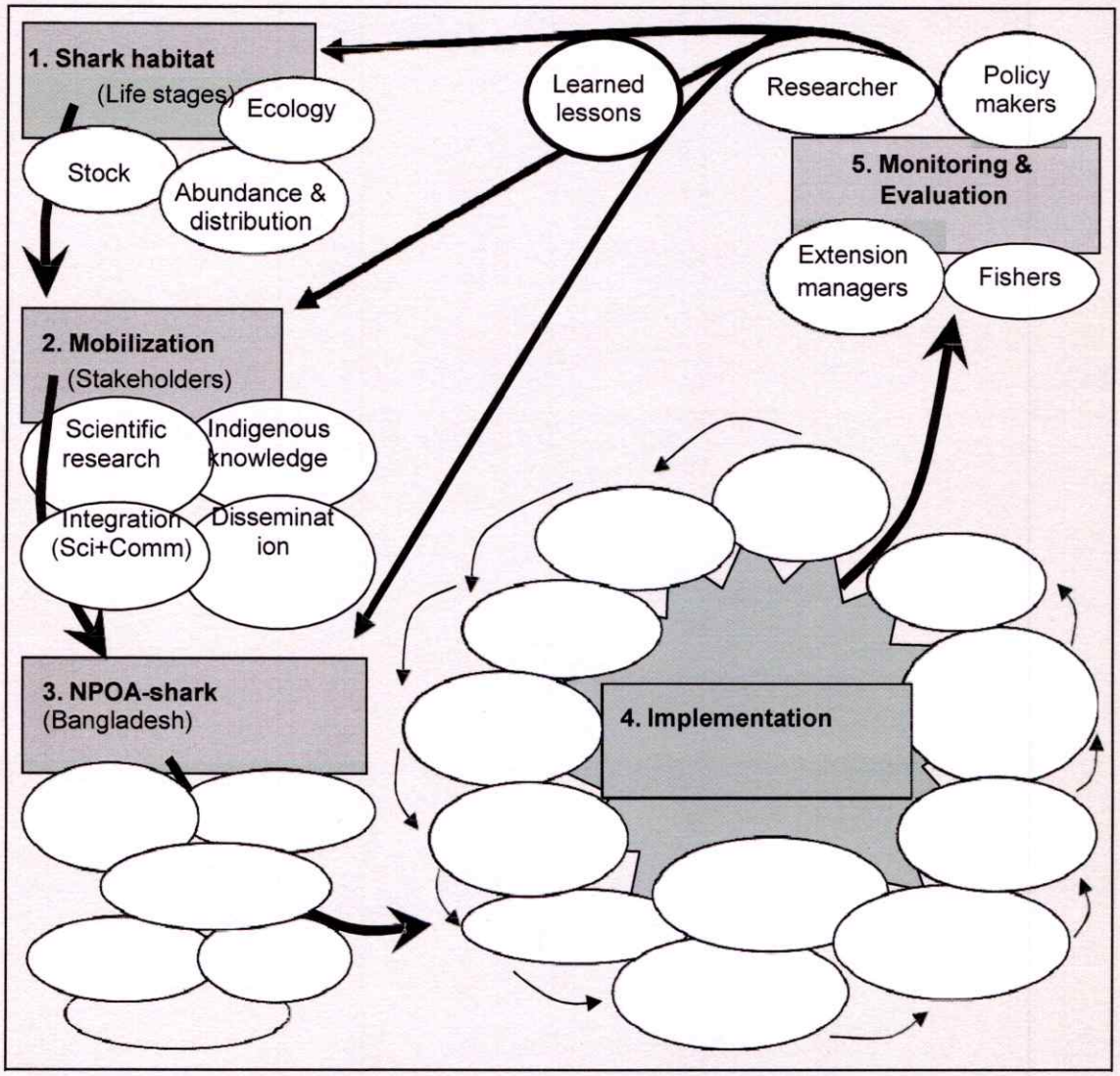

Fig. 2. Flow chart showing different actions of NPOA-shark.

In Bangladesh catch and landing data are maintained in BFDC Landing Centers, by the Shark Traders' Association and are collected from some selected sample areas by the Fisheries Resources Survey System (FRSS) of the DoF. In all cases, all landings are recorded as sharks. The catch monitoring system is not mainstreamed and data recording is not scientific. To improve data recording following should be done:

- Mainstreaming of catch monitoring system and group-wise landing data (*viz.* true sharks, hammerhead sharks, saw sharks, skates/guitar fishes, stingrays, Butterfly rays, Electric rays, Devil rays and Mantas) of sharks by the FRSS of the DoF, Marine Fisheries Wing (MFW) of the DoF and the BFDC Landing Centers.
- Technical capacity building regarding shark taxonomy, data analysis and

interpretation of sharks' harvest trends, landing, % composition and contribution, harvesting locations, landing locations, harvesting seasons, etc. of FRSS officials of the DoF.

- Awareness building among shark fishers', shark traders' boat owners to allow data collection; and
- Compulsion of log book keeping by the shark fishers', vessel owners
- The Bangladesh Fisheries Research Institute (BFRI) should compile a taxonomic key on the shark's species biodiversity in our waters with the recent IUCN status of available species
- The BFRI should initiate works/research studies on the abundance and distribution (spatial, horizontal and vertical), biology including the breeding seasons, breeding locations, nursing grounds, transboundary migration/movement patterns, assessment of nets and gears used in catching sharks, gear selectivity, etc. and value chain, various local and exportable shark products, export, assessment of transboundary straddling of sharks.
- The Protection and conservation of Fish Act and Rules and the *Marine Fisheries Act and Rules* should be reviewed in relation to other legal instruments and amended to ensure effective conservation and management of sharks. This may include the following:
- Live finning (discarding carcass into the water) of any elasmobranch fishes is to be completely prohibited.
- Strengthen finning bans through enforcement and by requiring sharks to be landed with fins attached; until then, ensure that fin-to-carcass ratios do not exceed 5% of dressed weight (or 2% of whole weight) and standardize RFMOs' finning bans to specify that ratios apply to dressed rather than whole weight (Camhi *et al.* 2008). Dried fins to body trunk (wet weight) ratio on board of any industrial trawler/artisanal mechanized or non-mechanized boat should never exceed 12 kg dry fins: 1,000 kg wet weight body/trunk (i.e. fins, tails cut-off).
- Maximum sustainable yield (MSY) of sharks' stock should be estimated as soon as possible and only one-third of the estimated MSY should be harvested annually.
- Ban harvesting of all berried female (gravid, having eggs or young fetus) sharks (elasmobranchs) irrespective of size, area and season, release them alive immediately.
- As per IUCNs global Red List, Whale shark (*Rincodon typus*) (EN), Silky shark (*Carcharhinus falciformis*) (VU), Blacktip shark (*C. limbatus*) (VU), and Whitespotted Eagle Ray (*Aetobatus narinari*) (EN) are considered threatened, while Tiger shark (*Galeocerdo cuvier*) (NT) is considered near threatened. The harvesting of these species should be restricted or banned immediately, as per CITES. This would ensure the conservation of those threatened and near threatened species including the whale sharks' in our water and the BOBLME areas as well. Snorkeling and underwater shark viewing programs (ecotourism,

non-consumptive utilization) can save the whale sharks.

- Besides, harvesting of all species of sawfishes- Narrow Sawfish (*Anoxypristis cuspidata*) (EN), Largetooth Sawfish (*Pristis pristis*) (CR), Smalltooth Sawfish (*P. pectinate*) (CR) and Green Sawfish (*P. zijsron*) (CR), one species of skate/shovelnose ray Bowmouth Guiterfish (*Rhina ancylostoma*) (CR), all species of Butterfly rays such as Smooth Butterfly Ray, *Gymnura micrura* (NT) and Longtail Butterfly Ray, *G. poecilura* (VU), all species of Electric rays (*Narcine* spp.) is to be banned or at least restricted immediately as per CITES. These species have become extremely rare in our waters.
- Minimum size limit for harvesting for all types of true sharks should be greater than 30 cm except for dogfishes (*Mustelus kanekonis*), Milk sharks (*Rhizoprionodon acutus*).
- Minimum size limit for harvesting hammerhead sharks (*Eusphyra blochii, Sphyrna lewini, S. mokarran, S. tudes, S. zygaena*); stingrays and skates/shovelnose rays should 30-40 cm.
- Minimum size limit for harvesting Eagle rays/Devil rays/Manta should be 20-25 cm.
- Marine protected areas (MPAs), marine and coastal protected areas (MCPAs), marine managed areas (MMAs) and marine reserves (MRs) are now considered as a potentially invaluable tool for coastal/marine fisheries (including sharks) conservation and management (FAO 2000). Total fishing ban including shark fishing is to be strictly ensured in all MPAs, MCPAs, MMAs and MRs. For example, Myanmar had already banned shark fishing operations in their declared MPAs starting from Ross island (12°13'N, 98°05.2'E) up to Lampi island (10°48.0'N, 98°16.1'E). The Maldives completely banned shark fishing in 2010.
- Impose area & duration specific harvest regulation based on breeding/spawning season, nursing season. Also, fix the minimum mesh size for nets used for harvesting sharks.
- Review present stock assessments, studies and stock status of sharks.
- Both fishery and biological data are needed to assess the status of shark populations. Basic catch and effort data of sharks from artisanal boats are often of poor quality because of non- or misreporting, particularly when sharks are taken as bycatch.

- Promote and strengthen research and gear modifications aimed at mitigating elasmobranch bycatch and discard mortality.
- Initiate research on improvement of utilization technology of shark products, extraction of shark liver oil (during 1976-78 the Technological Laboratory of Freshwater Fisheries Research Station, Chandpur of the Department of Fisheries used to produce bottled shark liver oil), drying (using BFRI developed Fish Dryer instead of drying in bad weather conditions); value-added products (VAPs) using meat, hide and fins, jewelry products using teeth, etc.
- Ensure active membership and dialogues with CITES, Convention on migratory species (CMS), IUCN, PEW Environment Group, TRAFFIC-The wildlife trade monitoring network, RFMOs and other relevant international agreements. Also promote and support the advice of the CMS Scientific Council and the CITES Animals Committee with respect to sharks management.
- CITES supports the management efforts of States, RFMOS, and FAO, it is clearly time for CITES to take a much stronger role in the protection of shark and ray species by taking the lead in regulating the trade as well as capacity building of the developing countries on sharks.
- To improve the conservation status of sharks, ensure they are exploited sustainably. Fishery managers and other government officials ought to have the ability to take immediate, decisive action at national, regional and international levels. These actions would include: implementing and enforcing finning bans (requiring sharks to be landed with fins attached) and scientifically-based (or precautionary) catch limits.
- Most of the exploited shark species are transboundary, and are being exploited by several BOBLME countries. Hence, the need for an appropriate transboundary management of the shark fishery resources in the BOBLME is urgent.
- Adopt tri-nation (Bangladesh, India & Myanmar) fishery management agreements (viz. total allowable catch, TAC for catch limitations) for shared elasmobranch stocks.
- One management measure which could be worked immediately is the protection of whale shark (*R. typus*) on a regional level. Four BOBLME member countries (Maldives, India, Thailand and Malaysia) have already given this species a protected status, and there is strong support for the introduction of national protection in the remaining four member countries. Since this iconic species is long-lived and wide-ranging, it requires regional not just national protection, so immediate protection throughout the BOBLME is required.
- Last but not the least, technical, financial and logistic assistance by the development partners would be needed to expedite implementation of NPOA-shark.

7. *Legal and spatial jurisdiction of NPOA-shark*

According to the *Marine Fisheries Act-2020* and the *Marine Fisheries Rules-2023* proper monitoring, control and surveillance (MCS) will be implemented by the MFW (coastal Senior Fisheries Officers, District Fisheries Officers) of the DoF and the Bangladesh Fisheries Development Corporation (BFDC) (Managers of the fish landing centers) for restricting indiscriminate exploitation of elasmobranch fishes. The *Marine Fisheries Act-2020* and the *Marine Fisheries Rules-2023* are enacted in all water areas including the entire Sundarbans, Marine protected areas (MPAs), Marine Managed Areas (MMAs), Marine and Coastal Protected Areas (MCPAs), Ecologically Critical Areas (ECAs), Ecologically Sensitive Areas (ESAs), Wildlife sanctuaries, Dolphin and porpoise sanctuaries, Marine reserves (MRs) and 20 nm off-shore marine areas, at present under the control of Forest Department and within our EEZs. In the context of developing and implementing the NPOAs, the FAOs Technical Workshop (FAO 2008) recommended that countries should:

- improve communication among different agencies, especially between thoseresponsible for fishery management and for species conservation;
- ensure key stakeholders are well sensitized on the importance of shark managementthrough improved communication;
- utilize a participatory approach with the involvement of all stakeholders, as broad aspractical;
- make plans as realistic and achievable as possible, including taking a step by step approach towards their full implementation.
- ensure that NPOA-shark remains a living document that can be updated as new measuresare developed and endorsed.

Even though most of the existing management measures of the DoF including the MFW are directed towards the management of the fisheries as a whole, Bangladesh has the legal framework to formulate specific measures aimed toward the conservation of sharks, if needed, and the capacity and capability to implement, and enforce such measures. Strategies that have been devised, and are currently being implemented by the DoF, are deliberate steps to achieve various management objectives.

8. Actions in Matrix

For the implementation of the NPOA-Shark a generalized time frame is presented here (Table 5). The NPOA-Sharks will be implemented following the guidelines in the National Fisheries Strategy, especially the Marine Sub-strategy, adopted by MOFL in 2006. The strategy emphasizes allocation of fishing rights and co- and community management approaches.

Table 7. Generalized actions, time-frame and agencies to be involved implementation-responsibility matrix) in implementing NPOA-Shark

OVERALL OBJECTIVE: Sustainable harvest and use of sharks & rays and conservation and management of species diversity

1. State Responsibilities

Situation analysis: States are encouraged as a matter of priority to ratify, accept or accede to the 1982 UN Convention, the 1995 Fish Stocks Agreement, the 1993 FAO Compliance Agreement and to implement the 1995 FAO Code of Conduct for Responsible Fisheries, including its related IPOA−Sharks and other voluntary instruments.

Objective: Cope-up with the international instruments for the conservation and management of sharks and rays

No.	Actions	Responsible Agency (s)	Years				
			2023	2024	2025	2026	2027
1.1	Ratify FAO Compliance Agreement,1993	MoFL		√			
1.2	Implement FAO Voluntary guidelines for Catch Documentation Schemes (CDS), 2017	MoFL			√		
1.3	Implement FAO Voluntary guidelines for Securing Sustainable Small-Scale Fisheries	MoFL			√		
1.4	Implement Voluntary guidelines for by-catch management and reduction of discards	MoFL			√		

2. Awareness building for fishers, traders, NGOs and the public

Situation analysis: Sharks and rays are mainly caught as by-catch in artisanal, mechanized boats and industrial fisheries targeting other species. The total recorded catch is less than 1% of the total marine landings. Consequently, awareness about the importance of shark and ray in the ecosystem and the vulnerability of shark stocks is limited among fishers, traders and NGOs and among the public.

Objective: Enhanced awareness about sharks and rays in the ecosystem, as well as shark and rays stock vulnerability to overfishing

No.	Actions	Responsible Agency (s)	Years				
			2023	2024	2025	2026	2027
2.1	Preparation of awareness building material (leaflets,	DoF BFDC					

	posters) demonstrating vulnerability of shark stocks, their role in the ecosystem and need for conservation and management	BFRI BFD	√				
2.2	Campaigns among fishers, traders and NGOs during off season for artisanal fisheries in coastal districts	DoF BFDC BFD	√	√	√	√	√

3. Capacity building in DoF, BFRI, BFDC, Customs, DoE and Forest Department

Situation analysis; Because of being insignificant in the total catches, sharks are given little attention by government authorities responsible for fisheries conservation, management and administration. Regular transfers of staff results in lack of institutional learning about shark conservation and management.

Objective; Enhanced awareness and knowledge among government officials about sharks and rays, conservation and management

No.	Actions	Responsible Agency (s)	Years				
			2023	2024	2025	2026	2027
3.1	Prepare training material on shark species (taxonomy), the role of sharks in the ecosystem and vulnerability to overfishing	BFRI Universities	√				
3.2	Training of Trainers (ToT) from DoF, BFRI, Universities, BFD, DoE and NGOs	DoF BFRI BFD		√			
3.3	Provide training for government officials posted in coastal districts	DoF BFRI BFDC Customs BFD DoE		√		√	
3.4	Provide training for officers in DoF, BFRI, BFDC, DoE, Customs and BFD's headquarters	BFRI University		√		√	
3.5	Compile a taxonomic key on the sharks species biodiversity in Bangladesh waters with recent IUCN status of available species	BFRI University (s) NGOs		√			

4. Data Collection, Statistics

Situation analysis: Fisheries statistics record sharks as a single category by gear category. Statistical information is gathered by the Marine Fisheries Wing of DoF, at BFDC's landing centres and by Upazila Fisheries Officers in coastal areas. The collection of statistics is incomplete and there are no landings data recorded from industrial fisheries.

Objective: Reliable data on shark catches and landings							
No.	**Actions**	**Responsible Agency (s)**	**Years**				
			2023	**2024**	**2025**	**2026**	**2027**
4.1	Assessments of shark fisheries. Assessments will cover both artisanal and industrial fisheries	BFRI Universities NGOs	√			√	
4.2	Develop and adapt the shark identification guides for the use of fisheries officers, NGOs and fishers	DoF BFRI NGOs/DPs	√				
4.3	Mainstreaming of catch monitoring and landing data by gear and species groups (true sharks, hammerhead sharks, saw sharks, skates/guitar fishes, sting rays, butterfly rays, electric rays, devil rays and mantas) by FRSS, Marine Fisheries Survey Management Unit (MFSMU) and BFDC's landing centres	DoF BFDC	√	√	√	√	√
4.4	Train DoF officials to enhance technical capacity regarding shark taxonomy, data analysis and interpretation of catch trends and to use the revised fisheries information system	DoF		√	√		
4.5	Enhance the collection and analysis of data on utilization and trade data to support the assessment of shark catches and landings	DoF		√		√	

5. Monitoring, and Surveillance

Situation analysis: The ultimate goal of fisheries management is to maximize the sustainable benefits and economic return from the country's territorial waters and exclusive economic zone. The success of a NPOA depends on it being based on adequate information and sound decision-making, and being implemented through a strong and cost-effective Monitoring and Surveillance system. Such a system is an integrated information collation, rule-making and enforcement system providing tools for implementation of policies, strategies and frameworks for fisheries management and other aspects of ocean and environmental governance.

Objective: Strengthening monitoring of landing sites and enhance surveillance for enforcement							
No.	**Actions**	**Responsible Agency (s)**	**Years**				
			2023	**2024**	**2025**	**2026**	**2027**
5.1	Regular inspection and monitoring of landing sites	DoF BFDC	√	√	√	√	√

		BFD					
5.2	Enhance enforcement, and strengthening surveillance	DoF BFD BN/BCG/River Police	√	√	√	√	√
5.3	Trade monitoring and implication of CITES mandates	DoF BFD Custom	√	√	√	√	√

6. Research

Situation analysis; Taxonomy and ecology of some shark species and groups are little knownand no regular research is carried out by BFRI or other institutions. Gear selectivity with regard to bycatches of sharks in other fisheries is not understood

Objective: Enhanced understanding of taxonomy and ecology of shark species and groups in Bangladesh waters

No.	Actions	Responsible Agency (s)	Years				
			2023	2024	2025	2026	2027
6.1	Review stock assessments carried out earlier	BFRI/Universities	√				√
6.2	Supplement statistical information with fishery independent data on shark stocks through research projects	BFRI/Universities		√			
6.3	Carry out research projects on the taxonomy and ecology of little known shark species	BFRI Universities		√			
6.4	Identify needs and initiate research and development on gear selectivity	BFRI		√		√	

7. Legislation and regulations

Situation analysis: The Fish Act and Marine Fisheries Act have no provisions for the regulation of shark fishing and existing regulations on licensing of fishing vessels and registration of fishers are not fully implemented. With the exception of the Wildlife (Conservation and Security) Act 2012, which protected fishing of threatened sharks and rays under schedule 1 &2?

Objective: Legislation and regulations for effective conservation and management of sharks

No.	Actions	Responsible Agency (s)	Years				
			2023	2024	2025	2026	2027
7.1	Review of the Fish Act and other relevant legislations to identify gaps for the conservation and management of fishing for sharks	DoF, MoFL		√			

7.2	Review the feasibility of and prepare amendments of the Fish Act's based on enhanced knowledge and date as result of activities under Area 6	DoF, MoFL		√	√	√	√
8. Management Measures							
Situation analysis: The current Fish Acts have no provisions for the regulation of shark fishing. Management Measures needed for gear restriction, time/ area closures, live release requirements, prohibition of live finning, discards and prohibition of species.							
Objective: Legislation and regulations for effective conservation and management of sharks							
No.	**Actions**	**Responsible Agency (s)**	**Years**				
			2023	**2024**	**2025**	**2026**	**2027**
8.1	Management Measures will be taken in accordance with proposed amendments of Fish Act/Rules for a) sharks fin b) discards and c) prohibition of species	DoF		√	√	√	√
9. International, regional and national cooperation and coordination							
Situation analysis: Bangladesh is abiding to international conventions and instruments with relevance for conservation and management of shark species and stocks and intends to supportinternational and regional cooperation to implement these							
Objective: Coordinated efforts internationally, regionally, and nationally for effective conservation and management of sharks							
No.	**Actions**	**Responsible Agency (s)**	**Years**				
			2023	**2024**	**2025**	**2026**	**2027**
9.1	Strengthen inter-institutional collaboration on management and conservation of sharks	MoFL, MoEFCC, DoF, BFD, BFRI, BFDC & NGOs		√	√	√	√
9.2	Utilization of the "Task Force Committee" formed by DoF at National/District/Upazila/Union level for better coordination among different agencies	DoF	√	√	√	√	
9.3	Ensure active membership in and dialogue with CITES	MoEFCC	√				
9.4	Support Regional Fisheries Management Organizations (RFMOs) for the management and conservation of sharks	MoFL, DoF	√	√	√	√	
9.5	Participate in and support regional initiatives for the management and conservation of sharks, such as SAARC, BOBP-IGO, IORA and other	MoFL, MoEFCC	√				

	regional initiatives for the conservation and management of sharks						
9.6	Adopt bilateral fisheries management agreements with neighboring countries for shared elasmobranches' stocks	MoFL, DoF	√				
9.7	Report on the preparation and implementation of the NPOA-sharks as part of the biennial reporting to FAO on the Code of Conduct for Responsible Fisheries (as per IPOA provision 28)	MoFL		√			
9.8	Seek international assistance and collaboration for the implementation of the NOPA-Sharks (including research projects)	MoFL, DoF, BFRI		√			

10. Updating the NPOA

Situation analysis: Reviews of the NPOA will take a more in-depth consideration of the NPOA to identify limitations or lessons learned which need to be considered for revision of the NPOA or the national fisheries strategy. Reviews will be prepared by a Working Group of selected officials, academics, scientists, researchers, and concerned stakeholders to address new issues, revise strategic goals and objectives and evaluate management measures

Objective: Reviewed and update of NPOA for better management measures

No.	Actions	Responsible Agency (s)	Years				
			2023	2024	2025	2026	2027
10.1	The NPOA will be reviewed and updated in every 4th year as needed in connection with regular shark assessments	DoF, BFRI, MoFL				√	
10.2	Formation of Working Group for review and update	DoF, BFRI, MoFL				√	

Table 8. Likely immediate effects of NPOA-shark on different stakeholders

Measures	Stock/environment	Industry/livelihood	Market/trade	Adminst./opinion
Fishing ban: area and season	**Benefits:** Positive effects on shark biodiversity & sustenance. **Risks:** Strong implementation is often impossible in case of seasons.	**Benefits:** Stock recovery & sustainable fishery; improved livelihood in the long run. **Risks:** Immediate resistance, short-term livelihood loss for fishers & traders.	**Benefits:** Sustainable fishery; improved market in the long run. **Risks:** Short-term livelihood loss for fishers & Traders.	Extra budgets to be needed for effective implementation and public awareness building; mixed opinion by experts and policy makers.
Effort regulation	**Benefits:** Small individuals and juveniles would get chance to escape, stockrecovery. **Risks:** Attitude foreffective implementation is often hard to get.	**Benefits:** Stock recovery & sustainable fishery; improved livelihoodin the long run. **Risks:** Immediate resistance, short-term livelihood loss for fishers & traders.	**Benefits:** Sustainable fishery; improved market in the long run. **Risks:** Immediate resistance, short-term livelihood loss for fishers & traders.	Extra budgets to be needed for effective implementation and public awareness building; mixed opinion by experts and policy makers; high risks of IUU fishing.
Catch regulation	**Benefits:** Stock recovery of red-listedones & sustainable fishery; improved livelihood in the longrun. **Risks:** Effective implementation isoften impossible.	**Benefits:** Stock recovery of the threatened, endangered & vulnerable ones, sustainable fishery; improved livelihoodin the long run. **Risks:** Immediate resistance, collapseof species-specific fishery; short-term livelihood loss for fishers & traders.	**Benefits:** Sustainable fishery; improved market in the long run. **Risks:** Immediate resistance, collapse of species-specific fishery; short-term livelihood loss for fishers & traders.	Extra budgets to be needed for effective implementation and public awareness building; mixed opinion by experts and policy makers; high risks of IUU fishing.
Compliance to international /regional rules and trades	**Benefits:** Compliance to international/regional rules and trades; Stockrecovery & sustainablefishery; improved livelihood in the long run. **Risks:** Effective implementation is costly, unmanageableand often impossible.	**Benefits:** Stock recovery & sustainable fishery; improved livelihoodin the long run. **Risks:** Immediate resistance, short-term livelihood loss for fishers & traders.	**Benefits:** Stock recovery & sustainable fishery; improved livelihood in the long run. **Risks:** Immediate resistance, short-term livelihood loss for fishers & traders.	Increased image value of the country regarding compliances to best practices. Without development partner's support effective implementation and capacity building is hard fordeveloping countries.

References

Ahmed, A. T. N. and M. N. Sarker 1984. Shark fishery of the Bay of Bengal. Journal of NOAMI (National Oceanographic and Maritime Institute) 1(1): 1-6.

Bahadur, H. I. 2011. Trades of shark products in Bangladesh. p. 43-50. *In*: M. E. Hoq, A. K. YousufHaroon and M. G. Hussain (eds.) 2011. Shark fisheries in the Bay of Bengal, Bangladesh: Status and potentialities. *SBOBLME Pub./Rep. 4.* Support to Sustainable Management of the Bay of Bengal Large Marine Ecosystem Project, Bangladesh Fisheries Research Institute, Bangladesh. 76 p.

Bal, D. V. and K. V. Rao 1990. Marine fisheries of India. First revised edition. Tata McGraw-Hill Publishing Company Ltd., New Delhi, 472 p.

Bykov, V. P. (ed.) 1983. Marine fishes. Chemical composition and processing properties. Amerind Publishing Co. Pvt. Ltd., New Delhi, India. 322 p.

BOBP-IGO (Bay of Bengal Program-Inter Governmental Organization) 2009. Second regional consultation on preparation of management plan for shark fisheries. 09-11 August 2009. Kulhudhuffushi, Maldives.BOBP-IGO/RC-SF/2/6. 8 p.

Camhi, M. D., S. V. Valenti, S. V. Fordham, S. I. Fowler and C. Gibson 2009. *The conservation status of pelagic sharks and rays: Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop*. IUCN Species Survival Commission Shark Specialist Group, Newbury, UK, 78 p.

Camhi, M. D., S. V. Fordham and S. L. Fowler 2008. Domestic and international management for pelagic sharks. *In*: M. D. Camhi, E. K. Pikitch and E. A. Babcock (eds.) *Sharks of the Open Ocean: Biology, Fisheries and Conservation.* Blackwell Publishing, Oxford, UK.

Castro,J. J., C. M.Woodley, and R. L. Brudek 1999. A preliminary evaluation of the status of shark species. *FAO Fisheries Technical Paper* 380:72 p.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) 2010. Fifteenth meeting of the Conference of the Parties. Doha (Qatar), 13-25 March 2010. CoP15 Doc. 53, 14 p.

Clarke, S. C., M. K. McAllister, E. J Milner-Gulland, G. P. Kirkwood, C. G. J. Michielsens, D. J. Agnew,

E. K. Pikitch, H. Nakano, M. S. Shivji 2006. Global estimates of shark catches using trade records from commercial markets. Ecology Letters 9 (10): 1115–1126.

Colomer, J. 2005. Australian government conservation and management of whale shark under the Environment Protection and Biodiversity Conservation Act, 1999. p. 26-30. *In*: T. R. Irvine and Keesing, J. K. (eds.) 2005. The 1st International Whale Shark Conference: Promoting international collaboration in whale shark conservation, science and management. Conference Overview, Abstracts and Supplementary Proceedings. 09-12 May 2005. Perth Western Australia. CSIRO Marine and Atmospheric Research, Western Australia. 116 p.

DoF (Department of Fisheries) 2012. Special Supplement on *National Fish Week-2012*. Department of Fisheries, Ministry of Fisheries & Livestock, Govt. of Bangladesh, Dhaka. 144 p.

DoF (Department of Fisheries) 2006. Marine fisheries sector sub-strategy. In: National Fisheries Strategy and Action Plan for the implementation of the National Fisheries strategy. Department of Fisheries, Ministry of Fisheries & Livestock, Govt. of Bangladesh, Dhaka. 77-91 p.

Dulvy, N. K., J. K. Baum, S. Clarke, L. J. V. Compagno, E. Corte's, A. Domingo, S. Fordham, S. Fowler,

M. P. Francis, C. Gibson, J. Martine'z, J. A. Musick, A. Soldo, J. D. Stevens and S. Valenti 2008. You can swim but you can't hide: the global status and conservation of oceanic pelagic sharks and rays. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 18: 459–482.

FAO (Food and Agricultural Organization of the United Nations) 2008. Report of the Technical Workshop on the status, limitations and opportunities for improving the monitoring of shark fisheries and trade. Rome, 3-6 November 2008, Rome. FAO Fisheries and Aquaculture Report No. 897. ISSN 2070-6987. 161 p.

FAO (Food and Agricultural Organization of the United Nations) 2007. Sharks, rays and chimaeras. FAO Species identification publications excerpts. International Plan of Action for the Conservation and Management of Sharks. CD-ROM.

FAO (Food and Agricultural Organization of the United Nations) 2000. Fisheries management. 1. Conservation and management of sharks. FAO Technical Guidelines for Responsible Fisheries. No. 4, Suppl. 1. Rome, FAO. 37 p.FAO (Food and Agriculture Organization of the United Nations) 1996. Precautionary approach to capture fisheries and species introduction. Elaborated by the Technical Consultation on Precautionary Approach to Capture Fisheries (inc. species introductions). Lysekil, Sweden, 6-13 June 1995. *FAO Technical Guidelines for Responsible Fisheries.* No. 4, Suppl. 2, FAO, Rome, 2003. 112 p.

Haldar, G. C. 2010. National plan of action for shark fisheries in Bangladesh. p. 75-89. *In* M.G. Hussain and M. E. Hoq (eds.) Sustainable management of fisheries resources of the Bay of Bengal. Support to Sustainable Management of the BOBLME (SBOBLME) Project. SBOBLME Pub./Rep. 2, Bangladesh Fisheries Research Institute, Mymensingh. 122 p.

Haque, A.B., Cavanagh, R.D. and Seddon, N. 2021. Evaluating artisanal fishing of globally threatened sharks and rays in the Bay of Bengal, Bangladesh. PLoS ONE 16(9): e0256146. https:// doi.org/10.1371/journal.pone.0256146

Haroon, A. K. Yousuf 2011. Shark fishery in the Bay of Bengal, Bangladesh. p. 11-32. *In*: M. E. Hoq, A.

K. Yousuf Haroon and M. G. Hussain (eds.) 2011. Shark fisheries in the Bay of Bengal, Bangladesh: Status and potentialities. *SBOBLME Pub./Rep. 4.* Support to Sustainable Management of the Bay of Bengal Large Marine Ecosystem Project, Bangladesh Fisheries Research Institute, Bangladesh. 76 p.

Hoq, M. E., A. K. Yousuf Haroon and M. G. Hussain (eds.) 2011. *Shark fisheries in the Bay of Bengal, Bangladesh: Status and potentialities.* Workshop Report. Support to BOBLME Project, Bangladesh Fisheries Research Institute. SBOBLME Pub./Rep. 4; 76 p. [See also BOBLME web-country page Bangladesh (*www.boblme.org/bangladesh.html*) for the published document on *Shark Fisheries in the Bay of Bengal, Bangladesh: Status & Potentialities.*]

Huda, M. S., M. E. Haque, A. S. Babul and N. C. Shil 2003. Field gude to finfishes of Sundarban. Aquatic Resources Division, Sundarban. Sundarban Biodiversity Conservation Project, Bangladesh Forest Department, Boyra, Khulna, Bangladesh. 197 p.

Hussain, M. M. 1971. The commercial fishes of the Bay of Bengal. Survey for the development of fisheries in East Pakistan. Chittagong, UNDP Project PAK 22, Project Publication No. 1: 60 p.

Hussain, M. M. 1969. Marine and estuarine fishes of the north-east part of Bay of Bengal. Scientific Researches, East regional Laboratories, Pakistan, Vol. VII(1): 26-55.

IUCN, 2020. The IUCN Red List of Threatened Species. Version 2020–3 [cited 2021 Feb 7]. In; IUCN Redlist website. https://www.iucnredlist.org.

Irvine, T. R. and J. K. Keesing (eds.) 2005. The 1st International Whale Shark Conference: Promoting international collaboration in whale shark conservation, science and management. Conference Overview, Abstracts and Supplementary Proceedings. 09-12 May 2005. Perth Western Australia. CSIRO Marine and Atmospheric Research, Western Australia. 116 p.

Jackson, J. B. C., M. X. Kirby, W. H. Berger, K. A. Bjorndal, L. W. Botsford, B. J. Bourque, R. H. Bradbury, R. Cooke, J. Erlandson, J. A. Estes, T. P. Hughes, S. Kidwell, C. B. Lange, H. S. Lenihan, J.

M. Pandolfi, C. H. Peterson, R.S. Steneck, M. J. Tegner and R. R. Warner 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science*, 293 (5530): 629 – 638.

Joshi, D., V. Talwar, R. Gandhi and A. Mookerjee 2005. Campaighn for whale shark conservation: Experiences from coastal Gujarat, India. p. 14-19. *In*: T. R. Irvine and Keesing, J. K. (eds.) 2005. The 1st International Whale Shark Conference: Promoting international collaboration in whale shark conservation, science and management. Conference Overview, Abstracts and Supplementary Proceedings. 09-12 May 2005. Perth Western Australia. CSIRO Marine and Atmospheric Research, Western Australia. 116 p.

Krajangdara, T., R. Sujittosakul and M. J. Rahman 2008. Elasmobranches found in the Bay of Bengal from pelagic longline and drift gill net fishing. p. 190-194. *In*: The Ecosystem-based fishery management in the Bay of Bengal. The Bay of Bengal Initiatives for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), Department of Fisheries (DoF), Ministry of Agriculture and Cooperatives, Thailand and Southeast Asian Fisheries Development Center (SEAFDEC), Training Department, Thailand. 250 p.

Kumari, B. and M. Raman 2005. Satellite remote sensing as a tool to determine whale shark distribution. p. 56-62. *In*: *In*: T. R. Irvine and Keesing, J. K. (eds.) 2005. The 1st International Whale shark Conference: Promoting international collaboration in whale shark conservation, science and management. Conference Overview, Abstracts and Supplementary Proceedings. 09-12 May 2005. Perth Western Australia. CSIRO Marine and Atmospheric Research, Western Australia. 116 p.

Myers, R.A. and B. Worm 2003. Rapid worldwide depletion of predatory fish communities. *Nature*, 423: 280-283.

Migdalski, E. C., G. S. Fichter and N. Weaver 1989. The fresh and salt water fishes of the world. Greenwich House, New York, USA, 316 p.

MoEF (Ministry of Environment and Forests) 2004. Bangladesh: National Programme of Action forProtection of the Coastal and Marine Environment from Land-Based Activities Prepared by Department of Environment, Ministry of Environment and Forests, Government of the People's Republic of Bangladesh in Collaboration with IUCN – The World Conservation Union Bangladesh Country Office.

MoFL (Ministry of Fisheries and Livestock, Government of Bangladesh) 1998. National Fisheries Policy.

Dhaka, Bangladesh. 18 p. Available at *http://www.fisheries.gov.bd/pdf/nat_fis_policy.pdf*.

Morgan, A.C. 2010. Sharks: The State of the Science. Ocean Science Division, Pew Environment Group, Washington, DC. 12 p.

MRAG-FERR (Marine Resources Assessment Group and Fisheries Ecosystems Restoration Research) 2008. University of British Columbia. The global extent of illegal fishing. Marine Resources Assessment Group. 2008. www.mrag.co.uk/Documents/ExtentGlobalIllegalFishing.pdf

Myers, R. A., J. K. Baum, T. D. Shepherd, S. P. Powers and C. H. Peterson 2007. Cascading effects of the loss of apex predatory sharks from a coastal ocean. *Science* 315: 1846-1850.

Norman, B. and J. Catlin 2007. Economic importance of conserving whale sharks. Report for the International Fund for Animal Welfare (IFAW), Australia. *Economicimportance.pdf.* 18 p.

(NPOA-sharks) National Plan of Action-sharks of Canada, Malaysia and the Seychelles.

Paul, L. 2009. International trade in shark fins, and illegal, unreported and unregulated shark fishing. The Hawaii Audubon Society, 850 Richards Street, Suite 505, Honolulu, HI 96813, USA. 12 p.

Polovina, J. J., M. Abecassis, E. A. Howell and P. Woodworth 2009. Increases in the relative abundance of mid-trophic level fishes concurrent with declines in apex predators in the subtropical North Pacific, 1996-2006. *Fisheries Bulletin* 107: 523-531.

Quddus, M. M. A. and M. Shafi 1983. *Bangopasagarer Matsya Sasmpad* (Fisheries resources of the Bay of Bengal. In Bangla. Bangla Academy, Dhaka,Bangladesh, 426 p.

Quddus, M. M. A., M. N. Sarker and A. K. Banarjee 1988. Studies on the Chondrichthyes fauna (sharks, skates and rays) of the Bay of Bengal. Jour. NOAMI (National Oceanographic and Maritime Institute) 5(2): 19-39.

Rahman, A. K. A., S. M. H., Kabir, M. Ahmad, A. T. A. Ahmed, Z. U. Ahmed, Z. N. T. Begum, M. A. Hassan and M. Khondker (eds.) 2009. *Encyclopedia of Flora and Fauna of Bangladesh.* Vol. 24, Marine Fishes. Asiatic Society of Bangladesh, Dhaka. 485 p.

Roy, B. J. 2011. Catch monitoring and assessment of shark and allied fisheries in the Bay of Bengal. pp. 33-42. *In:* M.E. Hoq, A.K. Yousuf Haroon and M.G. Hussain (eds.). 2011. Shark fisheries in the Bay of Bengal, Bangladesh: Status and potentialities. SBOBLME Pub./Rep. 4. Support to Sustainable Management of the BOBLME Project, Bangladesh Fisheries Research Institute. 76 p.

Roy, B. J., M. P. Dey, M.F. Alam and N.K. Singha 2007. Status of shark fishing in the marine water of Bangladesh. UNEP/CMS/MS/Inf/10. 17 p.

Sarker, M. N. 1989. An observation on the landing of sharks in coastal areas of Cox's Bazar region.c

Bangladesh Jour. Sci. Res. 7(2): 269-271.

Sattar, S. A. and R. C. Anderson 2011. Report of the BOBLME Sharks Working Group. 5-7 July 2011, Male', Maldives. BOBLME (Bay of Bengal Large Marine Ecosystem) Project. BOBLME-Ecology- 2011-15. pdf. 50 p.

Schmidt, J. V., C. L. Schmidt, F. Ozer, R. E. Ernst, K. A. Feldheim, *et al.* 2009. Low genetic differentiation across three major ocean populations of the Whale shark, *Rhincodon typus*. PLoS ONE 4(4): e4988. doi:10.1371/journal.pone.0004988.

Steele, J. H. and M. Schumacher 2000. Ecosystem structure before fishing. *Fisheries Research,* 44: 201- 205..

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