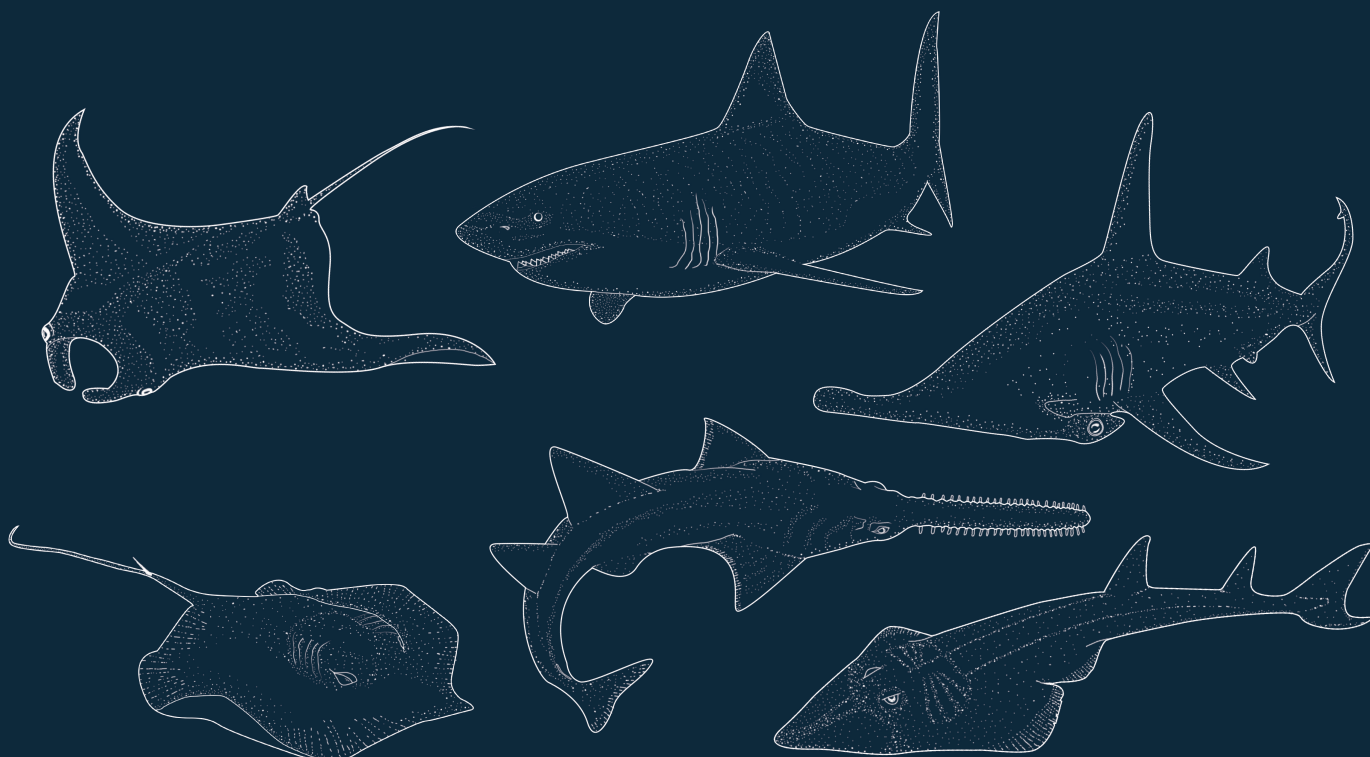




Sustainable Forests & Livelihoods (SUFAL) Project

Report on the National consultation for sharing knowledge on the status of and threats to sharks and rays in Bangladesh and developing a national conservation strategy

4.-5. May 2021



Bangladesh Forest Department
Ministry of Environment, Forest and Climate Change

Report on the National consultation for sharing knowledge on the status of and threats to sharks and rays in Bangladesh and developing a national conservation strategy

First published in July 2021

Publisher

Bangladesh Forest Department

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Citation

Bangladesh Forest Department and Wildlife Conservation Society (WCS). 2021. Report on the national consultation for sharing knowledge on the status of and threats to sharks and rays in Bangladesh and developing a national conservation strategy. Bangladesh Forest Department, Ministry of Environment, Forest and Climate Change, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.



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Acronyms and Abbreviations

ABR Lab	Aquatic Bioresource Research Lab	MPA	Marine Protected Area
BFDC	Bangladesh Fisheries Development Corporation	MR	Marine Reserve
BFRI	Bangladesh Fisheries Research Institute	MSC	Monitoring, Control and Surveillance
BoB	Bay of Bengal	MSY	Maximum Sustainable Yield
BOBLME	Bay of Bengal Large Marine Ecosystem	NBR	National Board of Revenue
BOBP-IGO	Bay of Bengal Programme Intergovernmental Organization	NDF	Non-Detriment Finding
CBD	Convention on Biodiversity	NGO	Non-Governmental Organization
CCF	Chief Conservation of Forests	NPOA	National Plan of Action
CCRF	International Code of Conduct for Responsible Fisheries	PD	Project Director
CF	Conservator of Forests	RPOA	Regional Plan of Action
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	RVMS	Research Vessel Meen Sandhani
CMS	Convention on the Conservation of Migratory Species of Wild Animals	SAR	Shark Assessment Report
CNF	Clearing and Forwarding	SEAFDEC	Southeast Asian Fisheries Development Center
COFI	Committee on Fisheries	SMART	Spatial Monitoring and Reporting Tool
CoP18	The 18th Conference of the Parties to CITES	SoNG	Swatch-of-No-Ground
CPUE	Catch Per Unit Effort	SOP	Standard Operating Procedure
CR	Critically Endangered	SUFAL	Sustainable Forests & Livelihoods Project
DFO	Divisional Forest Officer	TED	Turtle Excluder Device
DoF	Department of Fisheries	ToR	Terms of Reference
EEZ	Exclusive Economic Zone	UNCED	United Nations Conference on Environment and Development
EN	Endangered	UNCLOS	United Nation Convention on the Laws of Seas
FAO	Food and Agriculture Organization	VU	Vulnerable
FIK	Fishers Indigenous Knowledge	WCCU	Wildlife Crime Control Unit
FD	Forest Department	WCED	World Commission on Environment and Development
FRSS	Fisheries Resources Survey System	WCS	Wildlife Conservation Society
GoB	Government of Bangladesh		
IOTC	Indian Ocean Tuna Commission		
IPOA	International Plan of Action		
IUCN	International Union for Conservation of Nature		
IUU	Illegal, Unreported and Unregulated		
MFSMU	Marine Fisheries Survey Management Unit		
MoEFCC	Ministry of Environment, Forests and Climate Change		
MoFL	Ministry of Fisheries and Livestock		

1. Opening remarks from the host, chief guest, chair, and moderator

On behalf of the Wildlife Conservation Society Bangladesh Program (WCS), **Elisabeth Fahrni Mansur** welcomed more than 50 participants (Appendix 1) to the virtual consultation workshop with sincere gratitude for their interest in sharing knowledge on the status of and threats to sharks and rays, and discussing strategies and recommended actions for improving shark and ray conservation management in Bangladesh. In a brief overview of the agenda (Appendix 2) she explaining that national experts would present up-to-date insights on current procedures and efforts, research findings and resulting recommendations, after which participants would discuss and formulate recommended actions for the conservation of threatened sharks and rays and the sustainable exploitation of species not in immediate danger of extinction.

Elisabeth thanked the 19 speakers (Appendix 3) for their engagement despite busy schedules amidst the lock-down and apologized for not being able to accommodate other experts due to time constraints. She emphasized that this event should be perceived as a starting point for a collaborative and inclusive process with ample opportunities for contributing to the national strategy and action plan in the near future. She encouraged all participants to follow the presentations closely, post concise, constructive and respectful questions or comments in the chat box, and join the discussions despite the program being demanding, particularly for those fasting.

Chief guest **Md. Amir Hosain Chowdhury**, Chief Conservation of Forests (CCF), stated that the Forest Department (FD) is mandated to protect threatened sharks and rays under the Wildlife (Conservation and Security) Act 2012. As National Management and Scientific Authority for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the FD is also responsible for ensuring that international trade does not negatively impact their wild populations.

The *Sustainable Forests & Livelihoods* (SUFAL) project implemented by the FD aims to enhance wildlife and protected area management practices and thereby improve forest conservation and wildlife protection in Bangladesh. WCS was contracted by the FD under the SUFAL project to develop a Shark and Ray and Associated Species Conservation Strategy and Non-Detriment Findings for at least two CITES Appendix II listed shark and ray species, strengthen institutional collaborations for their implementation, and conduct mass awareness programs and technical trainings to ensure the capacity and support for enforcement and compliance with regulations protecting threatened sharks and rays in Bangladesh.

Illegal wildlife trade is a significant threat to the country's biodiversity that the FD cannot combat as a single agency. The FD has improved interagency relations through joint capacity building of law enforcement officers and the judiciary, and will continue to do so through its Wildlife Crime Control Unit. The protection of sharks and rays threatened by overexploitation from targeted and non-targeted catches and unregulated trade is an example of overlapping Government agency mandates. The CCF expressed his appreciation to WCS for arranging this consultation as an important step for informing a national shark and ray conservation strategy and for strengthening interagency cooperation.

A proposed amendment with a revised list of shark and ray species and genera protected under in the Wildlife (Conservation and Security) Act 2012 has obtained inter-ministerial approval. Species and gear-specific rules formulated under the new Marine Fisheries Act 2020 would further strengthen the national legal framework for reducing non-target catches of threatened marine wildlife and for ensuring that the trade of shark and ray products does not endanger the survival of threatened species.

Md. Amir Hosain Chowdhury ended his opening remarks by expressing his sincere gratitude to the Department of Fisheries for their collaboration. He appreciated the effort, commitment and support of experts and participants from different agencies in this consultation to enable the development of

an effective strategy informed by robust science and stakeholder perspectives for protecting threatened sharks and rays in Bangladesh.

After welcoming the chief guest and distinguished academics, researchers, and conservation and development practitioners from various institutions, **Dr. Md. Sharif Uddin**, Director of the Marine Fisheries Wing of the Department of Fisheries (DoF) explained that the productive marine waters of Bangladesh support a rich diversity of sharks and rays. Many of these species are threatened with extinction while others still occur in large enough numbers to support sustainable fisheries with appropriate management. In April 2021, the Ministry of Fisheries and Livestock (MoFL) tasked a committee to update the *National Plan of Action for the Conservation and Management of Sharks and Rays* drafted in 2014 with support from national and international organizations and in consultation with local stakeholders.

Dr. Uddin appreciated WCS for bringing academics, researchers, conservationists and development experts from different sectors together. He hoped that over the coming two days participants would share their research findings and discuss strategies and practical actions for protecting the most threatened sharks and rays from extinction and ensuring sustainable utilization of more common species. Developing a *National Plan of Action for the Conservation and Management of Sharks and Rays* aligns with Article 18A of the Constitution of Bangladesh, which requires the state to safeguard natural resources, biodiversity, wetlands, forests and wildlife for present and future citizens. It will also address the country's obligations to international conventions and the Indian Ocean Tuna Commission (IOTC).

The DoF is mandated to manage inland and marine fisheries resources, which are rich but not unlimited. Existing regulations for spatial closures and seasonal bans indirectly affect sharks and rays, which play an important role in maintaining the natural ecological balance in our waters. Since specific protection for sharks and rays are lacking in fisheries laws, the DoF is planning to formulate rules under the Marine Fisheries Act 2020 that will include species-specific regulations and align fisheries laws and rules with the Wildlife (Conservation and Security) Act 2012.

The DoF is committed to support the development and implementation of a *National Plan of Action for the Conservation and Management of Sharks and Rays*, but depends on national and international experts for providing robust scientific evidence to inform practical fisheries management measures. He requested speakers and participants to work together with the DoF, FD, law enforcement agencies, academics, researchers, and other stakeholders including fishers and fish traders. Constructive discussions would ensure a successful outcome of this consultation in support of a healthy ocean and healthy people. Dr. Md. Sharif Uddin thanked the FD for supporting the development of a national shark and ray conservation strategy and action plan through their SUFAL project, and WCS for facilitating this consultation despite the challenges of the Covid-19 pandemic.

Dr. Syed Arif Azad, former Director General of the DoF and Senior Advisor to the WCS Bangladesh Marine Conservation Program, commenced as moderator of the program by welcoming all participants and requesting speakers to maintain their allocated talk time to enable timely completion of the program. He led through the program by briefly introducing each speaker and requesting their response to questions or comments as time permitted.

2. Current practices, recent research findings and resulting recommendations for a national conservation strategy and plan of action for shark and ray conservation management in Bangladesh presented by national experts

2.1 Species diversity, priority habitats, and threats from fisheries and trade for sharks and rays in Bangladesh

Presented by Mohammad Shamsuddoha, Marine Spatial Analyst, WCS

WCS confirmed 39 shark and 59 ray species in Bangladesh, and the potential availability of 13 additional shark and four ray species. Of the total sharks and rays confirmed or suspected in Bangladesh, 32 shark and 43 ray species are globally threatened. Between December 2016 - January 2019, WCS citizen science shark and ray data collectors made almost 3,000 visits to eight coastal fish landing sites documenting 2,687 landings of 19 shark species and 3,103 landings of 41 ray species.

Spadenose sharks (*Scoliodon laticaudus*) and Scalloped hammerheads (*Sphyrna lewini*) accounted for 63.4% of total landings, 99.5% of individuals and 94.4% of total weight, while the other 17 species accounted for the remainder (N=2,319). Bluespotted maskrays (*Neotrygon caeruleopunctata*) and Bengal whiprays (*Brevitrygon imbricata*), Honeycomb whiprays (*Himantura undulata*) and Bleeker's whiprays (*Pateobatis bleekeri*) accounted for almost half (49.8%) of total landings, 95.6% of individuals and 57.4% of total weight, while the other 37 species accounted for the remainder (N=1,309). Cox's Bazar accounted for a large majority of shark and ray landings (67.2% for sharks and 73.4% for rays). Medium-mesh gillnets and set-bag nets were responsible for a large majority of shark landings. Long-lines with many hooks (baited and unbaited) accounted for about 85% of the total number of rays landed.

The WCS Citizen Science Fishermen Safety Network established among coastal small-scale gillnet fishermen recorded 545 catches of nine shark species and 57 catches of seven ray species during a total of 463 fishing trips and 3,559 net sets of medium-mesh gillnets targeting hilsa. Large-mesh gillnetters targeting large finfish recorded 190 catches of nine shark species and 24 catches of four ray species during a total of 85 fishing trips and 688 net sets.

Habitat suitability models for all shark-catch records combined indicate that the most suitable shark habitat is the shallow nearshore area offshore of the Sundarbans (water depth <100 m) and at the head of the Swatch-of-No-Ground submarine canyon (water depth >500 m). The habitat suitability model for all ray-catch records combined indicates that the most suitable ray habitat is the shallow estuarine nearshore area from the western to the central coast generally less than 50 m deep. Species-wise habitat suitability models were verified with published habitat preferences, and limitations (e.g. data considered only covered coastal small-scale fisheries not industrial or high sea fisheries) were reflected in the definitions of high and low suitability.

Interviews conducted by WCS with 304 fishers, traders, and consumers in nine coastal towns showed that 63% of the consumers (N=99) ate sharks and/or rays at least once a month and 37% every week. Among the traders (N=34), 46% were unaware of laws protecting sharks and rays. Of the 166 fishers questioned, 73% said medium-mesh gillnets catch most sharks. The majority of shark and ray meat consumers were Hindu, Buddhist, Christian or from ethnic minorities in the Chattogram Division, but increasing consumption among Muslims (15% of the 99 questioned consumers) and across the country was detected.

Recommendations

- Strengthen management, monitoring and enforcement of fisheries and wildlife protection regulations in the Swatch-of-No-Ground Marine Protected Area (MPA) and its proposed extension, a high-risk area for sharks and rays critical for reducing by-catch mortality.
- Strengthen management, monitoring and enforcement of fisheries and wildlife protection regulations in the Nijhum Dwip MPA, a highly suitable area particularly for rays.
- Reduce mortalities particularly of threatened sharks through educational outreach and training programs for fishers and vessel owners that enable them to identify legally regulated species, safely release them alive at sea, and avoid legal prosecution for illegal retention.
- Reduce illegal trade and consumption particularly of threatened rays through educational outreach programs informing consumers about punishments for illegal possession of threatened wildlife, and enabling traders to identify protected ray species, comply with trade regulations, and avoid legal prosecution for illegal trade.
- Enhance the enforcement of laws regulating wildlife trade and consumption particularly of rays through interagency collaborations, capacity building and training programs.
- Enhance the enforcement of wildlife protection laws particularly for sharks at sea through interagency monitoring and enforcement patrols.
- Improve awareness among fishers, vessel owners, traders and consumers about the importance of sharks and rays for a healthy ocean supporting healthy people, the urgency of improved protection for critically endangered and endangered species, and the laws and regulations that prohibit their catch, trade and consumption as a punishable crime.

2.2 Improving the protection of threatened sharks and rays in Bangladesh

Presented by Shamsunnahar Shanta, Marine Policy Coordinator, WCS

To date, two marine protected areas (MPAs) protecting priority habitat for threatened sharks and rays in Bangladesh have been established. The Swatch-of-No-Ground MPA protects at least 11 shark and seven ray species, while the Nijhum Dwip MPA protects at least six shark and 21 ray species.

Bangladesh has shown a strong commitment to protecting sharks and rays locally and globally by co-sponsoring the CITES listing of mobula rays, silky and thresher sharks at the CITES CoP17, and of mako sharks, giant guitarfishes, and wedgefishes at CoP18. The FD, with support from WCS, is strengthening interagency collaborations and capacity for combatting illegal wildlife trade, including the enforcement of CITES regulations for international trade in shark and ray products from Bangladesh, by providing trainings and identification tools that enable law enforcement officers to differentiate CITES listed species and their commonly traded parts.

The current legal protection of sharks and rays in Bangladesh is slightly confusing. The Wildlife (Conservation and Security) Act 2012 protects 18 shark and 11 ray species. However, newly available information indicates that (a) many species that occur in Bangladesh are not included despite their threatened status (which is periodically assessed by the IUCN Shark Specialist Group and updated in the IUCN Global Red List) and being CITES-listed; (b) several species almost certainly do not occur in Bangladesh; and (c) recent taxonomic changes mean that the names of some species currently listed have changed.

On request from the FD, WCS prepared a revised listing proposing eight genera and 23 species of sharks and rays that are considered Critically Endangered or Endangered in the Global IUCN Red List or the IUCN Red List for sharks and rays in the Arabian Seas Region, and/or listed in Appendix I of

CITES and/or the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and/or protected under a resolution of the IOTC to be listed under Schedule I, and one genus and 29 species assessed as Vulnerable in the Global IUCN Red List or the IUCN Red List for sharks and rays in the Arabian Seas Region, and/or listed in Appendix II of CITES and/or CMS to be listed under Schedule II of the Wildlife Act. The proposed listing, which also considers look-alike species, was reviewed by national and international experts, approved by the CITES national scientific authority and recommended for official declaration by the MoEFCC in an inter-ministerial meeting.

Under the SUFAL assignment, WCS is assisting the FD in improving governance frameworks for the conservation of threatened sharks and rays and the sustainable exploitation of non-threatened species. This includes formulating definitions for the schedules of the Wildlife Act and penalties for violations thereof, as well as adapting agency mandates to incorporate the protection of shark and ray species threatened with extinction from overfishing and illegal trade.

Improving the protection of threatened sharks and rays of Bangladesh requires collaborative efforts. Engaging local communities is paramount to reverse population declines of threatened species and ensure the sustainability of fishing and trade of non-threatened ones. WCS has developed and implemented targeted, effective and scale-able educational outreach initiatives, including mobile interactive exhibitions, community radio programs, and short documentary films for informing fishing communities and government officers on the ecological and economic importance of sharks and rays, sustaining productive fisheries, and for spreading awareness about laws and rules regulating shark and ray exploitation and trade.

Recommendations

- Develop and implement Non-Detriment Findings (NDF) for frequently landed and economically valued CITES Appendix II listed shark and ray species to comply with CITES trade regulations.
- Improve governance framework for the conservation of threatened sharks and rays and their implementation by adapting agency mandates and strengthening inter-agency collaborations.
- Strengthen technical capacity, awareness, and commitment across government agencies and institutions (e.g. FD, DoF, BFRI, BFDC) for the conservation management of sharks, rays, and other marine wildlife, through the provision of trainings and tools.
- NGOs and research institutions to support capacity and awareness building efforts, particularly in local fisheries dependent communities, for improved support and compliance with fisheries, wildlife protection, and trade regulations through targeted educational outreach programs that encourage ocean stewardship and active engagement as citizen scientists, e.g. for monitoring fisheries activities in MPAs and catches at landing sites.
- Collaboratively implement, assess the effectiveness, and adapt the National Strategy and Action Plan for the Conservation Management of Sharks and Rays.

2.3 Current procedures, results and challenges for monitoring and reporting shark and ray catches in Bangladesh

Presented by Dr. Md. Sharif Uddin, Director of the Marine Fisheries Wing, DoF

The Marine Fisheries Survey Management Unit (MFSMU) under the Marine Fisheries Wing of the DoF carries out land-based surveys for sampling fish catch landings at four sites on four days every month (spring and neap tides). Data on shark landings are however only collected from one of these sites, the BFDC fish landing center in Cox's Bazar¹ (Figure 1).

Catch/Landing Statistics of Sharks, Rays and Large Pelagic Fishes							
Landing Centre: District:			Month: Name of Investigator:				
Landed Species			Landed days/month	Landings (KG)	Species Nos.	Length range(cm)	Remarks
Local name	English name	Scientific name					
দুধুয়া মাছ	Dog fish shark	<i>Scoliodon laticaudus</i>					
মুগুয়া মাছ	Milk shark	<i>Rhizoprionodon acutus</i>					
টিগার	Tiger shark	<i>Galeocerdo cuvier</i>					
সিল্কি মাছ	Silky shark	<i>Carcharhinus falciformis</i>					
কৃষ্ণ মাছ	Black shark	<i>Carcharhinus melanopterus</i>					
স্নাই মাছ	Slender bamboo shark	<i>Chiloscyllium indicum</i>					
হামার মাছ	Hammer headed shark	<i>Sphyrna zygaena</i>					
বutterfly মাছ	Butterfly ray	<i>Gymnura japonica</i>					
কো মাছ	Cow nose ray	<i>Rhinoptera javanica</i>					
ব্যান্ড মাছ	Banded eagle ray	<i>Aetomylaeus nichofii</i>					
ব্লট মাছ	Blotched fantail ray	<i>Taeniura meyeni</i>					
ব্যাট মাছ	Bat/devil ray	<i>Mobula japonica</i>					
স্পট মাছ	White spotted whip ray	<i>Himantura gerrardi</i>					
বো মাছ	Bow mouth guitar fish	<i>Rhina ancylostoma</i>					
রেট মাছ	Reticulated whip ray	<i>Himantura uarnak</i>					
স্টা মাছ	Sting ray	<i>Himantura bleekeri</i>					
লি মাছ	Leopard whiplay	<i>Himantura undulata</i>					
ডা মাছ	Dwarf whip ray	<i>Himantura walga</i>					
গি মাছ	Giant Shovelnose ray	<i>Rhinobatos typus</i>					
সি মাছ	Shovelnose ray	<i>Rhynchobatus djeddenis</i>					
ক্ল মাছ	Clubnose guitar fish	<i>Rhinobatos thoun</i>					
সে মাছ	Sail fish	<i>Histiophorus gladius</i>					
অ	Others						

Signature of Investigator

Figure 1. Current data collection sheet of MFSMU requiring the recording of weight, number of specimens and range of lengths for seven shark, 14 ray and one billfish species at landings².

Vessel-based fisheries surveys conducted by the DoF in the Bay of Bengal since 2016 have identified six shark and eleven ray species to date, including a rare photo-verified record of the Endangered winghead shark *Eusphyra blochii*. Two separate surveys for shrimp and demersal fishes were carried out with RV Meen Sandhani (RVMS) in nine sampling strata considering different depths and fishing zones divided into 3x3 nautical-mile sampling quadrants (N=80 for each survey). Each survey consisted of three ten-day cruises covering 10-200 m deep coastal waters with 3-5 hauls on each working day operated from November to March in consideration of weather conditions. For all trawl samples, details including species composition, weight, number of specimens, length distribution were recorded. A separate experimental acoustic survey of pelagic fisheries resources was conducted from the research vessel RV Dr Fridtjof Nansen using 23-25 parallel transects at 7.5 nautical mile distance covering same depths as the demersal surveys.

Stock assessments, catch curve analysis, and biomass dynamics analysis, including the relative abundance for sharks and rays (Figure 2) were carried out using MFSMU survey data, fisheries statistics and biological information from published references. The DoF anticipates that 8-10 years of RVMS survey data will enable stock assessments for shark and ray species.

¹ Note slight discrepancy with report by B.J. Roy (2.10)

² Does not reflect recent changes in nomenclature.

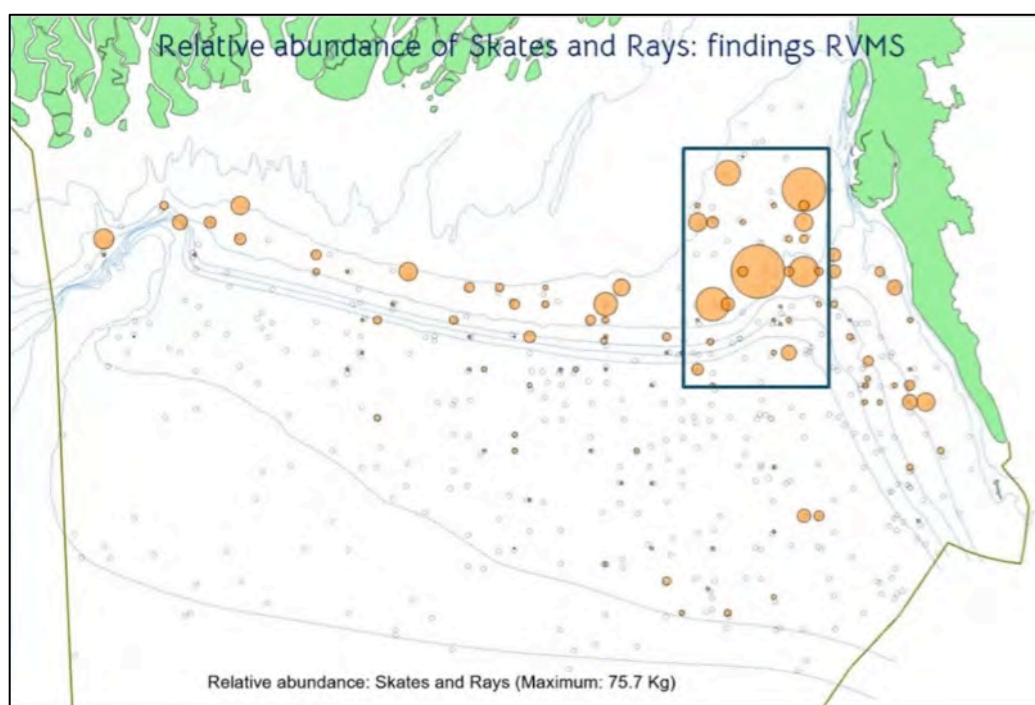


Figure 2. Catch locations and relative abundance of skates and rays calculated based on records from DoF at-sea survey records from 2016 to date.

Voyage/Trip No. : 03

Government of the People's Republic of Bangladesh
Marine Fisheries Office, Department of Fisheries

Daily Fishing Log of Shrimp Trawler

Sl. No. : 01

Name of Vessel			Registration			Company		
IMAM - 3			F-1623			MEENHAR MARINE FOODS LTD.		

Departure Date			Arrival Date			Fishing Date			Type of net	No. used	Mesh size codend (mm)	Head rope (m)
Day	Month	Year	Day	Month	Year	Day	Month	Year				
22	08	2016	09	09	2016	22	08	2016	Shrimp	02	45mm	25m

Name of Skipper. Signature with date

Mr. Raihan Uddin
(22/08/2016)

Trawl No.	Shooting Position		Towing Time		Tow Duration (hr.)	Depth Range (m)	Shrimp Catch (Kg)					Total	Fish Catch (Kg)								Total
	Lat N	Long E	Start	End			H/O	H/L	H/L	H/L	H/L		Croaker (Poa)	Cat Fish (Kata)	Pony Fish (Tek chanda)	Red fish/ Rupban	Eel (Kamila)	Tongue sole (Kukur jib)	Cuttle fish (Squid)	Others	
01.	20°48'35"	119°10'21"	10:00	10:20	42	14	04	30	210	02	260				70		40	20	150	280	
02.																					
03.																					
04.																					
05.																					
06.																					
07.																					
08.																					
Total :						14	04	30	210	02	260				70		40	20	150	280	

Figure 3. Log sheet from 2016 for mandated records from industrial fishing trawlers, including position, duration and depth range of each trawl, along with the catch weight of shrimp (tiger, white, brown, others), bony fishes (croaker, cat fish, pony fish, red fish, eel, tongue sole), cuttlefish/squid and others.

Industrial trawl fishing vessels are required to record and report species-specific information on economically valuable shrimp and bony fishes (Figure 3) to the DoF. Mandating the recording and reporting of priority shark and ray species is feasible.

Challenges for managing shark and ray fisheries from a DoF perspective are (1) the limited availability of baseline and stock assessment data, in part due to landings from small-scale fisheries being recorded only from one site, (2) inhibitive financial and manpower requirements for monitoring additional landing centers, (3) limited technical capacity of fisheries officers for species identification, and (4) the absence of effective at-sea monitoring, control and surveillance (MSC), a national policy on shark fishery, and species-specific protection under the Marine Fisheries Act 2020.

Recommendations

- Illegal, unreported and unregulated (IUU) fishing of sharks and rays occurring in Bangladesh due to limited MSC indicates a strong need for developing and implementing a National Plan of Action to conserve particularly endangered species of sharks and rays.
- Improving the quality and number of sites for species-wise landing records from artisanal fisheries would enable stock assessments of the most commonly caught sharks and rays.
- Mandated species-specific catch reporting from industrial fisheries must be aligned with national and international requirements and strictly enforced.
- Biological and ecological studies should be encouraged for gaining a better understanding of migration patterns, reproductive cycles, and mortalities of sharks and rays in Bangladesh to inform effective conservation management.

2.4 Efforts and outcomes of Bangladesh Fisheries Research Institute on shark fisheries management

Presented by Dr. Md. Enamul Hoq, Former Director of the Bangladesh Fisheries Research Institute

Management of shark fisheries in the Bay of Bengal was initiated in 2008 by member countries of the *Bay of Bengal Programme* Intergovernmental Organization (BOBP-IGO). Bangladesh participated in the second BOBP-IGO consultation on regional shark fisheries management in 2009. The BOBP defined objectives of national and regional shark management plans as (1) Achieve sustainable production through precautionary principles and protection of sharks; (2) Develop the capacities to implement conservation measures; (3) Promote full utilization of sharks; (4) Promote active participation of fisherfolk and other stakeholders in the development of shark fisheries; (5) Assess threats to sharks and improve the habitats critical for shark fisheries; and (6) Generate awareness about shark fisheries.

BOBP strategies for achieving these objectives are (1) Joint management measures for shared stocks and strengthening collaboration in research; (2) Ascertain control over access of fishing vessels to shark stocks; (3) Improve data collection and monitoring of shark fisheries; (4) Train all concerned in species identification; (5) Obtain utilization and trade data on shark species; and (6) Follow the international plan of action for the conservation and management of shark fisheries (IPOA-Shark).

Under the FAO supported Bay of Bengal Large Marine Ecosystem (BOBLME) project in 2012, the DoF/BFRI initiated preparations for a National Plan of Action (NPOA) for the conservation and management of shark resources in Bangladesh with the target to address knowledge gaps, produce a NPOA, and inform a Regional Plan of Action (RPOA) for improved management of transboundary stocks in partnership with the BOBP-IGO and Southeast Asian Fisheries Development Center (SEAFDEC). Shark data was collected for eight months, several awareness programs conducted, and a number of reports, books, and pamphlets produced, along with a draft NPOA that was never finalized due to a lack of information and bureaucratic issues.

Between 2010-2014 the BFRI conducted research for assessing monthly location-wise catches of shark fisheries, species diversity and abundance, catch time series according to gear types, and motivational hands-on training for improved data recording of shark catches in industrial trawl fishery.

Currently the BFRI is engaged in a collaborative research program with researchers from the Dhaka University (DU) on the sustainability of elasmobranch fishery and evaluating the resilience of populations to current fishing pressures financed under the *Strengthening Marine Fisheries Infrastructure Development Project* implemented by BFRI from 2018-2022. They are investigating species diversity, distribution, and relative abundance, and analyzing vulnerability (Figure 4) and efficiency of gear types. The BFRI has reportedly identified 77 elasmobranch species, including 15-20 new records for Bangladesh and possibly one species new to science.

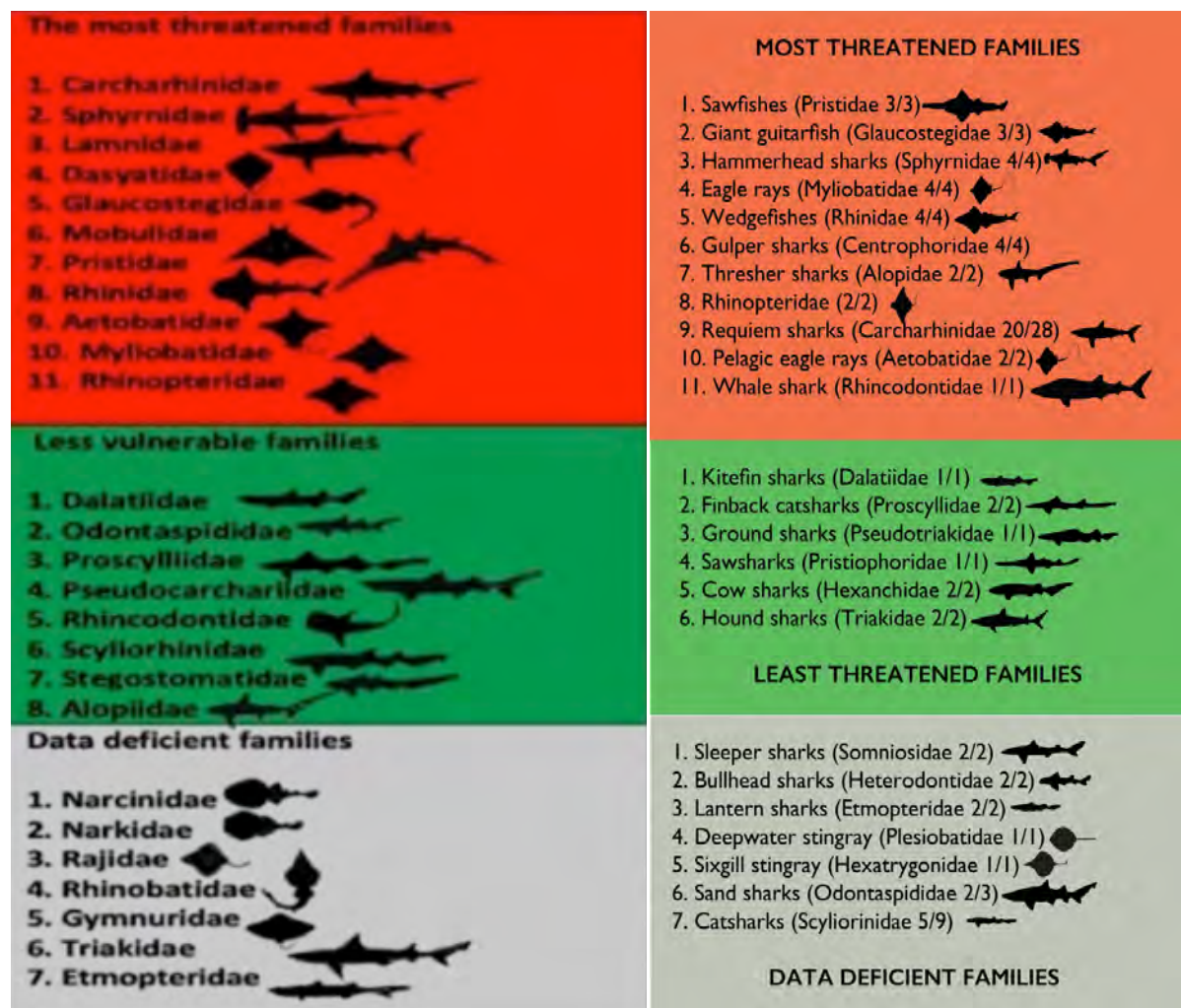


Figure 4. Results of the BFRI/DU vulnerability analysis for shark and ray families in Bangladesh (left) and the Arabian Sea and adjacent waters by [Jabado et al. 2018](#) (right).

Recommendations

- Improve understanding of CITES and its implications for fisheries and trade among DoF, BFRI and BFDC officers at all levels.
- Strengthen local research capacity and efforts focusing on CITES-listed and globally threatened species, for example by including a shark component in wildlife conservation projects.

- Update elasmobranch species check-list for Bangladesh.
- Harmonize Marine Fish Act 2020 and Wildlife (Conservation and Security) Act 2012 to align and strengthen legal protection of threatened aquatic wildlife.
- Strengthen collaborative approach to improve management of shark fisheries with Government agencies, researcher, academics, NGOs, fishers, and traders.
- Enable coastal Upazila DoF and FD officers to identify protected species and their parts, and to communicate and enforce applicable wildlife and trade regulations through practical trainings and educational outreach events.

2.5 Current procedures for monitoring and reporting shark and ray landings at BFDC fish landing centers

Presented by Md. Ahsanul Haque, Manager of BFDC Fish Landing and Wholesale Fish Market, Cox's Bazar.

Different species of sharks and rays are regularly landed at the BFDC landing center in Cox's Bazar. According to the manager, several ray species and bull sharks are apparently landed more frequently in *Bhadra* (mid-August to mid-September), while in *Falgun* and *Chaitra* (mid-February to mid-April), hammerhead sharks are landed more frequently than in other months. Mr. Haque also noted that the demand for rays is higher in the winter, likely due to favorable weather conditions for processing them.

According to BFDC records and information provided by shark and ray traders, he estimated that approximately 90-135 tons of sharks and rays were landed and reported under 'mixed fish' in the fiscal year 2019/2020, for which BFDC collected BDT 71,000-1,05,000 (838-1,239 USD) revenue. It is important to note that BFDC counts only 9 months as a fiscal year because of the fishing ban periods totaling at 87 days a year.

Fishers usually retain and store any sharks or rays they catch in their boat and bring them to fish landing sites, from where they're sold to shark and ray traders. The BFDC does not record species-specific landings or trade of sharks or rays; they are included under 'mixed fish'. They collect revenue payments from traders as they leave the fish landing centers; any sales thereafter are not BFDC's responsibility.

In response to questions from the participants, Md. Ahsanul Haque said that, if required and provided with the necessary training and tools to enable species identification and systematic data collection, BFDC staff could report species-specific shark and ray landings. If BFDC reported species or genus specific information on shark and ray landings, published Government statistics (e.g. Yearbook of Fisheries Statistics of Bangladesh) should reflect these details.

2.6 Findings on shark and ray diversity, habitat, and distribution in Bangladesh

Presented by Dr. M Shahadat Hossain, Professor at the Institute of Marine Sciences of the University of Chittagong.

The Institute of Marine Fisheries of the Chattogram University in collaboration with the BFRI identified eight zones defined by biological and oceanographic factors along with bio-geographic affinity and distribution patterns of sharks and rays in coastal and marine waters of Bangladesh (Figure 5).

Data collected and analyzed from the catches of industrial trawlers, artisanal and marginal fishers, fishmongers or traders, and government officials at landing centers revealed the presence of 67

species of sharks and rays belonging to 13 families in 6 orders. The Chattogram-Cox's Bazar coastal area supports the highest diversity (66 species) followed by the shallow shelf area up to a depth of about 40 meters (61 species).

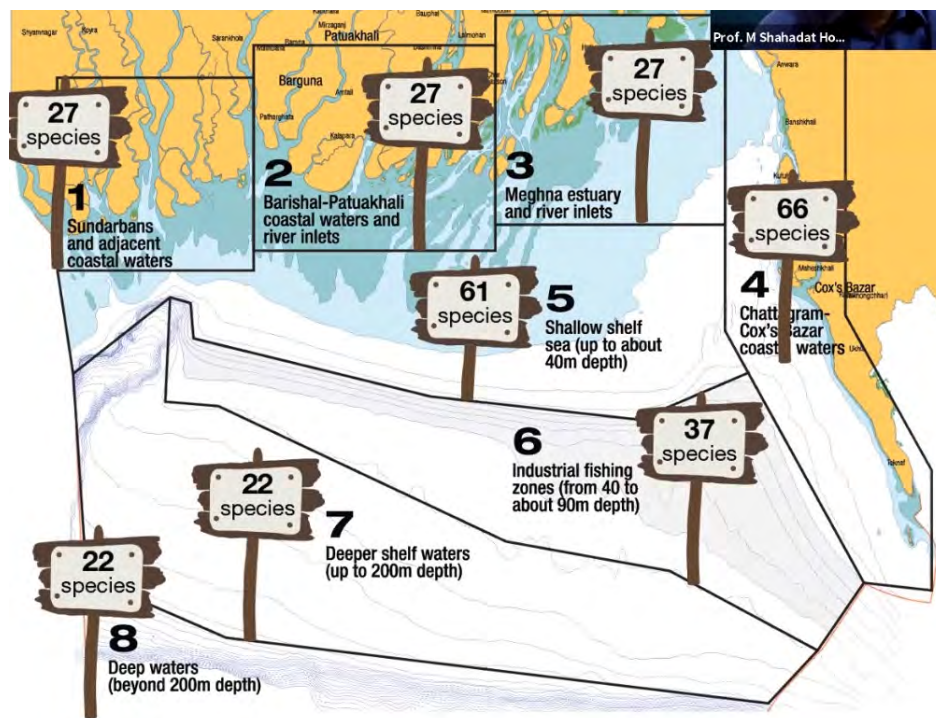


Figure 5. Coastal and marine zones delineated based on oceanographic features indicating the number of shark and ray species they support, suggesting that shallow nearshore waters associated with coral structures, mangroves, and mud or sand banks, support the highest diversity.

Recommendations

- Conduct dedicated surveys for photo-verifying shark and ray species and collecting information on their life cycle stages.
- Consider using high-definition underwater video for habitat mapping and population estimates.
- Consider the use of tagging individual specimens for positional data on species movements.
- Evaluate available information on the life cycles and habitat uses of sharks and rays to identify and designate conservation and restoration zones (e.g. MPAs, MRs, or Sanctuaries).

2.7 Findings on the genetic diversity of sharks and rays in Bangladesh

Presented by Professor Dr. Kazi Ahsan Habib, Dean of the Faculty of Fisheries, Aquaculture and Marine Science, and Chairman of the Department of Fisheries Biology and Genetics, Sher-e-Bangla Agricultural University, Dhaka

The Aquatic Bioresource Research Lab (ABR Lab) analyzed shark and ray specimens collected from fish landing sites. Combined with information from published reports, an updated checklist of marine fishes of Bangladesh ([Habib and Islam, 2020](#)) was published, including 83 species of elasmobranchs. Two thirds of the shark and ray species included in this checklist are globally threatened or near threatened.

DNA barcoding was conducted for 32 species, including a previously unknown *Glaucostegus* sp. By combining genetic and morphological features, ABR Lab was able to identify specimens with very similar morphological features to the species level. Studies of mitochondrial DNA from Critically Endangered Scalloped hammerhead *S. lewini* with circumglobal distribution indicate a genetically distinct population in the northern Bay of Bengal.

In collaboration with other institutions, the ABR Lab also prepared instructions for safely releasing sawfish from nets and hooks in a visually enhanced pamphlet and [a video](#) produced in three coastal dialects, as well as a mobile phone App for reporting accidental catches of sawfish, a website with information on sawfish, and a handbook on [ocean literacy in the Bay of Bengal](#) region. The implementation of these tools was postponed due to COVID-19.

Recommendations

- Assess stocks, populations, maximum sustainable yield (MSY) using multi-model approaches.
- Conduct additional population genetics studies to improve the understanding of regional population structures, and inform conservation management particularly for endemic species and those listed under CITES and the Wildlife (Conservation and Security) Act 2012.

2.8 Current procedures and challenges for monitoring and reporting exports of CITES regulated sharks and rays

Co-presented by Md. Jahidul Kabir, Director of Sheikh Kamal Wildlife Center and Bangabandhu Sheikh Mujib Safari Park, and Md. Jahir Akon, Director of Wildlife Crime Control Unit of the Forest Department

The Convention on International Trade in Endangered Species or Wild Fauna and Flora (CITES) is an international legally binding agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. Bangladesh is a party to CITES since 1982.

Three CITES Appendix I listed species of sawfish, and 13 ray and 12 shark species listed under CITES Appendix II are confirmed or suspected to occur in Bangladesh. For species listed on Appendix I, international trade is prohibited unless required in exceptional circumstances. For those listed on Appendix II, international trade is strictly regulated and only permissible after obtaining a CITES permit. A CITES permit for Appendix II listed species can only be issued if there is a positive NDF for the species, and the origin/source and purpose of trade are legal.

As National CITES Management Authority, the CCF has to (1) certify that a specimen was not obtained in contravention of national wildlife protection laws; (2) grant permits and certificates under the terms of the convention; (3) submit trade reports and implementation updates to the CITES Secretariat; (4) ensure that national laws prohibit trade in violation of CITES, and provide for the confiscation of specimens and penalties for violations. The National CITES Scientific Authority, a seven-member committee with representatives from government departments, ministries, and institutions, has to ensure that export will not be detrimental to the survival of a species and its role in the ecosystem through CITES NDFs.

Combatting illegal wildlife trade, which is a major, geographically extensive problem in Bangladesh involving a large number of species considered threatened with extinction, and enforcing CITES regulations requires strong inter-agency cooperation. Landing and trade of legally protected sharks and rays is a concern at most landing, processing and export sites with large numbers of threatened species entering domestic and international markets. The unmonitored export of legally permitted shark and ray parts also results in revenue losses for the Government.

The FD's Wildlife Crime Control Unit (WCCU) leads the combat against wildlife crimes in collaboration with other law enforcement agencies and organizations. The major tasks of the WCCU are (1) seizure of illegal wildlife and their body parts and arrests of illegal wildlife traders; (2) support 'mobile courts' in collaboration with the Executive Magistrate; (3) train officers on the identification of legally protected wildlife and their parts; (4) collect evidence and support prosecutions against wildlife offenders; (5) reporting and maintaining a central national wildlife crime data base; (6) conduct public awareness raising events; (7) treat and/or safely release seized live wildlife; and (8) gather intelligence via the WCCU Hotline, informant and social media networks, and collaborating law enforcement agencies.

From July 2012 to till date the WCCU recorded a total of 611 offences with 142 perpetrators accused, 340 cases filed, 109 awareness campaign events conducted, and a total of 34,466 wildlife was seized. No sharks or rays were among the seized wildlife.

The current situation for enforcing shark and ray trade regulations is confusing because our national law does not align with CITES commitments. But the amendment to the Bangladesh Wildlife (Conservation and Security) Act 2012 currently under consideration aligns with CITES commitments and will bring clarity for law enforcement officers. The most common and valued products of CITES shark and ray species in global trade, dried fins and gill plates, can be visually differentiated from non-CITES species with training and the identification guides provided by WCS.

Due to complex management systems, law enforcement agencies have less access to fish landing sites, while the monitoring authority has no power to enforce laws. Dried shark and ray parts are exported in mixed 'dry fish' shipments, which makes detection difficult and requires skilled and motivated fisheries and customs inspectors.

Recommendations

Trained government staff at an operational and managerial level along with strong interagency collaboration is needed for proper inspection of fishing vessels for illegal gear at landing sites and ports, the monitoring and reporting of licensed shark and ray traders, including those dealing online, and arresting and prosecuting wildlife criminals, which is a key challenge in combatting illegal wildlife trade in Bangladesh.

2.9 Findings and recommendations from shark and ray research of the Bangladesh Fisheries Research Institute (BFRI)

Presented by Dr. Ehsanul Karim, Senior Scientific Officer at BFRI

Investigations of sharks and rays landed at five sites (Cox's Bazar, Chittagong, Dubla Char, Pathorghata, Kuakata) carried out by BFRI between 2013-2016 tentatively identified 31 shark and 33 ray species representing 17 families. Rays (including skates) accounted for 82% of the recorded landings, with just over half of all specimens (skates 53%, rays 67%) measuring more than 50 cm in length. Of all sharks recorded, 57% were less than 30 cm long³.

About a third of all landings were recorded in Cox's Bazar peaking from November to March, with long-lines reportedly accounting for 32% of all recorded catches. According to BFRI reports, elasmobranchs contribute only 5% to the total catch of marine fisheries.

According to Dr. Ehsanul Karim, BFRI and its collaborators under the *Strengthening Marine Fisheries Infrastructure Development Project* identifying 26 shark species and 55 ray species, including eight species of the Rhinopristiformes order (guitarfishes, wedgefishes and sawfishes) from a total of 161,766 elasmobranch specimens they recorded at landing sites.

³ Length variability among species was not considered.

When asked about the possibility of determining optimum allowable catches using currently available data, Dr. Karim said that it was hypothetically possible and could be considered for defining catch limits in view of ecological vulnerability and pressures from fisheries and trade. He explained that the intrinsic growth rates play an important role in defining optimum allowable catches, and that a rigorously precautionary approach should be taken.

Recommendations

- Standardize collection of species-wise shark and ray catch and landing records to enable stock assessments, improve conservation management and sustainable exploitation of sharks and rays.
- Publish species-specific landing and trade data for sharks and rays in Government statistics.
- Mandate fishers to report mortalities, discards and/or safe releases of protected species.
- Evaluate and promote modifications to fishing gears and practices for reducing elasmobranch bycatch and post-release mortalities.
- Provide training and tools for the identification of legally protected shark and ray species or groups to fisheries and law enforcement officers, landing site managers, fishers, processors and traders.
- Incorporate lessons on elasmobranch biology, ecology and conservation management in fisheries and marine science curricula.
- Enhance collaborative elasmobranch research with BFRI, DoF, FD, universities and conservation NGOs.
- Engage in regional and international shark and ray conservation and trade management efforts.

2.10 Reporting requirements for sharks and rays from industrial fishing vessels and resulting insights

Presented by Mr. Bikram Jit Roy, Assistant Director of the District Fisheries Office in Chattogram and former Scientific Officer in the Marine Fishery Survey and Management Unit (MFSMU) of the DoF

Currently 255 commercial trawling vessels (218 targeting fish and 37 targeting shrimp) are licensed in Bangladesh for fishing in waters over 40 meters deep. According to Mr. Roy, 43,136 small-scale fishing boats are registered and not permitted to fish in coastal waters less than 10 meters deep to protect fish and crustacean nursery and breeding grounds⁴.

Sharks and rays make up less than 1% of the total marine fisheries landing volume (Table 1), the major portion of which is landed from small-scale fishing boats. According to Mr. Roy, large numbers of small-sized or juvenile sharks and rays are caught by industrial trawlers but not reported and discarded at sea due to their low market value.

The Marine Fishery Survey and Management Unit (MFSMU) of the DoF has been sampling shark and ray catches from artisanal fisheries landed at the fishery ghat in Chattogram and the BFDC ghat in Cox's Bazar since 2006 due to the high volume of elasmobranch landings, retail and wholesale. Eight scientific officers and ten field staff alternately record species-wise data on four days of every month (new-moon, full-moon, first quarter and last quarter).

⁴ According to the Marine Fisheries Sub-Strategy 2006, fishing up to 5 km from shore or in water below 5 m depth is not permitted.

The number of specimens landed is counted and the weight and length measured. The percentages of 11 shark species from four families and 24 ray species from nine families in overall landings are calculated based on species-wise weight (Table 2). Species were identified on site or preserved in 5-7% formalin solution and later identified at the MSFMU laboratory in Chattogram to the lowest possible taxonomic level with the help of various foreign guidebooks.

Since 2010, group-wise records for shark and ray catches have been a requirement for industrial fishing vessels. Log sheets to be submitted to and analyzed by the MSFMU were provided to skippers. On-board observers also collected species-wise data on sharks and rays from commercial fishing vessels. Additional information on fishing efforts (trip duration, number of fishing trips and days per months) was gathered by the MSFMU through interviews with wholesalers, boat owners and fishermen.

Recommendations

- Formulate and implement an integrated management plan to ensure proper management of shark and ray fisheries.
- Collect species-specific shark and ray catch records from industrial trawl fishing vessels.

Table 1. Total weight of sharks and rays landed from artisanal and industrial fisheries and its contribution to the overall marine catch

Year	Total weight of elasmobranchs landed from artisanal fisheries (MT)	Total weight of elasmobranchs landed from industrial fisheries (MT)	Total Marine Fisheries Landing (MT)	Elasmobranchs portion in total marine fisheries landing (%)
2010-11	4,205	0	546,333	0.77
2011-12	3,865	0	578,620	0.67
2012-13	4,471	546	588,988	0.85
2013-14	4,805	843	595,385	0.95
2014-15	4,175	918	599,846	0.85
2015-16	4,000	622	626,528	0.74
2016-17	3,850	645	637,476	0.71
2017-18	3,425	549	654,687	0.61
2018-19	3,550	724	659,911	0.65

Table 2. Total landing and contribution by weight of elasmobranch species in artisanal sector⁵

Species	2009-10 (%)	2010-11 (%)	2011-12 (%)	2012-13 (%)	2013-14 (%)	2014-15 (%)	2015-16 (%)	2016-17(%)	2017-18(%)	2018-19(%)	2019-20(%)
Total landing (MT)	4,033	4,205	3,865	4,471	4,805	4,175	4,000	3,850	3,425	3,550	3,400
<i>Scoliodon laticaudus</i>	25.49	6.06	22.09	22.46	36.35	22.61	23.98	28.69	11.04	26.66	37.88
<i>Rhizoprionodon acutus</i>	7.32	4.96	1.45	2.22	1.96	3.31	2.15	5.54	7.12	4.80	2.92
<i>Rhizoprionodon oligolinx</i>	-	-	0.005	3.64	0.03	-	-		0.84		
<i>Sphyrna lewini</i>	10.01	5.06	7.08	10.25	7.67	11.86	9.09	8.77	6.93	10.12	5.51
<i>Sphyrna mokarran</i>	1.66	-	-	-	0.07	-	-	1.14		0.68	2.19
<i>Chiloscyllium indicum</i>	2.85	7.12	1.26	0.53	0.53	0.50	1.99	0.59	1.17	1.03	2.20
<i>Galeocerdo cuvier</i>	2.96	1.06	1.34	2.15	2.27	1.03	1.49	2.50	1.89	2.02	1.08
<i>Carcharhinus melanopterus</i>	18.88	3.87	1.23	1.52	1.86	0.95	2.03		0.09	1.07	3.70
<i>Carcharhinus leucas</i>	0.31	0.75	0.30	1.35	2.81	2.30	1.50	5.68	6.37	4.78	1.0
<i>Carcharhinus falciformis</i>	-	7.46	0.88	0.27	1.74	1.22	2.53	1.11	0.56	0.97	0.50
<i>Carcharhinus sorrah</i>	-	-	0.003	0.76	0.63	6.27	2.93	0.43	0.65	1.0	0.50
<i>Stegostoma fasciatum</i>	0.0001	0.07						0.22		0.15	
Subtotal (% comp. of Sharks):	69.48	36.42	35.64	45.15	55.92	50.05	47.69	54.67	36.66	53.28	57.48
<i>Himantura uarnak</i>	4.49	33.96	42.97	2.37	2.47	0.21	0.43	0.55	0.14	0.04	3.07
<i>[Himantura] undulata</i>	0.33	0.28	0.23	2.06	3.52	8.58	4.49	5.78	9.42	4.86	2.85
<i>[Himantura] gerrardi</i> <i>[Maculabatis gerrardi]</i>	0.83	0.05	0.20	0.47	0.29	1.12	0.29	0.27	0.18	1.05	1.21
<i>[Himantura] uarnacoides</i>	4.88	11.33	8.70	33.15	18.30	20.90	28.64	29.76	39.07	25.76	23.27
<i>Gymn[æ]ura japonica</i>	3.82	2.88	2.61	3.44	4.64	3.93	6.82	5.04	2.32	2.78	1.50
<i>Rhinoptera javanica</i>	2.22	0.79	0.08	0.56	0.82	-	0.03		4.16	0.76	1.45
<i>Aetomylaeus nichofii</i>	0.04	0.63	0.88	1.34	0.66	0.94	3.49	1.99	0.86	1.05	1.37
<i>Mobula japonica</i> <i>[Mobula mobular]</i>	0.58	0.82	0.45	2.01	2.96	3.00	3.02	1.22	2.67	2.60	2.96
<i>Rhynchobatus granulatus</i> <i>[Glaucostegus granulatus]</i>	7.22	11.48	-	0.06	-	-	-			3.46	3.46
<i>Rhina ancylostoma</i>	0.14	0.18	0.02	0.01	0.56	-	-	0.02	0.06	0.04	
<i>Aetobatus narinari</i>	-	-	0.03	-	-	-	-		0.08	0.03	0.23
<i>Urogymnus [asperrimus]</i>	-	0.02	0.18	-	0.43	-	-		1.0		0.02
<i>Rhynchobatus [djiddensis]</i>	0.15	0.38	0.60	2.99	0.59	0.67	0.09	0.59	0.14	1.75	
<i>Rhinobatos typus</i> <i>[Glaucostegus typus]</i>	0.02	0.05	7.10	6.39	8.44	7.65	5.01		2.56	2.0	0.13
<i>Himantura walga</i> <i>[Brevitrygon walga]</i>	5.45	0.41	0.31	-	0.40	1.67	-	0.11	0.68		
<i>Narcine timlei</i>	0.35	0.32	-			1.28				0.54	1.0
Subtotal (% comp. of Rays):	30.52	63.58	64.36	54.85	44.08	49.95	52.31	45.33	63.34	46.72	42.52

⁵ Table reproduced as presented by Mr. Bikram Jit Roy [with correct scientific names inserted in brackets].
Note that *Rhynchobatus djiddensis*, and *Gymnura japonica* are not known or suspected to occur in the BoB.

2.11 International and regional frameworks for the National Plan of Action (NPOA) for sharks & rays in Bangladesh

Presented by Dr. A. K. Yousuf Haroon, former Chief Scientific Officer of the Bangladesh Fisheries Research Institute

International agreements that mandate the development and implementation of NPOAs for sharks and rays include the United Nations Convention on the Law of the Sea (UNCLOS), Convention on Biodiversity (CBD), International Code of Conduct for Responsible Fisheries (FAO-CCRF), UN Fish Stocks Agreement, CMS, CITES, and directives from the World Commission on Environment and Development (WCED, 1987), the FAO Committee on Fisheries (COFI, 1991), the United Nations Conference on Environment and Development (UNCED, 1992).

In 1999, FAO endorsed the International Plan of Action for the Conservation and Management of Sharks⁶ (IPOA-Sharks) as a voluntary instrument for states with shark fishing, requiring these states to adopt NPOAs for effective shark fishery management and monitoring compliant with international fisheries and wildlife trade agreements by 2001. All Bay of Bengal Large Marine Ecosystem (BOBLME) countries, including Bangladesh, endorsed the IPOA-Sharks. The Indian Ocean Tuna Commission (IOTC) requires members to adopt NPOAs along with other requirements pertaining to releasing and reporting sharks and rays⁷.

Recommendations

- Prepare an NPOA-Sharks informed by reliable up-to-date information on stocks, fisheries pressures, economic valuation, management and enforcement capacity, and the effectiveness of existing measures.
- Align the NPOA-Sharks with national laws, regional agreements and international commitments.
- Develop and implement NPOA-Sharks jointly under the MOFL, responsible for fisheries management, research, development, extension, marketing, quality control, and the MoEFCC, mandated with wildlife protection and protected area management, and in collaboration with other government agencies (Ministry of Law, Maritime Affairs Division, Navy, Coast Guard, Customs), universities and research institutions, associations of fishers, fishing vessel owners and fish traders, and NGOs.
- Periodically review the effectiveness of the NPOA-Sharks in a *Shark Assessment Report (SAR)* and inform necessary revisions thereof.

2.12 Current practices of trade in sharks, rays and their parts for domestic and international markets

Presented by Alifa Bintha Haque, Assistant Professor at the Department of Zoology of the University of Dhaka, and DPhil researcher at the Department of Zoology of the University of Oxford

The main trade hub in Bangladesh for sharks, rays and their products is Cox's Bazar. Dried fins are exported via sea, land and air to the USA, Singapore, Malaysia, Thailand, but primarily to China and Hong Kong - often via Myanmar. Dried meat, skins, rhino ray snouts, and dried intestines also go to

⁶ 'Sharks' is used for all shark and ray species.

⁷ IOTC member countries, including Bangladesh, have agreed on prohibiting the catching of threshers, hammerhead, oceanic whitetip and whale sharks, encouraging the live release of sharks where possible, especially juveniles and pregnant sharks that are caught incidentally and are not used for food and/or subsistence, and to submit species specific catch, effort, and size data.

Myanmar, while other cartilage, teeth and jaws are reportedly taken to India. Fresh meat and dried whole sharks less than 150 cm in length are trucked to domestic consumers in the Chittagong Hill Tracts, while fresh livers reportedly get shipped to Barisal in south-western Bangladesh (Figure 6).

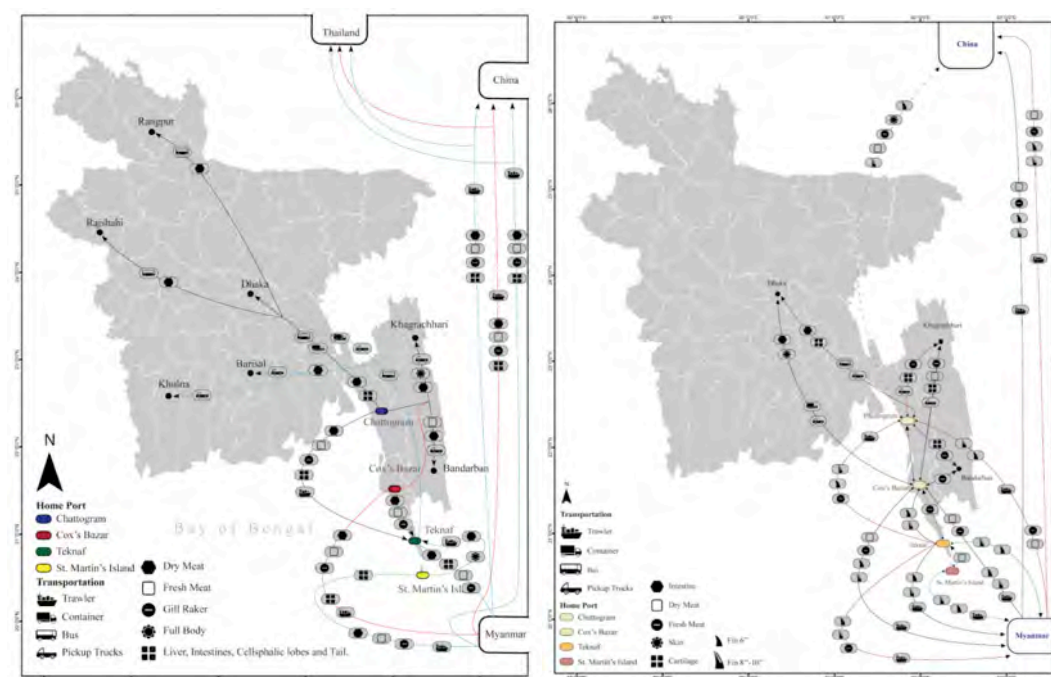


Figure 6. Trade routes, destinations and mode of transport for mobulid rays (left) and rhinorays (right) according to recently published reports illustrate the proximity of key trade hubs in Bangladesh to neighboring Myanmar, the primary transit destination for shark and ray products (Haque et al. 2020, 2021).

The trade in sharks, rays and their products is complex as it involves multi-gear harvesters, opportunistic and specialized intermediaries and traders, as well as domestic and international markets and consumers. While fishers behave independently of product prices in a supply-driven market (e.g. use of non-selective gears, all target and non-target catch is landed), consumer choice is constrained by price and availability, which indicates a demand-driven market for specialized products. Intermediaries and traders, including those operating online or opportunistically, can adapt to changes in seasonally supplied quantities and are currently unaffected by the high proportion of illegal products.

According to Ms. Haque there are significant discrepancies in published statistics on annual elasmobranch landings and exports of fins. Due to limited effort, capacity and resources for monitoring and enforcing trade in shark and ray products, this industry pays little revenue to the Government and operates largely illegally. Species or their parts entering the market from Bangladesh, often intermixed with other fish products, include concerning quantities of CITES Appendix II listed species. Critically Endangered sawfish, giant guitarfish, and wedgetfish are of particular concern in domestic markets due to local belief in their medical properties.

Recommendations

- Educate domestic consumers to abstain from eating protected species by dispelling beliefs about curative properties of elasmobranchs, promoting alternative protein sources, and increasing awareness about species protection regulations.

- Enable fishers, traders and law enforcement officers to identify protected species and their products through the provision of trainings and tools.
- Enhance compliance of traders with species protection and trade regulations by improving their awareness and including them in policy development processes.
- Prevent legally protected species or their parts from entering the market through improved monitoring and law enforcement at landing/processing/trade sites.
- Stop domestic consumption of legally protected species through improved monitoring and law enforcement at local markets.
- Improve at-sea safety and access to market information and support services for fishers and boat owners to incentivize compliance with species protection and trade regulations.
- Create direct market linkages to reduce or eliminate intermediaries and increase profit-shares for fishers and traders.
- Ensure better controls at custom's check points and improved procedures for pursuing prosecutions of offenders to deter perpetrators, incentivize legal trade procedures for sustainably managed shark and ray species, and levy Government revenue and taxes.

2.13 Social-ecological perspective on bycatch threats: lessons from sawfish conservation project in Bangladesh

Presented by Mahatub Khan Badhon, Lecturer in the Department of Zoology at the University of Dhaka

Fishers are increasingly marginalized by fisheries and wildlife conservation management regulations. Instead of instilling pride in their role as stewards for protected species, such regulations often negatively impact their livelihoods and push them to engage in illegal or non-sustainable practices. Driven by investors to maximize profit, fishers generally retain any catch irrespective of its market value or conservation status.

A socio-ecological survey conducted among fishers in the Sundarbans mangrove forest found market incentives to be the biggest driver for the retention of accidentally entangled sawfish. Releasing live sawfish from gill nets and set-bag nets is costly due to significant damage to the gear, in addition to the high market value of the increasingly rare fish itself. However, the study also found that the total income from targeted fish (e.g. hilsa) is higher than from accidentally caught sharks and rays altogether. With appropriate rewards or incentives and by instilling traditional self-governance values, fishers can be encouraged to release the accidentally caught fish and comply with fishing regulations.

Samples from 16 sites across the Sundarbans, selected based on their depth and salinity levels, were collected within one month and tested for sawfish presence using eDNA to no avail.

Recommendations

- Facilitate negotiations between resource managers and investors to address the long-term negative impacts of prioritizing maximum profit over sustainability.
- Identify feasible incentives or market interventions for inspiring fishers to protect sawfish and other threatened wildlife.
- Empower fishers as stewards of protected wildlife by engaging them in fisheries and wildlife conservation management and policy developments.

- Build trust and respect between fishers and wildlife and fisheries management authorities as a basis for encouraging fishers to release accidentally caught sawfish and other threatened species.

2.14 Human dimensions and rights: Shark conservation management in the Bay of Bengal

Presented by Enamul Mazid Khan Siddique, Head of Climate Justice and Natural Resource Rights for Oxfam in Bangladesh.

Inclusive governance is the basis for effective natural resource management and sustainable fisheries. Guiding principles are stakeholder engagement (“Nothing about us without us”) and accountability; addressing intersectionality, power imbalance and sharing; and respecting culture, traditions, and knowledge of indigenous and marginalized communities.

In the fisheries sector, stakeholders can and should be categorized according to their interests and power (Figure 7), because decisions affect different stakeholder groups differently and can lead to conflicts that potentially impair conservation efforts.

Decisions in the fisheries sector affect different stakeholder groups differently and can lead to conflicts that potentially impair conservation efforts. Stakeholders should therefore be categorized according to their interests and power (Figure 8).

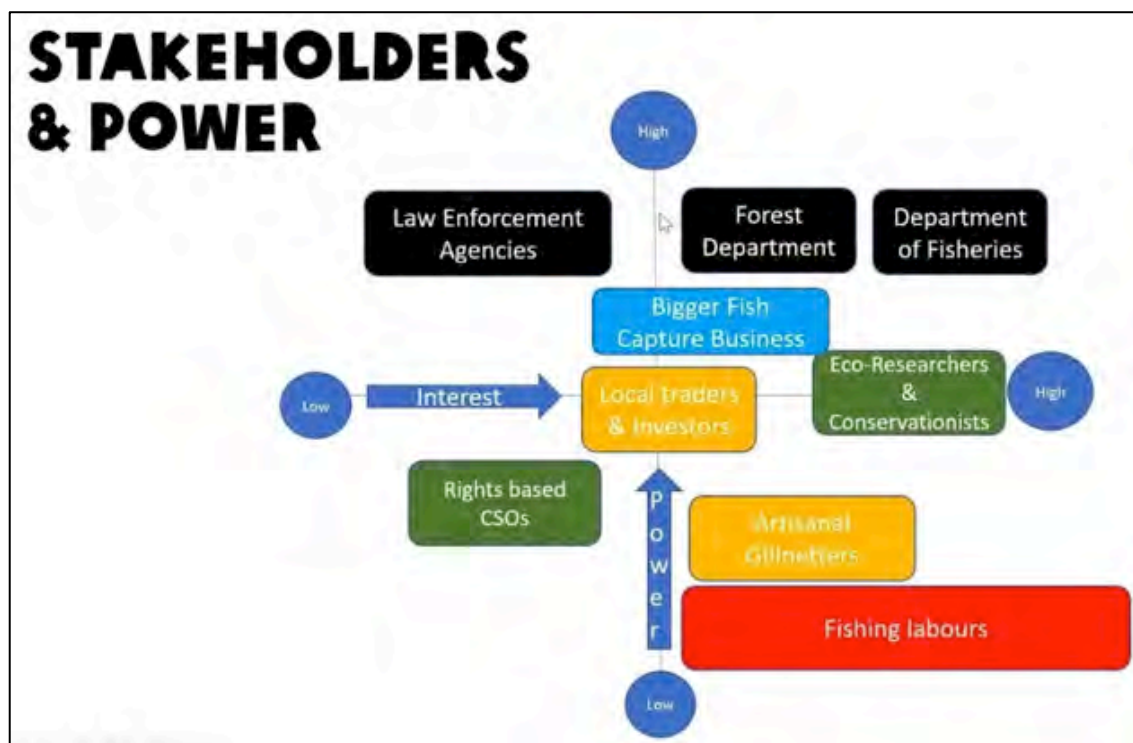


Figure 7. Visualization of the levels of power and interest in the context of shark conservation management in Bangladesh.

When defining regulations pertaining to natural resources, basic rights of users must be recognized by resource managers, the boundaries must be clear to users, costs and benefits aligned, rules formulated through an inclusive process, regular monitoring of user groups (e.g. differentiating between full-time/seasonal, registered/unregistered fishers) and resources in place along with defined sanctions for perpetrators (e.g. non-compliance results in withdrawal of fishing permits) and conflict resolution mechanisms. Ideally, one single management body should be monitoring human

activities and the resources through a spatially explicit systems approach, issuing permits and allocating compensation for those that do not get permits (e.g. through valuation of supply chain), and reporting on these activities.

National or local rules or regulations may not necessarily work for international resource user. So when formulating a national plan of action, perspectives on international fishing rights, encroachment from foreign fishing vessels, piracy, along with considerations of shared ecosystem management are required. Shared stocks require shared management

Key lessons learned from the current hilsa fisheries management regime are that compensation may never be enough and that shared stocks require shared management. Acknowledging the contributions and rights of fishers, and empowering them as front-line fisheries managers is an important first step, to be followed by focusing on sustainability in economic and ecological terms.

3. Actions needed for the conservation of threatened sharks and rays and the sustainable exploitation of species not in immediate danger of extinction

Facilitated working groups (Appendix 4) in virtual break-out rooms discussed the shared knowledge to identify and formulate actions that address (a) Gaps in scientific investigations on the status of sharks and rays in Bangladesh and threats to their survival, (b) Management interventions to strengthen the conservation of threatened species, and (c) Incentives for sustainable fisheries and livelihood alternatives to reduce mortalities and trade of threatened sharks and rays.

Key discussion points and resulting recommendations are summarized below and integrated in the draft *National Conservation Strategy and Action Plan for the Conservation Management of Sharks and Rays in Bangladesh*.

3.1 Recommended actions to address gaps identified for scientific investigations on the status of sharks and rays and threats to their survival

Reduce mortalities of threatened sharks and rays

- Create an informed and motivated network of fishermen trained in the safe release of sawfish and other threatened species to inspire fellow fishermen to do the same. Encourage these fishermen to report and photo-document live releases to authorities through a reward scheme to reduce mortalities and gather information for rare or threatened species.
- Assess the effectiveness and feasibility of lights or electricity on fishing nets to reduce shark and ray catches.
- Develop a 'calendar' with pupping seasons of threatened species to inform seasonal/temporal interventions and perhaps redefine existing ban periods.

Protect priority shark and ray habitat

- Identify nursery and breeding grounds of threatened and commercially important non-threatened shark and ray species using fishers' indigenous knowledge (FIK) and at-sea fisheries investigations to refine priority habitat protection plans.

Strengthen legal protection for threatened sharks and rays and enforce national laws and rules

- Periodically revise listing of sharks and rays under the Wildlife Act to align legal protection with updated conservation status assessments, changes in nomenclature and research results.

- Empower law enforcement officers, as well as Clearing and Forwarding (CNF) agents and officers from the National Board of Revenue (NBR), with training, mentoring and resource materials to detect and report illegally traded sharks, rays or their products.

Improve monitoring and reporting of shark and ray fisheries and trade

- Maintain an open access up-to-date checklist of confirmed and suspected shark and ray species for Bangladesh, including photo-verification, and information on their global conservation status, and applicable species protection and trade regulations.
- Preserve specimens of endemic, rare or newly discovered species in publicly accessible collections as voucher specimens for future references.
- Improve systematic institutional monitoring of shark and ray catches and landings for both small-scale and industrial fisheries by -
 - a. Equipping and training data collectors from the BFDC, as well as field-level officers from the DoF and FD on species identification and standard operating procedures for data recording and reporting from shark and ray landings.
 - b. Assessing the effectiveness and feasibility of monitoring and evaluating landings using modern technology, such as video-monitoring.
 - c. Building the capacity of the DoF/MFSMU to enter, verify and analyze catch and landing records, prepare reports required under regional or international commitments (e.g. IOTC, CITES, CMS) and stock assessments, and assess the effectiveness of management.
 - d. Mandating the recording of species-specific shark and ray catches for priority species from industrial fishing vessels, and assessing the effectiveness and feasibility of in-person or technological on-board monitoring.

Engage fishing communities in shark and ray protection

- Train and equip fishers as citizen scientists to record and report geo-referenced shark and ray catches.
- Train and equip community members as citizen scientists to record and report shark and ray landings or their parts in local markets.
- Engage fishers for community-based monitoring of MPAs, which cover priority shark and ray habitats.

Governance and Coordination

- Contribute to or initiate collaborative regional research, including for assessing stocks, spatial movement or genetic variability of migratory or high sea species.

3.2 Recommended governance frameworks and management interventions to strengthen the conservation of threatened sharks and rays and the sustainable exploitation of species not in immediate danger of extinction

Strengthen legal protection for threatened sharks and rays and enforce national laws and rules

- Formulate rules under the Marine Fisheries Act 2020 to align the protection of threatened sharks and rays with the Wildlife (Conservation and Security) Act 2012 and to regulate the sustainable harvest of non-threatened species.
- Conduct joint law enforcement patrols with FD, DoF, Customs, Police, Coast Guard, Border Guards and Navy, to enforce the protection of species listed under the Wildlife

(Conservation and Security) Act 2012 and stop the possession, trade and consumption of protected sharks and rays and their products.

- Empower field- and mid-level officers from the DoF, FD, and the BFDC with training, mentoring and the provision of resource materials, including models of sharks, rays and their commonly traded parts or products, to monitor shark and ray landings and trade through standard operating procedures for recording and reporting.
- Engage fishers in policy development processes and through educational outreach activities to encourage sustainable fishing practices and the live release of protected marine wildlife, and instill pride in their role as ocean stewards.
- Incorporate shark and ray conservation science and management in university curricula to strengthen the understanding of their ecological value and vulnerability and fundamental science-based species protection and marine conservation concepts.

Engage fishing communities in shark and ray protection

- Enable fishers and traders to identify legally protected species by providing trainings and tools.
- Empower community-based monitoring of protected species and protected areas through existing governance structures or scaling up citizen science networks to monitor landing sites as 'shark guards' or marine protected areas as 'ocean guardians'.
- Enhance compliance with species protection, fisheries, and trade regulations by training community members to educate, train and motivate other fishers, boat owners, traders, processors, or consumers in their communities.

Improve monitoring and reporting of shark and ray fisheries and trade

- Provide a guide with a taxonomic key that enables law enforcement officers, forestry and fisheries officers, fishers and traders to correctly identify the family, genus and species of sharks and rays using morphological characteristics, particularly for legally regulated species and species groups.
- Adapt standardized operating procedures (SOP) for the systematic recording and reporting of sharks and rays in catches, at landing sites, or in trade, to enable species-specific reporting in Government statistics (e.g. the DoF Fisheries Yearbook).
- Strengthen technical capacity and institutionalize interagency collaborations (e.g. between DoF, FD, and BFRI) for analyzing data on shark and ray catches, landings and trade, to improve fisheries, trade and species protection governance and management, monitor the effectiveness of conservation actions, assess the sustainability of non-threatened species exploitation, and comply with regional and international reporting requirements.
- Conduct periodical assessments and adapt wildlife protection, fisheries and trade policies to ensure that (a) sharks and rays not listed under the Wildlife (Conservation and Security) Act, 2012 are sustainably harvested or included in an amendment thereof; (b) the management of marine protected area, fisheries and trade reduce mortalities of threatened sharks and rays, effectively protect priority habitats, prevent threatened sharks, rays, and their products from entering markets; and (c) that healthy populations of threatened and non-threatened sharks and rays are sustained. The CITES National Scientific Committee and Management Authority, supported by representatives from relevant Government agencies, institutions, and NGOs, could coordinate these efforts as well as capacity building and awareness programs for their implementation.

Governance and Coordination

- Enhance the motivation, capacity and accountability of the DoF, FD, BFRI, BFDC, as well as the Navy and Coast Guard to collaboratively implement the national strategy and action plan for the conservation management of sharks and rays developed in consultation with other stakeholders, including fishers, through joint trainings, outreach, and monitoring activities.
- Support Bangladesh's engagement in regional fisheries management organizations (e.g. IOTC) and international conventions (e.g. CMS, CITES) to effectively protect shark and ray species or populations that move between countries and across multiple EEZs.

3.3 Recommended incentives for sustainable fisheries and livelihood alternatives to reduce mortalities and trade of threatened sharks and rays

The power structure in the artisanal fisheries business is dominated by moneylenders or *dadons* focused entirely on maximizing profit. Fishermen are being charged unauthorized and undocumented fees under the assumption that they fish in protected areas or for permission to fish during seasonal bans. They are usually not the owners of the fishing boats or gear. The cost of damage to fishing gear is generally deducted from the fishers' catch-shares, which deters live releases of sharks and rays. Accidentally caught sharks and rays provide a welcome additional income for fishers, who often sell them separately from the catch reported to the boat owner. The legality of shark or ray catches and trade are unclear to stakeholders and enforcement is weak.

These drivers result in low compliance with fisheries, wildlife or protected area regulations and the retention of all catches, including non-target sharks and rays. They need to be given due consideration for incentivizing compliance.

The current rations provided to fishermen as incentives during ban periods are insufficient. The effectiveness of co-management approaches, considered by some as an incentive for sustainable resource use, is negligible. It is important to identify shortcomings of these approaches for achieving optimum results. For example, co-management should not be limited to stakeholder meetings or awareness raising programs. To enable sustainably co-managed marine resources, conflicting interests and power structures must be recognized and balanced, in addition to defining allowable harvest limits and ownership.

Reduce mortalities of threatened sharks and rays

- Evaluate sustainable options for compensating damage incurred from live releases of legally protected sharks and rays.
- Promote value-enhanced products from sustainably caught non-threatened sharks and rays to incentivize the live release of threatened species.

Increasing profits from legally compliant trade and value-enhanced products from sustainably harvested non-threatened sharks and rays could incentivize the safe release of threatened sharks, rays, and other legally regulated marine wildlife.

Strengthen legal protection for threatened sharks and rays and enforce national laws and rules

- Effectively communicate wildlife protection, fisheries and trade regulations to all fisheries stakeholders, including fishers, boat owners, moneylenders, traders and relevant government officers, to clarify legal procedures and encourage compliant practices.
- Strictly and equitably enforce wildlife protection, fisheries and trade laws and regulations through joint patrols by the DoF, FD, Navy and Coast Guard.
- Strictly monitor and enforce spatial regulation for industrial fishing vessels to protect artisanal fishing zones.

Small-scale fishers would view the enforcement of the prohibition for industrial trawlers to operate in waters less than 40 meters deep as an important step by the Government to protect their exclusive small-scale fishing zones and fishing rights, which could in turn incentivize their legal compliance.

Engage fishing communities in shark and ray protection

- Engage fisher, boat owner and fish trader associations in the development and implementation of the shark and ray conservation strategy and action plan, particularly to address impacts thereof on their livelihoods.
- Evaluate profit-sharing schemes with investors and traders to reduce at-sea and livelihood risks for fishers and incentivize compliance with species protection, sustainable fisheries and trade regulations.

Market-based incentives could be levied through mutually beneficial profit-sharing schemes with investors and traders, who make the lion's share of profits with minimal risks, for reducing the high risks to fishers' lives and livelihoods.

- Consider institutionalizing participatory co-management of marine fisheries and MPAs and community-based monitoring of fisheries activities and threatened wildlife, including sharks and rays. For this approach to be effective, conflicting interests and power structures must be recognized and balanced, allowable fishing gear and catches as well as ownership defined, and long-term financing modalities put in place.
- Support fisher, boat owner and fish trader associations in guiding investors and newcomers to the fisheries business on legal procedures and sustainable practices.
- Reward compliant fishers to motivate others and dissuade opportunistic non-compliant fishers.
- Reduce domestic demand for legally protected species through targeted awareness programs, including among tribal peoples and addressing perceived medicinal or religious values.
- Empower local grass-root organizations and facilitators through participatory trainings to develop and conduct effective awareness raising programs.

Improve monitoring and reporting of shark and ray fisheries and trade

- Determine optimal allowable catch for non-threatened shark and ray species not currently legally regulated based on available information.
- Consider species groups for legal protection, since implementing regulations pertaining to single species are perceived as challenging.

4. Summary of the plenary discussion on proposed actions

Facilitated by **Elisabeth Fahrni Mansur**, Senior Marine Conservation Program Manager, WCS

Outcomes of the facilitated plenary discussion and comments posted in the chat box on the actions proposed by the three working groups for effectively protecting threatened sharks and rays and sustaining populations of non-threatened species are summarized below.

- Increasing awareness and compliance by sharing knowledge about the importance of sharks and rays for a healthy ocean and healthy people, their conservation management and applicable regulations through targeted educational outreach initiatives is a primary necessity. Experiences from previous awareness campaigns should inform a professional approach, including communication strategies tailored to relevant stakeholder groups with targeted messages and integrated impact assessments.

- The Government manages marine fisheries on behalf of the rightful owners, the fishers, who should be empowered through inclusive, equitable decision-making and implementation processes. Incentives for compliance with shark and ray conservation management and trade regulations should not only be considered as add-on benefits, but rather as a way to bring about changes in the fisheries economy that will benefit fishers, too. Choosing this approach over blanket bans would likely increase their willingness to comply and engage in monitoring and protection efforts. Incentives should be sustainable, respectful of fishers' rights and dignity, and provide economic as well as ecological benefits.
- Minimum size limits for commonly caught shark and ray species could be considered in addition to species restrictions and domestic and international trade regulations.
- The FD has staff stationed in coastal districts with fish landing sites, but their technical capacity for monitoring, reporting and enforcing regulations pertaining to sharks and rays needs to be increased through sensitization and training.
- Standardized operating procedures (SOP) would enhance collaborative efforts between the FD, DoF, BFDC, law enforcement agencies and other stakeholders.
- For coordinating interagency monitoring, enforcement and prosecution, sensitization and awareness actions with mandated Government agencies and the support of NGOs, the FD could consider designating a Deputy Chief Conservator of Forests.
- The WCCU has limited staff and is Dhaka-based. More trainings and sensitization programs are necessary for strengthening collaborations with other law enforcement officers. The WCCU currently focuses mostly on combating illegal trade in terrestrial wildlife, but they could also bring more attention to legally protected sharks, rays and their parts commonly found in domestic markets and international shipments.
- When assessing options for improving the recording of shark and ray catches or landings, the capacity and technical requirements for handling the data analysis and reporting must be given due consideration.
- Considering the comparatively low number of 200-225 commercial trawlers actively fishing, bringing the industrial sector under better management and monitoring through providing a modified reporting format, trainings and identification tools, and on-board mentoring is feasible.
- The feasibility of technological solutions or gear modifications to reduce the bycatch of elasmobranch in small-scale and/or industrial fisheries should be evaluated in the context of local fisheries practices and financial considerations, and in view of its effectiveness and longevity, before policy recommendations are made. The legally mandated use of turtle excluder device (TED) in industrial trawlers targeting fish and shrimp is an example of failure to do so resulting in no TED devices being installed to date.
- The need for more research should not serve as an excuse for inaction. Many species are Critically Endangered. They require immediate conservation actions that will inevitably also benefit other marine wildlife. In view of research results presented during this consultation, Bangladesh should not consider itself a 'data poor' range state. There is much scope to improve the research design and accountability of the analysis and reporting to achieve international standards for measuring the effectiveness of fisheries management, wildlife protection and trade regulations. Studies that aim to inform species and habitat conservation management should be prioritized.

5. Next steps for developing the National Conservation Strategy and Plan of Action for the Conservation Management of Sharks and Rays and Non-Detriment Findings (NDFs) for CITES Appendix II listed species

Presented by Elisabeth Fahrni Mansur and Daniel Fernando, IUCN Shark Specialist Group Regional Vice-Chairs for the Indian Ocean and facilitators in the NDF development workshops in Bangladesh.

This national expert consultation is part of the inclusive development of a national strategy and plan of action for the conservation management of sharks and rays in Bangladesh that guides government agencies, local stakeholders, NGOs, research institutions and private enterprises on protecting the most endangered sharks and rays from extinction and ensuring sustainable, productive fishery livelihoods in coastal communities (Figure 8).

To assess the status of sharks and rays in Bangladesh and threats to their survival and formulating a conservation and action plan following the IPOA-Sharks guidelines and aligned with international species protection and trade conventions and regional fisheries agreements, up-to-date information and recommendations presented in this consultation by the DoF, MFSMU, BFRI and other research institutes, as well as WCS at-sea surveys and citizen science networks, and published reports, will be compiled in an extensive background document. Additional consultations with members of shark and ray fishing communities, and shark and ray traders, as well as results from the NDF development process will further strengthen and inform the *National Strategy and Plan of Action for the Conservation Management of Sharks and Rays in Bangladesh*, which will be finalized in a national consultation with representatives from government agencies, institutions and ministries in May 2022 for official endorsement and implementation.

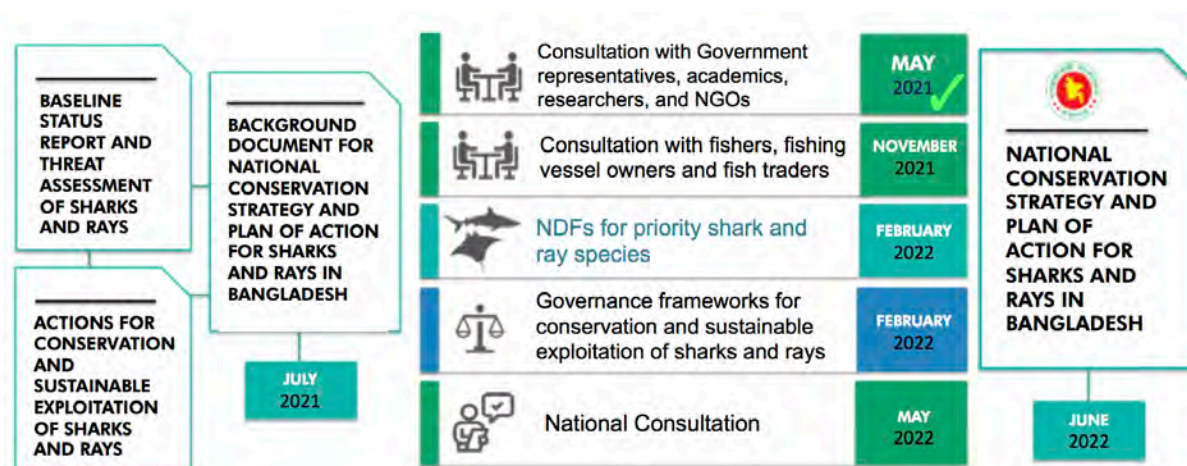


Figure 8. The inclusive development process of the *National Strategy and Plan of Action for the Conservation Management of Sharks and Rays in Bangladesh* financed under the SUFAL project by the FD/MoEFCC.

The NDF process is similar to a risk assessment and evaluates the intrinsic biological vulnerability and conservation concern, pressure from trade and fishing, and existing management for a species or a genus to determine whether sustainable harvest of the species or genus is possible or not (Figure 9). The national CITES scientific authority can only issue a trade permit for a species listed under CITES Appendix II if permissible as per the Wildlife (Conservation and Security) Act 2012 and only after verifying that the trade will not be detrimental to the species' wild populations. Therefore the National CITES Scientific Authority must conduct NDFs for species or genera before trade permits can be issued.

A positive NDF means that the trade is safe for the wild population and that trade can be permitted for the period of the validity of the NDF. Positive NDFs can come with certain conditions, for example requiring improved management or monitoring, or setting export or catch quotas. These conditions along with the allowable trade apply for the NDFs validity, after which the National CITES Scientific Authority needs to reassess the species or genus through the NDF process.

A negative NDF means that the extraction of a species or genus will negatively affect the survival of its wild population, thus trade can't be permitted. Negative NDFs can include recommendations for progressing towards a positive NDF for that species in the future by improving the management to halt the decline and promote recovery of populations.

Robust NDFs for shark and ray species can be developed even if stock assessments are not yet available or in data-poor settings. The NDF development process helps identify gaps in available data and indicates ways to improve data availability for future NDFs. There are substantial data on sharks and rays in Bangladesh from investigations conducted by WCS, the DoF and other researchers, which will help to generate at least two NDFs for one CITES II listed shark and ray species.

Two three-day long NDF development workshops will be convened by WCS in November and December 2021 with government representatives from the FD, DoF, BFRI as well as other national experts to evaluate priority species through a [standardized structured analysis](#). The NDFs will be finalized at a validation workshop in January 2022 with representatives from the DoF and FD for submission to the CITES Secretary by February 2022. Using a facilitated workshop approach will achieve additional benefits of strengthening technical capacity among government officials and local experts and providing practical experience for developing NDFs on their own.

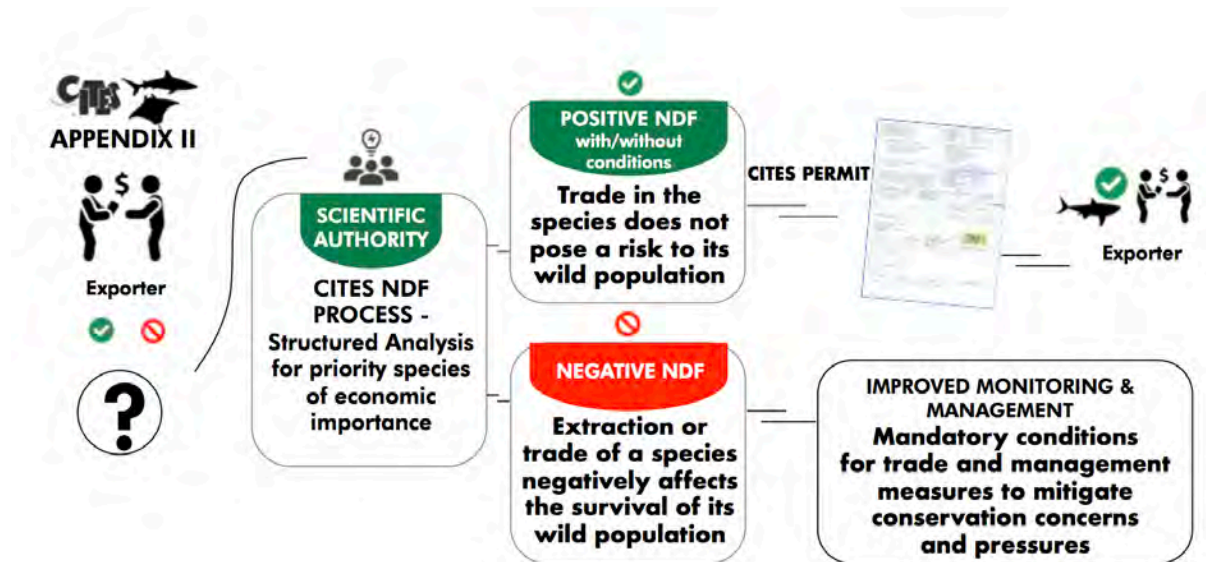


Figure 9. Overview of the NDF development process resulting in either a positive NDF if trade is found not to pose a threat to wild populations, or a negative NDF with mandatory conditions to mitigate conservation concerns and pressures.

6. Closing Remarks

The SUFAL Project Director **Mr. Gobinda Roy** congratulated all speakers and participants on their active participation and thanked WCS for the successful arrangement of the consultation as a platform for sharing knowledge and informing a national conservation strategy as well as CITES NDFs for sharks and rays.

Sharks and rays are important for ensuring a healthy ocean and sustaining a blue economy, so the sustainability of their exploitation must be prioritized. This consultation has enriched our understanding about threats they are facing and of actions required for the conservation management of sharks and rays in Bangladesh.

The FD is committed to collaborate with the DoF, academic institutions, researchers, conservationists and developmental professionals for improving the protection of threatened sharks and rays in Bangladesh, to ensure sustainable utilization of non-threatened species, and achieve compliance with international commitments, constitutional obligations and sustainable development goals to ensure the conservation and sustainable use of marine resources.

The FD's WCCU is dedicated to the enforcement of wildlife protection laws and combat wildlife crimes, including illegal trade in sharks, rays and their parts. Trade of non-threatened sharks, rays or their parts and products potentially offer opportunities for earning export revenue.

Under the SUFAL assignment, WCS is assisting the FD in developing a conservation strategy and action plan to safeguard threatened sharks and rays listed under the Wildlife (Conservation & Security) Act 2012 and manage the sustainable exploitation of other species. WCS is a trusted and experienced partner for developing and implementing wildlife conservation policies and actions grounded in robust science and informed by stakeholder inputs through inclusive, collaborative processes.

The information shared and recommended actions discussed during this consultation workshop will be adapted in the conservation management strategy and action plan. The SUFAL PD urged all participating individuals, agencies and institutions to continue working together for the protection of threatened sharks, rays and other marine wildlife.

Chair **Dr. Sharif Uddin** thanked all participants for engaging, and praised WCS for arranging such a well-organized and enriching consultation workshop. He especially valued the discussions in the working groups, despite the limitations of virtual interactions. Reflecting on things learned from the workshop, he mentioned the roles of relevant agencies, institutions and organizations in research, resource management and policy, and noted that economic and human rights aspects to be considered for ensuring effective protection of threatened species and sustainable utilization of non-threatened species. Dr. Sharif Uddin closed the consultation workshop by congratulating all speakers on their insightful research and appreciating the time they spent preparing their presentations, thanked WCS for the efficient organization, and prayed for everyone's safety.

Appendix 1. Speaker biographies

Mohammad Shamsuddoha, Marine Spatial Analyst, WCS is a wildlife biologist with an MSc degree in Wildlife Ecology, Management and Conservation Biology engaged professionally in conservation research in Bangladesh since 2011 with extensive experience in species and habitat conservation for terrestrial and aquatic wildlife. As certified GIS professional from Juniper GIS (2015) and SCGIS scholar (awarded in 2017), Doha brings high levels of expertise in conservation GIS to the WCS Bangladesh team. In his current position as WCS Marine Spatial Analyst, Doha oversees processes for analyzing systematically collected data into accessible and communicable information in support of effective and innovative conservation actions.

Shamsunnahar Shanta joined WCS Bangladesh in 2017 as Marine Protected Area Program Coordinator, which was redefined in 2020 as Marine Policy Coordinator. Shanta engages with small-scale fishers through at-sea fisheries investigations, citizen scientist programs, and consultations in local communities. She communicates with government counterparts on establishing and managing marine protected areas, strengthening the protection of marine wildlife and implementing fisheries management that balances wildlife protection with livelihood needs. Shanta completed her Master of Science degree in Fisheries Science and was awarded the WCS Christensen Conservation Leaders Scholarship for pursuing a PhD in Wildlife Science from Oregon State University, USA.

Dr. Md. Sharif Uddin is the Director of the Marine Fisheries Office in Chattogram for the Department of Fisheries. He has served the Department of Fisheries in various capacities for over 30 years, including as District Fisheries Officer and Project Director of a marine fisheries capacity building project, before joining the Marine Fisheries Office as Principal Scientific Officer in 2019 and being promoted as Director (Marine) in 2021 as additional charge. Dr. Sharif Uddin completed his masters' degree in aquaculture management from the Bangladesh Agricultural University and holds a PhD from Wageningen University. He served as a scientist in WorldFish and as a resource officer for the BoBP. He has authored and contributed to over 40 research articles published in national and international peer-reviewed journals and compendiums.

Dr. Md. Enamul Hoq has 15 years of research experience on coastal, mangrove and marine ecosystems and served as Director and Chief Scientific Officer for the Bangladesh Fisheries Research Institute (BFRI). As National Project Director of the BOBLME project he oversaw the "Survey of Shark Fisheries and Preparation of a National Plan of Action for Conservation & Management of Shark Resources in Bangladesh" in 2014.

Md. Ahsanul Haque is the Manager of the Bangladesh Fisheries Development Corporation (BFDC) Fish Landing and Wholesale Fish Market in Cox's Bazar.

Dr. M Shahadat Hossain is professor at the Institute of Marine Sciences of the University of Chittagong. He is involved in teaching and research in fisheries geoinformatics, marine spatial planning, blue economic development, marine microplastics, coastal zone management and coastal community resilience modeling.

Professor Dr. Kazi Ahsan Habib serves as Dean of the Faculty of Fisheries, Aquaculture and Marine Science, and as Chairman of the Department of Fisheries Biology and Genetics at the Sher-e-Bangla Agricultural University in Dhaka. He works in marine biodiversity research and conservation, specifically on DNA taxonomy and conservation genetics of elasmobranchs. Dr. Habib is engaged in the Ocean Literacy Movement and served as a government-nominated expert member on the national technical committee for the Nijhum Deep MPA.

Md. Jahidul Kabir is the current Director of Sheikh Kamal Wildlife Center, where he leads capacity building trainings for forest officers, and the Project Director of the Bangabandhu Sheikh Mujib Safari Park Project in Gazipur. He completed his Masters in Forestry from Chittagong University and a postgraduate diploma in Advanced Wildlife Management from the Wildlife Institute of India. The dedicated officer of the Bangladesh Forest Department with a keen interest for wildlife and

biodiversity conservation led the country's first tiger census using camera traps in 2015 and served as Director of the Wildlife Crime Control Unit.

A.S.M Jahir Uddin Akon currently serves as Director of the Wildlife Crime Control Unit for the Forest Department. He commenced his government service as Assistant Conservator of Forests for the Wildlife Management and Nature Conservation Division in Chittagong, and served as Divisional Forest Officer in the Wildlife Management and Nature Conservation Division Dhaka for three years. He contributed a chapter on 'Reducing Dependency on Fisheries in the Ecologically Critical Area Bordering the Sunderbans Reserved Forest' in a 2013 publication on Connecting communities and conservation: Co-management initiatives implemented by IPAC in wetlands and forests of Bangladesh.

Dr. Ehsanul Karim, Senior Scientific Officer at the Bangladesh Fisheries Research Institute (BFRI) holds a masters degree from the Bangladesh Agricultural University in Mymensingh and attained a PhD in Fisheries Science and Management from the Ocean University of China in 2016. Working in fisheries research and development with BFRI since 2010, he has expanded his skills through training on marine ecology, marine biodiversity, stock assessment, mariculture, integrated coastal zone management and shark fisheries management. Dr. Karim is at present implementing a research project on sharks and rays in Bangladesh in collaboration with researchers from the University of Dhaka.

Bikram Jit Roy is an Assistant Director of the Department of Fisheries District Fisheries Office in Chattogram. He previously served the Department of Fisheries as fishery officer, farm manager, and from 2002 to 2020 as Scientific Officer in the Marine Fishery Survey and Management Unit. He has authored or contributed to numerous articles on marine fisheries, particularly on shark fisheries.

Dr. A. K. Yousuf Haroon served the Department of Fisheries as ecologist, fisheries consultant. He was Senior, Principal and Chief Scientist for the BFRI and National Technical Advisor to the BOBLME project before retiring in February 2008. Since then, he has advised a number of large donor-supported government fisheries projects. Dr. Yousuf co-authored a book on sharks, skates and rays of Bangladesh and is a contributing author for the volumes on marine and freshwater fishes in the Encyclopedia of Flora and Fauna of Bangladesh published by the Asiatic Society of Bangladesh.

Alifa Bintha Haque works in the coastal region of Bangladesh on shark, ray, and sawfish conservation. She teaches at the Department of Zoology, University of Dhaka. She is a Ph.D. researcher in zoology at the University of Oxford, where she also completed an M.Sc. in Biodiversity Conservation and Management. Haque's Ph.D. project focuses broadly on increasing the sustainability of shark and ray fisheries in Bangladesh protecting several globally threatened species. Her goal is to initiate evidence-based marine conservation in Bangladesh with the involvement of local stakeholders, including fishing communities, fishers and traders.

Mahatub Khan Badhon is an early-career researcher based in Bangladesh. He uses multi-disciplinary approaches to investigate complex social and ecological issues that thwart conservation and the wise use of coastal and marine resources. He is currently working as Lecturer at the Department of Zoology of the University of Dhaka. He has worked with IUCN Bangladesh, the Center for Natural Resource Studies and Global Youth Biodiversity Network.

Enamul Mazid Khan Siddique, Head of Climate Justice and Natural Resource Rights for Oxfam in Bangladesh, works for inclusive governance of natural resources. He leads the water governance influencing work of Oxfam in Bangladesh, currently focusing on transboundary rivers of South Asia, with an emphasis on the Brahmaputra River Basin. Enam has worked in natural resource governance for the last eight years, which has included research, community organization, and advocacy for coastal community resilience and ecosystem conservation. He holds a Master of Science degree in sociology from the University of Dhaka, specializing in social ecological systems analysis.

Daniel Fernando is the co-founder and director of blue resources trust, a marine research, conservation and consultancy organisation in Sri Lanka. He is the party appointed councilor and current vice-chair to the sessional committee of the CMS scientific council representing the Asian region, and regional vice-chair of the IUCN shark specialist group for the Indian Ocean region. Daniel has extensive experience in leading NDF development workshops in Sri Lanka, India, Pakistan, Peru, Ecuador, Taiwan, and Indonesia. As international shark and ray expert will be facilitating the NDF development workshops in Bangladesh organized by WCS under the SUFAL consultancy assignment.

Elisabeth Fahrni Mansur co-founded the WCS Bangladesh Country Program and currently serves as Senior Manager of the Marine Conservation Program working to protect threatened marine megafauna and promote sustainable fisheries for a healthy ocean supporting healthy people. Her experience as educator, teacher's trainer and principal in Switzerland benefits the development of informative and culturally appropriate communication strategies for connecting wildlife conservation with sustainable livelihoods. As a Kinship Conservation Fellow she trained in market-based tools for conservation and leadership. Elisabeth is the vice-chair of the IUCN shark specialist group for the Indian Ocean region, member of the Society of Marine Mammology Education Committee, and team leader of the SUFAL shark and ray assignment.

Appendix 2. Agenda of national consultation for sharing knowledge on the status of and threats to sharks and rays in Bangladesh and developing a national conservation strategy

Tuesday, May 4th (Day 1)

Research for informing a National Plan of Action (NPOA) for shark and ray conservation management in Bangladesh

<i>Time</i>	<i>Topic</i>	<i>Presenter/ Facilitator</i>
9:30	Welcome & Introductions	Elisabeth Fahrni Mansur, Marine Conservation Program Manager, Wildlife Conservation Society Bangladesh (WCS), Md. Amir Hosain Chowdhury, Chief Conservator of Forests, Forest Department (FD), and Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, Department of Fisheries (DoF)
9:50	Consultation objectives and agenda of first day	Elisabeth Fahrni Mansur, WCS
1st Session - 10-minute presentations by experts followed by 5 min Q&A moderated by Dr. Syed Arif Azad		
10:00	Species diversity, priority habitats, and threats from fisheries and trade for sharks and rays in Bangladesh	Mohammad Shamsuddoha, WCS Marine Spatial Analyst
10:15	Improving the protection of threatened sharks and rays in Bangladesh	Shamsunnahar Shanta, WCS Marine Policy Coordinator
10:30	Current procedures, results and challenges for monitoring and reporting shark and ray catches in Bangladesh	Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, DoF, Chattogram
10:45	Efforts and outcomes of Bangladesh Fisheries Research Institute on shark fisheries management	Dr. Md. Enamul Hoq, former Director BFRI and former PD BOBLME
11:00	Break	
11:15	Current procedures for monitoring and reporting shark and ray landings at BFDC fish landing centers	Md. Ahsanul Haque, Manager BFDC Fish Landing and Wholesale Fish Market, Cox's Bazar
11:30	Findings on shark and ray diversity, habitat and distribution in Bangladesh	Dr. Md. Shahadat Hossain, Professor, Institute of Marine Sciences, University of Chittagong
11:45	Findings on the genetic diversity of sharks and rays in Bangladesh	Professor Dr. Kazi Ahsan Habib, Sher-e-Bangla Agricultural University, Dhaka
12:00	Current procedures and challenges for monitoring and reporting exports of CITES regulated sharks and rays	Md. Jahir Akon, Director, Wildlife Crime Control Unit, and Md. Jahidul Kabir, Director Wildlife Center and Safari Park Project, FD
12:15	Break	
12:30	Findings and recommendations from shark and ray research of the Bangladesh Fisheries Research Institute	Dr. Ehsanul Karim, Senior Scientific Officer, BFRI
12:45	Reporting requirements for sharks and rays from industrial fishing vessels and resulting insights	Bikram Jit Roy, Assistant Director, District Fisheries Office, Chattogram
13:00	International and regional frameworks for the National Plan of Action (NPOA) for sharks & rays in Bangladesh	Dr. A.K Yousuf Haroon, former National Technical Advisor BoBLME
13:15	Closing remarks – End of Day 1	Dr. Syed Arif Azad, WCS

Wednesday, May 5th (Day 2):

Actions needed for improved management of sharks and rays

Time	Topic/Activity	Presenter/ Facilitator
9:30	Welcome, objectives & agenda of second day	Elisabeth Fahrni Mansur, WCS
Cont. 1 st Session - 10-min expert presentations followed by 5 min Q&A moderated by Dr. Syed Arif Azad		
9:35	Current practices of trade in sharks, rays and their parts for domestic and international markets	Alifa Bintha Haque, Assistant Professor, Department of Zoology, University of Dhaka
9:50	Social-ecological perspective on bycatch threats: lessons from sawfish conservation project in Bangladesh	Mahatub Khan Badhon, Lecturer, Department of Zoology, University of Dhaka
10:05	Human dimensions and rights: Shark conservation management in the Bay of Bengal	Enamul Mazid Khan Siddique, Head of Climate Justice and Natural Resource Rights, Oxfam in Bangladesh
2 nd Session – Facilitated working group discussion on Actions needed for the conservation of threatened sharks and rays and the sustainable exploitation of species not in immediate danger of extinction (virtual break-out rooms)		
10:20	Briefing on working group objectives and modalities	Elisabeth Fahrni Mansur, WCS
10:25	Working Group A: <i>Science & Technology</i> : Gaps identified for scientific investigations on the status of sharks and rays and threats to their survival	WCS facilitator: Mohammad Shamsuddoha
	Working Group B: <i>Policy & Management</i> : Governance frameworks and management interventions to strengthen the conservation of threatened sharks and rays	WCS facilitator: Shamsunnahar Shanta
	Working Group C: <i>Socio-Economics</i> : Incentives for sustainable fisheries and livelihood alternatives to reduce mortalities and trade of threatened sharks and rays	WCS facilitator: Ashik Jahan Galib
11:10	Group work ends - Break	
11:30	Presentations on results from working groups	WCS facilitators
11:45	Facilitated discussion on resulting recommendations from working groups	WCS facilitator: Elisabeth Fahrni Mansur
12:15	Break	
Closing Session – Results and Next Steps for improved management of sharks and rays		
12:30	Summary of insights and recommendations on actions for improved management of sharks and rays	Dr. Syed Arif Azad, former Director General DoF, Senior Advisor, WCS Marine Conservation Program
12:45	Next steps: CITES non-detriment findings (NDFs) - preparations and request for species-specific data	Elisabeth Fahrni Mansur, WCS Daniel Fernando, CITES NDF Expert
13:00	Words of appreciation and closing remarks – End of National Expert Consultation	Gobinda Roy, SUFAL Project Director, FD, and Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, DoF

Organized under *Shark and Ray and Associated Species Conservation Strategy Development and Non-Detriment Findings* consultancy assignment implemented by the Wildlife Conservation Society (WCS) for the Sustainable Forests and Livelihoods (SUFAL) Project.



Appendix 3. Participants of the first national consultation for sharing knowledge on the status of and threats to sharks and rays in Bangladesh and developing a national conservation strategy

May 4-5 2021, Virtual Meeting

Organized under *Shark and Ray and Associated Species Conservation Strategy Development and Non-Detriment Findings* consultancy assignment implemented by the Wildlife Conservation Society (WCS) for the Sustainable Forests and Livelihoods (SUFAL) Project

Speakers

Agency/Organization	Designation	No.
Department of Fisheries (DoF)		
Marine Fisheries Office, Chattogram	• Dr. Md. Sharif Uddin, Director (Marine)	1
District Fisheries Office, Chattogram	• Bikram Jit Roy, Assistant Director	1
Bangladesh Fisheries Research Institute (BFRI)	• Dr. Ehsanul Karim, Principal Scientific Officer, Mymensingh • Dr. Enamul Hoq, Former Director and Ex-PD of BoBLME • Dr. A.K. Yousuf Haroon, Former Chief Scientific Officer	3
Bangladesh Fisheries Development Corporation	• Md. Ahsanul Haque, Manager, BFDC Fish Landing and Wholesale Fish Market, Cox's Bazar	1
Forest Department (FD)		
Forest Department	• Md. Amir Hosain Chowdhury, Chief Conservator of Forests, National CITES Management Authority • Gobinda Roy, Project Director, SUFAL • A.S.M Jahir Uddin Akon, Director, Wildlife Crime Control Unit • Md. Jahidul Kabir, Director, Sheikh Kamal Wildlife Center and Bangabandhu Sheikh Mujib Safari Park Project	4
Academia		
University of Chattogram	• Dr. M. Shahadat Hossain, Professor, Institute of Marine Sciences	1
University of Dhaka	• Alifa Bintha Haque, Assistant Professor, Department of Zoology • Mahatub Khan Badhon, Lecturer, Department of Zoology	2

Sher-e-Bangla Agricultural University, Dhaka	Dr. Kazi Ahsan Habib, Professor and Chairman, Department of Fisheries Biology and Genetics, and Dean, Faculty of Fisheries, Aquaculture and Marine Science	1
Non-Governmental Organizations (NGO)		
Oxfam Bangladesh	Enamul Mazid Khan Siddique, Head of Climate Justice and Natural Resource Rights	1
Wildlife Conservation Society	- Shamsunnahar Shanta, Marine Policy Coordinator - Mohammad Shamsuddoha, Marine Spatial Analyst - Elisabeth Fahrni Mansur, Senior Manager, Marine Conservation Program	3
Blue Resources Trust (Sri Lanka)	Daniel Fernando, Co-Founder and Director	1
Total		19

Participants

Agency/Organization	Designation	No.
Department of Fisheries (DoF)		
Director General's Office, Dhaka	- Dr. Tanvir Hossain Chowdhury, Deputy Chief (Marine Wing) - Shoukat Kabir Chowdhury, Assistant Director (Marine Wing), and IOTC Focal Point - Md Rashed Parvez, M & E Officer, Tuna Project S. M. Hasan Ali, Assistant Director - Jinat Jahan Bornali, Upazila Fisheries Officers (Reserve)	5
Marine Fisheries Survey Management Unit, Chattogram	- Al-Mamun, Scientific Officer - Farhan Tazim, Scientific Officer	2
Bangladesh Fisheries Research Institute (BFRI)	- Dr. Shafiqur Rahman, Principal Scientific Officer and Station head of Marine Fisheries and Technology Station, Cox's Bazar - Md. Golam Mostafa, Scientific Officer, Marine Fisheries and Technology Station, Cox's Bazar - Mohammad Khairul Alam Sabuj, , Scientific Officer, Marine Fisheries and Technology Station, Cox's Bazar - Abu Bakar Siddique Khan, Scientific Officer, Riverine Sub-Station, Khepupara	4

Forest Department (FD)		
Forest Department	• Dr. Md. Zaglul Hossain, DCCF Training & Research • Mihir Kumar Doe, CF Wildlife Management & Nature Conservation Circle • Md. Modinul Ahsan, DPD SUFAL project • Ishtiaq Ahmad, Chief Technical Advisor, SUFAL project • Nirmal Kumar Paul, DFO Wildlife Management & Nature Conservation Division, Khulna • Md. Yasin Newaz, DFO Wildlife Management & Nature Conservation Division, Chattogram • Md. Aminul Islam, DFO Coastal Forest Division, Patuakhali • Md. Towfiqul Islam, DFO Coastal Forest Division, Bhola • Md. Mofizur Rahaman Chowdury, Wildlife Management and Nature Conservation Division, Khulna • Fatema-Tuz-Zohora Khaleque Mila, Wildlife & Biodiversity Officer	10
Academia		
University of Dhaka, Department of Zoology	• Dr. Md. Sagir Ahmed, Professor • Sujjan Kumar Datta, PhD Student • Nazia Hossain, M.Sc. • Ayesha Akhter Zhilik, Research Assistant	4
Sher-e-Bangla Agricultural University, Dhaka	• Md. Jayedul Islam, Research Assistant, Aquatic Bioresource Research Lab, Department of Fisheries Biology and Genetics	1
North South University	• Mahi Washim, Research Assistant, Department of Environmental Science and Management	1
Non-Governmental Organizations (NGO) or Institutions		
WorldFish	• Dr. Md. Abdul Wahab, EcoFish Team Leader • Dr. Md. Nahiduzzaman, Scientist • Dr. Mohammad Jalilur Rahman, Scientist (Fish Population Biology), ECOFISH II Project	3
IUCN	• Sarowar Alom Dipu, Senior Programme Officer • Md. Shahidul Islam Kazal, Project Assistant • Saleh Md. Musa, Programme Officer • Ashis Kumar Datta, Programme Officer	4

Nature Conservation Management (NACOM)	Md. Abdul Kaiyum, Natural Resource Management Manager, USAID's ECOLIFE Activity	1
Wildlife Conservation Society (WCS)	- Dr. Md. Zahangir Alom, Country Representative and Program Manager (Terrestrial Conservation Program) - Samiul Mohsanin, Coordinator (Combatting Illegal Wildlife Trade), Terrestrial Conservation Program - Md. Arif Hossain Prodhan, Senior Program Coordinator, Terrestrial Conservation Program G. M. Masum Billah, Field Coordinator, Marine Conservation Team - Hafez Ahmad, Marine Data Management Officer, Marine Conservation Team	5
Total		40

Moderators & Facilitators

Wildlife Conservation Society (WCS) Bangladesh		
Marine Conservation Program	- Dr. Syed Arif Azad, Former Director General DoF, Senior Advisor - Elisabeth Fahrni Mansur, Senior Manager - Mohammad Shamsuddoha, Marine Spatial Analyst - Shamsunnahar Shanta, Marine Policy Coordinator - Ashik Jahan Galib, Senior Research Officer	5

Technical Support

Wildlife Conservation Society (WCS) Bangladesh		
Technical Lead	Nadim Parves, Senior Coordinator, Educational Outreach Team	1
Administration	- Md. Tariqul Islam, Senior Advisor, Terrestrial Conservation Program - Md. Arafat Rahman Khan, Communication Officer, Educational Outreach Program - Md. Rasel Mia, Training and Education Officer, Educational Outreach Program - Naim Khandakar, Marine Community Engagement & Policy Officer, Marine Conservation Program - Robiul Kauser, Marine Field Officer, Marine Conservation Program - Sukanta Biswas, NGO Liaison & Human Resource Officer	6
Total		7

Appendix 4. Working group discussants and facilitators

Working Group *Science & Technology*

Abu Bakar Siddique Khan, Scientific Officer, BFRI	Dr. Md. Zahangir Alom, Country Representative, WCS	Md. Jayedul Islam, Research Assistant, ABR Lab, Sher-e- Bangla Agricultural University
Alifa Bintha Haque, Assistant Professor, Department of Zoology, University of Dhaka	Dr. Mohammad Jalilur Rahman, Scientist, WorldFish	Md. Modinul Ahsan, Deputy Project Director, SUFAL project, FD
Ashis Kumar Datta, Programme Officer, IUCN	Fatema-Tuz-Zohora Khaleque Mila, Wildlife & Biodiversity Officer, FD	Md. Mofizur Rahaman Chowdury, Wildlife Management & Nature Conservation Division Khulna, FD
Dr. Kazi Ahsan Habib, Professor, Chairman and Dean, Sher-e-Bangla Agricultural University	G. M. Masum Billah, Marine Field Coordinator, WCS	Robiul Kauser, Marine Field Officer, WCS
Dr. Md. Sagir Ahmed, Professor, Department of Zoology, University of Dhaka	Md. Ahsanul Haque, Manager, BFDC Fish Landing & Wholesale Fish Market, Cox's Bazar	Sujan Kumar Datta, PhD Student, University of Dhaka
	Md. Arif Hossain Prodhan, Program Coordinator, WCS	

Facilitator: Mohammad Shamsuddoha, Marine Spatial Analyst, WCS

Working Group *Policy & Management*

Al-Mamun, Scientific Officer, MFSMU Chattogram, DoF	Dr. Tanvir Hossain Chowdhury, Deputy Chief (Marine Wing), DoF	Nadim Parves, Senior Coordinator, Educational Outreach, WCS
A.S.M Jahir Uddin Akon, Director, WCCU, FD	Mahatub Khan Badhon, Lecturer, Department of Zoology, University of Dhaka	Naim Khandakar, Community Engagement & Policy Officer, WCS
Daniel Fernando, IUCN SSC Regional Co-Chair Indian Ocean, CITES NDF expert, Blue Resources Trust, Sri Lanka	Md. Rashed Parvez, M & E Officer, Tuna Project, DoF	Nirmal Kumar Paul, DFO Wildlife Management & Nature Conservation Division Khulna, FD
Dr. Enamul Hoq, Former Director and Ex-PD of BoBLME, BFRI	Md. Aminul Islam, DFO Coastal Forest Division, Patuakhali, FD	Shoukat Kabir Chowdhury, Assistant Director (Marine Wing), IOTC Focal Point, DoF
Dr. Md. Sharif Uddin, Director (Marine), Marine Fisheries Office, Chattogram, DoF	Md. Rasel Mia, Training and Education Officer, WCS	
Dr. Syed Arif Azad, Former Director General DoF, Senior Advisor, WCS	Md. Tariqul Islam, Senior Advisor, WCS	
	Mihir Kumar Doe, CF Wildlife Management & Nature Conservation Circle, FD	

Facilitator: Shamsunnahar Shanta, Marine Policy Coordinator, WCS

Working Group *Socio-Economics*

Ayesha Akhter Zhilik, Research Assistant, Department of Zoology, Dhaka University

Dr. Md. Abdul Wahab, EcoFish Team Leader, WorldFish

Dr. Md. Zaglul Hossain, DCCF Training & Research, FD

Hafez Ahmad, Marine Data Management Officer, WCS

Ishtiaq Ahmad, Chief Technical Advisor, SUFAL project, FD

Jinat Jahan Bornali, Upazila Fisheries Officers (Reserve), DoF

Mahi Washim, Research Assistant, Department of Environmental Science and Management, North South University

Md. Yasin Newaz, DFO Wildlife Management & Nature Conservation Division Chattogram, FD

Dr. Shafiqur Rahman, Principal Scientific Officer and Station head, Marine Fisheries & Technology Station, Cox's Bazar, DoF

Elisabeth Fahrni Mansur, Marine Conservation Program Manager, WCS

Md Shahidul Islam Kazal, Project Assistant, IUCN

Md. Abdul Kaiyum, Natural Resource Management Manager, NACOM

Md. Arafat Rahman Khan, Communication Officer, WCS

Md. Towfiqul Islam, DFO Coastal Forest Division Bhola, FD

Mohammad Khairul Alam Sabuj, Scientific Officer, Marine Fisheries and Technology Station Cox's Bazar, DoF

Enamul Mazid Khan Siddique, Head of Climate Justice and Natural Resource Rights, Oxfam in Bangladesh

Farhan Tazim, Scientific Officer, Marine Fisheries Survey Management Unit Chattogram, DoF

Nazia Hossain, Master student, Department of Zoology, Dhaka University

S. M. Hasan Ali, Assistant Director, DoF

Saleh Md. Musa, Programme Officer, IUCN

Samiul Mohsanin, Combatting Wildlife Trade Program Coordinator, WCS

Facilitator: Ashik Jahan Galib, Senior Research and Community Engagement Officer, WCS

