Bay of Bengal Large Marine Ecosystem Project

Guide to the development of Myanmar's National Plan of Action for the conservation and management of sharks

BOBLME-2015-Ecology-19

BOBLME contract: LOA/RAP/2014/38

For bibliographic purposes, please reference this publication as:

BOBLME (2015) Guide to the development of Myanmar's National Plan of Action for the conservation and management of sharks BOBLME-2015-Ecology-19

FAUNA & FLORA INTERNATIONAL

Bay of Bengal
Large Marine Ecosystem Project

Guide to the development of Myanmar's

National Plan of Action

for the conservation and management of sharks

Department of Fisheries, Myanmar

Fauna & Flora International

Bay of Bengal Large Marine Ecosystem Project

June 2015

Food and Agriculture Organization of the United Nations

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Funding The implementation of the field activity and the production of this report were done with funding support of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project of the Food and Agriculture Organisation (FAO) of the United Nations. Supporting funding was also provided by European Commission, Helmsley Charitable Trust, Segre Foundation, and the Arcadia Fund.

Suggested citation DoF/BOBLME/FFI 2015. Guide to the Development of Myanmar's National Plan of Action for the conservation and management of sharks. Department of Fisheries Myanmar, Fauna & Flora International, Myanmar and the Bay of Bengal Large Marine Ecosystem Project.

Cover image Shark fins drying, Dawei Kann quarter, Myeik District, Myanmar. Credit: FFI Myanmar.

Executive summary

In accordance with the guiding principles detailed in the Food and Agriculture Organisation's (FAO) International Plan of Action for the conservation and management of sharks (IPOA-Sharks) Myanmar has undertaken the task of developing a National Plan of Action-Sharks. This process was initiated in 2005 by Myanmar's Department of Fisheries, but due to the lack of capacity and resources within the country the document lay in draft form. However, with the support of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project of the FAO: "Strengthening existing marine reserves and shark conservation in Myanmar", a collaborative effort between BOBLME and FFI with technical support from SEAFDEC-MFRDMD, the plan has been reviewed. This document forms the base of this revision setting out the steps required to have the NPOA-Sharks approved as well as identify management actions that the plan should address and the immediate priorities. These priorities include, in summary:

- Strengthening of current rules and regulations;
- Improvement of data collection on landings by species;
- Identification of natural habitats for breeding and nursery grounds of sharks and rays for conservation and protection;
- Study on ecology and biology of sharks and rays to determine status of stocks;
- Improvement of data acquisition on sharks products and trade; and
- Active enforcement at sea, landing sites and markets.

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Acronyms used

BOBLME	Bay of Bengal Large Marine Ecosystem
CCRF	Code of Conduct for Responsible Fisheries
CITES	Convention on International Trade in Endangered Species
CPUE	Catch Per Unit Effort
DoF	Department of Fisheries (Myanmar)
FAO	Food and Agriculture Organization
FFI	Fauna & Flora International
GEF	Global Environment Facility
IPOA	International Plan of Action
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unregulated and Unreported fishing
MEAT	Management Effectiveness Assessment Tool
MFF	Myanmar Fisheries Federation
MFRDMD	Marine Fishery Resources Development and Management Department (Malaysia)
MLFRD	Ministry of Livestock, Fisheries and Rural Development (Myanmar)
MOECAF	Ministry of Environment Conservation and Forestry (Myanmar)
MPA	Marine Protected Area
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental organisation
NPOA	National Plan of Action
SEAFDEC	Southeast Asian Fisheries Development Centre
UNCLOS	United Nations Convention on the Law of the Seas
WCS	Wildlife Conservation Society

1. Introduction

1.1. Background

With one-quarter of chondrichthyan fishes (sharks, rays, and chimaeras) threatened (Dulvy et al 2014) and because of their long life spans and slow reproduction, careful management of shark fisheries is essential. Furthermore, due to their highly migratory nature, such management needs to occur regionally and internationally, involving all countries involved in shark harvesting – irrespective of the quantities involved. The United Nations Convention on the Law of the Seas (UNCLOS) and its agreement on the management of fish stocks, and the FAO Code of Conduct for Responsible Fisheries (CCRF) both recommend that member states of FAO and CITES develop a framework and regulations for the conservation and management of sharks and rays for the sustainable use of these resources. The International Plan of Action for Sharks (IPOA-Sharks) was therefore developed in Tokyo in 1998 during a meeting of a Technical Working Group on the Conservation and Management of Sharks (FAO 1999). The main objective of these IPOA-Sharks is to ensure the conservation and management of sharks and their long-term sustainable use. Although the IPOA is voluntary, member states are encouraged to develop their own national plans for shark conservation.

For Myanmar, the responsibility of a National Plan of Action-Sharks (NPOA) lies with the Department of Fisheries (DoF) of the Ministry of Livestock, Fisheries and Rural Development (MLFRD). The process towards the NPOA began with an assessment of the shark fishery by DoF in 2004, supported by the Southeast Asian Fisheries Development Centre (SEAFDEC) (SEAFDEC 2006). The findings of this assessment were then used to draft Myanmar's first NPOA-Sharks in 2005 highlighting the need for taxonomic training for Department of Fisheries (DoF) staff and regular monitoring of shark catch. However, the lead author on this document, U Myint Pe, passed away in 2010 (U Myint Pe 2005). The draft was then re-addressed in 2011 through a working group on sharks as part of the Bay of Bengal Large Marine Ecosystem (BOBLME) Project of the Food and Agriculture Organisation (FAO) of the United Nations (BOBLME 2011). The working group highlighted the need for the draft to be reviewed, but cognizant of the lack of a comprehensive understanding of the biodiversity, biology and ecology of sharks and rays - especially their population dynamics, critical habitat requirements during their life cycle and conservation needs in Myanmar. Other important information for fisheries management such as landings data and the status of shark resources is also minimal, both at the state and national level. These are crucial information needs for the successful management of sharks and rays.

In 2014 the "Strengthening existing marine reserves and shark conservation in Myanmar" project was then initiated under the umbrella of BOBLME and implemented by Fauna & Flora International (FFI) with technical support from SEAFDEC-MFRDMD (Marine Fishery Resources Development and Management Department). This project continued until 2015 and involved an assessment of the shark and ray fishery in Myanmar, supporting taxonomic training and a review of Myanmar's two shark reserves, all of which contributed to a review of Myanmar's Drafted NPOA-Sharks.

The purpose of this current document is therefore to serve as a catalyst to facilitate discussions, working groups and wider stakeholder consultations with the aim of finalizing the NPOA-Sharks for Myanmar.

1.2. Objectives of the NPOA

It is proposed that the overall objectives of Myanmar's National Plan of Action for Sharks are to ensure the conservation and management of sharks and rays and their sustainable use as follows:

- To ensure sustainable use of sharks and rays;
- To assess threats to populations of sharks and rays and to provide special attention to threatened stocks;

- To minimize unutilized incidental catches of sharks and rays;
- To minimize waste and discards from catches of sharks and rays;
- To encourage the full use of dead sharks;
- To facilitate the identification and reporting of species-specific biological and trade data;
- To facilitate the collection of improved species-specific catch and landings data and the monitoring of catches of sharks and rays; and
- To develop a framework for establishing research, management and educational initiatives concerning sharks and rays.

2. Sharks and rays species in Myanmar

The number of sharks and rays species within Myanmar waters varies depending on which lists are used. Ahmad and Lim (2012) in their Field Guide to Sharks of the Southeast Asian Region lists 34 sharks and 44 ray species for Myanmar, however, after recent trips to landing sites by the authors as well as a review of literature on shark studies in Myanmar, there may be 58 sharks and 71 ray species (Table 1).

Table 1 Species of sharks and rays recorded in Myanmar

(The numbers in brackets refer to the sources of these data which are provided below the table). IUCN status from www.iucnredlist.org/ (as accessed on 11/04/15) (NA: Not Assessed, LC: Least Concern, DD: Data Deficient, NT: Near Threatened, Vu: Vulnerable, En: Endangered, CE: Critically Endangered). CITES status from www.checklist.cites.org (accessed 11/04/15) (App. I: CITES Appendix I; App. II: CITES Appendix II). (Note: some names may have changed from the original lists to be consistent with the latest nomenclature).

No.	Order/Family/Scientific name	Common name (English)	IUCN red list/CITES	1	2	3	4	5	6
Order: Hexanchiformes (1)									
	Family Hexanchidae (1)	**Sixgill and sevengill sharks**							
1	*Heptranchias perlo* (Bonnaterre, 1788)	Sharpnose sevengill shark	NT						*
Order: Squaliformes (6)		**Dogfishes**							
	Family Echinorhinidae (1)	**Bramble sharks**							
2	*Echinorhinus brucus* (Bonnaterre, 1788)	Bramble shark	DD	*					
	Family Squalidae (2)	**Dogfish sharks**							
3	*Squalus megalops* (Macleay, 1881)	Piked spurdog	DD	*					*
4	*Squalus* sp.	Dogfish shark			*			*	
	Family Centrophoridae (3)	**Gulper sharks**							
5	*Centrophorus granulosus* (Bloch & Schneider, 1801)	Gulper shark	VU						*
6	*Centrophorus moluccensis* (Bleeker, 1860)	Smallfin gulper shark	DD					*	
7	*Centrophorus* sp.	Gulper shark							*
Order: Squatiniformes (1)		**Angel sharks**							
	Family Squatinidae (1)	**Angel sharks**							
8	*Squatina* sp.	Angel shark						*	
Order: Orectolobiformes (6)		**Carpet sharks**							
	Family Hemiscyllidae (4)	**Longtailed carpet sharks**							

9	*Chiloscyllium griseum* (Müller and Henle, 1838)	Grey bambooshark	NT	*	*				
10	*Chiloscyllium hasselti* (Bleeker, 1852*)*	Indonesian bambooshark	NA	*					
11	*Chiloscyllium punctatum* (Müller and Henle, 183)	Brown-banded bambooshark	NT	*	*				
12	*Hemiscyllium* sp.	Carpetshark							*
	Family Stegostomatidae (1)	**Zebra shark**							
13	*Stegostoma fasciatum* (Hermann, 1783)	Zebra shark	VU	*	*				
	Family Rhincodontidae (1)	**Whale shark**							
14	*Rhincodon typus* (Smith, 1828)	Whale shark	VU App. II	*	*				
Order: Lamniformes (1)		**Mackerel sharks**							
	Family Alopidae (1)	**Thresher sharks**							
15	*Alopias superciliosus* (Lowe, 1839)	Bigeye thresher	VU						
Order Carcharhiniformes		**Ground sharks**							
	Family Scyliorhinidae (6)	**Catsharks**							
16	*Apristurus* sp.	Catshark							*
17	*Atelomycterus marmoratus* (Bennett, 1830)	Coral catshark	NT	*					
18	*Bythaelurus* sp.	Catshark							*
19	*Bythaelurus canescens* (Günther, 1878) (potentially misidentified)	Dusky catshark	DD						*
20	*Bythaelurus lutarius* (Springer & D'Aubrey, 1972)	Mud catshark	DD						*
21	*Haploblepharus edwardsii* (Schinz, 1822)	Puffadder shyshark	NT					*	
	Family Proscylliidae (3)	**Finback catsharks**							
22	*Eridacnis radcliffei* (Smith, 1913)	Pygmy ribbontail catshark	LC						*
23	*Proscyllium habereri* (Hilgendorf, 1904)	Graceful catshark	DD						*
24	*Proscyllium magnificum* (Last & Vongpanich, 2004)	Finback catshark		*					*
	Family Triakidae (4)	**Hound sharks**							
25	*Iago omanensis* (Norman, 1939)	Bigeye houndshark	LC						*
26	*Mustelus mosis* (Hemprich & Ehrenberg, 1899)	Arabian smooth-hound	DD			*			
27	*Triakis megalopterus* (Smith, 1839)	Sharptooth houndshark	NT					*	
	Family Hemigaleidae (3)	**Weasel sharks**							
28	*Chaenogaleus macrostoma* (Bleeker, 1852)	Hooktooth shark	VU	*	*				

29	*Hemigaleus microstoma* (Bleeker, 1852)	Sicklefin weasel shark	VU	*	*				*
30	*Hemipristis elongatus* (Klunzinger, 1871)	Fossil shark		*	*				*
	Family Carcharhinidae (24)	**Requiem sharks**			*				
31	*Carcharhinus albimarginatus* (Rüppell, 1837)	Silvertip shark	NT	*	*				
32	*Carcharhinus amblyrhynchos* (Bleeker, 1856)	Gray reef shark	NT		*				
33	*Carcharhinus amboinensis* (Muller & Henle, 1839)	Pigeye shark	DD	*	*				
34	*Carcharhinus amblyrhynchoides* (Whitley, 1934)	Graceful shark	NT	*	*				
35	*Carcharhinus brevipinna* (Müller and Henle, 1839)	Spinner shark	NT	*	*				
36	*Carcharhinus dussumieri* (Müller and Henle, 1839)	Whitecheek shark	NT	*	*				
37	*Carcharhinus falciformis* (Müller and Henle, 1839)	Silky shark	NT	*	*			*	
38	*Carcharhinus leucas* (Müller and Henle, 1839)	Bull shark	NT	*	*				
39	*Carcharhinus limbatus* (Müller and Henle, 1839)	Common blacktip shark	NT	*	*				
40	*Carcharhinus melanopterus* (Quoy & Gaimard, 1824)	Blacktip reef shark	VU	*	*			*	
41	*Carcharhinus plumbeus* (Nardo, 1827)	Sandbar shark	VU	*	*				
42	*Carcharhinus sealei* (Pietschmann, 1916)	Blackspot shark	NT	*					
43	*Carcharhinus sorrah* (Müller and Henle, 1839)	Spottail shark	NT		*				
44	*Carcharhinus* sp.							*	
45	*Galeocerdo cuvier* (Peron & Lesueur, 1822)	Tiger shark	NT	*	*				
46	*Glyphis gangeticus* (Müller & Henle, 1839)	Ganges shark	CE		*				
47	*Glyphis siamensis* (Steindachner, 1896)	Irrawaddy River shark	CE	*					
48	*Loxodon macrorhinus* (Müller and Henle, 1839)	Sliteye shark	LC	*	*				*
49	*Rhizoprionodon acutus* (Rüppell, 1837)	Milk shark	LC	*	*				
50	*Rhizoprionodon oligolinx* (Springer, 1964)	Gray sharpnose shark	LC	*	*				
51	*Scoliodon laticaudus* (Müller & Henle, 1838)	Spadenose shark	NT		*	*		*	

52	*Scoliodon* sp.	Spadenose shark						*	
53	*Triaenodon obesus* (Rüppell, 1837)	Whitetip reef shark	NT	*	*				
54	**Family Sphyrnidae (4)**	**Hammerhead sharks**							
55	*Eusphyra blochii* (Cuvier, 1817)	Winghead shark	NT					*	
	Sphyrna lewini (Griffith & Smith, 1834)	Scalloped hammerhead	EN App. II	*	*				
56	*Sphyrna mokarran* (Rüppell, 1837)	Great hammerhead	EN App. II	*	*				
57	*Sphyrna* sp.	Hammerhead shark						*	
58	*Spyrna zygaena* (Linnaeus, 1758)	Smooth hammerhead	VU App. II						
	Total species = 58								
	Total families = 15								

No.	Order/Family/Scientific name	Common name (English)	IUCN Red list/CITES	1	2	3	4	5	6
Order: Pristiformes (3)		**Sawfishes**							
	Family: Pristidae (3)	**Sawfishes**							
1	*Anoxypristis cuspidata* (Latham, 1794)	Narrow sawfish	EN App. I	*					
2	*Pristis pectinata* (Latham, 1794**)**	Smalltooth or wide sawfish	CE App. I	*					
3	*Pristis pristis* (Linnaeus 1758)	Freshwater sawfish	CE App. I	*					
Order: Rhinobatiformes (11)		**Guitarfishes**							
	Family: Rhinidae (1)	**Shark ray**							
4	*Rhina ancylostoma* (Bloch & Schneider, 1801)	Shark ray	VU	*				*	
	Family: Rhynchobatidae (2)	**Wedgefishes**							
5	*Rhynchobatus australiae* (Whitley, 1939*)*	Whitespotted wedgefish	VU	*					
6	*Rhynchobatus* sp.	Wedgefish			*				
	Family: Rhinobatidae (8)	**Shovelnose rays**							
7	*Glaucostegus granulatus* (Cuvier, 1829)	Granulated guitarfish	VU	*					
8	*Glaucostegus halavi* (Forsskal,1775)	Halavi guitarfish	DD	*					
9	*Glaucostegus typus* (Bennett, 1830)	Giant guitarfish	VU						*
10	*Rhinobatos formosensis* (Norman, 1926*)*	Taiwan guitarfish	VU						*
11	*Rhinobatos obtusus* (Müller and Henle, 1841)	Widenose guitarfish	VU	*					

12	*Rhinobatus* cf *puncifer*	Spotted guitarfish				*	*		
13	*Rhinobatos schlegelii* (Müller and Henle, 1841)	Brown guitarfish	DD				*		
14	*Rhinobatus* sp.								*
Order: Torpediniformes (9)		**Electric rays**							
	Family: Narcinidae (5)	**Numbfishes**							
15	*Narcine brunnea* (Annandale, 1909)	Brown numbfish	NA	*					
16	*Narcine lingula* (Richardson, 1840)	Rough numbfish	DD	*					
17	*Narcine prodorsalis* (Bessednov, 1966)	Tonkin numbfish	DD	*					*
18	*Narcine timlei* (Bloch & Schneider, 1801)	Blackspotted numbfish	DD	*					
19	*Narcine* sp.	Numbfish							*
	Family: Narkidae (2)	**Sleeper rays**							
20	*Narke dipterygia* (Bloch & Schneider, 1801)	Spottail sleeper ray	DD	*					
21	*Temera hardwickii* (Gray, 1831)	Finless sleeper ray	VU	*					
	Family: Torpedinidae (2)	**Torpedo ray**							
22	*Torpedo nobiliana* (Bonaparte,1835)	Atlantic torpedo							*
23	*Torpedo* sp.	Torpedo ray							*
Order: Rajiformes (2)		**Skates**							
	Family: Rajidae (2)	**Skates**							
24	*Okamejei* cf *powelli* (Alcock, 1898)	Whiteblotched skate			*				
25	*Raja* sp.	Skates							*
Order: Myliobatiformes (46)		**Stingrays**							
	Family: Plesiobatidae (1)	**Giant stingarees**							
26	*Plesiobatis daviesi* (Wallace, 1967)	Giant stingaree	LC						*
	Family: Hexatrygonidae (1)	**Sixgill stingray**							
27	*Hexatrygon bickelii* (Heemstra & Smith, 1980)	Sixgill stingray	NA						*
	Family: Dasyatidae (25)	**Stingrays**							
28	*Dasyatis akajei* (Müller and Henle, 1841)	Red stingray	NT		*				
29	*Dasyatis bennettii* (Muller & Henle, 1841)	Bennett's stingray	DD	*					
30	*Dasyatis fluviorum* (Ogilby, 1908)	Estuary stingray	VU		*				
31	*Dasyatis microps* (Annandale, 1908)	Smalleye stingray	DD	*					
32	*Dasyatis sinensis* (Steindachner, 1892)	Chinese stingray	NA	*					
33	*Dasyatis zugei* (Müller and Henle, 1841)	Sharpnose stingray	NT	*	*				

34	*Dasyatis* sp.	Stingray						*	*
35	*Himantura bleekeri* (Blyth, 1860)	Bleeker's whipray	VU					*	
36	*Himantura fai* (Jordan & Seale, 1906)	Pink whipray	LC	*	*				
37	*Himantura gerrardi* (Gray, 1851)	Whitespotted whipray	VU	*	*				*
38	*Himantura imbricata* (Bloch & Schneider, 1801)	Scaly whipray	DD	*	*				
39	*Himantura jenkinsii* (Annandale, 1909)	Jenkin's whipray	LC	*	*				
40	*Himantura toshi* (Whitley, 1939)	Blackspotted whipray	LC	*	*				
41	*Himantura uarnacoides* (Bleeker, 1852)	Whitenose whipray	VU	*	*	*			
42	*Himantura uarnak* (Forsskal, 1775)	Spotted whipray	VU	*	*	*		*	
43	*Himantura undulata* (Bleeker, 1852)	Honeycomb whipray	VU	*	*				
44	*Himantura walga* (Müller and Henle, 1841)	Dwarf whipray	NT	*	*	*			
45	*Himantura* sp.	Whipray			*				
46	*Neotrygon annotata* (Last, 1987)	Plain stingray	NT		*				
47	*Neotrygon kuhlii* (Müller & Henle, 1841)	Bluespotted stingray	DD						*
48	*Pastinachus atrus* (Macleay, 1883)	Eastern cowtail stingray	NA	*					
49	*Pastinachus solocirostris* (Last, Manjaji and Yearsley, 2005)	Roughnose stingray	EN			*			
50	*Taeniura lymma* (Forsskal, 1775)	Ribbontail stingray	NT	*					
51	*Taeniurops meyeni* (Müller and Henle, 1841)	Round ribbontail ray	VU	*			*		
52	*Urogymnus asperrimus* (Bloch & Schneider, 1801)	Porcupine ray	VU	*					
	Family: Gymnuridae (3)	**Butterfly rays**							
53	*Gymnura micrura* (Bloch & Schneider, 1801)	Smooth butterfly ray	DD	*				*	
54	*Gymnura poecilura* (Shaw, 1804)	Longtail butterfly ray	NT	*	*				
55	*Gymnura zonura* (Bleeker, 1852)	Zonetail butterfly ray	VU		*				
	Family: Myliobatidae (7)	**Eagle rays**							
56	*Aetobatus flagellum* (Bloch & Schneider, 1801)	Longhead eagle ray	EN	*					
57	*Aetobatus ocellatus* (Kuhl, 1823)	Whitespotted eagle ray	NA	*					
58	*Aetomylaeus maculatus* (Gray, 1834)	Mottled eagle ray	EN	*					
59	*Aetomylaeus milvus* (Müller and Henle, 1841)	Ocellate eagle ray	NA	*					
60	*Aetomylaeus nichofii* (Bloch & Schneider, 1801)	Banded eagle ray	VU	*	*			*	

61	*Aetomylaeus vespertilio* (Bleeker, 1852)	Ornate eagle ray	EN		*				
62	*Myliobatis* sp.	Kite ray						*	
	Family: Rhinopteridae (3)	**Cownose rays**							
63	*Rhinoptera adspersa* (Müller and Henle, 1841)	Rough cownose ray	NA	*					
64	*Rhinoptera javanica* (Müller and Henle, 1841)	Javanese cownose ray	VU	*	*				
65	*Rhinoptera neglecta* (Ogilby, 1912)	Australian cownose ray	DD						*
	Family: Mobulidae (6)	**Devil rays**							
66	*Manta birostris* (Walbaum, 1792)	Manta ray	VU App. II			*			
67	*Mobula eregoodootenkee* (Bleeker, 1859)	Longfin devil ray	NT	*	*				
68	*Mobula japanica* (Müller and Henle, 1841)	Spinetail devil ray	NT	*					
69	*Mobula kuhlii* (Müller and Henle, 1841)	Shortfin devil ray	DD	*					
70	*Mobula thurstoni* (Lloyd, 1908)	Smooth tail devil ray	NT	*					
71	*Mobula* sp.	Devil ray		*					
	Total species = 71								
	Total families = 15								

1. Sharks: Ahmad and Lim (2012).
   Rays: Ahmad et al. (2014).
2. Maung Hla and Thein Thein Kyi (2012)
3. Howard et al. (2015).
4. San San Khine (2010).
5. Strømme et al. (1979)
6. Krakstad et al. (2014).

The number of species which are actually caught and consumed however, following a review of landing site reports and the current surveys, is 24 for sharks and 14 for rays (Table 2).

Table 2 List of shark and ray species recorded at landing sites (see below table for source data)

#	Common name	Species name	Source (see below)		
			2004[1]	2007-08[2]	2014/15[3]
Shark					
1	Silvertip shark	*Carcharhinus albimarginatus*	*		
2	Graceful shark	*Carcharhinus amblyrhynchoides*	*		*
3	Pigeye shark	*Carcharhinus amboinensis*	*		
4	Spinner shark	*Carcharhinus brevipinna*	*		
5	Whitecheek shark	*Carcharhinus dussumieri*	*		
6	Silky shark	*Carcharhinus falciformis*	*		
7	Bull shark	*Carcharhinus leucas*	*	*	
8	Black tip shark	*Carcharhinus limbatus*			*

9	Black tip reef shark	*Carcharhinus melanopterus*	*		*
10	Sandbar shark	*Carcharhinus plumbeus*	*		*
11	Spot-tail shark	*Carcharhinus sorrah*	*		*
12	Hooktooth shark	*Chaenogaleus macrostoma*	*		
13	Grey bamboo shark	*Chiloscyllium griseum*	*	*	*
14	Brownbanded bamboo shark	*Chiloscyllium punctatum*	*		*
15	Tiger Shark	*Galeocerdo cuvier*	*		*
16	Sliteye shark	*Loxodon macrorhinus*	*		*
17	Arabian smooth-hound	*Mustelus mosis*			*
18	Milk shark	*Rhizoprionodon acutus*	*		
19	Grey sharpnose shark	*Rhizoprionodon oligolinx*	*		
20	Spadenose shark	*Scoliodon laticaudus*	*	*	*
21	Scalloped hammerhead	*Sphyrna lewini*	*	*	*
22	Great hammerhead	*Sphyrna mokarran*	*		
23	Piked spurdog	*Squalus megalops*			*
24	Zebra shark	*Stegostoma fasciatum*	*		

Rays					
1	Longtail butterfly ray	*Gymnura poecilura*		*	
2	Whitespotted whipray	*Himantura gerrardi*		*	
3	Whitenose whipray	*Himantura uarnacoides*		*	*
4	Reticulate whipray	*Himantura uarnak*			*
5	Dwarf whipray	*Himantura walga*		*	*
6	Blue-spotted mask ray	*Neotrygon kuhlii*		*	
7	Whiteblotched skate	*Okamejei* cf *powelli*			*
8	Roughnose stingray	*Pastinachus solocirostris*			*
9	Shark ray	*Rhina ancylostoma*		*	
10	Sharpnose guitarfish	*Rhinobatos granulatus*		*	
11	Spotted guitarshark	*Rhinobatos* cf *puncifer*		*	*
12	Brown guitarshark	*Rhinobatos schlegelii*		*	
13	Blotched fantial ray	*Taeniura meyeni*		*	
14	Porcupine ray	*Urogymnus asperrimus*		*	

Surveys of shark landing sites:

1. Sittway, Hlaing Gyi, Myeik in 2004 (Maung Hla and Thein Thein Kyi, 2012).
2. Pazundaung (Yangon) 2006-2010 (San San Khine, 2010).
3. Hlain Gyi, Yangon, Dawei, Myeik, Kawthaung and Ranong 2014-15 (Howard et al., 2015).

Of the above, the most commonly caught shark species, observed from surveys in 2006-2010 in Yangon (San San Khine, 2010) was the spadenose shark, *Scoliodon laticaudus*, with 64% of the catch, followed by scalloped hammerhead shark, *Sphyrna lewini* and grey bamboo shark, *Chiloscyllium griseum*. For rays, the most commonly caught species was the dwarf whipray, *Himantura walga*, with 95% of the catch, followed by whitenose whipray, *Himantura uarnacoides.* A survey of markets in 2015 (Howard et al. 2015) found that the most common species of shark were

spot-tail shark, *Carcharhinus sorrah,* spadenose shark, *Scoliodon laticaudus,* Indonesian bambooshark*, Chiloscyllium hasselti,* and brownbanded bambooshark, *Chiloscyllium punctatum.* For rays, markets mostly included bluespotted stingray, *Neotrygon kuhlii,* scaly whipray, *Himantura imbricata, and* whitespotted whipray, *Himantura gerrardi.* For the Mobula rays, although not in large numbers, two species were observed to be caught including the Japanese devilray, *Mobula japonica* and bentfin devilray, *M. thurstoni*.

3. Legislation

Within Myanmar two pieces of legislation have been enacted which specifically target the conservation/management of shark species:

1. **Notification 2/2001**: this law prohibits the capture and sale of Whale shark (*Rhincodon typus*);
2. **Notification 2/2004**: This law outlines the creation of two shark reserves (see Figure 1) within the Myeik Archipelago in which targeting of sharks is prohibited (not including rays).

The two shark reserves were created in 2004 by the DoF and comprise almost 25% of the archipelago's total area; however no effective conservation plan has been developed for these sites meaning that the reserves lack physical demarcation, active law enforcement, catch monitoring or awareness-raising programmes. At landing sites visited during this shark assessments by Howard et al. (2015), less than 10% of respondents were aware of the reserves and this was usually only for the block surrounding Lampi Island.

There is also a nationwide ban on shark fishing which dates back to 2009 (Appendix I). This is in the form of an order relating to CITES species by the Director General of DoF. The document refers to the protection of whale sharks, being the only shark CITES species at the time in Myanmar, but states that all shark species with Myanmar are to be protected. Specifically stating that it is illegal to catch, kill, disturb, transport, sell or keep any shark species. Although this is only an order, and not a notification by DoF, it does have the potential to nullify the purpose of the shark reserves - given that the ban covers all of Myanmar's waters. Incidental catches of sharks in nets or on long-lines and their subsequent sale does not appear illegal or at least seems to be tolerated by authorities. No legislation exists for the capture or selling of rays. Myanmar is, however, a signatory to the CITES convention and a number of shark and ray species are listed in CITES Appendix I or Appendix II (see Table 1).

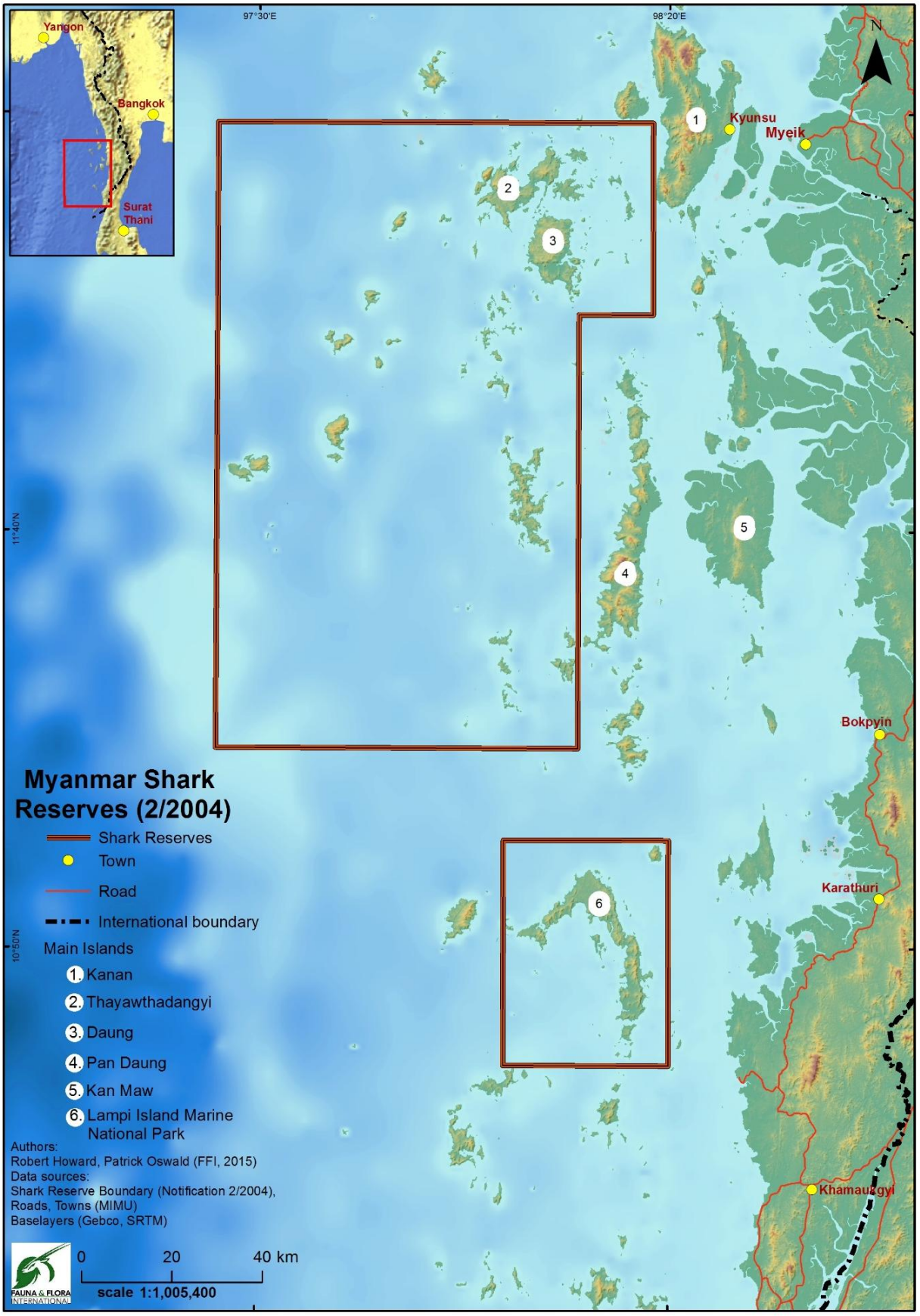

Figure 1 Myanmar shark reserve boundaries (red boxes). Notification 2/2004

4. Fisheries for sharks and rays in Myanmar[1]

4.1. Gear

Before the 2009 ban was introduced, fishers report using pelagic longlines varying from 200-1000 hooks/line and up to 3km long to target 'big-sized sharks'. Eels and other 'large' fish were used as bait. Interestingly fishers interviewed in Ayeyarwady Region report that the peak season was from February to May. However fishers in Dawei and Myeik said that the rainy season (i.e. July-September) was the best time to catch sharks which concurs with Khaing Khaing Thein (2008) surveys of landing sites covering Sittway, Hlaing Gyi and Myeik in which the majority of landings were during the wet season. This difference may be a result of the different fishing grounds accessed.

Since the ban on shark fishing, most fishers have switched to gillnetting with many targeting hilsa (*Tenualosa ilisha and T.toli*), mullet and a range of other bony fish species plus crabs and lobsters. Longlines are still used for catching species such as mackerel but with smaller hook sizes and fishing inshore from small wooden boats run by 20-30hp engines. Fishers state that sharks are caught accidently with most being juveniles, although all sizes of rays are hooked. This is the same for other gears such as bottom trawlers, grouper traps, drift nets and gill nets, in which sharks are caught as by-catch. In Thayawthadangyi Island, however, it is reported that one or two boats still target sharks.

Targeted shark fishing is reported to be conducted by fishers from Myeik. This is undertaken by longlining with hooks designed specifically for sharks. Each longline is approximately 500m long with around 800 hooks. For bait, small sardines are used or the hooks are simply covered with coagulated palm oil. Elsewhere in the archipelago dynamite is used as an indirect form of targeting sharks by luring them to an area that has been recently bombed as they became attracted to the dead fish floating in the water. The sharks are then caught using hook and line. However this appears more of a "bonus" from dynamite fishing rather than the main motivation for its use.

Rays are caught in similar ways to sharks using drift or stationary nets, but also by fish and shrimp trawlers as by-catch. For the larger species of rays, longlines are used. In Ayeyarwady Region fishers have started targeting manta and mobula rays near Coco Kyun Island using 18 inch mesh size gillnets. These fishers work for 90 days at the fishing ground and every 15 days a "mother boat" will collect their catch. In the Langann Island group within Myeik Archipelago, a fishery targeting devil rays has been going on for approximately 8 years, although not by villagers on the island. These fishers use purse seine nets from 10-15m wooden boats.

4.2. Status and catches of shark and rays

With respect to the IUCN status for sharks in Myanmar, two are listed as Critically Endangered (*Glyphis gangeticus* and *Glyphis siamensis*) and two as Endangered (*Sphyrna lewini* and *Sphyrna mokarran*). A further nine sharks are listed as Vulnerable and 21 Near Threatened (Table 1). For rays, two species are listed as Critically Endangered (*Pristis pectinata* and *Pristis pristis*, both sawfishes) and five species as Endangered (*Aetobatus flagellum, Aetomylaeus maculatus, Aetomylaeus vespertilio, Anoxypristis cuspidata* and *Pastinachus solocirostris*); with 18 listed as Vulnerable and nine Near Threatened. With regards to CITES regulations, one shark is listed in Appendix I (*Rhincodon typus)* and three in Appendix II (*Sphyrna lewini, Sphyrna mokarran and Sphyrna zygaena*). For rays there are three in Appendix I (*Anoxypristis cuspidata, Pristis pectinata* and *Pristis pristis)* and one in Appendix II (*Manta birostris*). The only species with a high threat status (EN or CE or Appendix I or II) that was observed in the markets in the current assessment was *Sphyrna lewini* in which several individuals of relatively small size were observed in the Thabawwseik beach market in Dawei.

[1] Information within this section sourced from Howard *et al.* (2015).

Following the ban placed on shark fishing in 2009, catch data on this group of fish is no longer collected by the DoF and historical catch data is difficult to access except for specific survey data or anecdotal information from fishers. However, several scientific surveys conducted to either monitor the status of Myanmar's fisheries as a whole, monitor landing sites or assessments of the health of coral reef ecosystems, together provide information on the past and current status of shark populations (see below). For rays, however, DoF in Tanintharyi has records from 2010 to the present on catches, although officers state that caution should be used in interpreting the data.

- **RV Dr Fridtjof Nansen surveys**

In 1978-1980 the research vessel Dr Fridtjof Nansen undertook surveys to find new fisheries resources for Myanmar (Strømme et al. 1979). This was repeated and expanded in 2013 with ecosystem-based surveys that included estimating the abundances of demersal and pelagic fish resources (Krakstad et al. 2014) as part of the BOBLME Project. Between 1978-80 to 2013 these two surveys found a 50% decrease in both shark and ray catches (Figure2).However, in comparing the changes in biomass between the two surveys the authors note that caution must be taken given the differences in survey methods (*i.e.* aimed trawls verse random trawls) and the number of replicates done. They do state however that "there is a shift in standing stock biomass away from long-lived and highly valuable species towards smaller fish with shorter life spans and of lower commercial value….reflect[s] a picture of a fishery that may suffer both from growth and recruitment overfishing".

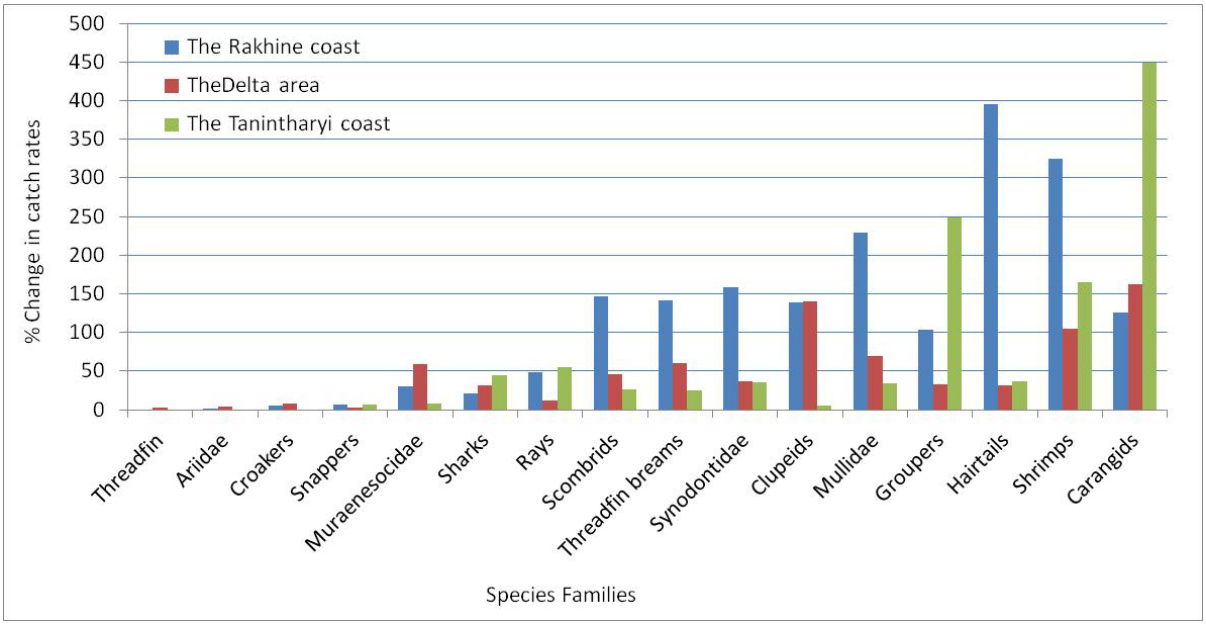

Figure 2 Percentage decreases in demersal catch rates, including sharks and rays, between the 1979 survey (aimed trawling) and the 2013 survey (random trawls). 1979 values = 100% (Source Krakstad et al. 2014)

Between June 2006 and May 2010, San San Khine undertook a PhD study of elasmobranch landings at the Nyauna Dan Jetty in Yangon where fishing vessels from the Ayeyarwady landed their catch (San San Khine, 2010). Catch rates of 4 species of shark and 12 ray species were monitored over this period. For both sharks and rays a marked decrease in landings was observed over the survey period. Shark individual recordings declined by 49% (2007-08 annual catch of 6462 individuals; 2008-09 annual catch of 3289 individuals) and rays by 48% (2007-08 annual catch of 38600 individuals; 2008-09 annual catch of 20159 individuals). Of these catches, the most abundant shark species recorded was *Scoliodon laticaudus* which declined from 4070 individuals in 2007-08 to 2261 in 2008-09. For rays the most dominant catch was *Himantura walga* which decreased from 36530 individuals in 2007-08 to 19600 in 2008-09.

- **Coral reef assessments, Myeik Archipelago**

Since 2013 Fauna & Flora International (FFI) have undertaken coral reef assessments of the Myeik Archipelago using the Reef Check methodology. The study includes standardized transects replicated over a reef to record fish abundance and diversity and several other variables at an average depth of 6m. During 115 surveys (covering the period from January 2013 to May 2014) not a single shark or ray was observed during the transects (Howard et al. 2014). In December 2014 FFI undertook further surveys of the archipelago and during 28 dives not one shark was seen (Howard (ed) 2015). For rays, the blue-spotted stingray (*Neotrygon kuhlii*) was observed at several sites but in very low numbers.

- **Department of Fisheries data**

Department of Fisheries officers in each district collect catch data from select landing sites within their jurisdiction. The below information was provided by the Tanintharyi Regional fisheries office, which includes data on ray catches for Dawei, Myeik and Kawthaung Districts.

Table 3 Catch in kilograms of rays in the Tanintharyi Region. Source data DoF Dawei Regional Office

Year	Catch (viss)	Catch (kg)
2010-2011	5158000	3,438,666
2011-2012	4552000	3,034,667
2012-2013	5461000	3,640,667
2013-2014	6134000	4,089,333

As noted above the data should be interpreted with caution given as some fisheries officers may have inflated their numbers. Given the decreases in ray catches observed by the other studies discussed above, these figures appear unrealistic but on recent observations at fish markets and landing sites, large quantities of rays are being sold with 400 litre ice boxes full of rays at several markets. It is possible that what is being observed is a case of hyperstability (where catches remain stable despite actual population declines) and catches are exceeding what the current populations of rays can support in the long-term. Alternatively, the slight increase in catches noted from the Fisheries Department data maybe a response of the shark ban in 2009 with fishers changing their target species.

- **BOBLME/FFI SocMon surveys**

In 2014, as part of the BOBLME Project, FFI undertook socio-economic surveys of two island communities within Myeik Archipelago (Schneider et al. 2014). One of the questions from this survey related to the perceived decline in catch trends for a range of marine resources as observed by local villagers. Over 50% of household heads reported a decline in shark and ray catch trends over the past 5 years with the majority of other interviewees either unsure or preferring not to answer (no respondent reported an increase in catches) (Figure 3).

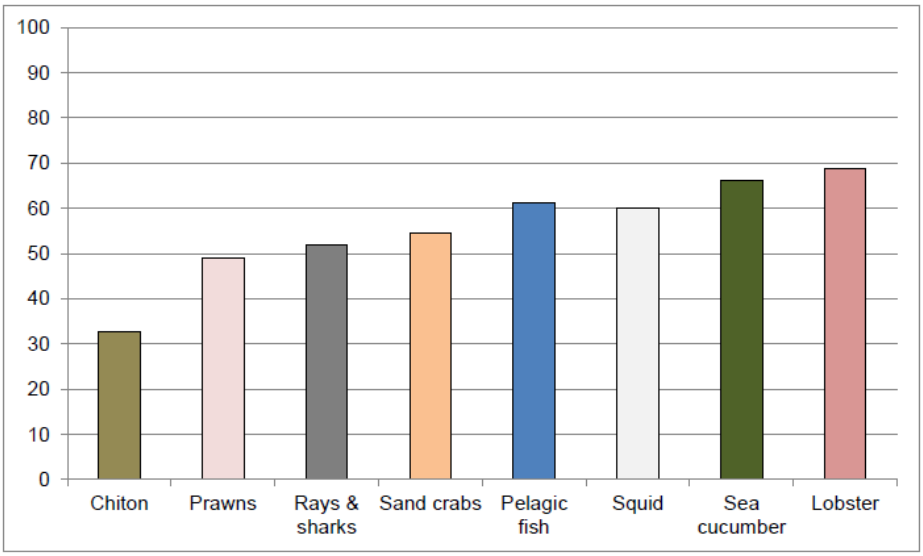

Figure 3 Percentage of household heads who reported perceived declines in catch trends over the past 5 years (source: Schnieder et al. 2014)

- **WCS Dive tourism surveys**

As part of their Marine Conservation in Myanmar Report from 2013, WCS (Wildlife Conservation Society) undertook dive tourism surveys to gain an understanding of the status of the marine environment through diver perceptions (Holmes et al. 2013). Six dive guides were interviewed, some of whom have been working since 2005, and all reported a decline in shark sightings during dives. Further, tourists recently returning from dives noticed the rarity of sharks in the area. This information was based on approximately 674 dives within the Myeik Archipelago.

4.3. Economics of the shark and ray fishery

Table 4 details the prices of shark and ray products before and after the ban was imposed (in 2009) as provided by the fishers and traders interviewed by Howard et al (2015). Included in the table is a list of the current prices of other marine resources to enable a comparison with the value of sharks. As can be seen, fresh shark and ray meat is similar in price to other marine products. The price for dried shark fins is a fraction of what could be earned before the ban was in place (this is surprising given that often when a product becomes banned, the price increases) but at 35USD/kg (in the Ayeyarwady Region), there is still an incentive for fishers to target large sharks. No price was given for the Tanintharyi area or in Ranong Thailand for fins. Fisher groups in the Ayeyarwady Region stated that they could earn as much as 30,000USD/month targeting sharks and their monthly income dropped about 50% following the ban when they switched from pelagic longlining to target sharks to gillnetting hilsa, shad and other bony fish. Manta rays and other mobula gill rakers are still highly sought-after and their high price gives fishers an incentive to target them.

Table 4 Price of sharks and rays and their products. Data provided by fishers and traders in Ayeyarwady Region, Yangon, Dawei, Myeik, Ranong and the island villagers of Don Pale, Palawar, Lin Long and Langann in Myeik Archipelago

Product	Before Ban (all in USD)	Now (all in USD)
Myanmar		
Dried shark fins	Small 66-100/kg; Large 134-200/kg	35/kg (price from Ayeyarwady Region only)
Salt-dried shark meat	4-4.8/kg	Consumed locally, no price given
Dried shark skin	0.66/kg	-
Shark fresh meat	-	2-3/1.5kg

Dried shark meat	-	8-10/1.5kg
Ray fresh meat	-	2-2.50/1.5kg
Dried ray meat	-	7-8/1.5kg
Dried mobula rays gill rakers		100-300/1.5kg
Fresh devil ray	-	20-50 per individual
Dried manta gill rakers	66/kg-$135/kg	135/kg
Manta salted meat	6.6/kg	-
Ranong (Thailand)		
Fresh shark meat	-	0.30-1.25/kg
Fresh ray meat	-	0.30-1.25/kg
Other marine resource products in Myanmar		
Fresh Sand crab	-	1-3/1.5kg (size dependent)
Fresh Mullet	-	1-2.50/1.5kg (species dependent)
Fresh Shrimp	-	2/1.5kg
Fresh Mackerel	-	1.50-3/kg
Fresh Squid	-	2/kg

From the markets and jetties noted above, shark and ray products are sent to a number of destinations within Myanmar and for export to countries within the region. In Hlaing Gyi, fishers said that small-sized sharks and rays were caught as by-catch and consumed by crews and their families, while those that caught larger sharks would process them on the boats at sea to avoid detection before offloading them at unknown markets. At the Yangon market, traders said that dried ray skin was exported to Thailand and salt-dried meat to China. In Dawei, traders state that the juvenile sharks and ray were usually for local markets in the region but dried meat was often sent to Yangon and to states further in the north of Myanmar. This was similar to shark and ray products in Myeik, however dried fins were all being sent to China through Thailand. Likewise, in Ranong, dried parts of sharks including fins, skulls, skin and the meat were being exported to China while some were destined for Singapore markets. The skin of some ray species such as *Himantura uarnacoides, H. gerrardi, H. uarnak, H. undulata* and *Pastinachus* spp. were valued as quality leather. Shark's teeth and jaws are used for the curio trade. The fins of shark and gill rakers of manta and mobula rays were highly valued as gourmet food and Chinese medicine.

5. Outlook

As noted in the introduction, this document will serve as the basis for discussions with relevant stakeholders to finalize the NPOA-Sharks for Myanmar, with such discussions focusing on the Action Plan Management Strategies proposed in the next section. The following steps are therefore designed as a guide for the DoF to reach the final NPOA with a key result being agreed-upon actions with the responsible persons/groups and deadlines identified:

1. Formation of a small national working group which will include DoF staff from management and legal sections, Naval staff, MFF (Myanmar Fisheries Federation) representatives, and conservation NGO representatives. Careful consideration will need to be given to the chair of this group in order to referee the competing interests. Either an independent chair is appointed or the position is a revolving one i.e. once a year the position is given to one of

the main institutions. Administration of the working group including organising meetings etc. should be handled by DoF give the subject matter.
2. First working group meeting to discuss a draft NPOA.
3. Regional meetings led by the Chair of the national working group (or the DoF shark Technical Adviser) in Rahkine, Yangon and Tanintharyi. Participants to include DoF District Officers, MFF, Naval officers and NGOs.
4. Second national working group meeting to discuss the results of regional meetings and finalise the draft NPOA.
5. Final NPOA document submitted to the Minister of MLFRD for approval.
6. Implementation of NPOA-Sharks Myanmar.

6. Action plan management strategies

6.1. Challenges and solutions

- **Data on catches**

Sharks are not targeted by most fishers, given the ban placed in 2009, but are caught together with other commercially important species. They are brought back as a whole to port and sold at a reasonable price with the fins fetching a better price. As there are very few fishers that target only sharks, and sharks are harvested mostly as by-catch, it is very difficult to make an accurate assessment of shark resources just using catch reports provided by fishers. This lack of appropriate data limits the quality of information available for stock assessment and effective management.

In 2015 an assessment of the shark and ray fishery in Myanmar was undertaken (Howard et al. 2015) with much of the data used to support the action plan. What the assessment identified was a lack of shark catch data, either one-off reports or monthly statistics. In this respect, assessments of the resource status of sharks should be undertaken on a continuous basis by collecting the following data at landing sites and/or markets on the species landed, including sizes and abundances:

- Catch data by species by commercial fishing vessels
- Catch survey data by species by survey vessels
- Landings data by species from fishing ports
- Catch statistics data.

Landing site data etc. should be collected on a monthly basis by teams of DoF staff trained in shark taxonomy (see capacity development below). These staff will be from the main landing site districts with key sites to include: Hlaing Gyi (Rakhine), Yangon City (Yangon), Dawei and Myeik (Tanintharyi).

- **Monitoring data**

To avoid issues of hyperstability whereby catch per unit effort (CPUE) remains high while the stock is actually declining, monitoring of shark stocks should not only be undertaken through catch data at landing sites but also through scientific surveys to accurately assess the status of shark populations. This is also relevant as what comes into landing sites is often juveniles, as by-catch, and does not represent the whole population. Randomly located scientific surveys are therefore required which target a variety of habitats and depths so as to include a range of shark species. Several surveys have been done of shark populations within Myanmar prior to 2015 e.g. FFI reef check surveys and the Nansen fisheries assessments. However, such surveys need to be conducted on a regular basis (eg. the Nansen surveys) and include more data on species (eg. Reef check). Furthermore, the DoF needs to encourage multinational surveys targeted on deep-water and oceanic species. Specific monitoring of whale shark populations could also been undertaken through collaboration with dive operators, in which tourist photos showing distinct patterning or scarring can be uploaded to websites such as Eco Ocean for use in mark-recapture analysis.

- **Development of human capacity**

Since most of the sharks and rays caught in Myanmar are very similar to each other, the identification of different species of sharks and rays in the field is not easy. Proper taxonomy is required to allow researchers to identify sharks and rays correctly. In 2014 and 2015 this issue was addressed by training 23 Myanmar biologists in shark identification conducted by SEAFDEC/MFRDMD. Although this training included several DoF staff, follow-up courses are required to ensure all DoF officers who work at landing sites and checkpoints have received this training. This should be supported through the creation of a national collection of sharks and rays covering both freshwater and marine species. DoF Myanmar and universities can also directly contribute to the better understanding of the taxonomy and management of sharks and rays by involving their staff and post-graduate students in trainings and workshops at national and regional levels.

The following programmes should be implemented in order to coordinate research on sharks and to enhance the knowledge of species:

- Improve and develop knowledge on the taxonomy, biology and ecology of elasmobranch resources in collaboration with SEAFDEC/MFRDMD.
- Participate in seminars and meetings related to elasmobranchs at national, regional and international levels.
- Attend national, regional and international training courses on elasmobranchs to build highly capable researchers.

- **Education and awareness**

Though many fishers and traders are aware of the ban on shark fishing and do not actively target them, they still keep and sell sharks as by-catch, many of which are juveniles (Howard et al. 2015). Although this is in part driven by food security needs, there is also an issue regarding the fact that the message of why sharks require such protection is not clear. Fishers, traders and consumers need to stop fishing, buying or eating sharks because they understand the consequences it will have for elasmobranch populations and not just because the government says so. The DoF and NGO partners therefore need to implement an awareness campaign educating people on why sharks are protected, why fisheries need to be sustainable as a whole and the basic elements of marine conservation.

- **Data on shark utilization, marketing and trade**

In Myanmar, sharks landed in certain quantities locally are subjected to quite high levels of utilization. Meat is used in the form of fresh as well as dried. Shark skin is used as a raw material for high-grade skin products, and cartilage is used in pharmaceuticals. Heads and some other discarded parts of sharks and rays are used as bait for fish and crab traps. Currently almost all shark species are accepted as table food.

However, despite the above observations, detailed and compiled information on the marketing and trading routes are still inadequate without any proper data collection mechanisms. Studies should attempt to elucidate individual traders and middle men both in Myanmar and in port towns such as Ranong in Thailand; and marketing routes from landing sites to Yangon and also across international borders.

Socio-economic surveys on marine resources have been carried out in selected communities within Myanmar, coupled with assessments specific to sharks at key landing sites (Schneider et al. 2014, Howard et al. 2015). Such assessments need to be conducted on a regular basis in order to monitor the socio-economic importance of sharks, the demographic profile of shark fishers and fishery systems in places which process shark products.

- **Conservation and management**

Although several laws have been put in place that deals with shark conservation, the actual application of these laws and the management of fisheries related to sharks has been minimal. This problem stems from a number of issues:

- Lack of enforcement in applying the law. This results from an absence of funds and therefore resources for DoF to undertake on-water patrols including boat inspections.
- No identification or use of indicators for the sustainable exploitation of shark and ray by-catch.
- Lack of information on critical habitats including breeding and nursery grounds in which to focus compliance activities.
- No requirements regarding the catch-and-release of by-catch.
- No data collection on shark species and abundances at landing sites and/or markets. Collection of ray catches is undertaken but not at a species level.

The current management measures that are designed to generally or specifically conserve and/or manage stocks of sharks and rays, require either a review or strategies developed to ensure that they are not just paper plans but lead to real improvements in stocks. The following is a list of current strategies and also strategies which are being planned:

- **Myanmar Marine Fisheries Law 1990** regulates fishing effort by quotas and seasonally but does not include specific regulations for shark fisheries.
- In 2009 a **nationwide ban on shark fishing** was enacted in Myanmar through an Order from the Director General of DoF (see section on Legislation for specifics). This Order needs to be strengthened into a more formal legal document such as a Notification. Importantly this document also needs to address the issue of by-catch as a marketable product and the penalties for contravening the law.

Within Myeik Archipelago, one of the richest marine areas in Myanmar, **two shark protected areas** were declared in 2004 by Department of Fisheries in which the targeting of sharks is illegal. A review of these reserves through a Management Effectiveness Assessment Tool (MEAT) analysis found them to be underperforming but, most importantly, redundant given the nationwide ban (i.e. whether inside or outside the reserve, fishers cannot target sharks) (DoF/FFI/BOBLME, 2015). The review proposed two possible actions:

1. Cancellation of Notification 2/2004: given there is a country-wide ban on fishing of sharks anyway, the premise for the reserves is now redundant as the same law applies for fisherman whether inside or outside the reserve boundaries. This would make enforcement easier as violators do not need to be caught actively fishing for sharks within the reserves but can be apprehended anywhere in Myanmar. However, the NPOA will need to address the large quantity of juvenile sharks still observed in the markets and reported as by-catch (Howard et al. 2015). There is also an issue with the current strength of the law declaring the nationwide ban (see above). At present this sits within an Order. If Notification 2/2004 is cancelled, the nationwide ban needs a notification/regulation of its own.
2. Identify core zones in the Shark Reserves and establish MPAs: given the extent of the reserves and lack of resources to monitor such large areas, the identification of key areas of biodiversity within the reserves could be designated as no-take zones in which all fishing is banned. This would include breeding and nursery grounds and could curb the high number of juvenile sharks caught as by-catch. The process would require a multi-stakeholder planning process including scientific assessments of the areas to identify and recommend the best sites. Notification 2/2004 would still stand but the boundaries and rules would be amended.

Lampi Island and surrounding islands were established as Marine National Parks of Myanmar in 1996. Since then, **Lampi Marine National Park** has been operating under the "Protection of Wildlife and Protected Areas Law (1994)" and "Protection of Wildlife and Protected Areas Rule (2002)". Among many other restrictions aimed at the conservation of the ecosystem, fishing within the two nautical miles from Lampi island low water level mark by any vessel is prohibited.

Under Myanmar's National Environmental Policy, Agenda 21 and the National Biodiversity Strategy and Action Plan (NBSAP) (MOECAF 2011), Myanmar's protected areas require strengthening, currently lacking representativeness and comprehensiveness. The largest gap is within marine and coastal ecosystems including coral reefs, seagrass areas, mudflats and mangroves. Myanmar's Fifth National Report to the United Nations Convention on Biological Diversity (MOECAF 2014) notes the "real and pressing" need to have these areas protected. Currently only four protected areas exist which include marine components, excluding the shark reserves. Extensive surveys, however, are being undertaken to elucidate key marine areas of biodiversity to aid marine spatial planning including the designation of protected areas. Although some sharks migrate too widely for MPAs to be of benefit to adults, they can help to protect vulnerable life stages in areas such as nurseries and breeding grounds (Davies et al. 2012). This information is, however, limited and needs to be collected to ensure important shark habitats are included in the MPA network.

Steps are also underway to develop the co-management of marine resources with local communities to ensure suitable use. Although these sites may not be large enough to protect all shark species, they are institutionalizing sustainable fisheries, and leading to enhanced environmental awareness and responsibility.

- **International/Regional cooperation**

Cooperation is needed with Thailand, in which many of Myanmar's sharks are sold, either through land borders or taken directly to fishing ports/landing sites (Howard *et al.* 2015). Although shark fishing and trade is legal in Thailand, agreements need to be made between the two countries in terms of what markets in Thailand can buy from Myanmar fishers.

Furthermore, although Myanmar has banned foreign fishing vessels from operating in its waters since April 2014, there is still concern that Illegal, Unregulated and Unreported (IUU) fishing activities by foreign fleets will undermine the impacts of NPOAs for the conservation and management of sharks. Therefore Myanmar will continue its cooperation with countries and programmes involved with FAO (e.g. the BOBLME Strategic Action Programme (BOBLME 2015)) and regional fisheries management organizations (e.g. SEAFDEC). This will involve collecting information and accurately assessing the impacts of IUU fishing under the goal of ensuring that such activities will have little effect on the outcomes from NPOAs for the conservation and management of sharks.

7. Priorities

The following programmes should be implemented to ensure the sustainable exploitation of sharks and rays resources in Myanmar.

- **Strengthening of current rules and regulations**. First and foremost the current ban to be strengthened with additional specifics on by-catch, immature shark catches and penalties. Action to be taken by Administration and Finance Division.
- **Improvement of data collection** on landings by major species. Action to be taken by Divisional-, District - and Township-level fisheries officers in collaboration with researchers from the Research Division and universities.
- **Identification of natural habitats for breeding and nursery grounds** of sharks and rays for conservation and protection. Action to be taken by the Research Division with support from local, regional and international scientists.
- **Study on the ecology and biology of sharks and rays** to determine the status of stocks. Action to be taken by the Research Division with support from local, regional and international scientists.
- **Improvement of data acquisition on shark products and trade.** Action to be taken by the Fisheries Statistics Division.

- **Active enforcement at sea, landing sites and markets.** Focus on illegal targeting of sharks at sea and selling and trading of large and protected shark species. Action to be taken by the Fisheries Management Division.
- **Stronger inter-governmental cooperation between the DoF and Myanmar's Navy** to actively monitor fishing vessels at sea and their catch. Action to be taken by the Fisheries Management Division.
- **Monitoring and evaluation of NPOA-Sharks implementation** and provision of regular progress reports. Action to be taken by the Fisheries Statistics Division.

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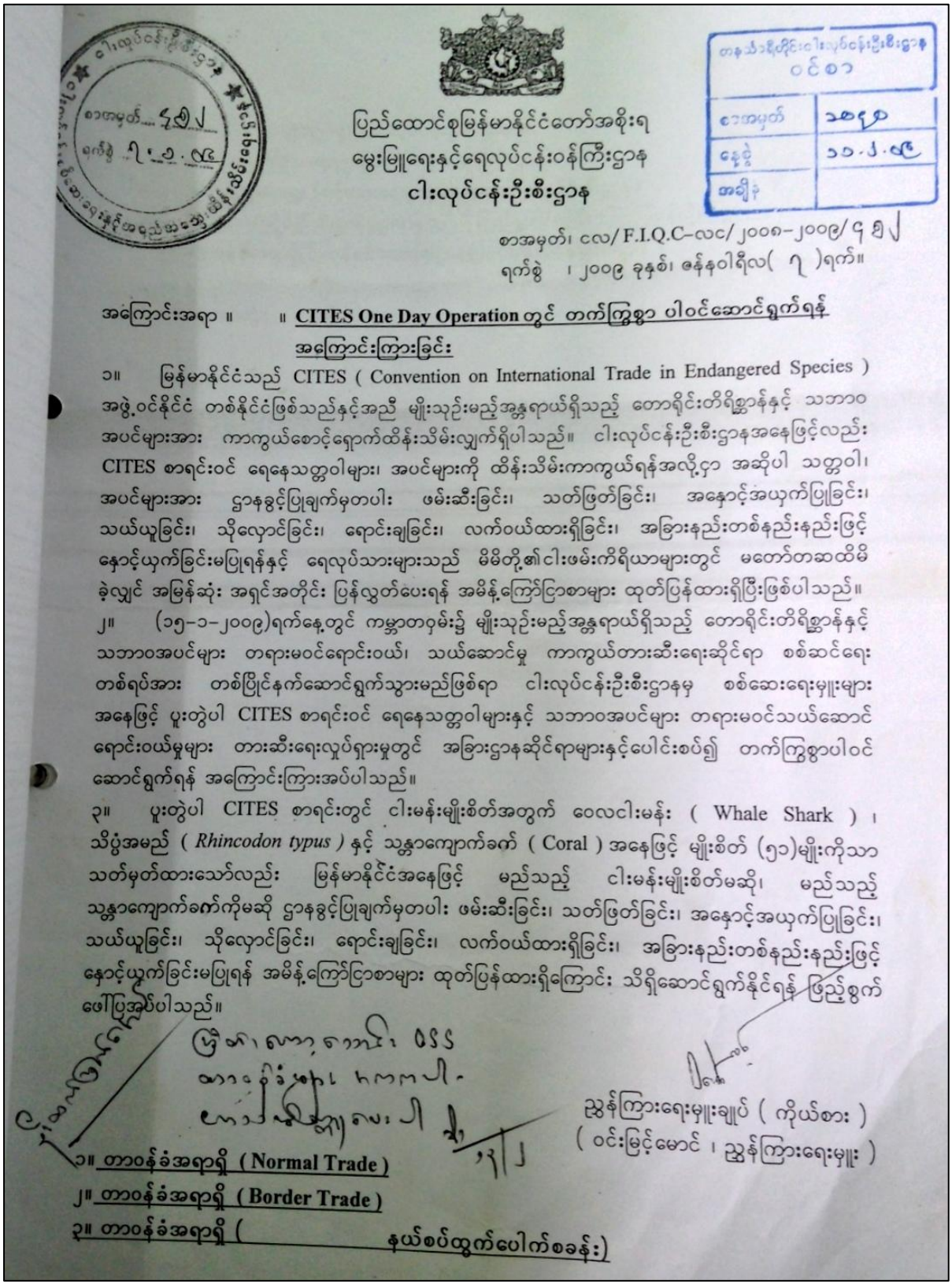
Appendix I Nationwide shark ban order



ပြည်ထောင်စုမြန်မာနိုင်ငံတော်အစိုးရ
မွေးမြူရေးနှင့်ရေလုပ်ငန်းဝန်ကြီးဌာန
ငါးလုပ်ငန်းဦးစီးဌာန

စာအမှတ်၊ ငလ/ F.I.Q.C–လင/ ၂၀၀၈–၂၀၀၉/ ၄ ၅၂
ရက်စွဲ ၊ ၂၀၀၉ ခုနှစ်၊ ဧန်နဝါရီလ(၇)ရက်။

အကြောင်းအရာ ။ ။ **CITES One Day Operation တွင် တက်ကြွစွာ ပါဝင်ဆောင်ရွက်ရန်**

အကြောင်းကြားခြင်း

၁။ မြန်မာနိုင်ငံသည် CITES (Convention on International Trade in Endangered Species) အဖွဲ့ဝင်နိုင်ငံ တစ်နိုင်ငံဖြစ်သည်နှင့်အညီ မျိုးသုဉ်းမည့်အန္တရာယ်ရှိသည့် တောရိုင်းတိရိစ္ဆာန်နှင့် သဘာဝ အပင်များအား ကာကွယ်စောင့်ရှောက်ထိန်းသိမ်းလျက်ရှိပါသည်။ ငါးလုပ်ငန်းဦးစီးဌာနအနေဖြင့်လည်း CITES စာရင်းဝင် ရေနေသတ္တဝါများ၊ အပင်များကို ထိန်းသိမ်းကာကွယ်ရန်အလို့ငှာ အဆိုပါ သတ္တဝါ၊ အပင်များအား ဌာနခွင့်ပြုချက်မှတပါး ဖမ်းဆီးခြင်း၊ သတ်ဖြတ်ခြင်း၊ အနှောင့်အယှက်ပြုခြင်း၊ သယ်ယူခြင်း၊ သိုလှောင်ခြင်း၊ ရောင်းချခြင်း၊ လက်ဝယ်ထားရှိခြင်း၊ အခြားနည်းတစ်နည်းနည်းဖြင့် နှောင့်ယှက်ခြင်းမပြုရန်နှင့် ရေလုပ်သားများသည် မိမိတို့၏ငါးဖမ်းကိရိယာများတွင် မတော်တဆထိမိခဲ့လျှင် အမြန်ဆုံး အရှင်အတိုင်း ပြန်လွတ်ပေးရန် အမိန့်ကြော်ငြာစာများ ထုတ်ပြန်ထားရှိပြီးဖြစ်ပါသည်။

၂။ (၁၅–၁–၂၀၀၉)ရက်နေ့တွင် ကမ္ဘာတဝှမ်း၌ မျိုးသုဉ်းမည့်အန္တရာယ်ရှိသည့် တောရိုင်းတိရိစ္ဆာန်နှင့် သဘာဝအပင်များ တရားမဝင်ရောင်းဝယ်၊ သယ်ဆောင်မှု ကာကွယ်တားဆီးရေးဆိုင်ရာ စစ်ဆင်ရေး တစ်ရပ်အား တစ်ပြိုင်နက်ဆောင်ရွက်သွားမည်ဖြစ်ရာ ငါးလုပ်ငန်းဦးစီးဌာနမှ စစ်ဆေးရေးမှူးများ အနေဖြင့် ပူးတွဲပါ CITES စာရင်းဝင် ရေနေသတ္တဝါများနှင့် သဘာဝအပင်များ တရားမဝင်သယ်ဆောင် ရောင်းဝယ်မှုများ တားဆီးရေးလုပ်ရှားမှုတွင် အခြားဌာနဆိုင်ရာများနှင့်ပေါင်းစပ်၍ တက်ကြွစွာပါဝင် ဆောင်ရွက်ရန် အကြောင်းကြားအပ်ပါသည်။

၃။ ပူးတွဲပါ CITES စာရင်းတွင် ငါးမန်းမျိုးစိတ်အတွက် ဝေလငါးမန်း (Whale Shark) ၊ သိပ္ပံအမည် (*Rhincodon typus*) နှင့် သန္တာကျောက်ခက် (Coral) အနေဖြင့် မျိုးစိတ် (၅၁)မျိုးကိုသာ သတ်မှတ်ထားသော်လည်း မြန်မာနိုင်ငံအနေဖြင့် မည်သည့် ငါးမန်းမျိုးစိတ်မဆို၊ မည်သည့် သန္တာကျောက်ခက်ကိုမဆို ဌာနခွင့်ပြုချက်မှတပါး ဖမ်းဆီးခြင်း၊ သတ်ဖြတ်ခြင်း၊ အနှောင့်အယှက်ပြုခြင်း၊ သယ်ယူခြင်း၊ သိုလှောင်ခြင်း၊ ရောင်းချခြင်း၊ လက်ဝယ်ထားရှိခြင်း၊ အခြားနည်းတစ်နည်းနည်းဖြင့် နှောင့်ယှက်ခြင်းမပြုရန် အမိန့်ကြော်ငြာစာများ ထုတ်ပြန်ထားရှိကြောင်း သိရှိဆောင်ရွက်နိုင်ရန် ဖြည့်စွက် ဖော်ပြအပ်ပါသည်။

ညွှန်ကြားရေးမှူးချုပ် (ကိုယ်စား)
(ဝင်းမြင့်မောင် ၊ ညွှန်ကြားရေးမှူး)

၁။ တာဝန်ခံအရာရှိ (Normal Trade)
၂။ တာဝန်ခံအရာရှိ (Border Trade)
၃။ တာဝန်ခံအရာရှိ (နယ်စပ်ထွက်ပေါက်စခန်း)

Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand are working together through the Bay of Bengal Large Marine Ecosystem (BOBLME) Project to lay the foundations for a coordinated programme of action designed to better the lives of the coastal populations through improved regional management of the Bay of Bengal environment and its fisheries.

The Food and Agriculture Organization (FAO) is the implementing agency for the BOBLME Project.

The Project is funded principally by the Global Environment Facility (GEF), Norway, the Swedish International Development Cooperation Agency, the FAO, and the National Oceanic and Atmospheric Administration of the USA.

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