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Elasmobranch Research and Conservation Initiatives in the Philippines

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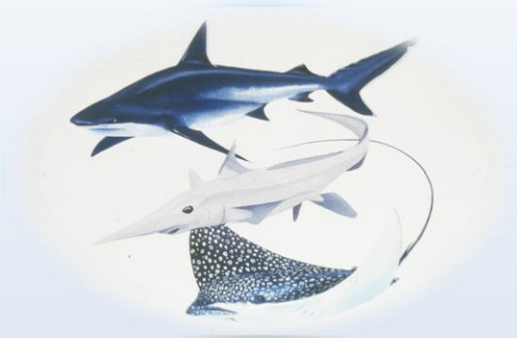
Elasmobranch Research and Conservation Initiatives in the Philippines

Outline

- Basic Biology & Ecology
- Threats & Constraints
- Conservation Initiatives
- Status & Challenges
- Priorities for Action

Sharks are fishes – cartilaginous fishes



2 Kinds

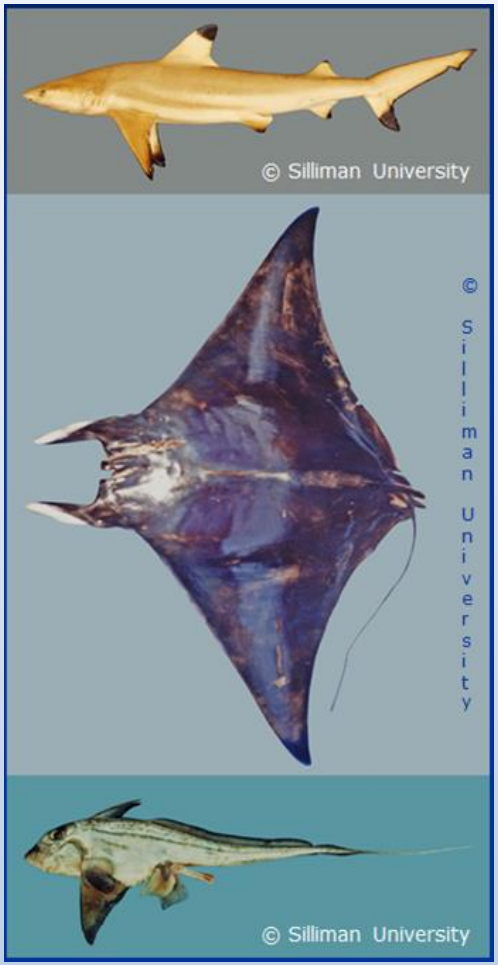
BONY FISHES
(Class Osteichthyes)

- Bony skeleton
- Gills covered (operculum)
- Scales
- Mouth in front of head
- Teeth attached to bone
- Gas bladder
- External fertilization (usually)

CARTILAGINOUS FISHES
(Class Chondrichthyes)

- Cartilaginous skeleton
- Gills uncovered (5-7 slits)
- Denticles
- Mouth underside of head
- Teeth attached to gum
- No Gas bladder
- Internal fertilization (Male: claspers)

Two types of cartilaginous fishes



Subclass Elasmobranchi

1. "True" Sharks

- mainly cylindrical or fusiform in shape
- 5-7 gill slits at sides of head
- pectoral fins never attached to head in front of gill slits

2. Batoids = Winged sharks = Flat sharks = skates and rays

- mostly flattened from top-bottom
- 5-6 gill slits at underside of head
- pectoral fins greatly expanded, attached to head in front of gill slits, forming flat wings

Subclass Holocephali

Chimaeras (= ratfishes = silver sharks)

- Flattened from side-side
- One gill slit
- Upper jaw fused to skull; Beaklike teeth fused into plates
- Largely naked skin

In popular terms

True sharks
(Also referred to as "non-batoids";
(composed of ground sharks,
bullhead sharks, mackerel sharks,
threshers, carpet sharks, saw sharks,
dogfishes, angelsharks

Skates and Rays
= Batoids
= Winged sharks
= Flat sharks
(composed of skates, rays,
guitarfishes, sawfishes, electric rays)

Elasmobranchii

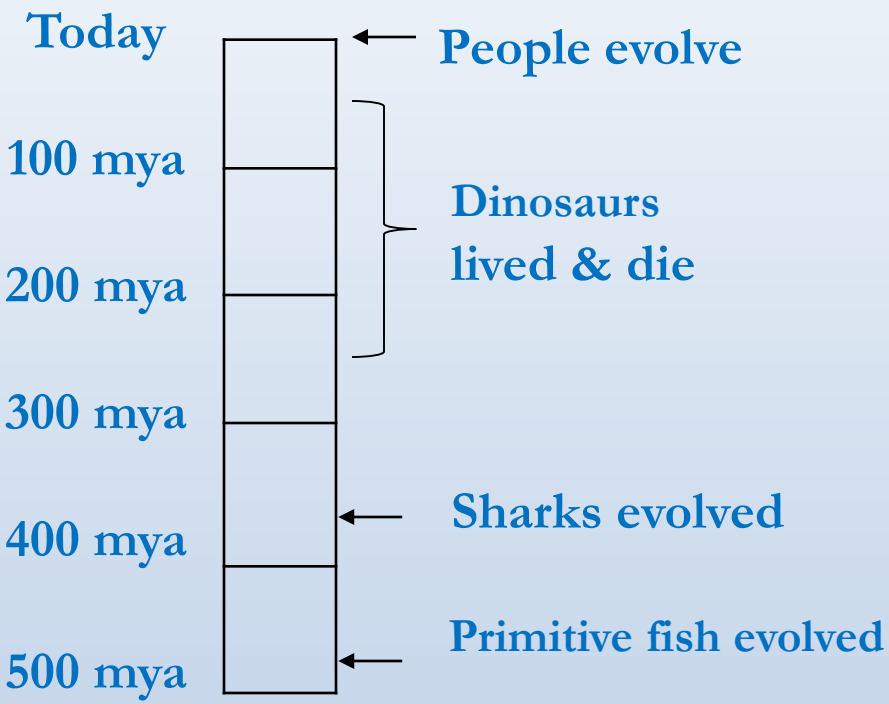
Silversharks
(Also referred to as chimaeras,
ratfishes or elephantfishes)

Holocephali

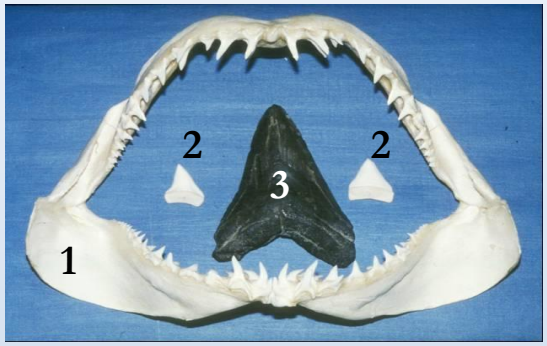
*Sharks** - The term "shark" is used in this presentation to refer to all cartilaginous fishes.

Sharks in Geologic Time Scale

Geologic Time Scale

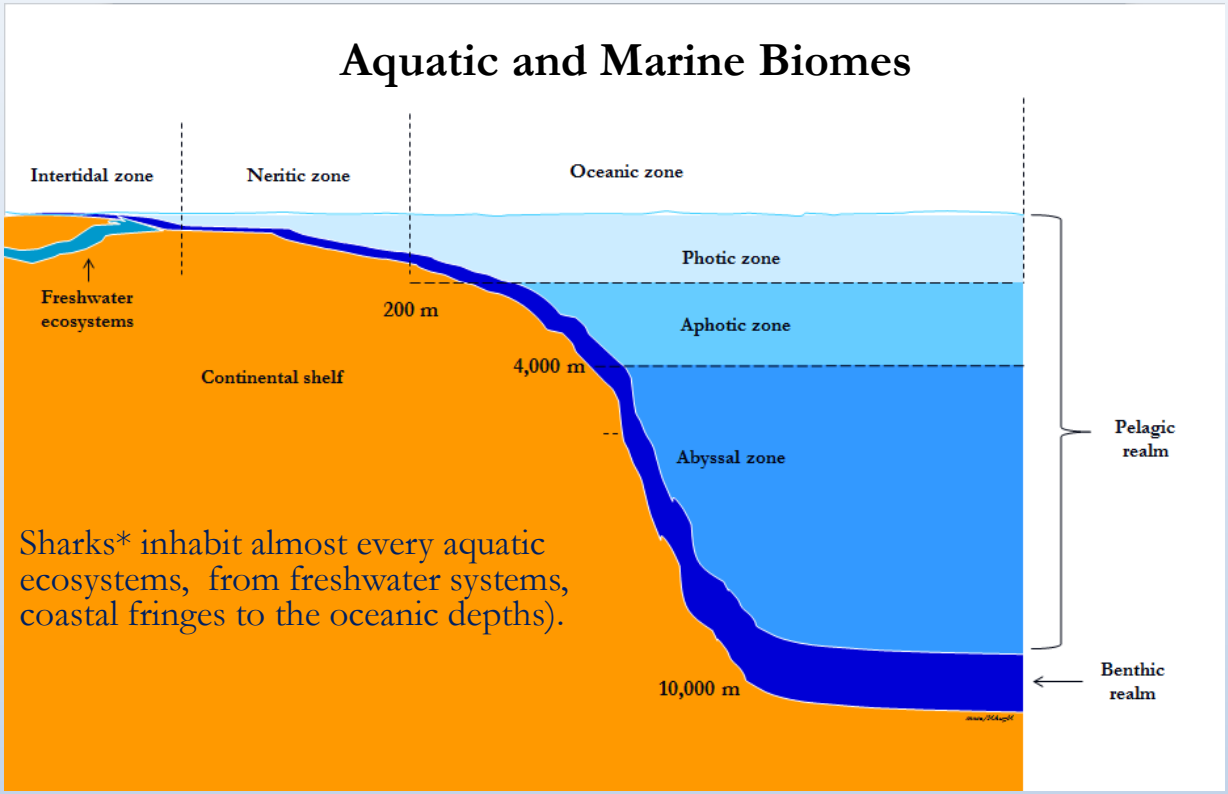


Legend: mya = million years go



1. **MAKO SHARK : 1 M yrs (extant)**
2. **GREAT WHITE: 60-65 M yrs (extant)**
3. **MEGALODON: prehistoric (extinct)**

Where do sharks live?

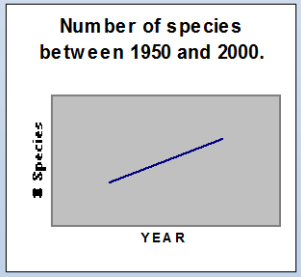


- Few are migratory; most have a more restricted distribution (i.e., endemics)
- 5% oceanic (offshore and probably migratory across ocean basins)
- 50% occur in shelf waters (c. 200 m depth)
- 35% found in deeper waters (200-2,000m)
- 5% other habitat types

How many shark species are there in the world?

Groups	Compagno's 2005 global checklist (draft file)			
	ORDER	FAMILY	GENERA	SPECIES
True Sharks	8	34	101++	494 ++
Flat Sharks	1	23	70 ++	635 ++
Silversharks	1	3	8	43 ++
TOTAL	**10**	**60**	**179++**	**1172++**

Indo-Pacific = 330++ spp



- Increase in number of shark species attributed to increased fishing efficiency (e.g., deep-water trawling).
- Increasing number of endemics (found only in a particular area and not anywhere else).
- Species Identification wrought with challenges

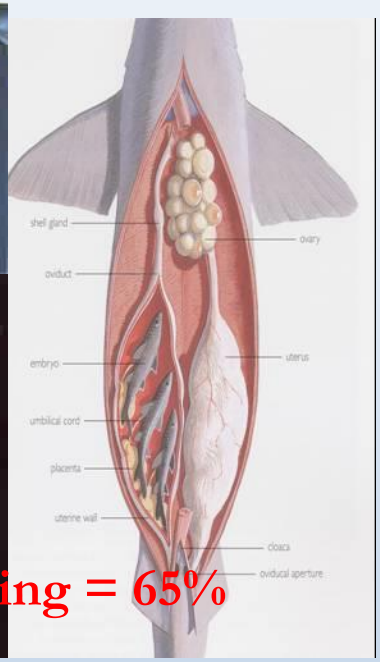
How many shark species are there in the PH?

??? - # basically depends on [who] your reference /source is …

Reference	Answer
UN-FAO data (past and present) (Phil Statistics Office)	No species listing; collective "sharks and rays" commodity
Warfel and Clague (1950)	11 (?): tiger sharks, Carcharhinus (6 spp), Sphyrna zygaena, Scyliorhinus torazame, Hexanchus griseus, unidentified nurse shark (longline); +2: Pristis cuspidatus, Rhynchobatus djiddensis (gillnets)
Encina (1977)	1: piked spiny dogfish *Squalus acanthias (*1967 fishery) (= possibly > 20 species)
Alava et al (1997)	2: whale sharks and manta ray (++ other mobulid species) (central Visayas and Mindanao)
Maypa et al. (1999)	~ 120 species (6 species unidentified) belonging to 24 families i(literature review in 44 provinces)
Alava et al. 2000; Maypa et al. 2000; Maypa et al. 2001	83 elasmobranch species, 43 of which are accorded provisional record status as new species to science, new or confirmed records to the Philippines (10 provinces in central Visayas and northern Mindanao)
NFRDI and NSAP 6 (2003-2004)	5+: Manta rays and at least 4 spp devilrays) in Bohol Sea
Gaudiano, unpub ms (2003-2006)	10+: Dalatia licha and Isurus paucus, and listed at list eight others which were not identified to the genus and/or species level
Compagno et al. (2005)	164: 129 valid species records (111 literature records; 109 actual specimesn; 24 new species) + 35 unconfirmed, needs further validation
NPOA-Sharks (2009)	+20: nominal records (needs further validation)

Biological Constraints

Reproductive strategies:



Life history characteristics:

- slow growth
- late sexual maturity
- low fecundity
- low natural mortality
- long life

= low reproductive potential

= low capacity for population increase

Litter Size = 1 – 3000 pups (AVG: 2-20 pups)
Gestation Period: 3-24 months (AVG: 10-12 mos)

Ecological Significance

↑ SPECIES RICHNESS

= ↑BIODIVERSITY

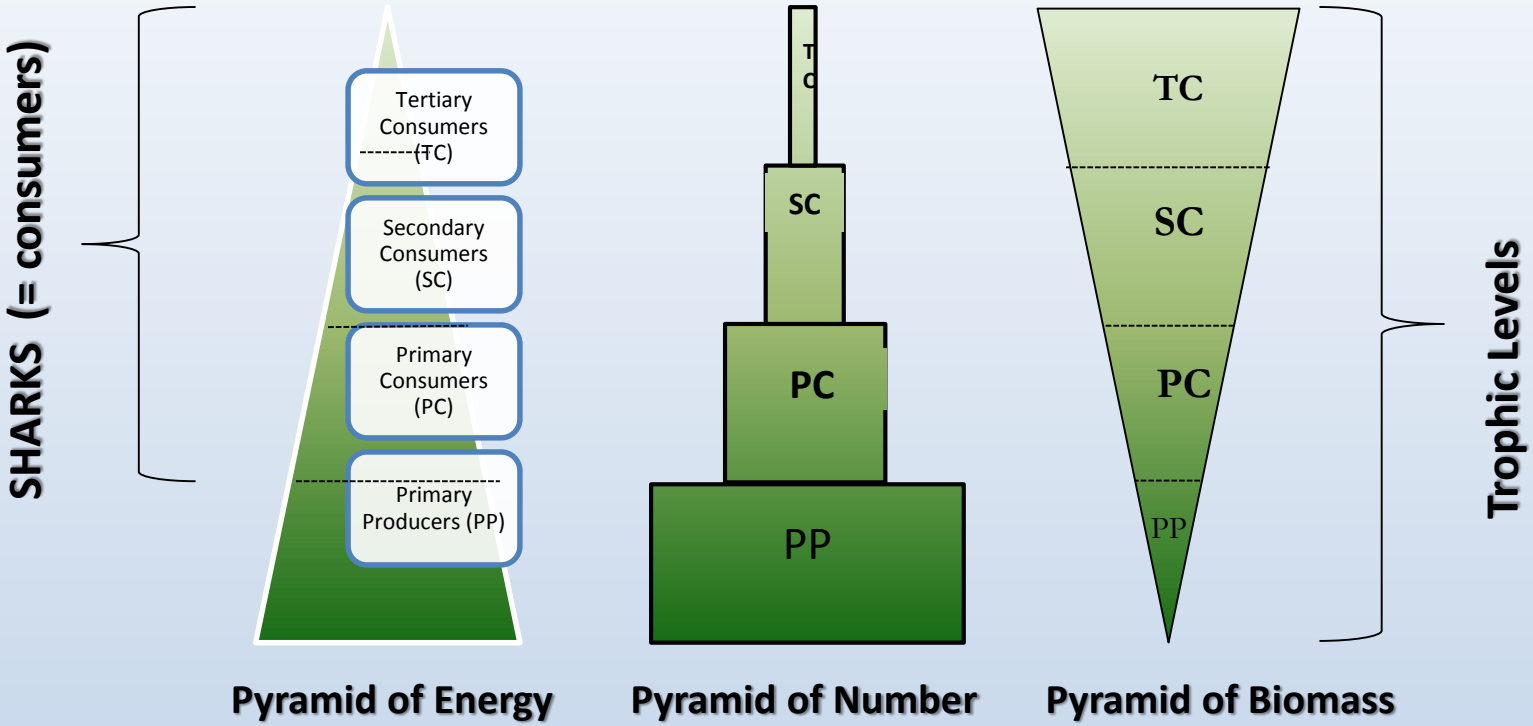
= STABLE TROPHIC STRUCTURE

Food chain = Food web

= STABLE ECOSYSTEM

= Ecosystem goods and services maintained

Ecological Significance

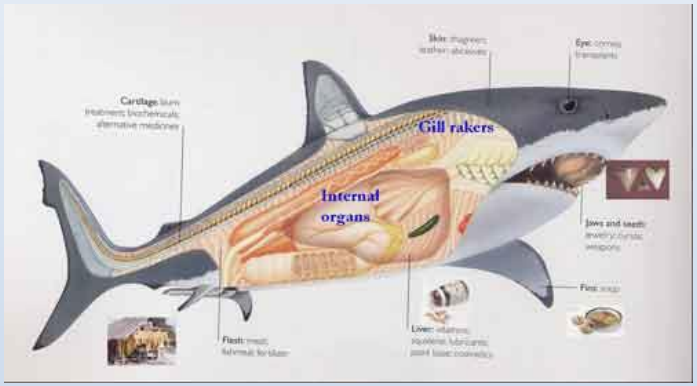


Sharks have a very varied diet. They are generally **carnivorous** (i.e., they eat other animals such as bony fishes, crustaceans, mollusks and different types of worms rather than plants and algae). A few, such as the whale shark, manta/mobulid rays, are **planktivorous** (i.e., they eat microscopic aquatic organism called plankton).

Pressures on Shark Species and Populations

FISHERIES

(Commercial/Municipal)



- Shark meat
- Shark fins
- Shark liver oil (squalene)
- Shark cartilages
- Shark skin
- Teeth and jaws
- Other parts

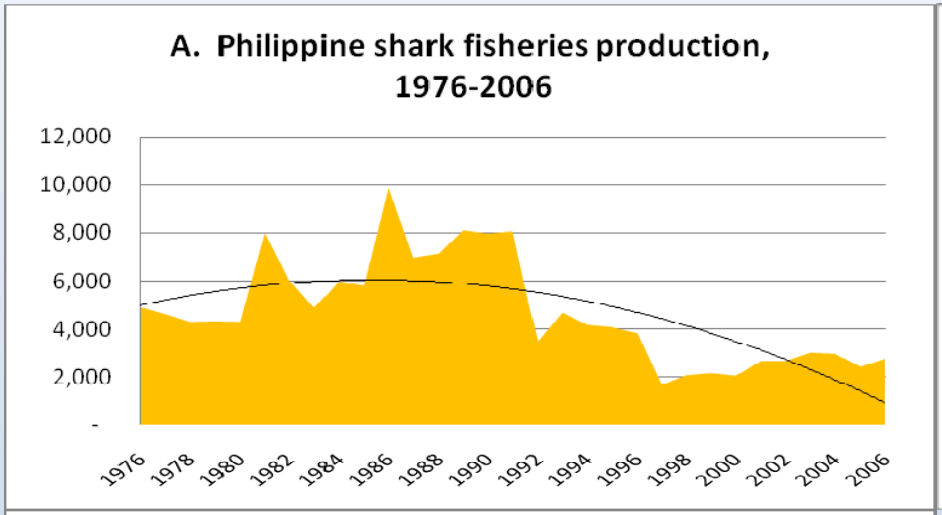
Intentional Catch (DIRECT)

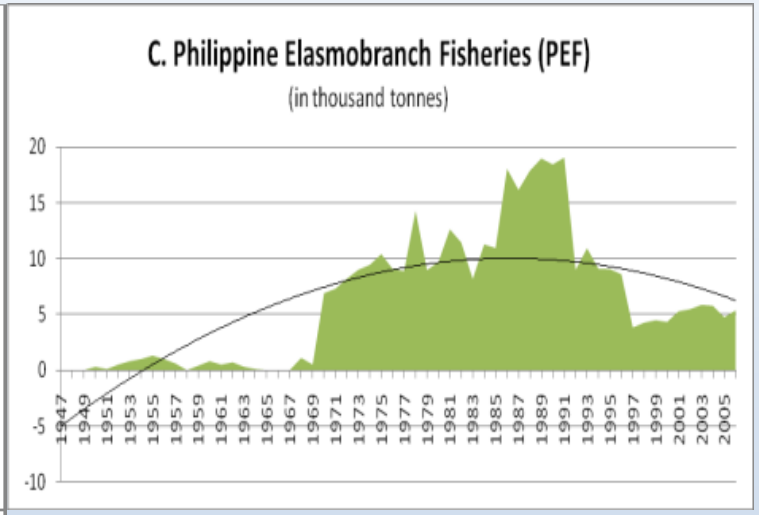
Incidental Catch (BYCATCH)

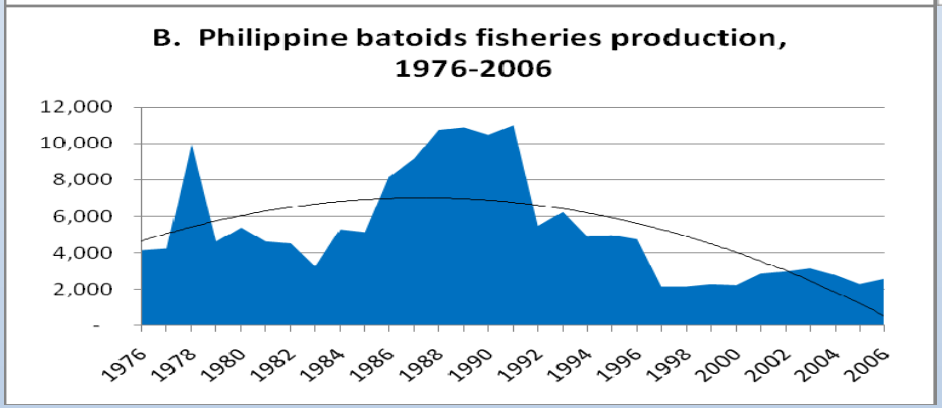
++ Aquarium trade ???

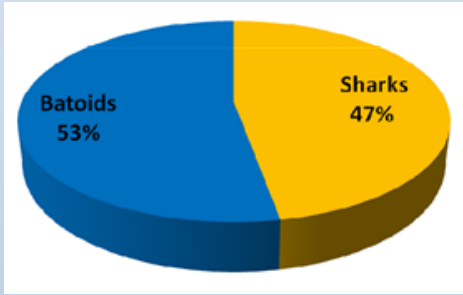
Philippine Shark Fisheries

Historical Catches & Landings



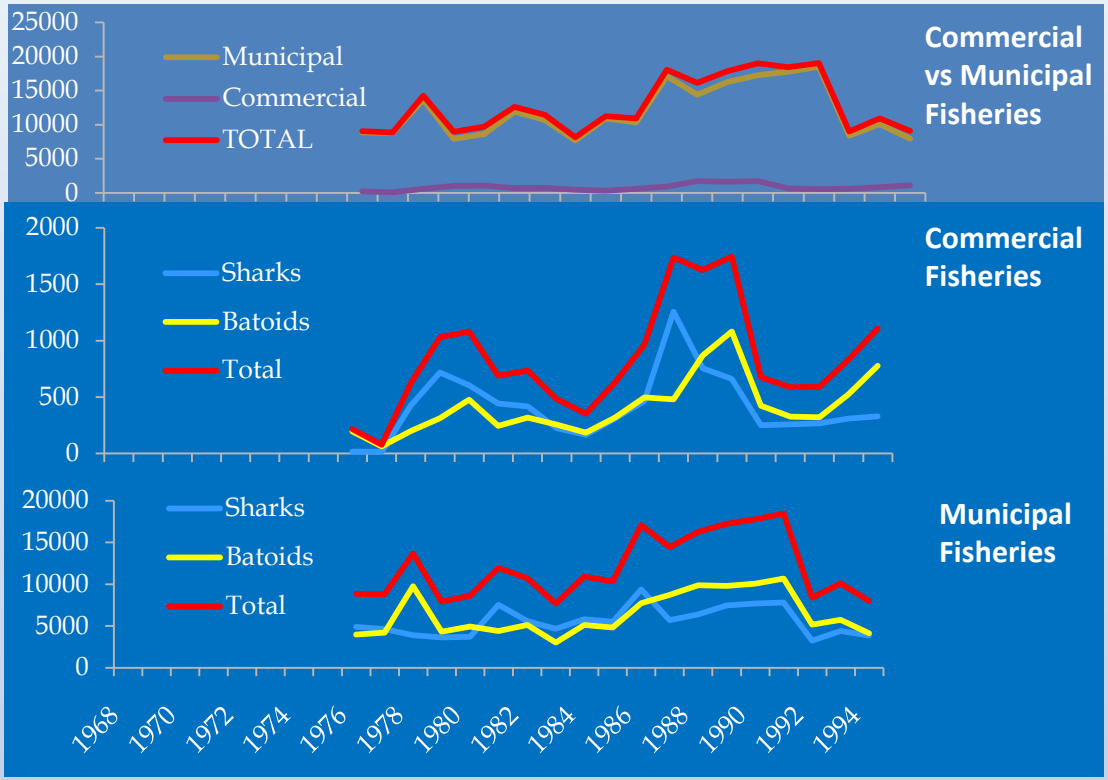






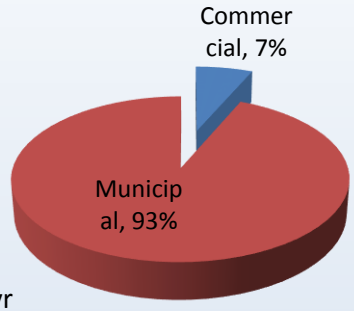
Philippine Shark Fisheries

Historical Catches & Landings

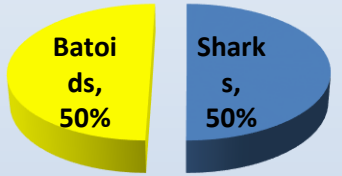


BAS (1976-1994, in mt)

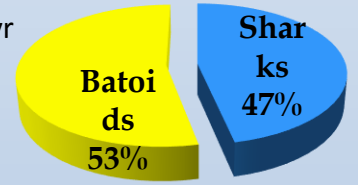
Averages:
Commercial = 831 mt/yr
Municipal = 11,952 mt/yr



Averages:
Sharks = 416 mt/yr
Batoids = 415 mt/yr



Averages:
Sharks = 5,560 mt/yr
Batoids = 6,391 mt/yr



Philippine Shark Fisheries

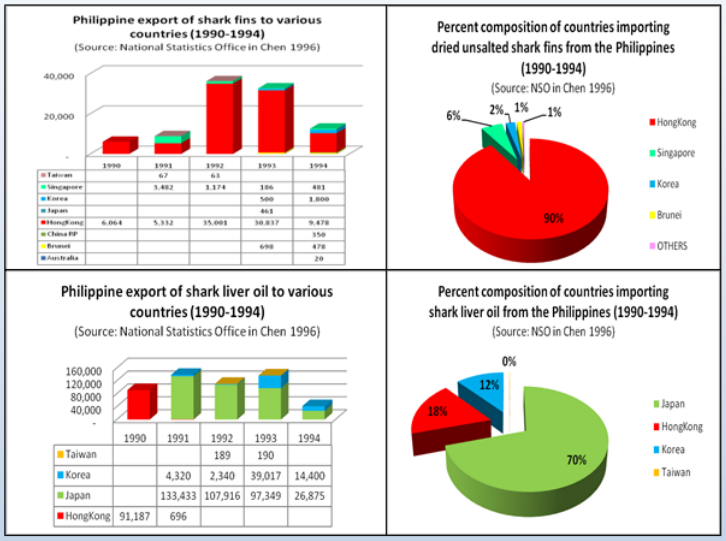
Fishing Grounds

GEAR	1990			1994		
	Sharks	Batoids	TOTAL	Sharks	Batoids	TOTAL
Luzon						
Babuyan Channel	10.839	3.560	14.399		3	3
Batangas Coast				1	1	2
Cuyo Pass	2.110	2.934	5.044			
Lamon Bay	5.994	16.818	22.812			
Manila Bay	2.745	0.538	3.283	2		2
West Palawan Waters	96.660	116.190	212.850	91	147	238
West Sulu Sa	32.896	16.200	49.096	11	1	12
Subtotal	**151.244**	**156.24**	**307.484**	**105**	**152**	**257**
Visayas						
Bohol Sea	0.265	2.370	2.635	163	39	202
Camotes Sea	0.017	0.003	0.0320			
East Sulu Sea	3.545	10.752	14.297			
Guimaras Strait	0.325	3.033	3.358	14	430	444
Leyte Gulf	0.043	0.007	0.050			
Ragay Gulf	0.572	0.661	1.233			
Visayan Sea	62.207	218.155	280.362	38	84	122
Samar Sea	0.108	3.608	3.716	1	3	4
Sibuyan Sea	5.612	21.485	27.097	1	27	28
Subtotal	**72.694**	**260.074**	**332.78**	**217**	**583**	**800**
Mindanao						
Davao Gulf	0.076	0.005	0.081		1	1
Mindanao Waters –Pacific side					1	1
Moro Gulf	10.527	0.528	11.055	2	9	11
South Sulu Sea	14.704	7.140	21.844	5	31	36
Subtotal	**31.301**	**24.491**	**55.792**	**7**	**42**	**49**
TOTAL	**253.385**	**424.482**	**677.867**	**329**	**777**	**1106**

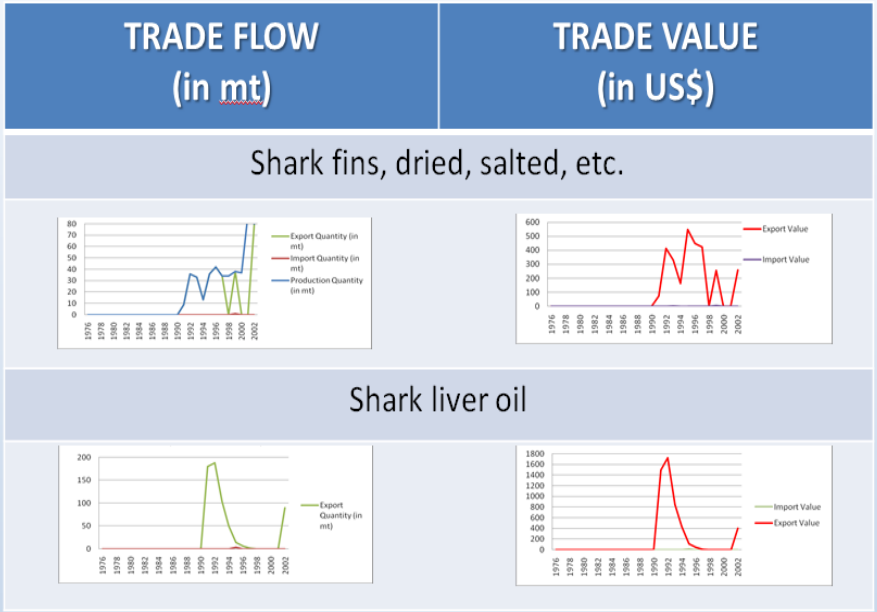
Incidental Catch (BY-CATCH)

- Bycatch fisheries from the high seas = unreported, unaccounted (Bonfil 1994)
  - Tuna longline, driftnet, orange roughy, purse seiners
  - Est. 30 to 50 % of total world elasmo reported catches
  - 1980s-1990s est = 11 to 13 M sharks/year = 26,000-3000 t/yr.
- Discards = about 230, 000 + t more

Utilization & Trade



Philippine Export of Shark Products (Shark Fins/Shark Liver) to various Countries (1990-1994).
(Source: National Statistics Office)



Historical Trade Flow and Trade Value of Shark Products: Shark Fins/Shark Liver Oil (1976-2002).
(Source: FAO FishStat)

Fisheries Operation vs Shark Conservation

Fisheries operation = the most important anthropogenic effect on marine biodiversity, at the genetic, species, and habitat levels.

- **Fishing-up process:** Geographic expansion as local populations of a preferred species decline
- **Fishing-down process:** Change in catch composition as populations of preferred species decline and species of lower niches in the marine food web are targeted.
- **"Boom-and-Bust" operations:** Fisheries of stocks that have undergone a relatively short period of exploitation (boom) followed by a sudden and rapid decline in catches and/or collapse in yield (bust) and a long period of either very slow recovery (usually only possible under fishery closure) or continued low yield at a small fraction of the original catches

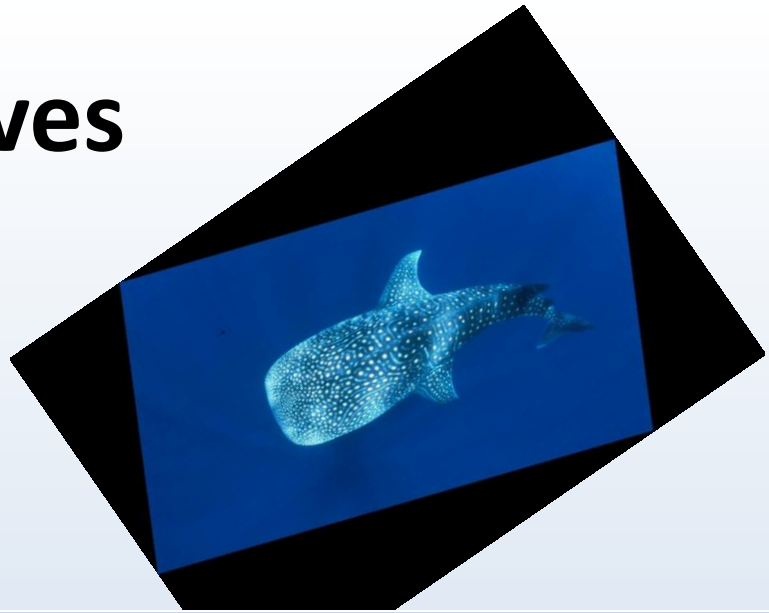
Impacts:

- **Growth overfishing** = fishing of individuals that are too small
- **Recruitment overfishing** = fishing of too many adults that can result in recruitment failure from decreased population egg reproduction
- **Genetic overfishing** = selective removal of animals with genetically superior traits
- **Serial overfishing** = most vulnerable species
- **Ecosystem overfishing** = important "keystone" species, which can disrupt community structure and function

Conservation Initiatives

International Level

- IUCN (www.iucn.org)
  - for the Management of Elasmobranchs
  - Global Red List Status: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) (www.redlist.org)
- CITES (www.cites.org)
  - Inventory of status and trade of elasmobranchs
  - Appendix I and II listing of species threatened by trade
- FAO (www.fao.org)
  - International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks*)
- CMS (www.cms.int/)
  - The Convention on Migratory Species, also known as the Bonn Convention, aims to conserve terrestrial, aquatic and avian migratory species throughout their range.



Management Tools of Other Shark Fishing Nations
Management Plans (*e.g.*, Australia, Canada, USA, New Zealand)
Quotas (*e.g.*, EU: basking shark, porbeagle)
Licenses/limited entries
Habitat area closures (*e.g.*, Nursery areas for bull sharks: Mexico)
Closed seasons (*e.g.*, US)
Minimum sizes (*e.g.*, Norway: spiny dogfish)
Gear restrictions (*e.g.*, Brazil: drift nets; Portugal: net length for kitefin)
Prohibition on finning (*e.g.*, Canada, Oman, S.Africa, US (California only; Australia: "discouraged" in EEZ)
Recreational bag limits (*e.g.*, California: seven sharks spp)
By-catch monitoring (*e.g.*, Western Australia: Southwestern shark fishery)
Protection of species (*e.g.*, Great white: Australia, USA (parts), South Africa, Namibia, Maldives, Mediterranean Sea

Conservation Initiatives

National Level Policies/Laws

Philippine Fisheries Code of 1998 (RA 8550)

- provides for the development, management and conservation of the fisheries and aquatic resources Sec. 97. "It shall be unlawful to fish or take rare, threatened or endangered species as listed in the CITES and as determined by the Department"
- Ban on the taking or catching, selling, purchasing and possessing, transporting and exporting of Whale Sharks and Manta Rays (FAO 193 *s. 1998*)
- Conservation of rare, threatened and endangered fishery species (FAO 208 Series of 2001)

Wildlife Resources Conservation and Protection Act of 2001 (RA 9147)

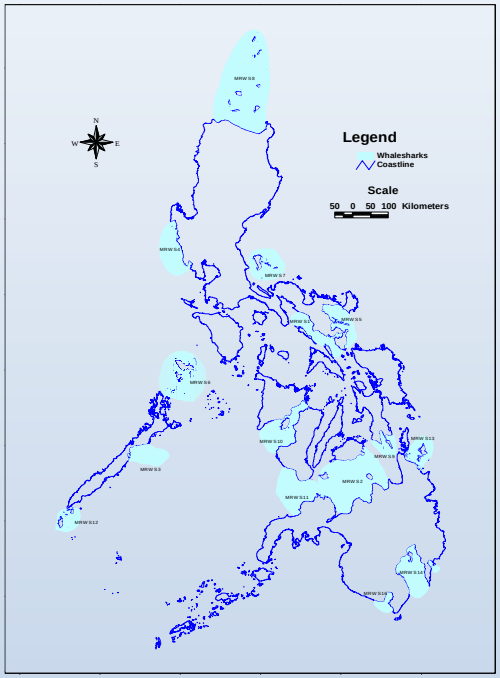
- provides for the conservation of the country's wildlife resources and their habitats for sustainability

Proposed: House Bill for the protection of sharks

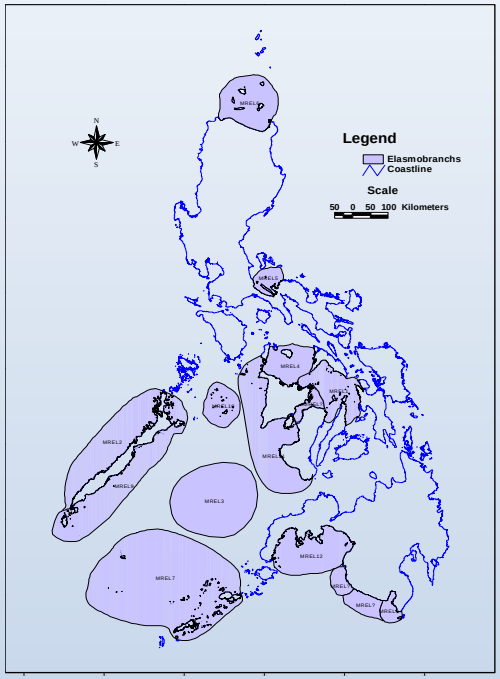
Local ordinances (e.g., Batangas City; Cebu; Palawan)

Conservation Initiatives

Management Areas: MPAs, PCAs and KBAs



Whale Shark Priority Conservation Areas (PCA) of the Philippines
Source: DENR 2001



Elasmobranch Priority Conservation Areas (PCA) of the Philippines
Source: DENR 2001

Conservation Initiatives

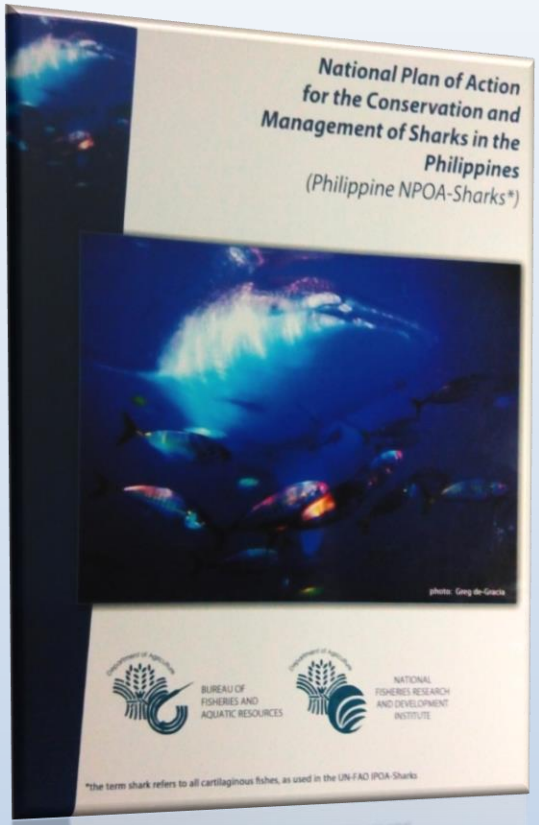
Protected Shark Species

Common Name/s	Scientific Name	Legal Bases
Blue-spotted ribbontail stingray	Taeniura lymma	PCSD Res. No. 10-413
Reef manta ray	Manta alfredi	CITES Appendix II
Giant manta ray	Manta birostris	CITES Appendix II, RA 8550, FAO 193
Knifetooth sawfish	Anoxypristis cuspidata	CITES Appendix I
Largetooth sawfish,	Pristis microdon	CITES Appendix II
Freshwater sawfish		
Smalltooth sawfish	Pristis pectinata	CITES Appendix I
Green sawfish	Pristis zijsron	CITES Appendix I
White-spotted giant guitarfish	Rhynchobatus australiae	PCSD Res. No. 10-413
Gray reef shark	Carcharhinus amblyrhynchos	PCSD Res. No. 10-413
Oceanic whitetip shark	Carcharhinus longimanus	CITES Appendix II, PCSD Res. No. 10-413
Blacktip reef shark	Carcharhinus melanopterus	PCSD Res. No. 10-413
Tiger shark	Galeocerdo cuvier	PCSD Res. No. 10-413
Whitetip reef shark	Triaenodon obesus	PCSD Res. No. 10-413
Tawny nurse shark	Nebrius ferrugineus	PCSD Res. No. 10-413
Great white shark	Carcharodon carcharias	CITES Appendix II
Whale shark	Rhincodon typus	CITES Appendix II, RA 8550, FAO 193, AO 282, PCSD Res. No. 10-413
Scalloped hammerhead shark	Sphyrna lewini	CITES Appendix II
Great hammerhead shark	Sphyrna mokkaran	CITES Appendix II
Smooth hammerhead shark	Sphyrna zygaena	CITES Appendix II
Leopard shark, Zebra shark	Stegastoma fasciatum	PCSD Res. No. 10-413

Conservation Challenges

- **Violations of existing laws**
  - CITES listed species = poaching, unreporting, non-compliance
  - Poaching in protected areas:
- **Enforcement Problems**
  - Lack of resources and manpower
  - Lack of technical ability to distinguish protected species from non-protected species
- **Deterioration/destruction of critical habitats**
  - Marine Protected Areas (MPA) for certain shark species
- **Major information and data gaps:**
  - ecology, biology, fisheries, management, others

Priorities for Action



- **Adoption of FAO's Precautionary Approach to management**
  - fisheries only be conducted where stock management regimes are in place
  - there is a need to take management action even where there are uncertainties and gaps in knowledge.
- **Improve the quality of ecological and fisheries data**
- **Develop and apply management mechanisms and tools, including to control and monitor trade.**
- **Investment in human and financial resources**
  - Research and Management
  - Development of policy, legal and institutional frameworks
  - Training and capacity/capability development to implement management measures.

Thank you!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