

Impact of policies on the conservation of sharks in the large pelagic fishery

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Abstract

Sharks are of great commercial importance in the marine fisheries sector in Sri Lanka. They are taken in large quantities for human consumption, especially to obtain shark fins, which is an export oriented product and to a lesser extent for the extraction of liver oil. Though pelagic shark catches are incidental to or a by-catch of fisheries mainly targeting tuna in Sri Lanka, sharks are mostly harvested for their fins.

The annual shark production has been estimated at 4392, 3177, 1828 and 1611 MT respectively in 2011, 2012, 2013 and 2014. A considerable declining trend of shark landings has been observed during the last two years mainly due to strong implementation of new regulations on sharks and strengthening of legal provisions mainly focusing on conservation of Thresher shark. Further, the declining price of shark fins made fishermen gradually divert to export oriented tuna fishery.

Past research has reported 60 species of sharks. However, present composition is limited to 48 species. The present catch is dominated by Silky shark, which has remained dominant over the past decade.

The regulation on the total banning of thresher shark (Gazette No. 1768/36 dated 27-07-2012) made noticeable impact on shark landing as a whole. This may be the major result of shark landings in the past 2 years. Sri Lanka's National Plan of Action for the conservation and management has also made fishermen aware of national policy for shark conservation. In 2014, the annual Pelagic Shark by-catch has been less than 2% of the total large pelagic production in the country.

Introduction

The fisheries industry of Sri Lanka contributes significantly to the nutrition, employment, food security, foreign exchange earnings and government revenue, and thus its sustainability is a primary concern in economic development of the country. Marine fishery industry consists of two main sectors: coastal and offshore. Coastal fisheries target the resources that lie within the continental shelf and it is traditionally a small scale fishing industry. The offshore fishery is carried out within the EEZ and also in high seas, basically targeting tuna and bill fishes which are highly migratory species and shared by other coastal countries and distant water fishing countries fishing in the Indian ocean.

Sri Lanka has a tropical climate with an annual weather cycle of two main periods: the South-West monsoon from May to August and the North-East monsoon from October to January. Shark resource in Sri Lanka is not a target fishery; its availability is incidental as by-catch. The only fishery that directly targets shark is the bottom long line fishery for gulper shark. However, due to the lack of economical market for their liver oil, only a few coastal boats are engaged in this fishery, off North-West (Kalpitiya), West (Negombo), South-West (Beruwala), South (Mirissa) and East (Valachchannai and Mutur). Shark flesh is a high priced commodity and their fins are a high priced export commodity. Shark production comes mainly from large pelagic fishery employing long line and gill net and comes as an incidental by catch.

Landing of shark catch and number of species have been reported to be declining in the local context as well as in the whole of the Indian Ocean. Therefore, in keeping with the policy of exploitation of fisheries and aquatic resources in a sustainable manner, the government of Sri Lanka has implemented several measures for conservation and management of sharks.

Review of shark landings in Sri Lanka

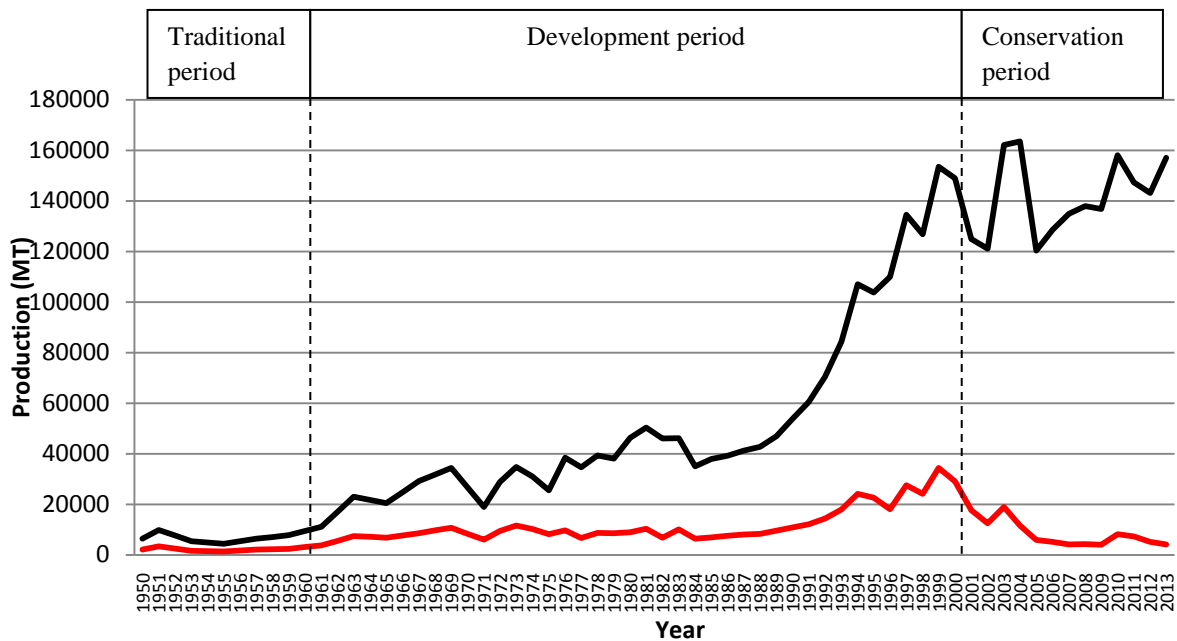


Fig 1 : Shark production and total large pelagic fish production 1950-2013

Source: IOTC data query

Shark landings show several noticeable eras: Traditional period, Development period and Conservation period. In the 1950's sharks have traditionally contributed to the large pelagic catch in Sri Lanka and they were mainly coastal and demersal species. At that time demersal fishery was the main fishing activity in the marine fishery sector.

In the 1960's introduction of the synthetic gill nets and motorized crafts have influenced significantly to increase the shark production due to increasing fishing power and fishery.

The noticeable increase in shark production reported since 1980's was due to the introduction of multiday large fishing boats with the assistance of Abu Dhabi North West fishing development project. These boats are introduced with large mesh gill net and long lines. This led to the emerging combination fishing gear of GN cum LL targeting tuna and associated large pelagic assemblage. Due to the lack of knowledge on operation of tuna long line, fishermen used gill net and long line in pelagic fisheries. Thereby a drastic increase was seen in the shark production after mid 1980's. The peak production was reported in 1999.

However, since 1999 the annual shark production has shown a considerable decline. This may be due to a combination of reasons and policies taken over the years. More influential

implementation by state authority policies are: implement of Monitoring Control Surveillance (MCS), control on Illegal, Unregulated and Unreported (IUU) fishing, regulations prohibiting the catching of thresher shark, prohibiting the practice of shark fining etc.

The sudden drop in the total large pelagic fish production and shark production in 2005 was due to the impact of Tsunami disaster at the end of 2004.

Methodology

Data for this study was mainly obtained through the *PELAGOS* database of Sri Lanka and the data base of the Indian Ocean Tuna Commission (IOTC) published data base.

National aquatic Resources Research and Development Agency (NARA) in Sri Lanka has been directly involved in offshore and coastal large pelagic data collection since 1985.

In 1994, NARA was able to introduce a comprehensive sampling programme through the technical and financial assistance of FAO/TCP project. A team of data collectors was placed at the major fish landing centers in the west, southwest, south, southeast, east and northeast to collect data in the large pelagic catches. During this time data were collected and all these information was stored in the *PELAGOS* database provided by the FAO/TCP project. In early day shark catch composition was for a limited number of species, which are main contributors of shark landings.

Since 2005, it was decided to combine all the shark catches instead of reporting species-wise data since there was a very low contribution of shark to the total large pelagic fish production. However, species-wise catch reporting was restarted in 2011 in order to comply with adopted resolutions for sharks by the Indian Ocean Tuna Commission (IOTC). This sampling programme has been conducted since 2011 and 14 shark species have been reported throughout this study. The information was collected by well trained full time Field Research Assistants of NARA and Fisheries Inspectors of the Department of Fisheries.

In 2015, onboard observation programme was started to collect large pelagic fishery data of multiday fisheries. Observers were trained to collect data and identified large pelagic fish species as well as sea turtles, mammals and seabirds.

Results

Among the sharks landing in Sri Lanka, Silky shark (*Carcharhinus falciformis*) is the dominant species followed by Thresher shark (*Alopias sp.*), Blue shark (*Prionace glauca*) and Oceanic whitetip shark (*Carcharhinus longimanus*) respectively. Contribution of other sharks including Hammerhead sharks (*Sphyrna sp.*) and mako (*Isurus sp.*) sharks to the total shark landings is relatively very small. There was a drastic decline of thresher sharks after 2012 due to the implement of the regulations prohibiting the catching of thresher shark.

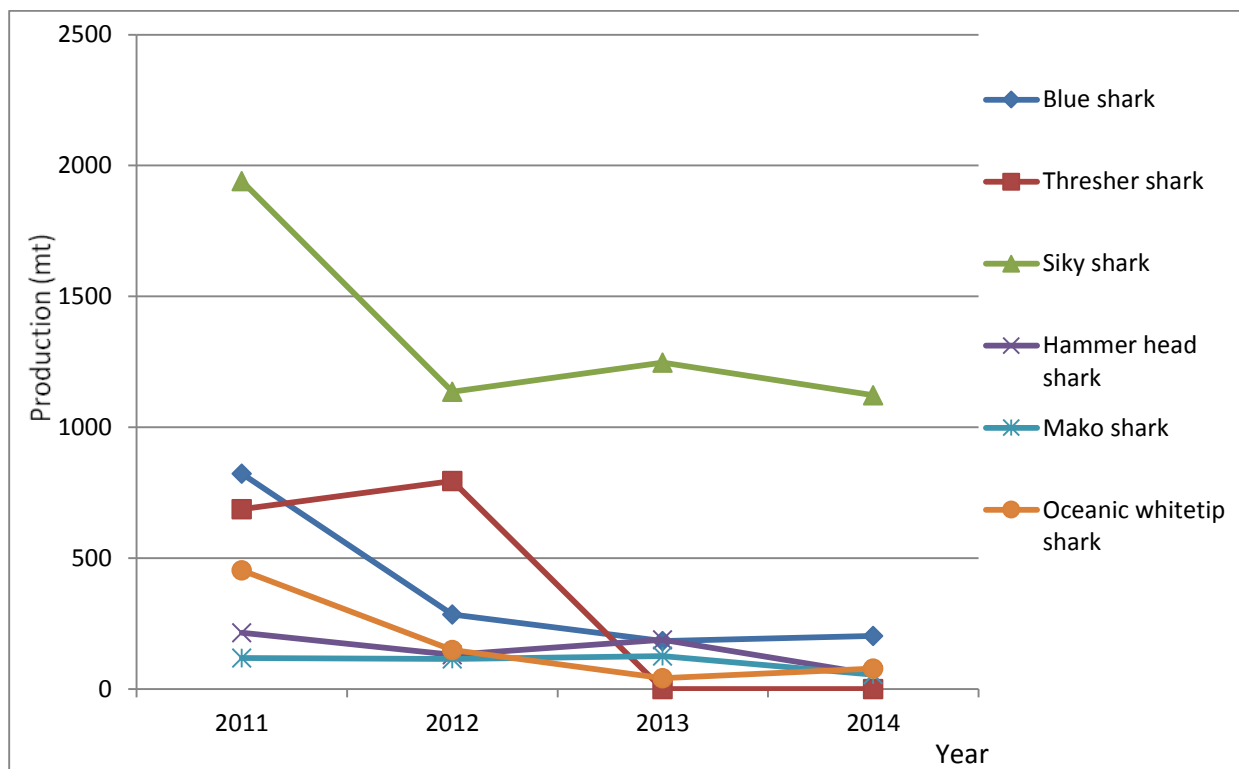


Fig 2 : Shark landings by major species 2005-2014

Source : PELAGOS data base – MFAR/NARA

Present status of shark resources in Sri Lanka

The annual shark production has been estimated at 1611Mt in 2014. When considering the percentage contribution of sharks to the total large pelagic fish production by weight, currently it remains around 2% while tuna has accounted for more than 72% by weight of the total large pelagic production. Billfish ranked next at 8% by weight.

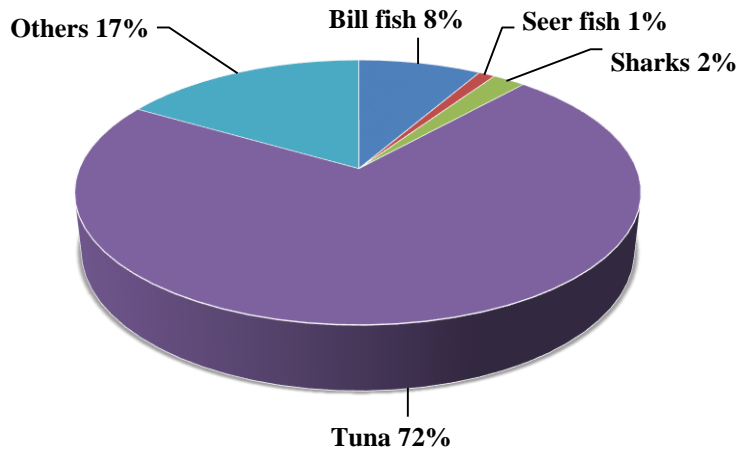


Fig 3: Contribution of sharks to the total large pelagic fish production 2014

Source: PELAGOS data base – MFAR/NARA

Shark landings associated with large pelagic fisheries in 2014 are given in Fig 4, separately for within EEZ and beyond EEZ. There was no discernible difference by weight percentage of fish group between within EEZ and beyond EEZ.

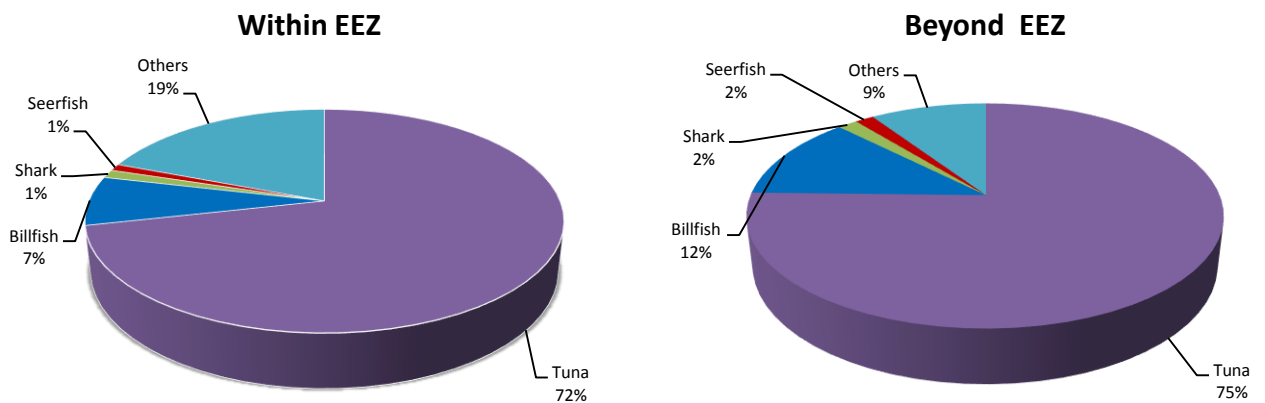


Fig 4: Contribution of sharks to the total large pelagic fish production within EEZ and beyond EEZ-2014 Source: PELAGOS data base – MFAR/NARA

Tuna contributes 74% by weight in the net catches. Billfish ranked next at 3% by weight. Shark was only 1% by weight.

Tuna contributes 67% by weight in the line catches. Billfish ranked next at 24% by weight. Shark was 2% by weight.

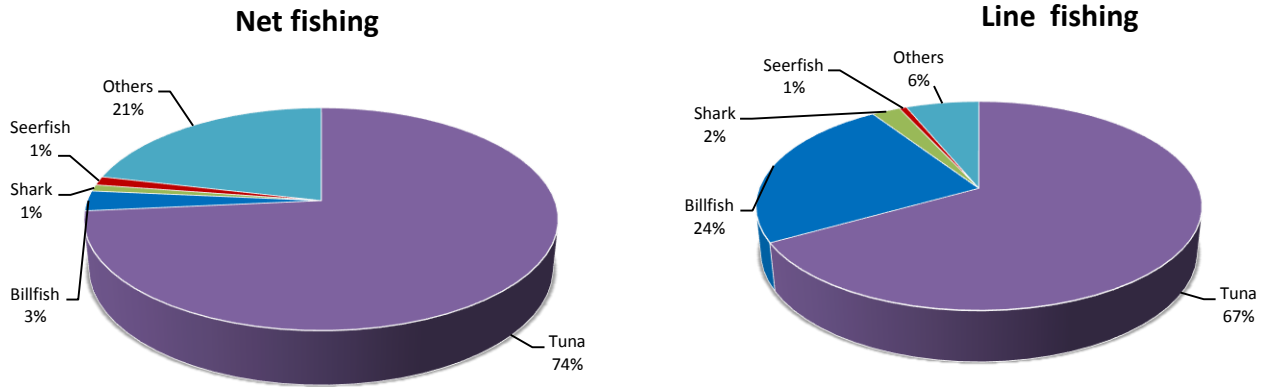


Fig 5: Contribution of sharks to the total large pelagic fish production in the net fishing and line fishing in 2014
 Source: *PELAGOS* data base – MFAR/NARA

The Silky sharks account for a higher proportion in the shark landings. Oceanic whitetip and blue shark are the next dominant species. The total contribution of these three species to the total shark landings is around 88% and the percentage contributions of other sharks including mako shark and hammerhead sharks to the total landings remain relatively small.

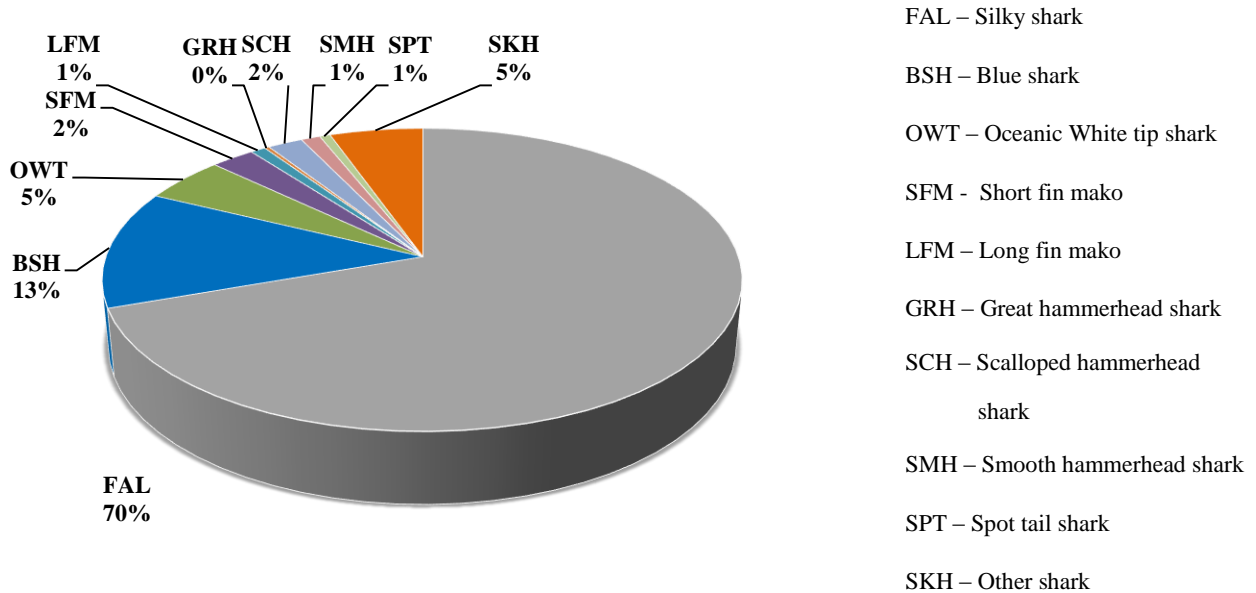


Fig 6: Species wise contribution in the total shark production in 2014
 Source: *PELAGOS* data base- MFAR/NARA

Silky shark contributes 81% by weight within EEZ. Blue shark ranked next at 7% by weight. This was followed by Oceanic whitetip at 3% by weight.

Silky shark contributes 42% by weight beyond EEZ. Blue shark ranked next at 26% by weight. This was followed by Oceanic whitetip at 8% by weight.

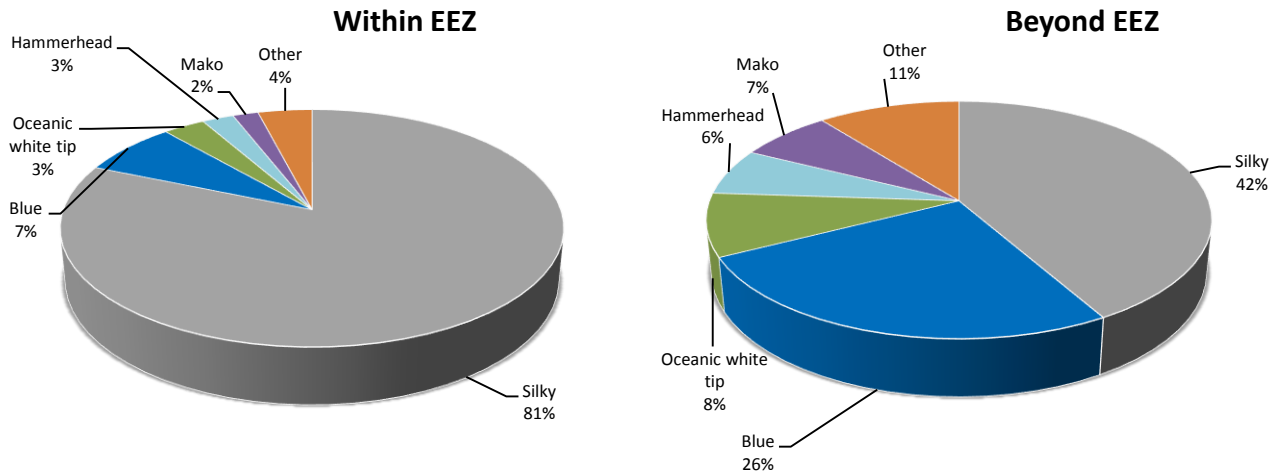


Fig 7: Species wise contribution in the total shark production within EEZ and Beyond in 2014 Source: PELAGOS database- MFAR/NARA

Silky shark contributes 57% by weight to the net catches. Blue shark ranked next at 16% by weight. This was followed by Oceanic whitetip at 4% by weight.

Silky shark contributes 75% by weight to the line catches. Blue shark ranked next at 12% by weight. This was followed by Oceanic whitetip at 5% by weight.

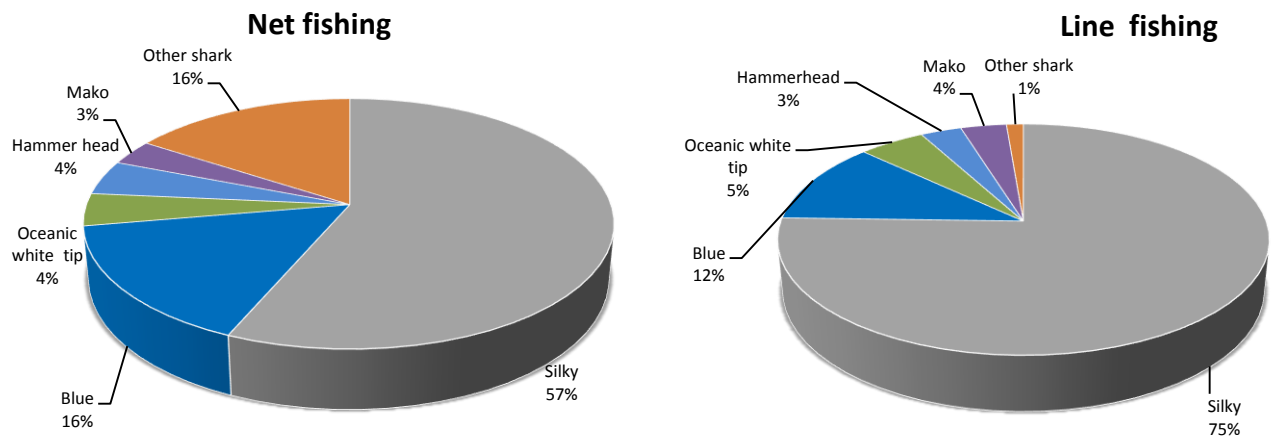


Fig 8: Species wise contribution in the total shark production in the net fishing and line fishing in 2014 Source: PELAGOS data base- MFAR/NARA

Legal and Administrative Framework for the conservation and Management of shark

Sharks are particularly vulnerable to overexploitation because of their biological characteristics of maturing late, having few young and being long-lived. Worldwide shark populations are in decline due to unregulated fishing, much of it to meet high demand for fins. These issues have created special concern regarding the management and conservation of sharks nationally as well as internationally. Therefore as a fishing nation, Sri Lanka coordinates with most of the international and regional shark management, conservation bodies such as Food and Agriculture Organization (FAO), Conservation on International Trade in Endangered Species of wild fauna and flora (CITES), Indian ocean Tuna Commission (IOTC), Bay of Bengal Large Marine Ecosystem (BOBLME) and several other international treaties that concern the conservation and biodiversity. Sri Lanka has developed several national instruments such as policy guidelines, law and regulations, and plan of action to guide the process of implementation of the commitments made under the above treaties.

The Fisheries and Aquatic Resources Act, No.2 of 1996 (FARA) is the main legal instrument that provides for the management, regulation, conservation and development of fisheries and aquatic resources in Sri Lanka, and gives effect to Sri Lanka's obligations under certain international and regional fisheries agreements. The Fisheries Regulation of Foreign Fishing boats Act, No 59 of 1979 (FFBA) provides for regulation, control and management of fishing activities by the foreign boats in Sri Lankan waters. Both these acts are administered by the Department of Fisheries and Aquatic Resources (DFAR), which has the overall mandate for the implementations of the provisions incorporated in them. Implementation of those provisions and regulations is essential for the management of all fisheries in the country including shark resources. In addition to that a number of draft regulations are under the process of promulgation to give effect to the obligations of Sri Lanka under certain international and regional fisheries agreements. These regulations once enforced will have beneficial effects on the management of, among other fisheries, shark resources in high seas.

Among the actions initiated by IOTC concerning the conservation of sharks caught in association with fisheries managed by IOTC, are the IOTC resolution 05/05, which deals with the issues of utilization, stock assessment gear selectivity and research needs and the IOTC resolution 10/12 that prohibits the catching of thresher sharks. Under the provisions in FARA, regulations have already been made specifically for conservation and management of shark fisheries with two different objectives:

- ❖ Landing of fish Species of shark and skate Regulations, 2001 (Gazette 1206/20 of 17 October 2001) forbids the practice of shark fining (slicing off fins of sharks caught) onboard fishing vessels and discarding the carcasses at sea). Fisheries are required to land fish belonging to the species of shark or skate while the fins of such species of fish are attached to such fish. Landing the fins which have been removed from any fish belonging to the species of shark or skate is prohibited. Penalty for non compliance with this requirement is imprisonment of either description for a term not exceeding six months or a fine not exceeding LKR 50 000 or both such imprisonment and fine.

- ❖ Thresher sharks, Sri Lanka has imposed a total ban on catching, retaining on board, transshipping, landing, storing, selling or offering for sale of any Thresher sharks. Prohibition of catching thresher shark regulations, 2012 (Gazette 1768/36 of 27 July 2012) provides special protection status to thresher sharks. According to this regulation no person shall catch any shark species of the family Alopiidae (which has three species, i.e. *Alopius vulpinus*, *Alopius superciliosus* and *Alopius pelagicus*) during fishing, recreational activities or sport fishing. Thresher sharks caught incidentally should be released live and such releases should be recorded in logbooks. Penalty for non-compliance is imprisonment of either description for a term not exceeding six months or a fine not exceeding LKR 25 000 or both such imprisonment and fine.

Some current regulations enacted under the FARA provide some protection for shark.

- ❖ ***Fisheries operation regulation 1996***

Licensing of all major fishing operations are to be brought under a licensing scheme. This regulation clearly stated that no person shall catch, land, transport, sell, buy, receive or have in possession any marine mammals or turtle.

- ❖ ***Fish catch data collection regulation, 2012***

According to this regulation, every person who uses mechanized fishing boat, over the length of 32 feet, registered under the registration of fishing boats regulations, 1980 published in the Gazette extra ordinary no. 109 of october3, 1980 for fishing in Sri Lanka waters shall maintain a log book issued by the DFAR.

Sri Lanka National Plan of Action for the conservation and management of sharks

The Sri Lanka National Plan of Action for the conservation and management of sharks (SLNPOA- sharks) contains measures that are being implemented for the conservation and management of shark resources in Sri Lankan waters and high-seas. It has been prepared considering the guidelines stipulated in the FAO code of conduct of responsible fisheries and International Plan of Action for the conservation and management of sharks (IPOA-sharks), and in consultation with fisheries managers, fisheries researchers, academics, fishing industry and trade, fishing community and NGOs. It provides information on the status of sharks in Sri Lanka, regulatory and administrative framework related to shark fishing, issues concerning conservation and management of shark fisheries, and strategies for achieving the objective of IPOA-sharks. SL-NPOA-sharks is to be implemented as an integral part of the Sri Lanka national fisheries and aquatic resources management plan. The main responsibility of its implementation lies with DFAR. Several other agencies also have major roles to play in its implementation. SL-NPOA-Sharks is intended to have an initial duration of four years (2014-2017) focused on establishment of necessary capacity, systems and databases while managing the fishing effort on shark resources based on an active and progressive precautionary approach in consultation with stakeholders. Upon the conclusion of this initial period the overall progress and the impacts of implementation will be evaluated against its goals and objectives, with a view of revision of SL-NPOA-Sharks taking into account the changes in fisheries.

The following ten strategic objectives have been identified in line with IPOA-sharks for achievement by the implementation of SLNPOA-sharks.

- 1) Ensure that shark catches from directed and non-directed fisheries are sustainable.
- 2) Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use.
- 3) Identify and provide special attention, in particular to vulnerable or threatened shark stocks.
- 4) Contribute to the protection of biodiversity and ecosystem structure and function.

- 5) Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States.
- 6) Minimize unutilized incidental catches of sharks.
- 7) Minimize waste and discards from shark catches in accordance with article of the Code of Conduct for Responsible Fisheries
- 8) Encourage full use of dead sharks.
- 9) Facilitate improved species-specific catch and landings data and monitoring of shark catches.
- 10) Facilitate the identification and reporting of species-specific biological and trade data.

SLNPOA- sharks provide very useful guidelines on how to conserve the shark fishery for biodiversity, conservation and for future generations. To understand the role of shark in the ecosystem, the following areas should get priority in conducting future research. It is very essential to know the spawning and nursery seasons of shark species and a complete management plan will depend on the investigation of the spawning and nursery grounds of shark species.

The Fauna and Flora Protection Ordinance (FFPO), which establishes the legal frame work for the protection of species of wild animals that include mammals, birds, reptiles, amphibians, fishes or invertebrates and plants in Sri Lanka is another legal instrument that has relevance to the conservation of sharks. It is administrated by the Department of Wild Life conservation (DWLC). Under FFPO a number of marine parks and sanctuaries along the Sri Lankan coastline have been promulgated with the aim of protection of coral systems. These marine parks and sanctuaries provide partial protection to coastal sharks.

DWLC is the focal point and competent authority in Sri Lanka for CITES, and implement provisions of CITES. Appendix II of CITES includes among other species two shark species, *Rhincodon typus*, *Cetorhinus maximus*, *Carcharhinus longimanus*, *sphyrna sp.*, *Lamna nasus* and *Carcharodon carcharias*. For export of specimens of the species included in Appendix II of CITES, a permit from the competent authority of the exporting country is required.

Discussion

The gap between the total large pelagic fish production and the shark production has continuously increased since early 1960's and widened to a greater extent with the decline of shark landings after 1999. The contribution of sharks to the total large pelagic fish production clearly indicates a gradual decline with time. Although the contribution of sharks had accounted for more than 30% of the total large pelagic fish production until 1975, it has been less than 6% over the last ten year period.

Shark landing shows a declining trend during the recent past three years. The estimated shark catch remain less than 6% by volume of the total large pelagic catch over the past ten years and less than 2% in 2014. This trend is due to implementation of new regulations through strengthening of MCS activities for effective law enforcement and SL-NPOA-Shark.

Among the sharks landing in Sri Lanka, Silky shark (*Carcharhinus falciformis*) is the dominant species followed by Blue shark (*Prionace glauca*) and Oceanic whitetip shark (*Carcharhinus longimanus*) respectively. Contribution of other sharks including Hammerhead sharks (*Sphyrna sp.*) and mako (*Isurus sp.*) sharks to the total shark landings is relatively very small. There was a drastic decline of thresher sharks after 2012 due to implementation of regulations prohibiting catching thresher sharks..

During the stakeholder meetings and awareness programmes held in 2013 and 2014, we were informed that the thresher shark population is showing an increasing trend in the coastal waters.

Acknowledgement

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