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Status of Shark fishery in Sri Lanka

By Herath H.L.N.S. and Maldeniya R.

Department of Fisheries & Aquatic Resources, Colombo 10, Sri Lanka

National Aquatic Resources Research and Development Agency (NARA), Colombo 15, Sri Lanka

Abstract

Sharks are of considerable importance to the marine fisheries conducted with large mesh gillnets and longliners in the offshore waters within and beyond the EEZ of Sri Lanka. PELAGOSE (NARA) data base and field level information were based on this study. The shark fishery was a targeted fishery in Sri Lanka a decade ago but it has changed and sharks have become a bycatch. Decline in the directed (target) shark fishery was observed due to disincentives such as price decline, high operating cost, effective Monitoring Control & Surveillance activities and implementation of the several measures for conservation and management of sharks. At present, the contribution of sharks to the total large pelagic fish production is less than 4%.The catches are comprised mainly of silky sharks in the offshore fisheries. Shark land generally as a whole with fins attached and fully utilized them without any waste. Shark meat is consumed in large quantities and fins are exported. National Plan of Action for Sharks is currently being prepared with stakeholder consultation and giving due recognition to all resolution pertaining to shark conservation and management initiatives of IOTC.

Introduction

Fishing is an integral part of the Sri Lankan culture and employing over 180,693 people in marine fisheries sector. Marine fishery industry consists of two primary sectors: coastal and offshore/ deep sea fishery. Coastal fishery takes place all around Sri Lanka and is influenced by both the South-West and North-East monsoons due to the geographical location of the country; between latitudes5^0 and 10^0 N, and longitudes 79^0 and 82^0 E. The South-West monsoon generally occurs from July to October, while the North-East monsoon from November to March.

With the introduction of synthetic netting material in 1960s and subsequently pelagic longline in marine fisheries capturing of shark as an incidental catch has been increased since the fisheries targeting on multispecies assemblages of large pelagic fishery resources. Demand for shark; fresh, salted or dried in the local market and also high export market value of shark fins captured fishermen's interest on sharks.

Until about a decade back, lack of appropriate fishing technology and capital equipment in longline fisheries catch consisted mainly shark. Thus, it is called "shark longline". However, as the decline of shark catches industry has gradually capitalized on lucrative new markets, export of large tuna. Thereby, deep water tuna longline has been progressively replaced surface longline. At present only limited effort is employed on surface longline.

It has been recognized by all tuna RFMOs that overfishing is the main cause of the rapid decline in shark populations. Sri Lanka is a member of the Indian Ocean Tuna Commission (IOTC) took number of conservation and management initiatives in complying with resolutions of IOTC pertaining to conservation and management of shark.

This study reviews the present status of shark fishery in Sri Lanka, socio economic aspects and impacts of conservation and management measures implemented. Data for this study was obtained from IOTC published data base for sharks and PELAGOS data base of the National Aquatic Resources Research and Development Agency (NARA). Socio economic information was gathered from stakeholder meetings as well as Sri Lanka customs.

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Shark fishery

Sharks have traditionally been contributed considerably to the marine fish catch in Sri Lanka, but they were primarily the coastal and bottom living species within localized distribution. Subsequent development and expansion of pelagic fisheries since 1960s significantly increased the production of sharks. The landing of this species had peaked in 1999 and it was 34,842 Mt (Figure1).

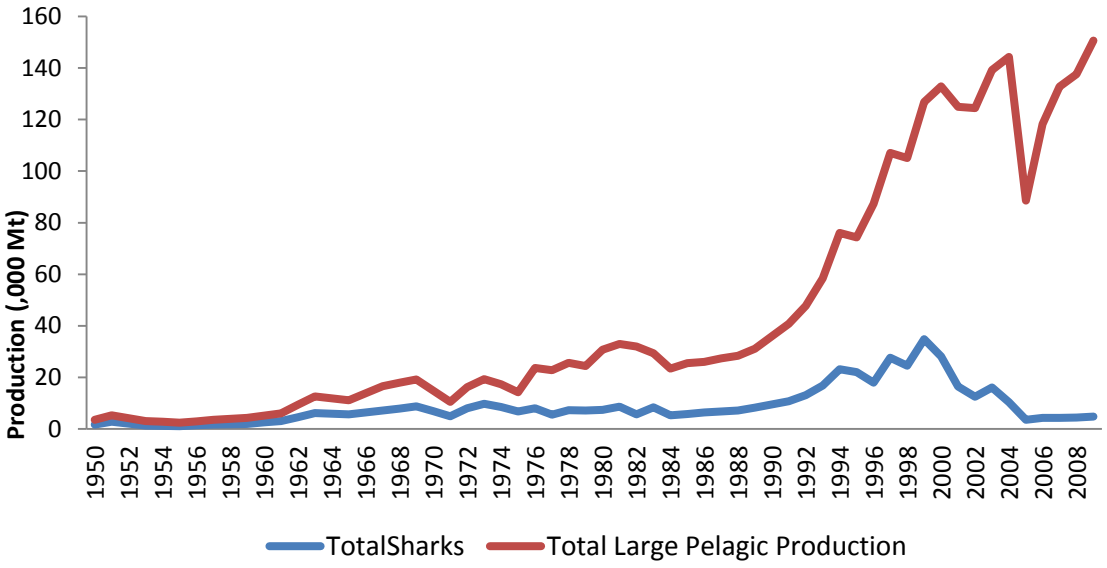


Figure1: Shark production vs. total large pelagic fish production

The sudden drop in the total large pelagic fish production in 2005 was due to the impact of tsunami at the end of 2004. The contribution of sharks to the total large pelagic fish production clearly indicates a gradual decline with the time. This is because fishermen had switched to target tuna since catching of tuna has become more profitable than sharks. Management and conservation measures taken by the Sri Lankan government have also been partially responsible for declining of the shark landings. There have been about sixty species reported in shark landings, but nearly twelve species have been dominated in the commercial landings in Sri Lanka (Joseph, 1999). Silky shark (*Carcharhinus falciformis*) has been the dominant species in Sri Lankan shark landings (Amarasooriya and Dayaratne , 1993).

Sharks are exploited by offshore fisheries as well as coastal fisheries in both pelagic and benthic habitats. Sri Lanka contributed 3.1% of the global catch of sharks during 1990-2004, being tenth in shark fishery world rankings. In 2004 the contribution reduced to 2.4% of global catch.

Current Status of shark fishery in Sri Lanka

Shark production

In 2009, the annual shark catch production realized from both coastal and offshore fisheries was 2,059 Mt. It showed gradual increase of 4137 Mt and 4392 Mt respectively in 2010 and 2011 and thereafter decline to 3178 Mt in 2012 (Figure 2).

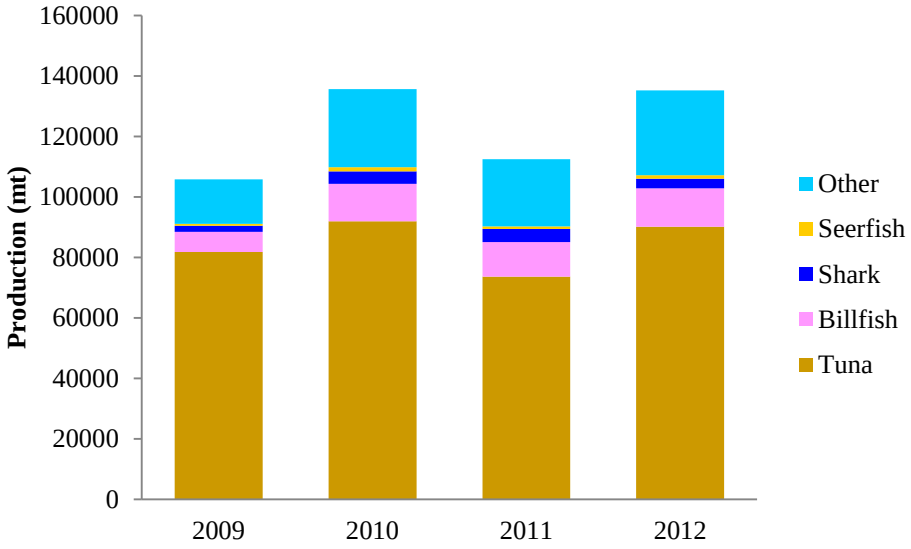


Figure 2: Annual shark production (2009-2012)

Shark production mainly comes from offshore fisheries. Coastal fisheries contributed less than 2% to the total shark production in 2009 but noticeably increased in 2010 and 2011 by 12% and 15% respectively and thereafter declined to 3% in 2012 (Figure 3). Popularization small-scale tuna longline fishery (baby longline) seasonally among coastal fishers may influenced some increase in shark catches in 2010 and 2011 but strong implementation of regulations, especially banning of catching thresher sharks would make some impact in 2012.

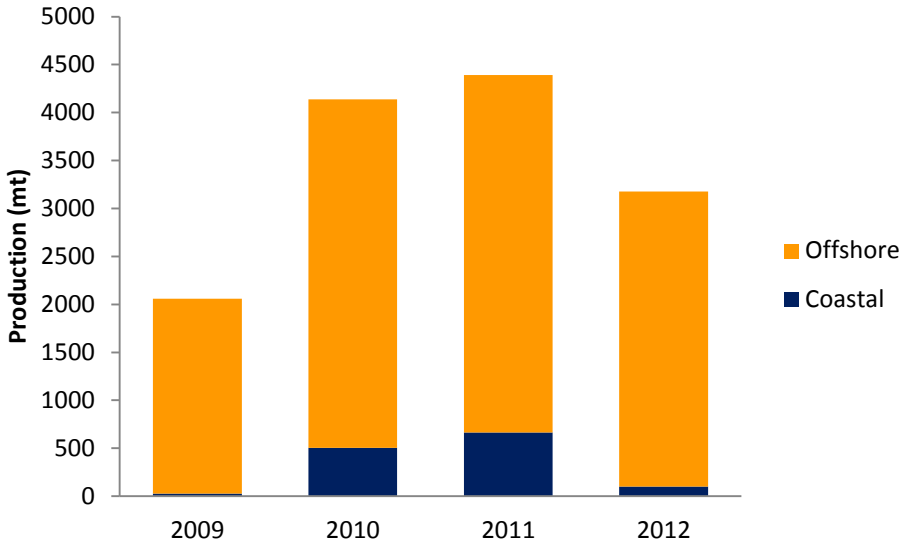


Figure 3: Coastal and offshore contribution in shark production

Historical fishery performance disclosed that Sri Lanka was once a major shark-fishing nation, but reported landings have rapidly declined since 2003 (Figure 4). However, shark contribution at present remains less than 4% to the total large pelagic production (Figure 5). It was reported that in 2012 the contribution was only 2%.

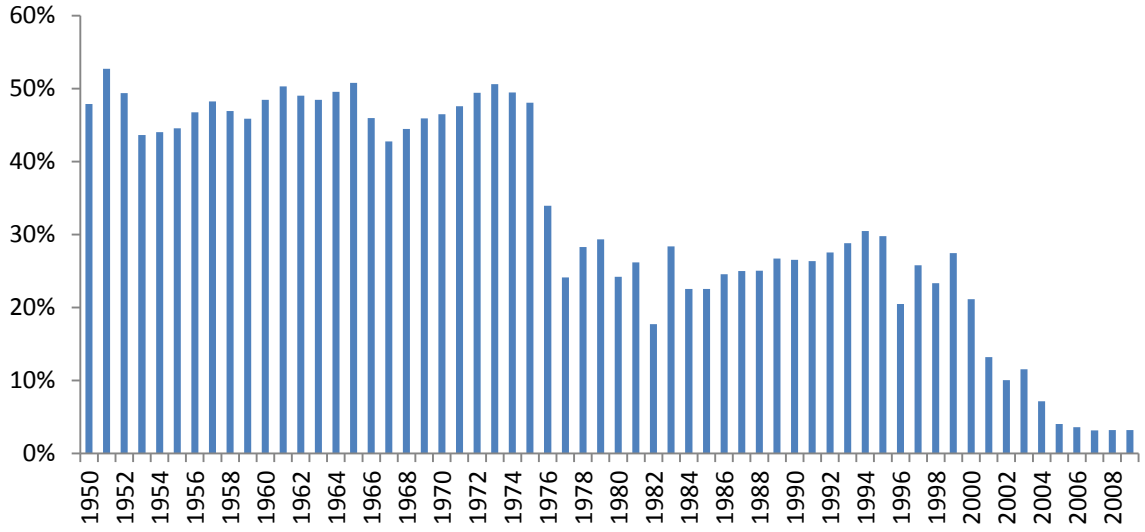


Figure4. Percentage contribution of sharks to total large pelagic fish production: 1950 – 2009

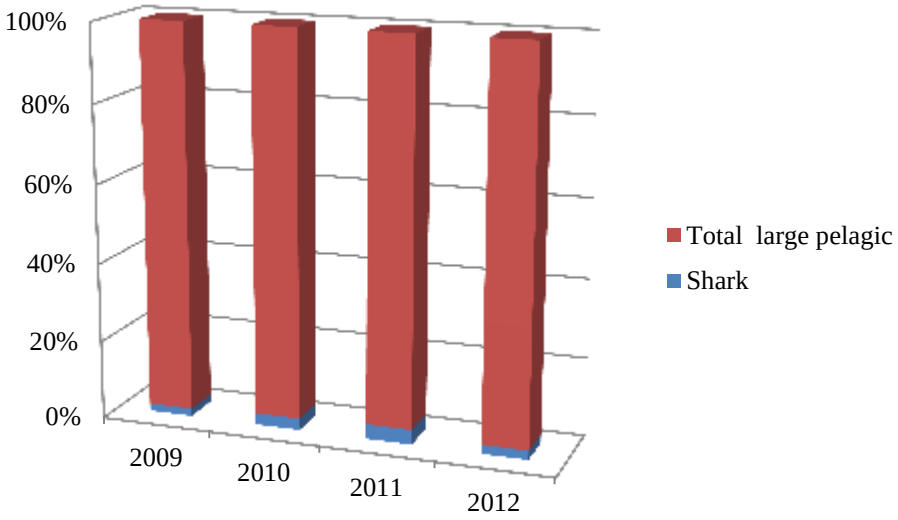


Figure 5: Present status of shark contribution to the total large pelagic fish catch

Shark landing by fishing area

Crucial to effective implementation of regulations pertaining to shark conservation and management is a thorough understanding variation of landings by areas. It was estimated that of the total shark catch of 3177 Mt in 2012 over 60% was landed in two major habours; Negombo in the west coast and Beruwala in the southwest coast (Figure 6).

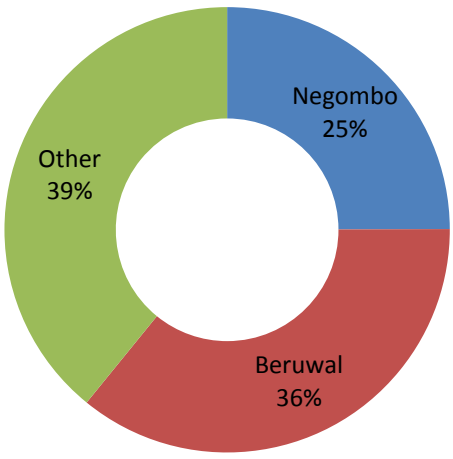
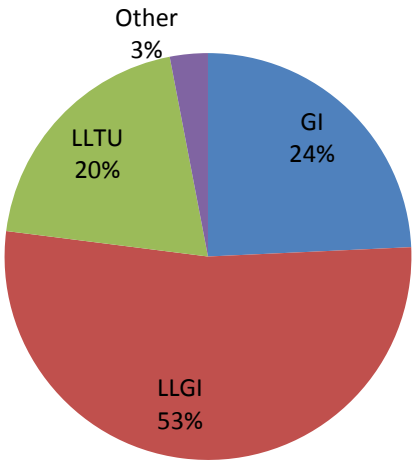


Figure 6: Shark landing by area in 2012

Shark landings by gear

In the large pelagic fisheries sharks are caught mainly by three fishing gears; gillnet, gillnet-longline combination and tuna longline. Of which gillnet-longline combination contributed 53% of the total landings of shark by weight in 2012 compared to 45.9% in 2011 (Hasaragi et al, 2011). Gillnet contributed 24% while tuna longline 20% (Figure 7). This is due to longline-gillnet combination is most widely used fishing gear in offshore and deep sea fishing in Sri Lanka (Longline-gillnet combination contributes more than 75 % of the total offshore and deep sea fishing effort) (Dissanayake and Hewapathirana, 2011).



GI-gillnet; LLGI-gillnet-longline combination; LLTU-tuna longline

Figure 7**:** Shark landings by gear in 2012

Species composition

In the Sri Lankan seas, De Silva (1988) identified 44 species of sharks belonging to five orders and fourteen families. Nine of these species while Amarasooriya and Dayaratne (1993), recorded 46 species. Some of the species recorded by De Silva was not recorded by Amarasooriya and Dayaratne (1993).The changing pattern and expansion of fishing activities to deeper areas may have resulted in the landing of a few species of sharks, which were not reported earlier or vice versa.

The studies conducted during 1990s where gillnet cum longline fishery were more pronounced in the large pelagic fisheries, the sharks landings were dominated with silky shark (*Carcharhinus falciformis*) followed by blue shark (*Prionace glauca)* and oceanic white tip shark (*Carcharinus longimanus),* respectively (De Silva, 1988; Amarasooriya and Dayaratne, 1993; Joseph, 1999).

According to the estimates in 2012 *Carcharhinus falciformis* remained dominated as a single species in the offshore fisheries contributing 37% to the total offshore shark landings followed by bigeye thresher shark (13%) and pelagic thresher shark (11%) while in the coastal fisheries contribution of bigeye thresher accounted 62% (Figure 7).

Although IOTC parties agreed to ban thresher shark fishing in 2010 Sri Lanka implemented this rule nationally in 2012. This may result in higher contribution of thresher sharks especially bigeye thresher.

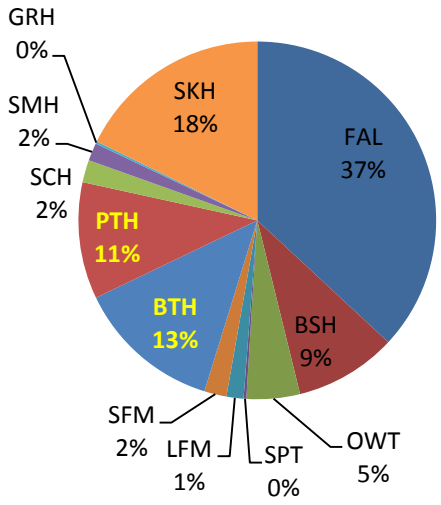


Figure 7: Species composition of shark reported in 2012.

FAL-Silky shark; BSH-Blue shark; OWT-Oceanic white tip shark; SPT-Spotail shark; LFM-Longfin mako shark; SFM- Shortfin mako shark; BTH- Bigeye thresher shark; PTH- Pelagic thresher shark; SCH- Scallop hammerhead shark; SMH- Smooth hammerhead shark; GRH-Great hammerhead shark; SKH – Other sharks

Socio-economic Aspects

The shark catch do create wealth as a food and also an export commodity as such though it comes as a bycatch it brings substantial income to overcome operational cost. Sharks have gained economic significance in Sri Lanka over the past two-three decades because of their high demand especially shark fins in the export market.

Shark oil

Shark oil is extracted only from deepwater shark where it is found in greater quantities using very crude technology; just heat over sunlight. A targeted fishery employing bottom longline for deep-water shark inhabiting on the continental slop was developed mainly in early 1980s in

specified localities in the west and northwest coast; Bruwala, Negombo, Chilaw, Kandakuliya. Level of fishing effort has reported great fluctuations as the fluxes in the market demand.

Fishing is carried out seasonally, during the calm season from November to April in coastal waters from west coast to south coast. Fishing effort employed in this fishery at present is quite low high operational cost. Due to low quality selling price of oil is low about LKR 1200/kg.

Shark fins

The increasing market for sharkfins is the main driving force behind the increasing pressure to target Sharks. Shark fins are mostly exported to Hong Kong, Korea, Singapore, China, and Taiwan. Fins of silky sharks, hammerhead shark, blue shark, oceanic whitetip shark are widely used for export. The value of thee fins are vary by species as well as by size i.e. fins of silky shark of size 18”-20” are currently fetches about LKR 4000, it is about LKR 2000 for blue shark. It has been observed that the volume of fin exported has been declined over the resent past years. Total export in 2012 was 88,064 mt while it was 5000 mt up to June, 2013. Ban of threasher shark has been affected to this industry which gives substantially higher volume i.e three – four times higher while other sharks.export commodity.

Dry fish production

Sri Lanka is a shark meat consumer of theirown catch. Shark meat either dried or in fresh has enjoyed a ready domestic market in Sri Lanka as it has a high demand. Value of dry fish in wholesale market is LKR 700 per kilogram and in retail market it was LKR 1000.

Other uses

Dried skin is exported to China as a raw material to make shoes, belt etc., has become an export commodity in recent years. In addition cleaned shark jaws and teeth are sold as tourist curios.

Eco-tourism

Tourism is one of Sri Lanka's fastest growing industries.Within this industry, ecotourism sector has emerged as a strong segment over this decade. Ecotourism industry is a major user of

biological resources. The strength of Sri Lanka's biodiversity will be a major factor in determining the expansion of the tourism industry.Today, there is an alarming awareness regarding the urgent need for environmental protection in general and biodiversity protection in particular, biodiversity protection being a part and parcel of the broader environmental protection. Numerous opportunities and benefits can be derived by strategically integrating biodiversity and environmental conservation requirements with future tourism needs.

Shark watching as a main ecotourism activity has expanded in many coastal countries. It has been understood that shark watching could generate more value than catching them.

The eco-tourism activities which started about five years back in Matara district (south coast) are fast gaining in popularity during the last two years. Whale Sharks, Dolphins, Whales and Manta rays could be seen a few miles off the sea in the south coast of Sri Lanka and is a strong lure for the tourists. At present Sri Lankan Navy and about ten private companies are engaged in this industry during the season from November to April.

Conservation and management

The biology and behavior, with the growing high magnitude of international trade for meat and fins make population of shark vulnerable to overexploitation and depletion. Though sharks are highly migratory many species are coastal, and are therefore directly impacted by coastal fishing activities, currently characterized by an increased fishing effort, and a low degree of selectivity. Their life history characterized by low fecundity, slow growth and late sexual maturity and thus they have a low capacity to recover once their populations have been overexploited. 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 and conservation bodies such as, Food and Agriculture Organization (FAO), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Asia-Pacific Fisheries Commission (APFIC), the International Organization of Marine Affairs Cooperation (IOMAC), Indian Ocean Tuna Commission (IOTC) and the Bay of Bengal Programme - Inter- Governmental Organization (BOBP IGO).

The Fisheries and Aquatic Resources Act No.2 of 1996 establishes the basic institutional framework required for fisheries management. The Act lays emphasis on management of fisheries and sustainable development with due recognition of conservation measures.

As the first regulation, landing of sharks with fins attached to the body (banning the fining at sea) is regulated by a gazette notification since year 2001. Further, in accordance to the IOTC resolution relevant to the thresher sharks, Sri Lanka has compiled a regulation to ban thresher sharks; *Alopias superciliosus* (big-eye thresher) and *Alopias pelagicus* (pelagic thresher) of amily Alopiidae. The regulation was gazette in July 2012 and from this catching, landing, selling etc. of this thresher sharks are totally prohibited. At the initiation of this regulation, immediate steps have been taken into actions such as conducting awareness programmes for stakeholders by a collective effort of the Department of Fisheries and Aquatic Resources, Ministry of Fisheries and Aquatic Resources and National Aquatic Resources Research and Development Agency (NARA) and thereafter its effective implementation began straightaway. Conducting continues unannounced raiding by Fisheries Inspectors of the Department of Fisheries and Aquatic Resources (DFAR) would enable to completely cessation of catching of thresher shark. These steps taken by Sri Lanka will ensure the sustainability of the shark populations.

Further, Sri Lanka continues working on the issue of conservation of migratory sharks and has consented to an agreement being developed under article 3, 4 & 5 of the Conservation of Migratory Species (CMS). This would add value to current global shark conservation and management efforts

The Department of Fisheries & Aquatic Resources and NARA under the Ministry of Fisheries & Aquatic Resources Development with support from the Bay of Bengal Large Marine Ecosystem Project (BOBLME) initiated the development of Sri Lanka National Plan of Action for conservation and management of sharks (NPOA-sharks) in line with the FAO IOPA-sharks. Three stakeholder consultation workshops were held in major shark landing areas of Sri Lanka and their valuable ideas also contributed for the development of the NPOA-sharks.

The array of shark conservation and management measures adopted by IOTC vary from binding recommendations or resolutions to non-binding measures. They include shark fin measures, catch and gear regulations, prohibited species, reporting requirements and research programmes. This enables to in place internationally binding shark measures for high seas fisheries.

Discussion

Shark catches shows clear decline trend during the recent past years. The estimated shark landing in 2010 was 4137 Mt and it has been declined to 3177.6 Mt in 2012. This trend is due to switching of effort more towards tuna longline which is more profitable than pelagic longline and also implementation of new regulations through strengthening of MCS activities for effective law enforcement.

Sharks are being regularly caught as a bycatch mainly in offshore as well as coastal large pelagic conduct will large mesh gillnet and longline. The estimated shark catch remained less than 4% by volume of the total tuna catch over the past years and less than 3% in 2012.

Shark fisheries appear to be driven by a demand for fin exports. With the banning of thresher sharks the volume of export of shark fins has been reported decline, indicating the effectiveness of conservation and management measure enforced.

As responsible fishing nation in the Indian Ocean, Sri Lanka respect all actions, recommendations and resolutions put forward by IOTC in connection with conservation and management of shark resources in the Indian Ocean. Measures have been already taken to comply with number of resolutions;

As a complement to management measures, a sampling programme has been strengthen by increased sampling intensity in both coastal and offshore waters and extended sampling area and capacity develop of enumerator in sampling methodologies, species identification, data recording etc. Study on shark has given high priority with the assistance of IOTC/OFC, IOTC/BOBPLME.

Monitoring of sharks made by species specific basis as well as for coastal and offshore fisheries separately. In addition, the critical seasons and habitats are identified for each species to define conservation and enforced measures in the NPOA-shark. Since the monitoring activities are

tighten, incidental catches of banned species have enable to release to the sea in spite of the encouraging optimum utilization of sharks. Stock assessment of shark species is very important and it will help for further management and conservation activities. Basic biological information on sharks such as growth, maturation etc., and also habitats and distribution data is still insufficient for detailed studies. These information would be get from log book data in due cause.

During the stakeholder meetings held in late 2012 and early 2013, we were informed that thresher shark population is showing increasing trend in the coastal waters.

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