

## Fishermen's Perception of Shark Conservation Sustainable and Its Effect on Shark Catching : A Case Study on Madura Island

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### Abstract

The high demand of shark products, particularly fins, have influenced the increase in the exploitation and trade of sharks, included small scale fisheries. The condition can increase the vulnerability of sharks because of their biological cycle and as a top predator and economically important fish. This paper aims to identify the conditions of exploitation and management of sharks in Sumenep Regency. The method used in this research is the field observation, in-depth interview and review of policies. Based on the existing results indicate that over exploitation has occurred in Sumenep, where fishermen catch almost any size of sharks, both great until the baby sharks ('baby hiu') in large numbers. Several species of sharks that many caught are the species *Carcharhinus melanopterus*, *C. obscurus*, *Sphyrna lewini* and *Chiloscyllium punctatum*. Shark trade activities occur in Tempat Pelelangan Ikan (TPI) of Pasongsongan, the fishing port of Ambunten, Dasuk, Dungkek, and Tanjung-Saronggi. Currently, the regulations governing the management and protection of sharks in Indonesia is still limited to only a few species of sharks, including whale sharks (*Rhincodon typus*), shark saws (*Pristis Microdon*, *P. clavata*, *P. zijron*, and *Anoxypritis cuspidata*), and manta rays (*Manta birostris* and *M. Alfreidi*), although other species has status Near Threatened until Endangered based International Union for Conservation of Nature (IUCN) and Appendix II based on the Convention on International Trade in Endangered species (CITES). Not to socialized existing regulations to the fishermen, the absence of regional policy in particular, and the high price is one reason still rampant shark fishing on a large scale. To that end, public awareness activities to fishermen and communities and appropriate regulation is needed in sustainable shark management efforts.

**Keywords:** *Sharks, Trade, Catch, Sustainable management, Sumenep Regency.*

### Introduction

This time the shark is threatened under conditions of overfishing. Demand of sharks, especially fins, are still very high and tends to continue to increase, in Asian countries and especially China [Erikson, 20115]. This triggered fears of many parties related to shark conservation, where there is still no control of exploitation and good conservation efforts. Recorded more than 10 million sharks were captured in Indonesian waters, and Indonesia is the largest exporter of sharks in the world for Spain, India, Hong Kong and Taiwan [Budiman, 2014].

In China, shark fin is a form of respect for the host to guests and an imperial menu, while in other countries shark fin soup is

believed to improve health and beauty. The culinary culture has affected the increase in exploitation and trafficking of sharks. This condition can increase the vulnerability of sharks due to their biological cycles. As a top predator and a key species, sharks have an important role in maintaining the health of the marine ecosystem and the food chain system [Sembiring, 2015] and are important economic fish, for which Indonesia is required to make fully of shark fisheries regulations.

There are also many efforts to protect sharks by foreign countries, one of which is in the Galápagos with the design of marine protected areas, so that any form of arrests carried out in the area is considered illegal [Stier, 2015]. The same thing was done in Canada, where the country carried out shark

protection in a comprehensive manner by making special laws to prohibit shark fin collection in its waters, season-based closure, restrictions on fishing gear and restrictions on fishing based on species [Sybersma, 2013]. This can be a good case example for implementation in Indonesia.

In Sumenep Regency, over-exploitation of sharks is suspected to be moderate and will continue to occur, even though it is carried out by small-scale fishermen. This condition can be seen from the massive proliferation of sharks and the lack of management efforts carried out by the regional government. As a preliminary study, this paper aims to identify the conditions of exploitation and management of sharks in Sumenep Regency.

### Materials and Methods

In-depth interview activities were conducted to explore information related to catching existing sharks. Informants were the key to the interview chosen purposively (purposive sampling) from stakeholders related to shark fisheries, such as fishermen, traders and government officials.

To see broader conditions and see the management needs needed, an analysis of existing policies was carried out, both internationally, central and regional. The review of this policy was then adjusted to the field findings obtained and analyzed in a qualitative descriptive manner, so that the facts, circumstances and variables can be seen as factors in the occurrence of shark fishing activities by small fishermen. The analysis was also conducted to see existing ideas, ideas, beliefs and motivations [6].

This research was conducted through field observations, in-depth interviews and policy studies. Field observations were carried out at fish landing locations, both at the fish auction site and existing traditional ports, including the TPI Pasongsongan, Ambunten fishing port, Dasuk, Dungkek, and Tanjung – Saronggi. This observation aims to see firsthand the conditions of capture fisheries activities, marketing, types of sharks captured, and fishing gear used.

### Results And Discussions

#### *Policies on Usage and Protection of Shark*

At this time, policies related to shark protection in Indonesia refer to IUCN and CITES. Since 2013, CITES has included types of shark cow / oceanic whitetip shark (*Charcarhinus longimanus*) and hammerhead hammerhead (*Sphyrna lewini*, *S. mokarran*, and *S. zygaena*) into Appendix II, meaning that shark trade abroad must go through strict supervision from the government.

Protection against sharks has begun, although the regulations governing the protection of sharks in Indonesia were still limited to certain types of sharks, including shark whales (*Rhincodon typus*) [7], saw sharks (*Pristis microdon*, *P. clavata*, *P. zijsron*, and *Anoxypritis cuspidata*) [8], and manta ray (*Manta birostris* and *M. alfredi*) [9]. This was a form of management effort carried out by the Indonesian government as a conservation effort.

In Indonesia, management of shark fisheries refers to the Action Plan National Management of Action (NPOA of Sharks and Ray Management) which has been established since 2009 based on the International Plan of Action (IPOA - Sharks) which was ratified by the World Food Organization (FAO) Fisheries Committee [KKP, 2009].

If referring to the existing NPOA, the points of the action plan that must be implemented immediately included [10]:

1. Reviewing the status of sharks in Indonesia;
2. Preparation of methods and processes for collecting data, included:

- 1) Collection and exchange of data, included:
  - a. Facilitating integrated data collection and monitoring of fisheries with the same management approach.
  - b. Improve the data collection efforts in accordance with catches landed in a format including recording of side captured, both used and disposed.
  - c. Build long-term database needs that aim to guarantee data in accordance with classification standards, accuracy, integration, consistency, and easily accessible
  - d. Assessing socio-economic fisheries and non-consumption usage.

- 2) Improve specific data, included:
    - a. Ensure the accuracy of catch data using observers, monitoring and independent research programs.
    - b. Make a field guide for effectiveness of identification.
    - c. Improve type identification skills for fishermen, observers, researchers and fisheries staff.
  3. Research development, included:
    - 1) Build time series data.
    - 2) Determination of survey strategies.
    - 3) Developing knowledge studies on life cycles, distribution, habitat mapping, etc.
    - 4) Conduct studies on the implementation of ecosystem-based management.
    - 5) Plan, collect and analyze fishery data from fishing vessels, including the number, type and size of vessels; characteristics and selectivity of fishing gear; fishing season; local arrests; navigation aids and capture technology; and by-products that are discarded
    - 6) Collect data and information about the socio-economic conditions of the use of sharks.
    - 7) Developing resource information, protected species and biology (genetics).
  4. Improve of the management steps, included:
    - 1) Sustainable shark fisheries, included:
      - a. Carry out periodic monitoring, including the existence of resources, usage patterns and trade chains.
      - b. Rationalization of arrests.
      - c. Utilizing research results as one basis for setting management goals.
      - d. Improved fishing methods that were environmentally sound
      - e. Carry out management in accordance with the policy.
    - 2) Protection of biodiversity, habitat, functions and structure of ecosystems, included:
      - a. Determine the protected species and their habitat.
      - b. Determine and protect of shark spawning areas.
      - c. Establish recovery programs for species whose populations were threatened.
      - d. Prohibiting trade and catch of certain types under 60 cm / 0.5 kg and applying strict sanctions.
  5. To increase the concern for shark fisheries, included:
    - 1) Build an information center.
    - 2) Improve understanding of cultivation management.
    - 3) Ecotourism development.
  6. Institutional Strengthening, included:
    - 1) Facilitate monitoring, dissemination of information and training programs.
    - 2) Establish effective communication and consultation consultations between all stakeholders.
    - 3) Implement the IPOA, especially with countries that have agreements with Indonesia and improve management and protection of threatened species.
- Fisheries in Sumenep Regency*
- Fisheries was the one sector that gave the largest contribution to regional income. For the marine fisheries sub-sector only, in 2014 it was recorded that it was able to contribute production of 46.672,80 tons, equivalent to the value of Rp. 479.371.000.000, - [BPS, 2015].
- This value was very large when compared to the Agriculture, Forestry and Fisheries sector, which was equal to 6.96% and 3.17% when compared to the total value of the Gross Regional Domestic Product (GRDP) in 2014. This showed that the dependence of regional economic sources and communities from marine capture fisheries, the types of caught were small pelagic fish (lemuru, flying fish, bloated) and large (cob), while sharks were still not recorded. The absence of this shark capture was a global problem, both statistically, death, landings, discharges, and fin sellers [Kettemer, 2013].
- Sharks Captured*
- Sharks were the one of the types of fish sold by fishermen in fish landing places in Sumenep. Sharks captured can be categorized into two categories, which were deliberately captured and accidentally caught (by catch) by fishing gear and nets, because the main target caught of fishermen were tuna. This condition was very common in many small-scale

fisheries (see [Peres, 2015] and was the biggest threat in the world of marine fisheries. For the purpose of sharks captured intentionally another reason to catch the sharks was the very

usually occurs in the shark season and / or in season there were no fish which can be captured for sale as a source of income,

high price.

**Table 1.** The Type and Status of sharks which was caught in Sumenep

Type	Local name <sup>a</sup>	Status based on the IUCN Red List ver. 2013.1. and CITES
<i>Carcharhinus melanopterus</i>	Hiu karang sirip hitam, Hiu mada, Kluyu karang	<i>Near Threatened</i>
<i>C. obscurus</i>	Hiu merak bulu, Cucut lanjaman, Hiu lanyam	<i>Vulnerable</i>
<i>Sphyrna lewini</i>	Hiu martil, Hiu caping, Hiu capil, Hiu bingkoh	<i>Endangered – Appendix II</i>
<i>Chiloscyllium punctatum</i>	Hiu batu, Hiu bongo, Hiu gedok, Hiu gedebong, Hiu bongol, Cucut dolok	<i>Near Threatened</i>

Source: <sup>a</sup>Fahmi dan Dharmadi [Fahmi, 2013]

Some types of sharks that were caught include, among others, *Carcharhinus melanopterus*, *C. obscurus*, *Sphyrna lewini* and *Chiloscyllium punctatum* (Table 1 and Figure 1). Sharks were caught and sold in almost all sizes, both large (> 100 cm), medium (50-100 cm) to small sizes (<30-50 cm), or what was referred to as "baby sharks" by fishermen.



**Figure 1.** Some types of sharks were caught by fishermen



**Figure 2.** Market condition and shark marketing

Every fisherman can sell the sharks every day about 3-7 fish by various selling prices. For fresh sharks, fishermen can sell for around Rp10.000,- until Rp20.000,- for the small sizes, Rp45.000,- until Rp150.000,- for the medium size, and Rp500.000,- until Rp1.000.000,- for the large sizes, even during the shark season and with a very large size, fishermen can sell their caught sharks between Rp2.500.000,- until Rp3.000.000. The form of shark sales consist of 2 forms, the first was the fishermen directly sell sharks to the market (consumers) and the second was the fishermen sell to collectors, who are then resold by the

collectors to Surabaya in both fresh and dry fins. For cases of sales in the form of fins, a lot occurs in the archipelago, where the selling price of fins can reach Rp200.000,-

Based on existing status, only *Sphyrna lewini* was prohibited from being traded, but based on conservation rules, the capture of baby sharks or small sharks weighing <0.5 kg or <60 cm was not justified. This can disrupt the regeneration cycle of sharks.

#### *Stimulator and Problem Factor*

The motivation to catch the sharks in Sumenep Regency, included:

1. Market Demand

- The high market demand and able to absorb all the caught sharks of fishermen.
2. The High Selling Price The high selling price caused fishermen to get a big profit, even fishermen will go straight home from sea when they have got 4 medium and large fish.
  3. Accidentally caught The main caught was tuna, but sharks which caught were not released back into the sea, but were sold to the market. Bycatch was the one of the biggest factors that can increase the vulnerability of sharks [14].

#### *Scarcity of target fish in certain seasons*

When there were no tuna, the fishermen caught all types of fish that can be sold, including sharks of all types and sizes to meet their daily needs.

#### *Shark Fisheries Management Needs*

Based on existing conditions, shark fisheries management in Sumenep Regency was very much needed to preserve the sharks. Law enforcement for matters that have been regulated in the legislation needs to be done firmly, while for matters that have not been regulated, it can be reduced in regulations at the regional level. The application of NPOA can be fully adopted, starting from stock status to institutional strengthening.

The prohibition was deemed insufficient [KKP, 2009]. The dynamics of shark trade need to be understood first as the first step in making management for all types of sharks. Calculation of shark stock must be carried out to make management and capture, and regulate changes in target species on sharks from a smaller stock to more stocks [18] in each season for the types of sharks that were still not vulnerable. As a supporter of policy, the use of DNA barcoding can also be done to detect the status of sharks [3, 19], especially for each shark product in processed form. In addition, the selectivity of fishing gear also needs to be increased, so that sharks caught accidentally can be reduced.

In the context of conservation, the use of sharks must not be stopped. Alternatives to non-exploitation can also be done. Sharks can not only be used for consumption, but can be developed for tourism. Tourism development

is believed to be able to provide greater value than utilization for consumption, because it can provide multiple effects. In Australia, two shark tourism activities were developed, namely: Snorkelling and swimming with whale sharks; and diving in cages with white sharks [20].

Techera and Natalie Klein [2013] argue that marine tourism provides economic, educational and environmental benefits and benefits even though not without risk to humans, animals and the environment. Another tourist activity that has been successful in building shark protection awareness was shark fishing tournament activities with a catch and release system [Heard, 2016].

Shark management can be made separately [Perez, 2015] and combined with other fisheries management. This was related to the characteristics, status of each type of shark and region. For this reason, shark management can be built based on season and region. For sharks with a status that was almost threatened, vulnerable and endangered, they should be fully protected.

#### **Conclusions**

Shark fisheries in Sumenep Regency tends to lead of overfishing. For this reason, shark fisheries management was very much needed in utilization and protection arrangements. Shark management should be based on existing legislation and NPOA, and if needed management can be supported by regional policies.

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