



Conservation Status of Shark Landed in Local Fish Market in Pangandaran Regency, Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Pangandaran has a great fishery potential. Therefore, fishing communities make fisheries a source of economy, especially in the fishing sector, namely by buying and selling the catch. Fish buying and selling activities are increasing in line with the fish consumption needs of the community. This has an effect on increasing fishing activity, causing a decrease in fish production. The study was conducted to find out information on the IUCN group of fish that are still sold in the fish market. The research was conducted by direct observation in the field at the Pangandaran fish market and its surroundings. Observations show that the Pangandaran fish market still sells fish that are listed in the IUCN. There are sharks and ray fish sold at the Pangandaran fish market. The species found were 3 species spread over five observation locations with details of one species listed IUCN-Least concern, and one species registered IUCN-Vulnerable for hammerhead shark and IUCN- Near Threatened for blacktip shark. The sharks identified as Appendix II species while the freshwater stingray belongs to Appendix III of CITES. Because endangered fish are still sold routinely, conservation is needed to preserve the biota. Fisheries management in the catching process also needs to be done so that endangered fish caught can be minimized.

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1. INTRODUCTION

Pangandaran is one of the regencies in West Java Province which has huge fishery potential. The abundant biodiversity in Pangandaran has a huge impact on the local community. Apart from fulfilling daily needs, the available marine resources can be used as a source of income so as to improve the economy of the Pangandaran community. Most of the people depend on the fisheries sector, especially capture fisheries. The catch will be sold to fish auctions, restaurants, fish markets and baskets. However, there are also catches that are consumed, usually small fish or leftover fish for sale. Resources that are used continuously without any management will cause biodiversity degradation and even extinction. Biodiversity is decreasing along with the increasing human needs which causes a decrease in the production of marine biota.

Fishbase revealed that there are about 144 species of finfish that are threatened with extinction in Indonesia [1]. In addition, the *Elasmobranchii* fish are in a high rate of extinction due to over fishing triggered by high market demand for stingray meat and skin and shark fin [2]. Each year, as much as 6242.9 kg sharks were caught in Probolinggo East Java Indonesia [3]. According to Anderson et al. [4], the process of stock depletion in Indonesian territory is a natural consequence of catching in fisheries whose use is open access, where there is no individual ownership of the fishing area.

Biologically, sharks belong to vertebrates or Chondrichthyes and belong to the sub-class *Elasmobranchii*. Shark and ray populations can be maintained if managed efficiently. FAO (Food and Agriculture Organization) stated that the total catch of sharks and rays was 700,000 tonnes in 2008 [5]. Based on data from the World Food and Agricultural Organization (FAO) in 2010 with a volume of production tends to decline where in 2000 it was 113,626 tons to only 107,290 tons in 2008 with an annual average of 109,248 tons (13.5% of the world's total) [6]. Of these, Indonesia, India, Spain, Taiwan, and Mexico are the five largest shark producing countries in the world [7-9].

Zainudin [10] states that shark fisheries resources in Indonesia have decreased with the catch per effort (CPUE) indicator of fishermen tending to be lower to 26-50%, fishing locations

are getting farther away; increasingly widespread and the rate of arrests is high. Shark fishing, like other *Elasmobranchii* fishing, has an impact in the form of a high risk for the existence of the shark population [11,12]. Based on their biological characteristics, sharks are highly susceptible to overfishing pressure [13,14], due to their long life cycle, slow growth and sexual maturity and low fecundity [15-17].

The fishing has caused several impacts on the shark and stingray populations. One of the impacts is the scarcity that occurs in the population of sharks and rays. The scarcity that occurs is the impact of several things, including the increase in the number of requests for local markets or international markets which are quite high [18]. Fahmi and Dharmadi [19] stated that the *elasmobranchi* fishery in Indonesia had been going on around the 70s as a by-catch from the tuna longline fishery, but now sharks have become one of the catch targets for fishermen in several fish landing sites in Indonesia, especially in artisanal fisheries. Shark and ray fisheries in Indonesia are not as popular as other fishery commodities such as tuna, large pelagic, small pelagic and shrimp fisheries. However, shark fishing activities in Indonesia have recently become an international issue because Indonesia has the highest production volume of shark catches.

Based on the problems that have been presented, it is necessary to find a way to overcome them so that the environment is maintained and sustainable. One of them is with sustainable fisheries management so that the existence of marine life is maintained, especially those that are already threatened with extinction. This research was conducted as a form of fisheries management, namely by collecting data on marine biota recorded in the IUCN and CITES but still being sold in the market. CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) or the convention on international trade in endangered species of wild plants and animals is an international agreement between countries which was drawn up based on the resolution of the session of the members of the World Conservation Union (IUCN) in 1963. The convention aims to protect plants and animals. wildlife against the international trade in specimens of wild plants and animals, which threatens the sustainability of these species. The

Indonesian government has ratified CITES through Presidential Decree No. 43 of 1978 dated December 28, 1978 and became effective on March 28, 1979. This has the consequence that any policies related to international trade related to plants and animals must refer to the CITES provisions. This study will unveil the composition of sharks and ray that are being sold in Pangandaran. With the data collection, it is hoped that it can be used as material for further sharks and ray fisheries management.

2. METHODOLOGY

2.1 Location

The research was conducted in December 2020 in Pangandaran Regency, West Java, Indonesia. Observations were made in five locations, namely the Fish Market on the East Coast of Pangandaran, Pangandaran Market, Parigi Market, Fish Sellers in Bojong Salawe and Cijulang Market (Fig. 1). The fish market is located on the East Coast of Pangandaran, where there are sea food restaurants as well as selling fresh fish. These are the most represented markets located in the area of Pangandaran Regency. The fish sold in the markets came from the coast of southern Java up to the Indian Ocean.

2.1 Observation Methods

The method used in this study was survey method. The data were collected mainly by observation and interviews to the local seller. The type of data used was primary data which were obtained through interviews and field observations. Sharks and rays species then identified using a reference from book and internet. Then their conservation status was confirmed using the IUCN red list and Appendix of CITES as well as the national regulation (Ministry of Marine and Fisheries Affairs). In accordance of sharks and rays identification, we also identified majority of fish and marine organism sold in the market to give a clearer picture of the sold species composition in Pangandaran Regency, West Java, Indonesia.

3. RESULTS AND DISCUSSION

3.1 Sharks and Ray Observed

Results of field observations indicate that there are still sharks and ray listed in IUCN red list being sold in the region. In all observation locations, generally we found one type of ray and two type of sharks. The detailed of sharks and ray species found and conservation status of them at all location can be seen in the following Table 1.

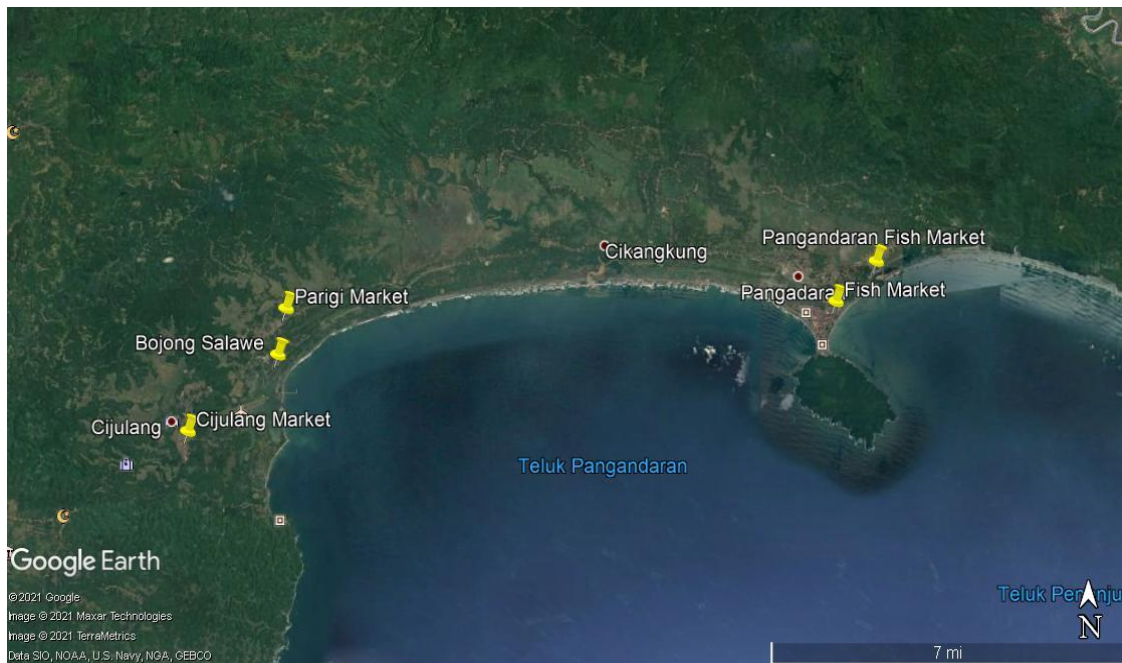


Fig 1. The five studied sites in West Java, Indonesia

Table 1. Shark and ray species found in five different market in West Java, Indonesia

Location/Species	Freshwater Stingray (<i>Urogymnus dalyensis</i>)	Hammerhead Shark (<i>Sphyrna zygaena</i>)	blacktip shark (<i>Carcharhinus limbatus</i>)
FM	√	√	√
PM	√	-	-
PAM	-	√	√
BS	-	√	√
CM	-	√	√

*FM: Fish Market; PM: Pangandaran Market; PAM: Parigi Market; BS: Bojong Salawe; CM: Cijulang Market



Fig 2. Sharks and Ray Observed at the Market. Freshwater Stingray (*Urogymnus dalyensis*) (a-b), hammerhead shark (*Sphyrna zygaena*) (c), Blacktip Shark (*Carcharhinus limbatus*) (d)

Based on the results of field observations, the types of fish sold are very diverse. The species found were 17 species in total spread over five locations including pelagic fish and invertebrate like Lobster and squid. The IUCN fish species with endangered status are stingrays and the IUCN group with least concern status. While other sharks species identified as IUCN - Vulnerable (Table 2). In addition, at the Fish Market and Pangandaran Market, lobster species were found which were included in the IUCN but not yet endangered. The results of interviews with traders explained that IUCN group fish are

still sold freely. Fish traders and restaurant owners get fish from local fishermen around Pangandaran.

Based on the results of field observations, the fish market in Pangandaran still sells fish commodities that are classified as IUCN. The types of fish sold are included in the endangered, vulnerable and least concern categories. The endangered category of fish is a species that is threatened with extinction so it should not be traded. Moreover, the type of fish has not met the age to be suitable for consumption.

Table 2. Conservation status of sharks and ray in Pangandaran Regency Market

Species	Conservation status		
	IUCN	CITES	NATIONAL
Freshwater Stingray (<i>Urogymnus dalyensis</i>)	Least Concern	Appendix III	-
Hammerhead Shark (<i>Sphyrna zygaena</i>)	Vulnerable	Appendix II	Export Prohibited*
Blacktip Shark (<i>Carcharhinus limbatus</i>)	Near Threatened	Appendix II	-

*according to Ministry of Marine and Fisheries Affairs Regulation No. 5 Year 2018

Based on IUCN data in 2015 the conservation status of stingrays in nature from 156 species of stingrays identified 10 species in the endangered category, 3 species in the critically endangered category, 21 species including near threatened, 27 vulnerable species, 33 least concern species and 62 data deficient species [20]. Factors that cause the conservation status of stingrays to be threatened are due to overfishing, reproduction that takes a long time, and the relatively small number of reproductive products. Continuous catching of stingrays occurs because the benefits possessed by this type of fish are very large, especially in the flesh, skin and fins. This causes the production of stingrays to decrease drastically. While the conservation status in CITES there are no types of stingrays in the list of animals protected by trade because CITES does not yet have data on these stingray species [2,20].

Another type of fish found in the fish market and listed in the IUCN endangered category is shark. The identified sharks are hammerhead sharks and silku sharks. The sharks found are sold freely to the public. The shark is still in a young stage or has not been included in the size suitable for consumption. The fish traders explained that they got the sharks from Pangandaran fishermen which were their catch.

The hammerhead shark has a sideways head that is less than a third of its body length, the front of the front head is very curved, there is no depression in the middle, the first dorsal fin is high, slightly tapered to the adult size, the second dorsal fin is short, with the hind end long and slightly concave edges, anal and dorsal fin bases are nearly the same length. A group of hammerhead sharks that live in continental shelf areas and island areas near the coast to offshore, starting from the surface layer to a depth of 20 meters or more [21,22]. These fish are included in the IUCN – Vulnerable and CITES - Appendix II. In addition, the regulation of

hammerhead shark trading has been controlled by the ministry of marine and fisheries affairs in the regulation No. 5 year of 2018 which says that the export of the hammerhead shark is strictly prohibited.

The blacktip shark has a first dorsal fin and a very broad pectoral fin that is rounded at the end, the tips of the fins are white in adults (black tipped in juveniles), there is a line between the dorsal fins and a short, broad snout (viewed from below). Their habitat in the surface layer to a depth of 152 meters, usually found far off the coast or near remote islands that have a narrow shelf. The distribution of this shark species is known to be very wide throughout the warm tropical and subtropical waters. The blacktip shark is included in the IUCN – Near Threatened; CITES – Appendix II.

The number of shark sizes that are below the adult size indicates that there are fewer adult size sharks available in nature. Catching sharks that have not yet reached maturity has the potential to accelerate the extinction of sharks in the wild. Accelerated extinction with fewer sharks developing to adulthood reinforces the need for shark conservation.

4. CONCLUSION

There are sharks found to be sold at the Pangandaran fish market. The species found were 3 species spread over five observation locations with details of one species listed IUCN-Least concern, and one species registered IUCN-Vulnerable for hammerhead shark and IUCN- Near Threatened for blacktip shark. The sharks identified as Appendix II species while the freshwater stingray belongs to Appendix III of CITES. Because endangered fish are still sold routinely, conservation is needed to preserve the biota. Fisheries management in the catching process also needs to be done so that endangered fish caught can be minimized.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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