

Conservation Status of Caught Fish on the Coast Pangandaran, Pangandaran District, West Java

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ABSTRACT Pangandaran has high potential in the tourism and fisheries sectors. Marine resources that are open access and can be used by anyone cause the sustainability of resources to be threatened due to over-exploitation. Traditional fishermen are one of the livelihoods owned by the majority of coastal communities, especially in the Pangandaran Coastal area. However, fishing activities have not been carried out wisely, and become a threat to the sustainability of sustainable marine biota. Small fishermen get by-catch in the form of protected marine life and are included in the IUCN Red List and the CITES Appendix list. This research was conducted to find out the species of marine biota with important conservation status or included in the status of the IUCN red list and the CITES Appendix list caught and traded in the coastal areas of Pangandaran Regency. The research was conducted using field observation method with purposive sampling technique in 2 locations; the east coast and the west coast of Pangandaran. There are 47 fish species found in all research sites with conservation status not evaluated (12.8%), least concern (83.0%), near threatened (2.1%), vulnerable (2.1%), and included in CITES Appendix II (2.1%).

Keywords: CITES; conservation; IUCN; traditional fishermen

INTRODUCTION

According to the [Minister of Marine Affairs and Fisheries Regulation No. 71 \(2016\)](#), the waters in the Indian Ocean (from the South of Java to the South of Nusa Tenggara, Sawu Sea, and the Western Part of the East Sea) fall under Fisheries Management Area 573. This region harbors a potential fishery resource of 1,267,540 tons, comprising small pelagic fish, large pelagic fish, demersal fish, coral fish, penaeid shrimp, lobster, crab, cuttlefish, and squid. Dominant fish species in this area include lemuru, cakalang, krai mackerel, layang scad, and madidihang.

Pangandaran Regency fall within the WPP 573 Indian Ocean zone, covering the waters off the western tip of Sumatra and the south coast of Java ([Nurhayati, 2013](#)). The Pangandaran waters area holds significant potential in both the marine tourism and capture fisheries sectors ([Suman et al., 2017](#)). Both sectors make a substantial contribution to the local economy and society in the Pangandaran region. Marine resources, including the Pangandaran waters, are considered open access, meaning they can be utilized by everyone and are not privately owned. This situation poses a threat to resource sustainability due to overexploitation. Local communities often perceive that they have the freedom to extract resources without considering the preservation and sustainability of these resources ([Nurhayati, 2013](#)). Overfishing leads to a decrease in fish populations and biodiversity due to high market demand.

In fishing activities, local fishermen frequently catch species with endangered conservation statuses. Additionally, fishermen often encounter bycatch of non-target organisms, including protected marine life listed in the Red List of the International Union on Conservation of Nature (IUCN) and the Appendix list of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) ([Permana & Azizah, 2022](#)). IUCN is an interna-

tional organization focused on conservation established in 1948, categorizing the conservation status of species into nine categories in the IUCN Red List. On the other hand, CITES is an international convention regulating the trade of nearly extinct flora and fauna species. Indonesia, as the 48th member of CITES since December 28, 1978, ratified CITES through Presidential Decree No. 43 of 1978. Several rare and endangered species are currently under scrutiny in international forums such as the UN-Convention on Biological Diversity (UNCBD) and the United Nations Framework Convention of Climate Change (UNFCCC). According to the CITES Appendix List of Aquatic Species in 2020, there are 107 marine organisms included in the CITES Appendix; 51 species are listed in Appendix I, and 56 species are listed in Appendix II.

The lack of local fishermen's knowledge regarding the conservation status of marine life is one of the obstacles to preserving marine resources in a given area. Fishing activities carried out by local fishermen are often not based on the availability of information and scientific data regarding the crucial conservation status of marine life. This lack of awareness contributes to the declining populations of marine life that should be protected, as they are included in the IUCN Red List and CITES Appendix ([Permana & Azizah, 2022](#)). Based on these considerations, the purpose of this study is to identify marine species with significant conservation status that are caught and traded in the coastal areas of Pangandaran Regency. The data collected is expected to serve as a basis for future management initiatives.

MATERIALS AND METHODS

Materials

The study was conducted in two locations, Pantai Timur Pangandaran in the water area around coordinates 108°39'32.7" E, 07°42'9.1" S (Site I), and Pantai Barat Pangandaran around coordinates 108°39'18.4" E,

07°41'54" S (Site II) in Pangandaran Regency, West Java Province (Figure 1), during the months of October and November 2022, carried out over a period of 14 days.

Methods

The method employed for fish sampling was a survey (field observation) using fishing gear commonly utilized by coastal fishermen, namely Lift Net and Beach Seine, which were operated within limited proximity to the shoreline. All fish captured by the fishermen were meticulously documented, morphometrically measured, and their meristic characteristics recorded. Identification was performed utilizing reference materials such as Kot-

telat's book from 1993, Market Fishes of Indonesia, and the FishBase website.

Subsequently, the extinction status of each fish species was assessed based on the IUCN Red List of Threatened Species and CITES Appendices, which serve as institutions of reference for global conservation status. The gathered data were then subjected to descriptive analysis, delving into detailed discussions regarding fish species with significant conservation status found at each location. Descriptive analysis was conducted by linking biological and ecological aspects of the identified biota, followed by a discussion of the conservation efforts undertaken and their management.

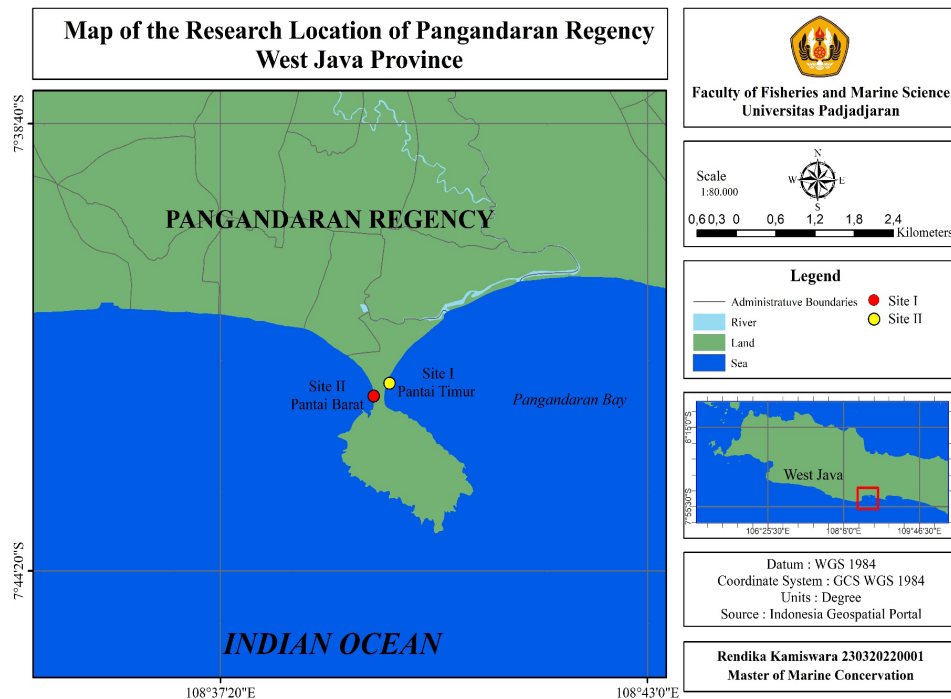


Figure 1. Research sites.

RESULTS AND DISCUSSION

The results of the observations showed that 47 species of fish were caught and identified from 40 genera, 30 families, 13 orders, namely Acanthuriformes, Carangiformes, Clupeiformes, Gobiiformes, Gonorynchiformes, Mugiliformes, Mulliformes, Perciformes, Pleuronectiformes, Scombriformes, Scorpaeniformes, Syngnathiformes dan Tetraodontiformes. 30 familia yaitu Acan-

thuridae, Balistidae, Carangidae, Chanidae, Clupeidae, Cynoglossidae, Diodontidae, Engraulidae, Ephippidae, Fistulariidae, Gerreidae, Gobiidae, Haemulidae, Labridae, Latidae, Leiognathidae, Mugilidae, Mullidae, Ostaciidae, Polynemidae, Pristigasteridae, Scatophagidae, Sciaenidae, Scombridae, Scorpaenidae, Siganidae, Sphyraenidae, Syngnathidae, Tetraodontidae and Trichuridae (Table 1).

Table 1. Conservation status of fish caught during research.

No.	Scientific name	Local name	Site I	Site II	Status Conservation IUCN	Status Conservation CITES
1	<i>Siganus javus</i> (Linnaeus 1766)	Baronang Angin	ü	-	LC (Carpenter & Smith-Vaniz, 2016)	-
2	<i>Acanthurus xanthopterus</i> Valenciennes, 1835	Kulit Pasir, Lodem	ü	-	LC (Abesamis et al., 2012)	-
3	<i>Ephippus orbis</i> (Bloch, 1787)	Blegedebe, Gandu	-	ü	LC (Carpenter, 2015)	-
4	<i>Platax batavianus</i> Cuvier, 1831	Gebel Jawa	-	ü	NE	-
5	<i>Aurigequula fasciata</i> (Lacepède, 1803)	Pepetek, cotek, gerongtong	ü	ü	LC (Larson et al., 2017 a)	-
6	<i>Secutor indicus</i> Monkolprasit, 1973	Raramangsi, Pepetek	ü	ü	NE	-

No.	Scientific name	Local name	Site I	Site II	Status Conservation IUCN	Status Conservation CITES
7	<i>Develementum interrupta</i> (Valenciennes, 1835)	Petek etem	-	ü	NE	-
8	<i>Sphyræna obtusata</i> Cuvier, 1829	Barakuda, Dolok,	ü	-	LC (Carpenter et al., 2015)	-
9	<i>Alectis indica</i> (Rüppell, 1830)	Langsar Pongge Rawis	-	ü	LC (Smith-Vaniz & Williams, 2016 a)	-
10	<i>Atule mate</i> (Cuvier, 1833)	Percang Domba, Selar como	-	ü	LC (Smith-Vaniz et al., 2016 b)	-
11	<i>Alepes kleinii</i> (Bloch, 1793)	Ampling	ü	-	LC (Smith-Vaniz & Williams, 2016 c)	-
12	<i>Carangoides praeustus</i> (Bennett, 1980)	Kapuran	ü	-	LC (Smith-Vaniz et al., 2018 a)	-
13	<i>Chorinemus tala</i> (Cuvier, 1832)	Talang	-	ü	LC (Smith-Vaniz & Williams, 2016 d)	-
14	<i>Selar crumenophthalmus</i> (Bloch, 1793)	Selar Bentong	ü	-	LC (Smith-Vaniz et al., 2015)	-
15	<i>Carangoides armatus</i> (Rüppell, 1830)	Pongge	-	ü	LC (Smith-Vaniz et al., 2018 b)	-
16	<i>Caranx tille</i> Cuvier, 1833	Kwe lilin	ü	ü	LC (Smith-Vaniz & Williams, 2016 e)	-
17	<i>Herklotsichthys quadrimaculatus</i> (Rüppell, 1837)	Layang, Mata belo	ü	-	LC (Santos et al., 2017)	-
18	<i>Stolephorus commersonii</i> Lacepède, 1803	Teri	ü	ü	LC (Munroe, 2018)	-
19	<i>Thryssa mystax</i> (Bloch & Schneider, 1801)	Sangko, selar	-	ü	LC (Di Dario & Munroe, 2020)	-
20	<i>Opisthopterus tardoore</i> (Cuvier, 1829)	Layang, tardore	-	ü	LC (Munroe et al., 2017)	-
21	<i>Gerres filamentosus</i> Cuvier, 1829	Kapasan	-	ü	LC (Larson et al., 2017 b)	-
22	<i>Exyrias puntang</i> (Bleeker, 1851)	Boboso, Bluncat	-	ü	LC (Larson, 2021)	-
23	<i>Chanos chanos</i> (Forsskal, 1775)	Bandeng	ü	-	LC (Freyhof, 2019)	-
24	<i>Planiliza planiceps</i> (Valenciennes, 1836)	Belanak, , belanak sipit	-	ü	LC (Palmer-Newton, 2021)	-
25	<i>Valamugil buechanani</i> (Bleeker, 1853)	Belanak	ü	-	LC (Sparks, 2017)	-
26	<i>Upeneus moluccensis</i> (Bleeker, 1855)	Modin, Bijinangka	-	ü	LC (Smith-Vaniz & Williams, 2016 f)	-
27	<i>Carangoides oblongus</i> (Cuvier, 1833)	Kwe Rawis	-	ü	LC (Smith-Vaniz & Williams, 2016 g)	-
28	<i>Platax orbicularis</i> (Forsskal, 1775)	Gebel Bunder	-	ü	LC (Carpenter & Robertson, 2019 a)	-
29	<i>Platax teira</i> (Forsskal, 1775)	Platax daun	-	ü	LC (Carpenter & Robertson, 2019 b)	-
30	<i>Pomadasys argyreus</i> (Valenciennes, 1833)	Gerot-Gerot	-	ü	LC (Al Abdali et al., 2019)	-
31	<i>Iniistius pentadactylus</i> (Linnaeus, 1758)	Babayaman, Pelo	-	ü	LC (Russell et al., 2010)	-
32	<i>Upeneus guttatus</i> (Day, 1868)	Bijinangka, Dayah jenggot	-	ü	LC (Uiblein et al., 2020)	-
33	<i>Polydactylus microstomus</i> (Bleeker, 1851)	Senangin	-	ü	LC (Motomura, 2010)	-
34	<i>Scatophagus argus</i> (Linnaeus, 1766)	Kiper	ü	-	LC (Collen et al., 2010)	-

No.	Scientific name	Local name	Site I	Site II	Status Conservation IUCN	Status Conservation CITES
35	<i>Johnius amblycephalus</i> (Bleeker, 1855)	Tigawaja, Diles	-	ü	LC (Nguyen et al., 2020)	-
36	<i>Sphyrna barracuda</i> (Edwards, 1771)	Barakuda	-	ü	LC (Senou, 2001)	-
37	<i>Cynoglossus lingua</i> Hamilton, 1822	Lidah Pasir	-	ü	LC (Munroe et al., 2020)	-
38	<i>Scomberomorus commerson</i> (Lacepède, 1800)	Tenggiri	ü	ü	NT (Collette et al., 2011)	-
39	<i>Trichiurus lepturus</i> (Cuvier, 1829)	Layur	ü	ü	LC (Collette et al., 2015)	-
40	<i>Pterois russeli</i> Bennett, 1831	Sekorpiun barong	-	ü	NE	-
41	<i>Fistularia commersonii</i> Rüppell, 1838	Remang-remang	-	ü	LC (Pollom, 2016)	-
42	<i>Hippocampus mohnikei</i> Bleeker, 1852	Kuda Laut	-	ü	VU (Pollom, 2017)	Appendiks II
43	<i>Sufflamen chrysopteron</i> (Bloch & Schneider, 1801)	Kambing	-	ü	NE	-
44	<i>Diodon hystrix</i> Linnaeus, 1758	Buntal	-	ü	LC (Iiu et al., 2015)	-
45	<i>Lactoria cornuta</i> (Linnaeus, 1758)	Belimbing, Buntal	-	ü	NE	-
46	<i>Lagocephalus spadiceus</i> (Richardson, 1845)	Buntal	-	ü	LC (Matsuura et al., 2014)	-
47	<i>Lates calcarifer</i> Bloch, 1790	Kakap	ü	-	LC (Pal & Morgan, 2019)	-

The number and species of fish caught at the two different research stations varies; at station 1, 550 individuals were captured, comprising 17 species, while at station 2, 761 individuals were captured, representing 36 species. The disparity between the two research stations is attributed to differences in the geographical location of the fishing areas, which affect the fish habitat and, consequently, the adaptive capabilities (mutual relationship) between fish and the environment. Additionally, the fishing gear used at both stations differs. According to Syafri-

aldi (2020), Factors such as ecology, geographical location, habitat, gear, size, and type of fishing gear influence the quantity, catch type, morphology, and size of fish. In line with Dewanti (2018), fish species are also influenced by their behaviors, with some schooling and others living solitarily. Based on field observations, fishing activities on the east and west coasts of Pangandaran Regency primarily use types of gear such as lift net, long line, trammel net, and beach seine.

Tabel 2. Percentage of fish conservation status at research stations.

Site	Conservation Status (%)					
	IUCN				CITES (Appendiks)	
	NE	LC	NT	VU	I	II
I	5.80%	88.20%	5.80%	-	-	-
II	16.60%	77.80%	2.80%	2.80%	-	1.00%
Total	12.7%	82.97%	2.13%	2.13%	-	2.13%

Observations in the field indicate that the fish caught on the west and east coasts of Pangandaran Regency are immediately traded in the areas around the shore. Middlemen collect the catches for direct sale in traditional or modern markets, allowing visiting tourists to purchase them directly. Despite unclear profits for fishermen due to fluctuating prices (tending to be low), the landed catches of fish are not documented. This lack of record-keeping has significant implications for the sustainability of existing resources, especially for fish with crucial conservation statuses that are being traded. Based on the classification or conservation status categories of the IUCN Red List and CITES Appendices (Table 1), the captured and identified fish species on the east and west coastal areas of Pangandaran consist of 47 species. Among them, 12.7% are classified as Not Evaluated (NE), 82.97% as Least Concern (LC), 2.13% as Near Threat-

ened (NT) (e.g., narrow-barred Spanish mackerel), and 2.13% as Vulnerable (VU) (e.g., seahorse), which are also included in CITES Appendix II.

Discussion

The narrow-barred Spanish mackerel (*Scomberomorus commerson*) is classified as NT or near-threatened due to its high economic value resulting from increasing domestic and global demand, leading to heightened exploitation. In certain marine areas, the narrow-barred Spanish mackerel is a primary catch for fishermen, such as in the Karimunjawa waters (PPP Karimunjawa, 2014). According to Widodo & Burhanuddin (2003), species of the Scombridae family, like the narrow-barred Spanish mackerel (*S. commerson*), kawakawa (*Euthynnus affinis*), and Indian mackerel (*Rastrelliger brachysoma*), have been exploited for a long time in the waters of the

Java Sea. Indonesia was the world's largest producer of narrow-barred Spanish mackerel in 1984 (Putri *et al.*, 2019). Indonesia continues to rank first globally as a narrow-barred Spanish mackerel producer, with a production value reaching 147,059 tons in 2010 (Kasim & Triharyuni, 2014). The excessive exploitation of narrow-barred Spanish mackerel requires a precautionary approach, as the species has been overexploited (Kasim & Triharyuni, 2014), necessitating optimal and sustainable management efforts to ensure the preservation of the species.

In addition to the narrow-barred Spanish mackerel, seahorses have a crucial conservation status, classified as Vulnerable (VU) and included in CITES Appendix II. According to the National Action Plan (RAN) for Seahorse Conservation for the period 2016-2020 (2015) (Sadili *et al.*, 2015), it is estimated that 45 countries worldwide trade seahorses. Seahorses are traded for use in traditional Chinese medicine (TCM). In 1995, it was reported that 20 million dried seahorses were traded, with hundreds of thousands of seahorses for the aquarium fish trade (particularly in America and Europe). Seahorses face threats not only from direct capture but also from habitat degradation and unintentional capture (Putri *et al.*, 2019). In this study, seahorses (*Hippocampus mohni-kei*) captured on the west coast were not the primary target and were unintentionally caught using beach seine nets (jaring arad) and tended not to be utilized.

The seahorse density in the waters of Bintan Island (Putri *et al.*, 2019) and other areas tends to be low. The low seahorse population globally and in Indonesia is attributed to excessive (Foster & Vincent, 2004), waste pollution (Panama, 2016) and environmental changes due to increased human activities (Wijayanti, 2007). Seahorses, which form monogamous bonds, face challenges when losing their partners, as they cannot reproduce until they find a new mate. However, not all seahorses are monogamous. Syafiuddin (2010) stated that the seahorse *H. barbourin*, obtained from Tanakeke waters for aquaculture, is not monogamous. Such studies contribute to sustainable seahorse management.

The excessive exploitation of Spanish mackerel and seahorse resources undoubtedly has biological and ecological repercussions, such as impacting the balance of the marine food chain. Policies regarding the utilization of Spanish mackerel and seahorse resources are continuously under review by the Indonesian government. Presently, there is no specific regulation governing the national protection status of seahorses. However, there are annual catch and export quotas for international trade, regulated by the Directorate General of Natural Resources and Ecosystem Conservation (Ditjen PHKA), and the Indonesian National Institute of Sciences (BRIN) no longer issues recommendations for the capture of seahorses from their natural habitats for trade purposes. Additionally, seahorse exports are only permitted for live specimens resulting from the breeding of *H. kuda* and *H. comes* species for ornamental purposes (Sadili *et al.*, 2015).

Limiting catch and export quotas is not the sole solution in seahorse management (KLHK, 2015). As a flagship species, the population of seahorses requires sustained attention to ensure its continuity. In international regulations, the protection of seahorses is detailed, particularly

in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). All seahorse species were included in Appendix II of CITES during the 13th Conference of the Parties (COP) in 2003. This implies that international seahorse trade must adhere to the provisions of international trade outlined in Appendix II of CITES. The implementation involves the issuance of seahorse export permits from Indonesia by the Directorate General of Natural Resources and Ecosystem Conservation, acting as the CITES Management Authority. Moreover, there is a warning from global conservation organizations to countries with seahorse resources that the global seahorse population is under threat of extinction.

CONCLUSION AND RECOMMENDATION

Conclusion

The species of fish caught and identified in the coastal areas of the Pantai Timur and Pantai Barat Pangandaran Regency, West Java Province, are diverse. A total of 47 fish species have been found distributed across all research stations. Among them, 12.7% are classified as Not Evaluated (NE), 82.97% as Least Concern (LC), 2.13% as Near Threatened (NT) (narrow-barred Spanish mackerel), and 2.13% as Vulnerable (VU) (seahorse), which are also included in CITES Appendix II. The sustainability of the populations Spanish mackerel and seahorses is under threat and continue to be excessively exploited. Therefore, the implementation of both national and international regulations governing the utilization of these resources must be consistently carried out and enhanced to ensure their conservation.

Recommendation

It is necessary to regarding the conservation status of shark and ray fisheries caught in Pangandaran Regency.

AUTHORS' CONTRIBUTIONS

RK: Established the idea, conducted research, performed the data analysis, corresponding author, manuscript preparation, and editing manuscript. TH: include ideas, doing research, data analysis, corresponding author, manuscript preparation, edit manuscript, and funding. AN: are Team research, edit manuscript. AY: are Team research, edit manuscript.

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