

Biodiversity and Conservation Status of Estuaries Fish Species, Cianjur, West Java, Indonesia: A Preliminary Study

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Abstract. The fish species is the one of main biological resources of estuary waters. The estuaries have critical role for sustainability of fish resources. The study aims to determine of diversity of estuaries fish species at Cianjur, West Java, Indonesia. Fish sampling was carried out during June and July 2018 at two location (Ciujung and Ciwidig estuaries). The fishing gears (*anco* and gill net) used to collected sample with mesh sizes of 1.5 and 2 inches. The results showed that 114 fishes sample from 19 species belong to 16 famili and distributed in two estuaries because these estuaries has same habitats, retively. Conservation status aims to protect and preserve living species. The benefit is this data can used to be more information about database in management of fisheries and to be database for making regulation in sustainability of fisheries.

Keywords: Biodiversity, Estuaries, Fish.

1 Introduction

Estuaries are complex ecosystems. The salinity level in a river mouth column can range from 18 ppt (parts per thousand) on the surface to 27 ppt at the bottom. As a result, more types of fish that prefer fresh water are found near the surface of the estuary while those who like marine are found basically in bottom [1]. The estuary area has a strategic role in aquatic ecology, including being a habitat for various stages in fish life stages [2] and functioning as spawning areas [3], parenting [4],[5], foraging [6] and environment.

The estuary of the Ciujung and Ciwidig rivers, located in the southern part of Cianjur, traditionally have function as a source of clean water and local water sources for local agriculture, fisheries, plantations, and tourism. Based on the results of a survey in 2010 and information from folks nearby, there are several human activities like factory activity and land clearing which has been going on for a long time around the river [7].

Fish is organisms that have ecological functions in the river and their existence is influenced by several aquatic environmental factors so that they can be used as indicators of water quality. The diversity of fish species can show the level of complexity and stability of the fish community. Diversity index can be used to measure the condition of an ecosystem. Diversity index is a value in knowing the diversity of life as closely related to the number of species in the community [1].

The study area has no basic biological information on fish species. Therefore, the objectives of the present study are to assess the potential of the fish for aquaculture development program. In addition, the present paper highlights the knowledge of the presence of the estuaries fish species in Cianjur, West Java, Indonesia.

2 Material and Method

This research was carried out by determining the stations which were considered to represent the water of estuaries in Cianjur; Ciujung and Ciwidig estuary (Figure 1). It can be sighted on the map that the sampling locations at both stations obtain inlets from the Cianjur estuaries with different habitat characteristics from each other.

Specimens obtained are entered into the plastic bags, per eye size of nets per station, preserved with 5% formalin and labeled. In the laboratory, specimens are washed from formalin, soaked in water for about 24 hours and then put in a container filled with 70% alcohol and then identified. Fish identification was carried out based on morphological characters with reference to Allen (1991) [8], and Kottelat et al. (1993) [1].



Fig.1. Map of the Estuaries in Cianjur with a sampling station

3 Results and Discussion

Estuary is a transition zone located between freshwater and marine habitats with dynamic environmental variability. This condition requires that biological communities that reside in these waters make adjustments to the dynamics of the present environment. In this ecosystem, fish represent the essential biological component that utilizes the estuary as a food bank, a place to require out the reproductive process, develop, and take refuge from predators [9].

The habitat conditions in the two estuaries were observed; Ciujung and Ciwidig estuary have a width of ± 40 meters with a calm current. The substrate from estuaries are sand with cloudy water clarity. Environmental conditions around the estuary are rice fields and salt mounds.

Ciujung estuary is located at the coordinates of 7°28'44.41 "SL and 107 ° 12'59.23" EL. This habitat is covered with various types of vegetation. Vegetations found include water hyacinth, pandanus, coconuts, and weeds. The existence of vegetation does not dominate the estuary area, its existence complements the balance in the ecosystem.

Ciuidig estuary is located at the coordinates of 7°29'35.85 "SL and 107°19'10.19" EL. The condition of the habitat found little vegetation and dominance of sand and rocks along the estuary. The vegetation found is not much different from the Ciujung estuary, the difference is the sandy and rocky soil structure which is dominant in the Ciuidig estuary. In general, the condition of the Cianjur river estuary is still in the good category.

Distribution of fish in rivers to estuaries in the tropics is one of the interesting studies in the aquatic ecologists [10]. From field activities, 19 species of fish belonging to 16 families were successfully obtained (Table 1).

Table 1. The result of fish collections at the Cianjur River Estuary

No.	Family	No.	Species	Local Name
1	Phallostethidae	1	<i>Neostethus lankesterii</i>	Teri
2	Hemiramphidae	2	<i>Dermogenys pusilla</i>	Julung-julung
3	Cyprinidae	3	<i>Rasbora caudimaculata</i>	Melem
4	Elopidae	4	<i>Elops machnata</i>	Bandeng lalaki
5	Mugilidae	5	<i>Mugil cephalus</i>	Belanak
		6	<i>Liza tade</i>	Belanak
6	Ambassidae	7	<i>Parambassis apogonoides</i>	Kacakaca
7	Carangidae	8	<i>Caranx sexfasciatus</i>	Kakapuran, Bagad
		9	<i>Caranx ignobilis</i>	Kakapuran, Bagad
8	Chandidae	10	<i>Ambassis vachellii</i>	Kacakaca
9	Gerreidae	11	<i>Gerres filamentosus</i>	Kapasan
10	Gobiidae	12	<i>Pseudogobiopsis neglectus</i>	Gelodog, gelodok
		13	<i>Mugilogobius latifrons</i>	Gelodog, gelodok
11	Leiognathidae	14	<i>Leignotahus splendens</i>	Pepetek
12	Moodactylidae	15	<i>Monodactylus argenteus</i>	Kupu-kupu
13	Scatipagidae	16	<i>Scatophagus argus</i>	Kiper
14	Terapontidae	17	<i>Terapon jarbua</i>	Kerong-kerong
15	Bagridae	18	<i>Mystus gulio</i>	Lele
16	Tetraodontidae	19	<i>Chelonodon patoca</i>	Buntal

The familia that has the most species found in the Cianjur estuaries is Mugilidae, Carangidae and Gobiidae with each found as many as two species. 13 other families are merely represented by one species. The Mugilidae family consists of two types; *Mugil cephalus* and

Liza tade. The Carangidae family consists of two types; *Caranx sexfasciatus* and *Caranx ignobilis*. The Gobiidae family consists of two types; *Pseudogobiopsis neglectus* and *Mugilogobius latifrons*.

The families of Mugilidae, Carangidae, and Gobiidae are more commonly found in the estuary of the Cianjur. Species from the Mugilidae family live by eating organic material found in sand and mud. The spread of the Indopasifik, South Africa, the Red Sea, East Africa, Japan and the south of the Great Barrier Reef and New Caledonia [1].

Most species from Carangidae family only have a small cycloid scale. Scales along the ribs are often modified into barbed scales. Separately, as many as nine finlets are sometimes found behind the dorsal and rectal fins and are predators of rapid swimming from the waters above the reef and in the open sea. Gobiidae family were able to survive in tidal areas because they have the ability to breathe through the skin of the body and the mucous membranes in their mouth and throat.

Tables 2. Biodiversity and distribution of Estuaries Fish in Cianjur

No	Type of Fish	Number of Fish		Total
		Ciujung	Ciwidig	
1	<i>Neostethus lankesterii</i>	1	0	1
2	<i>Dermogenys pusilla</i>	0	1	1
3	<i>Rasbora caudimaculata</i>	1	0	1
4	<i>Elops machnata</i>	1	0	1
5	<i>Mugil cephalus</i>	1	0	1
6	<i>Liza tade</i>	7	18	25
7	<i>Parambassis apogonoides</i>	4	28	32
8	<i>Caranx sexfasciatus</i>	0	1	1
9	<i>Caranx ignobilis</i>	3	4	7
10	<i>Ambassis vachellii</i>	1	0	1
11	<i>Gerres filamentosus</i>	12	13	25
12	<i>Pseudogobiopsis neglectus</i>	0	1	1
13	<i>Mugilogobius latifrons</i>	0	1	1
14	<i>Leignotahus splendens</i>	0	2	2
15	<i>Monodactylus argenteus</i>	1	0	1
16	<i>Scatophagus argus</i>	1	1	2
17	<i>Terapon jarbua</i>	2	6	8
18	<i>Mystus gulio</i>	0	2	2
19	<i>Chelonodon patoca</i>	1	0	1
Total		36	78	114
Number of species		13	12	

The amount of species abundance obtained (Table 2), as many as 114 types from two observation stations. 36 types of fish founded that inhabited the Ciujung estuary and 78 species from Ciwidig estuary.

Ciujung estuary was dominated by 12 types of *Gerres filamentosus*. *Gerres filamentosus* is a fish that is often found in coastal areas, on sandy substrates. These fish are commonly known as whip fin silver-biddy, which is a native fish on the coastlines of Africa and Eastern Madagascar to Japan, Australia and New Caledonia.

Ciwidig estuary was dominated by 28 types of *Parambassis apogonoides*. The *Parambassis apogonoides* found primarily in rivers and lakes [11]. This fish usually known as a colorful glass perwlet. The diversity and structure of fish communities in a water is a description of species characteristics and its life cycle is related to fluctuations in environmental conditions [12].

People near the estuary meet the consumption needs of fish with their own catch. Based on the results of interviews, most of the livelihoods of local people are fishermen. Fish as one of the economic potentials of the population around the estuary. Although fishing was already popular with local residents, there is still lacking information about documentation of fish diversity. This research is the first step to identify fish in the estuaries of Cianjur. This identification was made as basic to find suitable fish candidates to be cultivated, as well as how conservation efforts will be carried out in the future.

Tables 3. Fish Conservation Status at the Estuaries in Cianjur

No.	Conservation Status (IUCN)	Family	Species
1	Vulnerable (VU)	Gobiidae	<i>Mugilogobius latifrons</i>
2	Least Concern (LC)	Cyprinidae	<i>Rasbora caudimaculata</i>
3	Least Concern (LC)	Elopidae	<i>Elops machnata</i>
4	Least Concern (LC)	Mugilidae	<i>Mugil cephalus</i>
5	Least Concern (LC)	Ambassidae	<i>Parambassis apogonoides</i>
6	Least Concern (LC)	Carangidae	<i>Caranx sexfasciatus</i>
7	Least Concern (LC)	Carangidae	<i>Caranx ignobilis</i>
8	Least Concern (LC)	Chandidae	<i>Ambassis vachellii</i>
9	Least Concern (LC)	Gerreidae	<i>Gerres filamentosus</i>
10	Least Concern (LC)	Gobiidae	<i>Pseudogobiopsis neglectus</i>
11	Least Concern (LC)	Leiognathidae	<i>Leiognathus splendens</i>
12	Least Concern (LC)	Scatopagidae	<i>Scatopaghus argus</i>
13	Least Concern (LC)	Terapontidae	<i>Terapon jarbua</i>
14	Least Concern (LC)	Bagridae	<i>Mystus gulio</i>
15	Least Concern (LC)	Tetraodontidae	<i>Chelonodon patoca</i>
16	Not Evaluated (NE)	Phallostethidae	<i>Neostethus lankesteri</i>
17	Not Evaluated (NE)	Hemiramphidae	<i>Dermogenys pusilla</i>
18	Not Evaluated (NE)	Mugilidae	<i>Liza tade</i>
19	Not Evaluated (NE)	Monodactylidae	<i>Monodactylus argenteus</i>

There are four species included in the Not Evaluated (NE) category, namely *Neostethus lankesteri*, *Dermogenys pusilla*, *Liza tade*, and *Monodactylus argenteus*. Not Evaluated (NE) IUCN categories are given to species that have not been fully identified. The other fourteen species fall into the Least Concern (LC) category of *Rasbora caudimaculata*, *Elops machnata*, *Mugil cephalus*, *Parambassis apogonoides*, *Caranx sexfasciatus*, *Caranx ignobilis*, *Ambassis vachellii*, *Leiognathus splendens*, *Scatopaghus argus*, *Terapon jarbua*, *Mystus gulio*, and

Chelonodon patoca. The low risk IUCN category Least Concern (LC) is given to species that are still widely found in the wild. There is one species included in the category of vulnerable or Vulnerable (VU), namely *Mugilogobius latifrons*. Vulnerable (VU) categories are given for species that are proven to meet the criteria in IUCN, one of which is a reduction in population size and occurs in a span of less than 10 years and can certainly face extinction in nature. The thing that causes these species to fall into the category of vulnerable can be caused by massive exploitation and exploitation, especially as collections so that the amount found in nature is getting smaller.

Conclusion

Total of 114 fish samples from 19 species belonging to 16 familia were documented during the survey. The number of species of fish collected at Ciujung were 13 species and Ciwidig were 12 species. Mugilidae, Carangidae, and Gobiidae are the most dominant familia with members of two species each familia, while the other of 13 familia are only represented by one species. The fish species that have the highest abundance is *Parambassis apogonides* wich have 32 samples, followed by *Gerres filamentosus* and *Liza tade* wich have 25 samples each species. The condition of estuary waters in general is still good. The conservation status of the types of fish found is not yet worrying and in most the status is LC (Least Concern) from 14 species.

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