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The Ichthyofauna Of Lebak Petai Kecil, Ogan Komering Ilir Regency, South Sumatra, Indonesia

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Abstract – This study aims to analyze the ichthyofauna of Lebak Petai Kecil, Ogan Komering Ilir, Indonesia. The sampling were done at three stations on March to May 2022, used purposive sampling method. A total of 532 fish belonging to 15 species, 13 genera, and 10 families were collected. The highest relative abundance was *Helostoma temminckii* and the lowest was *Hemibagrus nemurus*. The Shannon-Weiner diversity index was 2.40; 2.31; and 2.33 for station 1, 2, and 3, respectively. The Evenness index was 0.88; 0.87; and 0.91 for station 1, 2, and 3, respectively. The Simpson's dominance index was 0.10; 0.12; and 0.11 for station 1, 2, and 3, respectively. The biodiversity index of the Lebak Petai Kecil was in the medium category.

Keywords – Biodiversity, Indonesian Fish, Floodplain, Lelang Lebak Lebung, Swamp

I. INTRODUCTION

The Ogan Komering Ilir Regency is one of the regencies located in South Sumatra Province, Indonesia. The topography of this regency is a lowlands area consisting of rivers, swamps, and coasts. The floodplains are waters area around river basins. This area is flooded in the rainy season and dry in the dry season. According to Muslim (2012), the people of South Sumatra call the floodplain area as lebak lebung. Many species of fish are found in lebak lebung waters. In this district, the management of aquatic resources (fishes) in the lebak lebung waters is through an auction system known as the lelang lebak lebung.

Lebak petai kecil is one of the lelang lebak lebung objects. This area is located in Menang Raya Village, Pedamaran District, Ogan Komering Ilir District. These waters have many aquatic plants, the most dominant being the purun plant (*Lepironia articulata*; Cyperaceae). Purun plants are used by the community as materials for handicrafts. The lebak lebung area is also a location for fishermen to catch fishes as a source of livelihood. Although, fishing activities have been carried out for a long time, scientific information regarding the diversity of fish species in this area is not yet available. The purpose of this study was to analyze the relative abundance, diversity index, uniformity index, and dominance index of fish caught at the study site.

II. MATERIAL AND METHODS

This study was carried out in March-May 2022 at Lebak Petai Kecil, Menang Raya Village, Pedamaran District, Ogan Komering Ilir Regency, South Sumatra. Sampling was carried out at three stations: the first (1) station at the base of the valley, the second (2) station in the middle of the valley, and the third (3) station at the end of the valley. The method of sampling was using purposive sampling method, namely with certain considerations. These three stations were places where there was a lot of fishing by local fishermen. Fish observations were carried out at the Fisheries Laboratory of the Aquatic Resources Management Study Program, Faculty of Fisheries, Universitas Islam Ogan Komering Ilir Kayuagung. The water quality observed in this research were physical and chemical parameters, namely: temperature, pH, dissolved oxygen and depth. Water quality measurements were carried out in situ and ex situ.

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The data obtained is recorded in a logbook, for each station. Data on fish types and the number of fish caught at each station are tabulated in the Microsoft Excell Program. Furthermore, the calculation and data analysis were carried out. The data analysis included species diversity index, evenness index, dominance index. The diversity index for fish species was calculated using the Shannon-Wiener diversity index (Odum, 1966):

$$H' = \sum_{i=1}^{S} \text{Pi}.\ln \text{Pi}$$

where S is the number of species in the sample, and Pi is relative importance values obtained as the squared ratio of the important values of S individual value for all species to N the total importance.

Determination of criteria: H' < 1,0 = low diversity; H' 1,0 - 3,0 (medium), H' > 3,0 (high)

The evenness index is calculated by a formula Odum (1996):

$$E = \frac{H'}{H'max}$$

Where, H' is Shannon-Wiener diversity index, E (Evennes index (value 0-1), H' maks (Maximum diversity index), S (Number of spesies).

Determination of criteria: E < 0.4 (low Evennes index), E 0.4-0.6 (medium), E > 0.6 (high)

Determination of the dominant fish species is determined using the following formula:

$$C = \sum_{i=1}^{S} (Pi)^2$$

Where, C is Simpson's dominance index, Pi is relative importance values obtained as the squared ration of the importance values, S is individual value for all species

III. Results And Discussion

A total of 532 fish consisting of 15 species, 13 genera and 10 families. Complete research results were presented in Table 1:

Table 1. The ichthyofauna of Lebak Petai Kecil, Ogan Komering Ilir Regency, South Sumatra Indonesia.

No	Family	Genus	Species	Local name	Station			Total	Body weight (g)	Total length (cm)	Relative abundance (%)
					1	2	3				
1	Osphronemidae	*Trichopodus*	*Trichopodus pectoralis*	Sepat Siam	30	33	30	93	11-13.5	20-55	14
			Trichopodus trichopterus	Sepat Mata Merah	20	25	30	75	7-10.3	6-14	15
		Belontia	*Belontia hasselti*	Selincah	6	10	6	22	10.5-12.5	19-22	4
2	Anabantidae	Anabas	*Anabas testudineus*	Betok	15	13	17	45	7-12	18-55	6
3	Helostomatidae	Helostoma	*Helostoma temminckii*	Sapel	30	32	40	102	7-14.5	18-85	18
4	Bagridae	Mystus	*Mystus singaringan*	Beringit	14	10	11	35	10-13.4	7-20	4
		Hemibagrus	*Hemibagrus nemurus*	Baung	1	1	0	2	17-22	150-189	0.9
5	Cyprinidae	Barbonymus	*Barbonymus schwanefeldii*	Lampam	8	8	9	25	11-14,5	21-86	6
		Osteochilus	*Osteochilus vittatus*	Palau	10	5	12	27	14-16	50-80	8
6	Xenocyprididae	Parachela	*Parachela oxygastroides*	Siamis	5	8	7	20	9-11	6-12	5
7	Danionidae	Rasbora	*Rasbora argyrotaenia*	Seluang	10	7	8	25	6-8	2-4	6
8	Pristolepididae	Pristolepis	*Pristolepis grootii*	Sepatung	7	4	10	21	11.5-14	30-53	6
9	Siluridae	Kryptopterus	*Kryptopterus bicirrhis*	Lais Biasa	8	11	15	34	10-17.5	5-28	5
10	Channidae	Channa	*Channa striata*	Gabus	1	0	2	3	25-27	140-159	1
			Channa lucius	Bujuk	2	1	0	3	18-27.4	140-233	1
Shannon-Weiner diversity index (H')					2.40	2.31	2.33	532			
Evenness index (E)					0.88	0.87	0.91				
Simpson's dominance index (D)					0.10	0.12	0.11				

The results showed that the fish found at the study site were dominated by blackfish. According to Muslim (2012), the fish that inhabit lebak lebung waters are grouped into two, namely white fish and blackfish. The most common fish found during the study were *H. temminckii* (102 individuals), *T. pectoralis* (93 indv), *T. tricopterus* (75 indv). The fewest fish found were *C. striata* (3 indv), *C. lucius* (3 indv), and *H. nemurus* (2 indv). The number of *H. temmincki* found during the study because this fish lives sedentary and inhabits swamps to fulfill its entire life cycle. In addition, it is suspected that these fish can survive changes in water quality. According to Machrizal et al., (2021), *H. temminckii* has a high level of tolerance to changes in temperature and dissolved oxygen concentration. *M. nemurus* is the least common, probably due to overexploitation. Sulistiyarto et al., (2007) said that seasonal changes can affect the composition and abundance of fish. The total number of fish associated with the presence of fish species at each observation station. The existence of species affects the number of species, individuals, and families and also affects the value of diversity, evenness, and dominance at each station (Magurran, 1988).

The largest fish was *C.lucius* (TL 18-27.4 cm, BW 140-233 g), the smallest was *R.argyrotaenia* (TL 6-8 cm, BW 2-4 g). *C.lucius* was able to survive in low-oxygen waters. According to Djumanto et al., (2019), the Channidae fish group can breed in dirty waters, low oxygen levels, and were even resistant to water shortages. The smallest sized fish was *R. argyrotaenia* (TL 6-8 cm, BW 2-4 g). Uncontrolled fishing activity causes fish of all sizes to be caught. If this activity continues continuously for a long time, the population will decrease, and the size of the fish will be smaller. According to Yusuf (2012), the results of overfishing will affect the size of gonad maturity.

Relative abundance is the percentage composition of organisms of a certain type to the total number of organisms in the area (Reis et al., 2016). The results showed that the highest relative abundance was *H. temminckii* (18%) while the lowest was *H nemurus* (0.9%). The composition of species in a community reflects balance, but this balance rarely occurs due to various disturbances, both from within and from outside. Relative abundance is very important in a community to explain diversity. Diversity will be greater if the populations in the community have similarities in abundance.

The species diversity index is an indicator of a community structure directed at assessing changes in the quality of fish resources in a community (Hiddink et al., 2008). The uniformity index was closely related to species diversity and dominance, the dominance index describes the level of dominance of a species over other species in an area which causes a low value of the diversity index (Reis et al., 2016). The diversity index for each station was different, the first station (2.40), the second station (2.31), and the third station (2.33). This means that the diversity of species in the study area was included in the moderate category. Allegedly, the availability of natural food in these waters was still in a tolerance condition to support the survival of just a few species of fish so that not too many species dominate in these waters. According to McConnell (1987), suitable habitat to support fish diversity determined by the physical and chemical conditions of the waters, the availability of natural food, protection from predation, and the availability of space for the life cycle. According to Odum (1996), species diversity was high when many species dominate the ecosystem and species diversity is low when only one or a few species dominate the community. The higher diversity index was related to the high water table due to rain. When the water was high, the substrate and microhabitat at each station were more varied, such as the presence of silt, sand and aquatic plants (swamps). A number of environmental baselines make it possible to create an increased variety of habitats, the more variety of habitats the presence of the types of fish inhabitants increases so that the diversity increases (Ridho and Patriono, 2020). In addition, the diversity of fish in the swamp was also influenced by biophysical and anthropogenic factors. According to Dudgeon (2000) the dominant anthropogenic factors influencing the diversity of swamp fish were overfishing and human activities which damage the swamp ecosystem.

The uniformity index at first station (0.88), the second station (0.87), and the third station (0.91), based on these data the uniformity index at the study site was high. According to Odum (1996) uniformity 0.00-0.50 = low community, 0.50-0.75 = medium community, and 0.75-1.00 = high community. Dominance index at the first station (0.10), the second station (0.12), and the third station (0.11). These results indicated that no species dominates in the study area.

Water quality is described as the state and physical, chemical and biological characteristics of a waters compared to the requirements for certain purposes, for example household needs, drinking water, agriculture, fisheries and industry (Poonam et al., 2013). The results of water quality measurements during the study are presented in Table 2.

Table 2. Parameters of water quality at the study site

No	Parameters	Station		
		1	2	3
1	Temperature (˚C)	28-29	28-29	28-30
2	pH (unit)	4,5-5,8	4,5-5,8	4,8-5,4
3	Disolved oxygen (mg/L)	2,1-2,5	2,4-3,0	2,2-2,4
4	Water level (m)	1,1-1,6	0,9-1,8	0,8-1,3

The results of the study showed that the temperature does not exceed the lowest or highest temperature limits that were optimal for fish growth. According to Bhatnagar & Devi (2013), the optimum temperature for fish farming is 20-30 ºC. An increase in temperature can result in a decrease in dissolved oxygen, the speed of chemical reactions increases, so that living things in it will die (Setyowati et al., 2015). The pH value was still in the good category for fish life. According to Fare et al., (2018), life in water can still survive if the waters have a pH range of 5-9. According to Payne (1986), swamp fish are able to live in conditions of low pH and high levels of dissolved oxygen because they have a hemoglobin pigment that has a high affinity for oxygen and a low sensitivity to carbon dioxide. pH is also a limiting factor for organisms that live in waters. Dissolved oxygen ranges from 2.1-3.0. According to Maruf (2018) the low oxygen value in swamp waters is caused by the process of decomposition of organic matter and oxidation of organic and inorganic materials. The main source of oxygen in waters comes from a diffusion process from free air and the results of photosynthesis of organisms that live in these waters (Raven, 2007). The depth of the waters ranges from 0.8-1.8 m. According to Waluyo et al., (2019) based on the water levels and duration of the inundation, the rawa lebak are divided into three categories, namely rawa lebak dangkal (water levels <50 cm, flooding period <3 months), rawa lebak tengah/sedang (water levels of 50-100 cm, flooding period of 3-6 months), and rawa lebak dalam (water levels of >100 cm, flooding period of >6 months). The initial arrival of water, the height and duration of the flooding were very dependent on rainfall.

Fish obtained during the study were 532 individuals, consisting of 15 species, 13 genera and 10 families. The highest relative abundance was *H temminckii*, the lowest was *M. nemurus*. The diversity index ranged from 2.31-2.40 (medium), the uniformity index ranged from 0.87-0.91 (high), the dominance index ranged from 0.10-0.12. Water quality within a reasonable range for fish life. Further research is needed with a longer period of time.

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