Diversity: Identification of Fish Catched Fisherman of Weru Village, Lamongan District

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Abstract

Lamongan Regency has great fishery potential, but the results of fishing by fishermen need to be reported to determine its diversity. The purpose of this study was to find out what fish were caught and the diversity of fish caught by fishermen from Weru Villaget. The method conducting of this research was carried out using a descriptive exploratory method with a quantitative approach, with the aim of describing the results of identifying the diversity of fish catches in Weru Village, Lamongan Regency. The results of the research from the catch of fishermen from Weru Village, Lamongan Regency, consisted of 14 fish species. Then the diversity index (H') of station I has a value of H' 0.33; station 2 has H' 0.34; station 3 has a value of H' 0.32; and station 4 has an H' value of 0.34. Then Stations 1, 2, 3, and 4 have an average value of 1.37 so they are classified as low diversity. Based on the findings of this study, there are still many other possible types of fish that have not been sampled, so it is necessary to take samples in terms of seasonal differences.

Keywords: Capture Results, Diversity, Fish, Weru Village

INTRODUCTION

Indonesia is an archipelagic country that stretches from the eastern end to the western tip, the potential for marine resources is abundant, but the community has not optimally utilized the potential for fishing resources with overfishing which can cause damage (Putri *et al*., 2018). Three-quarters of Indonesia's territory is sea, which is 5.9 million km2 (Lasabuda, 2013). According to Simbolon (2017), states that from the vastness of the Indonesian sea territory, the people who live in the coastal areas of the sea are 60% of the total Indonesian population whose work is fishermen and have an economic life related to marine resources. According to Durand (2010), fishermen's lives depend on catches at sea so fishermen are the main job for the coastal communities of Lamongan Regency.

According to Yaskun, M. Sugiarto (2017), Lamongan Regency has a total of 17,892 fishermen, who are divided into two groups, namely 14,166 labor fishermen and 3,726 skipper fishermen or owners. The number of fishing fleets is 3,263 units and 3,726 pieces of fishing gear. So that Lamongan Regency has the largest capture fisheries industry in East Java (Martadwiprani & Rahmawati, 2013).

Lamongan Regency is based on a sea fishing business centered in the waters of the Java Sea in the Brondong and Paciran Districts which have 5 Fish Landing Bases (PPI) as well as Fish Auction Places (TPI) starting from west to east Lohgung, Labuhan, Brondong, Kranji, and Weru (Dinas Perikanan Lamongan, 2019). Fishing base is a place or gathering of boats

and fishing vessels on the coast or on the beach (Dewi & Husni, 2018). There are 17 fishing base locations in Lamongan Regency, namely the villages of Paloh, Warulor, Sidokumpul, Weru, Sidokelar, Kemantren, Banjarwati, Kranji, Paciran, Stump, Kandangsemangkon, Blimbing, Brondong, Sedayulawas, Labuhan, Brengkok, and Lohgung (Dinas Perikanan Lamongan, 2019).

The number of catches of fishermen in Lamongan Regency is in accordance with data from the Dinas Perikanan Lamongan (2019) there are 50 types of catches with a total production of 75,751.70 tons, in data from the Dinas Perikanan Lamongan (2020) there has been a decrease in that there are 47 types of catches with a total production of 71,438.09 tons and while in the Dinas Perikanan Lamongan (2021) there was an increase in 48 types of catch with a total production of 74,052.81 tons. Based on these data, the diversity of fish caught by fishermen has decreased in the types of fish caught.

Catches in Lamongan Regency have decreased due to several factors, namely indications of decreased water quality, overfishing activity, and destructive fishing patterns (Ismail, 2018). So that the data can be used as a reference for the diversity of fish catches in this research.

Research on the identification of the diversity of fish caught by fishermen is important to do to determine the diversity of fish species caught by fishermen (Bengkal *et al*., 2019). Research related to the identification of the diversity of fish caught has been carried out in several regions in Indonesia. According to Ayub *et al*., (2022), identification of 12 types of fish in Tapak Paderi Bengkulu City. Other research has also been conducted at the Muara Angke Fish Auction Site, North Jakarta, which identified 14 types of fish (Wijayanti *et al*., 2018). Various previous research results inform that identification of the diversity of fish caught by fishermen is still limited to findings at auctions, so information is needed that can describe the diversity of fish in their natural habitat. So the researchers used the direct sampling method in the high seas which are often visited by fishermen to get fish catches as station determination. In addition to providing an overview of the current conditions of habitat and fish catches, this research can also provide an overview of elements of benefit to the fishing community regarding alternative locations for abundant fish catches to meet economic needs. Research related to the identification of caught fish can be used as information on biodiversity to determine the potential to be managed, especially fish commodities and their processed products so that they are very beneficial to the community.

The importance of data on the diversity of fishermen's catches as a source of information for the local government to find out the catch every year. However, the results of initial observations related to data in Weru Village indicated that there were no fishery data in Weru Village. Therefore, it is important to carry out research on identifying the diversity of fish caught by fishermen as data or information sources for the local village office or local sub-district office, as data updating for the Lamongan District Fisheries Service.

METHOD

The type of research conducted was explorative descriptive research with a quantitative approach, with the aim of describing the results of identifying the diversity of fish caught. Sampling was carried out in the Java Sea from fishermen from Weru Village, Paciran District, Lamongan Regency which was carried out on November-December 2022. Identification of sample data was carried out at the Fisheries Laboratory of the University of Muhammadiyah Malang.

Sampling using purposive sampling technique. Fish samples taken from 4 stations in the Java Sea. The data that has been obtained is then analyzed using the analysis technique for calculating the Shannon-Wienner diversity, evenness index, and Simpson dominance index as follows formula (1), (2), and (3).

Shannon-wienner diversity index (H')
H'= -∑ ni / N Ln ni / N atau H' = -∑ pi ln pi   (1)

Information:
H'   = Shannon-Wiener diversity index
Ni   = Number of individuals of each species found
N   = Total number of all individuals found
Pi   = Probability of importance for each type found (ni/N).
The species diversity index criteria, can see in Table 1.

Table 1. Species diversity index criteria

Species diversity index	Criteria
≥ 4	Species diversity is very high
$\geq 3 - \leq 4$	High species diversity
$\geq 2 - \leq 3$	Moderate species diversity
$\geq 1 - \leq 2$	Low species diversity
< 1	Species diversity is very low

Source: (Krebs, 1972)

Evenness Index (E)

$$E = \frac{H'}{H \max} \qquad (2)$$

Information:
H'   = Index diversity *shannon-wienner*
H max = Maximum species diversity
Source: (Krebs, 1972)
The evenness index criteria, as shown in Table 2.

Table 2. Evenness index criteria

Evenness index	Criteria
$E < 0,4$	Small population evenness
$0,4 < E < 0,6$	Average population evenness
$E > 0,6$	High population evenness

Source: (Fuad *et al*., 2019)

Dominance Index (D)

$$D = \sum \left(\frac{ni}{N}\right)^2 \qquad (3)$$

Information:
D = Index *Simpson*
$Pi = \frac{ni}{N}$
ni = The total number of individuals of a species found
N = The total number of individuals of all types found
Source: (Odum, 1953)
The dominance index criteria, can see in Table 3.

Table 3. Dominance index criteria

Indeks Dominasi	Kriteria
$0 < D \leq 0,5$	Low dominance
$0,5 < D \leq 0,75$	Average dominance
$0,75 < D \leq 1$	High dominance

Source: (Fuad *et al*., 2019)

RESULTS AND DISCUSSION

Based on the identification results and the number of fish caught by fishermen from Weru Village, Lamongan Regency, as follows Table 4.

Table 4. Number of fish caught by fishermen from Weru Village, Lamongan Regency.

Classis	Familia	Species	Station 1	Station 2	Station 3	Station 4	Total Number
Teleostei	Scombridae	*Restrelliger brachysoma*	252	253	196	255	956
		Euthynnus affinis	78	155	75	141	449
	Carangidae	*Carangoides malabaricus*	22	6	11	8	47
	Sphyraenidae	*Sphyraena pinguins*	23	49	67	6	145
	Serranidae	*Plectropomus maculatus*	3	6	5	3	17
		Epinephelus coioides	10	8	11	10	39
		Epinephelus faveatus	6	5	3	1	26
	Nemipteridae	*Nemipterus furcosus*	1	6	7	9	23
	Lutjanidae	*Lutjanus vitta*	0	9	6	4	19
		Lutjanus malabaricus	55	142	24	50	271
	Lethrinidae	*Lethrinus lentjan*	0	6	3	1	10
	Ariidae	*Plicofollis argyropleuron*	10	43	20	14	87
	Ephippidae	*Platax batavianus*	36	48	25	42	151
Elasmobranchii	Dasyatidae	*Maculabatis gerrardi*	11	15	9	12	47
			507	751	457	562	2287

Based on Table 4. fish caught by fishermen amounted to 2,278 specimens, consisting of 2 classis consisting of Teleostei and Elasmobranchii; 10 familia consisting of scombridae, carangidae, sphyraenidae, serranidae, nemipteridae, lutjanidae, lethrinidae, ariidae, Ephippidae, and dasyatidae; and 14 species consisting of *Restrelliger brachysoma, Carangoides malabaricus, Sphyraena pinguins, Plectropomus maculatus, Epinephelus coioides, Nemipterus furcosus, Lutjanus vitta, Plicofollis argyropleuron, Lutjanus malabaricus, Lethrinus lentjan, Epinephelus faveatus, Maculabatis gerrardi, Platax batavianus,* and *Euthynnus affinis*. The diversity index values (H'), evenness (E), and dominance (D), as sown in Table 5.

Table 5. Diversity index values (H'), evenness (E), and dominance (D).

Index	Station 1	Station 2	Station 3	Station 4	Average	Criteria
H'	0,33	0,37	0,32	0,34	1,37	Low species diversity
E	0,13	0,14	0,12	0,13	0,52	Average population evenness
D	0,05	0,11	0,04	0,06	0,26	Low dominance

Based on Table 5, the value of the diversity index, it has a value of 1.37 which is included in the criteria for low species diversity. The high or low value of the diversity index depends on the number of individuals in each fish species caught, so the greater the number

of fish species and the variation in the number of individuals in each species, the greater the level of diversity of fish in an aquatic ecosystem, or vice versa, the smaller the number of fish species and variations in the number individuals in each species, the level of diversity of fish in an aquatic ecosystem will also be smaller (Wahyuni & Zakaria, 2018).

Excessive exploitation will result in reduced or lost biodiversity and even damage to ecosystems (Afza, 2017). This is because fishing is the main job for the fishing community in Weru Village, Lamongan Regency. The factors that can cause low diversity of fish caught are climate change. According to Patriana & Satria (2013), states that climate change can change fish migration, this is what makes it difficult for people to catch fish. The use of fishing gear by fishermen from Weru Village, Lamongan Regency uses payang nets which can damage coral reefs. Damage to coral reefs has an effect on decreasing fish diversity, because coral reefs provide habitat, protection from predators, as food and as well as spawning grounds for fish (Ahlunnisa *et al*., 2016).

Based on the results of the calculation of the evenness index of fish caught by fishermen, it has an average value of 0.52 which is classified as moderate population evenness. According to Magurran (1988), an evenness index value that is close to one indicates that a community is more evenly distributed, whereas if the value is close to zero, it is more unequal. Based on table 4 there are 2 species, namely Lethrinus lentjan and species Lutjanus vitta which are not found at station 1 and for the whole are present at all stations. This is because the distance between all adjacent stations allows for a large number of food sources at all stations, therefore fish can move from station 1 to another station. According to Rahman *et al.* (2020), states that waters where there are many food sources will be a gathering place for fish.

Based on the results of the calculation of the dominance index of fish caught by fishermen, it has an average value of 0.26 which is classified as low dominance. The dominance index is used to determine the dominance of species in an area (Samitra & Rozi, 2018) and according to Nugroho *et al.* (2015), if the diversity index value is high then the dominance index value is low, and vice versa if the diversity index value is low then the dominance index value is high. Based on table 4, there are species that dominate at all stations, namely the *Restrelliger brachysoma* species with a total number of 956 specimens and those that do not dominate, namely the species *Lethrinus lentjan* with a total number of 10 specimens. This is because the fish that need coral reefs to be used as homes are gone or damaged. Coral reefs provide shelter from predators and places to find food for fish (Unstain *et al*., 2011).

CONCLUSION

The catch of fishermen from Weru Village, Paciran District, Lamongan Regency, contained 14 species with an H' diversity index value of 1.37 which was classified as low diversity.

RECOMMENDATION

It is necessary to conduct research during the dry season to determine the diversity of fish in terms of seasonal differences.

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