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Diversity of Oyster Types in the Waters of Ujung Batu Soppeng Riaja Beach, Barru Regency

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Abstract: ***Oysters are a group of shellfish with calcareous shells, most of which are known as bivalves of the Ostreidae family. This family consists of several genera, but the most commonly eaten oyster species are from the genera Crassostrea, Ostrea, and Saccostrea, and these are known by the commercial name Oyster. The most known species that are consumed or cultivated commercially today: Crassostrea gigas, C. sikamea, Saccostrea cuculata, S. echinata S. glomerata, Ostrea edulis. The existenc e of this type of oyster on Batu Beach, Barru Regency is an indicator of water quality that supports this area as a marine tourism area in Soppeng Riaja District, Barru Regency. From the results of this descriptive research, the 6 species found showed an average biodiversity index (H') of 1.7622, which indicates that the waters of Batu Beach, Barru Regency have a biodiversity or medium diversity category.***

Keywords: identification, diversity, oysters, intertidal

1. Introduction

1.1 Background

Oysters, whose commercial name is known as oysters, are one of the marine biota resources which are classified as animals that do not have spinal segments or are invertebrates. In its classification, oysters are included in the phylum mollusca, class bivalves (Nontji 1993). Morphologically, oysters have a pair of shells with unequal shapes (inequivalve). The shell functions to protect the mantle and other internal organs. This biota is often found at the lowest tidal limits in the intertidal zone, where this area is part of the coastal ecosystem which is heavily influenced by various biotic and abiotic components.

In tidal zones or coastal areas, oysters have a very important role, both ecologically and economically. Ecologically, oysters are categorized as an important ecosystem stabilizing biota, because they can soften the substrate and filter solid toxic heavy metal compounds that will accumulate in the shell formation process. Economically, oysters have high economic value because this animal can be used by the public to be traded or consumed for personal menu needs. Ujung Batu Beach is part of the intertidal area of the Makassar Strait, precisely in Soppeng Riaja District, Barru Regency. This location is located around 80 km north of the city of Makassar and is a marine tourism area which is quite busy visiting during free times during holidays for local people and visitors from outside the city. This water zone has open tidal characteristics and is directly influenced by the Makassar Strait (Figure 1). These waters are waters typical of tropical areas with several important communities such as seagrass beds, coral reefs, and supported by a few mangrove forests in long hill valleys, this is enough to support the survival of various marine biota. The types of biota in these waters are also quite diverse, one of which is oysters.

Figure 1: Location of Ujung Batu Beach, Barru Regency

1.2 Research purposes

This research aims to determine the identification and biodiversity of oyster species in the coastal waters of Ujung Batu Soppeng Riaja, Barru Regency.

2. Research Methods

This research was carried out for 2 months (beginning of September to the end of October 2023). The research was carried out descriptively, to identify types of oysters and determine the value of the biodiversity index in the intertidal area of Batu Soppeng Riaja beach, Barru Regency. To determine the types and number of oysters in

the intertidal area in the region, a transect line was placed at the observation station with a length of 1000 m. The transect line is stretched horizontally parallel to the coastline at the lowest low tide limit in the sub-intertidal section (the boundary of the coral reef dominant area). The distance between transects is 100 m, and the number of transects is 10 transect lines. In each transect, 5 quadrats (plots) were made with a size of 1 m^2 with a distance between plots of 20 m. To identify types of oysters, the book Dharma (2005) is used. Biodiversity index values were obtained using the Shannon-Weaver diversity index formula (1949 in Meadows and Campbell, 1988).

3. Results and Discussion

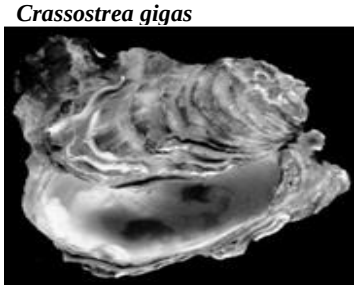
Based on the results of research and identification of oyster types in the intertidal area of Ujung Batu Soppeng Riaja Beach, Kab. Barru found 6 species of oysters belonging to 4 genera, the classification data can be seen in Table 1. From this table it can be explained that the 6 types of oysters found were the *Crassostrea gigas* species with a total of 67 individuals, *Crassostrea sikamea* with 56 individuals, *Saccostrea cuculata* with 45 individuals, *Saccostrea echinata* with 39 individuals, *Saccostrea glomerata* with 37 individuals, and *Ostrea edulis* as many as 35 individuals. From research data, the 6 oyster species were described based on shell color, description of the shell surface and substrate and the type of coral reef where the oysters were attached. A complete description of the types of oysters at the research location can be seen in Table 2.

Table 1: Classification of oysters found in Ujung Batu coastal waters, Barru

Phylum	Class	Ordo	Family	Genus	Species	Amount (ind.) Spesies
Mollusca	Bivalvia	Ostreoida	Ostreoidae	Crassostrea	*Crassostrea gigas*	67
				Crassostrea	*Crassostrea sikamea*	56
		Ostreoida	Ostreoidae	Saccostrea	*Saccostrea cuculata*	45
				Saccostrea	*Saccostrea echinata*	39
				Saccostrea	*Saccostrea glomerata*	37
				Ostrea	*Ostrea edulis*	35

Table 3 shows that the diversity or biodiversity of oyster species found in the coastal waters of Ujung Batu Barru Regency has an index value of 1.7622 which is in the range (1-3) which means (>1), this is an indication of the standardization of ecosystem stability of medium quality (Wang et al., 2013). According to (Chávez-Villalba et al., 2009) standardization of ecosystem stability based on a moderate biodiversity index in tropical waters shows that the ecosystem's carrying capacity for the biota in these waters is quite high. Silulu. P. F. et al (2013) also explained that the diversity index (H') is in the medium category if H'>1<2, so that the coastal waters where this research was carried out are included in this category, which means that the coastal waters ecosystem of Ujung Batu Barru is able to support the life and distribution of these diverse oysters. Huber, M. (2010) in the snail book stated that a chronically massive coral reef ecosystem in tropical waters will display various types of substrate of its own type in the form of living and dead coral, as well as sediment of a springy rock-gravel-sand composition. And these habitat conditions really support the life of several types of Crassostrea and Saccostrea. Ramos, S., et al., (1986) stated that the sub-littoral area (lowest tidal limit) is an area that supports the abundance of oysters, where at this limit there is generally an association with coral reef life which leaves a lot of fossil remains and coral fractures die forming various types of substrate for various types of oysters. The massive association of mangrove, seagrass and seaweed ecosystems with coral reefs which are related by alternating ocean current patterns with coastal currents from river mouths contributes to the sediment characteristics in the final transit of oyster habitat in the sublitoral zone of the beach which is supple with a substrate rich in organic nutrients for the oyster (Yunus, 2015). The average density in 50 quadrant plots in 10 transects of the 6 oyster species found at the research location was 46.5 individuals (0.93 $ind.m^{-2}$), this shows the presence of oysters in the coastal waters ecosystem of Ujung Batu, Barru District, it was found that there was at least one individual per square meter.

Table 2: Description of oyster types found in the waters of Ujung Batu Beach, Barru

No.	Oyster Species	Classification	Description/ Morphological Characteristics
1.	***Crassostrea gigas*** 	Kingdom: Animalia Phylum: Mollusca Class: Bivalvia Order: Ostreoida Family: Ostreoidae Genus: Crassostrea Species: *Crassostrea gigas* (Thunberg, 1793)	Based on Cangkang's observations *Crassostrea gigas* has a different shape, the shell color is brownish yellow to brown, *Crassostrea gigas* attaches to massive Acropora as its substrate.

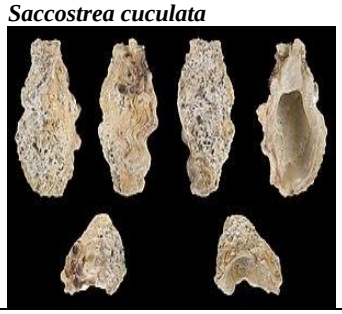
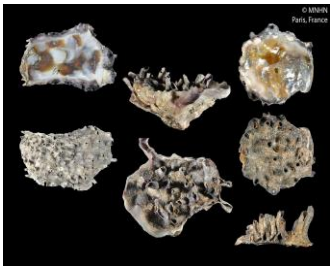
2.	***Crassostrea sikamea*** 	Kingdom: Animalia Phylum: Mollusca Class: Bivalvia Order: Ostreoida Family: Ostreoidae Genus: Crassostrea Species: *Crassostrea sicamea* (Amemiya, 1928)	Based on the results observations, *Crassostrea sicamea* has a shape The shell is regularly serrated, the surface of the shell looks very rough like small ripples, light brown to dark/dark brown. Crassostrea sicamea lives and attaches to rocky areas or dead coral fragments.
3.	***Saccostrea cuculata*** 	Kingdom : Animalia Phylum : Mollusca Class : Bivalvia Ordo : Ostreoida Family : Ostreoidae Genus : *Saccostrea* Species : *Saccostrea cuculata* (Born, 1778)	Based on the results observation, the two shells are united at the back (dorsal) and are connected by a pair of hinges. The inside of the shell is dark white, and the shell color is reddish brown. *S. cuculata* lives in rocky areas and brain coral
4.	***Saccostrea echinate*** 	Kingdom : Animalia Phylum : Mollusca Class : Bivalvia Ordo : Ostreoida Family : Ostreoidae Genus : Saccosstrea Species : *Saccostrea echinata* (Gaimard 1835)	Based on observations, *Saccostrea echinata* has an irregularly serrated outer shell surface or blunt spines of unequal length, a lighter color than the shell color. The shell is dark white to brownish yellow. *Saccostrea echinata* lives and attaches to rocky areas of coral reefs.
5.	***Saccostrea glomerata*** 	Kingdom : Animalia Phylum : Mollusca Class : Bivalvia Ordo : Ostreoida Family : Ostreoidae Genus : Saccosstrea Species : *Saccostrea glomerata* (A. Gould, 1850)	Based on the results observations, *Crassostrea glomerata* has an irregularly serrated shell shape, the surface of the shell looks very rough like small ripples, light brown to dark/dark brown. The inner surface of the shell is shiny white, Crassostrea glomerata lives and attaches to rocky areas or dead coral fragments.
6.	***Ostrea edulis*** 	Kingdom : Animalia Phylum : Mollusca Class : Bivalvia Ordo : Ostreoida Family : Ostreoidae Genus : Ostrea Species : *Ostrea edulis* (Linnaeus, 1758)	Based on observations, the shell of *Ostrea edulis* is oval or pear-shaped, white, yellowish or cream in color, with a rough surface showing pale brown or bluish concentric bands on the right valve. These two valves are very different in shape and size, as the left valve is concave and attached to the substrate, whereas the right valve is almost flat and fits inside the left valve. The inner surface is smooth, whitish or bluish gray. Live attached to a chewy clay sand substrate.

Table 3: Oyster Diversity Index in Ujung Batu Beach Waters, Barru Regency

No.	Species	Amount	ni/ N	Pi	Ln pi	pi Ln pi	H'
1.	*Crassostrea gigas*	67	67/279	0,2401	-1,4267	-0,3426	0,3426
2.	*C. sikamea*	56	56/279	0,2007	-1,6059	-0,3219	0,3219
3.	*Saccostrea cuculata*	45	45/279	0,1613	-1,8245	-0,2943	0,2943
4.	*S. echinata*	39	39/279	0,1398	-1,9675	-0,2751	0,2751
5.	*S. glomerata*	37	37/279	0,1326	-2,0204	-0,2679	0,2679
6.	*Ostrea edulis*	35	35/279	0,1254	-2,0762	-0,2604	0,2604
Biodiversity index H' = -∑ (pi ln pi)							**1,7622**
Equitability index E = H'/ln ∑Spesies							**0,9834**

Meadows and Campbell (1988), explained that oysters with a density of 1–3 individuals/m2 are a stable density in 3 important communities that coexist in the intertidal area, namely mangroves, seagrass and coral reefs. These three adjacent ecosystems provide support in terms of energy supply at the tropic level where the position of oysters can be in the form of tertiary consumers, decomposers, decomposers/destroyers (scavenger). Of the 6 species of oysters found at the research location, relatively evenly, the number of individuals is the same (relative equitability index 1) (Table 3) and this shows that there is no competition for habitat space and food. Odum (1998) indicated that a community that has relatively the same number of individuals in terms of the number of species indicates that the community exists in a stable ecosystem. And conversely, if a community has low evenness or is dominated by one or two species, then the community is in an unstable ecosystem.

4. Conclusion

From the research results, 6 types of oysters were found in the Ujung Batu coastal area, Barru Regency, namely the species *Crassostrea gigas*, *Crassostrea sikamea*, *Saccostrea cuculata*, *Saccostrea echinata*, *Saccostrea glomerata*, and *Ostrea edulis*. The diversity index in this coastal ecosystem zone is 1.7622 with a relative evenness of 1 which indicates that the oyster community is in a stable ecosystem.

5. Suggestion

It is necessary to research further about the oyster communities found in mangrove and seagrass ecosystems and their interactions with the physical and chemical environmental factors that support the life of oysters in these ecosystems.

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