Identification of Macrozoobenthos Around Asmoro Qondi Coast Area, Gesikharjo Village, Palang District, Tuban Regency

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Abstract

Asmoro Qondi is a Coast located in Tuban Regency. There are various activities carried out by the community in the area, such as fishing, disposing of garbage, and selling food. Activities carried out by local communities will affect marine biota, one of which is Macrozoobenthos. With this, it is necessary to conduct research with the aim of identifying Macrozoobenthos in the coastal area of Asmoro Qondi, Gesikharjo Village, Palang District, Tuban Regency. This type of research is a descriptive study using observational methods for data collection. Based on the research results found 1526 individuals of Macrozoobenthos consisting of 9 species from 8 families. *Ocypode kuhii* from the Ocypodidae family, *Meccas marginela* from the Cerambycidae family, *Littorina littorea* and *Littorina scabra* from the Littorinidae family, *Cerastoderma glaucum* from the Cardiidae family, *Cerithium tenellum* from the Cerithiidae family, *Persicula variabilis* from the Pisciidae family. The value of Macrozoobenthos species diversity is 1.62 which means moderate. The Macrozoobenthos uniformity value is 0.28 which means low. The dominance value of Macrozoobenthos is 0.2272 which means low. Based on the index of diversity, uniformity, and dominance, it shows that the Macrozoobenrhos on the coast of Asmoro Qondi is still low. This means that the condition of the coast of Asmoro Qondi with the large number of community activities affects the growth and development of Macrozoobenthos. Therefore, cooperation between local residents is needed so that the coast is preserved.

Keyword: makrozoobenthos diversity, asmoro qondi coast, human activities, garbage

1. Introduction

Macrozoobenthos is the most important group of organisms in the ecosystem. Macrozoobenthos is one indicator of water quality and can increase the diversity of society (Kinasih 2018) (Payung 2017). Macrozoobenthos are benthic organisms measuring 1.0 mm or more which include all mollusks (Motui et al. 2013) (Muhaimin et al. 2013). Macrozoobenthos is usually used to assess water quality (Vyas et al. 2012). Macrozoobenthos are organisms commonly used as pollutant indicators and also play a role in biological monitoring of waters (Minggawati 2013) (Roy & Gupta 2010). Due to its tendency to inhabit soft and hard substrate sediments, it is sensitive to certain pollutants, has low mobility, is easy to capture, and has a long service life (Trisnawaty & Emiyarti 2013) (Lumingas et al. 2011) (Sharma et al. 2013).

Macrozoobenthos greatly contributes to the functioning of aquatic ecosystems, plays important roles such as poor quality of mineralization and circulation of organic matter, the role of energy transfer through the food chain, and these animals play a role in the

nutrient balance of the aquatic environment. The composition of Macrozoobenthos can react to changes in the physical and chemical properties of water (Vyas et al. 2012) (Roy & Gupta 2010) (Minggawati 2013). Macrozoobenthic populations are influenced by environmental conditions, food sources, and competition (Susiana 2011) (Efriyeldi et al.). However, it is likely that the abundance of Macrozoobenthos decreases due to human activities. The important role of Macrozoobenthos in aquatic ecosystems, so that if the Makrozoobenthos community is damaged, it will inevitably lead to a decline in the ecosystem (Gaine et al. 2014) (Machrizal et al. 2020) (Oktarina & Syamsudin, 2015) (Wulandari, 2019). Damage to marine ecosystems can cause a decrease in the number of organisms that live in these habitats, especially macrozoobenthos (Nurgayah & Ketjulan) (Onrizal et al. 2019). The high level of human activity around this aquatic environment can affect water quality and can affect the diversity of Macrozoobenthos in these waters (Budi et al. 2013) (Fisesa et al. 2014) (Afif et al. 2014) (Gitarama et al. 2016). In addition, good seawater quality can be known the level of sea water transparency, if the water transparency level is low in normal weather it can give an indication that the large number of suspended marine organisms (Yuliana & Ahmad 2017) (Hamuna et al. 2018).

Asmoro Qondi Coast is one of the beaches in Tuban district, precisely in the village of Gesikharjo, Palang sub-district. Initially this beach did not have a name, but because the location of this coast is close to the tomb of Syekh Makdum Ibrahim Asmoro Qondi, the local residents named the beach as "Asmoro Qondi Coast". The condition of this beach is the same as other beaches in Tuban district, only used as a place to relax, catch fish, trade, and as a parking area for the boats of local fishermen (Febyanto et al. 2014). Community activities on the Asmoro Qondi beach will indirectly affect the condition of the coast, especially the quality of waters and biota on the coast such as Makrozoobenthos. Water quality can be characterized by an ecologically rich population of organisms that must meet both physical and chemical criteria (Rukanah, 2019) (Vyas et al. 2012) (Susiana 2011) (Efriyeldi et al.). Macrozoobenthos abundance is related to environmental changes such as contaminant toxicity level, ecological pressure, community activities (Yuliana & Ahmad 2017) (Yuniar 2019).

In connection with the diversity of Macrozoobenthos on the Asmoro Qondi coast, there is no research data on its diversity. In fact, information on the diversity of Macrozoobenthos is very important to determine the quality of the waters on the Asmoro Qondi coast which are widely used by the community in terms of water use and for fishing. Community activities around the coast of Asmoro Qondi such as fishing, fishing boat parking places, and trading affect the abundance of Macrozoobenthos, therefore it is necessary to conduct research on the diversity of Macrozoobenthos on the coast of Asmoro Qondi with the aim of obtaining information and data about the abundance of Macrozoobenthos.

2. Research Methods

2.1 Types of research

This research uses a descriptive research method because it is carried out with the aim of obtaining a description of the events or findings of data and symptoms that exist and those that occur based on visible facts or as they occur in the field when the

research was carried out, this description is a description of the diversity of Macrozoobenthos. which is on the coast of Asmoro Qondi (Deken 2011). The tools used in this study include stationery, handbooks of various kinds of Macrozoobenthos, and cameras. Then the materials used in this study are various types of Macrozoobenthos found in the coastal area of Asmoro Qondi. This research was conducted in the coastal area of Asmoro Qondi, Gesikharjo Village, Palang District, Tuban Regency during January 2021. Geographically Asmoro Qondi Coast is located -6.9026273o (Latitude) and 112.1247268o (Longitude), as shown in Fig 1.

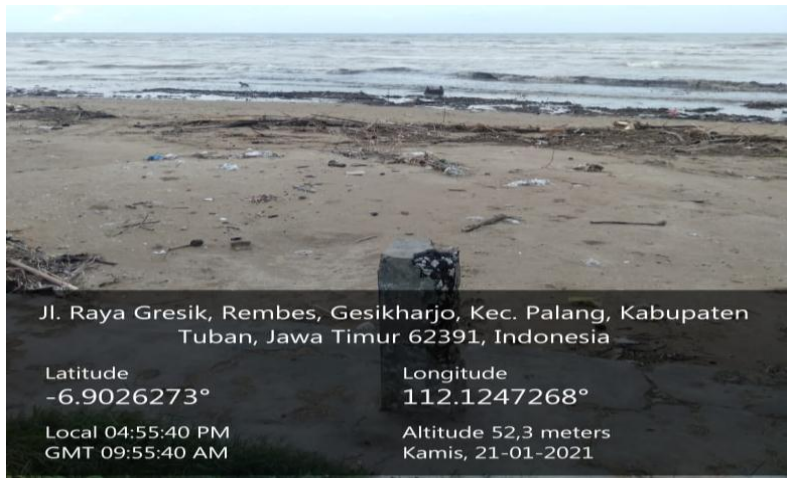


Figure 1. Geographical location of Asmoro Qondi Coast

2.2 Data collection technique

The data collection technique used in this study is the observation technique, namely through direct observation of the Macrozoobenthos on the coast of Asmoro Qondi Coast. The data obtained after making observations (direct observation) are various types of Macrozoobenthos diversity in the conservation area. Primary data includes observations of the object of research in the form of types and numbers of individual Macrozoobenthos organisms on the Asmoro Qondi Coast. Meanwhile, secondary data is obtained based on literature study on the types of macrozoobenthos and environmental parameters that influence this research (Alwi et al. 2020).

2.3 Data analysis

Diversity Index Analysis

To find out the diversity of Mikrozoobenthos species on the coast of Asmoro Qondi Coast, Palang District, Tuban Regency, using the species diversity index formula from Shannon-Wienner (Odum 1996). The diversity / diversity index shows the relationship between the number of species and the number of individuals that make up a community.

$$H' = -\sum_{i=1}^{5} \left(\frac{ni}{N}\right) \ln \left(\frac{ni}{N}\right)$$

Information:
H '= Shannon-Wienner diversity index.
Ni = Number of individuals of one kind.
N = total number.

Based on the species diversity index according to Shannon-Wienner is defined as follows:

a. The value of H '> 3 indicates that diversity is high.
b. The value of H '1 ≤ H' ≥ 3 indicates that diversity is moderate.
c. The value of H '<1 indicates that the diversity is little or low

Uniformity Index Analysis

The uniformity index was used to find out how much the distribution of the number of individuals of each type was by comparing the diversity index with its maximum value. The more uniform the distribution of individuals between species, the more the balance of the ecosystem will be. The uniformity index is determined based on the following equation (Ludwig and Reynolds, 1988) in (Kelautan et al. 2015):

$$E = \frac{H'}{H'max} \quad \text{where } H'max = \ln S \qquad (2)$$

Information:
E: uniformity index
H ': diversity index
H'max: maximum diversity index
S: the number of types

The ranges for the uniformity index are as follows:

A. 0 <E ≤ 0.5: The ecosystem is under stress and uniformity is low
b. 0.5 <E ≤ 0.75: The ecosystem is in a less stable condition and moderate uniformity
c. 0.75 <E ≤ 1.0: The ecosystem is in a stable condition and high uniformity

Dominance Index Analysis

According to Odum in (Agustini et al. 2016) the status of the community condition can be determined using the dominance index. Where:

$$D = \sum_{i=1}^{S} \left[\frac{Ni}{N}\right]^2 \qquad (3)$$

Information :
D: Simpson-dominance index
Ni: Number of individuals of type i
N: The total number of individuals
S: Number of types

Dominance index range in (Kelautan et al. 2015) as follows:

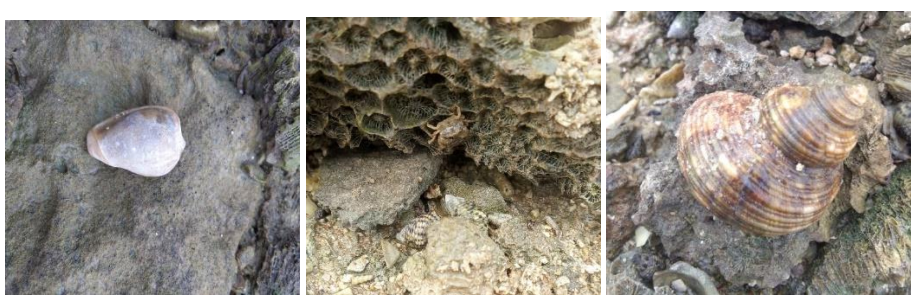
0 <C ≤ 0.5: Low dominance (there are no species that dominate the other species), the environmental conditions are stable, and there is no ecological pressure on the biota in the

location.
$0.5 < C \leq 0.75$: Moderate dominance and fairly stable environmental conditions.
$0.75 < C \leq 1.0$: High dominance (there are species that dominate other species), environmental conditions are unstable, and there is an ecological pressure.

3. Result and Discussion

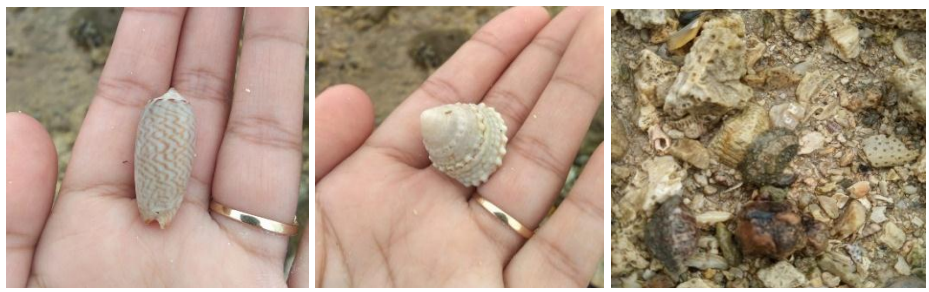
3.1 Result

Based on the identification results of Macrozoobenthos found in the coastal area of Asmoro Qondi, Gesikharjo Village, Palang District, Tuban Regency, presented in Figure 2 which consists of the species Littorina littorea and Littonina scabra (family Littorinidae), Cerastoderma glaucum (family Cardiidae), Cerithium tenellum (family Cerithiidae), Persicula variabilis (family Cystiscidae), Megastracae undosa (family Turbinidae), Meccas marginella (family Cerambycidae), and Ocypode kuhii (family Ocypodidae). While the results of the analysis of Macrozoobenthos diversity data on the coast of Asmoro Qondi obtained 1,526 individuals from 8 families which are presented in Table 1.The results of data analysis on the number of species and diversity shown based on the Diversity Index, Uniformity Index, and Dominance Index are presented in Tables 2, 3, and 4.



(a) (b) (c)

(d) (e) (f)



(g) (h) (i)

Fig 2. Macrozoobenthos diversity on the coast of Asmoro Qondi Coast
(a) Littorina littorea, (b) Littonina scabra, (c) Cerastoderma glaucum, (d) Cerithium tenellum, (e) Persicula variabilis, (f) Megastracae undosa, (g) Meccas marginella, (h) *Ocypode kuhii*

Table 1. Identification Results of Macrozoobenthos Types

No.	Family	Species	Number of Species / Individual
1	Cerambycidae	*Meccas marginella*	49
2	Ocypodidae	*Ocypode kuhlii*	16
3	Littorinidae	*Littorina littorea*	570
4	Cardiidae	*Cerastoderma glaucum*	236
5	Cerithiidae	*Cerithium tenellum*	140
6	Littorinidae	*Littonina scabra*	330
7	Cystiscidae	*Persicula variabilis*	123
8	Turbinidae	*Megastracae undosa*	51
9	Pisciolidae	*Zeylani cobdella*	11
		Total Number	**1526**

Table 2. Data Analysis of Macrozoobenthos Diversity Index

No.	Family	Species	Number of Species	H’
1	Cerambycidae	*Meccas marginella*	49	0,10
2	Ocypodidae	*Ocypode kuhii*	16	0,04
3	Littorinidae	*Littorina littorea*	570	0,36
4	Cardiidae	*Cerastoderma glaucum*	236	0,28
5	Cerithiidae	*Cerithium tenellum*	140	0,21
6	Littorinidae	*Littonina scabra*	330	0,32
7	Cystiscidae	*Persicula variabilis*	123	0,20
8	Turbinidae	*Megastracae undosa*	51	0,10
9	Pisciolidae	*Zeylanicobdella*	11	0,01
Total Number			**1526**	**1,62**

Table 3. Data Analysis of Macrozoobenthos Uniformity Index

No.	Family	Species	Number of Species	E
1.	Cerambycidae	*Meccas marginella*	49	0,02
2.	Ocypodidae	*Ocypode kuhii*	16	0,01
3.	Littorinidae	*Littorina littorea*	570	0,05
4.	Cardiidae	*Cerastoderma glaucum*	236	0,05
5.	Cerithiidae	*Cerithium tenellum*	140	0,04
6.	Littorinidae	*Littonina scabra*	330	0,05
7.	Cystiscidae	*Persicula variabilis*	123	0,04
8.	Turbinidae	*Megastracae undosa*	51	0,02
9.	Pisciolidae	*Zeylani cobdella*	11	0,00
Total Number			**1526**	**0,28**

Table 4. Data Analysis of Macrozoobenthos Dominance Index

No.	Phylum	Species	Number of Species	D
1.	Arthropoda	*Meccas marginella*	49	0,0010
2.	Arthropoda	*Ocypode kuhii*	16	0,0001
3.	Moluska	*Littorina littorea*	570	0,1395
4.	Moluska	*Cerastoderma glaucum*	236	0,0239
5.	Moluska	*Cerithium tenellum*	140	0,0084
6.	Moluska	*Littorina scabra*	330	0,0467
7.	Moluska	*Persicula variabilis*	123	0,0064
8.	Moluska	*Megastracae undosa*	51	0,0011
9.	Annelida	*Zeylani cobdella*	11	0,0001
Total Number			**1526**	**0,2272**

3.2 Discussion

The Macrozoobenthos ecosystem on the Coast of Asmoro Qondi, in Tuban district, has a diversity of Macrozoobenthos consisting of 8 families as can be seen in Figure 2, the diversity of Macrozoobenthos on the coast of Asmoro Qondi Coast, namely, Littorina littorea and *Littonina scabra* (family Littorinidae), Cerastoderma glaucum (family Cardiidae), Cerithium tenellum (family Cerithiidae), Persicula variabilis (family Cystiscidae), Megastracae undosa (family Turbinidae), Meccas marginella (family Cerambycidae), and Ocypode kuhii (family Ocypodidae). This Macrozoobenthos vegetation type has high salinity, unique adaptability to live and develop in muddy substrate, high salinity, always inundation, and unique adaptability to tidal influences (Irma et al. 2020). The coast of Asmoro Qondi has a muddy soil texture, where this type of soil is a characteristic of soil suitable for the growth of Macrozoobenthos (Sidik et al. 2016).

Littorina littorea is a type of Macrozoobenthos which has the largest number in the coastal area of Asmoro Qondi with a total of 570 individuals, this is because this type of Macrozoobenthos has a rather muddy habitat (Rahayu et al. 2018). *Littonina scabra* in

this region has a total of 330 individuals, *Cerastoderma glaucum* has a total of 236 individuals, *Cerithium tenellum* has a total of 140 individuals, *Persicula variabilis* has a total of 123 individuals, *Megastracae undosa* has a total of 51 individuals, *Meccas marginella* has a total of 49 individuals, *Ocypode kuhii* has a total of 16 individuals, and *Zeylani cobdella* has a total of 11 individuals.

Based on Table 1, the identification results of the Macrozoobenthos species showed that the types of Macrozoobenthos found consisted of 9 species from 8 families, namely *Littorina littorea, Littonina scabra, Cerastoderma glaucum, Cerithium tenellum, Persicula variabilis, Megastracae undosa, Meccas marginella, and Ocypode kuhii*. Littorinidae is the most dominant family with the number of species, namely 900 individuals from the total number of existing Macrozoobenthos. This is because the coastal area of Asmoro Qondi has a high tolerance for environmental changes (Marianingsih et al. 2013).

Based on Table 2, it shows that the Macrozoobenthos diversity index value there is 1.62 which indicates that the diversity of Macrozoobenthos there is moderate. This is because the environmental conditions have a variety of species that lead to good and it means that the environmental conditions in the enemy's Tundung conservation area are quite stable / balanced. According to the opinion of Shanon-Wienner diodum (1993) in Cahyono (Cahyono et al. 2018) which states that a community has a high level of species diversity if H 'reaches> 3.0.

As stated by Indriyanto (Arisandy & Triyanti 2020) when a community consists of many species, the species diversity of the community is known to be high. On the other hand, communities where only a few species of a few species dominate are known to have low specific diversity. According to Krebs, 1989 in Manikome (Manikome 2019) species diversity provides a description of the changes in each type of community that occur in a community due to competition for food (resources), as well as space and competitive patterns of distribution of individuals of a particular species. This diversity is closely related to the Macrozoobenthic activity patterns in terms of environmental factors.

Based on Table 3, it shows that the Macrozoobenthos on the coast of Asmoro Qondi Beach, Gesikharjo Village, Palang District, Tuban Regency shows the number 0.28 which indicates that the Macrozoobenthos uniformity there is low. This is because the number of each Macrozoobenthos species is different. The lower the uniformity index of a community means that the environmental conditions are increasingly unstable. The low uniformity value indicates that the community condition is in a depressed state (Arfiati et al. 2019). The high and low diversity can also be caused by habitat that is less supportive and stressful conditions for each species that occupy the location and vice versa if the uniformity is close to one, it can be said that the uniformity between species is evenly or the same (Abdillah et al. 2019) (Nurjannah & Irawan 2013).

Based on Table 4, it shows, Macrozoobenthos on the coast of Asmoro Qondi Beach, Gesikharjo Village, Palang District, Tuban Regency shows a number of 0.2272 which means that the dominance of Macrozoobenthos in this location is low. This shows that the environment for the growth of Macrozoobenthos is stable, there is no ecological pressure on the biota in that location so that Macrozoobenthos can grow well. The three data show that the coast of Asmoro Qondi Coast is a stable coastline, there is no striking dominance of any of the Macrozoobenthos species that live in the area. All types of Macrozoobenthos can grow well (Alimuddin 2016).

The diversity of Macrozoobenthos on the coast of Asmoro Qondi coast shows good results seen from the data that has been obtained. However, environmental conditions around the coast show the opposite result. Lots of household trash scattered around and cause an unpleasant odor. This is an important matter that must receive special attention, both from the local village and from the local community. There is a need for socialization or counseling about the prohibition of disposing of garbage on the coast and what is the danger of garbage to Makrozoobenthos. After the socialization, there is also a need for supervision of the community who will dispose of garbage on the coast of Asmoro Qondi. This is done so that the existing diversity is preserved. With the environmental conditions of Makrozoobenthos filled with garbage, Makrozoobenthos on the coast of Asmoro Qondi Coast can still survive well for now. However, if conditions like this continue, it is feared that it will disrupt the existing diversity, because waste is very influential for the growth of macrozoobenthos (Yusuf 2011). The residents around the coast of Asmoro Qondi Coast have an important role in maintaining this diversity.

4. Conclusion

Based on the results of the study, it can be concluded that in the coastal area of Asmoro Qondi, Gesik Harjo Village, Palang District, Tuban Regency, there were 9 types of Macrozoobenthos consisting of 8 types of families, among others; *Littorina littorea* and *Littonina scabra* (family Littorinidae), *Cerastoderma glaucum* (family Cardiidae), *Cerithium tenellum* (family Cerithiidae), *Persicula variabilis* (family Cystiscidae), *Megastracae undosa* (family Turbinidae), *Meccas marginella* (family Cerambodeidae), and *Ocypode* (family Ocypodidae). The highest number of species found is from the Gastrophoda class, namely the *Littorina littorea* species. Based on the data analysis, it was obtained that the Macrozoobenthos diversity value was 1.62 which means moderate, the uniformity value is 0.28 which means low, and the dominance value is 0.2272 which means low. Based on this, it can be concluded that the coast of Asmoro Qondi Coast is quite stable, which means that there is no striking dominance of certain species and is good enough for the growth of Macrozoobenthos.

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