Journal of Biological Science and Education
~JBSE~
Website: https://usnsj.id/index.php/biology
Email: biologi_jbse@usn.ac.id

Diversity of Bentos in Fresh Water and Branches Water in The Kambu River, Lalolara District

AUTHORS INFO

Suharno
Universitas Halu Ooleo
Suharno@gmail.com
+6285946053063

ARTICLE INFO

E-ISSN: 2721-0804
P-ISSN: 2723-6838
Vol. 4, No. 2, December 2022
URL: https://usnsj.id/index.php/biology

Suggestion for the Citation and Bibliography
Citation in Text:
Suharno (2022)
Bibliography:
Suharno (2022). Diversity of bentos in fresh water and branches water in the Kambu river, Lalolara District. *Journal of Biological Science and Education,* 4(2), 71-75.

Abstract

Benthic animals are often used as biological indicators of water quality because benthos have relatively fixed habitats, with such characteristics, changes in water quality and the substrate where they live greatly affect their composition. Benthic density is also strongly influenced by its tolerance and sensitivity to environmental changes. The purpose of this research is to determine the type of macrozoobenthos in the Lalolara River, Kambu District, Kendari City. This type of research is descriptive research with observational sampling techniques. The observation technique used is to go directly to the deep field observation and sampling of the flow of the Lalolara River. The river is about 20 m wide meter is divided into 20 observation points. Sampling was carried out on each line transect where each transect consisted of 4 plots measuring 30 x 30 cm. The results showed that there were six types of benthos found in the river Lalolara namely: Tarebia granifer, Pleurocera acuta, Medulia carinata, Planobula armigera, Viviparus interitextus, Parapholyx effusa. Based on the results of the study, it appears that the species Tarebia granifer dominates both forms of the substrate. Also from the observations, the comparison between substrates shows that the sandy substrate has a large number of individuals with a higher diversity than the silty substrate

Keywords: Diversity, Bentos

A. Introduction

Freshwater ecosystems are relatively small aquatic ecosystems in advanced earth compared to terrestrial and marine ecosystems. Freshwater ecosystem has a very significant importance in human life because Freshwater ecosystems are the most practical and inexpensive source to meet domestic and industrial interests. Freshwater ecosystems in general can be divided into 2 namely lentic waters (calm waters) for example lakes, swamps, reservoirs and and so on as well as lotic waters (current waters) such as rivers. Water ecosystem freshwater has many benefits for human life is a river (Rafi'I & Maulana, 2018).

The mouth of the river is an area fresh water and sea water meet lots of organic matter inorganic origin of various surrounding community activities. this condition can affect a wide variety of organisms one of them is for benthic fauna. Fauna benthos is a group of organisms benthos whose characteristic of life is always is at the bottom of the water. this organism relatively easy to identify and very sensitive to changes in quality waters so it will affect composition and distribution. Change water and substrate quality is very affect the abundance

as well the diversity of benthic fauna. In generally sandy bottom conditions These organisms live among the sediments while in basic water conditions, the muddy ones are usually these organisms make a hole (Abdullah and Lee, 2017).

As well as being a place for organisms to live, the basic substrate in the river ecosystem is also a limiting factor for the organisms that inhabit it, including macrozobenthos animals. Aquatic ecosystems in general and river ecosystems, in particular, are occupied by various types of high-level organisms to low-level organisms that interact with each other (Odum, 1993). One such organism is macrozobenthos.

Benthic animals play an important role in aquatic ecosystems and occupy several trophic levels in the food chain. The important role of these macrobenthos animals is because they can decompose organic matter which is a nutrient for aquatic producers (Odum, 1971).

The Kambu River has an important role in the survival of the surrounding community. In this area, many settlements and various human activities are carried out, such as gardening and searching for food from the river. Based on the results of observations made in the field, it was found that there were many benthic organisms so I was interested in doing a practicum with the title " Diversity of bentos in fresh water and branches water in the Kambu river, Lalolara District ".

B. Literature Review

1. Bentos in River Ecosystems

Aquatic organisms that live and live in sediments at the bottom of the water, either above or below the surface of the sediment, are referred to as benthos. Zoobenthos from the point of view of how they eat can be divided into filter feeders, for example, various types of coral, and deposit feeder bodies, for example, a type of snail (Odum, 1971).

Benthic organisms include organisms plant organisms called phytobenthos and animal organisms called zoobenthos (Odum, 1971). Macrozoobenthos are organisms that are filtered by filters graded at 0.6 mm (Lind, 1979). At the time of achieving growth maximum, the macrozoobenthos will be at least 3 to 5 mm in size (Sudarja, 1978)

Benthos that live in aquatic ecosystems is generally insect larvae, molluscs, oligochaeta, isopods, decapods and nematodes. The benthic community varies according to the environmental zone, each change in environmental factors along the river flow affects its abundance. In areas that are still relatively natural, the abundance is still relatively high, preferably in areas that have been exploited, the abundance decreases. This is caused by environmental conditions that are getting closer to the tolerance range.

In its life cycle, there are several living macrozoobenthos only part of it is benthic, for example at a young stage only or on the contrary. In general, worms and bivalves live as benthos at this stage adults, while demersal fish live as benthos in the larval stage (Nybakken, 1988), then it is stated that zoobenthos is generally relatively not active with special features such as the body is protected by a shell, has parts body that can be extended, the development of additional body parts such as hair, hard bristles and composed of muscles that make it easier movement on and within the sediment.

Benthic communities can also be distinguished by their movements, ie group of benthic animals whose lives are sedentary (sesile benthos), and animals benthos whose life is nomadic (motile). Benthic animals that live sessilely are often used as an indicator of water conditions (Setyobudiandi, 1997).

The distribution of benthic in the natural waters economy has a role important in terms of qualitative and quantitative aspects. For the qualitative distribution, different ground type states exist in wave action and other modifications bring a diversity of fauna in the littoral zone. Litoral zone supports a much greater amount of faunal diversity than the sublittoral zone and profundal. Litoral and sublittoral populations, especially microscopic forms. There are many insects and molluscs, these two groups are usually numerous 70% or more of the total species component present. With upgrades, the depth exceeds the littoral zone, and the number of benthic species usually decreases. The effect of different types of bottom substrate is modified by the mass of filamentous algae that covers an area. The mud bottom substrate is often described as supporting several species (Welch, 1952).

2 Benthic classification

Based on its size, Lind (1979) classifies zoobenthos into two major groups micro zoobenthos and macrozoobenthos. In line with the size, Hutabarat and Evans (1985) also classify zoobenthos into three groups based on size, namely: Microfauna are animals that are smaller

than 0.1 mm and classified into protozoa and bacteria, Meiofauna are animals with a size of 0.1 to 1.0 mm. Classified into several large protozoa classes and classes of very small crustaceans as well as worms and invertebrate larvae. Macrofauna are animals with a size larger than 1.0 mm Classified into molluscs, echinoderms, crustacean several phyla Annelida

Based on the place of life, zoobenthos is divided into two groups, namely: (a) epifauna, namely benthic organisms that live and are associated with the surface substrate, (b) infauna, namely benthic organisms that live in the sediment (substrate) by digging a hole (Hutabarat and Evans, 1985; Nyabkken 1988).

Odum (1971) classifies zoobenthos based on the habits they eat into two groups, namely: (a) filter-feeders, namely animals that filter detritus particles floating in the waters for example Balanus (Crustacea), Chaetopterus (Polyhaeta) and Crepudia (Gastropoda). (b) deposit-feeders, namely benthic animals that eat detritus particles that are has settled at the bottom of the waters, for example, Terebella and Amphitrile (Polychaeta), Tellina and Arba (Bivalvia).

In line with eating habits, Knox (1986) also divides into five groups namely: predatory animals, digging animals, detritus-eating animals that settle on the surface, animals that ingest food on the bottom, and animals whose food source is from above the surface

C. Methodology

1. Research Design

This research was carried out in the Kambu river, Kambu District, Kendari City on September 2, 2019, and then continued at the Education Laboratory of the Biology Unit, Haluoleo University, Kendari. This type of research is a descriptive research technique observational sampling. The observation technique used is to go directly to the field to observe and sampling streams Kambu River

2. Instruments

The tools used in this study were film bottles, thermometers, filters, label paper, raffia rope, 30x30 cm quadrants, hygrometers, and plastic bags. The material used in this lab is 2% alcohol which serves to preserve the sample

The data collection technique is to observe the practicum area and determine the stations, namely in fresh water and brackish water. At each station, one line transect was made where each transect consisted of 4 plots measuring 30 x 30 cm so that there were 4 observation plots. Measurement of environmental parameters including temperature, pH, and salinity of each transect.

The retrieval of research data is as follows

a. Take benthic organisms that represent one of the same species on the surface in each plot made along the transect line.
b. The benthos obtained is put into a plastic bag then given 2% formalin and labeled.
c. Animals whose species are known are immediately identified in the field, while those whose species are not known are identified in the laboratory.
d. Identifying benthic species at the Biology Education Development Laboratory using identification books Dharma (1988 and 1992), Dance (1992), Hyman (1995) and Allen (1997).

3. The Technique of Data Analysis

The data analysis technique used is a descriptive technique using the following formula:

$$\text{Abundance} = \frac{\text{Total number of i}-\text{th individuals}}{\text{number of squares where i}-\text{th individuals are}}$$

D. Findings and Discussion

1. Findings

The benthic animals found in the Kambu River during the practicum totalled 15 individuals (see observation table).

Of the 22 benthic animals found, 14 of them were in freshwater, and 8 of them were in brackish water. The results of the analysis of the 2 observed forms of water, both fresh and brackish water, are listed in the appendix. The results of observing the presence of these benthic animals can be seen in Table 1.

Table 1. The average total number of individuals and the average total benthic population in the Kambu River.

No.	Species Name	Station			
		I	II	III	IV
1.	*Tarebia granifer*	23	19	30	55
2.	*Pleurocera acuta*	8	17	9	-
3.	*Medulia carinata*	1	-	1	-
4.	*Planobula armigera*	4	4	-	-
5.	*Viviparus interitextus*	-	3	-	-
6.	*Parapholyx effusa*	-	-	-	6

From table 1 above it can be seen that the total number of individuals at number one, namely the *Tarebia granifer* species, was the highest at station 4 with a total of individuals, at station 1 there were 23 individuals while at station 2 there were 19 individuals and station 3 each 30 while at station 5 had 55 individuals for number 2 in the species *Pleurocera acuta* found 8 individuals at station 1 while at station 2 there were 17 individuals and for station 3 there were 9 individuals while at station 4 no individuals were found, at the third species, namely *Medulia carinata* where at stations 1 and 3 had 1 individual while at stations 2 and 4 no individuals were obtained, in the fourth species, namely *Planobula armigera* which was found at stations 1 and 2 had 4 individuals while for stations 3 and 4 no individuals were obtained, for the fifth species namely *Viviparus interitextus* at station 2 had 3 individuals while 1, 3 and 4 no individuals were found then finally in the species *Parapholyx effuse* at station 4 there were 6 individuals while for 1, 2 and 3 there were no individuals.

2. Discussion

Freshwater habitats occupy a relatively small area on the earth's surface, compared to marine and terrestrial habitats, but for humans, their importance is much more important than their territory. In freshwater communities, there are two characteristic water flow patterns, namely running water and still water. Still, water will reveal deep water where the current velocity has decreased, so silt and loose matter tends to settle to the bottom, leaving a soft bottom. Whereas in the flowing water community, it shows shallow areas where the current velocity is high enough to make the river bed clean from sediment and other loose materials so that the bottom is usually clear water because the existing substrate is always carried away.

Benthos is a natural food for basic animals, especially fish and shrimp. Benthos consists of various types and types, both of which live stuck (seagrass, sponge); creeping (starfish, crabs) as well as immersing themselves in sand or mud (shellfish, worms) (Setyobudiandi, 1999).

There are two basic characteristics of the waters that are the object of research, namely brackish water and fresh water. From the results of the study, there were 6 benthic species spread over 180 individuals. From these data, it can be seen that the species *Tarebia granifer* dominates both forms of the substrate. From the results of the study also, a comparison between freshwater showed that sandy substrates had a large number of individuals with higher diversity compared to muddy substrates.

The high number and diversity of sandy substrates is greatly influenced by several factors, including the sandy substrate which allows animals with adhesive devices to attach themselves to the substrate. Sandy substrates are animals that have adhesive devices. In contrast to the mud substrate, it is not suitable for animals that have adhesive devices, so the muddy substrate has fewer animal species, with low diversity.

The muddy substrate has a high level of turbidity, so not many animals congregate in the area. Whereas areas with sand substrates usually have clear water so animals like this situation. The basic substrate influences the composition and distribution of macrozoobenthos because it is one of the limiting factors for the spread of macrozoobenthic organisms. The type of substrate has to do with the content of oxygen and nutrient availability in sediments. the sand substrate, contains relatively large oxygen compared to the finer type of substrate, this is due to the type of sand substrate there are air pores that allow it more intensive mixing with the water above it. However, nutrients are not abundant in sandy substrates. Strong currents not only wash away small sediment particles but also just wash away nutrients. Sandy beaches do not provide a fixed substrate for organisms to adhere to. The two size groups of organisms which can adapt to sandy substrate conditions, namely infauna organisms macro (1-10 cm in size) capable of digging burrows in the sand and micro meiofauna organisms (0.1 – 1 mm in size) that live among the grains sand in the interstitial spaces. Conversely, on a smooth substrate, oxygen is

not so much, but usually, nutrients are available in very large quantities. Thus the type of substrate predicted by the benthos is a combination of three types of substrate (sand, silt and clay) (Bengen, 1995).

E. Conclusion

Based on the results and discussion of this research, the following conclusions can be drawn:

1 The high number and diversity of sandy substrates are strongly influenced by several factors, including sandy substrates that make it possible for animals with adhesive devices to attach themselves to the substrate, this is then by the observations that have been made, that most animals that found on sandy substrates are animals that have adhesive devices. Unlike the case with the mud substrate, it is not suitable for animals that have adhesive devices, so the muddy substrate has fewer animal species, with low diversity.

2 The number of individuals found is that there are 6 types of benthos spread over 180 individuals. From these data, it appears that species a dominates both forms of the substrate. Also from the observations, the comparison between substrates shows that the sandy substrate has a large number of individuals with a higher diversity than the silty substrate.

F. References

Abdullah, M. M., & Lee, S. Y. (2017). Structure of mangrove meiofaunal assemblages associated with local sediment conditions in subtropical eastern Australia. Estuarine, Coastal and Shelf Science, 198, 438-449

Bengen, D.R., Widodo & S. Haryadi. (1995). *Tipologi fungsional komunitas makrozoobentos sebagai indikator perairan Pesisir Muara Jaya, Bekasi*. Laporan penelitian. Lembaga Penelitian IPB. Bogor

Hutabarat & Evans. (1985). *Pengantar oseanografi*. UI Press. Jakarta.

Knox, G. A. (1986). Estuarine ecosistem and system aproach. Vol I CRC. Press Inc. Bacaration. Florida

Lind, L. T. (1979). *Hand book of common methods in lymnology*. Second Edition. The C. V. Mosby Company St. Louis. Toronto. London

Nybakken, J. W. (1992) *Biologi laut suatu pendekatan ekologis*. Penerjemah: H.Muhammad idman. Jakarta: PT Gramedia Pustaka

Odum, E.P. (1971). Dasar-dasar ekologi. Yogyakarta: Gadjah Mada University Press.

Odum, E.P. (1993). *Dasar-dasar ekologi*. Terjemahan Tjahjono Samingan. Edisi. Ketiga. Yogyakarta: Gadjah Mada University Press

Rafi'i, M., & Maulana, F. (2018). Jenis, keanekaragaman dan kemelimpahan makrozoobentos di Sungai Wangi Desa Banua Rantau Kecamatan Banua Lawas. *Jurnal Pendidikan Hayati*, *4*(2).

Setyobudiandi, I. (1997). Makrozoobentos. Bogor: Institut Pertanian Bogor.

Sudarja, Y. (1987). Komposisi kelimpahan dan penyebaran mangrove dari hulu ke hilir berdasarkan gradien kedalaman di Situ Lentik, Dermaga. Kab Bogor. Karya Ilmiah. Fakultas Perikanan. IPB. Bogor

Welch, S. (1952). *Limnology*. New York: Mc Graw Hill Book Company.