

PLANKTON DIVERSITY IN THE LAMPAGEU UJONG PANCU AREA, ACEH BESAR DISTRICT

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ABSTRACT

Plankton is a group of aquatic biota in the form of plants and animals that live or float passively on the surface of the water and their movement and distribution is influenced by current movements and when they are weak. The Lampageu Ujong Pancu area faces significant environmental challenges that impact marine ecosystems, including plankton populations. The expansion of aquaculture ponds has led to increased pollution which has had a negative impact on plankton diversity. This research aims to determine plankton diversity in the Lampageu Ujong Pancu area, Aceh Besar district. The research was conducted using the purpose sampling method. Sampling was carried out at five stations. The object of this research is all plankton species found in the research area. The results of the research found as many as 8 types of plankton species with the calculated diversity index being 1.311. These result indicate that the level of plankton diversity in the Lampagee Ujong Pancu area Aceh Besar district is at a medium diversity level.

Keywords: *Plankton, diversity, Ujong Pancu*

A. INTRODUCTION

One of the biotic component that determines life in waters is plankton. Plankton are microscopic organisms that live in water, both animals and plants that live floating in waters with very limited ability to move, so these organisms are always carried by the current, overall plankton cannot move against the current. The existence of plankton in an aquatic ecosystem can provide information about the condition of the waters through the diversity of plankton types contained in it. plankton includes two large groups, namely phytoplankton which is plant plankton, and zooplankton which is animal plankton (Odum, 1993).

Phytoplankton are able to photosynthesize and act as producers in the aquatic environment, while zooplankton act as the first consumers that connect producer phytoplankton with organisms

higher up the tropic level. The high diversity of zooplankton causes the food chain in a body of water to become increasingly complex. Phytoplankton and zooplankton also act as bioindicators of changes in water conditions. The richness and abundance of phytoplankton and zooplankton can describe the fertility of waters (Hidayat, 2012). The existence of plankton is influenced by various physical and chemical factors in the aquatic environment. The physical and chemical factors that influence plankton life are temperature, light penetration, currents, dissolved oxygen, pH, and the content of various nutritional elements (Sunarto, 2002).

Lampageu Ujong Pancu Village is one of the villages located in Peukan Bada District, Aceh Besar Regency. Geographically, Lampageu Ujong Pancu Village is located in a coastal area and most of the people make their living as fishermen. The people of Lampageu Ujong Pancu Village have fishing activities, as a daily livelihood to meet their economic needs. Plankton as a basic component in the structure of life in waters can be used as a parameter in monitoring the quality of the aquatic environment (Andini, 2014).

The role of plankton as a natural organism and producer of aquatic ecosystems, then the Lampageu Ujong Pancu area also faces significant environmental challenges that have an impact on marine ecosystems, including plankton populations, the development of expansion of aquaculture ponds has caused an increase in pollution which has a negative impact on plankton diversity. The expansion of aquaculture ponds has led to increased pollution which has had a negative impact on plankton diversity.

Diversity is the variety and variability of life on earth. Diversity is the difference in characteristics between communities. Diversity in living things can occur due to differences in texture, color, size, number and shape, which are biological characteristics to express the structure of the community. Biodiversity is the diversity of living things which includes the entirety or totality of genetic variations, species and ecosystems in an area. (Muhammad Abdul, 2022).

Plankton diversity is also influenced by environmental factors, such as temperature, humidity, water salinity and water depth. It is known that the salinity in the waters is 35, the water temperature is 26.5, the light depth is 11.3 m, the pH of the water is 8.16. All of these physical factors greatly influence the lives of the organisms that live in them and also the diversity of organisms that exist in these waters (Yetti, 2020). This research aims to determine plankton diversity in the Lampageu Ujong Pancu

area, Aceh Besar District, which is divided into station 1, station 2, station 3, station 4, and station 5.

B. RESEARCH METHODS

This research was carried out in June 2023. The research was conducted in the village Lampageu Ujong Pancu, Peukan Bada District, Aceh Besar Regency with 5 research location stations. Plankton diversity research using 5 stations was carried out to obtain representative and comprehensive data regarding the distribution and variation of plankton in an area. The reasons for this research involving 5 stations include environmental variations, plankton distribution, data accuracy, data comparison and analysis. Sample analysis was carried out at the Biology Education Study Program Laboratory, Ar-Raniry State Islamic University, Banda Aceh. The location of the research station in Lampagee Ujong Pancu can be seen in Figure 1..



Picture 1. Research Location Area

The tools and materials used in this research are presented in Tabel 1.

Table 1. Alat dan Bahan yang Digunakan dalam Penelitian

No	Tool Name	Function
1.	Bucket	To take sea water
2.	Sample bottle	To enter a samples
3.	Lugol	To preserve samples
4.	Microscope	To see plankton

5.	Plankton Net	To filter plankton
6.	Aquadest	To tool calibration
7.	pH meter	To measure the pH of water
8.	Identification book	To identify plankton
9.	Dropper pipette	To take samples in sample bottles
10.	Camera	To photograph plankton under a microscope
11.	Meter	To measure the sampling distance

This research was conducted using the method *Purposive Sampling*, namely the selection of sampling locations is carried out based on certain objectives. The number of sample points to be taken at this research location is 5 stations. The parameters observed include biological, physical and chemical parameters. Biological parameters consist of the number of species and the number of individuals of each type, physical parameters consist of temperature and depth of light, and chemical parameters consist of pH.

Calculation of the composition of plankton species was carried out by observing the samples under a microscope, then calculating the number of plankton obtained from 5 research location points. The observed plankton will be identified for each species. Then it is entered into the data tabulation. The diversity index calculation uses the Shannon-Winner (1998) formula as follows:

$$(H') = -\sum P_i \ln P_i$$

Information:

H' = Diversity indeks

P_i = n_i/N, the ratio between the number of individuals of the i-th spesies

n_i = The number of individuals of the i-th spesies

N = total number of individuals (Odum, 1993)

By criteria:

H' < 1 = Low diversity

1 < H' < 3 = Medium diversity

H' > 3 = High diversity

C. RESULT AND DISCUSSION

The results of research on plankton diversity in the Lampagee Ujong Pancu area, Aceh Besar regency can be seen in Tabel 2.

Tabel 2. Species Found During Observations Acrosss Stations

Station	Class	Family	Genus	Species	Individual
I	Bacillariophyceae	Diatomaceae	<i>Synedra</i>	<i>Synedra ulna</i>	1
	Chlorophyceae	Scenedesmaceae	<i>Actinastrum</i>	<i>Actinastrum</i>	21
				<i>hantzschii</i>	
Bacillariophyceae	Naviculaceae	<i>Navicula</i>	<i>Navicula</i> sp.	1	
II	Bacillariophyceae	Aulacoseiraceae	<i>Aulacoseira</i>	<i>Aulacoseira</i> sp.	1
	Bacillariophyceae	Surirellaceae	<i>Cymatopleura</i>	<i>Cymatopleura</i> sp.	1
	Bacillariophyceae	Aulacoseiraceae	<i>Aulacoseira</i>	<i>Aulacoseira</i> sp.	1
III	Bacillariophyceae	Eunotiaceae	<i>Eunotia</i>	<i>Eunotia gracile</i>	1
	Bacillariophyceae	Surirellaceae	<i>Cymatopleura</i>	<i>Cymatopleura</i> sp.	1
	Bacillariophyceae	Skeletonemaceae	<i>Skeletonema</i>	<i>Skeletonema</i> sp.	1
IV	Euglenaidea	Euglenaceae	<i>Euglena</i>	<i>Euglena</i> sp.	1
V	Bacillariophyceae	Diatomaceae	<i>Synedra</i>	<i>Synedra ulna</i>	1
	Euglenaidea	Euglenaceae	<i>Euglena</i>	<i>Euglena</i> sp.	1
Total					32

Based on Table. 1 It can be seen that the total number of plankton in the Lampageu Ujong Pancu area, Aceh Besar Regency is 32 individuals. The plankton species that dominate the area come from the Bacillariophyceae class which consists of 6 species, then 1 species from the Chlorophyceae class, and 1 species from Euglenaidea. The greatest diversity of plankton is found at stations I, II, and III, namely 3 species each at each station. This is followed by station V with 2 species of plankton, and the least at station IV is 1 species.

The number of classes at station I was found to be 2 classes (Bacillariophyceae and Chlorophyceae) with 3 types of species, including *Synedra ulna* with the number of 1 individual, *Actinastrum hantzschii* with a total of 21 individuals, and *Navicula* sp. with the number of 1 individual. The Chlorophyceae class has chlorophyll which plays a role in

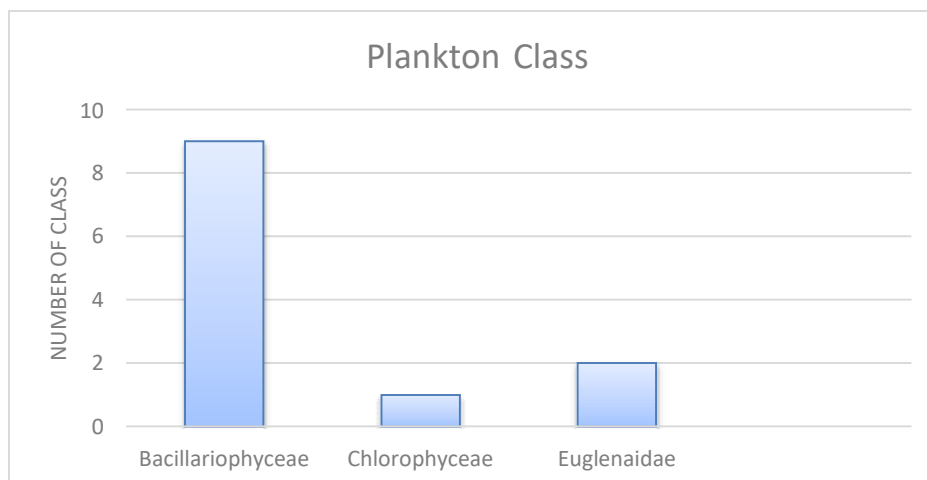
photosynthesis which produces organic material and dissolved oxygen which is used as a basic link in the food cycle in waters (Sastrawijaya, 2009). This is a factor in the number of species found *Actinastrum hantzschii* at station I.

Station II found 1 class (Bacillariophyceae) with 2 types of species, namely *Aulacoseira* sp. with a total of 2 individuals and *Cymatopleurasp.* with the number of 1 individual. Station III found 1 class (Bacillariophyceae) with 3 types of species, namely *Eunotia gracile*, *Cymatopleurasp.* *Skeletonemasp.* with 1 individual type each. Station IV found 1 class (Euglenaidea) with 1 type of species, namely *Euglenasp.* Station V found 2 classes (Bacillariophyceae and Euglenaidea) and 2 species, namely *Synedra ulna* and *Euglenasp.* 1 individual type each.

The highest abundance of Bacillariophyceae classes was at stations II and III with 3 classes each, while the lowest abundance was found at station I with 2 classes, and at station V 1 class was found. The low abundance of the Bacillariophyceae class at station V is because the location is further from land so it is thought to receive little supply of nutrients for the growth of Bacillariophyceae (Audah, 2021).

The species most commonly found in the Chlorophyceae class are *Actinastrum hantzschii* with a total number of 21 individuals. The least common plankton species found are, *Synedra ulna* (Bacillariophyceae), *Naviculasp.* (Bacillariophyceae), *Aulacoseira* sp. (Bacillariophyceae), *Cymatopleurasp.* (Bacillariophyceae), *Eunotia gracile* (Bacillariophyceae), *Skeletonemasp.* (Bacillariophyceae), and *Euglenasp.* (Euglenidae), each with 1 individual and only at certain stations.

Based on the data above, the comparison of the number of individuals in each class of plankton in the Lampagee Ujong Panca area, Aceh Besar Regency can be seen in Diagram 1.



The types of plankton found were 3 classes consisting of Bacillariophyceae with a total of 9 species, Chlorophyceae 1 species, and Euglenoidae 2 species. Apart from that, the observation results also found that the number of phytoplankton dominated almost all observation stations. This is because in general the existence of phytoplankton as primary producers in waters (Mahmudin, 2022).

The level of plankton diversity index in the Lampagee Ujong Pancu area, Aceh Besar Regency can be seen in Tabel 3.

No	Species	Σ	Pi	Pi Ln	Pi Ln Pi
1.	<i>Synedra ulna</i>	2	0.0625	-2.7725887	-0.173286795
2.	<i>Actinastrum hantzschii</i>	21	0.65625	-0.4212135	-0.276421336
3.	<i>Aulacoseira</i> sp.	2	0.0625	-2.7725887	-0.173286795
4.	<i>Cymatopleura</i> sp.	2	0.0625	-2.7725887	-0.173286795
5.	<i>Eunotia gracile</i>	1	0.03125	-3.4657359	-0.108304247
6.	<i>Euglena</i> sp.	2	0.0625	-2.7725887	-0.173286795
7.	<i>Skeletonema</i> sp.	1	0.03125	-3.4657359	-0.108304247
8.	<i>Navicula</i> sp.	1	0.03125	-3.4657359	-0.108304247
Total		32			1.294481258

Results of research conducted in the Lampagee Ujong Pancu Area, Aceh Regency There are many different types of plankton diversity found in this area. The number of species found was 8 species. The most commonly found species are *Actinastrum hantzschii*. The total number of plankton after identification was 8 species with a diversity

index result of 1,294. This shows that the level of plankton diversity in the Lampagee Ujong Pancu area, Aceh Besar Regency is moderate.

A diversity index value of $1 \leq H \leq 3$ indicates moderate diversity (Heip, 1998). The diversity index in the plankton community around Sire Beach, North Lombok Regency shows the level of diversity, and diversity is at a moderate/stable level (Astriana, 2021). The values obtained indicate that the distribution of plankton types at each station is even. This index looks at how similar the distribution of the number of individuals is at the community level (Odum, 1993). A uniformity index that is close to 1 indicates uniformity between species is relatively even, while close to 0, uniformity between species is relatively low. Plankton diversity is influenced by Bio- Physical-Chemical factors, it is known that the salinity in the waters is 34, the water temperature is 28.5, the light depth is 10.6 m, the water pH is 8.1.

D. CONCLUSION

Level of plankton diversity in the Lampagee Ujong Pancu Area, Aceh Regency Large is medium with a diversity index of 1,294 and a total of 8 species. The most numerous species were found from the Basillaophyceae family. It is known that the Bio-Physical-Chemical factor of salinity in the waters is 34, the water temperature is 28.5, the light depth is 10.6m, and the water pH is 8.1.

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