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# ZOOPLANKTON COMMUNITY STRUCTURE IN THE RAINY SEASON AS A BIOINDICATOR OF WATER QUALITY IN NAMBERAN LAKE GUNUNGKIDUL DISTRICT

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**ABSTRACT**

This research aims to determine–(1) The structure of the zooplankton community in Telaga Namberan, Gunungkidul Regency, (2) The chemical and physical conditions of the waters in Telaga Namberan, Gunungkidul Regency, (3) The relationship between the structure of the zooplankton community and water quality in Telaga Namberan, Regency Gunungkidul. This research is exploratory research with observational research methods. Sampling was carried out at six stations two times with three repetitions. The research results show that the abundance value is 16216.56 - 877388.54 ind/L, which is classified as water with high nutrient levels. The average dominance value of 0.495 means that the community structure is stable. The average diversity value is 1.098, meaning that the number of individuals of each species is relatively evenly distributed with stable water conditions. The average evenness value is 0.501, meaning it has even species, and the community is relatively stable. Frequency of attendance *Cyclops*sp., Nauplius sp., and Notholca sp always appear at all stations because they can adapt and fit to the environment.

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## 1. INTRODUCTION

Plankton community structure is a collection of plankton populations consisting of phytoplankton and zooplankton in a particular habitat that interact with each other in a certain stratification (Odum, 1998). The plankton community is the basis for the formation of a food chain. Therefore, plankton is important in an ecosystem (Yazwar, 2008). Zooplankton is important in aquatic food webs by utilizing phytoplankton (Sumeini 2012). Zooplankton itself can be used as a bioindicator of water quality.

Bioindicators are ecological indicators, a group of living organisms vulnerable to environmental changes caused by human activities and natural damage (Sumenge, 2008). Zooplankton is a natural food source for fish larvae and can deliver food to higher trophic levels. So, the water quality, whether good or bad, can be determined by calculating the structure of the existing

Zooplankton community. This is important because of the role of Namberan Lake itself as a source of water for the surrounding community.

Gunungkidul is characterized by limestone hills known as karst areas. Karst areas are characterized by the lack of surface rivers and the development of subsurface river channels. Surface hydrology, in this case, is the water potential of rivers and lakes in Gunungkidul. The difference in water volume in the dry and rainy seasons will affect the biotic and abiotic components in the lake due to the dilution of water in the lake. The rainy season was chosen. We wanted to know whether the increasing water volume affected the ecosystem in the waters of Namberan Lake because, during the rainy season, people often use the lake for fishing and bathing. In particular, fishing activities carried out by residents there are very frequent, especially during the rainy season and the condition of the waters in the lake will affect the quality of the fish they get.

Based on this discussion can be seen how vital Namberan Lake is for the community around the lake, so research needs to be carried out to find out how abiotic factors influence the rainy season on the structure of the zooplankton community in the lake and also on the water quality in Namberan Lake itself. Apart from that, it is also necessary to know the impact of the activities of residents there on water quality and also the structure of the plankton community there. This is important so that the quality of the water there is guaranteed so that the local people who use the water there can also be assured of their health.

## 2. RESEARCH METHODS

### 2.1 Research Population and Sample

This study's population is a zooplankton community that lives in the waters of Namberan Lake, Gunungkidul Regency. The samples for this study were zooplankton filtered by plankton nets at each station.

### 2.2 Time and Place of Research

This research was carried out in January - April 2021 with the following details: Lake survey, field activities, laboratory activities, and identification activities. This research was conducted in Telaga Namberan, Paliyan District, Gunungkidul Regency, and measurements of physico-chemical parameters were carried out at BBTKLPP (Center for Environmental Health Technology and Disease Control) and identification was carried out at the FMIPA UNY Karangmalang Laboratory, CT, Depok, Sleman, Yogyakarta.

### 2.3 Data Collection Techniques and Instruments

The tools used were a 0.5 ml dropper pipette, float, bamboo, cell phone camera, plankton net, bottle, 50 ml flacon, ice box, tissue, thermometer, microscope, plankton identification book, raffia rope, tape measure, glass bottle, 2.5 jerry can L, weight, object glass, cover glass, ruler, stationery, lux meter. The materials used were water samples, glycerin, 70% alcohol, and ice cubes.

### 2.4Research procedure

#### 2.4.1 Determination of Sampling Points

Sampling was conducted at 6 stations: Station 1 is a rice field area, big trees shade Station 2, Station 3 is used for fishing, Station 4 is used for washing, Station 6 is used for bathing, and Station 6 is a midlet area. Sampling was carried out 2 times with 3 repetitions at each station (Picture 1).


**Figure 1.** Location of Water Sampling: Boundary of the area that is submerged in lake water during the rainy season

### 2.4.2 Measurement of Physical & Chemical Conditions of Water

Light intensity was measured using a lux meter by opening the cover at the top of the lux meter and then directing the lux meter towards sunlight. Water temperature measurements were carried out using a thermometer dipped in water, then wait for approximately ± 2 minutes, then observe the indicator on the thermometer. Measurements of turbidity, pH, DO, COD, BOD, nitrate, phosphate, and detergent were carried out at the Center for Environmental Engineering and Disease Control by bringing water samples, which are placed in glass bottles and jerry cans and then taken to BBTKLPP (Center for Environmental Health Technology and Control disease) for analysis.

### 2.4.3 Zooplankton Sampling

Sampling was carried out using a plankton net that was lowered to the bottom at the station and then pulled back. The filtered water was put into a flacon bottle and then dripped with glycerin and alcohol in a 1:1 ratio. The flacon bottle was placed in an ice box and taken to the laboratory for identification.

### 2.4.4 Zooplankton Observations

The sample was first shaken gently in a flacon bottle to be homogeneous. The sample is taken with a dropper, and then the sample water is on an object glass and observed with a microscope. Observations were made evenly over the object's glass area by changing the field of view. Photos of zooplankton were taken, and their characteristics and numbers were noted.

### 2.4.5 Data Analysis Technique

The data analysis technique uses descriptive analysis techniques by analyzing the structure of the zooplankton community, which is determined based on the criteria requirements contained in the calculation index and then connected to the physicochemical factors so that it can then be concluded what the existing water quality is. An in-depth analysis was carried out using density, domination (Simpson 1949 in Odum, 1998), diversity (Shanon-Wiener), evenness (Lloyd and Ghelardi 1964 in Odum, 1998), and attendance frequency analyses.

## 3. RESULTS AND DISCUSSION

### 3.1 General Description of Namberan Lake

Namberan Lake, which is located in Karangasem Paliyan hamlet, is one of the 252 lakes in Gunungkidul (bappeda.gunungkidulkab.go.id). In the eastern part, it is surrounded by very large banyan trees, and in the southern part, it is a teak forest; this lake is used to meet the water needs of the Trowono residents. In terms of layout and location, this lake is not far from Southern Java Cross Route, which is one of the main routes to the south coast tourist area. Namberan Lake is also not far from Wonosari city center and is an artificial lake with an area of 600 m2.

### 3.2 Community Structure

#### 3.2.1 Zooplankton Abundance

Based on the zooplankton abundance data that has been obtained, it is known that zooplankton abundance ranges between 16216.56 - 877388.54 ind/L, and the highest abundance is at station 6 with a total of 877388.54 ind/L, and the lowest abundance is at station 2 with a total of 16216.56. and/L. If we look at the abundance of phyla, the phylum Arthropoda has the highest abundance, namely 1068220.54 ind/L. The Arthropoda phylum dominates the existing waters because arthropods can adapt well to the aquatic environment in Namberan Lake (Figure 2).

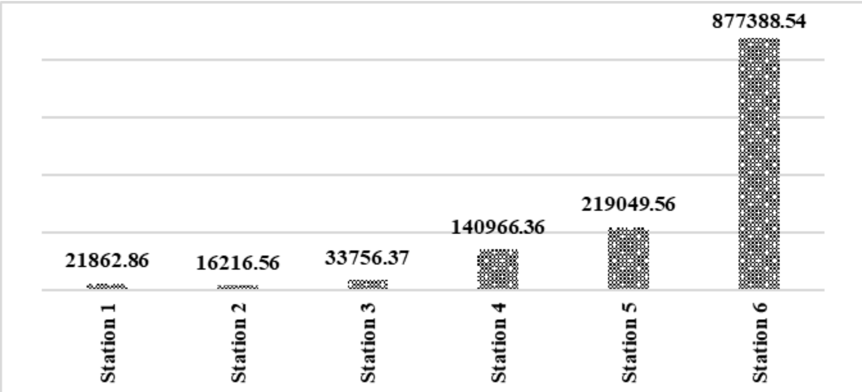


**Figure 2.** Zooplankton abundance

Physico-chemical parameters also influence the growth and development of zooplankton at station 6. At station 6 is a midlet area that is not directly impacted by community activities around the lake and is not shaded by trees or vegetation. Another influencing factor is the food factor; if the food for the zooplankton itself is sufficient and available at station 6, then this will support the growth of the zooplankton. The fertility of Lake Namberan waters, according to GoldmanAndHorne (1994) in Suryanto and Umi (2009), are classified as eutrophic waters because, based on the zooplankton abundance of more than 500 ind/L, this is proven by the lowest abundance at station 2, namely 16216.56 and/L. Eutrophic waters are waters with high nutrient levels (Effendi, 2003).

#### 3.2.2 Zooplankton Domination

Based on the zooplankton dominance data that has been obtained, it is known that the highest dominance is at station 1 with a value of 0.677, and the lowest dominance is at station 4 with a value of 0.416. Dominance ranges between 0.416 - 0.677, with an average value of 0.495, and based on the categories contained in Odum (1998), the average value indicates that no genus dominates in the community because a dominance number that is close to 0 means no genus dominates whereas a dominance number close to 1 means that a genus dominates (Figure 3).

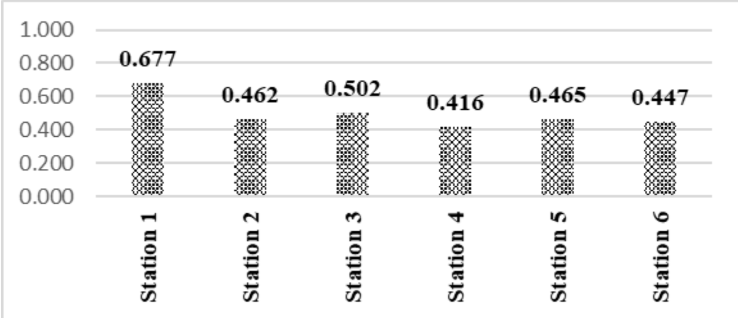

Figure 3. Zooplankton domination

This shows that the community structure in Telaga Namberan is stable. At station 1, it is almost close to number 1 because a species dominates, namely Notholca sp 1. If a species dominates at a station or zone, then that species can adapt and tolerate existing environmental conditions and other organisms.

### 3.2.3 Zooplankton Diversity

Station 6 had the highest diversity, with a value of 1.268, and station 1 had the lowest, with a value of 0.682. According to the species diversity index, diversity ranged between 0.682 and 1.268, with an average value of 1.098 at stations 2, 3, 4, 5, and 6, classified as medium, and at station 1, classified as low (Figure 4).

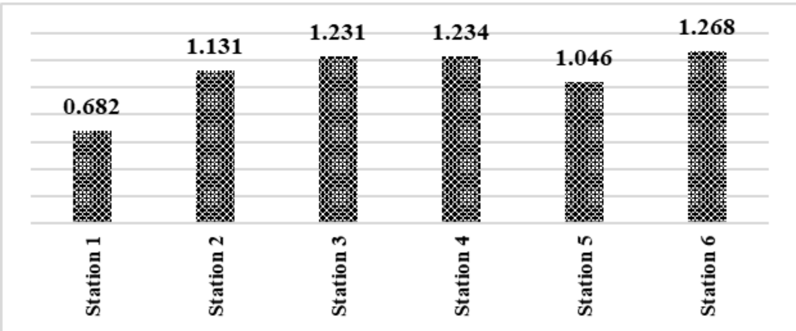

**Figure 4.** Zooplankton Diversity

At station 1, the species diversity is the smallest because its dominance value is the highest among the other 5 stations. These two indices are interrelated; they are inversely proportional to each other, where if the dominance index for station 1 is high, the diversity index will be low. The moderate diversity of zooplankton in Namberan Lake shows many species with a relatively even number of individuals, and each species has fairly stable water conditions.

### 3.2.4 Zooplankton Evenness

Based on the zooplankton evenness data obtained, it is known that station 2 has the highest evenness, with a value of 0.631, and station 1 has the lowest, with a value of 0.380. According to the species evenness index criteria, evenness ranges between 0.380 and 0.631, with an average value of 0.501 at station 2, which is classified as high; stations 3, 4, 5, and 6 are classified as medium; and station 1 is classified as low (Figure 5).

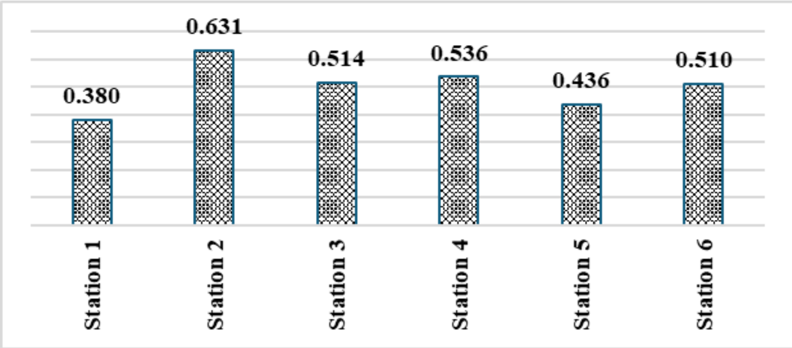


**Figure 5.** Zooplankton evenness

In general, the communities in Telaga Namberan are evenly distributed and relatively stable. At station 1, the species evenness is the smallest because the dominance value is the highest among the other 5 stations, the same as in the diversity index. After all, the evenness value is directly proportional to the species diversity value. If the number obtained is in the high category or close to 1, then the community in the waters is relatively even and stable.

### 3.2.5 Frequency of Zooplankton Presence

Based on the data that has been obtained, the species *Cyclops* sp., *Nauplius* sp., *Notholca* sp 1 appeared at all stations, and for the species *Brachionus* sp 2, *Notholca* sp 2, *Notholca* sp 3, *Notholca* sp 5, *Dipleuchlanis propatula*, *Dipleuchlanis* sp., *Trichocerca Scipio*, *Philodina roseola*, *Holophrya simplex* respectively – each only appears on 1 station (Table 1).

It is thought that the high presence of these three species is due to their ability to adapt and be suitable for living in the environment. These three species have a fairly high tolerance range for environmental factors, these species can reproduce quickly and have home ranges that are used to find the necessary resources. Then, for the nine species with the lowest frequency of presence, this is probably due to water physicochemical factors or environmental changes. These nine species cannot adapt well, so their frequency of presence is low. Another possibility is that it is unable to compete with other organisms.

### 3.2.6 Physical and Chemical Parameters

#### 3.2.6.1 Light intensity

Based on data from the Luxmeter, light intensity measurement data was obtained from 6 stations with differences in sunlight exposure due to vegetation cover from large trees. The highest light intensity was at station 359,695 lux with a 38,790 - 80,600 lux range. The lowest light intensity was at station 2 at 2,952 lux with a range of 2,134 - 3,770 lux. Wahyuni (2010) states that light intensity can indirectly affect the abundance of zooplankton food, namely phytoplankton because they need light to photosynthesize. Light directly affects the existence and adaptation of zooplankton. In general, zooplankton is dominantly negative phototaxis because, during the day, zooplankton will tend to come down to the surface to avoid active predators (Table 2).

#### 3.2.6.2 Turbidity

The highest turbidity value was found at station 6, ranging between 29.4 - 58.7 NTU with an average of 44.05 NTU, and the lowest was at station 5, ranging from 25.7 - 38.4 NTU with an average of 32.05 NTU. At station 5, people often use it for bathing, and at station 5, there are vegetation or large trees that provide shade so that not as much sunlight enters as at station 6. High turbidity figures greatly influence the zooplankton that live in these waters, influence the measurement of other parameters, and impact local communities who use these waters. According toMakmur (2012), turbidity cause negative effects on water quality, especially DO, BOD levels, and temperature, and have an impact on the diversity of fish species due to a decrease in photosynthesis, plankton, algae, and microphyte populations (Table 2).

The water in Namberan Lake is not good if it is used for consumption because the condition of the water is murky, and because it is murky, it can be said that the water quality is not clean, and this is by PERMENKES NUMBER 492/MENKES/PER/1V/2010, namely turbidity for drinking water quality is a maximum of 5 NTU and PERMENKES NUMBER 416/MENKES/PER/IX/1990 regarding the quality of clean water, the turbidity still meets standards because it does not exceed 25 NTU.

**Table 1.** Frequency of Zooplankton Presence

| No | Species | Frequency of Attendance |
|---|---|---|
| 1 | Cyclops sp. | 100% |
| 2 | Nauplius sp. | 100% |
| 3 | Notholca sp 1 | 100% |
| 4 | Moina sp. | 67% |
| 5 | Notholcas p 6 | 50% |
| 6 | Brachionus calyciflorus | 50% |
| 7 | Brachionus forvicula | 50% |
| 8 | Filinia sp. | 50% |
| 9 | Daphnia sp. | 33% |
| 10 | Notholca sp 4 | 33% |
| 11 | Brachionus sp 1 | 33% |
| 12 | Keratella sp. | 33% |
| 13 | Euchlanis Deflexa | 33% |
| 14 | Trichocerca sp. | 33% |
| 15 | Lecane sverigis | 33% |
| 16 | Brachionussp 2 | 17% |
| 17 | Notholcasp 2 | 17% |
| 18 | Notholcasp 3 | 17% |
| 19 | Notholcasp 5 | 17% |
| 20 | Dipleuchlanis propatula | 17% |
| 21 | Dipleuchlanissp. | 17% |
| 22 | Trichocerca scipio | 17% |
| 23 | Philodina roseola | 17% |
| 24 | Holophrya simplex | 17% |

**Table 2.** Measurements of water physical parameters

| Station | Parameter | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Light Intensity (Lux) | | Turbidity (NTU) | | Depth (cm) | | Water Temperature (°C) | |
| | Range | Average | Range | Average | Range | Average | Range | Average |
| 1 | 32,860 - 79,700 | 56,280 | 35.5 - 40.2 | 37.85 | 43.3 - 46 | 44.65 | 27 - 32 | 29.5 |
| 2 | 2,134 - 3,770 | 2,952 | 33.5 - 41.6 | 37.55 | 63.3 - 64 | 63.65 | 28 - 29 | 28.5 |
| 3 | 38,790 - 80,600 | 59,695 | 30.9 - 49.0 | 39.95 | 71 - 75.2 | 73.1 | 29 - 30 | 29.5 |
| 4 | 13,830 - 40,900 | 27,365 | 29.2 - 44.4 | 36.8 | 168.5 – 191 | 179.75 | 29 - 31 | 30 |
| 5 | 27,370 - 46,200 | 36,785 | 25.7 - 38.4 | 32.05 | 158 - 176.5 | 167.25 | 28 - 31 | 29.5 |
| 6 | 19,660 - 53,000 | 36,330 | 29.4 - 58.7 | 44.05 | 251 - 300 | 275.5 | 28 - 32 | 30 |

### 3.2.6.3 Depth

Station 1 has an average depth of 44.65 cm (ranging from 43.3 – 46 cm), and the highest depth is at station 6, with an average depth of 275.5 cm (ranging from 251 - 300 cm). According to Satino (2010), changes in the physical and chemical factors of waters due to changes in depth will cause different responses from the biota within them. It can be said that zooplankton also influences differences in the depth of a body of water due to changes in the physical and chemical factors (Table 2).

### 3.2.6.4 Temperature

Based on the data that has been obtained, the lowest temperature was obtained at station 2, on average 28.5°C with temperatures ranging between 28–29°C then the highest temperature at station 4, with an average of 30°C with temperatures ranging between 29–31°C and station 6 with an average of 30°C with temperatures ranging between 28–32°C. According to Bolorunduro & Abdullah (1996), various important activities of aquatic biota, such as respiration, food consumption, growth, and reproduction, will be influenced by water temperature, and the zooplankton will also have an effect (Table 2).

### 3.2.6.4 pH

Based on depth, the lowest is at station 2, with a pH of 7.9, and the highest pH is at stations 5 and 6, on average 8.25, which ranges from 8.0 to 8.5. According to Lismining and Hendra (2009), the optimal pH for zooplankton growth ranges from 5.0 - 8.0. The pH of the waters in Namberan Lake is still normal and can still be tolerated for the survival of organisms, especially zooplankton. However, if the pH increases again, zooplankton growth will be disrupted and can even cause death (Table 3).

### 3.2.6.5 DO/ Dissolved Oxygen

Based on the data that has been obtained, the lowest DO was obtained at station 2 on average7.2 mg/L with a DO ranging between 7.0 - 7.4 mg/L; then the highest DO at station 6 with an average of 9.1 mg/L with a DO ranging between 8.2 - 10.0 mg/L. According to Boyd (1979), a DO value of more than 5 mg/l strongly supports the life of aquatic organisms. From the data obtained, the DO value in Namberan Lake is very good because the value is high, more than 5 mg/l. With this, the survival of the existing zooplankton will be very well maintained and good (Table 3).

### 3.2.6.6 COD / Chemical Oxygen Demand

Based on the data, the lowest COD was obtained at station 4 on average15.8 mg/L with COD ranging from 12.1 - 19.5 mg/L, then the highest COD at station 2 with an average of 23.75 mg/L with COD ranging from 21.0 - 26.5 mg/L. According to Kurnaz et al (2016), COD levels higher than 20 mg/L indicate the presence of water pollution or pollution. If it is more than 50 mg/L, it shows higher and stronger toxicity. The COD value in Lake Namberan does not exceed 20 mg/L, so it can be concluded that the level is still safe from pollution or contamination (Table 3).

### 3.2.6.7 BOD / Biological Oxygen Demand

Based on the data, the lowest BOD at station 5 equals 2.4 mg/L, and the highest BOD was at station 2 with an average of 5.2 mg/L with BOD ranging from 3.4 - 7.0 mg/L. According to Sudinno (2015), a high BOD value indicates that a greater amount of organic material is being decomposed using a certain amount of oxygen in the waters, which is thought to indicate organic material pollution. The required BOD value is 20 mg/l. Based on the data, the BOD value of the waters in Namberan Lake does not indicate organic material pollution, so it is good for zooplankton and other organisms (Table 3).

Table 3. Data from measurement results for parameters pH, DO, COD, BOD

| Station | Parameter | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | pH | | DO (mg/L) | | COD (mg/L) | | BOD (mg/L) | |
| | Range | Average | Range | Average | Range | Average | Range | Average |
| **1** | 7.9 - 8.4 | 8.15 | 7.4 - 8.4 | 7.9 | 21.0 - 23.2 | 22.1 | 2.8 - 3.4 | 3.1 |
| **2** | 7.9 | 7.9 | 7.0 - 7.4 | 7.2 | 21.0 - 26.5 | 23.75 | 3.4 - 7.0 | 5.2 |
| **3** | 7.8 - 8.5 | 8.15 | 7.2 - 8.4 | 7.8 | 9.5 - 25.8 | 17.65 | 2.5 - 4.5 | 3.5 |
| **4** | 7.9 - 8.4 | 8.15 | 6.4 - 8.3 | 7.35 | 12.1 - 19.5 | 15.8 | 2.1 - 5.8 | 3.95 |
| **5** | 8.0 - 8.5 | 8.25 | 7.4 - 8.2 | 7.8 | 18.4 - 23.9 | 21.15 | 2,4 | 2,4 |
| **6** | 8.0 - 8.5 | 8.25 | 8.2 - 10.0 | 9.1 | 15.0 - 27.3 | 21.15 | 2.0 - 2.9 | 2.45 |

### 3.2.6.8 Nitrate

Based on the data, a nitrate level of < 0.01 mg/L was found at each station, which means that it is not dangerous for zooplankton in the waters of Namberan Lake. Based on PERMENKES NUMBER 416/MENKES/PER/IX/1990, the maximum level for clean water quality is 10 mg/L. According to Irwan et al. (2017), excess nitrate will accelerate eutrophication and cause increased growth of aquatic plants, thereby affecting dissolved oxygen levels, temperature, and other parameters. Nitrate is an important nutrient for aquatic plants, but excessive levels can cause significant water quality problems (Table 4).

### 3.2.6.9 Phosphate

Based on the data, phosphate was lowest at station 1 with an average0.103 mg/L ranging from 0.080 - 0.126 mg/L, then phosphate highest at station 5 with an average0.5 mg/L with phosphate ranging from 0.257 - 0.743 mg/L. The phosphate value in Namberan Lake was quite high because, according to Ketchum (1969) in Simon (2014), a phosphate value of 2.8 ug.at/l or equivalent to 0.087 mg/L is the upper limit for unpolluted water. This proves that an organic material might pollute the waters, and most likely, the organic material is detergent because station 5 itself is a place for washing clothes, and some sewers or drains come from residential areas (Table 4).

Tungka et al. (2016) stated that one of the factors that can cause high phosphate levels in water is the presence of domestic waste containing detergent. Detergents can increase phosphate levels because phosphate ions are one of the ingredients in detergents. High phosphate content does not directly impact organisms or society, but if consumed continuously, it will be dangerous. Even though it is dangerous, the phosphate content is also an important factor for zooplankton as the energy is transferred from outside to inside the cells. Therefore, phosphate is needed in small amounts (Effendi, 2003).

### 3.2.6.10Detergent

The detergent level was lowest at station 2, with an average of 0.02885 mg/L, ranging from 0.0056 to 0.0521 mg/L. Then, the detergent levels were highest at station 5, with an average of 0.24845 mg/L, ranging from 0.0613 to 0.4356 mg/L. Based on the data that has been obtained, the level of detergent in Telaga Namberan is low. According to PERMENKES NUMBER 416/MENKES/PER/IX/1990, the maximum level for clean water quality is 0.5 mg/L (Table 4).

This proves that the lake's water quality is not polluted by detergent waste. If the detergent level exceeds the quality standard, the supply of dissolved oxygen in the water will be lower, disrupting the zooplankton's life there. Measurable detergent content in Namberan Lake proves that people throw their household waste into the lake because it contains detergent.

Table 4. Data from measurement results for nitrate, phosphate, and detergent parameters

| Station | Parameter | | | | | |
|---|---|---|---|---|---|---|
| | Nitrate (mg/L) | | Phosphate (mg/L) | | Detergent (mg/L) | |
| | Range | Average | Range | Average | Range | Average |
| **1** | < 0.01 | < 0.01 | 0.080 - 0.126 | 0.103 | 0.0460 - 0.1043 | 0.07515 |
| **2** | < 0.01 | < 0.01 | 0.106 - 0.107 | 0.1065 | 0.0056 - 0.0521 | 0.02885 |
| **3** | < 0.01 | < 0.01 | 0.086 - 0.160 | 0.123 | 0.0368 - 0.3528 | 0.1948 |
| **4** | < 0.01 | < 0.01 | 0.126 - 0.127 | 0.1265 | 0.0675 - 0.3620 | 0.21475 |
| **5** | < 0.01 | < 0.01 | 0.257 - 0.743 | 0.5 | 0.0613 - 0.4356 | 0.24845 |
| **6** | < 0.01 | < 0.01 | 0.191 - 0.224 | 0.2075 | 0.0521 - 0.0767 | 0.0644 |

### 3.3 Relationship Between Zooplankton Community Structure and Water Quality

Based on the calculated community structure values indicate waters with high levels of nutrients, the dominance value shows that the community structure is in a stable state, the diversity value shows that there are many species with a relatively even number of individuals of each species with fairly stable water conditions, the evenness value shows that the existing community has even types and the community is relatively stable, the frequency of presence shows that the species that appear frequently can adapt and are suitable for living in waters.

Suppose it is related to the physical and chemical parameters. In that case, it can be said that the waters in Lake Namberan are lightly polluted because the turbidity and phosphate organic matter values obtained are quite high. This affects the calculation of the dominance index at station 1, where the dominance figure is high, causing the species to be less diverse and evenly distributed at station 1.

## 4 CONCLUSION

The zooplankton community structure in Namberan Lake is that the abundance value ranges from 16216.56 to 877388.54 ind/L. The average dominance value is around 0.495, meaning that no genus dominates. The average diversity value is around 1.098, meaning that species diversity is moderate. The average evenness value is around 0.501, meaning that evenness is medium. The highest frequency of attendance is Cyclopssp., Nauplius sp., and Notholca sp. The connection between zooplankton community structure and water quality is the abundance value indicating waters with high levels of nutrients, the dominance value shows that the community structure is in a stable state, the diversity value shows that there are many species with a relatively even number of individuals of each species with fairly stable water conditions, the evenness value shows that the existing community has even types and the community is relatively stable, the frequency of presence shows that the species that appear frequently can adapt and are suitable for living in waters.

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