

GASTROPODE DIVERSITY IN LAKE TONDANO AREA, NORTH SULAWESI, INDONESIA

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Abstract

The diversity of gastropod species is influenced by different substrates, environmental conditions, and human activities, so it is necessary to research the diversity of gastropod species in Lake Tondano. This study aims to obtain data on the diversity of gastropod species that live around Lake Tondano. The study was conducted in May 2022. The collection of research data on the diversity of gastropods in Lake Tondano begins by dividing the research area into five stations. Each station forms a Line transect of about 50 meters x 10 meters. At each line transect, 10 points will be determined in a zigzag manner for observation and sampling. The determination of the sample is carried out by purposive sampling. The gastropod samples will be identified and then documented, and the number will be recorded. Gastropods found around Lake Tondano are Achatinidae (*Achatina fulica*), Station 1: -, Station 2: -, Station 3: 1, Station 4: 1, Station 5: 1. Ampullariidae (*Pila Ampullacea*), Station 1 :173, Station 2 : -, Station 3: 73, Station 4: 117, Station 5: 57. Potamididae (*Tylomeliana toradjarum*), Station 1: 321, Station 2:2, Station 3: 123, Station 4: 3, Station 5 :- Viviparidae (*F. Javanical Filopaludina Javanica*), Station 1: 85, Station 2: 161, Station 3: 335, Station 4: 315, Station 5: 153. Based on these data, the highest index is at point 3, and the density index is at point 1.

Key words: diversity, gastropod, Lake Tondano area.

INTRODUCTION

Lake Tondano is close to Universitas Negeri Manado in North Sulawesi. Lake Tondano is one of the lakes rich in biodiversity and has a very strategic meaning, especially for the people around the lake in Minahasa Regency, the people in the cities of Manado, Bitung, and Tomohon. The surrounding community has used Lake Tondano to obtain various freshwater fishery products, as a source of water for household needs, as a means of transportation, and as a source of water to drive turbines in Hydroelectric Power Plants (PLTA). Lake Tondano is a relatively large area of water, and this area is an area rich in organisms, especially gastropods. The water area of this lake is 4,600 ha, with an average depth of 16 m (Kartamihardja *et al.*, 2017). Various kinds of biota live in Lake Tondano, such as fish, shrimp, worms, mollusks (gastropods and bivalves), and many other biotas found in Lake Tondano.

Gastropods have an essential role in the food chain. In water, gastropods are essential animals

that eat detritus and fallen litter and circulate substances that fall into the water (Putra, 2015). Gastropods are one of the mollusks that make up benthic water communities (Rahmasari *et al.*, 2015; Gundo, 2010). Gastropods are the most successful animals because their presence is considered to be in various places (Nybakken *et al.*, 2006; Titis *et al.*, 2015). The gastropod class is the largest species in the mollusk phylum (Adun Rusyana, 2012). The gastropod class is estimated to be around 140,000 species, and the distribution of these animals in fresh waters and marine waters (Muhammad Mansur. 2011; Rahmasari *et al.*, 2015). The existence of gastropod species is influenced by physical and chemical factors of water from temperature, pH, depth, and salinity (Isdrajad Setyobudiandi. 2010; Supratman *et al.*, 2018; Tatangindatu *et al.*, 2013). Previous research has shown that a lake is a place that supports gastropod life (Gundo, 2010; Kumurur, 2012), as well as Lake Tondano.

Gastropods are generally found in sandy, rocky, and muddy substrates. Besides that, environmental factors such as light, brightness, turbidity, temperature, salinity, and pH also affect their breeding (Supratman *et al.*, 2018). Changes in the structure of the gastropod community can include diversity and abundance (Titis *et al.*, 2015). The diversity of gastropod species is influenced by different substrates, environmental conditions, and human activities, so it is necessary to conduct research that examines the diversity of gastropod species in Lake Tondano. This study aims to obtain data on the diversity of gastropod species that live around Lake Tondano.

MATERIALS AND METHODS

The research was carried out in May 2022. The tools used were species identification books, notebooks, stationery, cellphone cameras, raffia rope, and roller meters. The materials used are gastropods. Collecting research data on gastropod diversity in Lake Tondano begins by dividing the research area into several locations. The sampling location was divided into five stations according to the environmental conditions around Lake Tondano (figure 1). Each station forms a Line transect of about 50 meters x 10 meters. At each line transect, 10 points will be determined in a zig-zag way for observation and sampling. Determination of the sample is carried out by purposive sampling using Ekman grab. The gastropod samples will be identified and then documented, and the number will be recorded. The measurement of environmental parameters in this study includes the measurement of physical parameters (temperature).

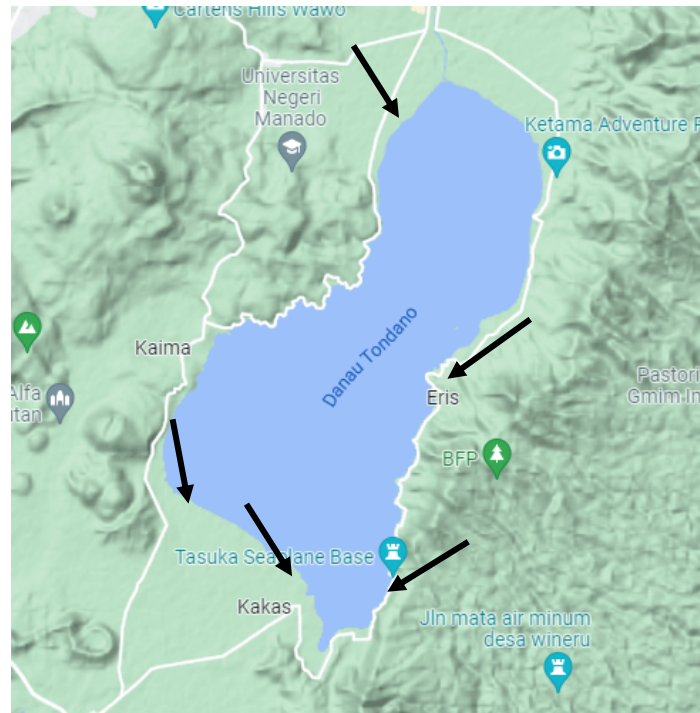


Figure 1. Research Site Map and Sampling

RESULTS AND DISCUSSION

The results of this study indicate that the types of gastropods found in the ecosystem around the edge of Lake Tondano are 2,006 individuals on the line transect. Belonging to 4 families of gastropods have been found in all study sites. From the five research locations, it is known that 569 gastropods inhabit the first point. Meanwhile, at the second point, it is inhabited by 164 gastropods, 531 gastropods inhabit the third point, 438 b gastropods inhabit the fourth point, and finally, the fifth point is inhabited by 211 gastropods. Gastropods can live in various places, from the sea, swamps, rivers, lakes, and forests. They can live in freshwater, brackish water, seawater, and land (Satria *et al.*, 2012; Dharma, 1988).

From the results, it was found that the location of the first sampling was Jl. Unima Tondano Campus occupies the top position with the acquisition of 569 species. Environmental condition factors such as air temperature, soil temperature, litter depth, air humidity, and litter affect the number and composition of terrestrial gastropod species (Kappes *et al.*, 2006; Nunes & Santos, 2012; Heryanto, 2014). Therefore, we cannot deny that Lake Tondano is a place that has suitable habitat for gastropods. However, the results also found that physical parameters such as temperature and environmental conditions affect the results in the field.

Table 1. Diversity of Gastropod Species in the Outskirts of Lake Tondano, North Sulawesi, Indonesia




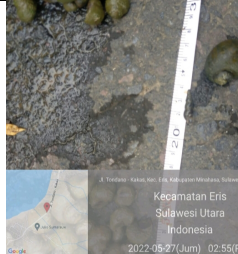
No.	Gastropod Species Name	Species Division
1.	Achatinidae <i>Achatina fulica</i>	Station 1 : - Station 2 : - Station 3 : 1 Station 4 : 1 Station 5 : 1
2.	Ampullariidae <i>Pila ampullacea</i>	Station 1 : 173 Station 2 : - Station 3 : 73 Station 4 : 117 Station 5 : 57
3.	Potamididae <i>Tylomeliana toradjarum</i>	Station 1 : 321 Station 2 : 2 Station 3 : 123 Station 4 : 3 Station 5 : -
4.	Viviparidae <i>Filopaludina javanica</i>	Station 1 : 85 Station 2 : 161 Station 3 : 335 Station 4 : 315 Station 5 : 153

Table 2. Measurement of Physical/Environmental Parameters

Parameters	Observation Station				
	I JI. Unima Tondano	II Desa Ranowangko	III Desa Kaweng	IV Desa Eris	V Desa Kakas
Station Condition	Lumpur Berair	Lumpur Berair	Berair	Berair	Berair
Temperature	25.5°C	25°C	27°C	27.5°C	25°C

Results Temperature measurements carried out in all stations ranged from 25°C to 27.5°C. The results obtained at the existing 5 stations are presented in table 3.

Table 3. Figure of the Diversity of Gastropod Species in the Outskirts of Lake Tondano, North Sulawesi, Indonesia

Achatinidae (<i>Achatina fulica</i>)	Viviparidae (<i>F. Javanica/ Filopaludina Javanica</i>)	Potamididae (<i>Tylomeliana toradjarum</i>)	Ampullariidae (<i>Pila Ampullacea</i>)
			

After analyzing the data, it was found that only 1 station had *Achatina fulica* species, and the other four stations did not. Likewise, *Tylomeliana toradjarum* was only found at Stations 1, 2, 3, and 4. At the same time, the other two species were found in all stations.

Snail (*Achatina fulica*) is a gastropod belonging to the family Achatina. Snails tend to invade an area to become pests, especially in agriculture, because of their general food preferences and can breed quickly in large numbers (Hoffman *et al.*, 2014). Therefore, local farmers who use the land around the lake as rice fields do not want their rice farming business to experience a decrease in production due to gastropods on their agricultural land, so in some rice fields, they provide snail pest control on their agricultural land, this causes a decrease in the number of *Achatina fulica* on their farms. Each transect is few. Many are left with only shells. At the same time, snail slime, the origin of researchers in North Minahasa district and even in many other areas in Indonesia, has been used as traditional medicine such as wound treatment and scar removal. Snails belong to traditional medicine (ethnozoology), which the community has practiced for a long time (Zayadi *et al.*, 2016), so collecting data on gastropod biodiversity around the lake is crucial.

CONCLUSION

Gastropods found around Lake Tondano are Achatinidae (*Achatina fulica*), Station 1 : -, Station 2 : -, Station 3 : 1, Station 4 : 1, Station 5 : 1. Ampullariidae (*Pila Ampullacea*), Station 1 :173, Station 2 : -, Station 3: 73, Station 4: 117, Station 5: 57. Potamididae (*Tylomeliana toradjarum*), Station 1: 321, Station 2:2, Station 3: 123, Station 4: 3, Station 5 :- . Viviparidae (*Filopaludina Javanica*), Station 1: 85, Station 2 : 161, Station 3: 335, Station 4: 315, Station 5 : 153. Based on these data, the highest index is at point 3 and the density index is at point 1.

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