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# IDENTIFICATION OF GASTROPOD SPECIES IN THE WATERS OF MOUDOLUNG, EAST SUMBA REGENCY

## Identifikasi Jenis Siput (Gastropoda) Di Perairan Moudolung, Kabupaten Sumba Timur

Suryaningsih Ndahawali*, Yatris Rambu Tega

Fisheries Product Technology Study Program, Wira Wacana Christian University, Sumba

*Jl. R.Suprapto, No. 35, Prailiu, Sumba Timur,Nusa Tengara Timur, Indonesia*

*Correspondence email: ningsih@unkriswina.ac.id

## ABSTRAK

Zona intertidal merupakan daerah yang memiliki daerah tersepeti karena berbeatasan dengan daratan serta dipengaruhi oleh pasang surut. Jenis biota pada daerah intertidal memiliki kenekaragaman yang tinggi. Terdapat banyak jenis biota seperti ikan, bivallvia, terubu karang, gastroda dan juga terdapat jenis tumbuhan seperti makroalga, lamun dan mangrove. Salah satu biota yang terdapat pada daerah intertidal adalah Gastropoda dari filum molusca memiliki keanekaragaman jenis yang cukup melimpah. Dengan kedaan loakasi seperti substrat berpasir, berlumpur dan berbatu. Perairan Moudong merupakan perairan yang memiliki topgrafi berbatu dan berlumpur, sehingga yang merupakan tempat/habitat jenis gastropoda. Tujuan penelitian ini untuk melihat tingkat keankaragaman jenis gastropoda dan kandungan gizi. Metode yang digunakan adalah metode observasi dan transek garis, dengan 9 stasiun dan 9 plot pada setiap transek. Berdasarkan hasil penelitian jenis gastropoda pada perairan Moudong terdapat 5 jenis gastropoda yaitu Oliva fordi, Telescopium Telescopium, Steromphala umbilicalis, Canarium labiatum, Familia muricidae. Tingkat keanekaragaman jenis gastropoda rendah dengan indeks H'< 2,0, kerana hanya terdapat 1 jenis disetiap stasiun pengambilan sampel. Untuk kandungan gizi ( hasil analisis proksimat) diperoleh kandungan gizi jenis gastropoda yang diperoleh pada perairan Moudolung cukup tinggi, salah satunya kadar Protein pada setiap jenis cukup tinggi.

## ABSTRACT

The intertidal zone is an area that has a narrow area because it borders land and is influenced by tides. The types of biota in tidal areas have high diversity. There are many types of biota such as fish, bivalves, coral reefs, gastroda and there are also types of plants such as macroalgae, seagrass and mangroves. One of the biota found in tidal areas is Gastropods from the phylum mollusca which has quite abundant species diversity. With location conditions such as sandy, muddy and rocky substrates. Moudong waters are waters that have rocky and muddy topography, so they are a place/habitat for gastropod species. The aim of this research was to see the level of diversity of gastropod types and nutritional content. The method used is the observation and line transect method, with 9 stations and 9 plots on each transect. Based on the results of research on the types of

gastropods in Moudong waters, there are 5 types of gastropods, namely Oliva fordi, Telescopium Telescopium, Steromphala umbilicalis, Canarium labiatum, Familia muricidae. The level of diversity of gastropod species is low with an H' index < 2.0, because there is only 1 type at each sampling station. For nutritional content (proximate analysis results), it was found that the nutritional content of the gastropod species obtained in Moudolung waters was quite high, one of which was that the protein content of each type was quite high.

| | |
|---|---|
| **Kata Kunci** | *Gastropoda, Perairan Moudolung, Sumba Timur* |
| **Keywords** | *Gastropoda, Moudolung, North Sumba* |
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## INTRODUCTION

Indonesia as an archipelagic country with a coastline of approximately 81,000 km. while the number of islands is 17,508 islands, shows a great potential for fisheries and marine resources (Kordi, 2010). Fisheries is one of the development sectors that has a fairly strategic role in the national economy, even this sector is one of the important foreign exchange revenue sectors. The fisheries sector as part of national development. The hope to make this sector a supporter in achieving these goals is based on the potential of marine fisheries owned (Khaldun, 2017). The vast Indonesian sea is larger than the land area, it must have great potential, both in terms of the diversity of natural resources and also the environment that is utilized to support local development (Merryanto *et al*., 2017) regional and national.

The Unitary State of the Republic of Indonesia (NKRI) is also a coastal state whose national territory components consist of land, sea (waters) and air space. Two-thirds of the total territory of Indonesia is ocean. Indonesia can also be called an archipelagic state, with evidence of 16,056 islands. Approximately 6 million km2 of Indonesia's territory is sea which greatly affects the climate and weather of the entire region. Viewed from its natural characteristics, Indonesia's marine environment shows an integral nature between the elements of the sea (water) and land (soil).

The Intertidal Zone is the narrowest area and borders the mainland. The intertidal zone is most widely used as a location for recreation and is also an area with a higher level of organism diversity, because it is the shallowest area (Sanur *et al*., 2012). This area affected by the ebb and flow has biota that live attached to the substrate or in the substrate, one of which is Gastropods (Snails). Gastropods are one of the mangrove animals that are used by humans as food because they have a high source of protein. Gastropods are soft-bodied animals and have shells. This animal has a very large function for life, not only for food but also as a bioindicator of mangrove forest damage. Good mangrove conditions have high diversity and number of gastropod individuals, and vice versa (Yoswaty & Dessy., 2016)

Gastropoda is a class of molluscs that has a diversity of more than 75,000 species (Desy *et al*., 2022). Gastropod habitats are very diverse and live on several types of substrates, including in mangrove ecosystems (Slamet *et al*., 2021). Several types of gastropods are reported to have high nutritional content, such as carbohydrates, protein, fatty acids, and vitamins. In addition, gastropods also contain essential minerals. Previous research, the Cassidula type has a protein content (57.02%), fat (1.73%), and macrominerals such as Na, K, Mg, Ca, and P (Erfina *et al*., 2022) In addition, the Lambis and

Monetaria types are also reported to have high protein content, low fat, and contain minerals.

The abundance of Gastropod species in a body of water is in accordance with the location conditions, and water nutrients including water quality, substrate conditions and must. Maudong waters are one of the waters located in East Sumba Regency, East Nusa Tenggara province, have a coral topography and are a mangrove area. The quality of the waters, substrate and water currents in this area are in accordance with the habitat of the Gastropod species. In Modolung waters, research on the type of Gastropod has never been conducted as one of the providers of raw materials for making processed fisheries and fish feed in cultivation, so it is necessary to conduct research on the identification of types and see the nutritional content of Gastropods. To be used as raw materials in fishery product technology.

## METHODS

This study uses an observation method, namely the method of seeing by This study will be conducted in the intertidal zone of the Modolung waters, Kanatang District. The observation method used in this study is to see the habitat area, water depth and to conduct documentation and continued with a literature study to see the diversity of gastropod species. The study used a line transect of 9 stations with a distance between stations of approximately 100 meters, each station consists of three transects, the line transect is drawn perpendicular to the coastline based on the intertidal zone, namely in the highest tide zone (upper zone), mangrove forest zone and the lowest ebb zone (lower zone). In each transect there are three sampling points or total plots, in one station there are 9 plots with a size of 1x1 m2. The distance between transect lines is 50 meters. The following is a chart of research stations in Figure 1.

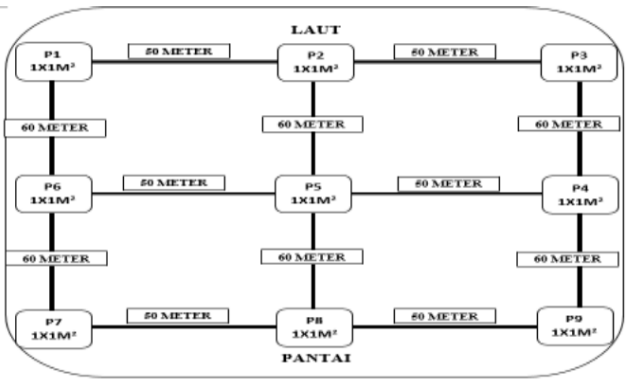


Figure 1. Research Transect Design

Testing Parameters

1) Diversity Index

Bivalve diversity is calculated using the diversity index from (Shannon Wiener, 1963) in (Fachrul, 2012). Researchers often use the Shannon-Wiener formula (H') using Log 10. With the following formula:

$$H' = \sum_{i=1}^{s} Pi\ Ln\ Pi$$

2) Chemical Content Analysis (Proximate)

a. Water content (Sudarmaji *et al*,1997)

Determination of water content contained in the material using the descriptive method (AOAC, 1995). First, the perselin cup is dried using an oven at a temperature of

1050C for 30 minutes then cooled in a desiccator then weighed with a weight of 5 grams of the sample that has been ground, weighed and put in a cup then heated in an oven at a temperature of 1050C for 3-5 hours. then cooled again in a desiccator and weighed. This treatment is repeated until a constant weight is achieved (the difference in consecutive weighing is less than 0.02 mg). The water content can be calculated using the formula:

$$\text{Water content \%} = (B-C)/(B-A)x100\%$$

Information:

A : The weight of the empty cup is expressed in grams

B : The weight of the cup + initial sample is expressed in grams

C : The weight of the cup + dry sample is expressed in grams

b. Ash content (Sudarmadji *et al*., 1997)

Ash content indicates the amount of minerals contained in a material. The material is weighed as much as 3 grams and then put into a cup whose weight has been known. Then put in a muffle with a temperature of 4 hours. And the sample will be dried at a temperature of 600 C for 24 hours and weighed until constant (d grams). Ash content is calculated by the formula:

$$\text{Ash content \%} = C/(B-A)\ x100\%$$

Information:

A : The weight of the empty cup is expressed in grams

B : The weight of the cup + initial sample is expressed in grams

C : The weight of the cup + dry sample is expressed in grams

c. Protein content (Sudarmadji *et al*.,1997)

A total of 10 grams of material is diluted in a 100 ml measuring flask to the mark. Then 10 ml of solution is taken and put into a 500 ml Kjedahl flask and 10 ml of concentrated sulfate is added. The sample is then boiled until clear. After cooling, the flask wall is washed with distilled water and boiled again for 30 minutes. After adding 140 ml of 30% NaOH and 3 ml of boric acid solution, distillation is carried out. The distillate is collected as much as 100 ml in an Erlenmeyer flask containing 25 ml of boric acid and a few drops of crude metal indicator. The results of the collection are then titrated with 0.02 N HCI until the color changes to gray. Protein content can be calculated using the formula:

$$\text{Protein \%} = (VA-)(HCIxNHCIx14{,}007x6{,}25x100\%)/Wx1000$$

Information:

VA : ml HCI for sample titration

VB : ml HCI for blank titration

N : normality of the standard HCL used

14,007 : Weight of Nitrogen Atom

6,25 : Worm protein conversion factor

W : Sample weight in grams

d. Fat Content (Sudarmaji *et al.*,1997)

The filter paper used was ovened at 600c for 1 hour and put into a desiccator for 30 minutes then weighed (A grams). The sample was weighed as much as 5 grams directly on the filter paper (B grams). The material and filter paper were ovened at 600C for 24 hours and weighed (C grams). Then extracted with Soxhlet with sufficient petroleum benzene solvent for 24 hours. Then the sample was dried at 600C for 24 hours and weighed until constant (D grams). The fat content was calculated using the formula:

$$\text{Fat total } \% = (C - Ax100\%)/B$$

Information:

A : The weight of an empty round bottom flask is expressed in grams

B : Sample weight is expressed in grams

C : Weight of round bottom flask in extracted fat in grams

e. Carbohydrate (Apriantono,1988)

Carbohydrate content can be calculated using the formula:

$$\text{Carbohydrate content (\% KH)} = 100\% - (A + B + C + D + E)$$

Information:

A =Water content,

B = Ash content,

C = Protein content,

D = Carbohydrate content,

E = Fat content.

3) Water Quality

pH (Degree of Acidity)

pH (Acidity Degree) is the concentration of hydrogen ions released in a liquid and is an indicator of the good or bad of waters. According to the research results of Megawati et al., (2014) the pH value has a great influence on biota in waters and high pH values will affect the primary productivity of phytoplankton for the availability of nutrients in the sea.

Temperature

Sea water temperature is an important parameter that can be done in the life of various marine organisms because it can affect the metabolism and reproduction of these organisms (Karif, 2015). In line with the research of Arief et al., (2015) that the temperature of the heat energy content is related to physical quantities where the higher the heat energy, the temperature will also increase and can indicate the phenomenon of climate change.

DO (Dissolved Oxygen)

According to Rahmawati *et al*., (2017), dissolved oxygen is the amount of mg/l of oxygen gas dissolved in water. Dissolved oxygen in water can come from two processes, namely from photosynthesis activities carried out by phytoplankton or other aquatic plants and from diffusion or dissolution from the air. Temperature and salinity or Cl- levels are factors that affect the level of oxygen solubility in the sea. Where the higher the

water temperature and salinity of the water, the lower the level of oxygen solubility in water.

## RESULT AND DISCUSSION

### 1. Diversity of Gastropod Species

Based on the results of observations of gastropod species in the waters of Modolung, Kanatang District, East Sumba Regency, it has a low level of diversity or H' > 1.0. The level of diversity of gastropod species can be seen in table 1.

Table 1. Level of diversity of gastropod species

| Observation Location | Diversity Index (H') |
|---|---|
| Station 1 | 1,25 |
| Station 2 | 1,35 |
| Station 3 | 1,05 |
| Station 4 | 1,80 |
| Station 5 | 1,30 |
| Station 6 | 1,35 |
| Station 7 | 1,35 |
| Station 8 | 1,59 |
| Station 9 | 1,00 |

The low diversity index of gastropod species at 9 stations in Moudong waters was caused by climate and gastropod seasons, this was caused by the condition of the location where the substrate was rocky, and the types of gastropods that live in waters that are more attached to rocks (Karyanto & Indrowati, 2004). In addition to this, Paparang, (2013) also stated that the high and low diversity in an area can be influenced by the type and level of activity carried out in the area. The higher the activity carried out in an area, especially in the type of resource exploration activity, by taking biota as objects of utilization, if not regulated and limited, it can cause a decrease in the value of diversity.

### 2. Types of Gastropods

Based on the results of observations of the types of Gastropods in the Modolung Waters, there are 5 types of sea snails identified. In the Modolung waters, it is dominated by one type of gastropod. The number of types of Gastropods identified is related to water conditions such as the form of the water substrate, seasonality, water quality and nutrients (Slamet *et al*., 2021) (Magdalena *et al*., 2019).

The types of Gastropods identified according to the transect method, where there are 3 stations, one station consists of 3 transects and 3 plots. The identification results can be seen in table 2.

Table 2. Types of Gastropods in the research transect

| No | Spesies | Transect | | | | | | | | | Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VII | IX | |
| 1 | *Oliva fordi* | 1 | 0 | | 2 | 1 | 0 | 0 | 1 | 2 | 7 |
| | *Telescopium* | 2 | 2 | 1 | | | | | | | |
| 2 | *telescopium* | 5 | 0 | 5 | 15 | 15 | 10 | 20 | 15 | 25 | 160 |
| | *Steromphala* | | | | | | | | | | |
| 3 | *umbilicalis* | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| 4 | *Familia muricidae* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5 | *Canarium labiatum* | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 4 |

**3. Identification of Gastropod Types**

**1. *Oliva fordi***

The Oliva fordi species, based on observations found on the surface of the coast, has an oval shape, black, yellowish white, gray with a little white on the inner round part of the shell. The surface of the shell is smooth, the tip is slightly pointed. It has a length of ± 3.6 cm, so it is included in the medium shell size. In addition to the shapes mentioned, it also has other varied shapes (Sitompul, 2020). The Oliva tigridella group has a shell that is about 2-3.5 cm long. The shell is also thick, shiny, and heavy. The shell is shaped like a cylindrical bullet, at the end it is shaped like a high cone. The patterns on the shell vary, to some that are plain to dark in color. The animal does not have an operculum. It is usually also called a digger snail that often comes out or is seen at night and at high tide. (Ginting *et al*., 2017).

Figure. *Oliva fordi*

**2. *Telescopium telescopium***

Has a shell length ranging from 10-14 with an elongated shell shape. This species has a blackish shell color with a slightly tapered apex and a rather wide chiffon curve. The surface of this species' shell is rough and grooved vertically (Salamanu, 2017)

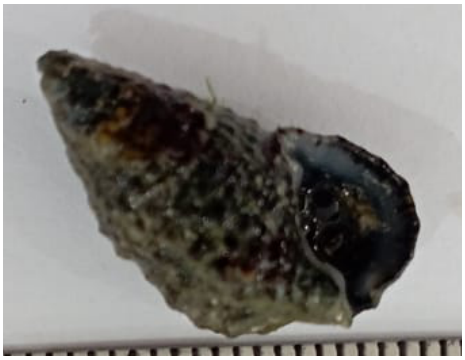

Figure 3. *Telescopium telescopium*

***3. Familia murcidae***

One of the types of Family Neritidae found in this study is Nerita sp. This species has a round shell with an average length and width of 6.8 cm and 3.4 cm. The surface of the shell is smooth. It has two colors, brownish black and greenish black. It has a paucispiral operculum type. This species is found on rocky substrates (Gea *et al*., 2020).

Figure 4. *Nerita* sp.

***4. Steromphala umbilicalis***

Has a thick and dense shell, with a relatively large body whorl and variable shape. The periostracum is mostly thin and velvety. The operculum is thick. Habitat in tropical, subtropical areas, in shallow waters, sandy, muddy or seabed debris. Has a length of between 2 - 4 cm with a short shell shape and has a dominant white and black color. This species has a pointed apex with a rather wide siphon curve and a rough, bumpy shell surface (Desy *et al*., 2022)

Figure 5. *Steromphala umbilicalis*

C. **Water Quality**

Based on the type of gastropods with a relatively small level of species, it can be caused by the condition of the substrate water environment. The Modung waters substrate is coral and is a Mangrove area, so the types of gastropods that live in this area are types that can attach and live in rocky areas (Budiawan & Ardiyansyah, 2020). The existence of gastropods is not only influenced by the condition of the waters, topography and substrate, but is influenced by water quality such as temperature, pH and oxygen. Observations of water quality in this study showed that the average temperature at each station ranged from 26-29 0C, pH ranged from 7.0-7.5, Dissolved oxygen ranged from 3.2 Mg/L.

For the water quality obtained at station 1, station 2 and station 3 have the same range, this is caused by the climate in East Sumba Regency which has extreme temperatures, with less rainfall, so that the increase in temperature in air and water is not much different, and experiences excessive evaporation (Khalil, 2016).

4**. Chemical Content of Snails**

The results of the chemical content analysis (proximate) of Gastropods in Modolung waters can be seen in table 3.

Table 3. Chemical Content of Gastropod Types

| No | Spesies | Proximate content | | | | |
|---|---|---|---|---|---|---|
| | | Water content % | Ash content % | Proteint content % | Fat content % | Carbohydrate content % |
| 1 | *Oliva fordi* | 78,14 | 5,42 | 12,16 | 0,38 | 7,86 |
| 2 | *Telescopium telescopium* | 6,48 | 53,13 | 8,83 | 1,10 | 30,47 |
| 3 | *Steromphala umbilicalis* | 6,15 | 54,35 | 9,10 | 1,36 | 29,04 |
| 4 | *Familia muricidae* | 15,59 | 17,70 | 9,50 | 0,64 | 59,60 |
| 5 | *Canarium labiatum* | 8,79 | 15,67 | 0,00 | 1 | 0,00 |

Based on the results of the proximate content analysis of gastropod species, it shows that the nutritional content of gastropod species originating from the Moudolung waters has a fairly high nutritional content and can be used and utilized as raw materials in processing fishery products.

## CONCLUSION

Based on the results of research on the diversity of gastropod species in the waters of Modulung, Kanatang District, East Sumba Regency, it has a low level of diversity with an H' Index <2.0, and has a fairly high nutritional value, one of which is a fairly high protein content/level.

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