Density of Mangrove Snail (*Telescopium telescopium*) in the Mangroves Ecosystem of Mengkapan Village, Sungai Apit Subdistrict, Siak District, Riau Province

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Abstract. Mangrove snails (*Telescopium telescopium*) are found in the mangrove ecosystem. *Telescopium telescopium* has significant ecological and economical role in the mangrove ecosystem. This study aims to determine the density of mangrove snails in the mangrove ecosystem of Mengkapan village. This research was conducted in February 2018. There were 3 transect and there were 6 plots (1m x 1m). The snails were collected once /2 weeks, 3 time. Densities of the snail were studied. Results shown that in the density of the snail was 4.33 – 5.17 organisms/m². The density of mangrove snail population in the mangrove ecosystem in the Mengkapan Village has no disturbance.

Keywords: distribution, hand collecting method, gastropod, population

1. Introduction
Mengkapan is one of the villages in Sungai Apit Sub district, Siak Regency, Riau Province. One of the potentials in the village of Mittens is a fairly extensive mangrove forest. The area of Mangrove ecotourism is around 20-30 Ha and for the area of Mengkapan village is 11,327 Ha. Mangrove forests are the main ecosystem supporting important life in coastal areas. Mangrove ecosystems have a very important role in the ecological cycle, which is as a nutrient provider for aquatic biota, shoreline protectors, feeding grounds, nurseries, nurseries, spawning ground, various kinds of aquatic organisms. The function of mangrove forests economically is producing household needs, producing industrial needs, and producing seeds [1].

Mangrove snails are native mangrove mollusks that are easily found in the middle of mangrove forests. Mangrove snails are often found in abundance in aquaculture areas bordering mangrove forests. Also, mangrove snails are found in rivers that are close to aquaculture areas [2]. Mangrove snails (*T. telescopium*) live in brackish water on a muddy base substrate and are affected by tides [3].

The area of mangrove forests in the village of Mittens is currently experiencing ecological pressure due to human activities. Many mangrove forests are exploited for various purposes such as illegal logging for timber, residential land, ecotourism, sea transportation, industrial activities such as
oil drilling, ports and human activities that produce domestic waste. In 2014 there was an oil spill by PT EMP Malacca Strait which caused the mangrove ecosystem in Mengkapan to be damaged. Besides, these activities can harm organisms in them, including mangrove snails.

Based on information from the community of Mengkapan village mangrove snail meat is also consumed. The existence of various activities carried out in the mangrove ecosystem is thought to influence the presence of mangrove snails. Therefore, it is seen from the condition of the area and the absence of research on mangrove snails in these waters so that this research needs to be done so that the mangrove snails can be found in the mangrove forest area of Mengkapan Village in Siak Regency.

2. Material and Method

The research was carried out in February 2018. The location of the study was the village of Mengkapan, Sungai Apit District, Siak Regency, Riau Province. The method used in this study is a survey method, as well as the data collected in some primary and secondary data. The research station is determined by the purposive sampling method. Then mangrove snail samples are collected by making transects perpendicular to the coastline that is adapted to the transect plot for mangrove condition analysis. To get an idea of the condition of mangrove forests in the study site, sampling was divided into three stations with different characteristics, as follows:

Station I: Mangrove area far from community settlements and community activities. Position 00059’09.23” LU and 102014’05.27” BT

Station II: Mangrove area located in the mangrove ecotourism area and there are community settlements. The ordinate position is 00058’52.33” LU and 102014’14.88” BT.

Station III: Mangrove areas are still affected by community activities and near oil drilling. The ordinate position is 00058’50.36” LU and 102014’22.98” BT.

A sketch of the Research Station in the village of Mengkapan in the Sungai Apit sub-district can be seen in (Figure 1) as follows:

![Figure 1. Sketch of study area](image)

Sampling is done using transects. At each station, the transect is stretched perpendicular to the rope, and then stretched from the reference point line (the beach) in a perpendicular direction to the land (outermost mangrove forest). This rope is used to make transects, the length of line transects depends on the thickness of the mangrove. A quadrant map is made with size (1 m x 1 m) of 6 quadrants, and the distance of each quadrant is determined. A sampling of mangrove snails is done by taking all the mangrove snails contained in the base substrate, roots and mangrove stem that are within the quadrant sampling area, by hand collection.
The mangrove conch that has been obtained is then intended into a plastic bag that has been labeled with paper and preserved using 4% formalin. Samples that have been put into plastic bags are stored in (cool box). The preserved mangrove snail sample was taken to the University of Riau's Aquatic Environment Management laboratory for further observation. Observations made are the measurement of the length of the shell and the width. The same method is carried out 3 times a repetition for one month at each station. The density of mangrove snail was analyzed as follows:

\[ X = \frac{\sum n_i}{A} \]

Information:
X = density of mangrove snail (ind/m²)
n_i = Total number of individuals for type
A = Sample sampling area (m²)

The basic substrates in the waters are carried out by following the procedure, the purpose is to find out the percentage of gravel, sand, and mud. The calculation of determining the type of water-based substrate based on the Shepard Triangle Method, namely:

\[ \%P = \frac{p}{sk} \times 100\% \]
\[ \%K = \frac{k}{sk} \times 100\% \]
\[ \%L = \frac{l}{sk} \times 100\% \]

Information:
P = Sand, L = Mud, K = Gravel, SK = Dry Sample

To find out the total organic matter content in sediments as follows, the percentage of total organic matter content in sediments is calculated by the formula:

\[ Total \ Organic \ (\%) = \frac{(a - b)\times 100\%}{c} \]

Information:
a: Weight of the sample cup after burning at 105 0C (grams)
b: Weight of the sample cup after drying at 550 0C (grams)
c: Sample weight - cup weight (grams)

3. Results and Discussion

People in the village of Mengkapan often catch mangrove crabs, fish, and gastropods such as mangrove snails and also include mangrove snails. Based on information obtained from several communities (interviews) that the mangrove snails are sold to the local community. Besides *T. telescopium* is also processed into several food products such as rendang and also fried. In general, the condition of mangrove forests in the village of M completeness is quite good compared to the conditions of a few years ago. This is due to the community's awareness to preserve it, that there is an effort to replant. This is the state of the village of Mengkapan mangrove forests which are at the tiller level (Figure 2).
The types of mangroves found in the village of Mengkapan are *Rhizophora apiculata, Avicennia marina, Sonneratia alba, Pandanus tectonius, Avicennia rumphiana, Acanthus egrateatus* and *Bruguiera gymnorrhiza* with varying densities at each level of [4]. Tree level density is 433.33 trees/ha and sapling levels range from 1777.78 trees/ha [4]. According to [5], *Avicennia* sp mangrove species is closely related to the *Cerithidea obtusa* gastropod type and in [6] about the density of *T. telescopium* in the Laguna mangrove ecosystem, the mangrove type found was *Avicennia* sp.

**Description of Mangrove Snail (T. telescopium)**

The mangrove snail found in the mangrove ecosystem of the village of Mengkapan in Siak Regency has characteristics such as thick, pointed, cone-shaped shells and striped edges. This organism is not easily carried by currents and tidal waves. The outer shell color is blackish brown. These organisms are commonly found under mud-mangrove trees (Table 1).

| No | Description  | Remarks                          |
|----|--------------|----------------------------------|
| 1  | Shell        | Thick, conical and striped       |
| 2  | Colors       | Blackish brown, cloudy brown, purplish brown |
| 3  | Shell Length | 75-110 mm                         |
| 4  | Shell Width  | 17-47 mm                          |

Based on the description of the mangrove snail (Table 1) that the mangrove snail has a thick, cone-shaped and striped shell. Has a blackish shell color, murky brown and there is also a purplish brown. It has a range of 75-110 mm in length and 17-47 mm in width, so it is following [7]Hamsiah's opinion (2000) that the conch shell is conical, long, slender, and somewhat horizontal at the bottom. The color of the shell is murky brown, purplish brown, and blackish brown, the outer layer of the shell is equipped with a very tight spiral line and has a curved inward path. The length of the shell ranges from 7.5-11 cm. The size of a normal adult shell can reach 90-100 mm in size [8], but according to [8], the conch shell can reach 130 mm.

This organism is generally found under mangrove trees with mud substrate and found in groups. This organism is not easily carried by currents and tidal waves. *T. telescopium* has a thick shell structure that is useful for reducing evaporation so that it can adapt to high temperatures and is not easily carried by currents and tidal waves. (Figure 3).
Based on the description and characteristics of the mangrove snail above, according to the identification book, Shea shells of the World belongs to the Mollusca phylum, Gastropoda class, Sorbeoconcha order, Potamididae family, Telescopium genus and T. telescopium species.

**Mangrove Snail Density**

The density value of mangrove snail (T. telescopium) ranges from 4.33-5.17 ind / m². The highest density at Station II is 5.17 ind / m² and the lowest at Station I is 4.33 ind / m². The density of T. telescopium can be seen in (Table 2).

| Station | Total Number of Individuals (ind) | Area (m²) | Density (ind/m²) |
|---------|----------------------------------|-----------|------------------|
| I       | 26                               | 6         | 4.33             |
| II      | 31                               | 6         | 5.17             |
| III     | 28                               | 6         | 4.67             |

The highest density of T. telescopium is found in Station II which is 5.17 ind / m² and the lowest in Station I is 4.33 ind / m². The highest density at Station II is around ecotourism and population activities. The high population density of T. telescopium in mangrove ecosystems is caused by organic matter. Station II, which has the highest density, is close to population activities that produce lots of organic material such as oil palm farming activities so that the environment is following T. telescopium habitat. However, the presence of anthropogenic activities does not greatly affect the density of mangrove snails. Station II has higher organic matter content than stations I and III. The station I is 27.46% and Station III 31.32% while Station II is 38.55%. Organic matter is a source of food for organisms that live in sediments including mangrove snails (T. telescopium). The
low organic matter contained in the substrate causes competition between organisms in the struggle for food because organic matter is food for T. telescopium [1].

According to [9], high density is also closely related to the distribution pattern of clustered snails because clustering distribution patterns are also supported by environmental conditions that are under the mangrove snail organisms (T. telescopium). The lowest density is found in Station I which is 4.33 ind / m². One of the factors influencing the low density of mangrove snails (T. telescopium) is that the organic material contained in Station I and III is lower than Station II. The station I is 27.46% and Station III 31.32% while Station II is 38.55%. Another factor that is thought to influence the low density of mangrove snails is a low level of mangrove density because the mangrove ecosystem is an ecosystem with high productivity (producing detritus) which plays an important role in the energy cycle.

**Sedimentary Faction**

The type of sediment found in the mangrove area of the Mengkapan village at each station has no difference, namely sandy mud (Table 3).

| Station | Sand (%) | Mud (%) | Type of Sediment |
|---------|----------|---------|------------------|
| I       | 46.96    | 53.04   | Sandy Mud        |
| II      | 47.73    | 52.27   | Sandy Mud        |
| III     | 46.33    | 53.69   | Sandy Mud        |

Based on the results of the study there are two types of substrate, namely mangrove and sand. The type of gravel substrate is not found in the mangrove area of Mengkapan village. The highest percentage of sand at Station I was around 47.73% and the lowest at Station II was around 46.33%. The highest mud substrate was found at Station II, which was 53.69% while the lowest was at Station I 52.27%.

The type of sediment fraction found at each station is sandy mud because the sand fraction content is more than 25% and the mud fraction content is less than 75% this is in accordance with Buchanan's opinion in [10], which states that the mud fraction content is less than 75% and sand fraction of more than 25% including sandy mud substrate. Higher sediments with finer fractions ie mud will accumulate much greater organic matter than sediments with fractions that tend to be coarser [11].

The low density at Station III is the low mud substrate at Station III and vice versa the high density at Station II the supporting factor is the mud substrate at Station II is high because the characteristics of this mud substrate have a great ability to bind organic material.

**Organic ingredients**

The content of organic matter found at each station in the village of M completeness of the mangrove forest ranges from 27.46 - 31.55% (Figure 4). The highest organic matter content seen in the graph above is found in Station II that is 38.55% and the lowest organic matter in Station I is 27.46%. The high content of organic matter at Station II is due to a large amount of litter produced from fallen leaves which will increase waters productivity.
Mangrove litter that falls will experience decay, causing high organic matter. [12] stated that mangrove litter in the form of leaves, twigs and other biomass is a source of food for aquatic biota and organic material which is crucial for marine fisheries productivity. Organic matter obtained from leaf litter falling onto the substrate is decomposed by decomposers to become detritus. The beginning of the decomposition process, namely from rodents in the substrate at the areal, is then broken down by bacteria to form organic matter. This decomposition also depends on sunlight. The high organic matter content at Station II is thought to also affect the density and distribution pattern of mangrove snails (*T. telescopium*) where at Station II the level of mangrove snails density (*T. telescopium*) is higher than Stations I and III.

4. Conclusion

Based on the results of the study the value of the density of Mangrove Snails ranges from 4.33-5.17 ind / m². the high and low density of Mangrove Snails in the Measure mangrove ecosystem is not too influenced by the existence of community activities and activities as well as the quality of the waters in the Miring Mangrove still relatively good and still supportive for the growth of mangrove snails.

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