Fisheries Journal, 15 (4), 1958-1973 (2025)
http://doi.org/10.29303/jp.v15i4.1676

RELATIONSHIP BETWEEN MANGROVE DENSITY AND ABUNDANCE OF *SCYLLA* SPP. IN PANTAI KELAPA MANGROVE TOURISM AREA, TUNGKAL I VILLAGEWEST TANJUNG JABUNG

Hubungan Kerapatan Mangrove Dengan Kepadatan Kepiting Bakau (*Scylla* spp.) Pada Kawasan Mangrove Pantai Kelapa Desa Tungkal I Tanjung Jabung Barat

Qori Nurhasana[1], Yun Alwi[2], Ester Restiana Endang Gelis[1*], Nurhayati[2], Septy Heltria[1], Febrina Rolin[1]

[1]Department Of Fisheries, Universitas Jambi, [2]Department of Animal Husbandry, Universitas Jambi

Jl. Jambi - Muara Bulian No.KM. 15, Mendalo Darat, Jambi 36361

[*]Corresponding author: esterrestiana@unja.ac.id

(Received June 29th 2025; Accepted August 22th 2025)

ABSTRACT

This research was motivated by the ecological importance of mangrove ecosystems as natural habitats for mud crabs (*Scylla* spp.) and the suspected influence of mangrove density on the population of associated biota in the Mangrove Ecotourism Area of Pantai Kelapa, Tungkal I Village, West Tanjung Jabung. The main objectives of this study were to identify the types and density of mangroves, determine the species and density of mud crabs, analyze the relationship between mangrove density and mud crab density, and assess sediment composition. A descriptive analytical method was employed, using both primary and secondary data collection. The results revealed four species of mangroves (*Sonneratia alba*, *Avicennia alba*, *Rhizophora mucronata*, and *Nypa fruticans*) with total tree-level densities ranging from 366.66 to 766 individuals per hectare. Two species of mud crabs were identified (*Scylla serrata* and *Scylla tranquebarica*), with densities ranging from 200 to 566 individuals per hectare. The highest mud crab density was recorded at station 3, which also had the highest mangrove density. A simple linear regression analysis showed an R^2 value of 0.3226, indicating a weak correlation. These findings suggest that mangrove density has a limited and statistically insignificant influence on the density of mud crabs in the study area.

Keywords: Mangrove crab, Mangrove density, Kelapa Beach Mangrove

ABSTRAK

Penelitian ini dilatar belakangi oleh pentingnya ekologi ekosistem mangrove sebagai habitat alami bagi kepiting bakau (Scylla spp.) dan adanya pengaruh kerapatan mangrove dengan populasi biota asosiasi di Kawasan Ekowisata Mangrove Pantai Kelapa, Desa Tungkal I, Tanjung Jabung Barat. Tujuan utama dari penelitian ini adalah untuk mengidentifikasi jenis dan

kerapatan mangrove, menentukan spesies dan kerapatan kepiting bakau, menganalisis hubungan antara kerapatan mangrove dan kerapatan kepiting bakau, dan menganalisis fraksi sedimen. Metode yang digunakan ialah analisis deskriptif yang digunakan untuk pengumpulan data, pengumpulan data menggunakan data primer dan sekunder. Hasil penelitian menunjukkan terdapat empat spesies mangrove (Sonneratia alba, Avicennia alba, Rhizophora mucronata, dan Nypa fruticans) dengan total kerapatan tingkat pohon berkisar antara 366,66 hingga 766 individu per hektar. Dua spesies kepiting bakau diidentifikasi (Scylla serrata dan Scylla tranquebarica), dengan kepadatan berkisar antara 200 hingga 566 individu per hektar. Kepadatan kepiting bakau tertinggi ditemukan pada stasiun 3, yang juga memiliki kepadatan mangrove tertinggi. Analisis regresi linier sederhana menunjukkan nilai R^2 sebesar 0,3226, yang menunjukkan korelasi lemah. Temuan ini menunjukkan bahwa kepadatan mangrove memiliki pengaruh yang terbatas dan tidak signifikan secara statistik terhadap kepadatan kepiting bakau di wilayah penelitian.

Kata Kunci: Kepiting bakau, kerapatan mangrove, Mangrove Pantai Kelapa

INTRODUCTION

Mangrove ecosystems are a type of forest that grows in coastal areas and is influenced by tidal activity. These ecosystems are commonly found in shallow coastal zones, estuaries, deltas, and sheltered shorelines (Rahim and Baderan, 2017). Indonesia possesses approximately 4.5 million hectares of mangrove forests (Yanti, 2021), one of which is located in Jambi Province, covering an area of 4,126.60 hectares (Achmad et al., 2020). This mangrove ecosystem lies in West Tanjung Jabung Regency, Tungkal Ilir District, Tungkal I Village, particularly in the Mangrove Ecotourism Area of Pantai Kelapa, which is situated near the Pangabuan River and spans approximately 250 m^2. The zoning of the Pantai Kelapa mangrove ecotourism area experiences sediment deposition from the Pangabuan River, particularly in the form of mud. This sedimentation may also result from tidal activity and organic matter decomposition within the mangrove ecosystem. Sediment texture plays a critical role in the growth of mangrove vegetation (Ardang et al., 2023), and mangrove structural analysis can be performed through mangrove density measurements.

Mangrove ecosystems provide important nursery grounds, serving as key habitats for the growth and reproduction of various aquatic organisms. Associated biota commonly found in mangrove habitats include mollusks, crustaceans, and fish species (Fajri et al., 2023), with mud crabs (*Scylla* spp.) being among the most prominent.

Mud crabs tend to burrow or hide in soft or silty clay substrates, which are preferred due to their ease of excavation for shelter and reproduction (Saputri and Muammar, 2018). Soft sediments, consisting of fine particles, also provide thermal comfort and retain heat from sunlight, which influences the crabs' metabolic activity, feeding, and reproductive behavior, thereby serving as a permanent habitat when food is sufficiently available (Saputri and Muammar, 2018).

The development of mangrove ecosystems is influenced by several factors, one of which is the presence of decomposers—microorganisms that play a crucial role in breaking down organic matter. In mangrove ecosystems, mud crabs act as primary decomposers by contributing to the breakdown of leaf litter, thus enriching the soil with organic content (Indah, 2024).

According to Sunarto et al. (2015), there are several types of mud crabs, including the red mud crab (*Scylla olivacea*), purple mud crab (*Scylla tranquebarica*), green mud crab (*Scylla serrata*), and white mud crab (*Scylla paramamosain*). The availability of natural food sources for mud crabs is significantly influenced by mangrove density. Variations in mangrove density

determine differences in food availability, ultimately affecting mud crab growth and population density (Pembudi, 2023).

The aim of this study is to determine the types and density of mangrove species found in the Kelapa Beach Mangrove Area, Tungkal I Village, as well as to identify the species and assess the population density of mud crabs (Scylla spp.) in the same area. Additionally, this research aims to analyze the relationship between varying levels of mangrove density (dense, moderate, and sparse) and the abundance of mud crabs. Finally, the study seeks to examine the sediment fraction, specifically the grain size composition, within the mangrove ecosystem to better understand the environmental characteristics supporting crab populations.

MATERIALS AND METHODS

Time and Place of Research

This research was conducted in the Mangrove Tourism ecosystem of Kelapa Beach Parit 9, Tungkal Satu Village, Tungkal Ilir District, West Tanjung Jabung. It was carried out from February 1 to March 1, 2025.

Figure 1. Research Location

Tools and materials

The materials studied in this study were mangroves, mangrove crabs, and substrates. The tools used in this study were roll meters, mangrove and mangrove crab identification books, raffia rope, sieve shaker, camera, sample plastic, hooks, farmer's shoes, shovel, scissors, oven, lab coat, *Global Positioning System*, plastic meter, pestle, laptop, test board, rubber bands, and scales. The materials used were tracing paper, label paper, water, and tissue.

Research methods

The method used in this study is descriptive analysis. The data used in this study are primary data, which are data obtained from field observations that produce primary data from the findings. The primary data used in this study are identification of mangrove density, types of mangroves, calculation of mangrove crab density, types of mangrove crabs, and analysis of sedimentation data. While secondary data are in the form of general conditions of the research location, journal and book references.

Research Procedures

Conducting location surveys and measuring the area of the coconut coast mangrove ecosystem area, determining sample stations, analyzing mangrove density and density per species, analyzing mangrove crab density and types of mangrove crabs, taking sediment samples, analyzing sediment fractions, and processing research data quantitatively using Microsoft Excel. These are the steps taken in the process to achieve the objectives of this study.

Data analysis

The data analysis used in this study is as follows:

1. Mangrove Density

a. Species density refers to the number of individual stands of species *i* within a unit area (Bengen et al., 2022), and is calculated using the following formula:

$$Di = \frac{ni}{A}$$

Di = density of species *i* (individuals/ha)
ni_= total number of individual stands of species *i*
A = total area of the sample plot (in hectares)

b. Density Standard Criteria
To find out the criteria for mangrove density, see the following:(Minister of Environment Decree, 2004).

Table 1. Density Standard Criteria

Criteria	Density (ind/ha)
Congested	>1500
Currently	1000 – 1500
Rare (damaged)	<1000

Source :(Minister of Environment Decree, 2004)

2. Mud Crab Abundance

Mud crab density can be calculated using the following formula (Bengen et al., 2022):

$$Di : \frac{ni}{A}$$

Di = individual density (ind/ha)
ni = number of individuals of species *i* (ind)
A = area of the sampling plot (ha)

3. Relationship between Mangroves and Mud Crabs

To find out the relationship between mangrove density data and mangrove capiting density, it can be calculated using the following simple linear regression formula:

$$y = \alpha + bx$$

information :
y = Density of mangrove crabs
x = mangrove density

a = constant
b = regression coefficient (increase or decrease value)

To determine the correlation coefficient value, the following criteria are used:(Julianto et al., 2021)

Table 2 Correlation Coefficient Criteria

No	r value	Interpretation
1.	0	No correlation
2.	0.001 – 0.20	The correlation is very weak
3.	0.21 – 0.40	Weak correlation
4.	0.41 – 0.70	Medium correlation
5.	0.71 – 0.99	Strong correlation
6.	1	Perfect correlation

4. Sedimentation Fraction Analysis

$$Percentage\ I = \frac{berat\ substrat\ i}{total\ berat\ substrat} \times 100$$

The percentage of each main substrate will then be entered into Shephard's triangle which will then determine the type of substrate based on the meeting point of each main substrate line.

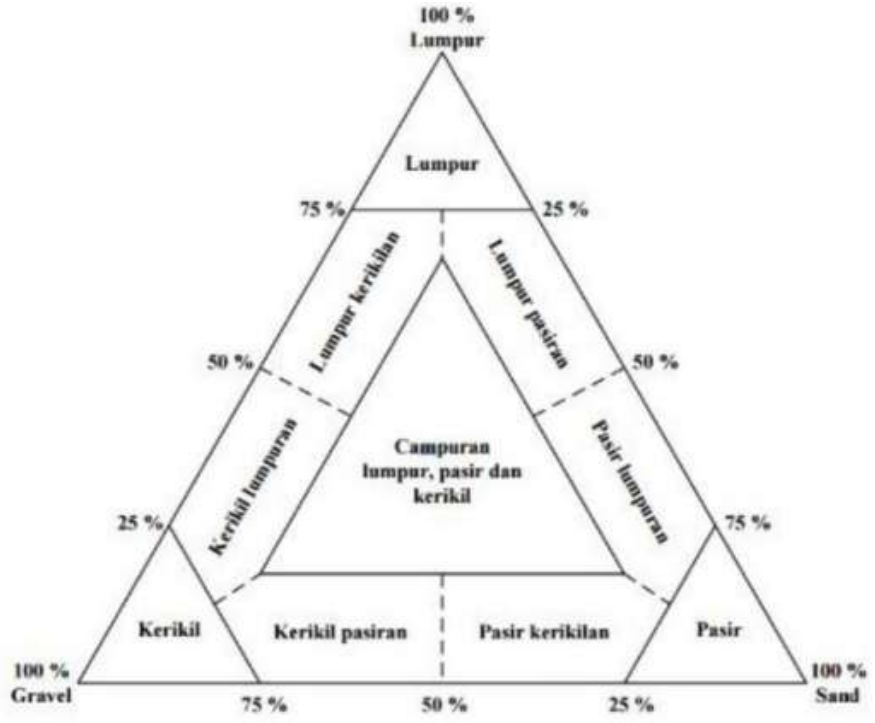

Figure 1. Shepard's Triangle

RESULTS

A. Mangrove Density

Based on the research results, it can be seen that 4 types of mangroves were found at tree level. The results of the density of mangrove species at tree level in this study have been summarized and presented in the table below.

Table 3. Tree Species Density

Station	Type	In (ind/ha)	Criteria	Density (Trees/Ha)
1	*Sonneratia Alba*	33,333		<1000
	Avicennia Alba	100		
	Rhizophora	233.33		
	Mucronata			
	Total	366.66	Seldom	
2	*Avicennia Alba*	166.66		<1000
	Rhizophora	133.33		
	Mucronata	66,666		
	Nypa Fruticans			
	Total	366.66	Seldom	
3	*Sonneratia Alba*	33,333		<1000
	Avicennia Alba	666.66		
	Rhizophora	66,666		
	Mucronata			
	Total	766.66	seldom	

The amount of mangrove vegetation can be seen in the following graph.

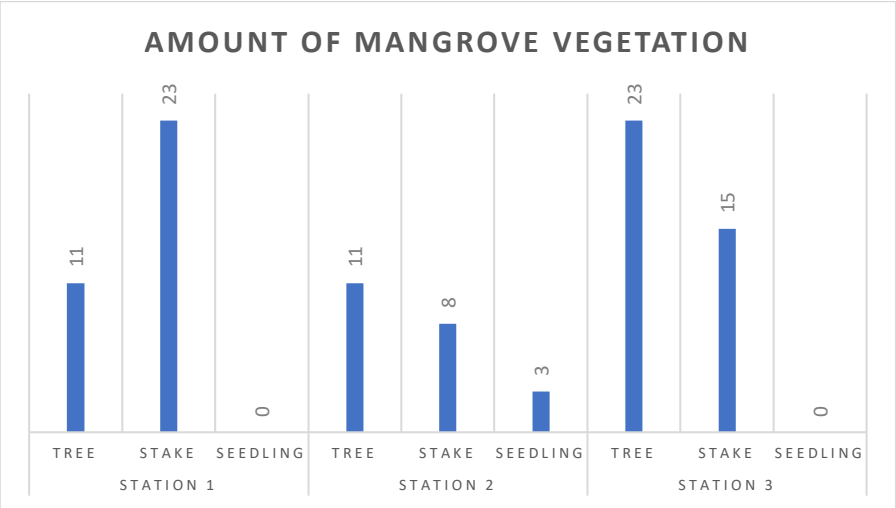

Figure 3. Mangrove Vegetation Density Graph at Observation Station

B. Mud Crab Density

Observation of mangrove crab samples was carried out on each plot and subplot by digging. The results of mangrove crab observations can be seen in table 4 and figure 4.

Table 4. Mud Crab Density.

Species	Density (ind/ha)		
	Station 1	Station 2	Station 3
Scylla tranquebarica	233,3333333	200	400
Scylla serrata	33,33333333	0	166,6666667
Amount	266,6666667	200	566,6666667

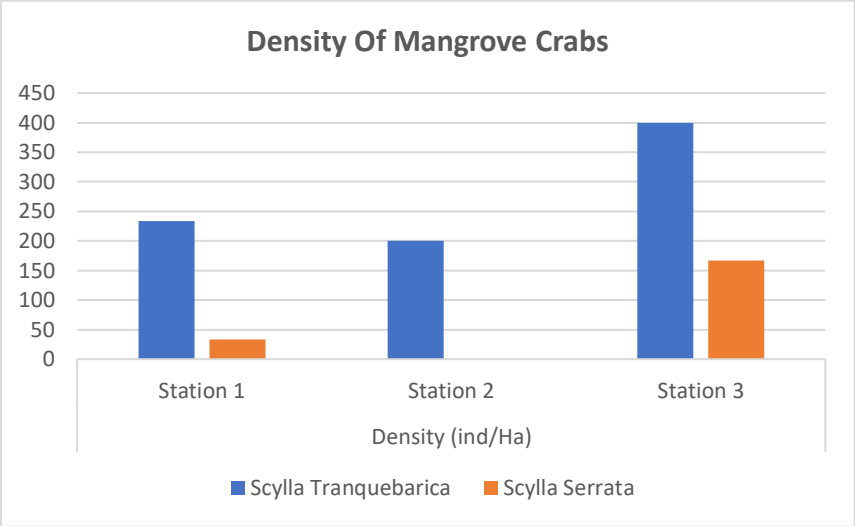

Figure 4. Mangrove Crab Density Graph.

C. Relationship between Mangrove Density and Mangrove Crab Density

To find out how big the correlation is between mangrove density and mangrove crab density, a comparison was made between mangrove density with mangrove crab density using analysis in simple linear regression. The aim is to determine correlation between two variables. Variable X shows the density of mangrove trees and variable Y shows the density of mangrove crabs.

Table 5. Mangrove Density and Mangrove Crab Density

Plot	**Mangrove density (ind/ha)**	**Mud Crab Density (ind/ha)**
1.	33.333	33,333
2.	100	100
3.	233.33	133.33
4.	33,333	33,333
5.	133.33	33,333
6.	200	133.33
7.	166.66	100
8.	466.66	200
9.	133.33	266.66

Data management of both variables is processed using Microsoft Excel 2016 software with linear graphs. The relationship between mangrove density and mangrove crab density is shown by the Rsquare (R2) value which can be seen in the image below.

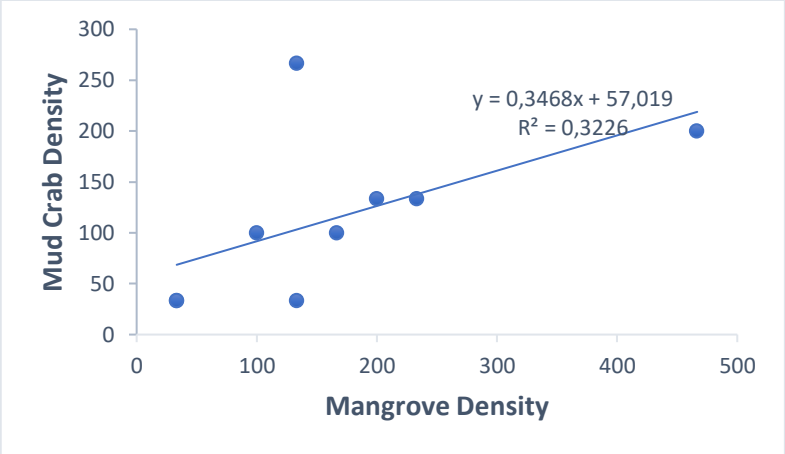

Figure 5. Regression Graph of the Relationship between Mangrove Density and Mangrove Crab Density

D. Substrate

The composition of sediment grain types based on laboratory tests and the Sephard triangle can be seen in Table 6 and figure 6.

Table 6. Sephard Triangle Results

Plot	Gravel	Sand	Mud	Substrate Texture
1	21%	73%	5%	gravelly sand
2	9%	73%	19%	silty sand
3	8%	73%	19%	silty sand
4	9%	83%	9%	sand
5	3%	78%	19%	sand
6	3%	77%	20%	sand
7	4%	80%	17%	sand
8	7%	78%	15%	sand
9	6%	63%	32%	silty sand

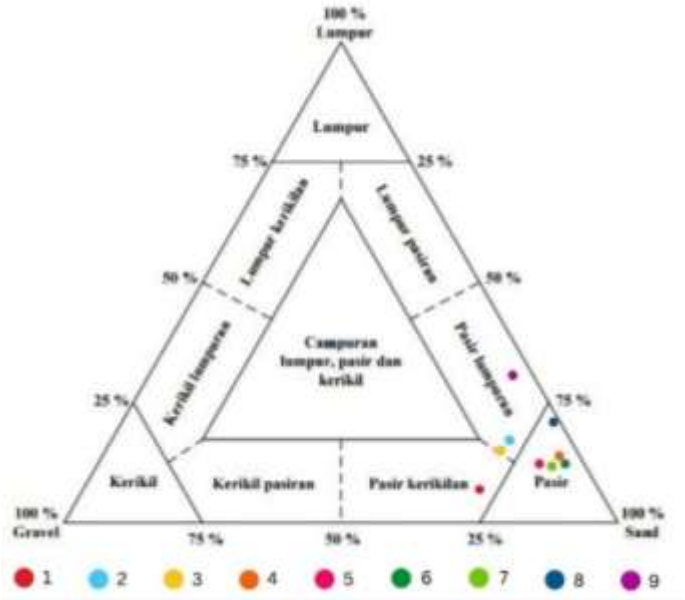

Figure 6. Sephard Triangle Results

DISCUSSION

A. Mangrove Identification

Based on the results of research conducted at the Kelapa Beach Mangrove Tourism, Tungkal I Village, 4 different mangrove species were found. The types of mangroves are *Sonneratia alba, Avicennia Alba, Rhizophora Mucronata*, and *Nypa Fruticans*. The following is a picture of the types of mangroves found at the research location of the Kelapa Beach Mangrove Tourism, Tungkal Satu Village.

(a) (b) (c) (d)

Figure 7. (a) *Sonneratia Alba* (b) *Avicennia Alba* (c) *Rhizophora Mucronata* (d) *Nypa Fruticans.*

Sonneratia Alba often found in the outermost mangrove zone which is usually called the open mangrove zone, an area that directly faces the sea. This type of plant is found in a more open environment and is directly exposed to sea waves.(Kolinug et al., 2014)The results of the observations also show that *Sonneratia Alba* is located in a front location that directly faces the sea. *Avicennia Alba* which is often known as black fire, this species is almost found at every station. According to(Pahlevi et al., 2024)This type of species is a type that is planted and is able to adapt well to habitat conditions in the mangrove area. In the genus Avicennia is a type of true mangrove plant that can be spread in every region with different levels of tolerance to salinity levels.

In the *Rhizophora mucronata* and *Nypa fruticans* species, they are more commonly found in areas that are deeper into the mangrove forest. These species can grow in environments that are more protected from ocean waves.(Sanadi et al., 2023). This is the reason that this type of mangrove plant is only found in plot 3 which is located in the mangrove forest.

Mangroves have different zones depending on environmental conditions such as salinity and sediment. From the observed conditions, there are 3 stations. Station one is on the left with a distance of 100 m from the Kelapa Beach mangrove tourism location, station 2 is around the Kelapa Beach mangrove tourism and station 3 is on the right of the mangrove tourism with a distance of 100 m from the Pantai Kelapa mangrove tourism. At each station there are plots consisting of plots 1,2 and 3. Plot 1 is the front zone that faces directly with the tidal zone of sea water. With sediment conditions that are sand and muddy sand and there are mangrove plants that are dominated by *Sonneratia Alba* and *Avicennia Alba*.

In plot 2 is located in the coastal zone located in the middle and the mangrove plants are dominated by *Avicennia Alba* and *Rhizophora mucronata*. And in plot 3 is located in the river zone close to the mainland dominated by *Rhizophora mucronata* and *Nypa Fruticans*. In the study(Karimah, 2017) states that each type of plant has its own ecology, so that this condition results in the formation of various types of communities and even zones that are different from one place to another.

E. Mangrove Density

The density of a species is the number of individuals in an area per unit area. Density is one of the factors that can affect the quality of mangrove habitat and has an important role in the life of mangrove crabs such as habitat, reproduction, breeding and foraging.(Tarumasely et al., 2022). Mangrove density can be used as an indicator to assess the presence of mangroves in an area, as well as reflecting the level of disturbance to the habitat. If the density of plant species in a habitat is low, this indicates that the habitat has been damaged. Conversely, high density indicates that the habitat is still in good condition, meaning that the habitat has not been damaged. (Sanadi et al., 2023).

Based on the research results, it can be seen that 4 types of mangroves were found at tree level. The results of the density of mangrove species at tree level in this study have been summarized and presented in the table 3.

As seen in table 3. above, the density of mangrove tree species in the research location has a total value ranging from 366.66 ind/ha – 766 ind/ha which is classified as rare. This is in accordance with the Decree of the Minister of State for the Environment No. 201 of 2004 that the rare category is with a tree density of <1,000 ind/ha. The highest density is at station 3 with a density value of 766.66 ind/ha. The lowest density is at stations 1 and 2 with a density value of 366.66 ind/ha.

Low density of tree species at the station is estimated to be due to the relatively far distance between trees and the limited number of trees. In addition, the mismatch between the type of substrate and the type of mangrove that grows is also a contributing factor. When viewed from the condition, there is still a lot of garbage around the Kelapa Beach Mangrove Tourism area, which is carried by the ebb and flow or comes from human activities. As a result, mangrove growth in the area is not optimal.

This is in accordance with the opinion (Petra et al., 2012) which states that the regeneration capacity at the tree level is relatively low because it is influenced by various factors, such as individual mangroves covered in plastic waste and the presence of dead mangroves which causes a decrease in mangrove density. In addition, the availability of fresh water and salinity levels are the main factors that affect mangrove growth. If mangroves are unable to adapt to these environmental conditions, their growth will be hampered.

The density graph in Figure 3 shows the results of observations of the number of individual mangrove plants found at each station, with varying results. At Station 1, the sapling category had the largest number of stands, with 23 stands, while the tree category had 11 stands and no seedlings were found at this station.

The number of individual mangrove vegetation at station 2, has the least number compared to other stations. At station 2 has a tree category of 11 stands, in the sapling category has 8 stands and the seedling category has 3 stands. This is because at station 2 around the mangrove tourism area, there is a lot of logging for the development of mangrove tourism.

Station 3 produces the largest number of mangrove stands from other stations, which is 38 stands and not much different from station 1 which has 34 stands. At station 3, there are 23 tree categories, 15 sapling categories and no seedling categories. In this station, the conditions are far from the tourist location so that the ecosystem has reached a more mature growth stage without being disturbed by tourism development. Older and larger trees have grown and developed.

Sea tides have an influence on the growth and productivity of mangroves, for example, tides determine the transport of oxygen to the root system, tidal washing affects erosion and the salt content of ground water.(Sanadi et al., 2023).

F. Mud Crab Identification

The following are the types of mangrove crabs found in the Kelapa Beach Mangrove Ecosystem, Tungkal Satu Village:

- Green Mud Crab (*Scylla serrata*)
  a. Classification (Keenan et al., 1998):

Kingdom : Animalia
Phylum: arthropoda
Subphylum : Crustacea
Class : Malacostraca
Order: Decapoda
Family : Portunidae
Genus : Scylla
Species : S. serrata

Figure 8. *Scylla Serrata*

b. Description :
*Scylla serrata*is an oval-shelled swimming crab. From the observed results, Scylla serrata has nine anterolateral teeth on each side and four blunt triangular front teeth between the two eyes forming a carapace. Its wrists have two prominent spines on the outside. The male abdomen is narrow, with three to five fused segments. Scylla serrata is usually green, brownish, or black, among other colors. This is in accordance with the opinion(Keenan et al., 1998).

- Purple Mangrove Crab (*Scylla tranquebarica)*
  a. Classification (Abidin et al., 2022):

Kingdom : Animalia
Phylum: arthropoda
Subphylum : Crustacea
Class : Malacostraca
Order: Decapoda
Family : Portunidae
Genus : Scylla
Species : S.*tranquebarica*

Figure 9. *Scylla tranquebarica*

b. Description
Scylla tranquebarica have front spines that are generally more pointed. Swimming legs have a very distinctive design. Eyes*Tranquebarica*round and relatively low in shape compared to other Scylla. The carapace is greenish brown. It has claws with prominent spines, one of which is rather blunt.(Abidin et al., 2022).

G. Mud Crab Density

Observation of mangrove crab samples was carried out on each plot and subplot by digging. The results of mangrove crab observations can be seen in table 4.

The density value of all mangrove crab species at station 1 which is located on the left side of the mangrove tour with a distance of 100 m from the mangrove tour has a density value of 266.66 ind/ha and at station 1 the mangrove crab with the highest density value is the *Scylla*

tranquebarica species with a density value of 233.33 ind/ha. At station 2 which is located around the Kelapa Beach mangrove tour has a density value of 200 ind/ha and there is only 1 species of mangrove crab, namely *Scylla tranquebarica* which has a density value of 200 ind/ha. At station 3 which is located on the right side of the mangrove tour, a distance of 100 m from the mangrove tour has the highest density value of the other stations, namely 566.66 ind/ha. At station 3 the mangrove crab with the highest value is the *Scylla tranquebarica* species with a density value of 400 ind/ha.

The high density value at station 3 is because the mangroves at station 3 have a good category for growth and habitat for mangrove crabs. According to(Siahainenia, 2008) Pressure and changes in the mangrove ecosystem environment can affect the density of mangrove crabs, therefore the decrease in the number of mangrove stands will affect the existence of mangrove crabs. The density value of all mangrove crab species at station 1 which is located on the left side of the mangrove tour with a distance of 100 m from the mangrove tour has a density value of 266.66 ind/ha and at station 1 the mangrove crab with the highest density value is the Scylla tranquebarica species with a density value of 233.33 ind/ha. At station 2 which is located around the Kelapa Beach mangrove tour has a density value of 200 ind/ha and there is only 1 species of mangrove crab, namely *Scylla tranquebarica* which has a density value of 200 ind/ha because the *Sylla tranquebarica* species is associated with mangrove species such as Rhizophora and Avicennia when viewed from the results of research at station 2 the types of mangroves found were *Avicennia alba* and *Rhizophora Mucronata* (Sullistiono. et al., 2021).At station 3 which is located on the right side of the mangrove tour, 100 m from the mangrove tour, it has the highest density value of the other stations, which is 566.66 ind/ha. At station 3, the mangrove crab that has the highest value is the Scylla tranquebarica species with a density value of 400 ind/ha.

The high density value at station 3 is because the mangroves at station 3 have a good category for growth and habitat for mangrove crabs. According to(Siahainenia, 2008) Pressure and changes in the mangrove ecosystem environment can affect the density of mangrove crabs, therefore the decrease in the number of mangrove stands will affect the existence of mangrove crabs.

Figure 4 shows that high density results were found at stations where mangrove density was also high. According to (Tarumasely et al., 2022), mangrove crab density can be influenced by mangrove density. There is a relationship between mangrove crab density and mangrove density, namely as a habitat for mangrove crabs. The mangrove ecosystem also serves as a source of natural materials and food needed by mangrove crabs. Therefore, from this statement, it can be explained that the density value can be generated in this observation by the relationship between mangrove density and the density of mangrove crabs living as aquatic biota in the Kelapa Beach mangrove tourism area, Tungkal I Village, West Tanjung Jabung.

The highest density was found in the species *Scylla tranquebarica*, according to(Sullistiono. Et al., 2021)that *Scylla tranquebarica* is often associated with certain types of mangroves such as *Rhizophora Apiculata, Rhizophora Mucronata, Avicennia Alba* and *Avicennia Rumphiana*, however *Scylla tranquebarica* is also commonly found in different types of mangrove habitats depending on environmental conditions and food availability.

H. Relationship between Mangrove Density and Mangrove Crab Density

To determine the correlation between mangrove density and mangrove crab density, a simple linear regression analysis was used to compare mangrove density and mangrove crab

density. The objective was to determine the correlation between the two variables. Variable X represents mangrove density, and variable Y represents mangrove crab density. The correlation can be seen in Table 5.

Data management of both variables is processed using Microsoft Excel 2016 software with linear graphs. The relationship between mangrove density and mangrove crab density is shown by the Rsquare (R2) value which can be seen in the image below.

Based on the graphic image 5, it shows that the graph of mangrove tree density with mangrove crab density is shown by the linear equation Y = 0.3468x + 57.019 with an R2 value of 0.3226 which means that the results of mangrove crab density are influenced by mangrove density by 32%. Based on the correlation relationship criteria value, the R2 value of 0.3226 is included in a weak correlation. Based on this, mangrove density with mangrove crab density does not have a significant effect on mangrove crab density.

Station 1 has a mangrove density in the rare category and is lower than station 3. This is due to the influence of the low density value as well. Station 2 has a mangrove density value in the rare category so that mangrove crabs at station 2 are fewer than stations 1 and 3. This will cause mangrove crabs to look for food where there is a natural food supply for the growth and survival of mangrove crabs. According to the opinion(Masiyh et al., 2023)that the availability of food and comfort to reproduce and breed are one of the factors in choosing a habitat for mangrove crabs. If not, the crabs will move to find food elsewhere even though they are still in the same habitat area.

Station 3 has a mangrove density with a rare category and has a higher density value than stations 1 and 2. Therefore, the density of mangrove crabs was found at a mangrove density with a higher value than the other stations. This is stated by(Yulianti. And Sofiana, 2018)that mangrove density affects the population of mangrove crabs. High mangrove density can increase the amount of litter that is a food source for macrozoobenthos. The abundance of macrozoobenthos will increase the population of mangrove crabs.

Mangrove leaf fall can be food for animals and large will experience decomposition or completely done by dead microorganisms or bacteria. The higher the litter production, the higher the productivity in the mangrove. Mangrove crabs are one of the animal species that decompose materials in the mangrove ecosystem.(Asmira, 2022)

I. Substrat

The composition of sediment grain types based on laboratory tests and the Sephard triangle can be seen in Table 6.

Based on table 6 and figure 6 above, the results of the sieve shaker and Sephard triangle analysis show that the study has sediment consisting of sand, muddy sand, and gravel sand with varying percentages. If seen from the table above, the results obtained are not much different. The substrate at each station is still mixed with sand or gravel, because this is influenced by the flow of sea water that carries sand particles at high tide and particles carried from the pangabuan deposits.

According to(Avianto et al., 2013)Muddy and sandy substrates are one of the habitats favored by mangrove crabs. (Nyebakken 1992) revealed that most estuarine crabs are dominated by very soft mud fractions. This substrate comes from sediments carried into the estuary by both fresh water and sea water. Rivers which are sources of fresh water bind suspended particles mixed with sea water in the estuary, then ions from sea water will cause

mud particles to clump, forming larger and heavier particles, then settle and form a typical mud base.

Seawater also contains a large amount of suspended matter. When seawater enters an estuary, the sheltered and calm conditions reduce current movement, allowing various particles to remain suspended. As a result, these particles eventually settle and form mud and sand substrates.

The existence of mangrove species Sonneratia Alba, Avicennia Alba, Rhizophora Mucronata and Nypa Fruticans at the stations found were classified as muddy sand, gravel sand, and sand substrates. In the types of Sonneratia Alba, Avicennia Alba, Rhizophora Mucronata and Nypa Fruticans, they are still tolerant of sand and muddy substrate habitats mixed with sand.(Avianto et al., 2013).

CONCLUSION

Based on the results of research conducted in the Patai Kelapa Mangrove Tourism Area, Tungkal I Village, West Tanjung Jabung, it can be concluded that Sonneratia alba, Avicennia alba, Rhizophora mucronata, and Nypa fruticans, with a tree level density classified as rare (366.66–766.66 ind/ha). Two types of mangrove crabs found were Scylla serrata and Scylla tranquebarica, with the highest density at the station with the highest mangrove density of 566.66 ind/ha which was found at station 3. The results of the regression analysis showed a positive relationship between mangrove density and mangrove crab density, with an R^2 value of 0.3226. The type of sediment is dominated by sand and muddy sand which supports the mangrove ecosystem as a natural habitat for mangrove crabs.

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