The Abundance and Distribution Patterns of Mud Crabs (*Scylla* Spp.) In The Ketapang Indah Mangrove Area, Singkil, Aceh

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Abstract

The mangrove crab lives in areas densely covered with mangrove vegetation with muddy or sandy mud substrates. The mangrove crab belongs to the class Crustacea and order Decapoda. Crustaceans are hard-shelled animals, so their growth is characterized by a process of molting. Mangroves are the natural habitat of mangrove crabs. The purpose of this study was to determine the species richness of mangrove crabs (*Scylla* spp) and the distribution patterns of mangrove crabs (*Scylla* spp). The research method used was a survey method. The technique for sampling mangrove crabs was random sampling using traps taken from three stations, with three repetitions at each station. The results of the study show that three species were found in the Ketapang Indah mangrove area, namely *Scylla serrata, Scylla paramamosain,* and *Scylla olivacea*. The overall distribution of mangrove crabs *Scylla serrata* and *Scylla olivacea* was uniform, while *Scylla Paramamosain* had a aggregate distribution pattern.

Keywords: Mangrove crabs; Species richness; Species distribution

Introduction

The mangrove crab (Scylla spp.) is a potential fishery resource commodity for development due to its high economic value (Rahayu et al., 2023). Mangroves play a role as a habitat for mangrove-associated biota (Wintah et al., 2021). Mangrove crabs live in estuarine and mangrove habitats. Many crabs inhabit the intertidal zone (open when the tide is low), with most adult crabs inhabiting shallow areas below the lowest tide water level, where they bury themselves in the mud during the day (Bir et al., 2020). As one of the ecosystem services provided by mangroves, mangrove crabs have the potential to support the economic livelihoods of communities, especially small-scale fishermen (Oktamalia et al., 2019).

The mangrove ecosystem has various ecological, social, and economic functions (Wintah et al., 2023). Mangroves serve as a habitat for mud crabs as they travel from coastal waters to the sea. Later, the parents and their young will try to return to coastal waters, river estuaries, or mangrove forest waters to seek shelter, find food, and grow. The mangrove crabs that are ready to mate will enter the mangrove waters or ponds. After the mating process, the female crabs will slowly move to the coast and then to the middle of the sea to spawn. The male crabs that have mated or are mature in the mangrove waters will occupy the muddy areas and look for places where food is abundant. Crabs use macrozoobenthos as a food source to help increase their size and body weight (Rahayu et al., 2023).

The distribution of living organisms from one place to another is described as their distribution pattern. The distribution of a species within a specific area can be classified into three basic patterns: random, aggregated, and

uniform. The term migration is used to describe this phenomenon, which refers to the movement of large numbers of species from one place to another. Gunarto et al. (2001) state that distribution is the spread of species influenced by the geographic range of a water body. Information about the distribution of mangrove crabs in a water body is very helpful for mangrove crab fishing, especially in terms of the ease of finding fishing grounds and the commercial value of the catch.

The distribution pattern is influenced several factors, including: spawning season, survival rate of each age group, and the relationship between crabs and environmental changes. Mangrove crabs are usually found on the bottom of sandy muddy waters, in the presence of mangroves and seawater inflow to rivers. In terms of ecosystem, the distribution of mangrove crabs is divided into two areas, namely coastal areas and marine waters. In coastal waters, which are nursery grounds and feeding grounds, mangrove crabs are found in the juvenile, sub-adult, and adult stages, while in marine waters, which are spawning grounds, mangrove crabs are found in the adult (gonadally mature) stage, zoea stage, and megalops stage. The mangrove crab is a swimming crab and is found in almost all coastal waters of Indonesia, especially in mangrove areas as well as in brackish water ponds or river estuaries (Kasry, 1996).

The distribution of mangrove crabs in the Ketapang Indah mangrove area of Aceh Singkil is not yet known with certainty. Therefore, research is needed on the distribution patterns of mangrove crabs (Scylla spp.) in the Ketapang Indah mangrove area of Singkil, Aceh.

Methods

The method used in this study was a survey method that examined environmental conditions. The survey method was chosen because this study aimed to obtain an up-to-date picture of the species richness and distribution of mangrove crabs in the Ketapang Indah mangrove forest area, Singkil. Mangrove crab sampling was conducted using random sampling with traps taken from three stations, with three repetitions at each station. Sex determination was carried out by observing the shape of the abdomen (Tiurlan et al., 2019).

Data Analysis

a. Species richness

Species richness is the total number of species in a community calculated using the Margalef Index based on Spellerberg's formula (1991).

$$D = S-1/\text{Log } N$$

Description:

D = Margalef Index

S = number of species

N = total number of species

Species Richness Index Criteria (Taqwa, 2010):

Margalef index > 4.0 = High species richness

Margalef index 2.5-4.0 = Moderate species richness

Margalef index < 2.5 = Low species richness

b. Species Distribution

Crab distribution was analyzed using variance analysis based on Spellerberg's formula (1991).

$$S^2 = \frac{\sum_{n-1}^{n}(xi - x)^2}{n - 1}$$

Description:
S^2: Variance Index

n: number of samples

xi: difference in values at the time of observation

x: sample mean

Determination of distribution patterns based on (Spellerberg, 1991).

S2 = 0 (Uniform)

S2 = x (Random)

S2 > x (Aggregate)

Results

a. Species richness

The species richness found at the study site included three species of mangrove crabs found in the Ketapang Indah Mangrove Area, namely *Scylla serrata, Scylla paramamosain,* and *Scylla olivacea*, which were distributed across three stations (Figure 1).

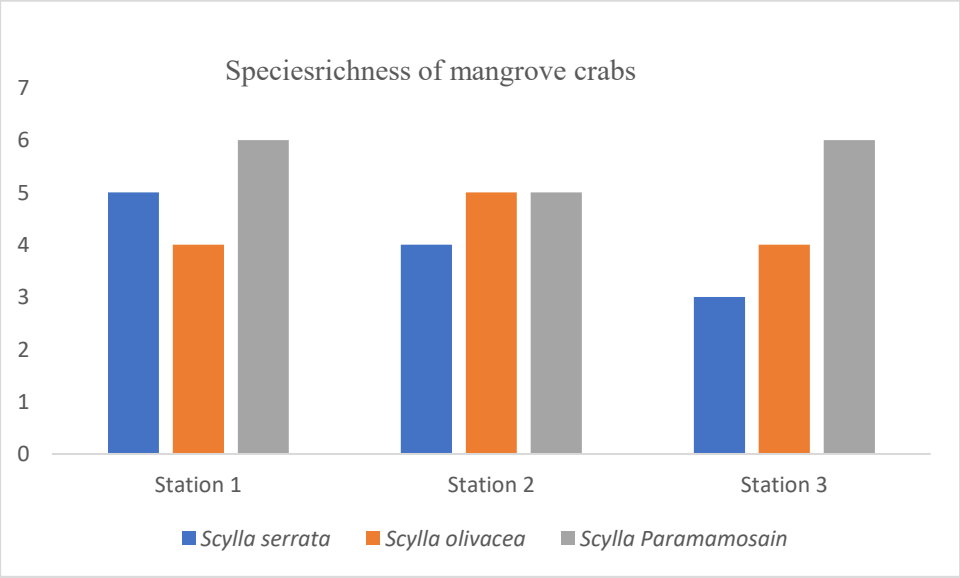

Figure 1. The total number of individuals at each station

b. Species Distribution

The distribution of crabs at each station in the Ketapang Indah Mangrove Forest Area (Table 1).

Table 1. Distribution of crabs at each station

No	Species	ST1	ST2	ST3	Total distribution	Distribution
1	*Scylla serrata*	1.02	0.41	0.48	0.64	Uniform
2	*Scylla olivacea*	0.41	1.02	0.70	0.71	Uniform
3	*Scylla Paramamosain*	1.84	1.02	1.95	1.61	Aggregate

Description:

ST1 = Station 1

ST2 = Station 2

ST3 = Station 3

Discussion

a. Species richness

The species richness is the number or abundance of species in a sample, community, or habitat (Odum, 1971). Species richness serves to determine the species richness of each species in each community encountered. Species richness is the total number of species in a community calculated using the Margalef Index. The species richness index in the Ketapang Indah mangrove forest area is moderate. The species richness found at the study site includes three species of mangrove crabs found in the Ketapang Indah Mangrove Area, namely *Scylla serrata, Scylla paramamosain,* and *Scylla olivacea*, which were distributed across three observation stations with a total of 76 individuals, with 26 individuals at station one, 25 individuals at station two, and 20 individuals at station three. *Scylla paramamosain* was most commonly found at station one, while *Scylla olivacea* was least commonly found at station one. *Scylla paramamosain* and *Scylla olivacea* were most commonly found at station two, while *Scylla serrata* was least commonly found at station two. *Scylla paramamosain* was most commonly found at station three, while *Scylla serrata* was least commonly found at station three.

b. Species Distribution

The overall distribution of crab species *Scylla serrata* and *Scylla olivacea* is uniform distributed. This uniform distributed pattern is caused by competition between individuals for food and shelter. Putra (2019) states that this uniform distributed pattern occurs due to relatively intense competition between individuals. The distribution of the species *Scylla Paramamosain* has a aggregate distribution pattern. The aggregate distribution pattern is caused by limiting factors on the existence of a population. Jamil et al. (2016) state that the aggregate pattern is caused by the species' tendency to resist predator attacks and the availability of sufficient food for certain species.

Conclusion

The species richness found at the study site included three species of mangrove crabs found in the Ketapang Indah Mangrove Area, namely *Scylla serrata, Scylla paramamosain,* and *Scylla olivacea*. which were distributed across

three observation stations with a total of 76 individuals, with 26 individuals at station one, 25 individuals at station two, and 20 individuals at station three. The overall distribution of crab species *Scylla serrata* and *Scylla olivacea* is uniform distributed. The distribution of the species *Scylla Paramamosain* has a aggregate distribution pattern

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