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# PROCEEDINGS

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### Food Sovereignty and Natural Resources in Archipelago Region

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International Seminar

"Food Sovereignty and Natural Resources  
in Archipelago Region"



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## RELATIONSHIP WITH THE POPULATION DENSITY OF MANGROVE CRABS IN THE GULF UN SOUTHEAST MALUKU

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### Abstract

Crabs on aquatic resources is one of the important economic value demersal and much favored by the public. This research aims to investigate the relationship of density population with an abundance of crabs on the mangrove in the Bay of Tual Un and identifies the kinds of crabs on living and Association in the mangrove area. The research method used was a case study is a study that focuses on an intensive and detailed case that resulted in the collection and analysis of data in certain cases. Methods of data collection is the method of observation. The results showed that the density of mangroves in station I, dominated by *Avicennia sp* types . With 5 levels of the tree, no saplings, a total of 10 levels. Station II is dominated by *Rhizophora sp*, tree-level numbered 20, a level of saplings to 20, numbers 5 and 20 saplings dominance by type *Avicennia sp* and *Bruguiera spp* Crab abundance in the relatively small at a distance of 1 meters of 20.85 % at station I, II station of 28.19 % and 51.66 % III station on within 3 m of 22.89 % first station, station II 34.76 % and 37.35 % from the third station, this small crabs *Portunus pelagicus* found, *podothaimus vigil*, *Thalamita crenata* and *Thalamita danae*. Based on the results it can be concluded that there is a relationship between population density with an abundance of small crabs in mangrove forests Un Gulf town of Tual.

Keyword: *Density, Mangroves, Populations, Crab*

### INTRODUCTION

The utilization of natural resources, which continues to increase with the intention of pursuing a target fulfillment needs thoroughly regardless of the aspect of sustainability, would threaten the existence of these natural resources. This happens because of a lack of understanding of the people about the importance of natural ecosystems that can keep the balance of life cycle as well as being a source of life for human. Efforts to protect and manage coastal biodiversity at this time is very important. This can be done through the reduction of negative impacts arising from human activities on the ecosystem such as coastal mangrove areas of main. Controlling pollution, reduce catch more and increase the protection of ecosystems is a major step towards the utilization of mangrove areas

sustainably. The Gulf is one of the Un small Bay on the island of Dullah, in Kei Kecil Islands, Southeast Maluku. The Gulf is closed by a spring Un mouth narrow bays and the inside of the post. As the waters of the spring reclusive, Gulf waters are shielded from the influence of very Un waves so that the waters are relatively calm.

Calm waters allow the onset of sedimentation process which can create substrate that are suitable for growing mangrove communities. The Gulf small bay Un is a good habitat for the creation of mangrove ecosystems are thick. The mangrove forest is a tropical beach vegetation communities dominated by a few mangrove tree species that grow and develop, the view of the tidal area Beach muddy, shallow bays on the coast, estuaria, delta, and a sheltered coastal areas (Bengen,2000). Since tidal coastal areas inhabited by communities of mangroves, various other communities will accompany it such as Community fish, benthos and various forms of other living beings. Many types of small crab in mangrove forests such as: small crab to green light, Moon and others. Nontji (2002), mention that the waters of mangrove known serves as the orphanage (nursery ground) for various types of aquatic animals that have a significant economic value, such as fish, shrimp and molluscs. This is due to the high primary productivity in mangrove waters (Supriharyono, 2002).

Small crab on aquatic resources is one of the economically important demersal value because many people interested and the price is quite expensive. As with other demersal resources. Generally have cirri traits: low activity, motion displacement not far form the hordes of relative small so its spread relatively evenly over the other pelagic resources (Aoyama 1973 in badrudin et al, 1998). Low activity and motion displacement who not too far, then the durability against pressure relative low arrest so that when the intensity of the arrest raised twice the mortality of his arrest would be increased twice (Badrudin et al. 1998).

Knowledge of the relation of density of mangrove with an abundance of small crab note that this research aims to know the relation of density population with an abundance of small crab on the mangroves in the Gulf Un in city of Tual.

## **METHODS**

Given there is some factor discussion in the implementation of research, where the State of the waters is not necessarily the same as in other waters, especially the factor of time, physical properties of the water. The climate and conditions of oceanography are different, then the research methods used are case studies, namely where a study is focusing on an incentive basis and detailed case, which resulted in the collection and analysis of data on cases in a certain time and limited to certain areas only (Hadi, 1988).

This research is a case study for the relationship with an abundance of small crab to mangrove density was examined in depth at the time, place and population limited, while the method of collecting the data collection method used, the used method of observation and recording of the popular consultations were incidents that were investigated in the study but the results can illustrate the nature of the research object of population (Hadi, 1988).

### **Determination of location**

This research was conducted in mangrove forests Gulf Un City Tual who grew up along the Gulf Coast at village Taar Un city of Tual. In terms of maritime regions, including research location in the littoral zone, because the area still affected by tidal activity. The location was chosen as the location of the Un Gulf research due to having large areas of mangrove in the overgrown, which pretty much sums up with a variety of types. Beside that, this area is in the Gulf so that its waters tend to be calm, free from the brunt of the mighty waves and wind. Viewed from the natural conditions that support the expected influence of the variables examined more real. A location investigated is divided into three main station (station I) represent areas that are somewhat dense mangrove vegetation, (station II) represents the location of the halls, and (III) represent the location of a very dense mangrove vegetation, the distance between the station and 100 meters.

### **Sampling Technique**

Small crab on sampling is done at a distance of 1 metre and 3 banks of mangrove habitat at different density levels in the area of mangrove vegetation turns rarely (I) somewhat dense mangrove areas, the vegetation turns (station II), and mangrove reas of dense vegetation turns (stations III) distances between stations, with 100 m. the first sampling provide a rare mangrove vegetation (station of I), by means of draw the line 20 metre long transect paralleled the coastline, then divided into 10 point with a distance of each point of a sample of 2 meters.

The same thing is done at the station of II and III. At each sampling station is done 3 times repeats, with a time interval of 7 days. To obtain data about the number of population of small crab in the iron hook is used as a tool to capture the small crab. After the calculation, then the small crab to each drawn represents the type and inserted into the sample bottle and preserved using formaldehyde 4%.

### **Sampling of mangrove**

To calculate the density of mangrove trees use the guidelines Dumbois (1978 in Santosa, at al, 1998) that the pharmacy mangrove vegetation include:

1. The level of the tree ("trees"). Diameter of Rod > 10 cm (measured as high as chest = 1.3 meters above ground level or 20 cm above the root of good).
2. The level ("sapling"). The Diameter of the stem <10 cm and height >1 m.
3. The level ("seedling"). A simple form of seed germinated until reaching a high since ≤ 1 m.

Mangrove forest density is determined by calculating the number of individuals using the mangrove tree transect 10 x 10 m. This determination is based on the method of quadratic Oosting, the (1956, in Cholik, 1996 and Dumbois at al, 1978 in Santosa at al, 1978), where the total area of this site cannot be used for a level stake ("sapling") and for ("seedling"), then the size of the stake and for level is 2x2m. Based on the above method diasusikan that at the level of the tree, each tree, each having closure ± 2 x 2 m.

Categories based on the number of mangrove tree density constituting, which became a benchmark in terms of the number of its density level stake. Categories of density can be seen in table 1 below :

**Table 1 Category density mangrove**

Location or	Jlh trees / 20m2	Category
Stasion I	<15	Near crowded
Stasion II	15 - 20	Solid
Stasion III	>30	It is very tight

### **Data Analysis**

#### **Distribution of small crab**

Data analysis using the method TTIQV (Two-Term Local Quadrat Variance) Hill and Reynolds, 1988 by the formula:

$$\begin{aligned}
 \text{VAR}(X)_1 &= [ 1/(N-1)] \{ [1/2 (X_1 - X_2)]^2 + [1/2 (X_2 - X_3)]^2 \\
 &\quad + \dots + [1/2(X_{N-1} - X_N)]^2 \} \\
 \text{VAR}(X)_2 &= [ 1/(N-3)] \{ [1/4 (X_1-X_2-X_3-X_4)]^2 + [1/4 (X_2 - X_3 + \\
 &\quad X_{N-1}-X_4)]^2 + \dots + [1/4(X_{N-3} + X_{N-2} - X_N)]^2 \}
 \end{aligned}$$

Description: X: the number of individuals in transect to i  
 N: number of transek in the belt transect

#### **Relative abundance of small crab**

According to Odum (1971), relative abundance (KR) can be calculated with the following formula:

$$\text{KR} = \frac{ni}{N} \times 100\%$$



Description:

- KR : relative Abundance:
- ni : abundance to i
- N : the total number of individuals

To find out whether there is a difference between the distribution of small crab attaching to different levels of density of mangrove as well as the distance the edge towards the sea are different, then the test is done on the basis of the quadratic contingency Chi (Sudjana, 1986), the formula is as follows:

$$N_{ij} = \frac{n_{io} \times n_{oi}}{n}$$

Description:

- n :Jumlah the frequency of observations
- nio : number of animals as the real value
- noi : number of animals as a theoretical value

## RESULTS AND DISCUSSION

### The Density Of Mangrove

The density of mangroves on the location of the research are presented in table 2

**Table 2 Number of Mangroves in location**

Location	Vegetation	Tk. trees (Phn/20m <sup>2</sup> )	Tk. Stake (Phn/20m <sup>2</sup> )	Tk. Seedlings (Phn/20m <sup>2</sup> )	Age	Category
St. I	<i>Avicenia sp</i>	10	5	0	5	Near crowded
	<i>Bruguiera sp</i>	5	5	0	3.7	
St. II	<i>Has sp</i>	20	20	5	15	Solid
St. III	<i>Avicenia sp</i>	10	20	5	11.7	It is very tight
	<i>Sonneratia sp</i>	20	10	5	8.3	

The density of mangroves on the third location of such research is the mangrove forest which is not homogeneous because it consists of four genera of the *Rhizophora sp*, *sp Avicennia*, *Bruguiera sp*, and *Sonneratia sp* different levels of density of mangrove can determine the level of abundance of small crab. Different density produces a number of different populations. The level of density of different mangrove on the station I, II, and III produce an abundance of small crab attaching. The relative abundance (KR) the small crab attaching side at a distance of 1 meter and 3 meter is presented in table 3.

**Table 3 Abundance relative (%) small crab attaching the habitat Mangrove distance Edge 1m and 3m**

No	Species	The 1 meters			Age	The 3 meters			Age
		St. I	St. II	St. III		St. I	St. II	St. III	
1	<i>Portunus pelagicus</i>	20.85	28.19	51.06	33.37	22.89	34.76	37.35	31.67
2	<i>Portunus vigil</i>	20.88	28.57	50.55	33.33	23.03	41.45	35.33	32.33
3	<i>Thalamita crenata</i>	22.11	25.63	52.26	33.33	21.43	37.75	40.82	33.33
4	<i>Thalamita danae</i>	21.65	26.29	52.06	33.33	26.37	35.71	37.91	33.33

The relative abundance (KR) the small crab attaching at the station I is the 1 meter amounted to 20,85% smaller than the station III amounted to 51,06%. The same thing also happens at a distance by 3 meters. KR small crab attaching at the station I was 22,89% smaller than the station III 37,35%. This occurs because the number of trees on a low density rate I station compared the level of density at category III with dense station.

Rooting mangroves serve as sediment traps. In addition also the mangrove is an area that is prone to tidal currents affected mainly happens periodically. The lack of number of mangrove trees on the area causing the area easily swept waves and currents. These processes allow the small crab attaching to another place can move together in order to hide or immerse themselves in muddy areas that are free of predators that would endanger his life.

Different density levels may determine the existence of small crab attaching. Small crab attaching to that found at the site of the research consists of four species, namely: *Portunus pelagicus*, *Thalamita crenata danae*, and *Thalamita Podothalamus vigil*. Of the four types of small crab attaching to such amount and abundance. The level of deployment of small crab attaching between the three stations have different levels of density and distance of edge. The relative abundance (KR) the small crab attaching to the edge distance 1 m, relative abundance (KR) the small crab attaching at the station I totaled 20,85%, total 28,19% II station and the station III, relative abundance (KR) the small crab attaching numbered 51,66%.

The station has a relative abundance of III (KR) the small crab attaching high if compared with the station I and II at the edge 1 m at a distance of 3 m, the Relative Abundance (KR) the highest station is found on the small crab attaching III totaled 37,35 followed station II amounted to 34.76 and the lowest at the station I was 22,89%. To find out whether or not there is a relationship between the abundance of small crab attaching to different levels of density of mangroves used Chi-square test. Calculations with the use of chi-square test retrieved results count  $X^2 = X^2$ , table 82,547 0.99 (3): 11.3, means that there is a relationship between different density level with the distribution and abundance of animals small crab attaching (*Portunus pelagicus*).

The second factor is the link between relationship is known by means of a comparison between the contingency coefficient (C) and Cmaksimum. The results obtained  $C = 0.23$  and  $C_{max} = 0.81$ . Because the value of C is close to 100% means that the relationship between the density of mangrove with an abundance of small crab attaching is real. Based on the results obtained, the abundance of small crab attaching many found at a distance of 1 metre on the edge of the mangrove populated category.

This is in accordance with the habitat live in front of the beach or small crab attaching to front of mangrove forests, muddy waters and on the basis of the seagrass. According to Romimohtarto (2000), *Portunus pelagicus* live in sandy beaches, mud and the waters ahead of the mangrove forests, they immerse themselves in the sand.

### **Distribution Mangrove**

Results of calculation variants with respect to the method of QV (Two-Term Local Quadrat Variance-) Hill and Reynolds (1998) in the Kasry (1991), mangrove habitats with different edge distances are served at the table (4) while the placement of variant and block size is presented in table (5).

**Table 4 Counting result variants in habitat mangrove and distance Edge 1 meters**

Location	VAR (X)1	VAR (X)2	VAR (X)3	VAR (X)4	VAR (X)5
Railway Station. I	1.67	1.43	1.17	1.45	2.5
Railway Station. II	3.67	2.03	1.58	1.58	3.6
Railway Station. III	2.67	2.11	0.12	0.12	12.2

**Table 5 Counting result variants in habitat mangrove and the distance Edge 3 meters**

Location	VAR (X)1	VAR (X)2	VAR (X)3	VAR (X)4	VAR (X)5
Railway Station. I	5.44	8.64	8.28	3.21	0.4
Railway Station. II	2.10	2.11	1.50	1.21	0
Railway Station. III	5.33	10.64	8.47	27.12	22

Distribution of the biota, according to Kasry (1973), are determined by physical, chemical factors in the environment. Physical properties of chemical environment that is influential among other light, temperature, flow, substrate, oxygen, salinity and nutrient elements. The type III has clumped distribution (clumped). According to Odum (1971), distribution or dissemination of the organisms are limited by individual properties it self (intrinsic factor), namely the nature of genetics and behavior on the pleasure of choosing the habitat as well as influences from the outside (extrinsic factor) that the interaction with the environment.



The distribution pattern at a distance of 3 m between the stations of I, II and III. There is a difference between the distribution pattern of the third station was caused due to a small crab attaching to animals in great numbers so competition in search of food. According to Nybaken (1992), the distribution of biota are determined by several factors. One is the relationship between species. The local distribution of some animals is limited by the presence of other organisms can be plant foods, predators, diseases and competitors.

The relationship between species that causes the organism cannot establish a cycle of his life with complete, although it is known that the area was within the reach of dispersion and match the pleasure of choosing organisms habitats. The Parameter has an important role with respect to aquatic organism. The range of the temperature on the station I, II and III at a distance of 1 metre edge ranges 250 °C and 270C ranges from 3 meters.

The low temperature side at a distance of 1 meter due to the influence of the fresh water sources exist around that location. Degree movies acidity (pH) at each station the same IE 7 with relatively basic Sandy mud and waters a bit Rocky. Water quality parameters on the station I, II, and III were declared to still be on a living organism's tolerance of the water.

## **CONCLUSIONS**

Based on the results of the research it can be concluded that there is a relationship of density population with an abundance of small crab attaching to the mangroves in the Gulf Un in the Tual city.

## **REFERENCES**

- Areas Tropical Storm. Publisher Gramedia. Jakarta.
- Bengen, D.G. 2000. Provide a reference how to intervene Technical Control and Management Mangrov Ecosystem. PKSPL-IIP. Bogor.
- Hadi, S. 1988. Statistics method. Publisher Andi. Yogyakarta.
- Kasry, A. 1991. Biology Mangrove crabs and Biology May. Bharata. Jakarta.
- Nontji, A. 2002. The Sea Archipelago. Publisher Djambatan. Jakarta.
- Nybaken, J. W. 1992. Marine Biology Ecology approach, a. Publisher Gramedia. Jakarta.
- Odum, E. P. 1971. *Fundamentalist of Ecology*. Sounders Company. Philadelphia.
- Romimohtarto, K, Juwana Seaport.S. 2001. Marine Biology. Publisher Djambatan. Jakarta.
- Supriharyono, 2002. Conservation and Management of Natural Resources in the Coastal