

PHYSICAL AND CHEMICAL CHARACTERISTICS OF WATERS FOR THE LIFE AND GROWTH OF MANGROVE CRABS (*Scylla serata*) IN INTERTIDAL WATER OF OEBELO VILLAGE, TANAH MERAH, AND NOELBAKI VILLAGES, KUPANG BAY

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Abstract: This study aims to determine the physical and chemical characteristics of waters for the life and growth of mangrove crabs (*Scylla serata*) in intertidal waters area of Oebelo, Tanah Merah, and Noelbaki Villages in Kupang Bay. Method used in this study is observation. Furthermore, the data obtained from these observations were analyzed using qualitative and quantitative descriptive analyses. The results obtained from this study indicated that characteristics of the physical and chemical parameters of intertidal waters in Oebelo, Tanah Merah and Noelbaki villages which are seen from temperature, current speed, total suspended solid (TSS), substrate texture, salinity, dissolved oxygen, degree of acidity, and particular organic matter (POM), showing a range of various values. However, variation in the height and low range of physical and chemical parameters of intertidal waters in the three villages still shows a value that is still within the tolerance range of mangrove crabs to sustain their life and growth process.

Keywords: Physical and chemical characteristics of waters, life, growth, mangrove crabs

I. INTRODUCTION

Oebelo, Tanah Merah, and Noelbaki are the three coastal villages included in the area of Kupang Bay. In addition, along the coastal line of these three villages, there are wide mangrove forest areas and intertidal waters that can be used by various biotas, such as mangrove crabs as habitat to sustain their life and growth (Rissamasu et al., 2013). The presence of mangrove forests and intertidal waters in these three locations that can be used by various biota including mangrove crabs, many fishermen in the local area can do various specific businesses, such as fisheries for various biota, one of which is mangrove crabs.

Regarding the fishery efforts of mangrove crabs in intertidal waters of the three villages, local fishermen's community said that in obtaining shells, they tend to catch or do exploitation in various ways, using hand to collect shells directly on the substrate, take

shellfish using iron dig or pieces of iron for digging the substrate and taking the shells within. In addition, for mangrove crabs that are large in size or reach spawning sizes which usually protect themselves on mangrove roots, they can be exploited by first cutting the mangrove roots and then the mangrove crabs inside are taken. If this exploitation habit is allowed to continue, it can result in degradation of the mangrove ecosystem as a habitat for mangrove crabs and other biota live in it.

Another thing informed by the local fishermen's community was that activities in exploiting biota other than mangrove crabs in the intertidal waters of these three villages, in this case were shrimp, some fishermen often used potassium and some used diesel oil and were directly spread to waters to stress the shrimp which at a certain time will experience mass death, then the shrimp is collected for sale. This condition is worsened by the activities of local fishermen who utilize mangrove forest areas as boat landing areas which at certain times will make certain negative contributions such as oil spills which directly lead to intertidal waters and are likely to have a fluctuating effect on in the physical and chemical parameters for aquatic biota existed in it including mangrove crabs in the three villages. Thus, by referring to the existing problems regarding the possible fluctuations in the physical and chemical parameters of the waters for the life and growth of mangrove crabs as a result of fishing and other non-environmentally friendly activities, then this study aims to know the physical and chemical characteristics of intertidal waters for the life and growth of mangrove crabs in the three villages to support future efforts of mollusk resource management.

II. METHOD OF STUDY

This research was conducted in August 2016 at the intertidal waters of Oebelo, Tanah Merah, and Noelbaki villages, Kupang Bay. Equipments used in this study are thermometer, current ball, refractometer, pH meter and DO meter. Furthermore, materials used in this study are aquadest, tissue, and sea water. The data collected from this study related to water temperature can be checked using a thermometer, the speed of water flow can be checked using a current ball, the the water base substrate can be investigated by taking the substrate and then observing the texture, while to know the content of total suspended solid (TSS), the water sample was collected and taken to the Marine and Fisheries Faculty laboratory for analysis.

Furthermore, salinity measurement can be done by using a refractometer, acidity (pH) by using a pH meter, dissolved oxygen (DO) by using DO meter and the content of particular organic matter (POM) can be determined by collecting a water sample and taken to the Marine Data generated from the measurement results are then analyzed using qualitative and quantitative descriptive analyses.

III. DISCUSSION

3.1 General Description of Mangrove Crabs Habitat in the Intertidal Waters of Oebelo, Tanah Merah, and Noelbaki villages in Kupang Bay

General description of mangrove crabs habitat in the intertidal waters of Oebelo, Tanah Merah, and Noelbaki villages of Kupang Bay can be illustrated as follows: the intertidal waters of Oebelo Village has a relatively sloping coast topography with a sandy mud base a fairly tight mangrove tree vegetation, but some areas are empty due to logging

activity. Furthermore, the intertidal waters of Tanah Merah village are relatively protected from waves, with quite dense mangroves vegetation and several open places because the mangroves have been cut down. While the intertidal waters of Noelbaki village have a relatively sloping topographic characteristics in the coastal area, protected from waves and have denser mangrove tree vegetation than Oebelo and Tanah Merah villages.

General description of mangrove crabs habitat in the intertidal waters of Oebelo, Tanah Merah, and Noelbaki villages of Kupang Bay, as described above, can also be seen in the following picture.



Figure 1. General Description of Mangrove Crabs Habitat in the Intertidal Waters (a) Oebelo Village, (b) Tanah Merah Village, (c) Noelbaki Village

3.2 Physical Characteristics of Waters for the Life and Growth of Mangrove Crabs (*Scylla cerata*)

Physical characteristics of waters for the life and growth of mangrove crabs in the intertidal waters of Oebelo, Tanah Merah, and Noelbaki villages of Kupang Bay, based on the measurement results of the study, can be detail illustrated in the following table.

Table 1. Range of Characteristics of Physical Parameters of Intertidal Waters in Oebelo, Tanah Merah, and Noelbaki Villages of Kupang Bay

Physical Parameters	Village / Location		
	Oebelo	Tanah Merah	Noelbaki
Temperature (°C)	27 - 29	27 - 29	26 - 29
Current Speed (m/s)	0,082 - 0,100	0,032 - 0,063	0,042 - 0,067
TSS (mg/l)	0,0024 - 0,0480	0,0020 - 0,0852	0,0036 - 0,1444
Substrate	Sandy Mud	Sandy Mud	Sandy Mud

Source: Study data, 2016

The table above explains that the characteristics of physical parameters of the intertidal waters in Oebelo Village are as follows: temperatures are ranging from 27 - 29 °C, the current speed ranges from 0,082 – 0,100 m/s, total suspended solid (TSS) ranges from 0,0024 - 0,0480 mg/l and the texture of the substrate is sandy mud. Furthermore, the characteristics of physical parameters of intertidal waters in Tanah Merah Village, are as follows: temperatures are ranging from 27 - 29 °C, the current speed ranges from 0,032 – 0,063 m/s, total suspended solid (TSS) ranges from 0,0020 – 0,0852 mg/l and sandy mud is dominated its substrate texture. While the intertidal waters of Noelbaki Village can be illustrated as follows: the temperatures is ranging from 26 - 29 °C, the current velocity ranges from 0,042 – 0,067 m/s, total suspended solid (TSS) ranges from 0,0036 – 0,1444 mg/l and the substrate texture is sandy mud.

3.3 Chemical Characteristics of Waters for the Life and Growth of Mangrove Crabs (*Scylla cerata*)

The chemical characteristics of waters for the life and growth of mangrove crabs in the intertidal waters of Oebelo, Tanah Merah, and Noelbaki Villages in Kupang Bay, based on the measurement results during the study, can be detail illustrated in the following table.

Table 2. Ranges of water chemical parameters in the three locations of Kupang Bay

Chemical Parameters	Village / Location		
	Oebelo	Tanah Merah	Noelbaki
Salinity (‰)	28 - 32	29 - 32	29 - 31
Dissolved Oxygen (mg/l)	4,4 - 5,1	5,7 - 6,8	4,6 - 5,7
pH	8,1 - 8,4	7,5 - 8,4	7,1 - 7,5
POM (mg/l)	0,0004 - 0,0028	0,0008 - 0,0029	0,0090 - 0,0168

Source: Study data, 2016

The table above explains that characteristics of the chemical parameters in the intertidal waters of Oebelo Village can described as follows: the salinity is ranging from 28 - 32 ppt, dissolved oxygen ranges from 4,4 to 5,1 mg/l, the acidity degree ranges from 8,1 to 8,4 and the particular organic matter (POM) is ranging from 0,0004 - 0,0028 mg/l. Furthermore, the intertidal waters of Tanah Merah Village can be detailed as follows: the

salinity is ranging from 29 - 32 ppt, dissolved oxygen ranges from 5,7 – 6,8 mg/l, acidity levels ranged from 7,5 – 8,4 and the particular organic matter (POM) ranges from 0,0008 - 0,0029 mg/l. Lastly, the condition of intertidal waters of Noelbaki Village is as follows: the salinity is ranging from 29 - 31 ppt, dissolved oxygen ranges from 4,6 – 5,7 mg/l, acidity degrees ranged from 7,1 to 7,5 and the particular organic matter (POM) is ranging from 0,0090 – 0,0168 mg/l.

According to Hutabarat (2000) and Brotowijoyo et al. (1995), the physical and chemical qualities of aquatic environments including intertidal waters play an important role in determining both the good / poor growth and survival of an aquatic biota, in this case including mangrove crabs.

Furthermore, Romimohtarto (2003) also explained that if there were fluctuations in these two parameters in the aquatic environment, it would cause disruption to the aquatic biota such as stress, disease, etc. As a consequence, there will be disturbances on the living aquatic biota to carry out its growth in these aquatic environments, such as death as well as the migration of this aquatic biota to other places to look for new better habitats to support their growth and survival. This situation is similar to mangrove crabs as one of aquatic biotas whose life and growth are highly dependent on the of quality physical and chemical conditions of the waters. It is in accordance with Effendi (2003) that the range of physical and chemical qualities of water that still can be tolerated by mangrove crabs for sustaining their life and growth is ranging from 27 - 32 °C for temperatures, with 28 °C as the ideal tolerated temperature, the current speed of 0,05 – 0,125 m/s, with ideal tolerance of 0,15 m/s, total suspended solid (TSS) which ranging from 0,063 – 1,50 mg/l, with an ideal tolerance of 0,75 mg/l, and the substrate condition is either muddy substrate, sandy mud, or rocky mud, while salinity ranges from 28 - 32 ppt, with an ideal tolerance of 28 ppt, pH ranges from 7,3 - 8,4, with an ideal tolerance of 7,5, dissolved oxygen range is > 4 mg / l, with an ideal tolerance of 6,0 mg/l, the organic water material is ranging from 0,00025 - 4 mg/l with an ideal tolerance of 2 mg/l.

According to the range value of physical and chemical qualities of water described by Effendi (2003) above, then if it is related to the range of physical and chemical qualities of water measured in the study, this range of values are still in the tolerant range for mangrove crabs to live and grow. However, although the physical and chemical ranges of water still can be tolerated by mangrove crabs for their life and growth, various activities practiced in the exploitation process by destructive means need to be limited or stopped to avoid the undesirable things happened such as disruption towards the growth and survival of mangrove crabs in the future.

IV. CONCLUSION

Regarding findings of the study above, it can be concluded that the characteristics of physical and chemical parameters of the intertidal waters in Oebelo, Tanah Merah, and Noelbaki villages which are seen from temperature, current speed, total suspended solid (TSS), substrate texture, salinity, dissolved oxygen, acidity, and particular organic matter (POM), show a variation on its range of values . However, the variation in height and low range of the physical and chemical parameters of the intertidal waters in the three villages still shows a value that is still within the tolerance range of mangrove crabs to sustain their life and growth process.

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