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BIOECOLOGY OF COCONUT CRAB (*Birgus latro* L.) ON KALEDUPA ISLAND

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Abstract

Bioecology of Coconut crab (Birgus latro L.) On Kaledupa Island, the objective of the research is to know the Biological characteristics (morphometric measurements in the length and width of the carapax, cephlathorax added rostrum (Cp + r) and body weight) and to know the Ecological characteristic (population size) Coconut crab which is on the island of Kaledupa. Sampling technique used the CMRR (Capture-Mark-Release-Recapture) method. Data analysis techniques used: (1) Coconut crab morphometry. Data were analyzed descriptively by calculating the average length and width of the carapax, cephalothorax + rostrum length and body weight, (2) Data on sex ratio and population estimation were analyzed quantitatively. Based on the result of the analysis, the highest morphometric measurements are the length of the carapax with an average of 6.37 cm, the width of the carapax 6.03 cm, the length of the cephalothorax + rostrum 10.06 cm, which is located at the location of Station I (Hoga island, Furake sub-village). This is because of this station has unspoiled environmental conditions and there are burrows or caves where the Coconut crab is hiding, where the station belongs to the Wakatobi National Park which is a protected area, and has coconut and other shrub vegetation. These are a food source of Coconut crab s, so this area is ideal for the survival of Coconut crab. The lowest morphometry measurements obtained by carapax length with a mean of 5.62 cm, carapax width of 5.49 cm, length of cephalothorax + rostrum of 9.044 cm, which is found at the location of Station II (Sombano village). This is thought to be the condition of habitats that have been converted into other uses such as the opening of plantation land, so many of the Coconut crab hide outs are damaged. The comparison of male and female sex ratio is 13 Male: 7 Female.

Keywords: Morphometry, Habitat, Bioecology, Walnut Island, Kaledupa Island.

A. Introduction

Kaledupa Island is one of the islands in Wakatobi archipelago which has very high marine natural resources. Flora and fauna in Kaledupa allegedly experienced a decline in population, so the government protects their existence. The protected animal groups like Coconut crab (*Birgus latro* L.), which legally presence of fauna in Indonesia has the status of animals protected by the PP 7 of 1999 concerning the preservation of plant and animal species.

Birgus latro belongs to the Mandibulata subfilum, it is the largest terrestrial Arthropod group belonging to the Crustaceae in the Coenobitidae family (Sugiri, 1989). The most favored habitat for Coconut crab is beach vegetation, supralittoral shrubs, caves, and rock holes. The existence of Coconut crab in an area like this is supported by the availability of food needed for its survival. (Sulistiono, 2007) " Coconut crab foraging at night."

The existence of Coconut crab on the island of Kaledupa is very alarming. The population is not known with certainty but tends to decline because it continues to be hunted and captured

by residents. Coastal forests as the native habitat of canary is increasingly limited due to land expansion and settlement. The high value of the Coconut crab commercial in the market so that the fishing activities carried out is increasing. This activity took place without considering the sustainable aspects of the Coconut crab generation to accelerate the population's decline.

The primary key to saving the population of Coconut crab is to understand this aspect of the animal Bioecology. Knowledge of bioecological elements is one of the efforts made in maintaining the community by knowing the ideal habitat for Coconut crab and reducing pressure on the community. Through understanding the bioecology of Coconut crab, it is possible to know the characteristics of morphometry level (size in the form of *cephalothorax* + *rostrum* (Cp + r) and body weight) and population size for Coconut crab. This information can be obtained related to the ideal preservation way for the survival of Coconut crab, especially in Kaledupa, Wakatobi Regency. In connection with this, the researchers are interested in researching Bioecology of Coconut crab (*Birgus latro* L.) on Kaledupa Island.

B. Literature Review

1. Coconut crab Classification (Birgus latro L.)

Coconut crab (*Birgus latro* L.) is known as Crustacea. This animal is unique and has different characteristics with other types of crabs. To give a specific description below, we can see the taxonomy of the Coconut crab.

Kingdom : Animalia
Phylum : Arthropod
Classis : Malacostraca
Order : Decapoda
Family : Coenobitidae
Genus : Birgus
Species : *Birgus latro* L.

(Sugiri, 1989).

2. Coconut crab Morphology (Birgus latro L.)

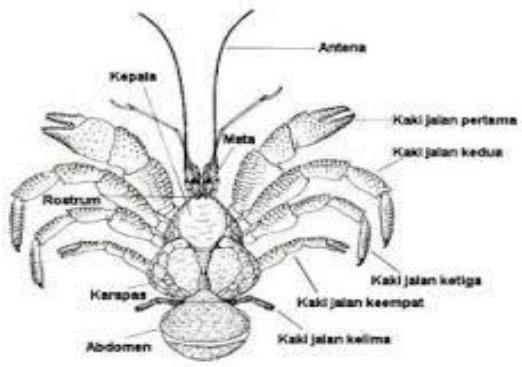

Figure.1 Cocout Crab Morphology (*Birgus latro* L.) (Romimohtarto, 2007)

Coconut crabs are included in the Mandibulata subfilum class Crustacea. Members of the Mandibulata subfilum have a body consisting of two parts (head and frame) or three parts (head, *thorax* with legs, and *abdomen*). Besides, it has one or two pairs of antennas, one pair of the *mandible* and one pair of *maxillaries* or more, three pairs of legs or more (Sugiri, 1989: 119). The Coconut crab has the characteristics of living an aquatic life and breathing with gills. The hard *exoskeleton*, consisting of slimy chitin. It is additional tools are *typical biramous* (two-pronged). The head is formed as a union of segments, sometimes united with the chest to form *cephalothorax* (*cephalus*, head, *thorax*, da) (Brotowidjoyo, 1989).

Coconut crab can reach 5 kg in weight with a chest-length exceeding 70 mm. Large toenails can span 90 cm. It is female Coconut crabs are smaller than males and have a chest-length of about 50 mm. Furthermore, Goltenboth *et al* . (2012) suggested that the crab's body length can reach 25 cm. Large size is not possible if they depend on the shell as a place to live, but it is needed to avoid direct sunlight (Whitten et al., 1987). The primary sexual characteristics that distinguish between male and female crabs from Coconut crab (*Birgus latro* L.) are female

Coconut crab with pleopods on the abdomen. In contrast, male crabs do not have pleopods. This pleopod consists of fine hairs located at the abdomen (Supyan et al., 2012).

3. *Coconut crab History and Dissemination (Birgus latro* L.)

Coconut crabs (*Birgus latro* L.) were first discovered by Rumphius in 1705 (Refiani, et al., 2009: 1). The Coconut crab is wild animal (*wildlife*), also known by the name of *robber crabs* or *Coconut crabs*. This animal is the largest terrestrial Arthropod group belonging to the Crustaceae in the Coenobitidae family (Jahidin, 2010: 139). This animal has attracted the attention of many biologists visiting islands in the Indian and Pacific Oceans, where these crabs are widespread.

In Indonesia Coconut crab are only found in the Tongian islands to the Talaud islands in North Sulawesi, Maluku, Irian, and parts of East Nusa Tenggara (Nontji, 2005: 183). Ramli, 1997 *in* Sulistiono, (2007) argued that "Distribution in Southeast Sulawesi is spread on Siompu Island, Tongali, Kaimbulawa and Liwutongkidi (Southeast Sulawesi)".

4. *Coconut crab Life Cycle* (*Birgus latro* L.)

The male Coconut crab reproductive system consists of a pair of gonads or testes that are specifically found in the abdomen. A pair of male gonads fused with the hepatopancreas organ. The male gonads consist of the testes and their channels. The male Coconut crab has the means to transfer mature Spermatozoa by using coca from the fifth pair of pereiopods (fifth walk). This tool for transferring sperm is similar to a penis or class. Mc Laughlin (1983) *in* Refiani (2009) stated that "The female reproductive system in *Malacostraca* is a pair of *ovaries* and is located in the *abdomen* that is not fused with the hepatopancreas " .

The Coconut crab (*Birgus latro* L.) marries on land. The fertilized egg is stored under the stomach of the crab. The female crab will carry the egg and release the egg into the seawater. When the tide is in the highest state which is around the full moon and as a result the larvae hatch. For 3-8 weeks, the larvae are part of the plankton before the transitional larvae (*glaucother*) move ashore and use snail shells as protection. At this stage, the Coconut crab larvae can face fierce competition with smaller strata, both in obtaining envelopes and feed. This transitional larva underwent several skin changes (*molting*), then became a little adult crab. It is when shields reach a cross-section of 2.5 cm at ± 2 years of age, they stop in the shell (Whitten et al., 1987).

5. *Coconut crab Habitat* (*Birgus latro* L.)

Coconut crab (*Birgus latro* L.) has two habitats, namely aquatic and terrestrial when the Coconut crab becomes a live egg on the beach, after dripping life as plankton in the sea. After adulthood lives on land (Whitten et al., 1987).

The most favored habitat *Birgus latro* L *.* is coastal vegetation and shrubs of the supralittoral area, inhabiting caves or rock holes and foraging at night (nocturnal). The Coconut crab is active for 11 hours, with a temperature range of 23-26 ° C at night. Adult Coconut crab has no dangerous predators except humans but the young one experiences predation by lizards, beach frogs, rats, boars, and even birds. The size almost entirely determines the dominance between the planets, and a flick of the claws can drive smaller individuals to seek protection (Whitten et al ., 1987).

6. *Coconut crab Resources and Food* (*Birus latro* L.)

Coconut crabs forage for food by filtering. In this case, the gill surface is covered with cilia. This cilia rhythmic punch pushes freshwater through one hole, the inward-moving chiffon. Then this water flows through the pores in the gills that release oxygen to provide respiration for the crabs. Any remaining material is removed from the anus and with water flowing out of the excurrent chiffon (Kimball, 1999). This Coconut crab can climb coconut trees and pick its fruit. He looks for food on the ground, among others, in the form of pandanus, breadfruit, kari, bitung, ketapang, coconut (Nontji, 2005). Coconut crabs will defend their food from their rivals. Coconut crabs eat coconuts (Anagnostoul & Schbart, 2014). In addition to coconuts and pandanus, Coconut crabs will eat weathered wood to dead birds. In captivity, crabs will easily eat lettuce, cabbage, and live *Achatina fulica* snails as well as various other feeds (Whitten et al., 1987).

Coconut crab applies the way of cannibalism or eats same-sex. This behavior is generally only seen in two distantly related individuals. Coconut crabs will getrid of sick or smaller individuals. Thus the potential for proliferation of large individual increases to the maximum by

decreasing pressure to obtain feed and other resources by utilizing important food sources on poorly fed islands (Whitten et al., 1987).

C. Methodology

1. Research Design

The research was conducted on a Date 24 June until 25 July 2015 and was housed in Kaledupa, Wakatobi, Southeast Sulawesi Province. This study consisted of three observation stations, namely Station I (Hoga Island, Furake sub-village), Station II (Sombano Village), and Station III (Watuhari).

The research objects in this study are all types of Coconut crab (*Birgus latro* L.) found on the island of Kaledupa. The indicators of this study are Bioecology of Coconut crab (*Birgus latro* L.) found on Kaledupa Island, including biological characteristics (morphometric size in the form of carapax length and width, *cephalothorax* tamba *rostrum* (Cp + r), body weight and sex ratio) and ecological characteristics (ecological characteristics (cp) population size).

The research method used in the study consisted of:

1. The samples were collected using exploration using indirect census methods, namely *Capture-Mark-Release-Recapture* (CMRR).
2. Coconut crab morphometry used was descriptive methods with direct observation techniques and morphological measurements. The methods and parts measured were as follows:
3. Carapax length, and *cephalothorax* + *rostrum* length .
4. Weight is the total body weight of the Coconut crab, which is weighed using manual scales.

2. Instruments

The tools used in this research can be seen in Table 1.

Table 1. Tools Used in Research and Functions.

No	Tool	Function
1	Stationery	Record research results
2	Wire	Tying the claws of the Coconut crab
3	Calipers	To measure the length and width of the carapace
4	Flashlight	As a light
5	Digital camera	Documentation tool
6	Manual Scales	Weigh the Coconut crab weight/weight
7	Thermometer	Measuring soil temperature
8	Thermohygrometer	Measuring air temperature and humidity

The materials used in the study can be seen in Table 2.

Table 2. Materials Used in Research and Functions.

No	Material Name	Use
1	Coconut crab(*Birgus latro L.*)	Research sample
2	Coconut	As bait
3	Type-Ex	To mark a sample

3. The technique of Data Analysis

The data obtained were tabulated, then analyzed qualitatively and quantitatively. The data analyzed qualitatively are environmental parameter data, while the data analyzed quantitatively are as follows:

1) Analysis of Morphometric Measurement Data

The data that has been obtained in a descriptive analysis is to calculate the mean length and carapace width, *cephalothorax* + *rostrum* length , body weight (Supyan, 2012).

2) Analysis of Population Estimation

The data obtained were analyzed using the following formula :

$$N = \frac{M(n+1)}{m+1}$$

$$\text{Estimated Variance (Var. N)} = \frac{M^2(n+1)(n-m)}{(m+1)^2(m+2)}$$

$$\text{Standard Deviation (SB)} = \sqrt{\frac{M^2(n+1)(n-m)}{(m+1)^2(m+2)}}$$

Where :

N = Estimated population abundance

M = Number of individuals marked and released back in the first sampling period
N = Total number of signed and unmarked in the second sampling period
M = Number of signed individuals who were recaptured in the second sampling period
SB = Standard Deviation (Alikodra, 1990).

D. Result and Discussion

1. Result

a. Description of Research Locations

The study's location was carried out on Kaledupa Island, one of the islands in the Wakatobi Regency, which is geographically bordered by:

1. The Banda Sea borders the north
2. Kec borders the south side. South Kaledupa
3. The Banda Sea borders the East
4. The Banda Sea borders west side

(Source: Kaledupa in Figures, 2011).

Geographically Kaledupa lies at coordinates of 0 to 5 ◦ 34; 12 " latitude and 123 ◦ 4618 " BT with vast the region of about 45.50 km ^{2}. In general, the study site has a topography with white sand and coconut trees that grow very much on the beach. On this island, many stone holes are found in the form of small caves that are used by Coconut crab as a hiding place. There are also coconut tree vegetation, pandan forest, other shrubs, and trees that are a source of eating Coconut crab.

Descriptions of each research station are as follows:

1. The station I (Hoga Island, Furake sub-village).

The station I (Hoga Island, Furake sub-village), when viewed from the topography, has a height of 2 meters above sea level, hard rock substrate in the form of rocks, and steep and found many large holes and small caves that make this place suitable for Coconut crab Habitat. The condition of the habitat is unspoiled, far from residential areas, where the station is included in the Wakatobi National Park, which is a protected area that supports the ideal habitat for Coconut crab .

2. Station II (Sombano Village).

Station II (Desa Sombano) is an area with a hard rock structure. The area is 3 km away from residential areas, the primary vegetation found in the form of coconut trees and shrubs. Many rock holes are found, which are used as Coconut crab as habitat.

3. Station III (Watuhari).

Station III (Watuhari) is an uninhabited hilly area, a hard rock structure. There is a bush thicket, rugged an uninhabited island.

b. *Coconut crab Ecology* (*Birgus latro* L.).

The measurement of the environmental quality parameters of the Coconut crab (*Birgus latro* L.) habitat in the form of soil temperature, humidity, and rainfall. For rainfall measurements obtained from BMKG Betoambari Bau-Bau . Measurements were made at three points in each station. The mean results of the analysis and calculation of environmental factors can be seen in Table 3.

1. Water temperature

Based on the results of temperature measurements at each observation location on the island of Kaledupa during sampling, data obtained that the average air temperature at the observation site Station I (Furake Hamlet), ranged from 25.5 ºC, Station II (Sombano Village), around 26.7 ºC, and Location of Station III (Watuhari), around 26.5 ºC. The results of

the measurement of the physical-chemical condition of the study site, in general, are still within the normal range for the life of the Coconut crab.

Table 3. The Range of Environmental Parameter Values at Each Observation Station.

Station	Air Temperature (ºC) (mean)	Humidity (%)	Standar Deviasi (s)	Rainfall (mm / mo)
I	25.6	43.3	0.744983	180.9
II	26.6	41		
II	26.5	39.3		

2. Humidity

The results of humidity measurements at each observation location on Kaledupa Island during sampling had an average humidity range at the site of Station I (Furake Hamlet), around 43.3%, Station II (Sombano Village), about 41%, and the location of Station III (Watuhari), about 39.3%. The humidity level is still a healthy temperature category for the tropics and is still within the tolerance for canary crab life. Humidity is one of the factors that influence the activity of Coconut crab s in which the animal is very fond of humid and dark areas for its residence (Handa, 2013).

3. Rainfall

Average rainfall obtained from BMKG Betoambari Baubau ranges 180, 9 mm / 6 months. The highest number of rainy days in April and March and the lowest number of rainy days in June. This is very influential on the appearance of Coconut crab at the observation site. Observations were made from June to July with a low number of rainy days so that the catch was small. Handa (2013), explained that the most active time for Coconut crab to look for food was when it was drizzling, but if heavy rain could endanger his life, then the Coconut crab would hide in his nest, as a form of behavioral adaptation.

c. Morphometry Measurement

Based on the morphometry measurements of Coconut crab (*Birgus latro* L.) at 3 study locations, the mean values were as follows:

a. The length of the karapaks of Coconut crab Station I (Hoga Island, Furake sub-village) is higher compared to Station II (Desa Sombano), and Station III (Watuhari). The length of the Karapaks at Station I ranged from 4.43-7.12 cm with an average length of 6.37 cm. The length of the Karapaks at Station II ranges from 4.14 to 7.12 cm with the mean length of the karapaks of 5.62 cm . While the length of the Karapaks at Station III ranges from 4 , 43 -6.47 cm with a mean length of the karapaks of 5.845 cm.
b. The karapaks width of canary planets is higher than Station II and Station III. The width of the Karapaks at Station I ranges from 4,654 to 6,127 cm, with the mean carapace width of 6.03 cm. The width of the Karapaks at Station II ranges from 4.43 to 6.49 cm, with the average carapace width of 5.49 cm. Karapaks width at Station III ranges from 4.56 to 6.78 cm with a mean carapace of 5.85 cm.
c. The length of *Cephalothorax + rostrum* Coconut crab Station I is higher than Station II and Station III. *Cephalothorax + rostrum* Station I ranges from 8,252-11,405 cm with a mean of *Cephalothorax + rostrum* 10,06 cm. *Cephalothorax + rostrum* Station II ranges from 7.815 to 10.770 cm with a mean of *cephalothorax + rostrum* 9.044 cm . Whereas the *cephalothorax + rostrum* at Station III ranges from 8-10.53 cm with the average *cephalothorax + rostrum* 9.245 cm.
d. The bodyweight of the Coconut crab Station I is higher compared to Station II and Station III. Bodyweight at station I ranged from 0.24 to 0.45 kg. with an average body weight of 0.38 kg. Bodyweight at Station II ranged from 0.13 to 0.54 kg, with an average body weight of 0.314 kg whereas the B tight body at Station III ranges from 0, 24 - 0.42 kg with an average body weight of 0.34 kg.

To know more clearly, the mean value (cm) morphometry measurements of Coconut crab (*Birgus latro* L.) can be seen in Figures 2 and 3

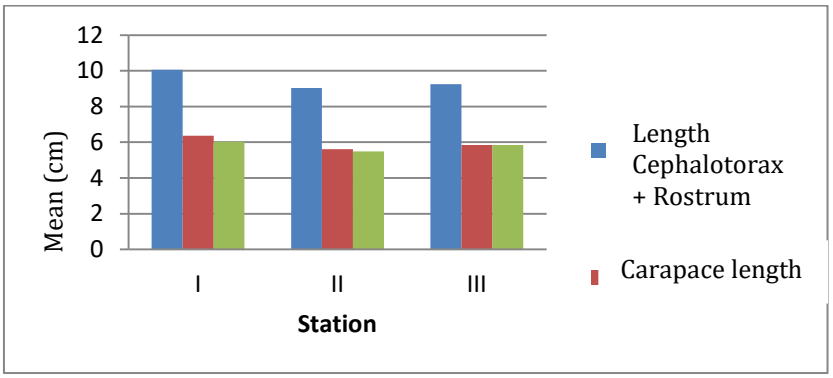

Figure 2. Mean Value (cm) Morphometry Coconut crab (*Birgus latro* L.) per station.

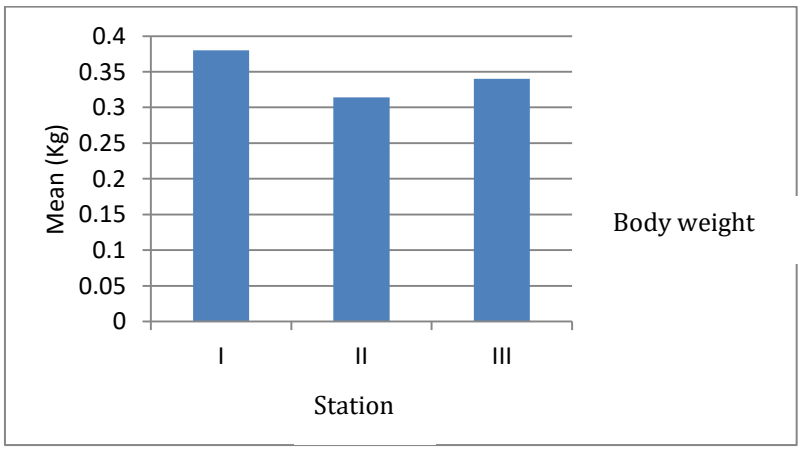

Figure 3. The mean body weight of Coconut crab Station

d. *Estimation of Coconut crab Population* (*Birgus latro* L.).

Data on the estimated size of the population of Coconut crab in Kaledupa Island using the CMRR method at each Observation Station are presented in Table 4.

Table 4. Estimated Population Size of Coconut crab Population for Observation Station

Research sites	Estimated individual abundance (N)	Estimated Variance (Var. N)	Standard Deviation (SB)
Furake	14	24.5	4.9
Sombano	18	54	7.3
Watuhari	4	2.6	1.6
Total	36	81.1	13.8

Based on the Table 4, it is known that the population range of Coconut crab per station of observation is 4-18 individuals. The population size per station from the largest in the sequence is Station II (Sombano village), 18 individuals, Station I (Furake sub-village), 14 individuals, and Station III (Watuhari), four individuals. At each observation, location shows an entirely different population size. Based on the estimated population value per Observation Station I-III, the highest population size is at Station II (Sombano village) with an estimated value of 18 individuals. In comparison, the lowest is found at Observation Station III (Watuhari) with an estimated value of 4 individuals.

e. *Coconut crab Genre* (*Birgus latro* L.)

Comparing the sex ratio of Coconut crab populations in each research station is presented in Figures 4 and 5. Male and female sex ratio at each station is at Station I (4: 3), Station II (6: 3 or 2: 1), and Station III (3: 1). The sex ratio of male and female populations of Coconut crab (*Birgus latro* L.) Kaledupa Island can be see on Figure 4 and 5.

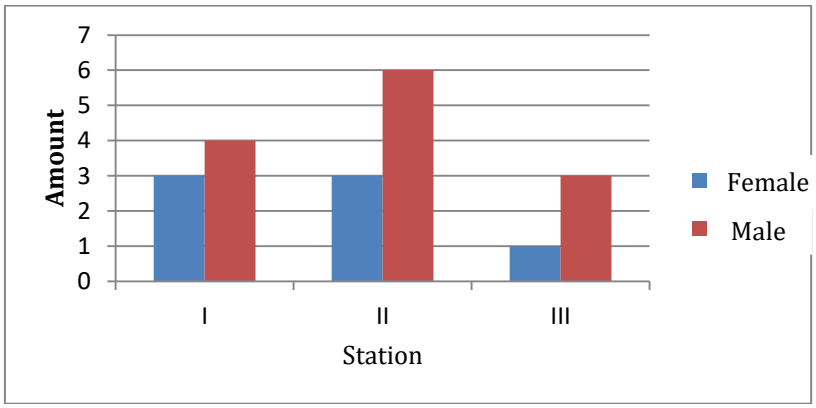

Figure 4. Coconut crab Gender (*Birgus latro* L.) Gender per Research Station

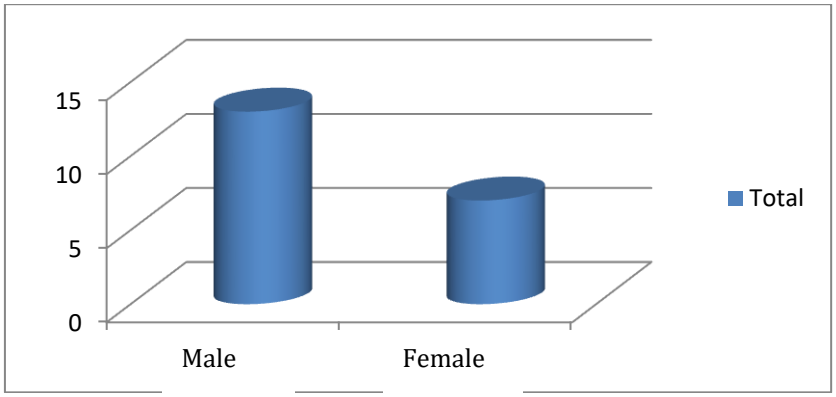

Figure 5. Amount of Genetic Coconut crab (*Birgus latro* L.) in Kaledupa Island.

2. Discussion

a. *Coconut crab Morphometry* (*Birgus latro* L.).

Morphometry measurement results of Coconut crab's (*Birgus latro* L.) obtained size variations at each research station. Based on the results of descriptive analysis the highest mean length of carapax 6.37 cm, carapax width 6.03 cm, length of cephlathorax + rostrum 10.06 cm, namely at Station I (Hoga island of Furake hamlet), and second with the highest average length of carapax 5, 84 cm, carapaks width 5.85 cm, cephlathorax + rostrum length 9,245 cm that is at Station III (Watuhari) while the lowest average carapace length is 5.62 cm, carapax width is 5.49 cm, cephlathorax + rostrum length is 9.044 cm which is found at Station II (Sombano village).

Morphometric differences found at each station are caused by environmental factors, which are the Coconut crab (*Birgus latro* L.). The morphometry size between Station I and Station III is not much different. This is because environmental factors and habitat conditions are relatively the same; one of the environmental factors affecting its existence is temperature. At which these two stations; it is in the temperature range of 25.6-26.6ºC, which is considered optimal and representative for the living place of Coconut crab (*Birgus latro* L.). We know that walnut crabs (*Birgus latro* L.) are poikilotherm (animals whose body temperature is affected by environmental temperature), these animals need optimal environmental temperatures to grow well. Ramli, (1997) in Handa, (2012) argued that " Coconut crab can live at an average temperature of 25-29ºC". Temperature also has an ecological influence on population distribution and biotic interactions of Wirakusumah (2003). Other environmental factor that support the existance of Coconut crab (*Birgus latro* L.) namely humidity and rainfall.

Also, the existence of Coconut crab (*Birgus latro* L.) is also strongly influenced by the state of its habitat. Coconut crab on the island of Kaledupa obtained the highest Morphometry mean at Station I (Hoga island, Furake hamlet) and Station III (Watuhari). Unspoiled environmental conditions cause this and there are burrows or caves where the Coconut crabis hiding, where the station belongs to the Wakatobi National Park which is a protected area, and has coconut and other shrub vegetation which is a source Coconut crabfood, according to Anagnostoul and Schubart research, (2014) " Coconut crabs eat coconuts". Handa (2013) stated that "Habitat of Coconut crab is generally dominated by coconut vegetation which contains nests or small caves and rocky coastal typology", so that this area is ideal for the survival of Coconut crab.

The lowest Morphometric rate is found at the location of Station II (Sombano village). This is due to the condition of the habitat that has been converted into other uses such as the opening

of plantation land, so many of the Coconut crab hideouts are damaged. Coconut trees, which are a source of the food Coconut crab, cut down to make homes. This is consistent with the results of Dave 2006 research in Handa (2013), explaining that "forest conversion continues to increase to be used as agricultural land, plantations, and settlements to cause a decrease in the productivity of these ecosystems."

Body Weight mean crabs highest Coconut crab range 0.314 kg is found in the observation location Station II (village Sombano), and the mean bodyweight of the lowest 0, 34 kg is found in the location of Station III (Watuhari). This is due to the number of Coconut crab obtained in Station II (Sombano village) more than any other station. Coconut crab can reach 5 kg in weight (Whitten et al., 1987).

Badyaev (2002) *in* Anagnostoul & Schubart (2014) argued that "Differences in adult body size result from differences between the sexes of males and females." Based on research obtained female Coconut crab size morphology is higher than the body morphology of male Coconut crab. Jahidin (2010) stated that, by the characteristics male Coconut crab size is smaller than females, females have ovigerous (egg sacs) on the external ventral abdomen while in males there is no over".

b. *Populasi Coconut crab* (*Birgus latro* L.)

The results of the estimated population size of Coconut crab using CMRR (*Capture-Mark-Release-Recapture*) method per Kaledupa Island population station are presented in Table 4. Population estimates at several stations show differences. The largest population size sequentially is found in Station II (Sombano village), 18 Individuals, Station I (Furake sub-village), 14 Individuals and Station III (Watuhari), 4 Individuals. The results of this estimation will continue to change over time. Naughton and Wolf (1989) *in* Jahidin (2010) argued that "The size of the population for several years is determined by the annual period of birth and death, the higher the mortality rate compared to birth causes a rapid rate of population decline, or conversely the higher the birth rate compared to the number death increased rapid population rates ".

Based on the study results, arrest first three station obtained 20 people and the arrest of two nine individuals consisting of three individuals who signed and six other individuals who are not marked. This shows that not all Coconut crab caught on the first arrest was obtained at the second arrest. Absence quests are the second arrest suspected existence of competition to get food because of the availability bit; besides that, there is a deterrent effect that occurs in journeys Kenari captured in the first capture so much at home in his hiding place. Coconut crab marked without appearing on the second arrest will try to find food elsewhere to get food. The explanation of Soetjipta (1992) that an organism has an adaptation of behavior that is formed from the learning process, while the presence of Coconut crab s that are not marked on the second sampling is as a result of not knowing the conditions at the observation location.

The estimated value of Coconut crab will be static or dynamic, depending on the factors of natality and mortality. As a closed population, the number of population will increase if the death is higher than mortality. Conversely, if dying is higher than natality will result in a decrease in population. The leading cause of the population's decline in Coconut crab is the high mortality factor caused by the community's hunting. Refiani, (2009) argued that " Coconut crab are widely hunted for their delicious meat, high nutritional content, and high selling prices in the market so that people catch without thinking about the sustainability aspects of their population".

Environmental conditions strongly support the existence of the Coconut crab population at the Kaledupa Island observation station. Environmental health, in this case, can be in the form of habitat, availability of food sources, competition, and different predators at each observation station. According to with the opinion of Soegianto (1994) stated that If the population of an organism is high in a place, then the area is suitable habitat for the body, on the contrary, if the abundance is low, then the site is not suitable for survival.

Sex ratio is essential to know because it affects the Kest a bilan population quests Coconut crab. The sex ratio is also an indicator of the population in a habitat (area) that can predict the condition of the community is good or not. A good population is supported by an ideal habitat for population survival (Rafiani, 2005).

The ratio of male and female Coconut crab islands, making up the population of Kaledupa is 13: 7 (Figure 4.). At three-station research shows that male Coconut crab is more dominant than the Coconut crab is androgynous females. Comparison of sex ratio between males and females per station is station I, consisting of 7 individuals found consisting of 4 male

androgynous individuals and three individuals who are female androgynous by comparison (4: 3). The sex ratio at Station I is different from Station II, which is found nine individuals with a ratio of 6 males and 3 with females and females with a ratio (6: 3 or 2: 1). At Station III consists of four individuals, three individuals are male, and one female bisexual individuals in the ratio (2: 1). Habitat conditions and food sources can cause differences in the sex ratio of each research station. This is consistent with research Sulistiono et al. (2007) argued that "Population decline quests Coconut crab in nature predicted the existence of environmental change (habitat and food) caused by human activities (logging, residential, and overfishing) ". Also, it is influenced by several factors such as lack of food availability, and resources for making burrows scarce, so that breeding becomes disrupted, and only a few offspring are produced (Whitten et al., 1987).

Environment Parameters that affect the sex ratio of Coconut crab in Kaledupa, also influenced by the activity of society, should be Rakat locals often catch Coconut crabs regardless of size and sex of Coconut crab. Jahidin (2010) states that "The population size and sex ratio are dynamic because it is strongly influenced by the carrying capacity of the environment and habitat. "

The results of Rikardo's research (2012) on Binongko Island, Wakatobi Regency, the number of catches during the study were 32 individuals consisting of 9 males and 14 females with a ratio of 9 male: 14 females. Safaruddin (2011) on Tomia Island, Wakatobi Regency, the number of catches during the study was 42 individuals consisting of 18 males and ten females with a sex ratio of 18 males: 10 females. Faizal (2011) argued that on the island of Wangi-Wangi, the number of catches during the study were 36 individuals with a sex ratio of 23 males: 13 females or 2: 1. With a comparison on Binongko Island, Tomia Island, and Wangi-Wangi Island. On the island of Kaledupa, the population of Coconut crab has been very threatened, which is indicated by the number obtained during the study, only 20 individuals with 13 males and nine females with a sex ratio of 13 males: 9 females.

E. Conclusion

Based on the results of the analysis and discussion of the study, several conclusions can be drawn as follows:

a. The Coconut crab (*Birgus latro* L.) on the island of Kaledupa obtained the highest Morphometry mean at Station I (Hoga island, Furake hamlet). Whereas the lowest Morphometry Average is at the location of Station II (Sombano village). This is due to station I (Hoga Island, Furake sub-village) having unspoiled environmental conditions, so this place is ideal for the Coconut crab's survival. Whereas Station II has a habitat condition that has been converted into another designation, so that many of the Canary Crab hideouts are damaged.
b. The population size of Coconut crab s on the island of Kaledupa obtained 20 individuals with 13 males and nine females with a sex ratio of 13 males: 9 females.

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