Mollusk Diversity Around the Mangrove Forests, Barru, South Sulawesi, Indonesia

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***Abstract*—This research aims to report the diversity of molluscs around mangrove forest on the estuary Bungi, TaneteRilau District, Barru, South Sulawesi, Indonesia. The research used methods of terraced paths. Data were collected from two stations, the determination using purposive sampling. At each site created 30 plots measuring 1x1m with distances between stations 10 m. Results of study on two research stations in the estuary Bungi found as many as 45 species of molluscs that represent two classes, as many as 30 types of Gastropods and Bivalves as many as 15 types of classes. Gastropods class consists of 9 Family namely, Potamididae, Thiaridae, Neritidae, Cerithiidae, Littorinidae, Strombidae, Muricidae, Cymatiidae, and Turbinidae. Bivalves class consists of 8 Familia,i.e., Ostreidae, Mactride, Arcidae, Tellinidae, Veneridae, Corbiculidae, Spondylidae and Tridacnidae.**

***IndexTerms*—Estuary Bungi, Mangrove Forest, Molluscs.**

I. Introduction

The molluscs are one group of benthic animals that can be found in mangrove forests. In general, these aquatic animals live in colonies and meliang with flexible movement through a change in the control of blood by a complex muscles tissue[1]. Molluscs understand their role in the utilization of energy in the decomposition process in the mangrove ecosystem, where bacteria, fungi and other benthic invertebrates are involved. This is an important process, including transformation, assimilation and conversion of chemical materials in sediment systems mangroves [2]. In the mangrove forests, molluscs are the fauna that have a reciprocal relationship with the decay that occurs in mangrove forests. And they are often called as an environmental engineer.

Biologists estimate approximately 75% of the time in the life cycle is spent in a mangrove forest mollusk [3]. Several of them live or spend most of their lives in mangrove forests seasonally appropriate levels in the difference in the life cycle or depending on the tide[4]. Mangrove forest habitat with a special nature, causes well as any biota in it has its ecological range, and each has a special niche. Correspondingly, researcher [5]informs that the diversity of mollusc communities in mangrove areas is often lower than a nearby area that no mangrove vegetation. This means that their presence is not due to the condition of mangrove forests in general, but strongly influenced and determined by local conditions.

In his latest study, [6]in Amazon mangrove forest, which is the second largest tropical estuary mangrove in the world, shows that 99% of the total biomass system is made in the mangrove ecosystem and 90% of the material remains distributed by benthic components. It also shows how important the mangrove forest and the benthic ecosystem as well as the mutual relationship between the two.

The distribution of molluscs exhibits a zoning pattern determined by some physical and biological factors prevailing throughout the tidal region. Many studies such as[7]–[9], has revealed that high tide and predator conditions are common factors that control the pattern of mollusk distribution. Their existence is determined by the tide, in which the flooding period can determine habitat patterns on a small scale and regional scale. Therefore, they tend to be more abundant in the mangrove area bordering the sea rather than bordering on land. It is also informed by [10] which finds the high density and diversity of mangrove molluscs in adjacent areas of the sea.

Bungi estuary mangrove forest in the district TaneteRilauBarru is one of the few areas of mangrove forests in estuaries Barrua fairly spacious and pristine. Results of the Forestry Development Centre team and Settlement in Barru, estimate the existing mangrove forest covering an area of 30.63 ha. The type of vegetation in general, is a type of mangrove (*Rhizophora* spp.), Api-api (*Avicennia* spp.), Nypa (*Nypafrutican*) and other vegetation types. The spread of each type of vegetation are relatively evenly distributed in the coastal areas in each district with an average crown is dense. This condition indicates that the region is significant enough be used as a research location to determine the diversity of molluscs that are in the mangrove forest area and the area around the farms.

II. Material and Method

Time and Location

This study was conducted from October to December 2015. The study was conducted in the areas around mangroves forest in the estuary Bungi, District of TaneteRilau, Barru, South Sulawesi, Indonesia. The line coordinate of location $4^{o}50'49"$- $4^{o}47'35"$ S and 199^{o} $35'00"$- $119^{o}49'16"$ E, with a broad area around 79.17 km^2.

Materials and Tools

Materials used for this research were molluscs guidebooks. Several books are The Biology and Culture of Marine Bivalve Molluscs of the Genus Anadara [11], The Biology of the Mollusca [12], The Mollusks: A Guide to Their Study, Collection, and Preservation [13], Siput dan kerang Indonesia Volume I [14], and Siput dan kerang Indonesia Volume II [15].Besides books, several websites,i.e.http://www.discoverlife.org/mp/20q?guide=Molluscs;http://www.petersseashells.comhttp://www.coolgalapagos.com/animals/mollusks.php.

The tools used were label paper, the compass, the meter rolls, rope, wooden pegs, a small shovel, plastic bags, plastic jars, boxes films, thermometer, salinorefraktometer, measuring pH. While the ingredients for the preservation of samples are formalin 10%, 40% alcohol and Rose bengal (dye).

Data Collection

Data were collected from two stations, the determination using purposive sampling, that the station (1) the area around the pond and the station (2) area around the mangrove forest. At each site created 30 plots measuring 1x1m with distances between stations 10 m, using the method of terraced lanes. Sampling was carried mollusks at low tide by taking all the live mollusks contained in the observation plots, both above ground, attached to the roots or stems of trees and in the soil to a depth of ± 25 cm [16]. Then the samples were taken from the plot observations, noting the type and labeled.

Environmental data measured and recorded directly at the study site, is the water temperature and air temperature, and the degree of acidity (pH). For salinity and soil texture analysis is done in the laboratory of Coastal Fisheries Research InstituteMaros, South Sulawesi, Indonesia.

Analysis Data

Mollusc samples had been identified to the species level. Species identification was done in the field by comparing the sample with the references that were mentioned previously. While the sample unidentified, preserved with 40% alcohol, then identified in the laboratory of Coastal Fisheries Research Institute, Maros, South Sulawesi, Indonesia.

III. Result and Discussion

Results of study in mangrove forest on the estuary Bungi found as many as 45 species of molluscs that represent two classes, as many as 30 types of Gastropods and Bivalves as many as 15 types of classes. Gastropods class consists of 9 Familia namely, Potamididae, Thiaridae, Neritidae, Cerithiidae, Littorinidae, Strombidae, Muricidae, Cymatiidae, and Turbinidae. Bivalves class consists of 8 Familia,i.e., Ostreidae, Mactride, Arcidae, Tellinidae, Veneridae, Corbiculidae, Spondylidae and Tridacnidae. The types of classes Gastropods mollusks are found, such as in Table 1.

If the results are compared with other similar studies such as [17]in Central Sulawesi Morowali, found 22 types of molluscs. In the region Pangkep Coastal South Sulawesi, found 28 species of molluscs[17]. In the Bay ofTering, Batam Island which is 57 kinds of molluscs[18], and in the Bay ofPemenangan, namely Lombok 103 types of molluscs[19]; as well as [19] in the Bay of Lampung, Lampung namely 65 types of molluscs. This shows that the area in the estuary Bungi still be said to have the number and types of mollusks in relatively good condition. Molluscs species diversity is high on mangrove forests due to the many types of molluscs visitors who come to the forest area which the substrates argillaceous sand and sandy loam.

The large number of molluscswere allegedly associated with the substrate on which they live, find food and their tolerance to extreme environments. This can be seen in the joy of living snail in mud or sandy mud habitat in the form of gathering and spreading as well as making a hole, either in the pond or on waterways. Also attached to the roots or mangrove trees that have been felled or decaying at around the pond when the water recedes.

If the types of molluscs found in mangrove forest stations are related to the grouping of mollusks according to [20], they are original, facultative and immigrant molluscs. Then the original mollusk are classified *Cerithiumalveolum, Cerithideacingulata, Certhidea obtuse, Celithonoualaniensis, Neritaplanospira, Terebraliasulcata, Telescopium- telescopium, Crassostrea iredalei*. Moreover, that is the type of facultative molluscs, are *Crassostreacucullata, Faunus ater,* and*Crassostreairedalei. While the classified type of mollusk migrants are Anadara granosa, Barbatia decustata, Cymatium pileare, Harvella plicataria, Leporimetis ephippium, Marcia hiantina, Meretrix- meretrix, Melanoides torulosa, Mactra violacea, Nerita chamaeleon, Nerita costata, Polymesoda bengalensis, Strombus aurisdinae, Strombus canarium, Strombus gibberulus, Strombus luhuanus, Strombus marginatus, Spondylus squamosus, Scapharca pilula, Turbo bruneus, Tridacna gigas, Lopha folium, Littorina scabra*, and *Saccostrae echinata*.

The types of mollusks migrants (gastropods and bivalves) station Bungi River Estuary Mangrove Forest can be found on the front of the forest bordering the sea. The large number of species of molluscsmigrantsis suspected caused by sand substrate argillaceous and argillaceous sand at the station similar to their natural habitat. Perhaps they also carried away by the current wave when the tide or to forage in coastal areas that are widely available nutirisi. Recent studies indicate that coastal boundary layer on a limited basis will distribute nutrients to the marine area [21]. Although it is only an estimate, that happening are derived from mangrove forests when the availability of nutrients in the woods beyond the needs of the benthic community [22].

According to [23], generally in the mangrove forests, they will drop to the ground muddy to feed at low tide of place attached to the stems and roots of mangrove trees (like the roots of Rhizophora and root Avicennia and Sonneratia or area pneumathopora).

Behavior is closely related to feeding behavior, reproduction and development of the larvae and this situation can be used to describe a broad distribution in connection with the high tide that can reach deep into the mangrove forest. Because mangrove sediments rich mixture will contain particles and dissolved organic matter for invertebrates makrobentik[2].

Table 1. Composition of Molluscs Type at Two Research Station InBungi River Estuary, Barru Regency

No.	Class	Familia	Species	Composition	
				AP	MF
1	GASTROPODS	Potamididae	*Cerithideacingulata*Gmelin, 1790	+	+
2			*Telescopium-telescopium*Linne, 1758	+	+
3			*Terebraliapalustris*Linne, 1767	+	
4			*Cerithidea obtuse*Lamarck, 1822		+
5			*Terebraliasulcata*Born, 1778		+
6		Thiaridae	*Faunus ater*Linne,1758	+	+
7			*Melanoidestorulosa*Bruguiere, 1789	+	+
8		Neritidae	*Neritaplanospira*Anton, 1839	+	+
9			*Neritopsis radula*Linne,1758	+	
10			*Neritaplicata*Linne, 1758	+	
11			*Celithonoualaniensis*Lesson,1831	+	+
12			*Neritinaviolacea*Gmelin, 1791	+	
13			*Neritachamaeleon*Linne, 1758		+
14			*Neritacostata*Gmelin, 1791		+
15		Cerithiidae	*Rhinoclavisaspera*Linne, 1758	+	
16			*Cerithiumalveolum*Hombron&Jacquinot, 1854	+	+
17			*Rhinoclavisvertagus*Linne, 1758	+	
18		Littorinidae	*Nodilittorinamilegrana*Philippi, 1848	+	
19			*Littorinascabra*Lamark, 1818		+
20		Strombidae	*Strombusvariabilis*Swainson, 1820	+	
21			*Strombuslabiatus*Roding, 1798	+	
22			*Strombusaurisdinae*Linne, 1758		+
23			*Strombuscanarium*Linne, 1758		+
24			*Strombusgibberulus*Linne, 1758		+
25			*Strombusluhuanus*Linne, 1758		+
26			*Strombusmarginatus*Linne, 1758		+
27		Muricidae	*Murex trapa*Roding, 1798	+	
28			*Chicoreusaxicornis*Lamarck, 1822	+	
29		Cymatiidae	*Cymatium pileare*Linne, 1758		+
30		Turbinidae	*Turbo bruneus*Roding, 1791		+
31	BIVALVES	Ostreidae	*Crassostreacucullata*Born, 1778	+	+
32			*Crassostreairedalei*Quoy&Gaimard, 1836	+	+
33			*Lopha folium*Linne, 1758		+
34			*Saccostreaechinata*Quoy&Gaimard, 1832		+
35		Arcidae	*Anadaragranosa*Linne, 1758		+
36			*Barbatiadecustata*Reeve, 1844		+
37			*Scapharcapilula*Reeve, 1843		+
38		Mactridae	*Harvellaplicataria*Linne, 1767	+	+
39			*Mactraviolacea*Gmelin, 1791		+
40		Tellinidae	*Leporimetisephippium*Spengler, 1798		+
41		Isognomidae	*Isognomperna*Linne, 1758		+
42		Spondylidae	*Spondylussquamosus*Schreibers, 1793		+
43		Corbiculidae	*Polymesodabengalensis*Lamarck, 1818		+
44		Veneridae	*Marcia hiantina*Lamarck, 1818		+
45			*Meretrix-meretrix*Gmelin, 1791		+
Jumlah	2	17		21	34

Note: AP = around the pound; MF = mangrove forest; + = presence

IV. Conclusion

Based on the results of the study it can be concluded that found 45 species of molluscs represent two classes: Class Gastropods as many as 30 species of 9 families and as many as 15 types of Bivalves classes representing eight families.

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