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Composition and abundance of Bivalves in the intertidal zone, Karang Papak Coastal, West Java, Indonesia: Based on lunar phase

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Abstract. This study aims to determine the types and abundance of Bivalves in the Intertidal Zone, Karang Papak Beach, West Java, Indonesia. This research was conducted in November 2018. The method of sampling used line transects (line transects) systematically using a 1 x 1 meter quadrant. All types of bivalves found in the quadrant are calculated and identified. The results showed that there were 2 types of bivalves found in the study sites, namely *M. micropterus* and *M. arenaria*. The calculation results of the abundance index value indicate that between stations have different values. Abundance based on the moon phase shows that the highest abundance in both species is found in the dark moon phase, this is related to environmental conditions such as the influence of light and the availability of food resources. This data can be used as additional information in determining the management of aquatic resources in that location.

1. Introduction

Composition and abundance of animal, especially of bivalves in the intertidal zone can influenced by several factor, such us lunar phase [1]. The intertidal region, a zone of interaction between sea, land and atmosphere, is one of the most interesting divisions of marine ecosystem, as it is daily covered and uncovered by flooding and ebbing tides. The one of intertidal zone in Indonesia is Karang Papak coastal, in Garut, West Java, Indonesia with the long zone around 170 m. Based on the preliminary study, these waters have economic value of bivalve resources that are directly utilized (self-consumed) and used as work to supporting the income of the community itself.

Bivalvia is the second largest taxonomic class within the phylum Mollusca with about 10,000 living species known throughout the world [2]. Bivalves is the one of biota that can live in the freshwater and salt water and can be used as bioindicators in the waters because of their high adaptability to various habitats [3]. Bivalves play important roles in regulating estuarine and coastal marine ecosystems by filtering large volumes of water containing plankton, planktonic larvae, particulate organic matter, and inorganic particles. As a result of pumping and filtering processes through the gills, bivalves eject both pseudofeces and feces which transfer inorganic, organic and nutrient-rich particulate to the bottom [4-6]. Hence, the bivalves promote ecosystem services such as stabilizing substrates, decreasing erosion, and enhancing habitat complexity [4,7]. If the people using the bivalves continuously, will not



supporting for conservation efforts, and will cause a decline in the bivalve population in nature and even become extinct [8]. In the earth, abundance and distribution of bivalves can be influenced by several factors such as abiotic and biotic factors (environmental condition, food availability, predation, and competition). Pressure and environmental changes can affect species composition and differentiation of bivalve structure [9].

The Karang Papak coastal, West Java has a very wide coastal area and has the potential of biodiversity including mollusks which among them are bivalves. So far, information about the types of bivalves and their abundance in this area is not yet available. Based on the description above, this study aims to assess the composition and abundance of Karang Papak coastal areas, West Java, Indonesia as well as analyzing its difference based on the lunar phase. It is expected that the information obtained can be used in an effort to manage it in the future, so that it can improve human welfare in a sustainable manner.

2. Material and methods

This research is a descriptive exploratory study that carried out in the months of June 2018 to February 2019 on the coastal of Karang Papak, Garut, West Java. Sampling is carried out 4 repetitions in one month 10 days which refers to the division of the phase of the moon.

The purposive sampling is the methods for placement station. The length of the transect line is 100 m. The intertidal zone research was carried out by making plots using a method of quadratic transect plots that were systematically placed from the sea to the land direction (perpendicular to the coastline along the intertidal zone). For each transect, 5 plots are placed regularly with a distance of 10 m from one plot to the next [10]. Sample plots with a square size of 1x1 m. Samples obtained from the field were then preserved using alcohol to be identified at the Integrated Laboratory, UIN Sunan Gunung Djati Bandung. Identification of bivalve species based on the Balvia identification guidebook in Indonesia. Samples that have been identified are then verified by experts researcher (LIPI) to ensure that the results of identification that have been done in the lab are correct. Data analysis of bivalve data obtained included the composition and abundance of its species on Karang Papak Coastal.

3. Result and Discussion

The bivalves consist of two species (*Mya arenaria* and *Modiolus micropterus*), one family (Mytilidae), and two genera which is *M. arenaria* had the highest density and distribution every time of lunar phase which indicating their ability to adjust with the tide fluctuation every lunar phase conditions. For more details, can be seen in the Figure 1.

M. arenaria (Figure 2) is the one of species in bivalves that distributed in Indonesian water [11]. It is known that this species can stimulate the light that enters to its body [12]. In addition, this species can be used to examine the distribution of heavy metals in a waters by identifying its tissue structure [13]. For some regions, this species is an invasive species such as the waters of Southcentral Alaska, and Wadden Sea [14-16].

Modiolus micropterus has distributed in other location. This species was founded by Ginting in Tanjungbalai, North Sumatera, Indonesia [17]. Moreover, Vonk was founded this species in the southwest Sulawesi, Indonesia and southeast Sulawesi [18,19].

Intertidal zone as the one of zone that directly affected by tides seawater and has an important role in the abundance of species, including the bivalve group. The high abundance of individuals in the dark phase shows that the use of conditions in that phase is well utilized by bivalves. The use of this moon phase condition is related to the behavior of animals as well as in endogenous settings. Endogenous clocks help organisms to anticipate upcoming daily and annual environmental changes in their habitat and to adjust biochemical, physiological, and behavioral processes accordingly [20].

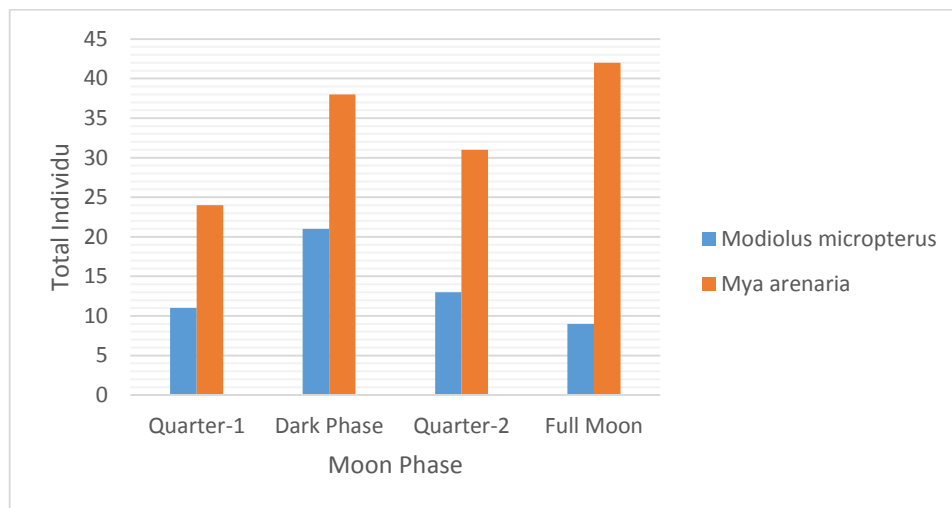


Figure 1. Abundance of Bivalves in the intertidal zone, Karang Papak, West Java.

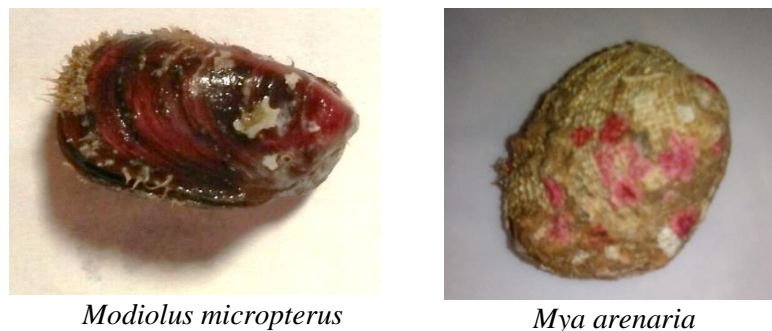


Figure 2. The bivalves from the intertidal zone, karang Papak, West Java, Indonesia.

4. Conclusion

The bivalves were composed of one famili (Mytilidae), two genera and two species of which *Mya arenaria* had the highest abundance and distribution every phase of lunar.

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