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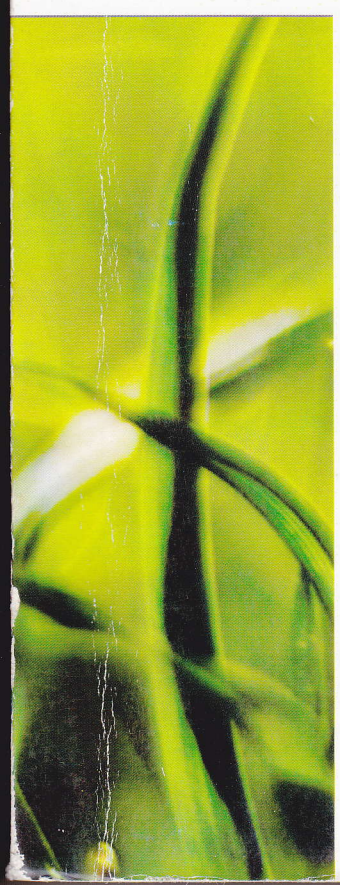

Intellectual Property Rights in Technopreneurship Based on Green Business and Technology

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"Intellectual Property Rights in Technopreneurship based on Green Bussiness and Technology"

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The Gastropods Diversity in Intertidal Zone at Sundak Beach District Gunungkidul

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Abstract. Research Gastropods diversity and abundance conducted in intertidal zone at Sundak beach district Gunungkidul in January 2013 with the aim to determine the condition of the aquatic community in the Gastropoda. Observations used method of direct observation by dividing the intertidal region into 3 stations. Gastropods sampling used transect squares method. Gastropods had been observed in the intertidal beach Sundak with total of 87 Gastropods, divided into 20 species included in 13 families. *Pardalina testudinaria* is the most abundant species. The largest Gastropods abundance at station II was 3.2 individu/m2. Diversity index of Gastropods relatively low ranged from 2.02 to 2.09, and the dominance index also relatively low ranged from 0.135 to 0.19. Vegetation types consists of 19 species of intertidal macro algae and one species of sea grass. The most abundant macro algae is *Ulva fasciata* and the sea grass is *Cymodocea rotundata.*

Keywords : *Gastropods, intertidal zone, Sundak beach, macro alga, and sea grass.*

1 Introduction

Gastropods in the intertidal zone of Sundak beach is eating macro algae that can be found corals substrate area. Diversity and abundance of gastropods in some intertidal zones have differences in data. There no research on the diversity and abundance of gastropods and relationship with the presence of macro algae and sea grass on the Sundak beach. The results of the intertidal zone related with Gastropods diversity and abundance can be used as data of the Gunungkidul State. The data can be used as the basis for local government and coastal communities in the maintenance of the natural resources in coastal area, especially the diversity and abundance of Gastropods at that area.

The study was conducted on January 2013 in the intertidal Sundak beach Gunungkidul. The object of research is the living gastropods, water quality parameters, water base substrate, and vegetation macro algae and sea grass. The research method used was direct observation method, namely research done by plunging directly into the field at the time of low tide and take Gastropods, macro algae and sea grass, and also sea water samples. Determination of observation stations by dividing the coastal intertidal areas Sundak into 3 stations. At each station observation made the recording position using GPS.

Gastropods samples obtained through in to the killing bottle and preserved using 4% formalin and labeled for later identified using the guidebook Shells of the Western Pacific in Color Vol. II (Habe, 1964), Shells of the Western Pacific in Color Vol. I (Kira, 1965), Pacific Sea Shells (Tinker, 1958), Shells of the World (Oliver, 1975) at the Laboratory of Animal Taxonomy Faculty of Biology, University of Gadjah Mada Yogyakarta. Vegetation samples identified by Atmadja et al., (1996). Environmental, physical parameters of water chemistry and substrate type conditions are observed.

Measurements for the physical parameters of water chemistry is pH, and temperature done in same time, while the measurement of DO (Dissolved Oxygen) and salinity carried out in Health Laboratory Yogyakarta.

The data obtained were analyzed;

a. Diversity Index (H '),
The criteria used to interpret the Shannon-Wiener diversity (Krebs, 1989 in Dibyowati, 2009):
H '≤ 3:32 : low diversity
3:32 <H '<9.97: Diversity classified as being
H '≥ 9.97 : Diversity is high.
H 'max will occur if found in condition in which all species are abundant.
criteria:
E ≥ 0.6 : Ecosystems are in a stable condition, high uniformity.
0.4 ≤ E ≤ 0.6 : Ecosystem in less stable conditions, uniformity being.
E ≤ 0.4 : Ecosystems are in a depressed condition, low uniformity.

(Magurran, 1987 in Dibyowati, 2009).

Dominance index was calculated according to the Simpson index:
criteria:
- If a value of 0 <C <0.5, then the low dominance
- If the value of 0.5 <C <0.75, the dominance was
- If the value of 0.75 <C <1.00, the high dominance

(Odum, 1993 in Susiana, 2011).

Gastropods data and of community structure at intertidal vegetation (macro algae and sea grass) from the three stations was processed using Microsoft Exel 2007. It to find a relationship between types of macro algae and sea grass with species and macro algae- sea grass wet weight with a number of individuals of Gastropods in the intertidal zone at Sundak beach analyzed by Pearson bivariate correlation analysis using SPSS version 15.

2 Results and Discussion

Intertidal area at Sundak beach can reach a distance of about 150 meters. Interaction with humans is more common in a distance of 100 meters, while the distance of 50 meters further interaction less and even no hack because the waves are so big and strong that hit this area.

2.1 Vegetation conditions

2.1.1 Composition Type macroalgae and seagrass

Intertidal vegetation found as 20 types, which consists of 19 species of macro algae and 1 species of sea grass. Types of macro algae found on this observation more than the research conducted by Santi et al., (2010) on 17 April 2010 in the intertidal zone in the waters of the beach Sundak only just 17 types. Big amount vegetation types in a third observation are *Ulva fasciata* and *Chaetomorpha linum* from the division

Chlorophyta also *Laurencia corallopsis* and *Gracilaria coronopifolia* of the division Rhodophyta, ang the minor are *Padina* and *Dictyota volubilis* of the division Phaeophyta, and *Cymodocea rotundata* Spermatophyta division.

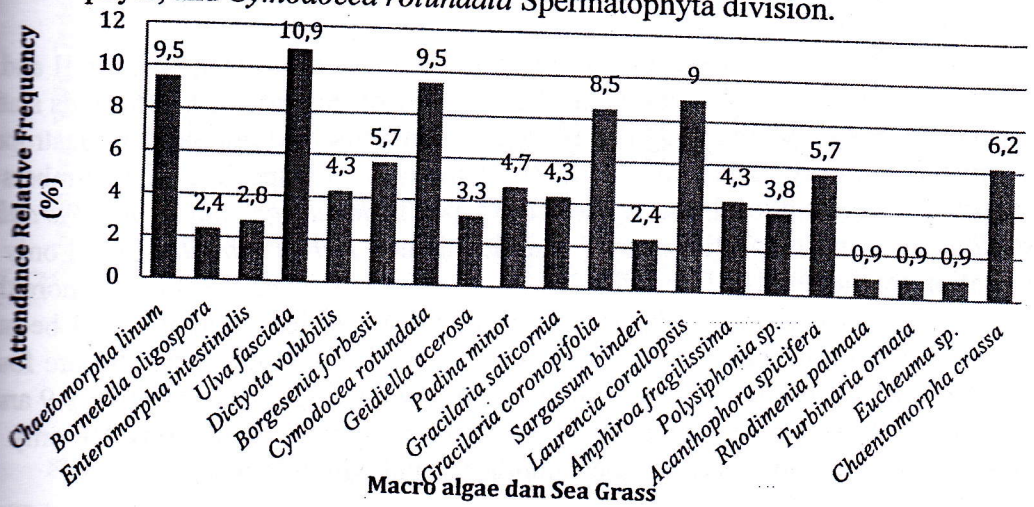

Figure 1 Relative Frequency Diagram presence macro algae and sea grass types.

2.1.2 Wet Weught of Macro algae and Sea grass

Wet weight of macroalgae and seagrass in all three observation stations showed varying values. Station II has a value relative 3179.2 g/m2 of wet weight is larger than the other two stations, namely stations III at 2115.8 g/m2, and I train at 2097 g/m2. Handayani et al., (2007), said fertility and weight of wet seaweed in the water depends on several environmental factors such as the state of the substrate and water conditions. For example, types of *Ulva fasciata* has a large amount of wet weight in all three stations as more adaptive and are often found in almost all parts of the intertidal area Sundak Beach. Several types of macro algae among other types of *Gelidiella acerosa, Enteromorpha intestinalis, Amphiroa fragilissima,* and *Eucheuma* sp.

2.2 Structure Gastropods Communities

2.2.1 The composition and abundance of Gastropods

Composition Gastropods

Gastropods were found during research at three stations in the itertidal zone at Sundak beach totaling 87 individuals which are 20 species from 13 families. Gastropoda types found on this observation much more than from research conducted by Eni et al., (2012) conducted in the intertidal zone in coastal waters Sundak ie only 13 species and 3 of them are *Doriopsis pectin*, *Aplysia parvula*, and *Discodoris lilacina* are not found on this observation. However, the three types plus types Asteronotus cespitotus (Wedusan) found only when the field survey conducted in November and December 2012. So far, no studies and statements that describe the cause of many types are in that month. However, based on a survey in November and December 2012, disappearance types such as observation may be due to seasonal factors. When surveying the field, such as the type *Aplysia parvula* and its eggs are

like noodles found many clustered in the gully and on the substrate of macro algae and sea grass. This can be factors that caused massively migration mating type to the Intertidal Coast during the month of November 2012 at Sundak beach.

Gastropods Abundance

Gastropods were found at station I were 35 individuals, more than stations II and III respectively by 28 and 24 individuals. The number of individuals Gastropods station I was not in line with the number of types of gastropods. The numbers of Gastropods are most commonly found in station II as many as 13 species. The numbers of Gastropods at the station because there are types I *Morula granulata* and *Pardalina testudinaria* found respectively by 7 individuals and *Nerita albicilla* found only on this station by the number 6 individuals. The Gastropods types at station II more than the station I, the amount of Gastropods at station II are less than station I because most types are found only consists of a single individual. Gatropods who are found more than just *Pardalina testudinaria* and *Cymatium muricinum* respectively 9 and 7 individuals. However, the number of Gastropods species at stations III only 11 species, Littorina scabra is the highest number found with 9 individuals.

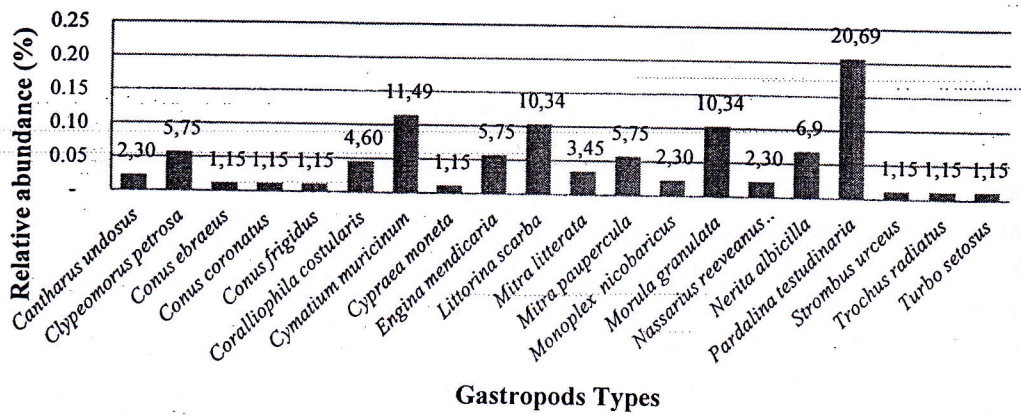

Figure 2 Diagram of Relative Abundance Each type of Gastropods

Pardalina testudinaria is the most commonly found of all three stations observed, the number of 18 individuals with a relative abundance of 20.69%, followed by *Cymatium muricinum* by the number of 10 individuals with a relative abundance of 11.49. Most of the gastropods were found during the study had a relatively small shell size which ranges from 1-3 cm, except in species *Turbo* is 4-7 cm. The difference in abundance of Gastropods in this study is mainly due to the capability of adaptation to environmental conditions that exist. The kind that has a high adaptability to survive and influence will be more exists in the intertidal Sundak beach.

2.2.2 Important Value Index Type of Gastropods

Calculation Importance Value Index in each type of Gastropods in the intertidal Sundak beach show that *Pardalina testudinaria* has the highest Importance Value Index compared to other species is equal to 37.76%.

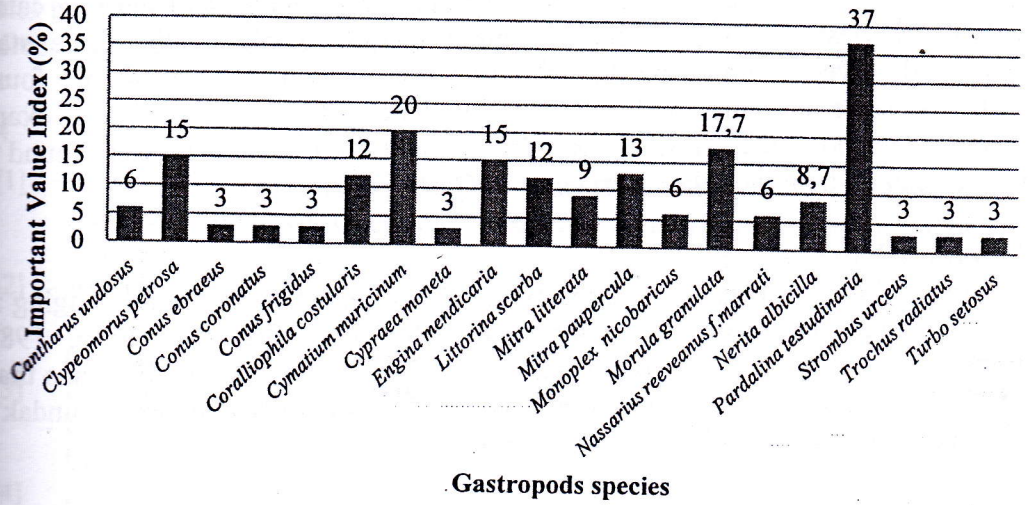

Figure 3 Important Value Index Diagram of Each Gastropods

This suggests that *Pardalina testudinaria* give a large role to the structure of the Gastropods community also in the diversity index, dominance, uniformity and abundance in the intertidal zone Sundak beach. This species is found abundantly in rhizome and roots of sea grass *Cymodocea rotundata,* types that grow in the habitats characteristics as sand area.

2.2.3 Diversity Index (H '), Uniformity (E) and dominance (C) of Gastropoda

Diversity Index (H ')

Gastropods species diversity index values in these three observation stations showed values from 2.02 to 2.09. Based on the criteria that can interpret the Shannon-Wiener diversity (Krebs, 1989 in Dibyowati, 2009) states that if the value of H 'ranged ≤ 3:32, the diversity value

Table 1 Diversity Index (H '), Uniformity (E), and dominance (C) Type of gastropods in each station

Stations	H'	E	C
I	2,02	0,89	0,135
II	2,09	0,81	0,18
III	2,04	0,85	0,19

Species diversity in the intertidal zone Sundak beach included in the low category with the lowest diversity found in station I. Low levels of the three stations Gastropods diversity could be due to only a few types of Gastropods are found in relatively large amounts and relative abundance of other types. For example, *Pardalina testudinaria*, *Cymatium muricinum*, and *Littorina scarba* were found to be more abundant than the other 17 species of Gastropods.

Uniformity Index (E)
Uniformity index values in all three types of stations showed values ranging from 0.81 to 0.89. Based on the criteria of uniformity index (Magurran, 1987 in Dibyowati, 2009), states that if the uniformity index more than 0.6 it means that the individual composition of each type of gastropods in the intertidal beach Sundak is in stable condition and also has a high uniformity.

The dominance index (C)
Dominance index value used to determine the presence or absence of certain types of Gastropods that dominant in each station. Uniformity index values in all three types of observation stations showed values ranging from 0.135 to 0.19. Based on the criteria according to Odum (1993) in Susiana (2011), this value ranges between 0 and 0.5 indicating that species dominance in all three observation stations is low.

2.2.4 Relationship Between Macro Algae and Sea Grass Type With Number Type Gastropods

Based on the statistical test results obtained form a positive but weak correlation between the number of types of macro algae and sea grass with a number of types of gastropods, demonstrated the value of the correlation coefficient of 0.424 and 0.010 with significant (<0.05). From this it can be said that the increase in the number of types of macro algae and sea grass positive effect on the increase in the number of types of Intertidal Gastropods at Sundak beach with model linear equation Y = 1.008 +0.112 X.
Based on observation, Gastropods from Family Cerithiidae and Trochidae can be said associated with macro algae Chlorophyta. Macro algae Family Cypraeidae and Strombidae associated with the two classes, namely Chlorophyta. Gastropods herbivorous type in medium sized cruising range between 0.5 to 1 m2 (Carpenter, 1986 in Hatta, 1991) is more like the intertidal area is overgrown by macro algae that facilitate the type to be eaten by gastropods such *Chaentomorpha, Ulva, Acanthophora*, and other macro algae have a small morphology, soft texture (Steneck & Walting, 1983 in Hatta, 1991). Thus, the various types of macro algae, the more diverse the Gastropoda type.
Environmental conditions including salinity waters (26-32 ‰), temperature (18-30^{0}C), DO (7.5 mg / L) was within the range that supports life Gastropoda.

3 Conclusion

Based on the results of research conducted in the intertidal beach Sundak Gunungkidul DIY in January 2013 concluded that was found 20 type of Gastropods

and the most abundance type of *Pardalina testudinaria*. Rate of Gastropods species diversity is relatively low with an index ranging from 2.02 to 2.09.

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