

Analysis of Pigment Concentration Common Macroalgae on the South Coast of Gunungkidul, Yogyakarta by Spectrophotometric Method

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Abstract. Macroalgae is photosynthetic organisms that live in watery environments, especially in the sea. Macroalgae have various types of chlorophyll depending on the types including chlorophyll a, b, c, and d. One of the dominant pigments in red seaweed is phycobilin which consists of phycoeritrin, phycocyanin, and allophycocyanin. Macroalgae are abundantly found in intertidal zone of the south coast of Gunungkidul but there is still few study on the macroalgae potency. This research aimed to determined pigment concentration of macroalgae in south coast of Gunungkidul, Yogyakarta in order to understand potency of macroalgae pigments for small to industrial purposes. The method used is spectrometry, then analyzed by the formula. The result of this research is From three species were abundantly found in south coast of Gunungkidul, *Ulva lactuca* have concentration of Phycobilin pigment like Phycocyanin 0,005 mgml⁻¹, Allophycocyanin 0,112 mgml⁻¹ and Phycoeritrin 0,027 mgml⁻¹ also Chlorophyll a 0,022 mgg⁻¹ and Chlorophyll b 0,026 mgg⁻¹. *Padina minor* have concentration of Phycobilin pigment like Phycocyanin 0,088 mgml⁻¹, Allophycocyanin 0,270 mgml⁻¹ and Phycoeritrin 0,033 mgml⁻¹ also Chlorophyll a 0,026 mgg⁻¹ and Chlorophyll b 0,028 mgg⁻¹. *Gracilaria textorii* have concentration of Phycobilin pigment like Phycocyanin 0,027 mgml⁻¹, Allophycocyanin 0,112 mgml⁻¹ and Phycoeritrin 0,008 mgml⁻¹ also Chlorophyll a 0,019 mgg⁻¹ and Chlorophyll b 0,007 mgg⁻¹.

Keywords: Gunungkidul, macroalgae, pigment, spectrophotometry

Comparison of Macroalgae Abundance and Diversity in Intertidal Zone of Porok Beach, Gunungkidul between Two Seasons

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Abstract. Macroalgae are marine plants that play important roles in marine ecosystem. The aim of this study is to gain the information about diversity and abundance of macroalgae in intertidal zone of Porok Beach, Gunung kidul, Yogyakarta in rainy and drought seasons. This research utilizes line transect and stratified random sampling

method which is used 1x1 m plot. The samples are identified by morphological characters thallus. The taxonomical classification key was used as a guide for species identification. The results show that the response of macroalgae growth varies between times and seasons of the year. Based on the results of the study in 2017, it was found that species with the highest coverage value in drought season is *Cladophora* sp (19.44% / m²), while the lowest coverage of macroalgae is *Boergesenia* sp. (0.002% / m²) and in 2018 the highest coverage in the rainy season is *Ulva lactuca* (9.07% / m²), while the lowest coverage of macroalgae is *Gigartina* sp. (0.10% / m²).

Keywords: Macroalgae, abundance, diversity, drought season, rainy season

Comparison of ecological and macroalgae diversity in Porok Beach and Ngrumput Beach Gunungkidul, Yogyakarta, Indonesia

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Abstract. Macroalgae or seaweeds is one of the main feedstock of coastal area in Gunungkidul, Yogyakarta. Macroalgae has an important role as primary producer in the coastal ecosystem. Several species of macroalgae have been used by the local society around coastal area of Gunungkidul Yogyakarta, but the research about ecological and macroalgae diversity in Porok Beach and Ngrumput beach is not available yet. This research aim to study the ecological and diversity of macroalgae in the intertidal zone of Porok Beach and Ngrumput Beach, Gunungkidul, DIY which is characterized by the rocky and sandy substrate. The study was conducted on September 9, 2018. Data were collected using purposive random sampling method. The result of this research is analyzed using Sorensen's similarity index (S) based on both the number of common species in two communities of macroalgae in Porok Beach and Ngrumput Beach. The result of this research there are 26 species of macroalgae found in Porok Beach and 17 species of macroalge found in Ngrumput Beach. The similiarity index (S) was 69.76%.This research is expected to maintain and monitoring the sustainability of macroalgae.

Keywords: diversity, macroalgae,Ngrumput Beach, Porok Beach

Analysis of Chlorophyll and Phycobilin Concentration Common Macroalgae On The South Coast of Gunungkidul, D.I. Yogyakarta by Spechtphotometric Method

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Keywords: Macroalgae, Spechtphotometry, Chlorophyll, Phycobilin

Abstract: Macroalgae are organisms that live in the territorial waters, especially in the sea. Macroalgae as photosynthetic organisms have a variety of pigments, such as chlorophyll pigments, chlorophyll a, b, and other pigments such as carotenoids and phycobilin. Macroalgae pigment is a potential source for antioxidant, solar cell component, and natural food coloring agents. Many species of macroalgae found in intertidal zone of the southern coast of Gunungkidul Yogyakarta, but the research about macroalgae diversity is rarely done. The aim of the study was to determined chlorophyll and phycobilin concentration of *Chaetomorpha crassa*, *Turbinaria ornata*, and *Gelidiella acerosa* in south coast of Gunungkidul, D.I. Yogyakarta. The method of this research using spectrophotometry, and then data analysis was performed using the formula. The results showed that *Chaetomorpha crassa* contain 0,016 mgml⁻¹ chlorophyll a concentration, chlorophyll b 0,023 mgml⁻¹, also contain Phycobilin pigment, the concentration is 0,028 mgml⁻¹ of phycocyanin, 0,197 mgml⁻¹ of Allophycocyanin, and 0,037 mgml⁻¹ of phycoeritrin. *Turbinaria ornata* containing 0,023 mgml⁻¹ of chlorophyll a concentration, 0,016 mgml⁻¹ of chlorophyll b, also containing phycobilin pigment, the concentration is 0,050 mgml⁻¹ phycocyanin, 0,173 mgml⁻¹ allophycocyanin, and 0,029 mgml⁻¹ phycoeritrin concentration. *Gelidiella acerosa* has 0,012 mgml⁻¹ chlorophyll a concentration, 0,005 mgml⁻¹ chlorophyll b concentration, also containing phycobilin pigment, the concentration of phycocyanin is 0,013 mgml⁻¹, 0,074 mgml⁻¹ allophycocyanin, and 0,005 mgml⁻¹ phycoeritrin concentration.

Population Diversity of Marine Macroalgae between 2018 and 2019 at Porok, Gunungkidul, Yogyakarta

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Keywords: Macroalgae, Diversity, Porok.

Abstract: Porok is one of beaches in Gunungkidul with greatest diversity of macroalgae (seaweeds). Substrate of intertidal zone are dominated by dead-coral reef and sandy. Macroalgae in Porok grow attached to hard surface, such as rocky and sandy substrate. Seaweeds may be particularly sensitive to global change which is natural process or human activity, therefore it can be used for indicator of environmental changes. Diversity of macroalgae is one of indicator for environmental changes. This research aims to observe macroalgae diversity between 2018 and 2019, also to find out environmental factor that influence diversity. The sampling method using random sampling by hand-picked, then measurement of pH and temperature. Documentation capture by digital camera with placed the specimen above millimeter block. The research result in 2018 were found 22 species and 26 species in 2019. The pH number of sea water can be affecting diversity of macroalgae.

Comparison of Marine Macroalgae Diversity In Porok and Sepanjang Beach Gunungkidul, Yogyakarta

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Keywords: Diversity, Marine macroalgae, Porok, Sepanjang

Abstract: Macroalgae have a variety of uses utilized extensively as food by the local society around coastal area of Gunung Kidul Yogyakarta. However, research about macroalgae diversity in Porok Beach and Sepanjang beach is not available yet. The aim of the study was to investigate the diversity of macroalgae in the intertidal zone of Porok and Sepanjang, Gunungkidul, Yogyakarta which is characterized by the rocky and sandy substrate. Data are presented as a checklist comprise of the taxonomic identity and image of each species. Comparison of macroalgae diversity was carried out based on the Soresen Index based on the number of similar species have found at Porok and Sepanjang. The result showed 26 species macroalgae of Porok and 13 species of Sepanjang. The similarity index (S) was 46,15% which showed the low level of population structure and composition similarity. This low similarity value indicated that Porok and Sepanjang has different habitat condition, so that a comprehensive data of macroalgae diversity in all beaches in Gunungkidul is needed.

Vitamin C Content of Common Macroalgae in Intertidal Zone of Sepanjang Beach, Gunungkidul, D.I Yogyakarta and Potential Use as a Vitamin Source in Nutrition

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Abstract. Macroalgae are known as a dietary raw material because it is nutritious and have an excellent source of vitamins. It also has a variety of uses which are widely used as food by local communities around the coastal region of Gunungkidul, Yogyakarta. However, research about Vitamin C in macroalgae Sepanjang Beach is not available yet. This research aims to study vitamin C content of common macroalgae in the intertidal zone of Sepanjang Beach, Gunungkidul, Yogyakarta which is characterized by the rocky and sandy substrate. The study was conducted on October 13th, 2019. Data were collected using purposive random sampling method. Analysis of vitamin C content was carried out using the iodometric titration method. Based on experiments that have been done, the results obtained are that vitamin C is contained in the three types of macroalgae. The concentration of vitamin C varies between 0.205 – 1.965 mg/mL. The highest vitamin C content is 1.965 mg/mL found in *Sargassum polycystum* and the lowest is 0.205 mg/mL in *Mastocarpus papillatus*. Based on its vitamin C content, it can be concluded that macroalgae have the potential to be processed into food ingredients, cosmetics, medicine, etc. because of its nutritional content.

Keywords : Macroalgae, Macroalgae Potential, Sepanjang Beach, Vitamin C

Decapoda Phenetic Study: Brachyura on intertidal zone of Porok Beach, Yogyakarta Based on Morphological Character Diagnosis

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Abstract. Phenetic studies are part of an important systematic study that based on morphological characters. One of phenetic study's method is numerical phenetic with binary scoring index. In order to know the Brachyuran (crabs) phenetic relationship we use jaccard coefficient to count numerical phenetic index. From sampling that conducted in intertidal zone of Porok Beach on 30th August 2019 with purposive random sampling method, we found 7 Brachyura; *Eriphia sebana*, *Grapsus albolineatus*, *Ocypode cordimanus*, *Percnon planissimum*, *Charybdis annulata*, *Thalamita crenata*, and *Atergatis floridus*. The r coefficient that counted with Jaccard coefficient method showed 85,16% phenetic relationship. *Eriphia sebana* and *Percnon planissimum* have the highest similarity compared to other species.

Keywords: Brachyura, phenetic study, jaccard coefficient, Porok Beach, intertidal zone

The Anomuran And Brachyuran (Crustacea: Decapoda) in Intertidal Zone of Porok Beach Gunungkidul, Special Region of Yogyakarta

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Keywords: Porok Beach, Purposive Random Sampling, Brachyuran, Anomuran.

Abstract: Porok beach as a marine research center rarely visited by tourist so the habitat and species are still conserved. Porok beach is a karst beach that composed by sands and rocks. The substrate consists of seagrass, dead coral, soft coral, and algae. Therefore, the habitat was suitable for marine crustacean. We provide systematic list of Brachyuran and Anomuran, as a preliminary study for further research and a document base of marine area in Porok Beach, Gunungkidul. The study was conducted on intertidal zone of Porok Beach. Samples were collected using purposive random sampling method on August 30th 2019. Purposive random sampling was used to know the biodiversity. The result shown that 12 species and 8 families of Brachyuran and Anomuran found that are Diogenidae, Eriphiidae, Portunidae, Grapsidae, Majidae, Ocypodidae, Percnidae, and Xanthidae. The highest diverse family is Portunidae consist of 3 species *Thalamita crenata*, *Charybdis annulata*, and *Charybdis* sp.

The diversity of Echinoderms in Sarangan Beach, Gunung Kidul, Yogyakarta

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Abstract. Indonesia as an archipelago country has a wide sea and long coastal line, it have caused a high biodiversity. Gunung Kidul is one of the regencies in the Special Region of Yogyakarta which is famous for its many beaches which have high marine biodiversity. Sarangan Beach is one of the beaches located in Gunung Kidul which is dominated by the surface of the substrate in the form of sand, coral, and macroalgae, so that on this beach can be found various kinds of marine biota, one of which is Echinodermata. The variety of Echinoderms in the Indonesian coast, especially Sarangan Beach, is not widely known, so the purpose of this research is to determine the diversity of Echinoderms on that beach. This research was conducted on 2 October 2018 at 04.30 WIB. Sampling was carried out at Sarangan Beach using *purposive random sampling* method, then the sample was further preserved and identified. The results obtained from this study were the discovery of 1 species from the class Asterozoa namely *Anthenea* sp., found 3 species of Ophiurozoa class namely *Ophiocoma scolopendrina*, *Ophiomastix annulosa*, and *Ophiocoma erinaceus*, and found 4 species of Echinozoa class namely *Colobocentrotus atratus*, *Heterocentrotus trigonarius*, *Stomopneustes variolaris*, and *Echinometra* sp.

Keywords: diversity, Sarangan beach, echinoderms, Asterozoa, Ophiurozoa, Echinozoa.

Diversity of Echinoderms in Intertidal Zone of Sundak Beach, Gunung Kidul, Yogyakarta

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Keywords: diversity, echinoderm, Sundak beach

Abstract: Indonesia is a maritime country with high diversity of marine biota, which one is from Phylum Echinoderms. Echinoderms are known as biota of marine which is are living on corals, sandy, and on the intertidal zone and deep ocean. The intertidal characteristics of Sundak Beach has a suitable structure to echinoderms life because there are many corals, but there is many species has not been identified before. The purpose of this research is to know the diversity of echinoderms phylum on the intertidal zone. Sampling was carried out on August, 24th 2019 with purposive random sampling method along the coastal-line in intertidal zone. The result of this research are identified and classified on the each class. Based on the results, the are found species from Echinodea, Holothuroidea, and Ophiuroidea. Species from Echinoidea are Tripneustes gratilla, Echinometra mathaei, Heterocentrotus trigonarius, Diadema antillarum., and Echinotrix calamaris. Holothuroidea namely Holothuria atra. Ophiuroidea namely Ophiotrix fragilis, Ophiocoma scolopendrina, and Ophiocoma erinaceus. The conclusion from this study is the discovery of five spesies from class Echinoidea, one spesies from class Holothuroidea and three spesies from class Ophiuroidea

Abundance and Distribution Pattern of Echinoderms in Intertidal Zone between Sadranan and Slili Beach, Gunung Kidul, Yogyakarta

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Keywords: echinoderms, abundance, distribution pattern, Sadranan beach, Slili beach.

Abstract: Echinoderm is one of the phylum which has high diversity and abundance in Indonesia, especially in Gunung Kidul, Yogyakarta. Sadranan and Slili beach are side by side beach located in Gunung Kidul. This beach is dominated by coral and rocky coral with macroalgae that provide the habitat of Echinoderms. This research is conducted to study the abundance and distribution pattern of Echinoderms in the intertidal zone between Sadranan and Slili beach. Sampling was carried out on Friday, 4 September 2019 at 05.00 p.m. in the intertidal zone using quadrat plot methods. The beach area is 2240 m² which is divided into 21 plots with 1 x 1 m size. Data analysis was performed by measuring Margalef index (D), Pielou index (e), and Shannon-Wiener index (H') then analyzing the distribution pattern and habitat parameters. The result shows that the Echinoderms which has the highest abundance is *Echinometra mathei* with 19 individual founds. The distribution pattern of *Echinometra mathei*, *Stomopneustes variolaris*, *Heterocentrotus trigonarius*, *Ophiocoma erinaceus*, *Macrophiotrix longipeda*, *Ophiomastix annulosa*, and *Echinus* sp. is clumped. The distribution pattern of *Tripneustes gratilla*, *Diadema antillarum*, *Echinotrix calamaris*, and *Ophiocoma scolopendrina* is uniform.

The Diversity of Echinoderms (Echinoidea, Ophiuroidea, and Holothuroidea) in Slili Beach, Gunung Kidul, Yogyakarta

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Abstract: Gunung Kidul is one of the regencies in Special Region of Yogyakarta that famous for many beaches. Slili Beach is one of the beaches in Gunung Kidul Regency with the dominant substrate are covered corals, sandy and little bit algae. This beach is dominated by sands and covered coral rock with marine biota which is one of them is Echinoderms. This research is conducted in the intertidal zone of Slili Beach using purposive random sampling methods and continued by preserving and identifying the collected samples. There are three classes, six families, and eight species of Echinoderms. The species are *Stomopneustes variolaris*, *Echinometra mathaei*, *Diadema antillarum*, *Tripneustes ventricosus*, *Tripneustes gratilla*, *Ophiocoma scolopendrina*, *Ophiocoma erinaceus*, and *Holothuria atra*.

Keywords: echinoderms, biodiversity, slili beach

Biodiversity of Mollusc in Intertidal Zone of Barakuda Beach, Jepara Regency, Central Java, Indonesia

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Keywords: Biodiversity, Molluscs, Barakuda Beach

Abstract: Barakuda Beach is located in Karimunjawa Island, Jepara Regency, Central Java, Indonesia. Barakuda Beach was developed for tourist destination and the substrate is dominated by fine sands, coral reef, and mangrove. Mollusc is the second largest phylum in the Animal Kingdom after Arthropods. The body of these animals have three main parts consist of leg, visceral mass, and mantle. This research aimed to study about diversity of Mollusc in the intertidal zone of Barakuda Beach, Karimunjawa Island, Jepara Regency, Central Java. The research was conducted on July 11th, 2019 in intertidal zone of Barakuda Beach, Karimunjawa Island, Jepara Regency, Central Java, Indonesia (5°49'9"S 110°27'32"E). The sampling method used on this research is purposive random sampling. The results were 3 families of classes Gastropods and 1 families of classes Bivalves. The families of classes Gastropods that found were Muricidae, Neritidae, Cerithiidae. The families of classes Bivalves that found were Mytilidae. Gastropods were commonly lives in intertidal or shallow sublittoral zones and they eat marine worms or even small fishes. Mytilidae generally lives in the coral substrate and they eat algae and sponges or tiny animals that grow on rock and coral

BIODIVERSITY OF MOLLUSC IN INTERTIDAL ZONE OF BUNGA JABE BEACH, KARIMUNJAWA, CENTRAL JAVA, INDONESIA

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Keywords: Biodiversity, Bunga Jabe Beach, Mollusc.

Abstract: Bunga Jabe Beach is located in Kemujan Village, Karimunjawa Island, Jepara, Central Java, Indonesia. It is not far from Legon Bajak Harbour and Karimunjawa Airport. Bunga Jabe Beach was developed for tourist destination but suitable for the habitat of Mollusc because the substrate is dominated by fine sands and coral reef. This research aimed to study about diversity of Mollusc in the intertidal zone of Bunga Jabe Beach, Karimunjawa Island, Central Java. The research held when ecological parameters were 27°C for water temperature, 28°C for air temperature, and 8 for pH. The research was conducted on July 8th, 2019 at 19.42 - 21.47 WIB in intertidal zone of Bunga Jabe Beach (5.7975° S, 110.4765° E). The sampling method of this research is purposive random sampling. The result of this research showed there were 5 families of classes Gastropods and 1 family of classes Bivalves. The families of classes Gastropods that found were Cerithiidae, Melongenidae, Muricidae, Neritidae, and Planaxidae. The family of classes Bivalves that found was Arcidae. Neritidae was the most abundant family that found because the habitat of these family was in the intertidal zone of tropical area which exposed to the air and sun for long periods.

Comparison of Gastropods' Abundance in Kralak Beach, Gunungkidul, Yogyakarta, in 2018-2019

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Keywords: Abundant, Gastropods, Kralak Beach

Abstract: Kralak Beach is located in Ngestirejo Village, Tanjungsari District, Gunung Kidul Regency, Yogyakarta, Indonesia with coral-reef substrate. The aim of this study was to determine the abundance of Mollusc in the intertidal zone of Kralak Beach (S8°8'43" E110°35'59) and to compare the result from 2019 to 2018. The study was conducted in March 4th 2018 and October 4th 2019 at 03.10 WIB in the Kralak Coast intertidal zone using the quadrant plot method. The research held when ecological parameter was $\pm 21,3^{\circ}\text{C}$ for water temperature 36‰ for salinity, and 7,5 for pH. While in 2018 $\pm 27^{\circ}\text{C}$ for water temperature 35‰ for salinity, and 7 for pH. Data were analyzed using Shannon-Wiener index of diversity (H'), evenness index (E), and dominance index (D). The most abundant species in 2019 were *Tenguella marginalba*. (H') was 0,907, (E) was 0,308, and (C) was 0,001. While in 2018 is *Cypraea* sp. with (H') was 3,648, (E) was 0,948, and (C) was 0,032. Based on the result, the abundance of Gastropods in 2019 compared to 2018 are decreased, the distribution are prevalent, and neither species from 2019 nor 2018 are dominant.

Phylogenetic Relatedness Analyses of Squalus with Maximum Likelihood Method

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Abstract. Sharks came from the Chondrichthyes class that live in the sea on the pelagic zone or open water zone with a depth of 0-10000 meters. One genus of sharks that are frequently encountered is the genus Squalus. The genus Squalus has approximately 33 species. Those species are distributed quite widely, ranging from the Eastern Indian Ocean, Southwest Atlantic, in the Eastern Atlantic, with the majority of distributions in the Western Pacific. The genus Squalus is globally distributed. The population adapt to changes in the surrounding environment, caused a high genetic diversity in it. This study aims to analyze the phylogenetic relationship among the shark species from the genus Squalus for conservation purposes. Samples were collected from NCBI nucleotide genebank from different parts of the world with ranging climates; tropical, temperate, and cold. The result showed that each species has a very close relationship with the same one, and one or two from a different species such as Squalus acanthias with S. hemipinnis, or in the same species but from different places such as S. acanthias in europe (Germany or Swedia) that has a close relationship with those in America (Canada), and it is known that the closest genetic distance is 0.0% whilst the furthest is 9%. These results prove that species with the closest genetic distance (0.0%) have the highest possibilities to be conserved ex situ.

Keywords: squalus, phylogenetic analyses, CO1, maximum likelihood