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HISAS

Today's Vision, Tomorrow's Reality

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Chair of Committee's Message

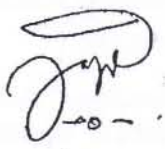
The 11th HISAS (Hokkaido Indonesian Student Association Scientific Meeting) met in Sapporo at February 08 2014, hosted by PPIH (Indonesian student Association in Hokkaido) with the gracious support from Hokkaido University by providing venue in the Faculty of Earth and Environmental Science. Our thanks and appreciation go out to KBRI Tokyo, KITAGAS and other sponsors, great invited speakers, participants and to all the others that contributed in the largest HISAS meeting ever held.

We are very pleased to have been able to invite Prof Noriyuki Tanaka from Census Hokkaido University, Prof Yuichi Kamiya from Faculty of Environmental and Earth Science Hokkaido University, Dr. Yosuke Okimoto from Faculty of Agriculture Hokkaido University and Dr. Aditya Riadi Gusman from Institute of Seismology and Volcanology Hokkaido University. We had very great talk delivered by such experts in their respective field which can broaden our knowledge.

The aim of HISAS is communicating research progress from Indonesian student under sustainability framework for better future. Although it originally targeted Indonesian students who are studying at Hokkaido, many participants came from outside of Japan with diverse scientific background. More than 60 papers were delivered and presentations made on these and related topics. All of the presented papers will be available in this proceeding. It was almost impossible to capture all of the content and enthusiasm from the various fields of new information and new technologies which were introduced in this meeting. We are optimistic these proceeding will broaden our knowledge in many topics and related fields.

At last we want to acknowledge the editors. We are extraordinarily grateful to the generous help of these colleagues. It was with great pleasure that our colleagues and we had this opportunity to host such a great meeting.

Sapporo, 8 February 2014



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The Relationship between Water Quality and Distribution of Aquatic Biota in Sagara Menyan, Subang West Java-Indonesia

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Abstract— **Coastal known as the aquatic ecosystem have a very large resource potential. This area has been widely utilized and made a significant contribution. However, coastal get constant pressure in the form of ecological pollutants resulting from human activities. These conditions will lead to a decrease water quality that will bring harm to the aquatic biota. This observation purposed to measure the characteristics of the quality parameters and the distribution of coastal and estuarine biota in Segara Menyan. Water temperature at Segara Menyan ranged from 30 to 32 °C. Water depths ranged 59 to 250 cm. The transparency ranged 50 to 89.5 cm. Range levels of DO 1.5 to 5.4 mg/L. Range levels of salinity 30 to 36 psu. Range levels of total phosphate 0.03 to 0.2 mg/L. Range levels of nitrate 0.0023 to 0.0257 mg/l. Range levels of nitrite 0.0005 to 0.0058 mg/L. Range levels of amonia 0.0071 to 0.2429 mg/L. D_1 dan D_2. The range of chlorophyll-a 0.0032 to 0.122 mg/L. Based on the STORET Method analysis obtained, Segara Menyan was fertility waters with medium polluted in water quality. It has low diversity, low stable community, medium similarity and high dominance of biota aquatic. Caused by pressure in the form of ecological pollutants originating from human activity and the management indiscretion..**

Keywords— **Water quality, Waters condition, Organism, Segara Menyan, Human Activity**

I. INTRODUCTION

As it mentioned in that entitled "Institutional Arrangements for Managing Coastal Resources and Environments", Sorensen & MC CREARY (1990) defines the border or coastal zone is the space where the two major environmental change, namely sea and land. There are 17,508 islands and 81,000 miles of coastline along Indonesia known as the mega-biodiversity countries in terms of biodiversity, coastal areas and has huge potential to various development options (Rahmawati, 2004). Marine and coastal areas are a very important area for the majority of the Indonesian population and 60% of the total population of Indonesia, living and active in marine and coastal areas (Dahuri, 1995). Indonesian marine and coastal areas are also an important area in the world environment. Indonesia is recognized as a world center of biodiversity for marine biota and coastal, including coral reefs, reef fish, mollusks and mangrove (Tomascik et al., 1997). However, coastal areas face constant pressure in the form of ecological pollutants originating from human activity and the management indiscretion has caused many marine ecosystems and certain marine biota decreased quality and quantity and water quality at a very worrying rate (Dirhamsyah, 2006). One of the coastal water affected is the Segara menyan. This is one of the coastal areas and estuaries in West Java. In addition to having a broad estuary, the area has mangrove forest vegetation. Hence, the estuarine region Mayangan has abundant resources of coastal biota contained therein.

The purpose of this research is to measure the quality parameters characteristics of the aquatic biota distribution in coastal and estuarine in Segara Menyan Mayangan Subang.

II. MATERIAL AND METHOD

A. *Sampling Period and Study Sites*

The sampling was carried out in December 2012 in Segara Menyan, Subang West Java-Indonesia. A total of 4 stations were chosen according to the water character of environmental conditions. Station 1 is located in the body of the river, Station 2 is located at the mouth of the river, Station 3 is located at the mouth of the close river and Station 4 is located off the coastal area. Water quality parameters were observed at each station such as temperature, depth, transparency, DO, salinity, total phosphate, nitrate, nitrite, ammonia, and chlorophyll-a. While the biological parameters observed were macro benthos, plankton, and fish.

B. *Sampling Methods*

Physico-chemical analysis

The concentrations of total phospate, Nitrogen (Nitrate, Nitrite, Ammonia) were measured using inductively coupled phasma spectrometry after digestion with aqua regia (HNO_3:HCl; 1:3) in teflonlined high pressure decomposition vessels. Salinity was recorded with a refractometer, abiotic parameters (temperature and

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dissolved oxygen) were recorded with an oxygen meter, and water transparency was estimated based on turbidity and Secchi depth, according to Yáñez-Arancibia *et al.*, 1983 (*in* Rebelo, 1992).

Biological samples processing

Biotic parameters (chlorophyll-a) was measured using spectrometry methods. Fishes were preserved by freezing. At the laboratory each specimen was identified, according to the taxonomic keys of Bauchot and Pras (1987) and Whitehead *et al.* (1986), measured (total length), and weighed (total weight). The mollusc samples were processed through a sieve with a mesh size of 0.5 mm and the retained fraction was fixed in 4% neutral formalin stained with Rose Bengal. Organisms were sorted out of the residue by eye (see De Grave and Whitaker, 1999), identified to species level when possible, and counted.

Data analysis

The total number of species, the Shannone Wiener diversity index (Shannon and Weaver, 1963), the Simpson dominance index (Odum, 1971), and Eveness Indeks (Bengen 2000). The condition of water quality was analysis with STORET Index (KepMen No 51, 2004). Describe the condition from reference study and ecology side.

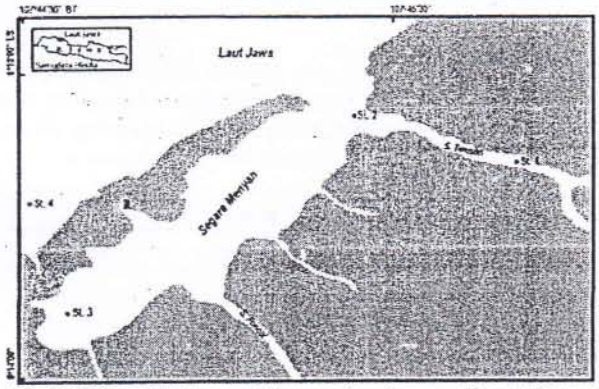

Fig 1. Map of the Segara Menyan showing sampling stations: st 1 (the body of the river), st 2 (the mouth of the river), st 3 (the mouth of the close river), st 4 (the coastal).
sources: modification from google map (Zahid, 2012)

Tabel 1.Material and Methods Used in Analysis of Water Samples on The Physics, Chemistry, And Biology Parameters (APHA 1989; 2005)

No	Station	Unit	Material/methods	In situ/Ex situ
1	Temperature	°C	Thermometer /Expansion	In situ
2	Depth	cm	Secchi disk/Visual	In situ
3	Transparency	cm	Secchi disk/Visual	In situ
4	Salinity	psu	Refractometer	In situ
5	DO	mg/l	Winkler	In situ
6	Total Phospate	mg/l	Spectrometry/Digestion	Ex situ
7	Nitrate (NO_3-N)	mg/l	Spectrometry/Brucine	Ex situ
8	Nitrite (NO_2-N)	mg/l	Spectrometry/Colorimetrik	Ex situ
9	Ammonia (NH_3-N)	mg/l	Spectrometry/Phenate	Ex situ
10	Chlorophyll-a	mg/l	Spectrometry/aseton	Ex situ
11	Plankton	Ind/l	elektric Microskop / sensus	Ex situ
12	Benthos	Ind/m^3	Surber/visual	Ex situ
13	Nekton	Ind	Net/visual	Ex situ

III. RESULT

1. Environmental Variables

Table 2. Values Obtained for Water Variables at the 4 Sampling Station

Parameters	Station			
	1	2	3	4
Temperature (°C)	30-31	30,5-31,5	31-32	31,5-32
Depth (cm)	145-161	90-104	59-76	119-124
Transparency (cm)	68-76	86-95	50-60	69-89,5
% transparency	48.01	81,74	84,62	65,29
Surface Salinity (psu)	35	30	30	35
Bottom Salinity (psu)	31	30,5	34	36
Surface DO (mg/l)	2,3077	3,8462	3,8462	5,3846
Bottom DO (mg/l)	1.5385	3,8462	5,3846	5,3846
Total Phosphate (mg/l)	0,2048	0,0442	0,0455	0,0483
Nitrate (mg/l)	0,0023	0,0187	0,0257	0,0047
Nitrite (mg/l)	0,0005	0,004	0,0058	0,0015
Ammonia (mg/l)	0,0719	0,1863	0,2229	0,2429
Chlorophyll-a (mg/l)	0,0085	0,0032	0,0104	0,0122
Species Number of Plankton	14	8	1	9
Diversity Index of Plankton	0,7212	0,7273	0,7085	0,3628
Evenness Index of Plankton	0,4983	0,5026	0,4895	0,2507
Dominancy Index of Plankton	0,2809	0,2343	0,3064	0,6304
Species Number of Benthos	11	10	11	10
Diversity Index of Benthos	3,41	2,6	0,44	0,39
Evenness Index of Benthos	0,9	0,82	0,04	0,12
Dominancy Index of Benthos	0,11	0,21	0,83	0,17

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2. *Water Quality Parameters*

Based on the results of the analysis using the STORET Method was obtained amounting -29, so according value system of "US-EPA (Environmental Protection Agency)" to determine the status of water quality value ranged -11 s/d -30 was medium polluted categorized.

Table 3. Analysis STORET Method

		quality standards	min	max	average	min	max	average	Total
Physics									
Temperature	°C	25±3	30	32	31	-1	-1	-3	-5
Transparency	Cm		50	89,5	69,75				0
Chemistry									0
Salinity	psu	<34	30	36	33	0	-2	0	-2
DO	mg/L	>5	1,5	5,4	3,45	-2	0	-2	-4
Total Phospate	mg/L	0,015	0,03	0,2	0,115	-2	-2	-6	-10
Nitrate (NO_3-N)	mg/L	0,008	0,0023	0,0257	0,014	0	-2	-6	-8
Nitrite (NO_2-N)	mg/L		0,0005	0,0058	0,00315				0
Ammonia (NH_3-N)	mg/L	0,3	0,0071	0,2429	0,125	0	0	0	0
Total									**-29**

3. *Biology Parameters*

Plankton

The four stations provided a total of 28 species. Table 2 shows the highest total abundance is at sampling station 4 (766 ind/l) and the lowest total abundance is at sampling station 1 (79 ind/l). The dominant species of the study was *Rhizosolenia*, distributed in sampling station 2,3 and 4. The largest number of *Rhizosolenia* is at sampling station 4 (601 ind/l of 766 ind/l), although this species is present in sampling station 2 and 3.

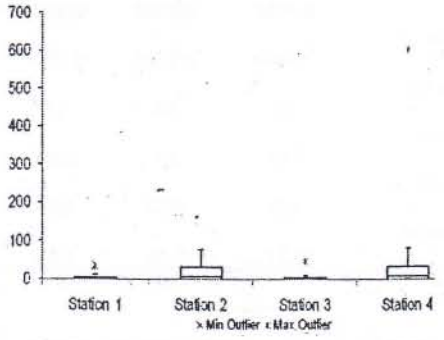

Figure 2. Plankton abundance in each sampling station

Then, the second largest number of species is *Thalasionema* that was founded at sampling station 2,3, and 4. Abundance of *Thalasionema* is higher than the other. Abundance of *Chaetoceros* were higher in sampling station 2 although this species was also present in sampling station 4. Abundance of *Coscinodiscus* were higher in sampling station 1 although this species was also present in sampling station 4. But, *Gunardia* are only present in sampling station 4.

Table 4. Index of plankton

	Mean ±SD	Range
Species Number	8±5,35	1-14
Diversity Index	0,63±0,18	0,36-0,73
Evenness Index	0,44±0,12	0,25-0,50
Dominancy Index	0,36±0,18	0,23-0,63

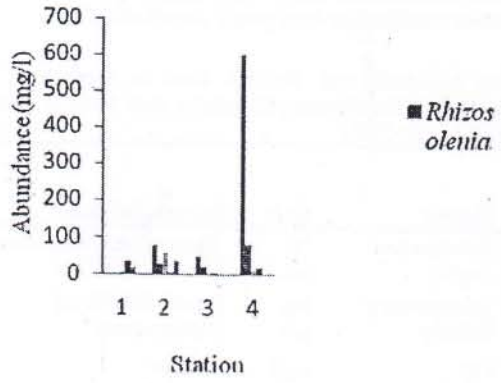

Figure 3. The most exist species of plankton in each sampling station

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Benthos

The four stations provided a total of 24 species. Table 3 shows the highest total abundance is at sampling station 1 (1000 ind/m^2) and the lowest total abundance is at sampling station 3 (250 ind/m^2) which consist of dominant species, *Terebralia palustris*. But dominancy index in sampling station 1, 2, and 4 were low. The highest diversity index and evenness index were at sampling station 1. Segara Menyan has low diversity, low stable community, medium similarity and high dominance of benthos.

Table 5. The Variation of Benthic Community in Every Station

Station	H'	E	Ci
1	3,41	0,90	0,11
2	2,60	0,82	0,21
3	0,44	0,04	0,83
4	0,39	0,12	0,17

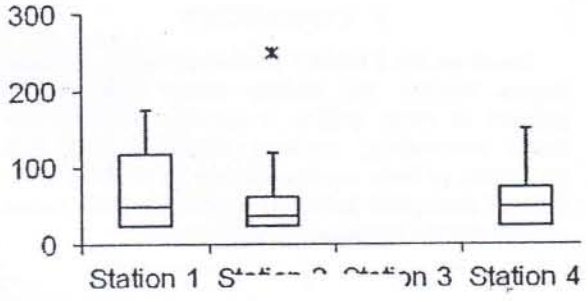

Figure 4. Benthos abundance in each sampling station

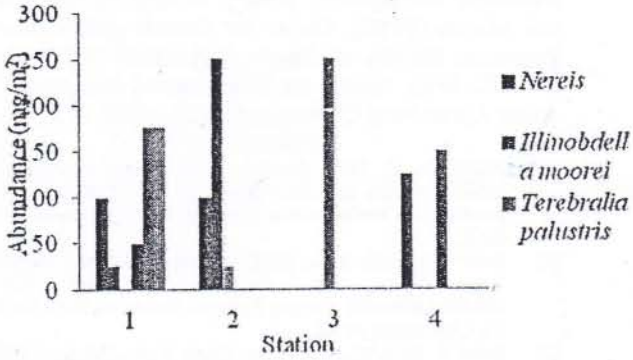

Figure 5. The most exict species of benthos in each sampling station

Nekton

At Station 1 nekton dominated by milkfish (*Chanos Chanos*), at Station 2 is dominated by Baelama anchovy (*Thryssa baelama*), at Station 3 is dominated by fish Japanese flathead (*Platycephalus Bataviensis*) and at Station 4 was found a few species such as Prickly croaker (*Aspericorvina jubata*), Belanger's croaker (*Johnius belangerii*), Scalloped perchlet (*Ambasis nalua*), and Amoy croaker (*Argyrosumus amoyensis*).

Tabel 6. Species of Nekton in Sagara Menyan

species	Maturity stage	male (ind)	female (ind)	total (ind)
Chanos chanos	2-4	3	4	7
Thryssa baelama	-	-	-	6
Platycephalus bataviensis	1-4	4	2	6
Johnius belangerii	4	-	1	1
Aspericorvina jubata	2	2	-	2
Ambasis nalua	3	-	7	7
Argyrosumus amoyensis	2-4	1	1	2

IV. DISCUSSION

The Segara Menyan is a semi-enclosed estuarine lagoon located within the Java Sea. Many fish species utilize estuary lagoon as feeding, nursery, and refuge area. Water temperature at station 1 Segara Menyan ranged 30 to 31 °C, while the temperature of the class crustacean zooplankton organisms are generally still able to survive. Tropics temperatures range is relatively stable than the equator of the polar region because more sunlight.

Segara Menyan waters are in between that range. The temperature changes affect of the water suitability as aquatic organisms habitat, because it's every aquatic organisms have a maximum and minimum range limit (Effendi 2003). Temperature directly affects the rate of photosynthesis and the physiology of animals (degrees metabolism and circulation reproduction) which in turn affects the way of eating and growth (Hayes and Laevastu 1982).

Salinity of the sea ranged 34-35 psu (Nontji 1993). Surface water salinity is affected by the balance between evaporation and precipitation (Meadow and Campbell 1988). Observation and analysis showed that chlorophyll-a in the Segara Menyan is dependent on sun rays. If the sun emmited more in specific level, so the chlorophyll concentration also will increase. It can be proved at Station 1 which has a moderate level of radiation.

Chlorophyll concentration at Stasion 1 amounted to 0.0085 mg/m^3. Station 2 has a low level of radiation, because it is surrounded by mangrove plants. Chlorophyll concentration at Stasion 2 amounted to 0.0032 mg/m^3. Whereas, Station 3 and Station 4 have high levels of radiation because it is nearing the open sea. Chlorophyll concentrations at stations 3 and 4, respectively by 0.0104 mg/m^3 and 0.0122 mg/m^3.

Based on biota observations in Segara Menyan, plankton abundance was highest at Station 1 *Coscinodiscus* species, whereas at Station 2-4 is *Rhizosolenia*. A station 1 is the highest temperature than other. It means that *Coscinodiscus* species can tolerate high temperature about 34°C. According Nontji (1993), *Rhizosolenia* is the type found in all tropical waters (circum tropical) that have adapted to warmer

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temperatures. Phytoplankton is the most important primary producer in marine, because phytoplankton can photosynthesize. Distribution and growth of phytoplankton as primary producers in the food chain in the waters influenced by upwelling that occurs in the waters.

Water depth at Segara Menyan ranged 59-161 cm. The shallow location will be easier to basic mixing happen as the result of the influence of waves, it caused water depths more than 3 m (Andriyono 2010). Plankton abundance was highest at Station 4 which has a depth ranging from 119 to 124 cm. Plankton abundance in the waters affected by the depth and dissolved oxygen. Water surface layer rich in dissolved oxygen tends decreases with increasing depth Henderson-Sellers and Markland (1987). Station 4 is the coastal area with high DO value (5.3846 mg/l) and high plankton abundance (766 Ind/m^2). Daily fluctuations of oxygen can affect other chemical parameters, especially when the absence of oxygen, which can result in changes in the solubility properties of some chemical elements in water (Effendi 2003).

Dissolved oxygen at Station 4 higher when compared to Station 1 Station 4 is caused due to an open area. This area can get DO source from photosynthetic process and atmospheric diffusion, different with covered area. According Effendi (2003) levels of 0.3-1.0 affects on aquatic organisms, especially fish that can lead to fish kills.

Segara Menyan is waters with moderate to fertility high levels. Station 1 phosphate levels are very high and the next station phosphate levels are relatively moderate. The fertility rate resulted in an abundance of fish, plankton and macrozoobenthos. According to Effendi (2003) waters with high fertility has a total phosphate concentration 0.051 to 0.1 mg/l. The total phosphate levels describe there are a lot of algae and aquatic plants. According to Davis and Cornwell (1991) in Effendi (2003) there is a positive correlation between the levels of total phosphate with chlorophyll-a because phosphorus are essential elements for aquatic plants and algae. In addition, the large number of fish and benthic are the result of the total phosphate with high content.

The distribution of macrozoobenthos in the waters will overflow if the oxygen contents for the process of respiration is enough. Oxygen is essential for life aquatic macro-and micro-organisms as required for the process of respiration. Daily fluctuations of oxygen can affect other chemical parameters, especially when the absence of oxygen, which can result in changes in the solubility properties of some chemical elements in water (Effendi 2003).

Nekton distribution at Station 1, 2, 3, and 4 are dominated by different species of fish. At Station 1 nekton dominated by milkfish (*Chanos Chanos*), at Station 2 is dominated by Baelama anchovy (*Thryssa baelama*), at Station 3 is dominated by fish Japanese flathead (*Platycephalus Bataviensis*) and at Station 4 was found a few species such as Prickly croaker (*Aspericorvina jubata*), Belanger's croaker (*Johnius belangerii*), Scalloped perchlet (*Ambasis nalua)*, and Amoy croaker *(Argyrosumus amoyensis)*. Nekton diversity is high in Segara Menyan. The depth at Stations 1, 3 and 4 are shallow and Station 2 is deep. The increasing depth causing the level of diversity of organisms is reduced, but the dominance of a few species increased. Baelama anchovy (*Thryssa baelama*) is carnivorous, one of them prey on small crustaceans and other macrozoobentos. Macrozoobentos at Station 1 (the river mouth area) has a higher diversity index than the other stations, amounting to 3.41 with high evenness index is 0.9. A benthic habitats is muddy substrate with a low depth for classified into suspended feeder benthic.

Segara Menyan was fertility waters with medium polluted in water quality. it has low diversity, low stable community, medium similarity and high dominance of biota aquatic. Caused by pressure in the form of ecological pollutants originating from human activity and the management indiscretion.

V. CONCLUCION

Based on the STORET Method analysis obtained, Segara Menyan was fertility waters with medium polluted in water quality. it has low diversity, low stable community, medium similarity and high dominance of biota aquatic. Caused by pressure in the form of ecological pollutants originating from human activity and the management indiscretion.

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