Asian Jr. of Microbiol. Biotech. Env. Sc. Vol. 20 (December Suppl., No. 2) : 2018 : S258-S269
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ISSN-0972-3005

MARINE WATER QUALITY ASSESSMENT USING BIOLOGICAL ORGANISMS AS INDICATOR AROUND FISH LANDING BASE IN KARANGANYAR, REMBANG, INDONESIA

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(Received 10 November, 2018; accepted 27 December, 2018)

Key word: *Seawater quality, Diversity index, Saprobity index, Biological parameters, Mesosaprobic*

Abstract – The development of fish landing bases in Karanganyar is a national fishery program in Indonesia, but this development project certainly has consequences because it can cause changes in ecosystems in the sea waters around the project site. This study aims to determine the initial conditions as the basis and general description of marine waters and the impact that will occur due to the construction of Karanganyar fish landing bases**.** Analytical method of sea water analysis used is an atomic absorption spectrometer, while for biological parameters is Shannon diversity index. Based on the results of the seawater quality analysis, some parameters have exceeded the standard of total solid suspended was 106 ppm - 134 ppm, ammonia ranges 210 ppm - 775 ppm, phenol ranges 0.02 ppm - 0.02 ppm, oil fat ranges 65 ppm - 251 ppm, cadmium ranges 0, 01 ppm - 0, 04 ppm, lead ranges 0, 08 ppm - 0, 21 ppm and total coliform ranges 7×10^3 - 20×10^3. The saprobic value index was 1 and the tropical saprobic index ranges from 0.16 to 0.34, indicating the β-mesosaprobic status. The nekton diversity index is 1.74, and the necton uniformity index 0.83 shows the stable category. The results of sea water quality analysis showed that some parameters exceeded the allowable limits, while based on the saprobity index showed mild to moderate polluted waters

INTRODUCTION

The Indonesian government has built around 966 fishing ports and fish landing bases. As an archipelago with a coastline that reaches 95,181 km and the number of fish resources owned, ideally Indonesia must have more than 3,000 fishing ports, with a ratio of 30 km the coastline must have one fishing port or fish landing base, when compared to countries Japan and countries that have a ratio of one fishing port every 11 km, or a country of Thailand that has a ratio of one fishing port every 50 km. Indonesia is developing and adding fish ports and fish landing bases to reach an ideal number (Latif and Dwiastuti, 2015).

Fishing ports based on the law of the republic of Indonesia number 31 of 2004 and Law number 45 of 2009 are places that consist of land and water with certain limits as a place for fisheries business system activities used as fishing vessels leaning, anchoring and dismantling fish. The Marine and Fisheries Office of Rembang Regency as one of the districts that has good fishery potential has plans to build Fish Landing Base in the Karanganyar sea waters. The existence of Fisheries Port is very necessary to support fisheries activities in the utilization and management of fish resources (Republic of Indonesia, 2004). Based on a letter from the department of Marine and Fisheries of the Central Java province concerning the feasibility of a spatial sea allocation plan in the regional regulation of the zoning plan for the coastal and small islands of central java province, it is known that in the allocation of marine space plans for the Karanganyar fish landing base has an area of 70,792 hectare in the sub zone of fisheries port operational area. This development plan is complemented by a Spatial Development Suitability Letter for karanganyar fish landing base from the Ministry of Maritime Affairs and Fisheries of Central Java Province and the Rembang regency regional planning agency (Central Java Governor, 2014).

Development of Karanganyar fish landing base in accordance with the Rembang district planning

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scheme and existing regulations from both the central government and the local government. However, a study of potential adverse effects of fish landing activities in marine ecosystems, referring to Article 22 paragraph (1) of Law Number 32, 2009 states that any business plan and/or activity affecting environmental interests should have a study of impact an action against the environment, including analysis of disturbance and changes in biodiversity in the affected sea waters (Republic of Indonesia, 2009).

Biodiversity in the marine waters of Karanganyar must be conserved, sea water quality conditions must be in accordance with sub-standard regulations set by the Indonesian government based on the Decree of the Minister of Environment No. 179 of 2004, concerning sea water quality and its maintenance. The inclusion of pollutants, especially those that are persistent, is feared to cause bioaccumulation and biomagnification processes and cause damage to biodiversity which is the potential of natural resources that must be protected and conserved. Based on Law No. 5 of 1990 concerning conservation of biological Resources and preservation of ecosystems, activities that may have an impact on marine waters must be carried out in a harmonious and balanced manner. The preservation of living natural resources and their ecosystems must aim to seek sustainability of biological potential, natural resources and ecosystem balance. to support better efforts to improve the welfare and quality of human life Anthropogenic activities around the coastal waters of the sea allow disturbance to the biological potential of marine waters, especially in the community of macrobenthic, plankton and necton (Ingole *et al.*, 2008).

Marine pollution can be caused by fish landing activities, where fish auction activities produce a lot of organic and inorganic materials, for example the activity of the Patimban fishing port in Subang Regency, West Java is estimated to produce 2.575 liters / day of waste or equal to 2.57 m^3/day. This is a very large amount that causes pollution in marine waters and disruption of coastal marine ecological systems. Poor waste treatment plants cause waste resulting from fish landing base activities and fish ports to be dumped directly into the sea (Dicky *et al.*, 2017).

The Organic matter is a collection of complex organic compounds that have undergone a process of decomposition by decomposing organisms. Organic matter is an important source of nutrients, is needed by marine organisms. High organic materials cause the need for oxygen to increase Dissolved Oxygen, Demand for Chemical Oxygen and Oxygen Demand Biochemistry will be high because the demand for oxygen in the metabolic process of marine organisms becomes high, if oxygen needs are not sufficient then the metabolic process of the organism produces undesirable compounds, such as NH_3, H_2S, acidity of sea water, and other toxic compounds. Compounds that are toxic metabolic waste organisms cause death for most marine organisms (Endang *et al.*, 2017). The inorganic waste will be difficult to degrade naturally, so that when entering oceanic waters will cause an increase in the number of metal ions in sea water. The process of bioaccumulation and biomagnification through food chains and food nets if they survive for a long time can be carcinogenic and teratogenic (Wisdom, 2009). According to Amriani's research in 2011, there has been a process of bioaccumulation of heavy metal Lead (Pb) and Zinc (Zn) in blood shells (*Anadara granosa L*) and mangrove shells (*Bengalensis l. polymesoda*) in the waters of Kendari Bay, indicating that they were detected in shells, containing Pb and Zn is 1,750 ppm and 9,863 ppm. Although it is still in the substandard categoryif it lasts for a long time will be very dangerous (Amriani *et al.*, 2011).

Based on the references, a lot of ecosystem damage due to fishing landing port activities is therefore the aim of this study is to find out the latest ecosystem picture in Karanganyar marine waters based on biological indicators and sea water quality, so that the prediction of the impact of the construction of fish landing ports can be managed and monitored. The results of this study can be utilized by the local government in determining spatial and regional plans, especially for the regulation of the marine area of Rembang Regency, so that the development of fish landing bases in Karanganyar waters can be

MATERIALS AND METHODS

Location the Karanganyar fish landing base is administratively located in Karanganyar Village, Kragan District, Rembang Regency, Central Java Province. In general, Kragan district is adjacent to the Java Sea in the north, bordering Sarang Subdistrict in the East and Sedan District in the South, and in the West it is adjacent to Sluke

District. Sampling was conducted on September 21-24 2017 at 5 measurement stations, 08.00 -12.00 wib in optimal conditions, air temperature: 28-29 ° c, with air pressure 764-768 mm Hg, water content 65.9 - 75.9 speed wind 3.3 - 5.26 Km / Hour, dominant direction: 90°C.

a. Method of seawaters quality analysis The method of seawater quality used is descriptive with purposive sampling technique, based on the Minister of Environment Regulation no. 51/2004, concerning sea quality standards at ports and decisions of the Minister of Environment no. 179 of 2004, concerning sea water quality standards [12]. Analysis of sea water samples using the aAtomic absorption spectrometer method. (State Minister of Environment, 2004 and Emery and Thomson, 2001)

The type of data collected is the quality of seawater including physical and chemical parameters. Sampling location is a seawater sample taken on the action plan, among others, as the following: the location of the pier construction and the location of the breakwater construction. The location of seawater data collection is adjusted to the estimated impact of activities on the construction of Karanganyar fish landing bases in the sea area.

Data collection and sampling is done by using a water sampler. Sample the water in each depth is put together and put in a bucket. The water sample is then included in the sample bottle labeled in the form of date, time and location of sampling. The sample bottle is then put in an ice box and taken to the laboratory for analysis. Some parameters are measured in situ (direct)

b. Method of analysis marine biota (biological parameter)

Sampling of marine biota in the study area is plankton, benthos in five measurement stations and nekton at three measurement stations at the location of the waters around the Karanganyar Fish Landing Base. Phytoplankton and zooplankton identification was performed using identification instructions, such as American Public Health Associaties and Bold & Wynne methods (APHA, 1992. and Bold, Wynne, 1985) data on identification and abundance calculation results were then used to calculate the Diversity Index (H ') and Uniformity (J) using Shannon-Weaver Index (Ilhan and Rafet, 2017; Goswami,2004). Data analysis methods, plankton observations will be done under a microscope using the Sedgwick-Rafter Room Count. The abundance of its kind is calculated in ways Wetzel & Likens methods (Wetzel and Likens, 2000).

Identification of Macroozoobenthos. Types the data collected were samples of macrozoobentos taken macrozoobenthos sieves. The obtained macrozoobenthos were introduced into the sample container and preserved using 10% formalin solution which rose as a dye solution to be absorbed by macroozoobenthos making it easier to identify. The identification was performed at the Laboratory using a binocular microscope and based on the identification book. The data derived from the Relative Abundance Index (KR), the Diversity Index (H '), the Height Type Index (E), and the Domination Index (C). (Kathleen A. Nolan and Jill Callahan, 2005)

Identification of Nekton. Types the data collected were a nekton sample. The sampling of Nekton is done at each measurement station. The collection of Nekton as additional data is taken from the data of fish species caught by fishermen in precise fish auctions as well as through interviews with fishing communities. Quantitative data were analyzed to obtain Relative Abundance, Frequency Of Exposure, Diversity Index (H ') and Dominant Index (C) (Goswami, 2004).

c. Sampling Location and Coordinates of Sea Water Quality and Sea Water Biota. Sampling sites for water quality and aquatic biota (plankton and benthos) were conducted at the same point (Table 3), while for sampling nekton based on coordinates, according to table 4, as follows:

The map below shows the location and coordinates of sampling for the quality of seawater

Table 1. Location Coordinate Sea Water Quality and Marine Biota [15]

No	Code Location	Location Coordinates
1	BIOP 1	06°41'58,748 S 111°38'1,743 E
2	BIOP 2	06°41'58,032 S 111°38'6,146 E
3	BIOP 3	06°41'58,619 S 111°37'47,539 E
4	BIOP 4	06°42'15,026 S 111°38'15,284 E
5	BIOP 5	06°41'52,103 S 111°38'13,657 E

Table 2. Location Coordinate Nekton of Karanganyar Marine Waters

No	Location Code	Location Coordinates
1	NEK 1	06°41'38,405 S 111°37'41,895 E
2	NEK 2	06°41'42,714 S 111°38'16,743 E
3	NEK 3	06°42'11,005 S 111°38'26,943 E

and biota of the marine waters around the Karanganyar fish landing base (Figure 1).

RESULTS AND DISCUSSION

Parameters of sea water quality and aquatic biota

Based on the analysis of seawater quality in Karanganyar seawaters using the atomic absorption spectroscopy method, the following results are obtained: (APHA, 1992 and Arsad, 2012)

The results of seawater quality indicate that some parameters have exceeded the limits set by the Decree of the Minister of Environment. 37 of 2003 and the Decree of the Minister of Environment 179 year 2004 are as follow: (Minister of Environment of Indonesia, 2003 and Chapman, 1996)

Total soluble solids

The results of the analysis of total dissolved solids ranged from 106 mg / L - 136 mg / L (80 mg / L standard). Total suspended solids show a high concentration of dissolved solids in Karanganyar waters, this can be an early indicator of marine pollution. Total dissolved solids can be sourced from all suspended particles in sea water. Suspended solids can cause photosynthesis to be disrupted because the penetration of sunlight only reaches a limited depth, so photosynthesis runs imperfectly. This causes oxygen produced from photosynthesis to be reduced and cause disturbed ecological balance. Distribution of suspended solids in Karanganyar waters is influenced by the entry of organic waste due to activities at fish landing bases, fish auction activities and waste produced by residents around the Karanganyar Fish Landing Base (Amriani, *et al.*, 2011 and Endang , *et al*, 2017) (3, 10)

Amonia Total

Based on the analysis of Ammonia concentration at all measurement stations showed results that exceeded the prescribed limit, namely 210 mg / L - 775 mg / L (allowable ammonia is 0.3 mg / L). Ammonia concentration in the form of nitrates and phosphate compounds is a nutrient that can support the fertility of sea water and is an organic material needed by marine organisms, but if the amount of excessive ammonia can cause uncontrolled eutrophication. This event caused the level of oxygen demand to be high because the productivity of marine waters became high and mature. This condition is not good for other organisms because there will be competition for getting oxygen in the ocean waters. If the oxygen demand in seawater is not balanced or reduced, the aerobic metabolic process becomes anaerobic and allows the metabolic

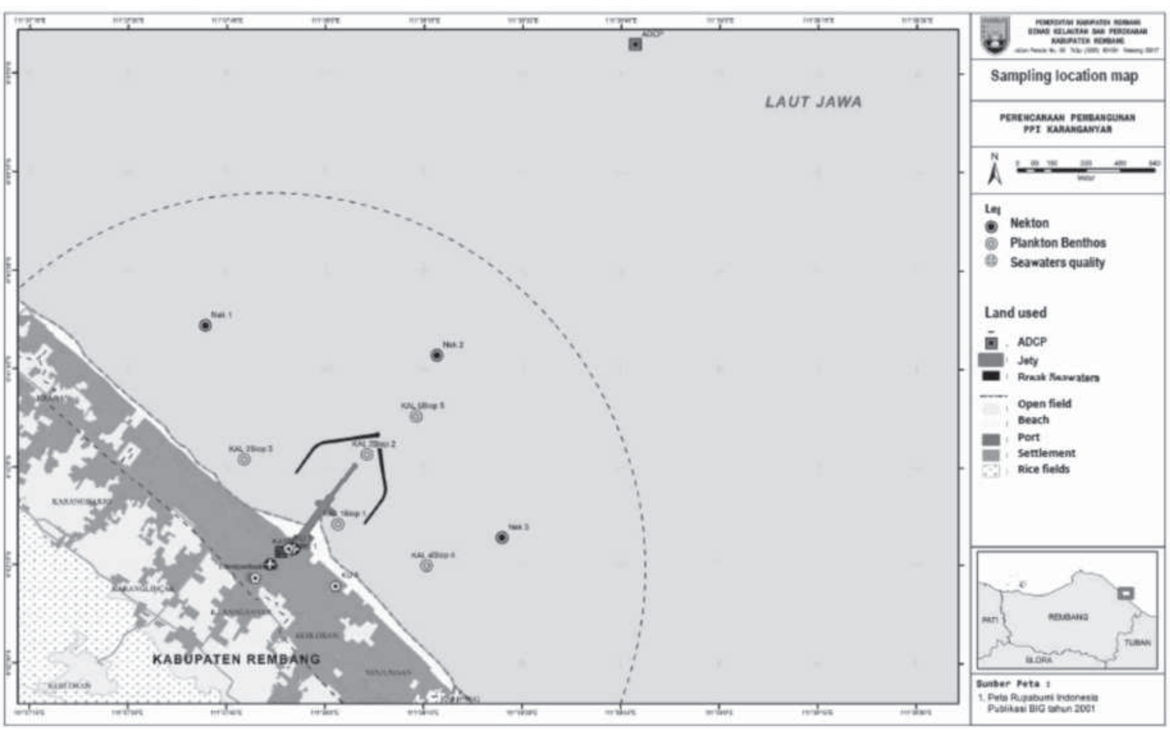

Fig. 1. Map of Sampling Site of Aquatic Biota and Sea Water Quality Samples

process of marine organisms to produce H2S which will cause poisoning to organisms that live in Karanganyar waters. Decomposition of organic matter, especially the overhaul of anaerobic components, will produce ammonia, H_2S, and foul-smelling methane and can be toxic. [19]

Hydrogen Sulfide (H_2S)

H^2S measurement results from all measurement stations showed results that exceeded the permissible limits, detectable H_2S concentrations ranging from 0.57 mg / L-0.90 mg / L (the standard H_2S allowed was 0.03 mg / L). Hydrogen sulfide (H_2S) is a compound that results from anaerobic degradation of organic waste by marine microorganisms. In coastal waters around the Fish Landing Base, many fish auction activities are carried out by fishing communities that produce organic waste that has the potential to produce H_2S as a result of decay process (Marianne, et al., 1977)

Fenol

Phenol concentrations at five measurement stations showed concentrations ranging from 0.01 mg / L to 0.02 mg / L above the prescribed limit (allowable limit of 0.002 mg / L). Phenol is a compound that can cause unpleasant odors, are toxic, irritate the skin, cause human health problems and death in organisms contained in marine waters with a certain concentration value. Phenol compounds are pollutants commonly found in marine waters. Polluted sources in the sea come from crude oil spills, oil spills and oil industry dumps. The presence of phenol compounds in the ocean can endanger marine life because phenols are toxic. Phenol compounds can be degraded by microorganisms into phenolic compounds, if the phenol content is excessive so the ability of microorganisms in phenol degradation is very limited so that the presence of phenol compounds in the ocean can endanger the life in the sea. (Satya Sundar Mohanty*and Hara Mohan, Jena. 2017.)

Oil and Fat

Measurement of oil and fat at five measurement stations showed results that exceeded the specified limit, which is 65 ppm - 251 ppm (the standard allowed is 5 ppm). Oils and fats, including types of organic matter, have a lower specific gravity than sea water so that fat and oil float on the surface of sea water (Manahan, Stanley, 2000). This causes disruption of sunlight penetration in the photon zone so that the photosynthetic process in organisms that have chlorophyll is disrupted, the

Table 3. Results of seawatrs quality measurement around Karanganyar fish landing base

No	Parameter	Unit	Result of Analysis					Quality
			KAL-1	**KAL-2**	**KAL-3**	**KAL-4**	**KAL-5**	Standard
				Physics				
1	Turbidity	TTU	0,75	0,6	0,75	0,8	1,10	>3
2	Smelly level		No smell	No smell	No smell	No smell	No smell	No smell
3	TSS	mg/L	127	134	136	131	106	80
4	Trash		detected	No	No	No	No	No
5	Temperature	C	32	32	31	31	31	Natural
6	Layer of Oil		No	No	No	No	No	No
				Chemistry				
1	pH		8,2	8,2	8,0	8,2	8,2	6,5 – 8,5
2	Salinity	$^0/00$	32,8	32,9	32,1	26,4	32,9	Alami
3	Amonia total	mg/L	673	544	775	671	210	0,3
4	H2S	mg/L	0,57	0,57	0,90	0,57	0,57	0,03
5	Fenol	mg/L	0,02	0,01	0,01	0,02	0,02	0,002
6	Detergent	μg/L	<0,36	<0,36	<0,36	<0,36	<0,36	1
7	Oil Fat	μg/L	191	251	65	139	122	5
				Undesired Metal Parameters				
1	Cadmium	mg/L	0,01	0,03	0,04	0,01	0,02	0,01
2	Cuprum	mg/L	<0,04	<0,04	< 0,04	< 0,04	<0,04	0,05
3	Timbal	mg/L	0,08	0,21	0,17	0,11	0,09	0,05
4	Seng	mg/L	0,03	0,04	0,05	0,04	0,04	0,1
				Microbiology Parameters				
1	Total	MPN/100 mL	20 x 103	7 x 103	11 x 103	11 x 103	7 x 103	1000

level of photosystesa productivity in marine waters becomes unbalanced, so the diversity of marine biota becomes reduced and an indicator of marine ecological damage. (Ilhan A, and Rafet C O. 2017).

Microbiology Parameters

The results of measurements of microbiological parameters from 5 measurement stations showed results that exceeded the set limits at 7 x 10^3 MPN / 100mL to 20 x 10^3 MPN / 100mL (the permissible microbiological standard parameters were 1000 MPN / 100 mL). In this case the standard parameter of Microbiology is Escherichia coli. Escherichia coli is produced from domestic and household activities around the Karanganyar coast and Karanganyar fish landing base activities. High detection of Escherichia colishows that sanitation is poor, therefore knowledge and understanding of good santasi and proper installation of household waste installation are needed. *Escherichia coli* which is high in the Karanganyar sea can cause pollution in the waters around the Karanganyar fish landing base.

Research on the condition of Coliform Bacteria in the waters of Doreri Bay, Manokwari has been polluted from community activities that are most often found around river mouths and fish landing activities so that there is a lot of residual domestic waste left and the remaining fish auction activities are directly disposed of directly into the sea. Lack of adequate public facilities such as toilets and landfills also causes poor sanitation (Tresia Tururaja and Rina Mogea, 2010 and A.E. Ghaly, 2010)

Heavy Metal Cadmium and Lead

Sea water pollution can be caused by the entry of heavy metal compounds from the rest of the loading and unloading activities of the ship's engine repair waste at Karanganyar Fish Landing Base. Cadmium measurements at 3 measurement stations (stations 2, 3 and 5) showed results that exceeded the limits, ranging from 0.02 ppm to 0.05 ppm (0.01 ppm of permissible cadmium concentration) while lead

Table 4. Results of analysis of plankton and benthos in Karanganyar seawaters

	Location of Sampling				
	K1	K2	K3	K4	K5
Polisaprobic (A) Group					
Amount (nA)	0	0	0	0	0
α-Mesosaprobic (B) Group					
Nitzschia sp.	84	36	0	72	72
Vorticella sp	0	12	0	12	0
Stephanodiscus sp	0	12	6	0	6
Amaount (nB)	84	60	6	84	78
β-Mesosaprobic (C) Group					
Tabellaria sp	30	42	78	54	30
Amount (nC)	30	42	78	54	30
Oligosaprobic (D) Group					
Amount (nD)	0	0	0	0	0
Group E (Outside A, B, C dan D)					
Balanus tintinabulum	12	0	24	0	0
Corycaeus ovalis	18	24	36	12	18
Frontonia sp	30	60	6	0	0
Macrosetella gracilis	12	12	12	54	6
Macrocyclops fuscus	90	72	204	396	60
Larva Portunus pelagicus	60	78	132	258	102
Richterella sp	24	42	24	0	0
Amount (nE)	246	288	438	720	210
Saprobic Index	1,00	1,00	1,00	1,00	1,00
Total Saprobic Index	0,32	0,26	0,16	0,16	0,34
Status	β–Meso Saprobic	β–Meso Saprobic	β–Meso Saprobic	β–Meso Saprobic	β–Meso Saprobic
Information	Polluted Light to Medium	Polluted Light to Medium	Polluted Light to Medium	Polluted Light to Medium	Polluted Light to Medium

metal ranged between 0.09 ppm up to 0.21 ppm. (Allowable lead concentration is 0.05 ppm). Heavy metals Cd and Pb are harmful, persistent and toxic pollutants. this is because heavy metals Cd and Pb have high affinity for the sulfidryl group, so that heavy metals bind to sulfur in the enzyme, so the enzyme becomes immovable. Likewise, the carboxylic (-COOH) and amino (-NH2) groups present in the body can also react with heavy metals which can cause interference in the metabolic processes of organisms in the sea. Heavy metals Cd and Pb can attach and bind to the groups mentioned above, and then accumulate into the body of living things, and further interfere with the physiological processes in the body (Arsad, 2012).

The bioaccumulation process and the biomagnification that occur in the food chain in the marine ecological system will be very dangerous. All marine biota basically have the ability to accumulate heavy metals so that the metal content of lead and copper will accumulate in marine biota through the absorption of metals into the gills or surface of the skin and into the digestive tract through feeding or absorption activities. The process of bioaccumulation of metals in tissue organisms through the food chain and the high process of taking lead and copper in water or sediment causes lead and copper concentrations to accumulate in the organism's body. Biological accumulation can occur through the direct absorption of heavy metals contained in water and through the food chain. Accumulation occurs because of the tendency of heavy metals to form complex compounds with organic. Substances contained in the body of an organism. Heavy metals arising from fish landing base activities are generated from oil spills and the remaining fuel of ships reaches a volume of 5 liters / day - 10 liters / day. While the remaining anti-fouling paint packaging can produce a volume of around 1 liter / day. which then immediately discharged into the sea. This condition if lasts longer will cause the accumulation of heavy metals and hazardous and toxic materials (Arsad, 2012).

The government, through the Rembang district maritime and fisheries service, will plan to build a temporary storage place for waste which is heavy metal and toxic hazardous materials. In accordance with Government Regulation no. 101 of 2014 concerning the collection and storage of hazardous and toxic wastes.) Design and layout of temporary storage and collection of hazardous and hazardous waste based on attachment Kep-01 / Bapedal / 09/ 1995 concerning technical procedures and technical requirements for hazardous and toxic materials waste storage and collection to be submitted to related parties. The Karanganyar Fish Landing Base will be handed over to the Rembang Regent for Hazardous and toxic materials waste collection in accordance with the Minister of Environment Regulation No. 30 of 2009 concerning preparation of licenses and supervision of management and supervision of hazardous and toxic materials waste due to hazardous by local governments. (Republic of Indonesia, 2014).

Table 5. Nekton analysis in seawaters around fish landing base of Karanganyar

No	Species name	ni	Pi	Ln Pi	Pi Ln Pi
1	Buntek(*Arothron hispidus)*	3	0,038961	-324,519,313	-0,1264361
2	Cumi cumi (*Loligo sp*)	6	0,077922	-255,204,595	-0,19886072
3	Kakap Pungar (*Lutjanus johni*)	4	0,051948	-295,751,106	-0,15363694
4	Kamojan (*Nemiptarus sp)*	20	0,25974	-134,807,315	-0,35014887
5	Petek (*Leiognathus equulus*)	30	0,38961	-0,94260804	-0,36724989
6	Rejung (*Sillago sihama*)	8	0,103896	-226,436,388	-0,23525858
7	Sotong (*Sepiida sp*)	6	0,077922	-255,204,595	-0,19886072
Jumlah		77	1	-158,618,412	-163,045,182
H' (diversity index)			174,662,934	moderat	
H max (species richness)			194,591		
E (uniformity index)			0,837886	stable	

Information :
the criteria for the Shannon - Wiener diversity index (H ') are as follows:[17, 24]
H '<1 : low diversity,
1 <H'≤3 : medium diversity
H '> 3 : high diversity.

Index Saprobic dan Tropic Saprobic Index

Saprobic Index and Tropik Saprobic Index are closely related to the condition and existence of plankton and benthos in the waters of Karanganyar. Phytoplankton and zooplankton can be used as indicators of marine pollution index. Phytoplankton can perform aerobic photosynthesis in aquatic waters that produce carbohydrates and Oxygen. Phytoplankton is categorized in the first level food chain so it can be used to determine the level of Saprobic Index and Tropical Saprobic Index (Kathleen A. Nolan and Jill E. Callahan. 2005 and Goswami, 2004). The table below shows the results of plankton sampling and benthos of karanganyar waters around the fish landing bases and fish auction sites, as follows:

Based on the results of saprobic index and tropic saprobic index analysis on five measurement stations in Karanganyar marine waters, the results obtained are a saprobic index with value 1 and tropic saprobic index ranged from 0.16 to 0.34, with â-Meso saprobic status indicating that Karanganyar waters are contaminated mild to moderate. The value of the saprobic index is a description of the level of water pollution measured based on the nutrient and pollutant content. The type of phytoplankton found is a pollutant bioindicator. The presence of saprobic organisms as water indicators is also determined by the quality of the aquatic environment. Each type of saprobic organism will occupy certain waters and its existence is determined by the water quality of the physical and chemical properties of water. The existence of *Nitzschia sp* on all stations is suspected as an indicator of species in mildly to moderately polluted waters. Nitzschia has a variety of pollution tolerances for organic matter and can act as an indicator of moderate to severe tainted water conditions. The β-Mesosaprobic zone is classified as a zone with moderate levels of pollution, aerobic processes occur through photosynthetic aeration produced by chlorophyll organisms in eutrophic waters. The process of protein degradation lasts almost complete such as amino acids, fatty acids, and ammonia so that only found in low concentrations. The oxygen produced in this zone is sufficient to meet the oxidation of organic matter. In this zone, it is usually transparent or slightly turbid, odor-free and generally colorless and characterized by submerged vegetation, macrozoobenthos and abundant phytoplankton. (Kathleen A. Nolan and Callahan 2005 and Goswami, 2004)

Nekton: Nekton is a self-moving organism, independent of water and wave currents so nekton can adapt to environmental conditions. Therefore, nekton can be used as an indicator of environmental change, including environmental changes due to the ingredients of pollutants. Based on nekton sampling at three different points, there are 7 different fish species with a total of 77 individuals. Petek and kamojan fish are the most common fish species in sampling. as follows

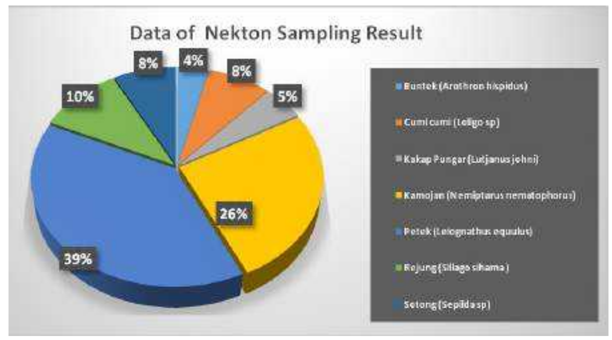

Fig. 2. Graph of Nekton Sampling Results in Karanganyar Marine Waters

The results of the analysis of the diversity and uniformity index of nekton from three measurement stations in the Karanganyar seawaters are shown in the table below, as follows:

Based on the results of the analysis showed that the index of nekton diversity was 1.74 (1 <H'd"3: Medium diversity) and the uniformity index was 0.83 (uniformity index <1, in the stable category). (Kathleen A. Nolan and Jill E. Callahan. 2005 and Goswami, S.C., 2004) This condition is a preliminary description of the current activity of the existing fish landing. Surely this will change if the fish landing base is developed in accordance with the Rembang district spatial plan. therefore, it is necessary to conduct environmental management and monitoring efforts so that the stability of ecosystems in Karanganyar waters can be maintained and sustainable

Research Supporting Data

In this study, measurement of supporting research data is needed to complete the initial description of the ecological status of the karanganyar waters under current conditions. It is expected that the supporting data can be more complete about the condition of the karanganyar sea waters due to fish landing base activities. The morphology of the Karanganyar beach in the study location includes the coastal area which is a meeting area between the land which includes the karanganyar village and the Java Sea. This area is influenced by the nature of the sea such as sea winds, tides, seawater intrusion with coastal vegetation with muddy beaches.

Data bathymetry, Based on bathymetry measurements carried out on September 21-24, 2017 with parallel coastline patterns using Echosounders and transducer devices as sensors to record water depths mounted perpendicular to the side of the ship. After obtaining depth / bathymetry and topographic values below the depth of the water contour is obtained as a topographic map. Basal topographic maps can be used to detect biological and non-biological resources including fish population surveys that are relatively accurate, faster and more fruitful in identifying impacts for the marine environment. The data can be used as initial data on the ecological status of Karanganyar. The figure below shows the topographic map of the Karanganyar distribution, as follows :

Topographic maps show the basic shape of sea water contours. Based on the results of topographic analysis, the basic contours of the Karanganyar

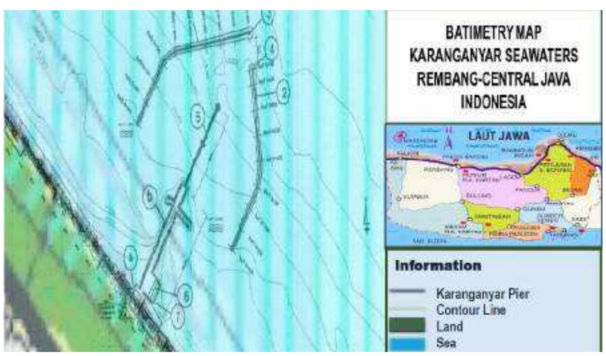

Fig. 3. Contour depth of seawaters Karanganyar, Rembang.

waters increasingly lead to a shallower coast. The operation of the fish landing base will affect bathymetry changes, namely current patterns and wave patterns in the waters. Current pattern changes occur due to the construction of fish landing bases and wave structures that change the movement of current and wave patterns, so that based on the above description, current environmental conditions and wave changes will change. Given the current changes and wave patterns will cause changes in sedimentation patterns that can cause abrasion and accretion (changes in coastline). Changes in current patterns and the occurrence of sedimentation will cause disruption of the ecological status of the waters and the occurrence of abrasion on the coast. Solid waste entering the sea also causes more sedimentation.

The sedimentation process causes the penetration of sunlight to be limited to certain zones so that the diversity of organisms in sea water is reduced, thus forming a community of organisms that show water quality. Therefore more comprehensive coastal sedimentation management is needed. The impact of shoreline changes is a further impact ofthe impact of changes in current and wave patterns caused by the construction of Karanganyar fish landing base. (Arsad, 2012 and Chapman, 1996). Sedimentation process in Karanganyar waters can cause changes to the coastline. Changes in coastlines that occur around the waters of the Rembang Karanganyar coast cover a large area due to the sedimentation process. This can be seen based on the analysis of coastline change maps from 2009 to 2017, showing that there have been many shoreline changes, accretion and abrasion. If it is not managed properly, this allows greater eclipse damage than before. Changes to the coastline have been seen based on the map below:

Table 6. Rainfall data for 10 Years

Bulan	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Januari	133	148	112	248	171	367	223	249	167	167
Februari	179	194	179	158	113	297	43	115	151	152
Maret	289	208	160	238	173	252	169	150	151	49
April	95	31	84	105	149	28	282	168	186	184
Mei	33	50	81	150	124	89	102	65	28	45
Juni	44	11	0	208	36	19	109	32	6	111
Juli	30	0	5	117	43	0	92	147	0	52
Agustus	5	0	0	16	0	0	0	0	0	51
September	0	0	2	162	0	0	0	0	0	176
Oktober	2	83	0	177	43	38	9	9	0	134
November	57	189	38	72	219	31	90	90	27	123
Desember	208	113	72	169	199	168	373	345	84	93

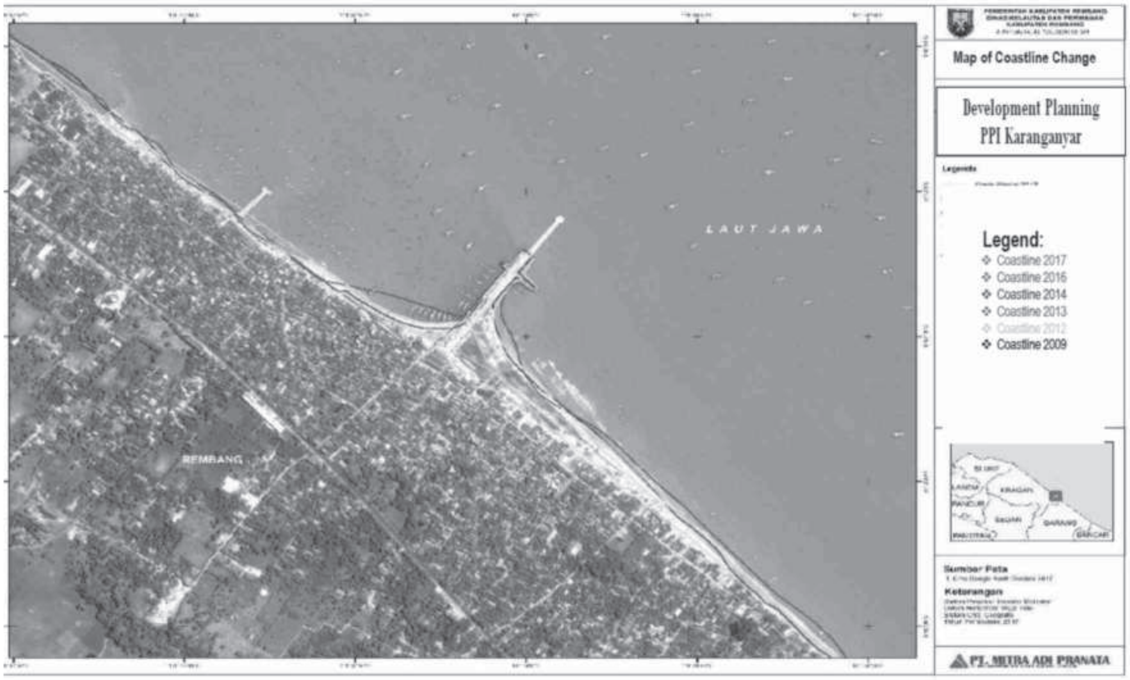

Fig. 4. Coastline changes from 2009 - 2017 based on satellite image analysis

This study is complemented by rainfall and climate data at the research location, as follows :

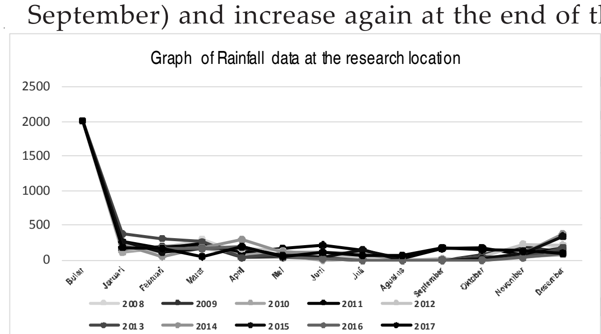

Fig. 5. Monthly rainfall trend (mm) during 2007-2016

Climate. Climate can be defined as weather patterns from a region in the long run. The simple way to describe climate is the condition of rainfall and air temperature at all times (Skinner and Porter, 2000).

The climate in the study area is tropical and has a relatively hot air temperature. Generally, average monthly rainfall in the last 10 years (2007 to 2017) has a range of 101.775 mm, this value shows the criteria for rainfall medium based on assessment from BMKG Climatology Station, Tuban Regency (Table 6). Based on daily rainfall data for ten years, shows a high trend at the beginning of the year and decreases in the middle of the year (August - September) and increase again at the end of the in ber en he se ty es ch he rainfall, the more pollutants will flow into the sea. with imperfect waste treatment plants at fish landing bases, this will further aggravate the ecological burden received by sea water (Angela D. Coulliette and Rachel T. Noble, 2008

CONCLUSION

The results of seawater quality analysis, some

Table 7. Monthly Rainfall Criteria

No.	Rainfall Value (mm / day)	Rainfall Value (mm / hour)	Description
1	1-20	1-5	Light rain
2	20-50	5-10	Moderate rain
3	50-100	10-15	Heavy rain
4	> 100	15-520	Very heavy rain

parameters have exceeded the standard of total solid solution is 106 ppm - 134 ppm (* 80 ppm standard), ammonia 210 ppm - 775 ppm (* 0.03 ppm, standard), phenol 0.02 ppm - 0.02 ppm (* 0.002 ppm standard), oil fat is 65 ppm – 2\51 ppm (* 8 ppm, standard), cadmium is 0,01 ppm - 0,04 ppm (* 0,01 ppm standard), lead (pb) is 0,08 ppm - 0, 21 ppm (* 0.05 ppm, standard) and total coliform 7 x 10^3 - 20 x 10^3 (*1000 mpn / 100 mL - standard). he Saprobic Index Value is 1 and the Tropical Saprobic Index ranges from 0.16 to 0.34, the status of β-Mososaprobic, the nekton diversity index is 1.74, and the necton uniformity index is 0.83 in the stable category. The sedimentation process has occurred in the coastal waters of Karangnyar due to the entry of organic and inorganic materials due to anthropogenic activities that cause changes in the Karanganyar coastline

SIGNIFICANCE STATEMENTS

This study is a case study of the existing condition of Marine Waters Quality Status of Karanganyar Sea due to fish landing activity at this time. research can be used as a description and comparison before and after the development and development of fish landing base, so efforts to monitor and manage marine environment karanganyar easier to do.

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