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Overview the Condition of Seawaters Around the Fish Landing Base in Sarang - Indonesia

Slamet Isworo (1*) and Poerna Sri Oetari (2,3)

[1]*Department of Health, Dian Nuswantoro University, Semarang, Indonesia.*
[2]*Mitra Adi Pranata Company, Environmental Impact Assessment (EIA) Consultants, Semarang, Indonesia.*
[3]*Graduate School of Environmental Science, Diponegoro University, Semarang, Indonesia.*

**Corresponding Author*

Abstract

Background and Objective: An Overview about the status of the waters of Sarrang, it must be known from the beginning that the changes that occur due to the activities of fish landing bases so that it can be known and managed comprehensively. this study is a case study that produces an analysis that can be utilized by the local government in determining the development of its territory

Materials and methods: Tools and Materials: pH-meter, GPS, Thermometer, Secchi, Turbidimeter, Analytical Scale And Spectrophotometer, Eckman Grab. HNO3, Plankton Net, Dark Sample Bottle, Aquades, Formalin 4%,

Method. Analysis of sea air quality using AAS method and plankton, benthos and nekton analysis using Saprobity and Shannon Winner diversity index

Results: The results of water quality analysis found some indicators that exceed the quality standard limits of lead 0.9 ppm - 0.15 ppm, coliform 4 x 10^3 - 14 x 10^3 (MPN / 100 mL), Ammonia = 519 ppm - 655 ppm, Phenol = 0.02 ppm - 0.22 ppm, H_2S = 0.57 ppm - 0.74 ppm. Analysis of the biological component as follows Saprobik Index is 0.1, Tropic Saprobik Index is 0.24-0.49 and Nekton's Diversity Index is 1.74

Conclusion: Based on the category of water pollution levels around the Sarrang fish landing base indicates that the ecological status of the category is moderately polluted.

Keyword: Plankton, Benthos, Nekton, Sarang of Seawaters, Quality of Seawaters, Diversity, Saprobity, AAS, Ecological status, Transect

INTRODUCTION

Rembang regency is one of the Districts in the Republic of Indonesia, which has huge fishery and marine potential and has a long coastal area of ± 62.33 km. With the abundant potential of marine products, and supported by the presence of several residents who live along the coast with livelihoods as fishermen. Based on the statistical data of rembang district stated that the total production of marine fishery in Rembang regency reach 65,523 tons. Given the second largest fishery resources in the province of Central Java, marine fisheries sector in Rembang waters is very potential in supporting the economy in Indonesia. Efforts of mining in supporting the distribution of fish catch by fishermen, fish landing facility required, including fish auction place to accommodate and distribute the catch to the area around the province of Central Java. Fish landing activities Sarang located in Rembang regency has a land area of 2 hectares with an adequate dock. (1) Relation to the strategic potential of marine fishery products in Rembang region, it is necessary to develop based on regulation through Minister of Marine Affairs and Fisheries Decree no. 45 / KEPMEN-KP / 2014 on the Port Master Development Plan, stating that the status of Fishery Foundation is defined as Fish Landing Base from 2015 to 2034. (2) States that the development of Sarrang fish landing base has been in accordance with the spatial plan of Rembang Regency, so it is necessary to study the compress environment in its development implementation, ecological condition status. Sarrang waters need to know in advance so that the impact of fish landing development can be managed better (3).

Pollution to marine waters will be more significant in the development and activity of fish landing base, this is because many organic and anrganic materials that can contaminate the sea due to fish landing activity at the port. pollutant materials from fisherman activities will be more accumulated at the port, thus causing disruption of ecological systems in coastal waters. (4)

According to Indicator of the quality of marine waters around the fish landing docks, it is important to consider the environmental parameters that must be managed and monitored as a standard quality standard set by the government (5), as follows:

1. **Water temperature** has a significant influence on the process of exchange or metabolism of living things. So that temperature is one important factor in regulating the process of life and the spread of organisms. The fish can grow well in 25-32 ° C.

2. **Total Suspended Solid (TSS**) a water sample is the amount of weight of a suspended material in a given water volume, with units of mg per liter.

Suspended solids consist of precipitated components, floating materials and suspended colloidal components. Suspended solids contain inorganic materials and organic materials. Therefore, TSS is an indicator of water soluble organic material. Respiratory aquatic organisms.(6)

3. The degree of acidity (pH) has a major influence on the life of aquatic organisms, so that the pH of a waters is often used as a guide to poor water quality. Aquatic organisms require water conditions with a certain degree of acidity, water with a pH too high or too low can kill organisms, as well as changes. The organisms of marine or coastal ecosystems are relatively more stable and are within a narrow range, typically ranging from 7.7- 8.4.

4. Phosphate is one of the nutrients needed for the growth and metabolism of phytoplankton and marine organisms, and also determines the fertility of the waters. The elements of nitrogen and phosphorus present in the form of nitrate (NO_3) and phosphate (PO_4), under normal conditions at sea have a ratio of N / P is 15: 1. High levels of phosphate caused by the degradation of decomposed organic matter in marine sediments. Therefore, all the phosphates present in the underwater will rise to the surface, so that the surface layer becomes fertile resulting in enrichment (eutrophication) of nutrients in the ocean waters [(7).]

5. Nitrate. Nutrients are needed in the growth of phytoplankton and other microorganisms as food sources and can also affect the fertility of marine waters. The eutrophication process in many waters is influenced by organic matter content./98 [(8,9)] Nitrites are usually found in very small amounts of natural water, their levels are less than nitrate because nitrite is unstable when there is oxygen. Nitrite is a transitional form between ammonia and nitrIte and between nitrate and oxygen gas commonly known as nitrification and denitrification in the biogeophysical cycle [(10).]

6. Salinity has an important role and has a close relationship with the life of aquatic organisms including fish. The physiological salinity corresponds closely to the adjustment of fishing osmotic pressure. Salinity in waters farther from the mainland the higher the salinity so that the pH will become more alkaline. Salinity itself is the level of salinity or salt content in water. Salinity sea water has a salt content of 3-4 PSU equivalent to salinity 30-40 PSU (practical salinity units)[(10)]

7. BOD (Biological Oxygen Demand BOD is one of the parameters that states the amount of oxygen needed by the organism in its metabolic processes. High BOD values indicate an increase in the amount of decomposed organic matter by using oxygen in water. The amount of BOD value can also be used to determine the presence of contamination in the water. So, more organic matter in the water so that the oxygen content is less soluble in it. Marine waters containing organic matter and suspended solids generally cause high BOD.

8. COD (Chemical Oxygen Demand) COD represents the total amount of oxygen required to oxidize organic chemicals, but because of the high chloride content (Cl) in sea water so that the COD parameter is difficult to use as an indicator of marine pollution **[(11)]**

9. Ammonia and Total Nitrogen. Ammonia is one of the parameters of organic pollution in waters produced through the process of decomposition of organic matter (eutrophication) anaerobically by microbes. The high ammonia content in the waters will cause the water color to become turbid and produce odor. **[(11)]**

An ecosystem of biotic, abiotic, organic and inorganic factors interconnected to form a complex interaction relationship pattern, as follows: high pH will cause the balance between ammonium and total ammonia in the water to be disturbed, the increase in pH will increase the total ammonia concentration is also very toxic to organisms. High ammonia concentrations on the surface of the water will cause fish deaths in the waters. The acidity of the water or its pH value greatly affects whether the amount of ammonia present will be toxic or not. The effect of pH on total ammonia toxicity is indicated by the state at low pH conditions that are toxic if the amount of ammonia is large, whereas at high pH only with low amounts of ammonia will be toxic. High levels of ammonia can be used as an indication of contamination of organic materials derived from domestic waste and agricultural fertilizer runoff. The source of ammonia in the waters is the result of organic nitrogen breakdown in the form of dead water plants and aquatic biota. Fish can not tolerate too high concentrations of ammonia because it can interfere with the process of binding oxygen by the blood and can ultimately lead to death. In addition, ammonia also depends on the water temperature. [(12)]. The non-ionized ammonia form (NH3) is highly toxic while the ionized form (NH4 + ion) is not toxic. These two forms are collectively called total ammonia[.(13)]

10. Sulfate. Sulfate compound is found as a result of decomposition of organic matter. High sulfate levels in these waters are influenced by human activities carried through rivers to rivers and flow into coastal and marine waters [(14).] These parameters can cause ecological imbalances, especially in marine waters around the Sarang fish landing port.

Plankton, Benthos and nekton are indicators of marine waters, therefore in the marine waters assessment these three factors include those that need to be measured and considered. Biological indicators including plankton, benthos and nectone can be used to assess macro changes in ecological balance, biological indicators are an easy guide to monitor the occurrence of contamination. In the presence of environmental pollution, the species diversity will decrease and the food chain becomes simpler, unless fertility occurs. the existence of Flora and marine fauna can be used as biological indicators of marine pollution can be observed from species diversity, and the rate of growth of the structure. The diversity of flora and fauna of high sea waters ecosystems indicates that the quality of water is good / not contaminated. But otherwise if the diversity is small, then the marine waters are polluted [(14)]

Coral reefs are marine organisms that can be used as bioindicators of damage levels of undersea ecosystems. Because of the importance of coral reefs in the ecological balance of the sea, the Indonesian government issued a coral reef rescue policy. the Indonesian government then launched the program rescue coral reefs or better known as "Coral Reef Rehabilitation and Management Program "(COREMAP). Therefore, in every study on marine conservation, coral reefs and seaweed become biondikator level of damage to marine waters. Damage to coral reefs and seaweed can be caused by unsustainable human development activities in managing and responding to the effects of industrial development. The development of fish landing harbor base can certainly affect the ecological balance of undersea flora and fauna. This is stated by Cooperation Center for Coastal and Marine Resource Studies [(15)] The method commonly used in the observation of coral reefs and seaweed is the transect method. The use of transect method in describing the condition of the reefs corals are usually presented in the form of a community structure that consists of data: percentage of live coral cover, percent of coral cover dead, number of genera, number of species, number of colonies, size of colony, abundance, frequency of presence, growth form, coral reef diversity index. Sampling methods on coral reefs and sea grasses in transects would be better if supported by documentation through photo capture under the sea. Bioindicator of the marine ecosystem is a seaweed ecosystem. Seaweed is one of the biological resources found in coastal and marine areas. One indicator of the ecosystem is the seaweed ecosystem. Seaweed is one of the biological resources found in coastal and marine areas. . These resources can usually be found in waters associated with the presence of coral reef ecosystems. Natural seaweed can usually live on sand and dead corals, likewise with plankton, benthos and nekton in the ocean can be used as bio-indicator of marine water damage level, its organism diversity indicates the level of environmental damage. Pollution levels can alter the structure of the ecosystem and reduce the number of species in a plankton, benthos and nekton communities, so that the diversity is reduced. Thus, the polluted marine ecosystem diversity index is always smaller than the natural marine ecosystem. [16] Diversity in a marine waters are usually expressed in the number of species present in the site. The greater the number of species will be the greater the diversity. The relationship between the number of species and the number of individuals can be expressed in the form of diversity index. Organism diversity was analyzed by utilizing the diversity index formula Shannon Wienner, while the classification of the degree of pollution waters. Tropical coastal environments are biologically diverse environments which is good, but with the entry of pollutants causing marine ecosystems to become degraded by human activity that has the potential to cause extinction. Therefore, efforts should be made to preserve the organisms at sea.

Analysis of seawater quality in chemical, physical and biological components can provide an initial picture of the ecological status of waters sarrang, especially after the activity of fish landing bases. as well as analysis of plankton and benthos diversity indices as marine organisms susceptible to ecological changes due to contaminant entry at the Sarrang stage. With the reduction of planton and benthic diversity in marine waters Sarrang can be used as an indicator of the occurrence of pollution or ecological disturbance.

Therefore, research is needed to find out the initial picture condition of sarrang waters, especially in the waters around the fish landing base in sarrang village, rembang-Indonesia. The results of the study are expected to be the basis for the development and spatial plan of the Sarrang region including the planning of the Rembang district, especially with the government's plan to develop larger fish landing bases. So that local governments need a basis in determining strategic environmental assessment policies, environmental impact analysis and sustainable spatial and regional plans based on a good environment. Overview studies to find out the picture of an ecosystem is very important [17]

MATERIAL AND METHOD

1. **Materials**. Material used in research are scaled ropes, Water bottle, Nansen Bottle Sampler, Plankton Net**,** glassware, titration equipment, 250 ml sample bottles, and 300 ml, pH meters, GPS, mercury thermometer, oven, label paper, secchi disk, turbidimeter, analytical balance, oven and AAS (Atomic Absorption Spectrophotometer), Eckman Grab. Sedgwick-Rafter, Cover glass, Pipette drops, Book Identification, Microscope, dark sample bottle , Sedgwick-Rafter Counting Cell. Aquabidest, HNO_3, Larutan lugol iodin, formalin, Asam asetat, Larutan lugol iodin, kalium iodida p.a, kalsium karbonat, Pb solution, 5 ml HNO_3 dilution solution, plankton sample bottle, Plankton-net, , Aquades, Formalin 4%,

2. Method

The sampling site has temperatures between 28-29 ° C, with an air pressure of 764-768 mm Hg, with a moisture content of 74.5% - 78.9%. Wind speed 0.45 m / s - 1.36 m / s

a) **Sampling For Sea Water Parameters**

The method used in determining the sampling location for the parameters of seawater and ground water quality is "Purposive Sampling". [18] Data on seawater quality in the waters surrounding Fish Landing Base Sarang is taken from the measurement of seawater quality on 21-24 October 2016 at 5 measurement stations. Measurement of seawater quality is done in the morning - noon time is at 08.00 - 12.00 is at optimum range conditions. Read more location and data of seawater quality as follows:

Table 1. Location of Sea Water Quality Measurement in Fish Landing Base Sarang Waters

No	Measurement Location	Coordinates	Depth
1	AL-1	110° 40' 18.57" E 6° 44' 12.27" S	2,8 m
2	AL-2	110° 40' 23.37" E 6° 44' 6.208" S	4,8 m
3	AL-3	110° 40' 10.314" E 6° 44' 4.334" S	3,0 m
4	AL-4	110° 40' 30.91" E 6° 44' 14.917" S	4,0 m
5	AL-5	110° 40' 29.996" E 6° 44' 2.215" S	6,8 m

(Primary Data, 2017)

The quality standard referred to is Minister of Environment Regulation no. 51/2004, concerning standard of quality standard of port designation. Sampling of seawater quality ie sample water is put into the sample bottle from each station, then it will be analyzed in Center for Industrial Pollution Prevention Technology Semarang with method of Atomic Absorption Spectrometer. [19]

Sample extraction

The identification of air samples in quantities made under standard operating procedures for the method and air sample analysis. One hundred milliliters of air samples were transferred to a 500 mL separation funnel, added 5 mg of powdered NaCl and pH measured. A 50 mL n-hexane was added to the sample and shaken for 10 minutes. Samples are allowed to settle for 30 minutes to increase the mass of two phases. The top organic layer is collected in a 300 mL Erlenmeyer flask, while the bottom layer moves to a 500 mL separation funnel. The extraction was repeated twice using 50 mL n-hexane. The organic phase is clean by adding 100 mL of pure air and shaken for 3 minutes. The sample is left fixed to increase two phases and then insert the bottom layer. The extraction is repeated twice using 100 mL of pure air. The extract was added with 5 mg of anhydrous sodium sulfate and concentrated to about 1 mL using a vacuum evaporator operating at 25 rpm and 35 ° C. Sediment samples were dried at room temperature in the laboratory, milled by mortar and sifted with 2 mm pore filter. Twenty-gram sediment samples were placed in a 250 ml flasked flask, supplemented with 40 mL acetone and shaken for 30 min. After the skin reaches, the extract is poured. . Each crude extract was then dissolved in 10 mL of hexane and cleaned by passing the chromatographic column released by the anhydrous florisil and sodium sulfate. The net extract is concentrated in the rotary evaporator up to about 2 mL [19]

The sampling methods for marine water quality were based on the Indonesian National Standard (SNI) No. 06-6989.57:2008 of The Methods of Surface Water Sampling. The analysis was used Atomic Absorption Spectrophotometry Method and while Total Suspended Solid (TSS) analysis was used gravimetric method according to Indonesian National Standard and APHA standard [20, 21]

b) Sampling of Plankton and Nekton

Sampling of marine flora and fauna in the study area in the form of plankton, benthos, and nekton at the location of waters around Fish Landing Base Sarang Sampling done on 21-24 October 2017. With the coordinates as follows 6 ° 41'44.28 "S 111 ° 38'18.36 "T. Analysis of plankton, benthos and nekton by using Saprobity index analysis and Shannon Winner diversity index [22]

Sampling of plankton and benthos is done at the same point. The phytoplankton and zooplankton sample were taken using plankton net with mesh size of 30-50 μm for phytoplankton and 0.2 mm for zooplankton. Then, the sampel were preserved with 4-5% formalin solution. The identification of plankton were used identification key and benthos sample were taken by grab sampler. The sediment that had been taken were shifted in water by 5 mesh sieve (254 mm). The filtered material then preserved by 10% formalin solution that had been added with coloring solution. The sample were identified by identifying key. The Nekton sampling process is to take advantage of GPS, boats, and catching equipment while the plankton sample is using plankton-nets. [23] Lee, *et al.* (1978) The water samples containing plankton and nekton are then taken to the Laboratory to identify their saprobity levels. The map below shows the location of seawater quality sampling and biological sampling, as follows :

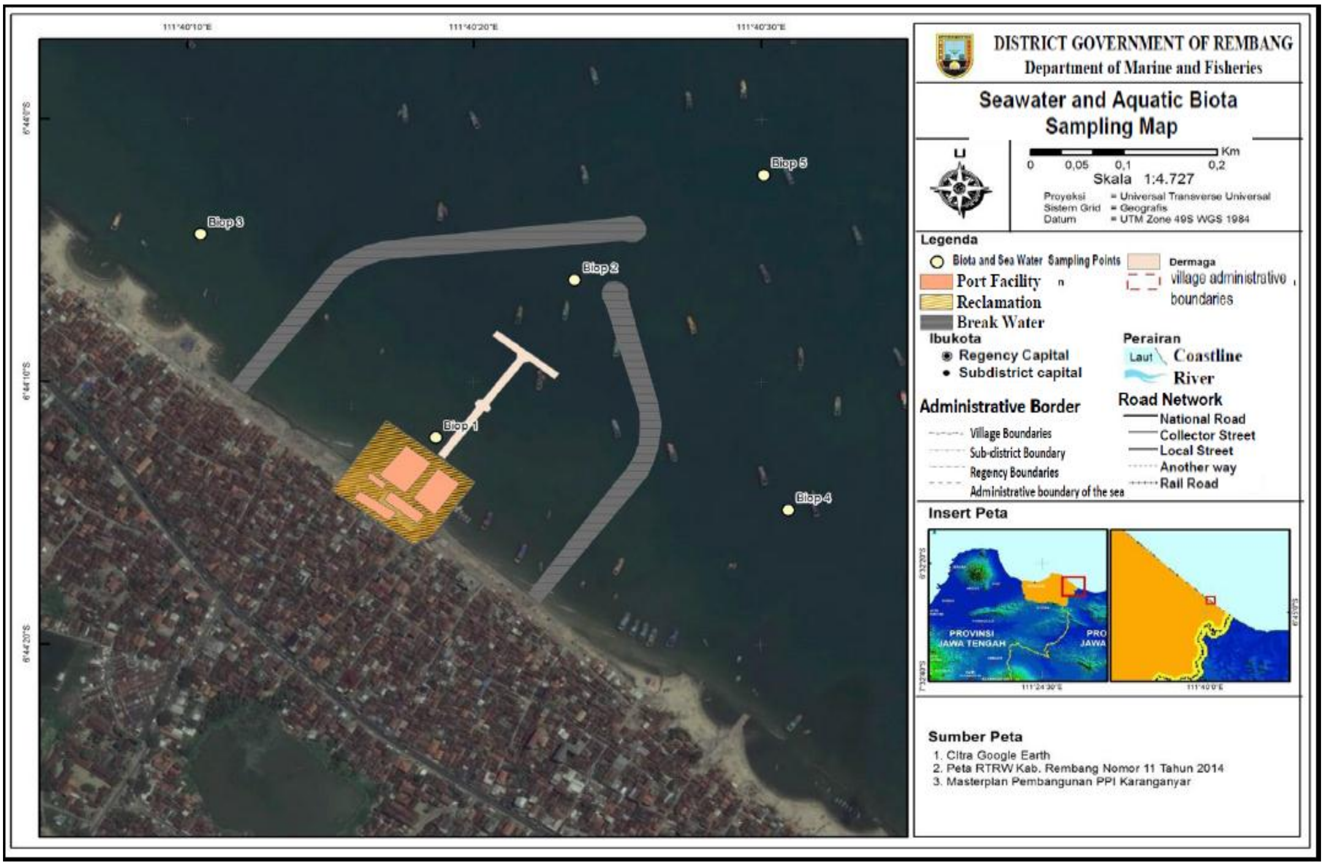

Figure 1. Location of Seawater Quality Sampling-Groundwater and Sea Water Biota

RESULTS AND DISCUSSION

1. Sea Water Quality Components

Based on the results of seawater quality analysis are as follows :

Table 2. Quality of Sea Water in Fish Landing Base Sarang waters [19]

No	Parameter	Unit	Result Analysis					
			AL-1	**AL-2**	**AL-3**	**AL-4**	**AL-5**	Quality standards
	Physic							
1	Brightness (TCU)	True Colour unit U Colour	0,75	1	1	1	1,5	>3
2	smell	-	No smell	No smell	No smell	No smell	No smell	No smell
4	Total suspended solid	mg/L	122	134	138	113	106	80
5	Trash	-	yes	Nihil	yes	Nihil	Nihil	Nihil
6	Temperature	OC	33	32	32	26	29	Natural
7	Oil residue	-	Nil	Nil	Nil	Nil	Nil	Nil
	Chemistry							
1	pH	-	8,1	6,1	8,2	8,1	8,1	6,5 – 8,5
2	Salinity	‰	33,1	33,1	33,1	33,1	33,2	Natural
3	Ammonia total	mg/L	655	534	464	589	519	0,3
4	H_2S	mg/L	0,57	0,57	0,57	0,74	0,57	0,03
5	Phenol	mg/L	0,22	0,02	0,01	0,01	0,01	
6	Detergent	mg/L	0,84	0,97	0,62	0,82	0,99	1
7	Fat Oil	mg/L	211	226	271	210	303	5
	PARAMETERS- METAL SOLUTIONS							
1	Cadmium (Cd)	mg/L	<0,01	<0,01	<0,01	<0,01	0,02	0,01
2	Copper (Cu)	mg/L	<0,04	<0,04	<0,04	<0,04	<0,04	0,05
3	Lead (Pb)	mg/L	0,13	0,14	0,15	0,09	0,12	0,05
4	Zinc (Zn)	mg/L	0,05	0,07	0,03	0,03	0,05	0,1
	PARAMETER MICROBIOLOGY							
1	Coliform	MPN/100mL	11×10^3	7×10^3	14×10^3	4×10^3	11×10^3	1000

Data Source: Primary Data of measurement results in October 2017

Quality Standard *: Permenlh No. 51/2004, Seawater Quality Standards For Seaports [19]

AL1: location of measurement at distance 100 m north of Fish Landing Base Sarang

AL 2: location of measurement at distance 300m north of Fish Landing Base Sarang

AL3: location of measurement at distance 300m west of Fish Landing Base Sarang

AL4: location of measurement on the East Fish Landing Base Sarang

AL5: location of measurement at 500m distance north of Port of Sarang

The quality standard referred to is Minister of Environment Regulation no. 51/2004, is the seawater standard of Ports. Based on the measurement data of seawater quality at 5 (five) measurement points, that the quality of sea water in the waters around Fish Landing Base Sarang has been contaminated by organic contamination.

1. Sea Water Parameters That Exceed Standard Standards

The parameters of seawater quality exceeding the specified standard limits are Colliform range from 4×10^3 to 14×10^3 (MPN / 100 mL), the amount of ammonia (mg / L) range from 519 ppm - 655 ppm, Phenol between 0,02 ppm – 0,22 ppm, H_2S range from 0,57 ppm - 0,74 ppm. colliform range from 4 x 103 to 14 x 103 (MPN / 100 mL) the allowable standard is 1000, it is intended that the waters are in the bad category. this indicates that the sanitation around the Sarrang fish landing base is in poor condition. Sanitation due to organic waste from domestic activity is very bad, the waste processing industry at the fish landing bases has not been well implemented. By because it is very necessary for domestic waste results of fishing activities meet the established requirements. Research conducted by Karbasdehi in 2017 on Indicator bacteria community in seawater and coastal sediment: the Persian Gulf as a case. Indicator bacteria community seawater and coastal sediment: the Persian Gulf as a case, indicating that the condition of coliform bacteria is quite timggi with range 2326 (MPN / 100 mL) **[33]** **.** Waste treatment is needed, especially coliform, ammonia, phenol so that waste with this parameter can go down so as to meet the quality standards of sea water

Phenol is an organic compound, which is toxic, and easily soluble in water, making it easy to cause pollution in the water. Phenols can be toxic and if water exposed to phenol contamination will result in decreased water quality and disturbance to aquatic ecosystems. Based on Regulation Of Environment Minister)no. 51/2004, regarding sea water quality standards for ports refers to polluted waters, the standard limit of phenol concentration in marine waters is 0.002 ppm. Phenol contamination of marine waters in the Fish Landing Base Sarang caused by anthropogenic activity of largely organic nature degraded into final compounds, including phenol compounds. Phenol has a negative effect on the environment, especially aquatic ecosystems, water sources for population and public health around the location Fish landing base, because it is toxic and carcinogens. Phenol is also known to contaminate groundwater sources because it is easily soluble in water so that the pollution of coastal waters by phenol needs to receive intensive attention. [19]

Phenol (C_6H_6O) is an organic compound having hydroxyl groups which is attached to the benzene ring. This compound is often also called a hydroxy benzene or carbolic acid compound, phenate monohydroxybenzene, phenic acid, phenyllic acid, phenyl hydroxide, oxybenzene, benzenol, monophenol, phenyl hydrate, phenyl alcohol, and phenol alcohol. [24] The level of phenol toxicity varies greatly depending on the number of atoms or molecules attached to its benzene chain. For chlorinated phenols, the more chlorine atoms binded to the benzene chain the more toxic. Chlorophenol may be more toxic to aquatic biota is accumulated and more persistent than simple phenols. Simple phenols such as phenol, cresol and xylenol are easily soluble in water and are more easily degraded. Phenol compounds are pollutants that are often found in the ocean waters. The source of pollutants in the ocean comes from crude oil spills due to the activities of fishermen, fuel spills of ships. The presence of phenol compounds in the ocean can endanger marine life because phenols are toxic. [25]

The ammonia source in the waters is the result of breakdown of organic nitrogen and inorganic nitrogen from Fish Landing Base activity, especially the activity of Sarang fish auction, which produces a lot of organic and inorganic waste which then degraded (amonification) by marine microorganism causing marine pollution. Canadian Council of Ministers of the Environment (1999) Ammonia can be decomposed on the sediments at the bottom of the sea floor. Ammonia in water can be lost through the evaporation process because the ammonia partial pressure in the solution increases with increasing pH. The higher the pH of sea water, the higher the toxicity of ammonia. Because most of the NH-shaped, while the ammonia-shaped molecule (NH3) is more toxic than the ion (NH_4 +). Ammonia in the form of molecules can penetrate the cell membrane parts faster than the NH4+ ions. Ammonia in the waters of Sarang already in the category high enough that is in the range 519 ppm - 655 ppm (standard permitted ammonia is 0.3 ppm).

Hydrogen sulfide (H_2S) is derived from the activity of protein decomposition is organic matter. H2S is the result of degradation of proteins and organic matter by marine microorganisms that then decompose on sediments in the seabed. The result of seawater quality analysis in Fish Landing Base Sarang was detected H_2S is 0,57 ppm from seawater quality standard of H_2S which allowed only 0,03 ppm. [26]).

Bacteria that can be used as a water pollution bioindicator include Coliform, Fecal Coliform, Salmonella and Streptococcus Fecal. The coliform bacteria found in waters of the Sarrang Fish landing base with high concentrations is 4 x 103 to 14 x 103 (MPN / 100 mL), exceeding the approved standard is 1000 (MPN / 100 mL), this indicates that coastal seas have contaminated [27]

Pollution of the sea by coliform is possible because sanitation in this place is very bad because the organic material is directly discharged into the Based on the measurement results at 5 points of measurement at the location of the Sarrang Fish Landing Base, it detected a high enough ammonia concentration at the sampling site 1 that is in the waters at 100 m north of Fish Landing Base Sarang, with a depth of 2.8 m and this point is the location which is closest to the location of the center of fish sales and population of fishermen settlements, while the lowest ammonia levels are in the location of AL3 in the waters at a distance of 300 m from West Port Sarrang at a depth of 3 m. At AL-3 location because there is no building with sampling depth of 3 meter so it shows lower value of Total Coliform compared to other location. Based on the data of the analysis, the quality of seawater in Sarrang Fish Landing Base based on physical, chemical and microbiological analysis (e colii and total ciliform), the waters in the bad category with some parameters have exceeded the quality standards set based on Regulations Minister of Health of the Republic of Indonesia

The groundwater quality support data is also measured to see the comparison of groundwater quality and sea water quality, groundwater quality data can be seen in Table 3. The groundwater quality in the Base Areas of Fish Nest is taken from groundwater quality measurement on 21-24 October 2016 at the well in the area of Hive Fishing Base, the well water around Fish Auction Sarang. From these measurements, it is known that the well water quality has been contaminated with the parameters shown: Total Desolved Residues, Hardness, Ammonia and Microbiology. parameters (total Coliform and E Coli). above the clean water quality standard set by the Regulation of the Minister of Health of the Republic of Indonesia, [28]. This indicates that the well water is contaminated. Groundwater quality support data show poor groundwater quality as follows:

Table 3. Groundwater Quality at Activity Sites (Minister of Health of the Republic of Indonesia, 2017)

No	Parameter	Unit	Result of Analysis	Water Quality Standards
	A. PHYSICS			
1	Smell	No Smell	No Smell	No Smell
2	Turbidity	NTU	1,48	25
3	Dissolved Residues (TDS)	mg/L	66	1.000
4	Color	TCU	*,17	50
5	Flavors	Not Feeling	Not Feeling	Not Feeling
6	Temperature	ºC	31	± 3 ºC Air temperature
	B. CHEMISTRY			
1	Iron (Fe)	mg/L	0,13	1
2	Hardness (CaCO3)	mg/L	4.092	500
3	Chloride (Cl)	mg/L	36,7	-
4	Manganese (Mn)	mg/L	<0,07	0,5
5	pH	-	7,5	6,5 – 8,5
6	Zinc (Zn)	mg/L	0,03	15
7	Sulfat (SO4)	mg/L	159,8	400
8	Copper (Cu)	mg/L	<0,04	0,05
9	Ammonia (NH3-N)	mg/L	370	-
	Organic Chemistry	mg/L		
1	Total Chromium	mg/L	<0,04	-
2	Cadmium (Cd)	mg/L	<0,01	0,005
3	Nitrite as N	mg/L	0,08	
4	Nitrate as N	mg/L	4,41	1
	C. MICROBIOLOGY	mg/L		
1	Total Coliform (MPN)	MPN/100mL	20×10^3	50
2	E.Coli	MPN/100mL	7×10^3	0

Data Source: Primary Data, Soil Water Quality in the area around **Fish Landing Base** Sarang

Quality Standard: Minister of Health of the Republic of Indonesia, 2017

2. Biological Components

Sea Flora and Sea Fauna

The conditions of marine flora and fauna studied in the study area are plankton, benthos, and nekton. In the study area was taken based on sampling of primary data in the location of waters around the fish landing base conducted on 21 -24 October 2017. 21 -24 October 2017.

Plankton and Benthos, The condition of Plankton and Bentos in the study area is based on the results of Saprobitas analysis and its diversity index as follows [17] (table 4):

Table 4. Analysis of Saprobitas - Fish Landing Base Sarang

	Station				
	S1	**S2**	**S3**	**S4**	**S5**
Poly-saprobic Group (A)					
Sum (n A)	**0**	**0**	**0**	**0**	**0**
α- Meso-saprobic Group (B)					
Chaetoceros sp		12			12
Navicula sp.	6	6	6	6	
Nitzschia sp.	12	90	36	42	96
Vorticella sp	24				
Stephanodiscus sp		24			18
sum (nB)	**42**	**132**	**42**	**48**	**126**
β-Mesosaprobic Group (C)					
Tabellaria sp	72	108	24	66	54
sum (nC)	**72**	**108**	**24**	**66**	**54**
Oligosaprobic Group (D)					
sum (nD)	**0**	**0**	**0**	**0**	**0**
Group E (without A, B, C dan D)					
Balanus tintinabulum	6				6
Ceratium furca				12	
Ceriodaphnia sp			18		
Corycaeus ovalis	24	18	24	24	42
Euplotes sp				6	
Frontonia sp	54				
Macrosetella gracilis	6	12	252	18	6
Macrocyclops fuscus	54	78		78	258
Larva *Portunus pelagicus*	168	90	162	56	84
Protococcus sp		6			
Richterella sp	42	42	6		18
Spirotaenia condensata			6		
Jumlah (nE)	**354**	**246**	**468**	**194**	**414**
$SI = \frac{1(nC)+3(nD)+1(nB)-3(nA)}{1(nA)+1(nB)+1(nC)+1(nD)}$	1,00	1,00	1,00	1,00	1,00
$TSI = \frac{1(nC)+3(nD)+1(nB)-3(nA)}{1(nA)+1(nB)+1(nC)+1(nD)} \times \frac{nA+nB+nC+nD+nE}{nA+nB+nC+nD}$	0,24	0,49	0,12	0,37	0,30

Description: (**) = β - Mesosaprobic, Description Polluted mild to moderate [17,22]

Source: Analysis Results, 2017

Ecological diversity is expressed by index value, as statistical analysis of ecological diversity so as to estimate the abundance of a plankton and benthos in making a conclusion especially in comparing the diversity among some communities. Environmental changes have a strong effect on a single organism structure, including species richness and composition. Pancton and benthic macroinvertebrates included in this biological component are very sensitive to change, because it includes various taxa with various characteristics that are sensitive and tolerant species. Reducing the number of species along the environmental gradient has been linked to various environmental change factors, mainly due to the entry of pollutants due to human activities. Therefore, the diversity of planton and benthos can be used as an indicator of the quality of a marine waters through the calculation of the saprobitas index. [29]

The result of saprobitas analysis showed that the waters around Fish Landing Base Sarang were classified as mild to moderate. The sources of pollution include loading-unloading activities-fish auction in Fish Landing Base , and waste disposal by citizens to the sea. These findings support the results of water quality analysis, whereby several water quality parameters have been shown to exceed the threshold.

Pollution that occurs in the waters around the Fish Landing Base Sarang cause disruption to the biota, either against plankton, bentos or nekton. Several types of biota that can tolerate the pollution conditions will be able to survive, but the type of biota that is not able to tolerate pollution will experience a decrease in abundance due to death and migrate away from contaminated locations. Therefore, the management of the aquatic environment around Fish Landing Base Sarang is expected to improve the condition of waters and aquatic biota that have habitat in the waters around Fish Landing Base Sarang, either plankton, bentos or nekton.

The dominant types of plankton in the waters surrounding the project include ***Macrocyclops fuscus, Portunus pelagicus (crab larvae), Nitzchia sigma, Frontonia sp, and Tabellaria sp. Nitzchia sp*** is one type of marine plankton that has a high tolerance to extreme environments, including having a high resistance in the aquatic environment that has contamination of organic matter. Tabellaria sp belongs to one group of oligosaprobic organisms as an indicator of the waters being at the level of mild or uncontaminated contamination. Saprobitas analysis results show that the waters around Fish Landing Base Sarang have been contaminated with mild to moderate levels of pollution [30]

Nekton

The results of the nekton survey indicate that the dominant fish species found in the waters around the project are peti fish (*Leiognathus equulus*) and kamojan fish (*Nemiptarus nematophorus*). The diversity index is 1.74 (medium category), and the uniformity index is 0.837 (stable category). [30]

Makrozoobentos survey results before the project showed that bentos type encountered was dominated by *Anadara sp* type, followed by *Pleuricera sp* and *Unio sp*. *Anadara sp* is a tropical animal that lives in shallow waters to a depth of 20 m. Anadara sp including filter-feeder animals with main meals are detritus, as well as relatively resistant to pollution levels.

Nekton is a marine organism that can move or swim by itself in water so it does not depend on strong ocean currents or wind motion caused by wind. Nekton includes fish, squid, shrimp, crabs, mammals and marine reptiles. Location of nekton samples around Fish Landing Base Sarang, ie at coordinate points 6 ° 41'44.28 "S 111 ° 38'18.36" T. The tools used in this nekton sampling process are GPS, boats, and arad traps. Sampling is done at three different points. [31]

The degree of species diversity consists of two components: the number of species present (generally leading to species richness) and relative species abundance lead to uniformity. Diversity is generally measured using the distribution patterns of some abundance (individual or productivity) sizes between species. Data of biota number obtained at each point then analyzed with index of diversity, and index of uniformity by using formula as follows.

$$H' = -\sum Pi \, Ln \, Pi$$

$Pi = ni/N$,

Where H 'is the index of diversity, **ni** is the number of individuals per species, and N is the total number of all species. The criteria for diversity index are as follows.

H '<1 indicates a low level of species diversity

1 <H '<3 indicates a moderate level of species diversity

H '> 3 shows a high level of species diversity

While the uniformity index can be calculated by the following formula :

$$\mathbf{E = H' / Hmax}$$

$$\mathbf{Hmax = Ln\ S}$$

Where E is the uniformity index and S is the total number of species. The value of uniformity index ranges from 0-1. If the value of E <0.20 can be said unstable type uniform conditions, whereas if the value of E is 0.21 <E <1 then it can be said stable type uniformity conditions.

Based on the sampling of nekton at three different points, there were 8 different fish species with 172 individuals total. Kamojan fish and petek are the most common fish species in the sampling

Table 5. Results Of Nekton Analysis

No	Name of Species	ni	Pi	Ln Pi	Pi Ln Pi
1	*Buntek (Arothron hiidus)*	9	0,05232558	- 2,9502699	-0,15437459
2	*Cumi cumi (Loligo sp)*	12	0,06976744	-2,66258783	-0,18576194
3	*Rejung (Sillago sihama)*	8	0,04651163	-3,06805294	-0,14270014
4	*Bawal Putih (Pampus argenteus)*	1	0,00581395	-5,14749448	-0,02992729
5	*Badong (Eubleekeria jonesi)*	3	0,01744186	-4,04888219	-0,07062004
6	*Petek (Leiognathus equulus)*	24	0,13953488	-1,96944065	-0,27480567
7	*Kamojan (Nemiptarus nematophorus)*	105	0,61046512	-0,49353413	-0,30128537

No	Name of Species	ni	Pi	Ln Pi	Pi Ln Pi
8	*Kakap Pungar (Lutjanus johni)*	10	0,05813953	-2,84490938	-0,16540171
	Sum	172	1	-23,1851715	-1,32487675
H' (index of diversity)		1,324877 (moderate)			
Hmax		2,079442			
E (uniformity index)		0,637131 (stable)			

Based on the results of the analysis indicated that the diversity index was 1.32 (moderat category) and the uniformity index was 0.63 (stable category) [17]. Description of fish species found at the time of sampling by photo mapping method [32]. Its can be seen in the following table.

Table 6. Types of Identified Fish

No	Name	figure	Sum
1	*Buntek (Arothron hiidus)*		9
2	Cumi cumi *(Loligo sp)*		12
3	Rejung *(Sillago sihama)*		8
4	Bawal Putih *(Pampus argenteus)*		1
5	Badong (*Eubleekeria jonesi)*		3
6	Petek *(Leiognathus equulus)*		24
7	Kamojan *(Nemiptarus nematophorus)*		105
8	Kakap Pungar *(Lutjanus johni)*		10

The results of this study are a general description of the marine ecological conditions of the latest sarrang and can be used as a baseline for other activities, especially environmental impact assessment studies and environmental feasibility studies to determine the predicted impacts that will arise if the fish landing ports will be expanded and expanded. Rembang district government as a stake holder area can utilize the results of this study for the planning of marine territorial waters district rembang, central java province

CONCLUSION

Based on the analysis of marine water quality Sarang shows the waters in polluted condition, with The parameters of seawater quality beyond the prescribed standard limit are lead (Pb) ranging from 0.9 ppm - 0.15 ppm (mg / L), Colliform range from 4×10^3 to 14×10^3 (MPN / 100 mL), ammonia (mg / L) ranged from 519 ppm - 655 ppm, Phenol between 0.02 ppm - 0.22 ppm, H2S range from 0.57 ppm - 0.74 ppm, while the analysis Saprobik Index = 0.1, Tropic Saprobik Index = 0.24-0.49 and Nekton's Diversity Index is 1.74 shows the waters are also in polluted condition

SIGNIFICANCE STATEMENTS

This study is a case study of recent studies on the ecological conditions of waters sarrang, especially its impact due to landing activity of fishing boats. As is known that the waters of Sarrang including in the conservation area Karimunjawa marine park that is protected by the Indonesian government. The results of this study provide the basis for the stakeholders who are authorized in the management and monitoring of ecological conditions of waters sarrang and as a frame of reference in the study of environmental impact analysis, especially in the field of marine waters assessment

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