J. Pijar MIPA, Vol. 18 No. 1, January 2023: 112-117 ISSN 1907-1744 (Cetak)
DOI: 10.29303/jpm.v18i1.4488 ISSN 2460-1500 (Online)

ANALYSIS OF SEAWATER QUALITY IN GILI AIR NORTH LOMBOK DISTRICT

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Received: December 9, 2022. Accepted: January 11, 2023. Published: January 31, 2023

Abstract: The research aims to identify seawater quality conditions (physical and Chemical) in Gili Air Lombok and determine the water quality status using the pollution index method based on the Indonesian Minister of Environment Decree No. 115/2003. The method is descriptive research with quantitative and qualitative approaches. To identify water quality by comparing it with PP No. Water quality standard. 82/2001 concerning Water Quality Management and Water Pollution Control which includes physical parameters and chemical parameters. The water quality of Gili Air-sea based on the water pollution parameter test shows that the physical quality parameters still meet the required quality standards except for two chemical quality parameters. The pH of 6.3, and Phosphate has a value of 0.1 mg/l, which exceeds the quality standard seawater for marine tourism. Dissolved Phosphate in Gili Air waters comes from demineralization from the bottom of the waters in the form of coral. The movement of seawater accelerates demineralization. Phosphate in Gili Air waters also comes from seagrass productivity in these waters. However, the phosphate levels in the waters of Gili Air do not endanger the life of aquatic biota and do not interfere with the aesthetics of tourism.
Meanwhile, based on the assessment of the status of water quality using the pollution index method. It was shown to be very lightly polluted with an IP value of 2.622.

Keywords: *Gili Air Waters, Water Quality, Physical, Chemical.*

INTRODUCTION

Gili Air is one of Lombok's three famous Gili islands, namely Gili Trawangan and Gili Meno. The location of Gili Air Pier is in Gili Air Hamlet, Gili Indah Village, Pemenang District, West Lombok Regency, West Nusa Tenggara Province. Pemenang District is about 9 Km from the capital city of North Lombok Regency. The area of Pemenang District includes three islands, namely Gili Trawangan. Gili Air is the island closest to the island of Lombok. These islands are located on the western coast of Lombok. Gili Air can be visited by traveling by motor boat (boat) from Bangsal Harbor with a distance of about 10 minutes [1].

Pollution in the waters of Gili Air is an important issue that needs attention from various parties. Sources of water pollution based on the characteristics of the waste produced can be divided into sources of domestic waste and non-domestic waste sources [2].

Domestic waste sources generally come from residential areas, and non-domestic waste sources come from activities such as industry. Agriculture and animal husbandry, fishing, mining, or activities that do not originate from residential areas [3].

Indicators or signs that environmental water has been polluted are changes or signs that can be observed [4]. There is a change in water temperature and There is a change in pH or hydrogen ion concentration. There is a change in the color, smell, and taste of the water. The emergence of precipitates, colloidal substances that dissolve dissolved materials. The presence of anaerobic microorganisms with products in the form of odors (acidic bacteria. for example, Escherichia coli. Pseudomonas. Klebsiella)

Increased radioactivity of environmental water. Observations made to determine changes in water quality can be classified into physical, chemical, and biological observations.

RESEARCH METHODS

Research Type: This research is descriptive research with quantitative and qualitative approaches. The research method used is a case study, a method in which all aspects must be fully observed, While the results of the data analysis only apply to a certain place and period of time. Research sites: The research location was carried out around the Gili Air Pier. Gili Indah Village. Pemenang District. North Lombok Regency (Figure 2).

Gili Air is a tourist destination's favorite maritime tourist in the Regency North Lombok, West Nusa Tenggara. After the great earthquake on July 29, 2018, slowly but surely, tourist visits to Gili Air began to recover gradually. Recorded an increase of 40.2% or as many as 14.307 people in the month of September or two months after the earthquake. Although the profitable economy, increasing the number of tourist visits also contributed contribute more to increasing the volume of waste on-site in Figure 1 below [5].

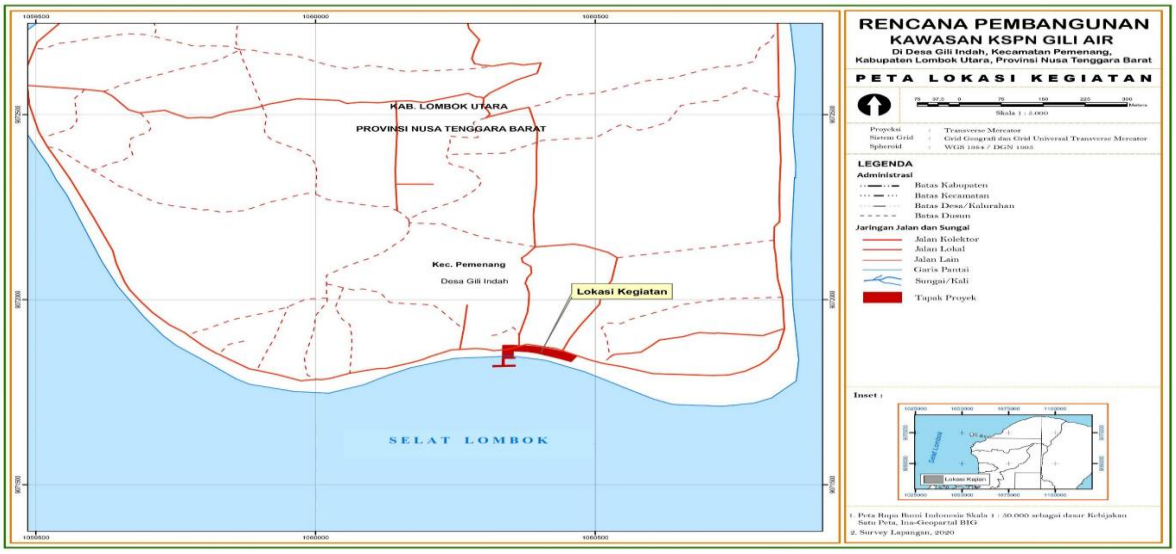

Figure 1. Research Locations

The tools used in the research are GPS (Global Positioning System), Weigh bottles, sterile bottles, Thermometers, Spirit, Cotton, Sampling bag, and Rope. Table tennis ball Jerry can use a volume of 2 liters for water. Camera. Stationary. Label. Cold box. Meter. The study's materials were seawater samples in the waters around the Gili Air Pier. A sampling of Seawater Quality in Gili Air: Seawater sampling was carried out one time on October 16, 2020, in the waters around the Gili Air Pier. Sampling was done by grabbing a sample. Grab sample (temporary sample) is a sampling method employing samples taken directly from the body of water being monitored. This sample only describes the characteristics at the time of sampling [6].

Seawater Quality Analysis

It is an analysis to determine the Quality of sea water in Gili Air waters by testing water pollution parameters, including physical parameters (color. odor, brightness, turbidity, total suspended solids, temperature, garbage, and oil film), chemical parameters (pH, salinity, dissolved oxygen (DO). Phosphate and nitrate). The Quality of the waters in the Sea of Gili Air is analyzed by calculating using the Pollution Index method. The measured parameter values in the Sea of Gili Air are compared with the water quality standard for designation. Namely the quality standard of the aquatic environment by the government regulation of the Republic of Indonesia Number 82 of 2001 concerning Quality Management of Water [7].

Pollution Index: In article 2 of the Decree of the Minister of State for the Environment No. 115 of 2003 concerning Guidelines for Determining Water Quality Status. It is explained that water quality status can be determined using the Pollution Index Method [8]. The Pollution Index (IP) method uses statistical analysis to determine the Quality of river water. The formula used is as follows:

$$IPj = \frac{\sqrt{(Ci/Lij)^2 M + ((Ci/Lij)^2 R}}{2}$$

Information:

Lij = Concentration of water quality parameters included in the quality standard for water use (j)

Ci = Concentration of survey results of water quality parameters

Ipj = Pollution Index for designation (j)

(Ci/Lij)M= Maximum Ci/Lij value

(ci/Lij)R = Average Ci/Lij value [9]

Evaluation of the pollution index value with water quality is shown in Table 1:

Table 1. Relationship between Pollution Index Values and Water Quality

IP Value	Water Quality
$0 \leq Ip \leq 1.0$	Good Condition
$1.0 < Ip \leq 5.0$	Lightly blackened
$5.0 < Ip \leq 10.0$	Medium blackened
$Ip > 10.0$	Heavy blackened

RESULTS AND DISCUSSION

Seawater Quality

The results of laboratory analysis of seawater samples in the Gili air study area showed that the physical and chemical quality parameters still met the quality standards required by the Decree of the Minister of Environment No. 51 of 2004 concerning Sea Water. Quality Standards. in Appendix II for the use of water as a marine tourism area it is categorized as quite good [10].

The results of the analysis of the Quality of physics show that the sea waters of Gili Air are colorless and very clear around the area along the coast. The clarity of the water allows you to see directly to the bottom of the coastal waters from the surface. The water does not smell and tends to be fresh, considering that there are seagrasses that grow in these waters, so the supply of dissolved oxygen in the water can come from the photosynthesis of seagrasses. The brightness of the water can penetrate up to 6.5 meters. Sunlight can penetrate to that depth. [11] explained that brightness is the level of water transparency observed visually using a Secchi disk. By knowing the brightness of water. To what extent is an assimilation process in the water still possible? Which layers are not cloudy, and which are the most cloudy?

Waters that have a low brightness value during normal weather times can indicate the number of suspended particles in these waters. The brightness value of the waters around Gili Air is relevant to the low turbidity value of 0.007 NTU. Total Suspended Solids was 0.243 mg/l. This value was far below the value set by the quality standard, namely 20 mg/l. The waters are spotless. No trash and oil layers are found. While the results of the chemical quality analysis of seawater are known to be as follows:

Table 2. Seawater Quality Inspection Results at Activity Locations

The meter	Unit	Score	Raw Quality*
	PHYSIQUE		
Color	Pt. Co	Colorless	30
Smell		Odorless	Not smells
Brightness	M	6.5	>6
Turbidity	Ntu	0.007	5
Total Suspended Solids	mg/l	0.243	20
Temperature	^{o}C	28	Experience
Rubbish	-	Nothin g	Nothing
Oil layer	-	Nothin g	Nothing
	CHEMICAL		
pH	-	6.3	7 – 8.5
Salinity	ppt	32	Experience
Dissolve Oxygen (DO)	mg/l	7	>5
Phosphate	mg/l	0.1	0.015
Nitrate	mg/l	0	0.008

The degree of acidity (pH) is the negative logarithm of the Concentration of released hydrogen ions in a liquid and is an indicator of water quality. The pH of water is one of the Chemical parameters that are quite important in monitoring the stability of the water. Variations in the pH value of the water greatly affect the biota in water. In addition, the high pH value greatly determines the dominance of phytoplankton which affects the level of primary productivity in waters where the presence of phytoplankton is supported by the availability of nutrients in marine waters [12]. The pH value of the water around Gili Air is 6.3. this value is classified as the natural condition of the pH of sea waters. But this value is below the quality standard above. The pH of seawater is relatively more stable and is usually in the range of 7.5 and 8.4. except near the coast. The ideal pH value for water is 7 - 8.5. Water conditions that are very alkaline or very acidic will endanger the survival of organisms because they will interfere with metabolic and respiration processes. The low pH measurement results may occur because several factors, including the photosynthetic activity of marine life, influence the pH in water, temperature, and water salinity. The measurement results' pH range can still be tolerated because it has a small difference from the minimum quality standard, around 0.7. According to Odum (1971) that a pH value between 6.5 – 8.0 is the safe limit for the pH of the waters for the biota life in it [13].

Salinity

Water salinity affects the osmotic pressure of water. The higher the salinity. The greater the osmotic pressure. Differences in water salinity can occur due to differences in evaporation and precipitation. The salinity value of Gili Air's seawater is 32 ppt, which is in the range of natural salinity values for eastern Indonesian sea waters, namely 32-38 ppt. Dahuri (1996) explained that the salinity value of Indonesian waters generally ranges from 32-34% [14].

Dissolved Oxygen (DO): Describe that dissolved oxygen (Dissolved Oxygen/DO) is the amount of oxygen dissolved in water. DO is needed

by all biota for respiration—metabolic processes or exchange of substances which then produce energy for growth and reproduction. Oxygen is also needed to oxidize organic and inorganic materials in aerobic processes. In general, oxygen is found in the surface layer because oxygen from the air nearby can directly dissolve and diffuse into seawater. The dissolved oxygen value in Gili Air waters is 7 mg/l, and this value exceeds the required quality standard, which is more than 5 mg/l. The high dissolved oxygen in Gili Air waters is due to seagrasses and coral reefs that can supply oxygen to the waters apart from free air diffusion [15-17].

Phosphate levels in Gili air waters are 0.1 mg/l. The value required for the quality standard is 0.015 mg/l. Then the phosphate value of Gili Air waters is high. This high Phosphate is due to the high diffusion of Phosphate from the bottom sediments in the form of dead coral and coral reefs. Sediment is the main storage place for phosphorus in the cycle that occurs in the sea. Generally, in the form of particulates, it is bound to hydroxide compounds and iron oxides. Phosphorus compounds bound in sediments can undergo decomposition with the help of bacteria or through abiotic processes to produce dissolved phosphate compounds which can undergo diffusion back into the water column.

Dissolved Phosphate in Gili Air waters comes from demineralization from the bottom of the waters in the form of coral. The movement of seawater accelerates demineralization. Phosphate in Gili Air waters also comes from seagrass productivity in these waters. However. The phosphate levels in the waters of Gili Air do not endanger the life of aquatic biota and do not interfere with the aesthetics of tourism.

Nitrate was not detected in Gili Air waters. It is possible that the value was so low that it was not detected. Nitrate required quality standard is 0.008 mg/l. The low nitrate levels are due to the absence of surface runoff from agricultural land. Which generally contains a lot of nitrates. Explanation by WHO & European Commission (2002) that the main source of nitrogen enrichment is runoff originating from agricultural land. Whereas on the island of Gili Air, there is no agricultural land and no agricultural activity [16-19].

Ammonia was not analyzed, considering that the waters have a fairly continuous movement of water, so the remaining organic matter decomposition may not turn into ammonia. The waters are not indicated to smell and are less likely to contain ammonia.

Pollution Index (IP) of Gili Air Waters:

The water quality standard used is based on the Decree of the Minister of Environment No. 51 of 2004 [20] concerning Sea Water Quality Standards. in Appendix II for water use as a marine tourism area. The results of calculating the pollution index at each sampling point are presented in table 3.

Table 3. Calculation results of the Gili Air Waters Pollution Index

NO	Parameter	Unit	Analysis Results	uality Standards	Ci/Li	New Ci/Li*
1	Turbidity	NTU	0.007	5	0.001	0.001
2	Total Suspended Solids	mg/L	0.243	20	0.012	0.012
3	pH	-	6.3	7-8.8	0.6	0.6
4	Dissolve Oxygen (DO)	mg/L	7	>5	0	0
5	Phosphate	mg/L	0.1	0.015	6.667	5.120
					average Ci/Li	1.147
					Maximum Ci/Li	5.120
					Pij	2.622
The seawater quality condition studied was lightly polluted (SKL=4) with a percentage of 72.0%						

Information: Calculation results according to Permen LH No. 115 of 2003 concerning Determination of Water Quality Status Note (*): key parameter of pollutant source (Ci/Li New > 1.0); BML: Decree of the Minister of Environment No. 51 of 2004 concerning Sea Water Quality Standards (Appendix II for Designation of Marine Tourism)

Based on the results of the analysis using the Pollution Index above. It can be seen in the pollution level relative to seawater quality parameters. The calculation results show that from sampling the Quality of seawater in the waters around Gili Air. The PI value is 2.622, which is included in the Very Lightly Polluted category.

CONCLUSION

The conclusions obtained from the research results are as follows: Seawater quality in Gili Air

waters based on the laboratory analysis results shows that the Physical quality parameters still meet the required quality standards except for two Chemical quality parameters, pH and Phosphate. Based on the results of an analysis using the Pollution Index. It shows that from sampling the Quality of seawater in the sea waters around Gili Air. The PI value is 2.622, which is included in the Very Lightly Polluted category. Dissolved phosphorous in Gili Air waters comes from the demineralization of the bottom of the waters in the form of coral. The movement of seawater accelerates demineralization. Phosphate in Gili Air waters also comes from seagrass productivity in these waters. However. The phosphate levels in the waters of Gili Air do not endanger the life of aquatic biota and do not interfere with the aesthetics of tourism.

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