

Analysis Of The Density Of Coliform Bacteria As An Indicator Of Pollutant In The River Aek Katia Labuhan Batu District

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Abstract.

Coliform bacteria is a one of a kind negative bacteria commonly found in the river aek katia in kabupaten labuhanbatu, the presence of coliform bacteria can be an indicator of biology that is important to know the environmental conditions. This study aims to determine the environmental conditions based on biological indicators in the form of an abundance of coliform bacteria in the river Aek Katia Kabupaten Labuhanbatu. The main ingredient in this study is the river water and sediment. The results obtained are still below the quality standard so that the river aek katia in good condition biologically. The presence of coliform bacteria in the river can affect human and biota. So it needs to be considered in the efforts of the management of the environment of the community, especially in an effort to maintain the sustainability of fisheries resources.

Keyword: *Density, bacteria, River Aek Katia*

I. PENDAHULUAN

River Aek Katia is a river located in Bilah Barat District, Labuhanbatu District very close to the settlement so that the river is very often visited by the residents to attempt the activity of each of them, from start to wash the dishes, washing clothes, bathing and so on. Even children who are around the settlement also very often play to the river to play at once to have an adventure, because that's when children around these settlements can swim, though still a child.

River region Labuhanbatu District have problems, among other natural factors, in terms of society and the problems caused by anthropogenic factors. Anthropogenic factors are the factors that could potentially result in a conflict that such a large, weighing pressure the exploitation of the resources of the river as well as the rapid rate of pollution gradually. influenced by the influx of waste, both domestic, and industry that result in a decline in water quality and productivity of the ecosystem (Shah 2012). According to Hamuna (2018) in the river will be found in various types of garbage and pollutants, it certainly can lead to environmental degradation in the region of the edge of the river and surrounding ecosystem, the inclusion of substances of inorganic and organic kebadan excessive water has an adverse impact on the river and cause a decrease in river water quality is the physical, chemical, and biological. The definition of pollution in the Regulations of the Republic of Indonesia Number 82 Year 2001 on Water Quality Management and Water Pollution Control states, water pollution is indicated by the decline in the quality of water up to a certain level which causes the water to not function as intended. Certain level such is the quality of the raw water is set and serves as a benchmark to determine the rate of occurrence of pollution of waters. Assessment of quality of the raw waters in addition to are based on the designation, also based on the real conditions of water quality which may vary from one region to the other.

Approach in the determination of water quality status by comparing the data of each water quality parameters such conventional parameters physical, chemical, bacteriological, and the condition of the normative,

with a quality standard that is used as a reference or a reference in the determination of the condition of the waters (Hamuna 2018). Coliform bacteria is a type of bacteria that is capable of being used as an indicator of the presence of bacteria other. The determination of coliforms as an indicator of pollution with a view of the number of colonies of bacteria that certainly positively correlated with the presence of pathogenic bacteria, coliform analysis faster and cheaper than on the analysis of the type of bacteria to another. The low presence of coliform bacteria in. Waters showed the good quality of the waters. Coliform is a group of bacteria that can be used as an indicator of pollution dirt and salinity are not good against the waters. The presence of coliform bacteria in the river suggests the possibility of the presence of microorganisms that are eterpatogenetik and taksigenetik that is able to affect the health of the biota and humans (Wanda 2012).

Coliform bacteria is a group of bacteria that are sourced in the faeces of man and animals contained in the lot number, make the bacteria is often used as an indicator of the quality of the food and waters. Bacteria of group of coliforms has a toxic drug that is capable of causing disorders in the digestive system (Partiwi 2013). One of the environmental problems is the potential for pollution of the waters of the sea caused by various human activities, such as industrial activities and households that can affect the water quality of the waters (Naidoo, 2012). Biological water quality is determined by many parameters, i.e. the parameters of microbial contaminants, pathogens and producing the toxin. The existence of the biological parameters such waters can also increase if the waste is not managed and continuously streamed to a waters (Manulu, 2012).

II. MATERIALS AND METHODS

River Aek Katia this is the river which is very close to the settlement so that the river is very often visited by the residents to attempt the activity of each of them, from start to wash the dishes, washing clothes, bathing and so on. Even children who are around the settlement also very often play to the river to play at once to have an adventure, because that's when children around these settlements can swim, though still a child. The waters of the village of tanjung medan Labuhanbatu District, which take water and sediment where there are 3 stations and each station has 3 point research. Research station for sampling distinguished based on the consideration.

Station I

Station I is a river in the village of lubuk nor nor, where the station I is close to the settlement of the population and many people who use the river as a place of daily activities such as washing clothes and dishes, and even a place to dispose of dirt either from animal or human, in addition a lot of people throw away with household waste into the river.

Station II

Station II is located on the river in tanjung medan, where the station II also close to human settlements and station II, this is the business of livestock such as cattle chickens are managed by local people. The area of this river is dirty and there are wastes of livestock such as poultry manure and used feed ingredients.

Station III

Station III is located in the village of brave mountain, where the station III is far from the residential areas where the river is only used as a place to catch fish, but even so it is possible there are also people who use the river for daily activities however, the river is clean because it is far away from the station I and II.

Sampling of research is taken directly on the river Aek katia, labuhanbatu District in November –December 2021, is based on purposive sampling technique, where the waters of the river in tanjung medan is an area that is used as a place of exile community. Sampling of water and sediment in the study carried out parallel to the shore, using 3 stations with 3 point perstasiun parallel to the line of the river and the distance from the point a to the point that another 4 km.

Data Analysis

Analysis of coliform bacteria water samples in this study using the method of membrane filters. First filter the river water samples of 100 ml using the membrane filter with the tool manifold membrane filter, next menjapit membrane filter and move it to the media TTC (in laying the membrane filter into the media TTC no trapped air underneath), incubation of media at a temperature of 36oC for 2 x 24 hours. Do the observations of the growth and changes of bacteria filtered

in the membrane filter, if the results of the positive coliform bacteria will form colonies that are yellow to orange. Test booster with transfer of bacteria that grow on TSA media 0% and TB, incubation TSA 0% in the temperature of 45oC for TB incubation in the temperature of 36oC. The last count the amount indicated coliform bacteria. The use of the method of membrane filters produce bacteria in the form of colonies. The technique of membrane filter in a statistical result can be calculated directly and precisely. The density of bacteria colony can be calculated with the density per 100 ml, the formula calculation according to APHA (1979) and the WHO (1977) as follows: Total bacteria/100 ml = Total bacterial colonies x 100 (the volume of water in the strain) of Ministry of Environment 2006, stating that the quality standard for coliform bacteria 1000 colonies/100ml.

Sediment Samples

Analysis of coliform bacteria to sediment samples in this study refers to the research Pelczar (1988), namely the method of multiple test tube. The first sediment samples of 250 g was dissolved in a solution of BFP 250 ml and stacometer so homogeneous. Second prepare the 9 test tubes containing media LB 9 ml in which there is durham, move 1 ml Juvenil, 1(2), 243-249, (2020) 246 sample into the medium LB rank three (10-1, 10-2, and 10-3) and dilution, inklubasi for 2 x 24 hours (observe if there are bubbles on the tube durham and the color of the solution turbid identified bacteria contained coliform bacteria). The third test booster, samples bubbly transferred to a solution of BGLB, inklubasi for 2 x 24 hours. If there is a bubble in the tube durham and the colors look murky means identified coliform bacteria. The use of the method of multiple test tube compare the results only based on the number of bacteria approximate nearest is expressed in MPN (Most Probable Number). Then the results compared with the quality standards Kep-51/MENKLH/2004, stating that the quality standard for coliform bacteria in the sea is a 1000 MPN/g.

III. RESULTS AND DISCUSSION

Coliform Bacteria

The results of the test Coliform bacteria waters (Table 1.) using the methods of sieve membrane (membrane filter). According to Kunarso (2015), stating at first the technique of membrane filters was developed first by a Win in 1957, and these techniques are growing rapidly until now, with various modifications and procedures that are more perfect. The technique of membrane filters is a good technique for the examination of water and waste bacteriological (American Public Health Sociation 2012). The working principle of the technique of membrane filter is based on the overhang of the particles of the sample, which passes through the top surface of the membrane filter (Cotton 2014).

Table 1. The results of the test waters

Location	The number of Coliform Bacteria (colonies/100 ml)
Lubuk Nor-Nor	700
	600
	600
Tanjung Medan	500
	500

	600
Gunung Berani	700
	800
	800

The results of the test coliform bacteria to sediment using the MPN method. The method of Most Probable Number (MPN), is a method of calculation of cells, especially for the calculation of coliform bacteria based on the number of approximate nearest. The closest approximation is the calculation in a certain range. Calculated with the value of guess is close to statistical refer to the table MPN (Hartanti 2015). Results in research test coliform bacteria in the river. Aek Katia village of Tanjung Medan
The analysis of the Contamination of Coliforms in waters of the River Aek Katia

The waters of the River Aek Katia Labuhanbatu District in this study has three Stations, from the results of the study parameters environmental Station I, II, and III pH value in accordance with the quality standards, while for temperature, DO, and salinity is not in accordance with the quality standard of the waters (Table 3.). The third research station has the potential for the growth of coliform bacteria (Table 4.).

Table 2. The Results Of The Test Sediman

Location	Jumlah Tabung Positif			MPN/g
	10	10	10	
Lubuk Nor-Nor	3	4	2	39
	3	4	2	39
	4	0	2	41
Tanjung Medan	2	1	2	23
	2	1	3	30
	3	1	3	30
Gunung Berani	3	1	2	78
	2	1	3	122
	2	1	2	78

Table 3. Growth Parameters Bakteri Coliform

Parameters	Study Site			Bcteri Coliform	Source	Condition
	Lubuk Nor-Nor	Tanjung Medan	Gunung Berani			
Suhu (0C)	30,8	33,7	33,1	12,33	Ramadan (2021)	Tools
DO (mg/L)	4,51	4,41	4,27	>5	Rahman (2022)	Tools
Salinitas (ppt)	22	25	24	<75	Nurul (2022)	Not in tools
Ph	5,5	7,5	6,9	6,2-7,5	Yuli (2021)	Tools

According to Tururaje (2014), coliform bacteria is an indicator of environmental contamination or poor sanitation as well as indicators of fecal contamination from humans and warm-blooded animals. Coliform bacteria have a higher durability of the pathogenic bacteria, as well as other more

easily isolated and grown (Sutiknowati 2018). Increase of temperature, moisture and pH in an environment cause the occurrence of the proliferation of pathogenic bacteria (Slamat 2012). Temperature conditions that support the growth of coliform bacteria is 12-44 0C, while the salinity range for growth of coliform bacteria that is not greater than 85 ppt (Herd 2013). Salle (2013) states marine bacteria able to grow at pH of 6.5 to 8.5, but the growth optimum of 7.2 to 8.5. According to Andrianto (2018), the levels of dissolved oxygen in the water is a good >5 mg/L. The results of the study parameters DO less optimum for the growth of coliform bacteria, this shows that the absence of activity of the agricultural-intensive as well as there are types of bacteria that require oxygen in his life. Pasco et. al (2013), the value of the DO low indicates that the absence of activity of agriculture is intensive in the area considering the rest of the fertilizer is one of the sources of pollutants coliform bacteria. Ali (2013), aerobic bacteria are bacteria that life requires free oxygen for example Nitrosomonas dan Acetobacter, while anaerobic bacteria is a type of bacteria that can live without free oxygen for example Escherichia coli and Aerobacter.

Research coliform bacteria in waters and sediments in the area of Ten (Table 4.5) is very important due to determine the condition of the area. According to the Waluyo (2017), stated one of the indicators of pollutant microbes is the presence of coliform bacteria, in addition coliform bacteria are pathogenic form of bacteria that can cause disease, it is therefore extremely important to do the test coliform bacteria in the waters.

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The highest value in the region of the Stomach Paseser waters which has average on the waters of 600-800 colonies/ml, whereas the sediment 75-120 MPN/g coliform bacteria, but still within the standard of a good quality. The abundance of coliform bacteria in the waters of station III can be caused by environmental conditions where close to human activities.

And According to Princess (2018), stated that the high and low values of coliform bacteria Juvenil, 1(2), 243-249, (2020) 248 can be used to determine the condition of the quality of the waters. The disposal of organic waste that comes from community activities can cause pollution and can increase pathogen organisms in the waters. Results at Station I and II have the value of an abundance of

coliform bacteria that is low, because the organic content in the waters low, but the value of coliform bacteria can continue to increase. The results of the third station Ten have a value that is below the quality standards for the waters of the KEPMEN LH 2006 amounted to 1000 colonies and to sediment KEPMEN LH number 51 year 2004 amounted to 1000 MPN that has been set. According to Kunarso (2011) threshold limit value allowed for content of coliform bacteria is by 1000/100 ml. The waters of Ten Bangkalan can be said to be in good condition biologically. The noise density of coliform bacteria become one indication of the quality of the environment, there is still the need for further research to determine the indicator-other indicators to be important factors to determine the conditions and the quality of the environment. It is very important in the efforts of the management of the environment, particularly in efforts to use natural resources in coastal and marine areas. According to Wahyuni (2016), stated that the condition of the physics of the waters of the well is not necessarily the conditions of the biology of the waters are also better on the same waters.

Table 4. The Parameters Of The Waters Of Padang Sea

Parameter	satuan	Lokasi Penelitian			Sumber	Kondisi Perairan
		Lubuk Nor-Nor	Tanjung Medan	Gunung Berani		
Fisika suhu	(0C)	20,9	22,8	22,2	Kepmen LH No. 51 2021	Not in tools
Kimia Ph		7	7,5	6,9	Kepmen LH No. 51 2021	Tools
DO	mg/L	3,61	3,51	3,37	Kepmen LH No. 51 2021	Not in tools
Salinitas	Ppt	14	17	16	Kepmen LH No. 51 2021	Not in tools
Biologi Bakteri	Koloni/ml	600-500	400-500	400-500	Kepmen LH	Tools
Coliform					2022	
	MPN/g	33-36	26-28	65-120	Kepmen LH No. 51 2022	Tools

IV. CONCLUSION

Based on the research and analysis that has been done can be concluded that There are coliform bacteria in the waters of the average 500-800 colonies/ml, whereas the sediment average 78-122 MPN/g. As for the status of pollution in biology at the river aek katia ,the village of tanjung medan the physical Quality of the River Aek Katia including less well because the TDS value high and the color of the river is brown because of the high turbidity. The river is still used by people for everyday life, especially for the purposes of sanitaskecamatan bilah barat kabupaten labuhanbatu still below the quality. The water quality of the River aek katia is above the quality standard for drinking water, so it is not feasible for a source of drinking water. However, the River water aek katia is still feasible to use for infrastructure/water recreation, the cultivation of freshwater fish, livestock and irrigate crops. How to cope with the decline in River water quality aek katia due to the presence of the bacteria fecal coliform can be done by making a latrine .

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