River Water Quality In South Kalimantan Assessed From Microbiology Parameter For Sanitary Hygiene Needs

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Abstract

The presence of coliform bacteria can be an important biological indicator to determine environmental conditions. This study aims to determine environmental conditions based on micro biological indicators in the form of the presence of coliform bacteria in river waters in Banjar Regency, South Kalimantan. Water sampling was carried out at eight measurement points in the upstream flow of the river in Banjar Regency. The analytical technique used is to compare the results of laboratory tests with the Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements. The results of laboratory examinations showed that the total colifom content at eight observation points in the river in Banjar Regency, South Kalimantan ranged from 5050 to 52833,335 CFU/100mL. This means that the total coliform value at the research site does not meet the required class I quality standard **.**

Keywords : coliform bacteria; river quality ; water quality standards ; Banjar Regency river ; sanitation hygiene needs

1. Introduction

Changes in water quality conditions in river flows are the impact of discharge from existing land uses [1]. River water quality parameters can change based on natural conditions and human activities, so it will affect river water quality [2]. Along with the increase in population, it will cause an increase in the activities or activities of the people living on the banks of the river.

The existence of the Martapura Sub-watershed which has a length of up to 80 km empties into the City of Banjarmasin and its upstream is in the City of Martapura, Banjar Regency, currently experiencing pollution problems. This is because the entry of waste both organic and organic waste originating from activities generally carried out by people living on the banks of the river, including industrial activities and household activities in the form of bathing and washing toilets (MCK), has contributed to the decline in water quality in the area. Martapura Sub-watershed [3].

Data from the Directorate of Water Pollution Control also shows that the largest contribution of waste, ranging from 58.31 percent to 94.16 percent, comes from domestic waste [4]. The large contribution of domestic waste is a result of poor sanitation patterns, culture and community behavior, especially riverside communities in Banjarmasin City [5]. The addition of domestic waste/waste due to residential activities continuously resulted in the river being no longer able to perform natural

recovery. Indirectly, these settlements can cause contamination of pathogenic bacteria such as Escherichia Coli (E.Coli). These bacteria can be found in human feces.

Several microbes can be used as an indicator parameter of environmental pollution, one of which is coliform bacteria that grow and develop in waters. Microbiological parameters are used as initial bioindicators of water pollutants originating from domestic waste, the presence of coliform bacteria in river water bodies is interesting for research because community activities along the upstream banks of the Martapura River in Banjar Regency have their own uniqueness. Most of the people of Banjar Regency are still accustomed to open defecation (BABS), especially to rivers. It can be seen from the many floating latrines on the river bank. Where 1 floating latrine can be used 1-10 households [6].
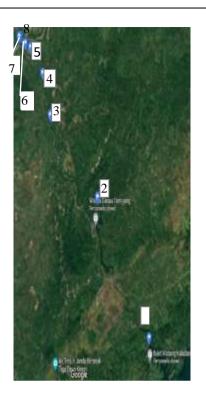
The decline in biological quality in river waters will result in human health problems, especially those caused by E. coli such as diarrhea, urinary tract infections, respiratory diseases, pneumonia, and other diseases. According to Ingerson and Reid (2011), infection can spread in the body , eventually leading to the blood, liver, and nervous system [7], so it is necessary to examine the content of E.coli bacteria in river water in Banjar Regency. The purpose of this paper is to analyze the quality of rivers in Banjar Regency in terms of E.coli bacteria parameters for sanitation hygiene purposes.

2. Materials And Methods

The research method used in this research is a field survey method. The sampling technique used in this research is purposive sampling technique. Water sampling was carried out at eight measurement points in the upstream flow of the river in Banjar Regency (see table 1) , South Kalimantan with a river flow length of 29.53 kilometers. The determination of this sampling point is based on the potential of pollutant sources from upstream to downstream.

The criteria for sampling areas are densely populated areas and fishing activities. The sampling process was carried out in the morning from 08.00 WITA and in the afternoon at 14.00 WITA. This can identify an increase in the use of clean water for domestic activities which will later become waste water and enter the river and affect the quality of river water. Sample examination was carried out at BBTKL Banjarbaru. The analytical technique used is to compare the results of laboratory tests with the Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements for Sanitary Hygiene, Swimming Pools, Solus Per Aqua, and Public Baths

Table 1 River Water Sampling Locations in Banjar Regency

Sample location point	Distance between sample points(km)	Location Description
1	±0	The location of the upstream of the river in Banjar Regency (Riam Kanan Reservoir)
2	± 11.55	The start of pollution by waste both from point source and non-point source in the river in Karang Intan Village
3	±10.98	The river in Jingah Habang Village
4	± 2.55	The river in the Arpat . River Village
5	±2.43	Riamkiwa River
6	±0.60	The river in Pingaran Ulu Village
7	±0.63	River in Astambul Village (tributary)
8	±3.84	Martapura River

3. River Water Microbiological Quality

River water quality in Banjar Regency based on the total coli parameter can be seen in Table 2.

Table 2 . Parameter Measurement Results of Total coli Bacteria in River Water in Banjar Regency.

Location Point	Measurement results (CFU/100ML)	Threshold Value (ministry of health regulations)	Pollutant Potential
1	5050		Settlement
2	35000		Settlements and fisheries
3	49200		Settlements and fisheries
4	7831.67		Settlements and fisheries
5	19983,335	50 CFU/100 mL	Settlements and fisheries
6	17966.67		Settlements and fisheries
7	14483.335		Settlements and fisheries
8	52833,335		Settlements, markets and Fishery

The total coliform value at the study site did not meet the class I quality standard, which required a total coliform value of 50 CFU/100 mL so it was not feasible as a source of drinking water. Utilization of water that does not meet the requirements for sanitation hygiene will cause water borne disease, namely

disease caused by ingestion of water contaminated with human and animal feces or urine containing the pathogen [8]. Transmission of this pathogen occurs when using contaminated water for drinking, food preparation, and washing clothes [9]. The disease is most susceptible to occur in people who use water without going through a treatment process first. Ground water and surface water are most at risk of being contaminated with pathogenic bacteria that can cause Acute Gastrointestinal Illness [10].

Coliform bacteria can be used as an indicator because their density is directly proportional to the level of water pollution. The very high value of total coliform in this research location is thought to occur because the waste from households is directly dumped into the river. Observation results show that the presence of latrines on the river in Banjar Regency with conditions that do not meet the requirements for healthy latrines is also a factor causing the high content. Densely populated settlements where household waste disposal distances from water sources tend to be close together cause coliform bacteria contamination [11].

Other activities in the research location besides the presence of settlements, traditional markets and fishing activities (fish cages) can cause the total coliform concentration in river water to increase [12], [13]. The type of water for sanitation hygiene purposes is water used for daily needs and for maintaining personal hygiene such as bathing, brushing teeth, as well as for food, eating utensils and clothing whose quality is different from that of drinking water. [14].

Table 3 Correlation Test Analysis of Total Coliform with DO River Water in Banjar Regency

		Total coliform	DO
Total coliform	Pearson Correlation	1	-0.878**
	Sig. (2-tailed)		0.0041
DO	Pearson Correlation	-0.878**	1
	Sig. (2-tailed)	0.004	

**. Correlation is significant at the 0.01 level (2-tailed).

Based on Table 3 , the correlation of total coliform with DO river water is negative, -.0.878 (significance 0.004), meaning that there is a negative correlation if the total coliform parameter value has increased, then the DO parameter value of river water has decreased.

Water quality is important in life for both aquatic organisms and humans and aquatic communities such as bacteria, aquatic plants, fish, zooplankton and so on. Water quality is determined by factors such as dissolved substances, suspended substances and living things, so it can be said that water quality is the level of pollution in terms of physics, chemistry, and biology as a result of human activities [15]. The amount of waste shows the specifications of the waste seen from the amount of pollutant content in the waste. Environmental parameters are able to show how much pollution there is, if the number of parameters is low and has a low concentration, this indicates a small opportunity for environmental pollution [16].

Coliform is a group of bacteria that can be used as an indicator of dirt pollution and unfavorable salinity of the waters. Coliform bacteria, a group of bacteria originating in human and animal feces that are present in large quantities, make these bacteria often used as indicators of food and water quality. Bacteria belonging to the coliform group are toxic which can cause disturbances in the digestive system [17]. The high presence of coliform bacteria in a water

indicates the worse the quality of the water

4. Conclusions

The total colifom content at eight observation points in rivers in Banjar Regency, South Kalimantan ranged from 5050 to 52833,335 CFU/100mL. This means that the total coliform value at the study site does not meet the class I quality standard, which requires a total coliform value of 50 CFU/100 mL so it is not suitable for use for sanitation hygiene purposes. There is a negative correlation if the total coliform parameter value has increased, the DO parameter value for river water has decreased. Steps to minimize bacterial contaminants into rivers need to be taken so that the use of river water in Banjar Regency does not endanger the health of the local community.
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5. Acknowledgement

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