The Impact of Sumberporong Village Community's Sanitation Behavior on Welang River Water Quality

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***Abstract*—Human activities have caused environmental problems in the Welang River. These activities are pollution related to the disposal of household waste and the use of toilets. Environmental diseases such as ARI, TB, dengue fever, malaria, worms and skin diseases are caused by this circumstance. In order to understand how sanitation efforts affect water quality and to prevent the development of more complicated problems, it is crucial to examine the existing quality level of the river water in Welang. Both quantitative and qualitative approaches were used in this research, with descriptive methods. This study compares the findings with PP No. 22 of 2021 in an effort to determine how sanitation operations have affected the water quality of the Welang River. Analyses conducted in accordance with PP. No. 22 of 2021 have shown that the water quality of the Welang River remains adequate. However, despite the lack of sanitation initiatives, this pollution has taken place.**

Keywords—River Water; Welang River; Water Quality; River Water Quality Standard; PP No. 22 of 2021

I. INTRODUCTION

Rivers are a type of open water habitat that is highly susceptible to pollution. This pollution usually comes from ecosystem elements and human activities in the river area [1].In general, several activities that produce waste are responsible for water quality degradation in Indonesia [2].Waste can also have a negative impact on society and the appearance of the environment. This pollution is considered a form of environmental degradation that affects society [3].

The Welang River is now facing environmental problems caused by human activities. These activities are pollution activities in the form of household waste disposal and toilets. This happens because the Welang River is close to densely populated

[1] Desi Nursaini and Arman Harahap, "River Water Quality," *BIOEDUSAINS: Journal of Biology and Science Education*, 5.1 (2022), 312–21 <https://doi.org/10.31539/bioedusains.v5i1.3519>.
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settlements or housing estates [4].The population density in Sumberporong Village in 2023 is 2853.77 km2 with a total population of 8,333 people [5].

Although studies have been conducted on the water quality of the Welang River in Sumberporong Village, they are still limited to measuring chemical water quality in the form of pH and DO, and biological water quality in the form of plankton or phytoplankton. However, previous studies have not discussed community sanitation activities. In this study, researchers will retain the previously studied component, pH as a chemical indicator. Researchers will also add several other components to be studied, such as temperature and TDS as physical indicators, phosphate as a chemical indicator, and e-coli bacteria as a biological indicator. For this study, researchers added community sanitation activities as one of the components to be studied in more detail. This research seeks to explain the influence of community sanitation activities on the phenomenon of environmental degradation, especially water quality degradation.

I. METHODS

This research uses a descriptive approach by using a combination of statistical and qualitative analysis. The purpose of descriptive research is to accurately portray the subject or object of research as it is in reality [6].Quantitative research seeks to obtain and compare data using numerical values and measures. This research focuses on describing, clarifying, and testing relationships between variables through statistical analysis, while qualitative research seeks to fully understand social phenomena by interpreting the context, experiences, and perspectives of its members [7].The research took place in the area of Sumberporong Village, Lawang District, Malang Regency, which administratively, this research is located in RT 01, RW 16, Krajan Timur, Sumberporong Village, Lawang District, Malang Regency, East Java. Meanwhile, the location of Welang River water sampling is located at the coordinates 7°49'4.33"LS and 112°43'58.19"BT. The variables studied include sanitation behavior and river water condition.

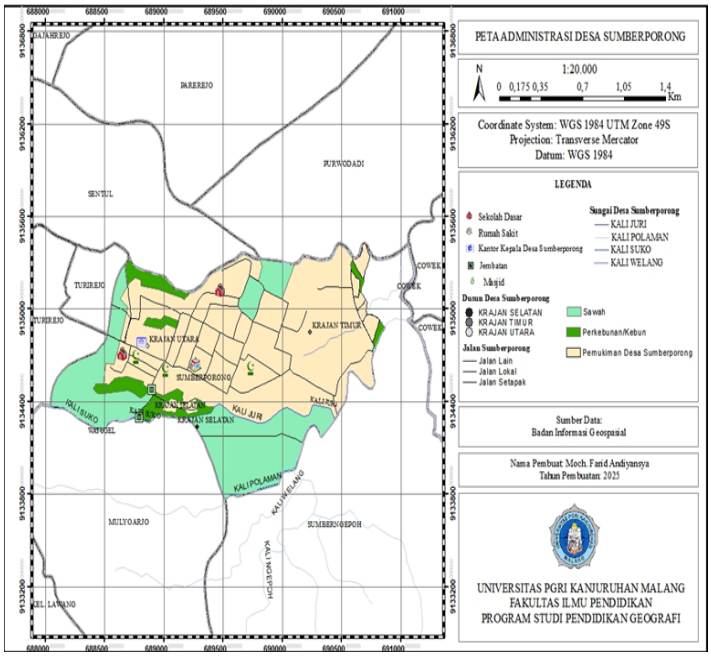

Fig. 1 Administration Map of Sumberporong Village

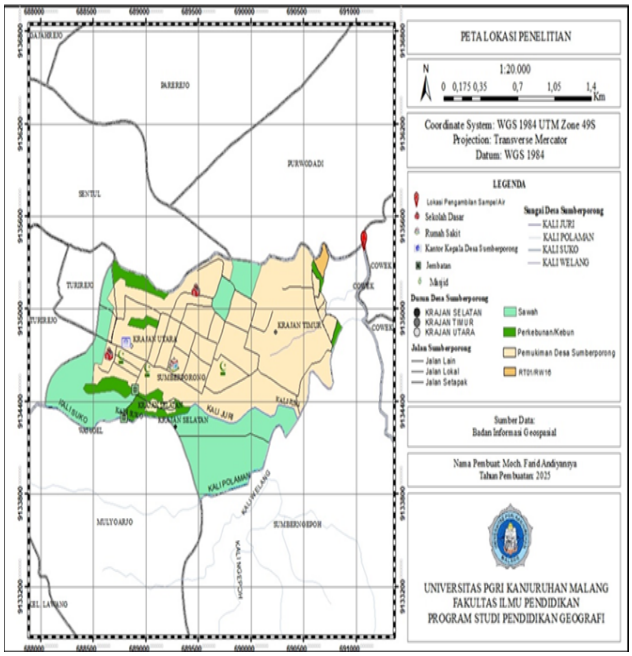

Fig. 2 Research Location Map

II.

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III. RESULTS AND DISCUSSION

A. Validity Test

The purpose of the validity assessment was to verify the validity of the research instruments. The results of the validity assessment in this study are reviewed in the following table:

TABLE 1. VALIDITY TEST RESULTS

Question Items	Rcount	Rtable	Description
1	0,302	0,3246	Invalid
2	0,868	0,3246	Valid
3	0,778	0,3246	Valid
4	0,216	0,3246	Invalid
5	0,595	0,3246	Valid
6	0,791	0,3246	Valid
7	0,868	0,3246	Valid
8	0,832	0,3246	Valid
9	0,766	0,3246	Valid
10	0,646	0,3246	Valid

The questionnaire contains 10 questions and was completed by 35 respondents. With 35 respondents, the rtable value is 0.3246. The table shows that two questionnaire items are invalid because the rcount value is less than the rtable value. Two items have been eliminated, leaving 8 valid items.

B. Reliability Test

Reliability tests were conducted on the questions identified in the previous validity assessment. The following findings relate to the reliability assessment of the research instrument:

TABLE 2. RELIABILITY TEST RESULTS

Reliability Statistics

Cronbach's Alpha	*N of Items*
,904	8

Based on the table above, the testing process is carried out on the items that have been declared valid. The question items that have been declared valid are 8 items, and of these 8 items, the Cronbach's Alpha value is 0.904. The results show that all 8 tested questions can be considered credible. The reason is that the alpha reliability is above 0.6.

C. Normality Test

TABLE 3. NORMALITY TEST RESULTS

Tests of Normality

	Kolmogorov-Smirnov[a]			***Shapiro-Wilk***		
	Statistic	***Df***	***Say.***	***Statistic***	***df***	***Say.***
Sanitation Activities	,391	5	,012	,796	5	,075
Welang River Water Quality	,361	5	,032	,674	5	,005

a. *Lilliefors Significance Correction*

The results of the normality test using the Shapiro-Wilk technique show that the significance value of the sanitation activity variable is 0.75. The sanitation activity data follow a normal distribution because the significance value is greater than 0.05. The significance value of the water quality data is 0.005. Therefore, the water quality data cannot be determined to be normally distributed because the signification value is less than 0.05.

D. Heteroscedasticity Test

Heteroscedasticity is a scenario characterized by the use of unequal residual variances in the regression model, with the test requirement that if the significance value exceeds 0.05, then heteroscedasticity does not exist [8].The results of the heteroscedasticity test aim to investigate the existence of unequal residual variances for certain observations [9].The results of the heteroscedasticity evaluation are shown in the table below:

TABLE 4. HETEROSKEDASTICITY TEST RESULTS

Coefficients[a]

	Unstandardized Coefficients		***Standardized Coefficients***		
Model	***B***	***Std. Error***	***Beta***	***T***	***Say.***
(Constant)	-820,439	1860,311		-,441	,689
Sanitation Activities	32,386	53,955	,327	,600	,591

a. *Dependent Variable*: ABS_RES

The heteroskedasticity test data in Table 4. above provides evidence that the sanitation activity variable is 0.591. This indicates that there are no symptoms of heteroscedasticity in the data. Therefore, it can be said that the sanitation activity data shows homoscedasticity because the significance value is greater than 0.05.

E. Simple Linear Regression Test

Simple linear regression tests how much the independent variable influences the structured variable [10]. In this study, the independent variable is sanitation behavior and the dependent variable is water quality. The simple linear regression equation is shown in the following formula [11]:

$Y = a + bX$ (1)

[8] Anur Achsanuddin and others, "Factors Affecting Tempe Production in Burau District, East Luwu Regency," *Competent: Scientific Journal of Economics and Business*, 2.2 (2023), 568–77 <https://doi.org/10.57141/kompeten.v2i2.76>.

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TABLE 5. SIMPLE LINEAR REGRESSION TEST RESULTS

Coefficients[a]

Model		*Unstandardized Coefficients*		*Standardized Coefficients*		
		B	***Std. Error***	***Beta***	***T***	***Say.***
1	(Constant)	-1076,953	3186,981		-,338	,758
	Sanitation Activities	38,368	92,433	,233	,415	,706

a. Dependent Variable: Welang River Water Quality

Based on the values listed in table 5. above, it is found that the constant value is -1076.953. The value of the independent variable is 38.368. So that these results can be written based on the following equation.

$Y = a + bX$ (1)

$Y = -1076,953 + 38,368X$ (2)

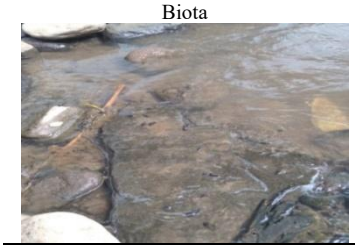
Thus, from the results of the above equation, it can be interpreted that if there is no sanitation activity or the value of the independent variable is 0, the water quality of the Welang River will have a value of -1076.953. However, if there is (1) unit of sanitation activity, there will be an increase in the content of physical, chemical and biological parameters in the Welang River by 38.368. The significance value is 0.706. This result exceeds 0.05, which indicates that the independent variable (sanitation efforts) does not significantly affect the dependent variable (water quality of Welang River). The calculated t-value (0.415) is less than the t-table value (1.699). This indicates that sanitation activities have no effect on the water quality of Welang River. Consequently, this shows that sanitation practices do not have a strong impact on the water quality of the Welang River.

F. Observation

The observation results are shown in Table. 6 below:

TABLE 6. OBSERVATION RESULTS

River Conditions	**Description**
Rubbish 	There is a lot of garbage on the banks of the Welang River. This garbage is in the form of household waste such as: detergent plastic, food plastic, plastic bottles, etc.
Precipitate 	The sediment in the Welang River is mainly sand and a little mud. In addition, there is also household garbage that is also deposited on the bottom of the Welang River.
Vegetation 	Along the Welang River, there is a lot of grass growing on the river bank. There are also other plants like bamboo and banana.

Biota		There are several types of biota that live on the banks of the Welang River, including: small fish, water snails, and also orchids.
Built Up Land		At the location of the river water sampling point, there is no built-up land. There is only non-built land in the form of rice fields. The developed land in the form of settlements is about 800m away from the rice fields where the water samples are taken.
Infrastructure		The existing infrastructure in the Welang River, especially for access to the river, is only in the form of land. This is quite reasonable since the area is in the form of rice fields.

The main concern about the condition of the Welang River is the amount of garbage along the river and under the water surface. Based on an interview with the head of RT 01, RW 16, it was found that the garbage in the Welang River was sent by the villagers and not caused by poor sanitation behavior of the local residents. The following is the statement of the interviewee:

"The garbage in the Welang River is sent garbage, probably from the next village. The residents here never throw garbage into the river because there are already officials (Mr. AY, 4 March 2025)".

In addition, the sanitation behavior of the residents of RT 01, RW 16 also tends to be good, as they routinely perform community service once a month. As one resident explained:

"In this area, it has become a habit for residents to do community service once a month (Mrs. DI, March 4, 2025)."

FIG. 3 Photos with K9 Block Mothers Post-interview

G. Water Quality Analysis of Welang River

The research focused on the physical, chemical and biological aspects of the Welang River water. Physical characteristics include Total Dissolved Solids (TDS) and temperature symptoms. Chemical parameters were examined in terms of pH balance and phosphate levels, while the biology was based on the E. coli bacteria in the water. The results of the assessment are shown in the table below:

TABLE 7. RESULTS OF WELANG RIVER WATER QUALITY ANALYSIS

No	Parameter	Indicator	Quality Standards	Results
1	Physics	Temperature	Deviation 3	28,8
		TDS	1000	177
2	Chemistry	pH	6-9	7,82
		Phosphate	1,0	0,89
3	Biology	E-Colli bacteria	2000	1000

1. Temperature

Temperature significantly affects the chemical and biological activities of organisms in aquatic ecosystems. Temperature plays a crucial role in regulating the condition of aquatic ecosystems [12].Increased temperature can lead to decreased solubility of gases in water, increased viscosity, smoother chemical processes, and increased evaporation [13].The results listed in Table 7. show that the water temperature parameter of the Welang River is 28.8^{the}C. When referring to the provisions of class 3 river water quality standards according to PP No. 22 of 2021, namely deviation 3, so that if the normal water temperature is 28^{the}C, the normal water temperature is limited to between 25^{the}C-31^{the}C. From these results, it was concluded that the water temperature of the Welang River was still at a normal temperature. However, the water temperature of the Welang River tends to be high.

This is due to the lack of a canopy covering the water body of the Welang River. This condition can be known based on observations that the Welang River is surrounded by rice fields, which in fact do not have vegetation with large canopies to block sunlight. This is like the opinion of [14] in her research, which states that "the causes of this increase in water temperature include the intensity of sunlight, the canopy of vegetation around the water bodies, and the heat exchange between the water and the surrounding air".

2. Total Dissolved Solid (TDS)

Based on the research results, the TDS (Total Dissolved Solid) content in the Welang River is 177 mg/L. These results are still far from the normal limits set by the class III river water quality standards in PP No. 22 of 2021, namely 1000 mg/L. So looking at these results, it can be stated that the Welang River water is still within normal limits. The possibility of this dissolved solids content comes from soil runoff and rock weathering. This is relevant to the results of research from [15]which said that "the TDS content found in the Aek Pala River is likely caused by rock weathering, soil runoff, and the influence of industrial and domestic waste".

3. pH

The acidity parameter measures the level of H^+ ions present in the water component, describing the balance between acids and bases. [16].The Welang River water test results showed a pH of 7.82. These results are confirmed in Table 7 above. In line with this finding, when juxtaposed with the guidelines for water quality levels based on Class III as stipulated in Government Regulation No. 22 of 2021, which stipulates a normal pH range of 6 to 9, it can be concluded that the condition of the Welang River water is still within the appropriate parameters. Variations in pH levels in the water are influenced by natural and inorganic waste components present in the river [17].

4. Phosphate

Phosphate is a type of chemical pollutant that generally comes from soap or detergent waste [18]. Phosphate comes from fertilizers that run off into the river through drainage and rain. [19].The results of the assessment of phosphate content in the Welang River show that the phosphate concentration in the Welang River is 0.89 mg/L, as shown in Table 7. Compared with the

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water quality regulations based on PP No. 22 of 2021, the phosphate concentration remains within the safe range below 1.0 mg/L. So, the phosphate concentration in the Welang River is still within the acceptable parameters.

However, the Welang River area is also surrounded by rice fields, so there is a possibility that the phosphate content in the Welang River water body also comes from fertilizers through runoff or during rainfall. This condition is consistent with research conducted in the Kaligarang River in Semarang that the value of phosphate is related to the location of the river adjacent to residential areas, so it is contaminated by detergents and household waste [20].

5. E-Colli

Escherichia coli (E. coli) bacteria are an indicator of pollution because they are found in almost all aquatic ecosystems and are commonly found in human or warm-blooded animal feces and in water contaminated by organic waste [21].The content of E. Coli bacteria in the Welang River reached a value of 1000 MPN/100 mL. If this value is compared with the river water quality standards in PP No. 22 of 2021, which is 2000 MPN/100 mL. So it can be seen that the water quality of the Welang River is still within the normal limits of the E. Coli bacteria content. Although classified as still within normal limits, the presence of E. Coli bacteria in the Welang River water body is not without cause. This may be due to human feces in the river, or feces from warm-blooded animals such as cows, and so on.

This is based on the observations listed in table 7. that the Welang river is surrounded by rice fields. So there is fecal runoff from animals such as cows when used to plow rice fields. In addition, due to the distance between settlements and rice fields, it is likely that farmers will use the relatively close river facilities to dispose of feces when they are in the rice fields. There is relevance between this study and the research conducted in Karang Mumus River which is used for hygiene and sanitation activities such as toilets. This is because about 60.8% of houses do not have septic tanks. In addition, the presence of livestock and agricultural businesses is a supporting factor for increasing E. Coli bacteria levels in the Karang Mumus River [22].

IV. CONCLUSION

Referring to the studies that have been completed, the conclusion is that the sanitation activities of RT 01, RW 16 residents are not significant enough to influence the water quality of the Welang River. This is because the results of the analysis show that pollution has occurred even though it is not influenced by community sanitation activities. Apart from that, if you look at the results of the water quality test, you can see that the water quality has not exceeded the limits set by the government through the PP. No. 22 of 2021. So based on the hypothesis that was created previously, it shows that Ho (null hypothesis) is accepted and Ha (alternative hypothesis) is rejected.

V. SUGGESTION

1. The Sumberporong Village Management, based on the results of this research, is advised to provide policies and facilitate the further management of household waste, especially liquid waste before it is thrown into the ditch and reaches the river.
2. To the developer of Malang Anggun Sejahtera Housing, based on the research that has been carried out, it is recommended that future housing developments include an advanced management system for household waste, especially liquid waste before it is disposed of into the gutter.
3. Future researchers are advised to research the specific causes of the content of pollutants in the Welang River water body, which may be caused by industrial activities.

VI. THANK-YOU NOTE

The researcher would like to thank the parties who have contributed to this research activity. Cooperation and support from various parties, starting from parents, Mr. Achmad Maulana Malik Jamil, S.Si M.Eng. as supervisor 1 and Mrs. Dr. Onik Farida Ni'matullah, S.Pd., S.Pt., M.Pd. as supervisor 2, Sumberporong Village Administrator, and community figures so that this research can be carried out and run smoothly. The researcher also does not forget to express his thanks to the reviewers and editors who have helped improve the quality of this manuscript. It is hoped that this research will bring real benefits and impacts to readers, especially regarding preventing degradation of river water quality.

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