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Correlation between People's Behavior and the Water that Wells Up in the Kaliyasa River, Cilacap

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ABSTRACT. As time goes by and the world's population is increasing, the world's water supply will decrease and become a serious problem if there is no sustainable management. The case of decreasing water quality occurred in the Kaliyasa River, Cilacap Regency which was caused by a lack of public awareness of the environment and there were industries that also dumped their remaining production into the river without being processed or neutralized again. This study aims to assess the quality of dug well water using several parameters, examine the behavior of the surrounding community, and assess the relationship between community behavior and the quality of dug well water. This study used a survey method. The sampling of well water is determined by stratified sampling. The results of the study of the relationship between dug well water quality and community behavior using the Spearman rank correlation obtained a probability or significance value of 0.000 smaller than α 0.05 (0.000 <α 0.05), which means that there is a significant relationship between community behavior in use or utilization Kaliyasa River with dug well water quality.

Keywords: water quality, survey method, community behavior, stratified sampling, Kaliyasa River

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1. Introduction

Earth consists of 71% water (Trisnaini et al., 2018). Most of the earth's surface is covered by water. The composition of water on earth is composed of 97% seawater and 3% fresh water. Water is the most important element for human life (Asghari et al., 2018). Not only humans but flora and fauna also need water to survive (Kamala, 2015). The increasing population and rapid urbanization have made water resources the most important thing in life (Xu et al., 2019). The quality of aquatic resources is of particular concern over time, because urbanization and population increases greatly affect water quality. Water quality is an indicator that water resources can be used or not in order to meet the needs of living things. Water quality can be seen from measurements of several water parameters such as chemical, physical, and microbiological parameters (Sahabuddin et al., 2014).

The main problem with water resources is the quantity of water that cannot meet the needs of life and the quality that decreases with the times. CurrentRapid urbanization, advances in industry, extreme weather phenomena, and the behavior of humans themselves are the causes of reduced water resources and decreased quality (Nguyen et al, 2019). Water pollution is the entry or introduction of substances, energy, or other components into water which causes water quality to decline. Water pollution can occur either intentionally or accidentally (Herlambang, 2006). Water pollution is mostly caused by sewage. The waste itself is divided into two based on its source, namely domestic and industrial waste. Domestic waste is waste that comes from household waste and public places, while industrial waste is waste generated from the rest of the production process. The waste has several characteristics, namely strong odor, cloudy color, and when exposed to the skin it will feel itchy. There are various impacts that can result from the impact if the water is polluted, namely the emergence of various diseases (dysentery, typhoid, cholera, etc.), disruption of the balance of the ecosystem, and lack of clean water sources.

River become an important element for living things both for humans and the flora and fauna in it (Siahaan et al., 2011). Kaliyasa River in Cilacap Regency is a river that is often used by local residents to fulfill their daily needs. However, the quality of the Kaliyasa River has decreased due to the disposal of household waste and industrial waste. There is a tuna canning industry that discharges its waste products into the Kaliyasa River. In addition, the behavior of the people around the Kaliyasa River is also the cause of the decline in river water quality because the surrounding community discharges their household waste into the river flow. The condition of the water in the Kaliyasa River, which is polluted, is alleged to be the cause of the decline in the water quality of the residents' wells around the Kaliyasa River because the pollution that occurs in the Kaliyasa River is thought to have seeped into the dug wells belonging to the residents. Therefore, a study was carried out aimed at assessing the quality of dug well water around the Kaliyasa River, assessing the behavior of the community using dug well water around the Kaliyasa River, and analyzing the relationship between community behavior and the quality of dug well water around the Kaliyasa River.

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2. Materials and Methods

Collecting data using a survey method with stratified sampling, the strata are divided into 6 levels of distance between the gai well and the river, namely 90m, 100m, 120m, 150m, 180m, and 210m. In each stratum, 3 samples are taken in one well and 1 sample of water in the river body. Measuring the quality of well water uses quality standards for clean water quality RI Permenkes No.416 / Menkes / Per / IX / 1990. The main parameters used to limit the quality of Kaliyasa river water are odor, TDS, color, iron, chloride, manganese, pH, and total coliform. Meanwhile, the quality of dug well water was analyzed by analysis of variance. Variant analysis model is used to analyze the effect of free change on dependent change. (Neter, 1996)

Measurement of people's knowledge and behavior is measured using a questionnaire to respondents. Data collection using questionnaires and direct interviews with respondents in the form of a Likert scale. Respondents were obtained as many as 100 people in Tegal Kamulyan Village, Cilacap Selatan District. Which is obtained using equation 1 as follows, (Notoatmodjo, 2002)

$$N = \frac{N}{1 + N\ d2} \qquad (1)$$

Information:
n = Number of respondents
N = number of household population
D = the desired level of precision is 10%

The total population in the village of Tegal is 2,849 people. S0, based on equation 1 the calculating becomes.

$$N = \frac{2{,}849}{1 + 2{,}849\ (0.1)^{2}} = 96.6 \approx 100$$

Testing the relationship between community behavior and dug well water quality was carried out in the Tirta Wijaya Laboratory of PDAM Cilacap Regency. The schematic of the sampling location is in Figure 1.

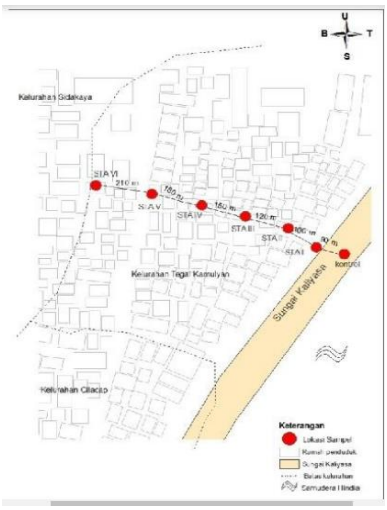

Fig. 1 Schematic of sampling location

3. Results and Discussion

3.1. Kaliyasa River Water Quality and Dug Well Water Quality

Based on the research that has been done,It can be concluded that Kaliyasa River water does not meet quality standards. The measurement parameters refer to the Clean Water Quality Standard Permenkes RI No.416 / Menkes / Per / IX / 1990 which from the research shows most of the parameters exceed the quality standard. This happened due to community activities that affected the decline in the quality of Kaliyasa River water. These parameters can be seen in table 1 and 2.

Table 1.
River water quality

Parameter	Unit	Quality Standards	Sampling			Avarage
			I	II	III	
Fisika						
Small	Not small	-	-	-	-	-
Amound TDS	mg/l	1500	28.850,00*	30.100,00*	34.500,00*	31.150,00*
Warna	Sakla TCU	50	217,00*	352,00*	367,00*	312,00*
Kimia						
Fe	mg/l	1	2,54*	2,06*	2,33*	2,31*
Cl	mg/l	600	15.400,58*	16.200,25*	19.664,83*	17.088,55*
Mn	mg/l	0,5	0,93*	0,90*	1,20*	1,01*
pH	-	6,5-9,0	7,65	7,57	7,72	7,65
Mikrobiologi						
Total Caliform	Amound / 100ml	<50 (non piping)	85,00	64,00	36,00	61,67

Information = * : above the quality of the minister of health regulation RI No. 416/Menkes/Per/XI/1990
Source : Sasongko et al, 2014

Table 2.
Water quality dug wells

Parameter	Quality Standards	Sampling					
		STA 1	STA 2	STA 3	STA 4	STA 5	STA 6
Smell	-	-	-	-	-	-	-
TDS (mg/l)	1500	608,67	511,33	194,55	479,33	655,00	459,00
Color(TCU)	50	104,33*	123,67*	12,00	28,00	88,00*	99,33*
Fe (mg/l)	1	1,04*	0,97	0,66	0,57	0,48	0,20
Mn(mg/l)	600	763,32*	765,20*	661,12*	610,87*	253,94	158,46
pH(mg/l)	6,5-9,0	7,62	7,63	7,73	7,69	7,58	7,72
Total Coliform (/100ml)	<50	66,33*	1.533,00*	237,67*	42,33	94,33*	25,33

Information = * : above the quality of the minister of health regulation RI No. 416/Menkes/Per/XI/1990
STA 1 = Stasiun 1 = well away 90 m form kaliyasa river
STA 2 = Stasiun 2 = well away 100 m form kaliyasa river
STA 3 = Stasiun 3 = well away 120 m form kaliyasa river
STA 4 = Stasiun 4 = well away 150 m form kaliyasa river
STA 5 = Stasiun 5 = well away 180 m form kaliyasa river
STA 6 = Stasiun 6 = well away 210 m form kaliyasa river
Source : Sasongko et al, 2014

3.2. Parameters that affect

i) Physical parameters

Based on the physical parameters of water referring to the water quality standards of Permenkes RI No.416 / Menkes / Per / IX / 1990, it can be seen that the smell of both the Kaliyasa River water and the dug well water shows no odor. In the Kaliyasa River water quality, it can be seen that the TDS far exceeds the quality standard, while in dug well water, it is still safe below the quality standard. TDS or total dissolve solid, which is the amount of dissolved solids (Hersya, MH et al, 2017). In terms of color parameters, overall the Kaliyasa River water far exceeds the quality standard threshold. Meanwhile, in dug wells, most of the stations exceed the water color quality standard, only two points are still below the quality standard, namely stations 3 and 4.

ii) Chemical parameters

The chemical parameters in this research were iron, manganese, chloride, and pH. The iron content in Kaliyasa River water exceeds the quality standard, while in dug well water, only station 1 has slightly exceeded the quality standard. Ingestion of iron exposure can cause clinical symptoms as well as digestive complaints such as fatigue, nausea, vomiting, abdominal pain to diarrhea (Putri, TA and R. Yudhastuti, 2013). In terms of manganese parameters, Kaliyasa River water exceeds the quality standards that have been set. In dug well water, station 1 and station 5 exceed the manganese quality standard, namely 0.6 and 0.72. In terms of chloride parameters, Kaliyasa river water far exceeds the water quality standard. Meanwhile, most of the dug well water exceeds the quality standard. While the pH parameters both in Kaliyasa River water and dug wells,

iii) Biological parameters

Biological parameters used in this research are coliform bacteria. The content of coliform bacteria in the Kaliyasa River water exceeds the quality standard which is the result of people throwing their feces directly into the river directly. In the dug well water, most of the stations exceed the quality standard which is the most high, namely at station 2 which reaches 1533. This is far from the quality standard which is only 50 jumlh / 100 ml. According to (Pratiwi, RH, 2017), coliform bacteria themselves can cause digestive disorders in the human body (Gastroenteritis).

3.3. Community behavior

Table 3.

Aspects of public knowledge

Knowledge	F	%
Know very well	4	4
Know	16	16
Know anough	18	18
Don't know	35	35
Really don't know	27	27
total	100	100

Source : Sasongko et al, 2014

Table 3 is a table of aspects of public knowledge regarding water pollution in rivers and its impacts. It turns out that most respondents (35%) don't know, 27% really don't know, 18% know enough, 16% know, and only 4% know very well about river water pollution by direct disposal of sewage and causing contamination of water from dug wells in the vicinity . Public knowledge about water pollution in rivers and its impact on dug wells is still lacking. Perceptions and behavior in disposing of garbage in the river are related to the environmental literacy of the community (Isthofiyani et al, 2016). Many people still carry out activities to dispose of household waste and other waste into the Kaliyasa River. The behavior of residents who do not maintain the quality of river water and dug well water and their environment, is a behavior that has become a habit that is difficult to change. According to (Surtikanti et al, 2017) Education can increase knowledge on how to build community attitudes, especially caring for the surrounding environment.

3.4. The Relationship Between Dug Well Water Quality and Community Behavior

Table 4.

Community behavior

Behavior	F	%
Best	0	0
Good	19	19
Good anough	21	21
Bad	44	44
Worst	16	16
Total	100	100

Source : Sasongko et al, 2014

Environmental conditions can change people's behavior and on the other hand, people's behavior can shape their environmental conditions (Suryadi et al, 2016). The relationship between community behavior and dug well water quality is analyzed with the Spearman Correlation. The calculation results show that the probability value or the Spearman significance value is 0.000 smaller than α 0.05 (0.000 <α 0.05), which means that community behavior is significantly related to water quality. dug well. This means that the behavior of the people in Tegal Kamulyan Village who dispose of their waste into the Kaliyasa River results in a decrease in the quality of dug well water used by the community itself.

6. Conclusion

From the results of this study it can be concluded that the results of measuring the quality of dug well water around the Kaliyasa River did not meet the quality standards stipulated by

the Minister of Health RI No.416 / Menkes / Per / IX / 1990. The results of the study on the behavior of the people of Tegal Kamulyan Village from the aspect of knowledge are not knowing, the attitude aspect is disagreeing, and the action aspect is not good. In general, people's behavior is not good. The results of the study of the relationship between dug well water quality and community behavior using the Spearman rank correlation obtained a probability or significance value of 0.000 smaller than α 0.05 (0.000 <α 0.05), which means that there is a significant relationship between community behavior in use or utilization Kaliyasa River with dug well water quality.

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