Analysis of Groundwater Biological Parameters in Ponjong District, Gunung Kidul Regency, Special Region of Yogyakarta

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Abstract

Abstract with no more than 250 words should be supplied to reflect the content of the paper in two languages (Indonesian and English). The first abstract to be written is the Indonesian version (title: Abstract, style: Subtitle), italic. A concise and factual abstract is required. The abstract should state briefly the context of the problem (background), purpose/aim of the research, the principal methods, the results and major conclusion (contribution). An abstract is often presented separately from the article, so it must be able to stand-alone. For this reason, References/citation should be avoided. Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself. Abstract protrudes into the left and right within each 1 cm, size 10 pt.

This study shows that the condition of the well water tested based on physical, chemical and biological parameters to determine the feasibility of the water used by the surrounding community still meets the required quality standard thresholds. Although somewhat polluted because of the mining. Underground water in the karst area of Gunungkidul Regency is safe as raw water for drinking by residents and meets the standards set by the Indonesian Ministry of Health and Government Regulation Number 82 of 2001 concerning Water Quality Management and Water Pollution Control. If used as drinking water, it still has to go through water treatment or be heated to a certain boiling point, because it contains bacteria that may be harmful to humans.

Keywords: *Environtment; Groundwater; Karst*

1. Introduction

The Gunungkidul Regency area is geologically composed of limestone, where in this type of area there are very contrasting hydrological differences between the surface and below the surface, especially during the dry season between April and November. The difference is that the presence of water on the surface is very limited, but the presence of water below the surface is abundant. The thing that drives the use of ground water is increasing compared to surface water. Ground water has better quality, the influence of pollution is relatively small, has a relatively wide distribution and is easy to obtain in a simple way (Sudarmadji, 1988). Qualitatively, karst groundwater has generally good quality. Communities in the study area use most of the karst groundwater sources as a source of drinking water. The quality of karst groundwater contains high concentrations of 2 elements Ca (calcium), Mg (magnesium), and high hardness. This is consistent with the mineral composition of carbonate rocks which are dominated by Ca and Mg. Therefore, if this water source is used as drinking water, it is best to settle it first so that the concentration of these two elements can be reduced. The effect of using water that contains high Ca and Mg can lead to disruption of kidney function. However, some human activities also affect the quality of water sources, such as limestone mining activities. Limestone mining activities, both large and small scale, are still the biggest threat to the sustainability of karst areas.

2. Method

2.1. Primary data collection:

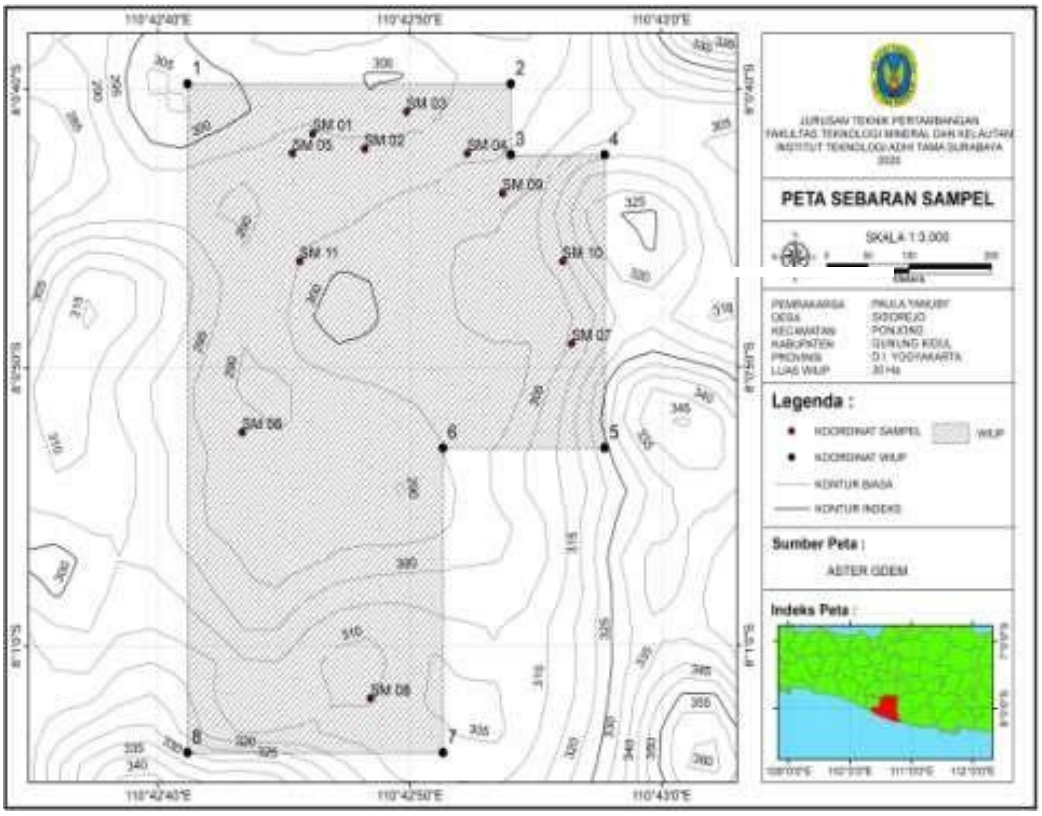
a. Obtained directly from taking samples of well water at each resident's house in the karst area.
b. Delivery of well water samples to the Center for Environmental Health Engineering and Disease Control (BBTKLPP) Yogyakarta for water quality tests in the form of biological parameters.

2.2. Secondary data collection:

a. Location of well water sources in Ponjong District, Gunungkidul Regency, Special Region of Yogyakarta
b. Gunungkidul Regency monthly rainfall data
c. Review the results of previous studies.

3. Results and Discussion

Biological parameters include total coliforms in the sample water. The test results obtained showed that sample 9 was still a sample with a high microbial content and also indicated the presence of Coliform bacteria. When water is stored, the bacteria will grow to the number stated as Too Numerous to Count. Total coliform bacteria is a type of coliform bacteria that originates from environmental pollution by organic materials. Total coliform is the first bacterial indicator used to determine whether water is safe for consumption. In sampling I on March 10 2020 during the rainy season, we got 11 wells. In sampling II on 19 October 2020 during the dry season, we only got 9 wells of water because 2 68 wells experienced drought. From the results of testing in the laboratory, water samples from Ponjong District with the total number of coliforms contained in 100 ml of water were from 9 wells each. If the presence of total coliform bacteria is caused by environmental conditions where the distance of the sampling site is approximately 1 km from the water source, so with this long distance, it is likely that the water will be contaminated with organic material. The high total coliform content indicates the presence of pathogenic bacteria such as Giardia and Cryptosporidium contained in the water (Chiras and Reganold, (2005). These pathogenic bacteria can cause various diseases, such as dysentery, cholera, digestive tract diseases, typhus, hepatitis, polio and so on. According to the Republic of Indonesia Minister of Health's Decree, the maximum level of total coliforms permitted in drinking water is 0 mpn/100ml, which means that the presence of these bacteria in drinking water is absolutely not permitted. In general, from a biological perspective, the water originating from these 9 locations in unpolluted conditions where the results of laboratory tests found that there were no total coliform bacteria in the samples. When compared with the water quality standards regulated in the Minister of Health Standards Regulation number 32 of 2017, the water from the 11 locations did not exceed the predetermined threshold so that the water can be used for all water use classes, especially Class II, III and IV.



Picture 1.
Area Research Sampling

Picture 2.
Sampling Test Biological Parameter

Table 1.
Result Test Biological Parameter

No	*Sample Location*	*X = Eas Y = North Z = Elevasi*	*Test result*			
			Parameter	*Units*	*Result*	*Method*
1	SM 01	X = 0468355 Y = 9114414 Z = 311	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
2	SM 03	X = 0468469 Y = 9114438 Z = 307	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
3	SM 04	X = 0468543 Y = 9114392 Z = 310	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
4	SM 05	X = 0468330 Y = 0468330 Z = 312	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
5	SM 06	X = 0468269 Y = 9114084 Z = 305	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
6	SM 07	X = 0467670 Y = 9114182 Z = 276	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
7	SM 09	X = 0469586 Y = 9114348 Z = 353	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
8	SM 10	X = 0469659 Y = 9114273 Z = 351	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H
9	SM 11	X = 0469339 Y = 0469339 Z = 346	Total Coliform	CFU/100 mL	TNTC	APHA 2012 Section 9222 H

4. Conclussion

From biological parameters, the water from the 11 locations is polluted by bacteria as seen from coliforms, especially total coliforms. Even though it is polluted, the number of coliform bacteria contained in the water does not exceed the required quality standard threshold so that if it is used as drinking water, then it still has to go through water treatment or be heated to a certain boiling point, because it contains bacteria that may be harmful to humans.

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