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Original Article

Suitability of Spring Water Quality for Community Utilization in Girijati Village, Gunungkidul

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ABSTRACT
Spring water is a natural water source that plays an important role in meeting community needs, but its quality must be monitored to ensure safe use. This study aims to assess the quality of Mudal and Sendang Beji spring water in Girijati Village, Purwosari District, Gunungkidul Regency based on basic physical and chemical parameters in accordance with local utilization. The method used was quantitative descriptive with comparative analysis, where water samples were taken on May 13-14, 2025, and analyzed using physical (temperature, TDS, taste, odor) and chemical (pH) parameters, which were then compared with the standards of Indonesian Minister of Health Regulation No. 32 of 2017 for hygiene, sanitation, and public bathing. The results showed that the Mudal spring had an average temperature of 27.83 °C, TDS of 425.67 mg/l, pH of 6.78, no odor, and a bland taste, while the Sendang Beji spring had a pH of 6.67 with similar physical parameters. All measured parameters meet the quality standards for hygiene, sanitation, and public bathing purposes. It can be concluded that both springs are suitable for daily use by the community, such as for consumption, bathing, washing, and agricultural irrigation, in accordance with their current utilization.

KEYWORDS
Water Quality, Spring Water, Physical-Chemical Parameters

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INTRODUCTION

Springs are water sources that emerge naturally from groundwater systems (Barry et al., 2023; Lorette et al., 2018). This occurs without human influence, but rather as a result of geological processes or other natural processes (Azizah, 2017). water that flows from spring sources is influenced by the type of aquifer and rock formation through which the water flows, the temperature

along the flow path, and the amount of water that flows, both now and in the past (Hafiz et al., 2023). This water resource plays an important role for the community because it is useful for meeting basic daily water needs, tourism, and agriculture. All community activities in various aspects of life require clean water. According to UNESCO (2023), access to clean water and sanitation remains a major challenge in many developing countries. In 2020, 368 million people used wells and springs that were not managed safely. Therefore, water quality analysis is an important factor and the first step in water supply management (Al-Hayali et al., 2024). Furthermore, Al-Mallah & Al-Suhail (2017) emphasize that water quality analysis is necessary to ensure cleanliness and safety in water use, thereby protecting public health.

Research by Vikahadi et al. (2023) reveals that health problems can be caused by the use of water that does not meet existing requirements. Therefore, water use must comply with the requirements specified for its intended use, considering that water quality is a condition of water in a water body that has been tested based on its physical, chemical, and biological properties, and the test results are then adjusted to the intended use of the water (Said & Sudarmadji, 2014). The requirements for water sources that can be consumed are water sources that are free from contaminants or disease-causing agents, free from harmful and toxic chemicals, odorless and tasteless, and meet the minimum standards set by health agencies (Aurilia et al., 2021). The physical parameters of water consist of taste, odor, and temperature. Meanwhile, the chemical parameters of water include pH and dissolved solids (Faisal & Atmaja, 2019; Ginting et al., 2023).

Referring to the latest regulation issued by the Indonesian government to regulate the protection and management of springs, as stated in Government Regulation of the Republic of Indonesia Number 22 of 2021 concerning the Implementation of Environmental Protection and Management. This regulation classifies water into four categories: category one for water used as raw water for drinking; category two for water used in recreational facilities, freshwater fish farming, livestock, and agriculture; category three for water used in freshwater fish farming, livestock, and irrigation; and category four for water used for watering plants.

Girijati Village is one of the villages in Purwosari Subdistrict, Gunungkidul Regency, which has several springs in its area. However, in this study, the researchers only focused on measuring water quality at two springs, namely Mudal and Sendang Beji. These two springs have been used by the local community to meet their needs for clean water, public bathing, and agricultural irrigation. This is in line with the research (Marviyanasari et al., 2013) which found that water from springs is widely used for vital needs such as drinking, cooking, and washing, reaching 100% of the total respondents, and 72.22% use these springs for irrigation and agriculture. Furthermore, according to research by Alvitriani et al. (2015), in rural areas where there are springs, the majority of residents use the springs for agricultural activities and household needs. According to Macdonald & Davies (2000), the use of groundwater from springs is a better and more economical way for rural communities.

Research on the quality of springs for domestic needs has been conducted in various countries using various approaches. Reda (2015) in Ethiopia and Ameen (2019) in Iraq studied physical and chemical parameters such as pH, TDS, and temperature to determine the suitability of drinking water, with the results showing that most parameters were within safe limits despite seasonal variations. In Nigeria, Ezea et al. (2022) and Okoro & Apiamu (2024) found several springs with acidic pH and heavy metal content exceeding WHO standards. Dumaru et al. (2021) in Nepal and Ghanem et al. (2021) in Palestine emphasized the importance of water quality data for long-term management, especially in areas with high human activity. These studies generally used comprehensive physical and chemical parameters to assess water quality suitability, with the main objectives being drinking water and irrigation needs.

In Indonesia, spring water research has also developed with various focuses. Sudia et al. (2021) studied springs in Southeast Sulawesi for freshwater and brackish water classification using comprehensive laboratory analysis, while Soviana et al. (2023) studied 27 springs in Gunungkidul, including Mudal and Sendang Beji, using Multi-Criteria Decision Analysis (MCDA) and standardization of Indonesian Minister of Health Regulation No. 32/2017 for the development of tourist facilities with a focus on hygiene measurements. Based on these studies, most of them focus on physical-chemical aspects for drinking water and irrigation needs.

There has been no study that specifically considers alternative uses by local communities, such as public baths, and assesses the suitability of the water quality of Mudal and Sendang Beji springs in Girijati Village based on basic physical and chemical parameters

that are appropriate for local conditions.

Based on this, this study needs to be conducted with the aim of analyzing the suitability of quality for local use by using basic physical and chemical parameters, which will then be analyzed using comparative analysis by comparing the results with Indonesian Minister of Health Regulation No. 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements.

METHOD

Research Location

This study was conducted on May 13 and 14, 2025, at Mudal Spring and Beji Spring, located in Girijati Village, Purwosari District, Gunungkidul Regency, Special Region of Yogyakarta. Girijati Village is located in Gunungkidul Regency, which is geologically composed of karst formations. Karst areas are composed of limestone (CaCO3) that is easily dissolved by acidic rainwater, resulting in complex underground hydrological systems. Water quality in karst areas is also easily affected by rainfall variations, with higher CaCO3 content in the dry season compared to the rainy season (Nugroho et al., 2020). The geological conditions of Girijati Village and the use of Mudal Spring and Sendang Beji Spring as the main water sources for the domestic needs of the village community made these two locations the objects of this study.

Research Approach

This study is descriptive quantitative in nature to analyze the suitability of water quality at the Mudal Spring and Sendang Beji. Descriptive quantitative research is a type of research that analyzes data using information that is collected. The data used in this study consists of primary and secondary data. Secondary data was obtained through a literature review involving various previous literature, including articles, journals, books, and other sources related to this study.

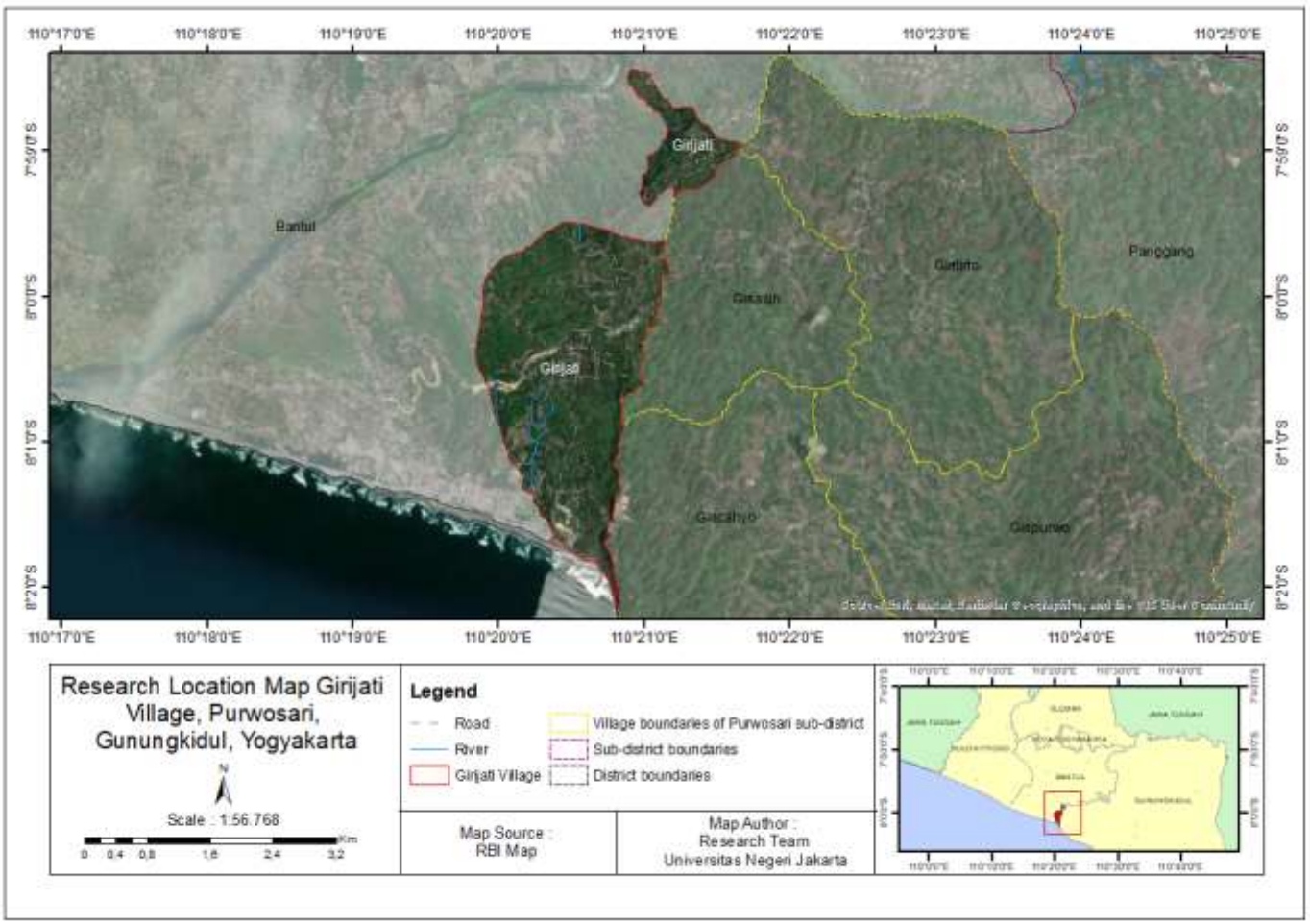

Figure 1. Research Location Map

Meanwhile, primary data was obtained from sampling the physical and chemical aspects of both water sources based on hygiene and sanitation parameters and public bathing parameters as stated in Minister of Health Regulation No. 32 of 2017, then adjusted to the conditions and equipment in the field. These two parameters were used because they are in accordance with the use of spring water by the surrounding community for their daily needs. The parameters and water quality standards can be seen in Table 1.

Table 1. Water Quality Parameters and Standards

	Temperature	pH	Total Dissolved Solids	Odor	Taste
Sanitation	-	6.5-8.5	1000 mg/l	Odorless	No taste
Public Bath	15-35	5-9	-		

Source: Regulation of the Minister of Health of the Republic of Indonesia Number 32 of 2017

(a) Sendang Beji Spring

(b) Mudal Spring

Figure 2. Documentation by Researchers in 2025

Data Analysis

In the data analysis, a comparative data analysis was conducted. Comparative analysis is a systematic comparison of two or more things to show their similarities and differences (G. R. Pertiwi et al., 2023). The purpose of this comparative analysis was to compare the water quality of the Mudal and Sendang Beji springs. The results of field measurements were then compared with the hygiene and sanitation standards for public bathing facilities specified in Minister of Health Regulation No. 32 of 2017.

RESULTS AND DISCUSSION

In this study, water quality measurements were used for hygiene, sanitation, and public bathing purposes. The parameters measured included physical parameters such as temperature, total dissolved solids (TDS), taste, and odor. Meanwhile, chemical parameters included pH. The measurement results are presented in Table 2.

Table 2. Results of Physical and Chemical Measurements from Two Spring Water Source Locations

Point		Date	Hour	Odor	Taste	Temperature	Soluble Solids	pH
Mudal Spring	Upper Point	May 13	11:35	Odorless	Bitter	30	622	6.37
			2:30 PM			28	640	6.62
		May 14	9:48			28	323	7.46
	Lower Point		11:49			28	323	7.52
		May 14	10:42			28	323	6.65
	Upper Point		12:28			25	323	6.62
Spring Sendang Beji		May 13	12:13	No Smells	Bitter	31.8	622	6.7
			1:35 PM			32.1	622	6.47
		May 14	10:22			27	300	6.73
			12:10			28	287	6.76

Based on Table 2, the measurement results of the samples from both springs above show relatively good organoleptic conditions because they do not show any disturbing odors or tastes. The water temperature and TDS values at both locations are still within the normal range. Furthermore, the pH values at both springs indicate slightly alkaline water, but still within acceptable limits.

Furthermore, the analysis of spring water quality in Girijati Village used measurement standards that refer to Indonesian Minister of Health Regulation No. 32 of 2017 with adjustments to field conditions. The sample collection results were then compared. The comparative analysis data for spring water quality at both spring sources can be seen in Table 3.

Table 3. Comparative Analysis Results of Water Quality at Mudal Spring

No	Parameter	Field Measurement Results (Average Value)	Ministry of Health Regulation No. 32 of 2017		Meets Hygiene and Sanitation Water Quality Requirements		Meets Public Bathing Water Quality Requirements	
			Sanitary Water Quality	Public Bathing Water Quality	Yes	No	Yes	**No**
1	Odorless	Odorless	Odorless	Odorless	✓		✓	
2	Taste	Bland	Bland	bland	✓		✓	

No	Parameter	Field Measurement Results (Average Value)	Ministry of Health Regulation No. 32 of 2017		Meets Hygiene and Sanitation Water Quality Requirements		Meets Public Bathing Water Quality Requirements	
			Sanitary Water Quality	Public Bathing Water Quality	Yes	No	Yes	No
3	Temperature	27.83	-	15-35	-		✓	
4	TDS	425.67	≤ 1000 mg/l	-	✓		-	
5	pH	6.87	6.5-8.5	5-9	✓		✓	

Source: Primary Data Analysis Results, 2025

Based on Table 3, the results of water quality parameter measurements at the Mudal spring show satisfactory results and meet the requirements of Indonesian Minister of Health Regulation No. 32 of 2017. The water at the Mudal spring has a fresh taste and no odor. The average water temperature is 27.83°C, with dissolved solids totaling 425.67 mg/l, and a pH of 6.87.

Table 4. Comparative Analysis Results of Water Quality at the Sendang Beji Spring

No	Parameter	Field Measurement Results (Average Value)	Ministry of Health Regulation No. 32 of 2017		Meets Hygiene and Sanitation Water Quality Requirements		Meets Public Bathing Water Quality Requirements	
			Sanitary Water Quality	Public Bathing Water Quality	Yes	No	Yes	No
1	Smell	Odorless	Odorless	Odorless	✓		✓	
2	Taste	Bland	Bland	bland	✓		✓	
3	Temperature	29.37	-	15-35	-		✓	
4	TDS	457.75	≤ 1000 mg/l	-	✓		-	
5	pH	6.67	6.5-8.5	5-9	✓		✓	

Source: Primary Data Analysis Results, 2025

Based on Table 4, the results of the measurement of water quality parameters at Sendang Beji spring show fairly good results and meet the requirements of Indonesian Minister of Health Regulation No. 32 of 2017. The water at Sendang Beji spring has a bland taste and no odor. The average water temperature is 29.37°C, with dissolved solids totaling 457.75 mg/l, and a pH of 6.67.

Based on Table 3 and Table 4, temperature measurements at the Mudal and Sendang Beji springs show normal results and are in accordance with existing standards. In a study (Ameilia et al., 2018), it is stated that water temperatures ranging from 25°C to 30°C are normal and suitable for human consumption. Temperature plays an important role in determining water quality. The temperature parameter indicates that the water contains a significant amount of dissolved chemicals or that organic matter is decomposing due to microorganisms. In addition, temperature can also affect oxygen solubility, where higher temperatures indicate that the oxygen content in the water will decrease (Mairizki, 2017).

In terms of odor, the results show that both Mudal and Sendang Beji springs are odorless or normal and meet the quality standards for sanitation and public

bathing. This is in line with research (Djana, 2023), which states that good water quality is characterized by the absence of a distinctive odor, both from a distance and up close. Meanwhile, fishy and foul-smelling water can occur due to the entry of foreign objects into the water, such as waste materials, or due to the decomposition of organic solutions originating from bacteria. Odors in water can be detected through the sense of smell, namely the nose. The purpose is to determine whether there is an odor or not in the water at the spring source in the sample (Nanda et al., 2023). According to Permenkes No. 32 of 2017, the standard parameters determined are equivalent to the ambient air temperature and odorless conditions in accordance with the benchmarks set for both purposes.

Furthermore, clean water is essentially tasteless, but water can become flavored if there are contaminants in it. These contaminants can be chemical substances or substances originating from human activities (Nanda et al., 2023). In terms of taste, it was revealed that no particular taste was detected from the Mudal and Sendang Beji springs, which is considered sufficient for hygiene and sanitation purposes. Therefore, these two springs are classified as suitable based on the criteria contained in Permenkes No. 32 of 2017 on the normalization of drinking water standards. Physically, water can be tasted by the tongue. According to (H. Pertiwi, 2016), poor water quality is indicated by a sour, sweet, bitter, or salty taste.

In TDS measurements, both sampling locations showed values that met the water quality standards for sanitary hygiene purposes because they did not exceed the maximum permissible level of 1000 mg/l. Total Dissolved Solids (TDS) are organic ions, compounds, and colloids in water, and come from sources such as organic matter in the form of leaves and mud, inorganic matter in the form of rocks and air containing calcium bicarbonate or other minerals, and can also come from household or industrial waste (Rahman et al., 2020).

pH measurements at the Mudal spring showed a value of 6.87, and at the Sendang Beji spring, a value of 6.67. Based on the quality standards and intended use classes regulated in Permenkes No. 32 of 2017, water quality with a pH range of 6.5-8.5 for sanitation hygiene and pH 5-9 for public bathing from these spring sources is suitable and feasible for use in all intended use classes (I-V), where the spring water can be used for consumption, public bathing, irrigation, and other uses that require water quality consistent with its purpose. The acidity level (pH) parameter indicates the intensity of acid and base content in a solution or water. A pH below 6.5 is considered acidic, and a pH above 8.5 is considered basic. The lower the pH or the higher the acidity, the greater the corrosiveness to metal objects such as pipes (Mustika, 2024).

It can also cause an unpleasant taste. The pH value indicates the [H+] and [OH-] content of the spring water. Neutral water pH indicates that the ion content in the water is almost equal or balanced. Water used for daily consumption must have a neutral pH because water that is too acidic or alkaline can be harmful to health. Naturally, the rocks that make up an area can affect the pH value, mainly due to the process of mineral dissolution in rocks (Aurilia et al., 2021). This is shown in the measurement results (Table 5) from research in the Physical Geography Field Study conducted in April 2025 at the Mudal spring, where the measurement results were used as a reference for data comparison because there was a spring pH value below the quality standard threshold, namely 6.47.

Table 5. Physical and Chemical Measurement Results at Mudal Spring

No	Parameter	Measurement Results at Mudal Spring
1	Odor	No odor
2	Taste	Bland
3	Temperature	28.74
4	TDS	412
5	pH	6.47

Source: Results of Physical Geography Field Research 2025

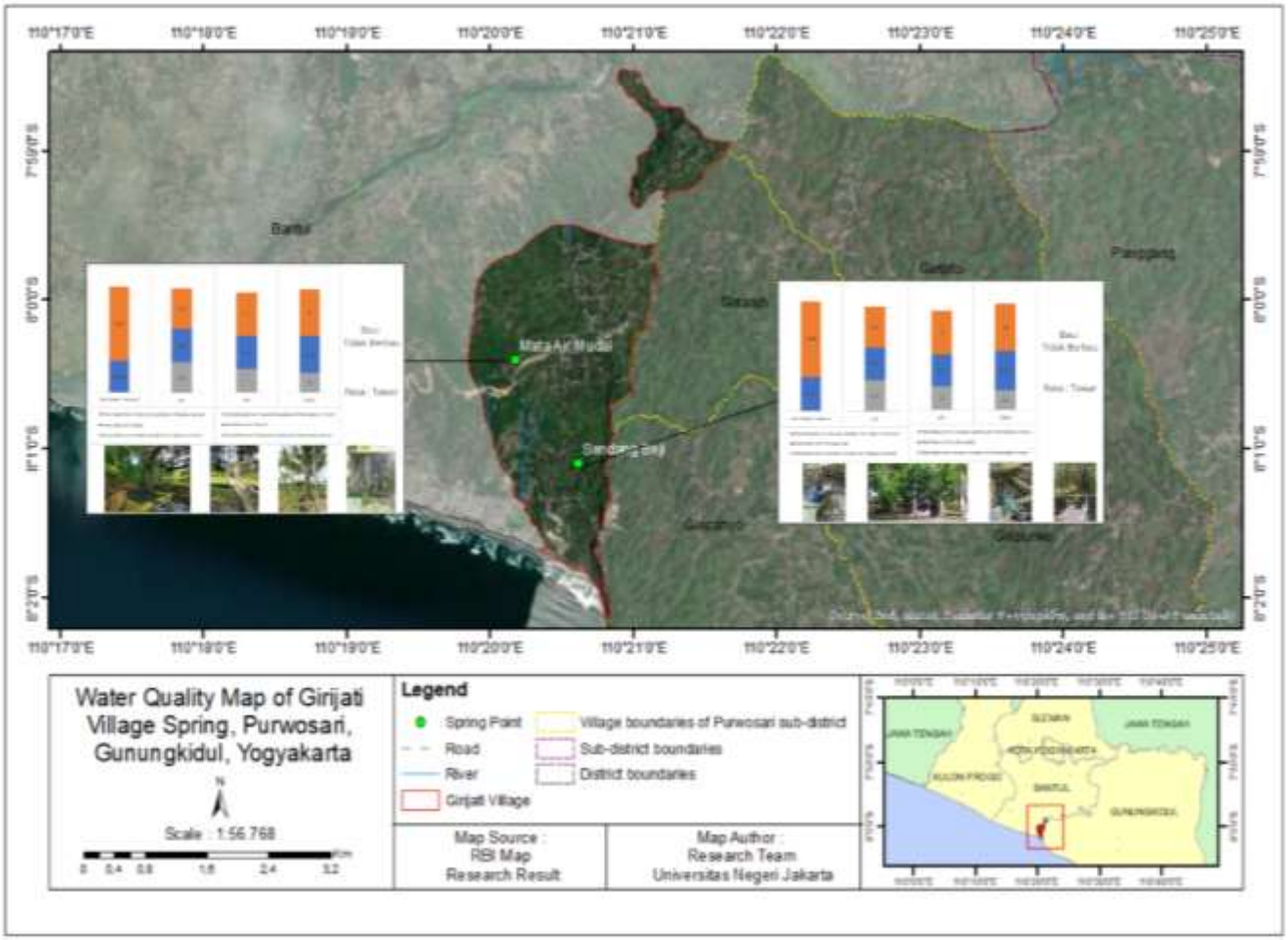

Figure 3. Water Quality Map of the Girijati Village Spring

Based on the sampling results and comparisons conducted at both spring locations, it can be concluded that the Mudal and Sendang Beji springs meet the quality standards for hygiene sanitation and public bathing purposes, making them suitable for use by the community at the neighborhood level for daily needs such as consumption, bathing, washing, and agricultural irrigation directly connected to the springs. As an important component of natural resources, water use must be carried out wisely, considering the interests of both current and future generations. Therefore, good water management is necessary to ensure that water is available in safe quantities and quality (Fahlupi et al., 2019). This is supported by research (Setiawan et al., 2018) which found that when water parameters do not meet quality standards, the community is advised to treat the water before using it for consumption. A simple treatment process can be carried out, which is recommended in the form of filtering and sedimentation, such as the use of alum and lime. Based on these results, they are then incorporated into a map that can be seen in Figure 3.

To maintain the cleanliness of the springs, especially the Mudal Spring, the community routinely carries out mutual assistance activities every certain period, which are divided into two forms. First, cleaning is carried out through mutual assistance as a form of community concern for the environment. Second, some still carry out this process as part of a local tradition that has symbolic meaning as a form of respect for nature and ancestors. This tradition was formed due to the history or legends surrounding the existence of these springs. Similar to the Mudal spring, the existence of the Sendang Beji spring is also accompanied by legends, and over time, this spring has become a religious tourist attraction. The community service activities carried out to clean the area around the spring are part of efforts to prevent pollution. According to research (Hakki et al., 2015), in order to overcome the problem of pollution, mutual cooperation is needed to clean the environment around

the spring source on a regular basis. In addition, village officials and related agencies need to play a more intensive role in educating the community about the importance of water source conservation.

CONCLUSION

Mudal and Sendang Beji springs in Girijati Village, Purwosari District, Gunungkidul Regency, Yogyakarta, the water quality at both locations has met the quality standards set by Indonesian Minister of Health Regulation No. 32 of 2017 for hygiene, sanitation, and public bathing. Compliance with these standards was determined through testing of physical and chemical parameters, where the values for temperature, total dissolved solids (TDS), and pH were within the required range, and the water was odorless and tasteless. These two springs have a very important and vital function for the community. Ecologically, both are sources of water for domestic and irrigation needs, while culturally, both springs have sacred and spiritual values that are continuously preserved through traditions and religious practices.

However, this study only discusses water quality aspects, without considering the quantity needed by the community in their daily lives. In addition, there are several limitations in this study, including the limited equipment available, so the parameters used must be adjusted to the available tools. The research period, which lasted only two days, was also a constraint. Therefore, it is recommended that future researchers use all the mandatory parameters listed in Indonesian Minister of Health Regulation No. 32 of 2017. In addition, to make the research results more comprehensive, water samples should be taken in two different seasons to determine whether seasonal changes affect water quality.

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Conflict of Interest: The author has no competing interests to declare that are relevant to the content of this article.

REFERENCES

Al-Hayali, H. D., Al-Tamimi, O. S., & Hamamin, D. F. (2024). Hydrogeological Assessment of The Aquifers in Shwan Sub-Basin, Kirkuk, Iraq. *Iraqi Geological Journal*, *57*(1C), 276–292. https://doi.org/10.46717/igj.57.1C.18ms-2024-3-30

Al-Mallah, I., & Al-Suhail, Q. (2017). Assessment of The Water Quality Index of The Main Drain, Iraq. *Iraqi Geological Journal*, *50*(2), 36–46. https://doi.org/10.46717/igj.50.2.3Ms-2017-12-26

Alvitriani, A., Budiyono, B., & Utami, R. K. S. (2015). Pemanfaatan Air PDAM oleh Penduduk Desa Purajaya dan Purawiwitan Kabupaten Lampung Barat. *Jurnal Penelitian Geografi*, *3*(4). https://jips.fkip.unila.ac.id/index.php/JPG/article/view/9884

Ameen, H. A. (2019). Spring Water Quality Assessment Using Water Quality Index in Villages of Barwari Bala, Duhok, Kurdistan Region, Iraq. *Applied Water Science*, *9*. https://doi.org/10.1007/s13201-019-1080-z

Ameilia, D., Sugiyanta, I. G., & Nugraheni, I. L. (2018). ANALISIS KUALITAS AIR TANAH DANGKAL UNTUK KEPERLUAN AIR MINUM DI DESA PEMATANG. *Jurnal Penelitian Geografi*, *6*(4).

Aurilia, M. F., Santoso, D. H., & Sungkowo, A. (2021). Analisis Karakteristik dan Kualitas Mata Air di Desa Redin, Kecamatan Gebang, Kabupaten Purworejo. *Jurnal Ilmiah Lingkungan Kebumian*, *3*(2), 1–12. https://doi.org/10.31315/jilk.v3i2.4302

Azizah, P. N. (2017). Analisis Vegetasi di Kawasan Sekitar Mata Air Ngembel, Kecamatan Pajangan, Kabupaten Bantul. *Jurnal Riset Daerah*, *XVI*(1).

Barry, J. D., Runkel, A. C., & Calvin Alexander, E. (2023). Synthesizing Multifaceted Characterization Techniques to Refine A Conceptual Model of Groundwater Sources to Springs in Valley Settings

(Minnesota, USA). *Hydrogeology Journal*, *31*(3), 707–729. https://doi.org/10.1007/s10040-023-02613-w

Djana, M. (2023). Analisis Kualitas Air dalam Pemenuhan Kebutuhan Air Bersih di Kecamatan Natar Hajimena Lampung Selatan. *Jurnal Redoks*, *8*(1). https://doi.org/10.31851/redoks.v8i1.11853

Dumaru, B., Kayastha, S. P., & Pandey, V. P. (2021). Spring Water Assessment for Quality and Suitability for Various Uses: The Case of Thuligaad Watershed, Western Nepal. *Environmental Earth Sciences*, *80*(17). https://doi.org/10.1007/s12665-021-09826-w

Ezea, V. C., Ihedioha, J. N., Abugu, H. O., & Ekere, N. R. (2022). A Multi-Criteria Approach to Drinking and Irrigation Water Assessment of Spring Water in Igbo-Etiti, Nigeria. *Applied Water Science*, *12*. https://doi.org/10.1007/s13201-022-01747-8

Fahlupi, R., Asyik, B., & Nugraheni, I. L. (2019). Perilaku Kepala Keluarga dalam Memanfaatkan Air Sungai Way Galih di Desa Way Galih. *Jurnal Penelitian Geografi*, *7*(2).

Faisal, M., & Atmaja, D. M. (2019). Kualitas Air pada Sumber Mata Air di Pura Taman Desa Sanggalangit sebagai Sumber Air Minum Berbasis Metode Storet. *Jurnal Pendidikan Geografi Undiksha*, *7*(2), 72–82. https://doi.org/10.23887/jjpg.v7i2.20691

Ghanem, M., Ahmad, W., Keilani, Y., Sawaftah, F., Schelter, L., & Schuettrumpf, H. (2021). Spring Water Quality in The Central West Bank, Palestine. *Journal of Asian Earth Sciences: X*, *5*. https://doi.org/10.1016/j.jaesx.2021.100052

Ginting, E. V. E., Setianingrum, L., & Harahap, T. (2023). Kelayakan Penyediaan Infrastruktur Air Bersih Kawasan Pesisir Berdasarkan Persepsi Masyarakat (Kecamatan Teluk Betung Timur, Kota Bandar Lampung). *Jurnal Perencanaan Dan Pengembangan Kebijakan*, *3*(1), 70. https://doi.org/10.35472/jppk.v3i1.1047

Hafiz, M. N., Othman, M., Razali, N. A. M., Suif, Z., & Ahmad, N. (2023). Laboratory Investigation on Water Quality of Spring Water for Small Community and Water Security. *International Journal of GEOMATE*, *24*(105), 77–84. https://doi.org/10.21660/2023.105.s8504

Hakki, W., Sugiyanta, I. G., & Haryono, E. (2015). Dampak Pemanfaatan Bantaran Sungai terhadap Kualitas Lingkungan di Kelurahan Pasar Krui. *Jurnal Penelitian Geografi*, *3*.

Lorette, G., Lastennet, R., Peyraube, N., & Denis, A. (2018). Groundwater-flow Characterization in A Multilayered Karst Aquifer on The Edge of A Sedimentary Basin in Western France. *Journal of Hydrology*, *566*, 137–149. https://doi.org/10.1016/j.jhydrol.2018.09.017

Macdonald, A. M., & Davies, J. (2000). *A Brief Review of Groundwater for Rural Water Supply in Sub-Saharan Africa*.

Mairizki, F. (2017). Analisa Kualitas Air Minum Isi Ulang di Sekitar Kampus Universitas Islam Riau. *Jurnal Katalisator*, *2*(1), 9. https://doi.org/10.22216/jk.v2i1.1585

Marviyanasari, S., Sugiyanta, I. G., & Nugraheni, I. L. (2013). Pemanfaatan Sumber Mata Air Sebagai Kebutuhan Penduduk Di Desa Wonoharjo Kecamatan Sumberejo Kebupaten Tanggamus Provinsi Lampung Tahun 2012. *Jurnal Penelitian Geografi*, *1*(5).

Mustika, A. (2024). Kualitas Mata Air Langsepan Ditinjau dari Parameter pH, TDS, dan DHL. *Jurnal Jernih*, *2*(01). https://doi.org/10.31537/jernih.v2i01.1877

Nanda, M., Purba, A. F. H., Gultom, K., Sari, K. S., Muthmainah, N., & Ramadhan, F. (2023). Analisis Parameter Fisik (Kekeruhan, Bau, Rasa) dan Uji Kandungan Besi (Fe) pada Sumur Gali dan Sumur Bor di Kelurahan Bantan, Kecamatan Medan Tembung. *Jurnal Kesehatan Tambusai*, *4*(3). https://doi.org/10.31004/jkt.v4i3.16765

Nugroho, J., Zid, M., & Miarsyah, M. (2020). Potensi Sumber Air dan Kearifan Masyarakat dalam Menghadapi Risiko Kekeringan di Wilayah Karst (Kabupaten Gunung Kidul, Provinsi Yogyakarta). *JPLB*, *2020*(1), 438–447. https://doi.org/10.36813/jplb.4.1.438-447

Okoro, S. E., & Apiamu, A. (2024). Quality Evalution of Spring Water Sources in Some Rural Communities in Southeastern Nigeria. *Big Data in Water Resources Engineering (BDWRE)*, *5*(1), 14–19. https://doi.org/10.26480/bdwre.01.2024.14.19

Peraturan Menteri Kesehatan Republik Indonesia Nomor

32 Tahun 2017 Tentang Standar Baku Mutu Kesehatan Lingkungan Dan Persyaratan Kesehatan Air Untuk Keperluan Higiene Sanitasi, Kolam Renang, Solus Per Aqua, Dan Pemandian Umum, Pub. L. No. 32/2017.

Peraturan Pemerintah Republik Indonesia Nomor 22 Tahun 2021 Tentang Penyelenggaraan Perlindungan Dan Pengelolaan Lingkungan Hidup, Pub. L. No. 22/2021.

Pertiwi, G. R., Risnita, & Jailani, M. S. (2023). Jenis Jenis Penelitian Ilmiah Kependidikan. *QOSIM: Jurnal Pendidikan, Sosial & Humaniora*, *1*(1). https://doi.org/10.61104/jq.v1i1.59

Pertiwi, H. (2016). *Studi Tingkat Kesadahan pada Air Minum Di Nagari Muaro Pingai Kecamatan Junjung Sirih Kabupaten Solok (Studi Kasus Pengelolaan Air Minum oleh Nagari)*. *1*(2), 2541–125.

Rahman, M. F. I., Wibisana, H., & Zainab, S. (2020). *Analisa dan Pemetaan Total Padatan Terlarut di Pesisir Pantai Pasuruan dengan Citra Satelit Terra Modis*. *16*(2). https://doi.org/10.28932/jts.v16i2.2509

Reda, A. H. (2015). Assessment of Physicochemical Quality of Spring Water in Arbaminch, Ethiopia. *Journal of Environmental Analytical Chemistry*, *2*(5). https://doi.org/10.4172/2380-2391.1000157

Said, M. F. N., & Sudarmadji. (2014). *Kajian Ketersediaan dan Penggunaan Air dari Mataari untuk Kebutuhan Domestik Di Kecamatan Turi, Kabupaten Sleman*. Universitas Gadjah Mada.

Setiawan, A. T., Sudarmi, & Sugiyanta, I. G. (2018). Analisis Kualitas Air Sumur di Kelurahan Ganjar Agung Kota Metro Tahun 2017. *Jurnal Penelitian Geografi*.

Soviana, N. N., Putra, D. P. E., & Marliyani, G. I. (2023). Springs and Tourism Facilities Development in Purwosari, Gunungkidul, Special Region of Yogyakarta, Indonesia. *IOP Conference Series: Earth and Environmental Science*, *1233*(1). https://doi.org/10.1088/1755-1315/1233/1/012019

Sudia, L. B., Indriyani, L., Yunus, L., Mursidi, B., Yasin, A., Albasri, & Nurdin, M. (2021). Water quality in Thirty Freshwater Springs and Twenty Four Brackish Springs in The Karst Area to Realize Sustainable Water Resources Management. *Sustainability (Switzerland)*, *13*(5), 1–16. https://doi.org/10.3390/su13052679

UNESCO. (2023). *Rapport Mondial des Nations Unies sur la mise en valeur des ressources en eau*.

Vikahadi, N., Wicaksono, A. P., Nugroho, N. E., Gomerreuzzaman, M., & Prasetya, J. D. (2023). Analisis Kualitas Air sebagai Air Bersih Pada Sumber Mata Air Hutan Bambu di Desa Sumbermujur, Kecamatan Candipuro, Kabupaten Lumajang. *Jurnal Lingkungan Kebumian Indonesia*, *1*(1). https://doi.org/10.47134/kebumian.v1i1.2054