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ANALYSIS OF WATER QUALITY POLLUTION IN THE TEMPUR RIVER BASED ON TDS, TSS, TEMPERATURE AND COLOR PARAMETERS

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ABSTRACT

This study aims to analyze the level of water pollution in the Tempur River based on physical parameters, including Total Dissolved Solids (TDS), Total Suspended Solids (TSS), temperature, and color. The Tempur River is one of the water sources used by the surrounding community, so it is important to know its water quality condition. Sampling was carried out at several strategic points along the river. Laboratory analysis was performed to measure TDS, TSS, temperature, and water color intensity, then compared with the quality standards set in Government Regulation No. 22 of 2021 regarding Water Quality and Water Pollution Control. The temperature, TDS, and color parameters of the Tempur River are still within the quality standard limits set by Government Regulation No. 22 of 2021 The results show that the water temperature of 28.9°C is within the normal range but close to the upper limit, potentially influenced by high sunlight intensity, low vegetation shading, and shallow river depth. The TDS level of 305 mg/L is well below the maximum threshold of 1000 mg/L, indicating that dissolved substances are within safe limits, though minor anthropogenic activities may contribute to this value. The TSS concentration of 35 mg/L is below the allowable limit set by Government Regulation No. 82 of 2001, suggesting the water is relatively clear and suitable for agricultural and fishery use. Furthermore, the water color value of 15.0 Pt-Co is significantly below the threshold of 50 Pt-Co, indicating clear water with minimal pollution from dissolved organic compounds or industrial waste. Overall, the water quality of the Tempur River remains within acceptable limits, though ongoing monitoring is recommended to maintain its suitability for various uses.

Keywords—*Tempur River; TDS; TSS; temperature; color; water pollution*

I. INTRODUCTION

River pollution can be identified from various characteristics including chemical, biological, and physical aspects. When analyzing water quality, physical characteristics are the first indicators that can be observed and measured. Parameters such as turbidity, color, temperature, odor, and total suspended solids provide a brief overview of the river water's condition (Yohannes et al., 2019). Changes in these physical attributes usually signal contamination or deterioration of water quality due to industrial waste, household waste, erosion, or other activities (Trisnaini et al., 2018).

The Tempur River is a water body located in an area with agricultural, livestock, and dense residential activities. These activities have the potential to introduce pollutants into the river, both organic and inorganic waste (Prayogo, 2015). Therefore, a comprehensive water quality analysis is necessary to determine the level of pollution that has occurred.

In this study, the water quality of the Tempur River is focused on four main parameters: Total Dissolved Solids (TDS), Total Suspended Solids (TSS), temperature, and color. These parameters were chosen because they represent the physical and chemical characteristics of water that are easily influenced by pollution (Darmawan et al., 2021). TDS and TSS provide an overview of the concentration of solids in the water, temperature affects biochemical reactions and aquatic life, while color can indicate the presence of both organic and inorganic pollutants (Kusna, 2021).

This study aims to analyze the pollution condition of the Tempur River based on the measurement of these parameters, and evaluate whether the river's water quality still meets the quality standards set by government regulations, specifically Government Regulation No. 22 of 2021 concerning Water Quality and Water Pollution Control (Anidah H Triwulandari & Okik Hendriyanto Cahyonugroho, 2023). The results of this study are expected to serve as a basis for policy-making in the management and preservation of river water quality.

Total Dissolved Solids (TDS) is a measure of the total dissolved solids in water, such as ions, compounds, and colloids in the river (Anwar et al., 2021). TDS is expressed in milligrams per liter (mg/L) or parts per million (ppm). The TDS value provides an indication of water quality as it reflects the concentration of dissolved substances that can affect taste, health quality, and the ability of water to support aquatic life (Irwan & Afdal, 2016). Water with high TDS levels may indicate pollution or changes in the natural characteristics of the water. The sources of TDS components can be natural, such as rock weathering, or human activities, such as domestic waste, industrial waste, and agriculture (Rosyidah, 2018).

Total Suspended Solids (TSS) are solid particles suspended in water that do not easily dissolve, including mud, sand, clay, and organic matter. TSS is measured in milligrams per liter (mg/L) and is one of the important parameters in assessing the quality of river water (Marlina et al., 2017). Natural sources of TSS include soil erosion, rock weathering, and biological activities such as algae growth. Anthropogenic or human-made sources include runoff from agricultural land that carries soil particles and fertilizers, construction waste, and industrial waste that has not been properly treated (Pratiwi & Indah Agustiorini, 2023). Human activities such as deforestation and poorly managed land development can also increase TSS levels in rivers (Pangestu et al., 2021).

Water color measurement is usually done visually using standard color scales, such as the Platinum-Cobalt Scale, or with a spectrophotometer for more accurate results (Rosarina & Laksanawati, 2018). Color is expressed in Hazen units (Pt-Co) for true color or can be measured using specific wavelengths in a spectrophotometer. Color measurement helps identify the level of pollution or the

presence of substances that may harm aquatic life and human health.

II. METHOD

A. *Location and Time of Study*

This study was conducted at the Tempur River located in Blitar City, with coordinates at S 08° 6' 2.7036". The location was selected based on preliminary identification of pollution potential due to domestic and agricultural activities in the surrounding area. Data collection was carried out during the water quality monitoring period by the Environmental Agency of Blitar City, from July to August 2024

B. Data Sources

The data used in this study are secondary data obtained from the water quality monitoring results by the Environmental Agency of Blitar City. The DLH collected samples and performed laboratory analysis on physical parameters of the river water, which include:

- Temperature (°C)
- Total Dissolved Solids (TDS) (mg/L)
- Total Suspended Solids (TSS) (mg/L)
- Color (Pt-Co Unit)

These measurement results were then submitted to the researchers in the form of official laboratory reports.

C. Data Analysis Techniques

The data obtained were analyzed quantitatively and descriptively. Each parameter was compared with the water quality standards based on Government Regulation No. 22 of 2021 concerning Wastewater Standards and Water Quality Criteria. The analysis was performed through the following steps:

- Grouping data: Each parameter was mapped based on the sampling points.
- Comparison with quality standards: The parameter values at each point were analyzed against the threshold limits specified in the regulation.
- Interpretation of results: If a parameter's value exceeds the quality standard, it is considered an indication of pollution.
- Identification of potential pollution sources: Based on the surrounding environmental conditions of the river and secondary data from the Environmental Agency of Blitar City.

III. RESULT AND DISCUSSION

Based on secondary data from the Environmental Agency of Blitar City, the results of the water quality measurements for the Tempur River are presented in Table 1. The following image shows the data collection process conducted in the field to analyze the water quality at the designated measurement points.

Figure 1. Tempur River Location

Figure 2. Tempur River Condition

Table 1. Results of Physical Parameter Measurements of the Tempur River

No	Parameter	Standard Quality	Value	Unit
1	**TDS**	**1000**	**305**	mg/L
2	**TSS**	**50**	**35**	mg/L
3	**Temperature**	**Dev 3**	**28,9**	°C
4	**Color**	**50**	**15**	Pt-Co Unit

The results of the measurement of the physical parameters of Tempur River water are compared with the quality standards outlined in the Government Regulation No. 22 of 2021 concerning Water Quality and Water Pollution Control

The water temperature value of 28.9°C is within the normal range, although it is close to the upper limit of the environmental temperature deviation. This temperature increase is likely due to high sunlight intensity, low shading vegetation around the river, and shallow river depth, which accelerates heat absorption. High water temperature can decrease dissolved oxygen levels, affecting aquatic biota.

The TDS value of 305 mg/L is still far below the maximum threshold (1000 mg/L). This indicates that the dissolved substances such as mineral ions, salts, and organic materials are within safe limits. However, this value still reflects light anthropogenic activities such as domestic waste or runoff from agricultural fertilizers.

Based on the measurement results, the Tempur River in Blitar has a TSS concentration of 35 mg/L, which means the TSS level in this river is below the standard quality set in Government Regulation on Water Quality Management and Pollution Control for Class II water, which is 50 mg/L. Therefore, the water quality of the Tempur River still meets the allowed quality standards, indicating that the river water has relatively low turbidity and can be categorized as good water for certain purposes, such as agricultural irrigation and fisheries.

The water color value of 15.0 Pt-Co Unit is still well below the threshold (50 Pt-Co). This relatively low color indicates that, visually, the water is still clear and has not experienced heavy pollution from dissolved organic compounds or colored industrial waste. However, fluctuations in color values may occur over time depending on environmental activities.

In general, all four physical parameters analyzed are below the standard quality set in Government Regulation on Water Quality Management and Pollution Control. Overall, the water quality of the Tempur River is considered good for its designated uses, although ongoing monitoring and environmental management are recommended to maintain its health.

IV. CONCLUSION

Based on the analysis of secondary data from the Environmental Agency of Blitar City, it can be concluded that:

1. The water quality of the Tempur River in Blitar remains within safe and acceptable limits based on several key parameters. The water temperature of 28.9°C is within the normal range, though it is close to the upper limit, likely influenced by high sunlight intensity, low vegetation shading, and shallow river depth. This increased temperature could potentially reduce dissolved oxygen levels, affecting aquatic life.
2. The Total Dissolved Solids (TDS) value of 305 mg/L is well below the maximum threshold of 1000 mg/L, suggesting that dissolved substances like mineral ions, salts, and organic materials are within safe limits. However, the presence of some anthropogenic activities, such as domestic

waste or runoff from agricultural fertilizers, is still reflected in this value.

3. The Total Suspended Solids (TSS) concentration of 35 mg/L is below the maximum allowable value set in Government Regulation No. 82 of 2001 for Class II water (50 mg/L), indicating that the water has relatively low turbidity and is suitable for agricultural irrigation and fisheries.
4. Finally, the water color value of 15.0 Pt-Co is significantly lower than the threshold of 50 Pt-Co, suggesting that the water remains clear and free from heavy pollution or colored industrial waste. However, fluctuations in color values may still occur depending on environmental influences.

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