



# Water Quality Assessment of Phan Waterfall, Trang Province

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## Abstract

This environmental science study investigated the water quality of Phan Waterfall, Palian District, Trang Province. The objective of the study was to assess whether the water quality of the waterfall is suitable for natural use and aquatic life. The research question focused on whether the pH, water transparency, temperature, and dissolved oxygen levels met standard water quality criteria. Water quality data were collected by measuring pH, water transparency, water temperature, and dissolved oxygen using standard field measurement methods. The results showed that the pH value of the water was near neutral and suitable for aquatic organisms. The water transparency was very high and within water quality standards. The average water temperature was appropriate for a natural waterfall environment, and the dissolved oxygen level was higher than the minimum standard value. In conclusion, the findings indicate that the water quality of Phan Waterfall is within acceptable standards and suitable for aquatic life and environmental conservation.

Keywords: water quality

## Research Question

1. Is the acidity-base of the waterfall in the area of Phan Waterfall suitable or not?
2. Is the transparency of the waterfall in the area of Phan Waterfall appropriate?
3. Is the temperature of the waterfall in the area of Phan Waterfall appropriate?
4. Is the oxygen value of the waterfall in the area of Phan Waterfall appropriate?

## Introduction

**Content Knowledge**  
Water quality is an important environmental issue because it affects aquatic ecosystems and community use of natural water resources. Phan Waterfall, located in Palian District, Trang Province, is a natural freshwater source used for recreation and environmental value. This study addresses the question of whether the water quality at Phan Waterfall is suitable according to standard water quality criteria. Key water quality indicators include pH, water transparency, temperature, and dissolved oxygen. These parameters are commonly used to assess surface water conditions and are fundamental components of the GLOBE Water Quality Protocol (The GLOBE Program, 2023). Changes in these factors can influence aquatic organisms and ecosystem balance. Neutral pH levels are generally suitable for freshwater life, while adequate dissolved oxygen is essential for organism survival (Burd, 2020). This research is important to the local community because it provides information about the current condition of the waterfall and helps support environmental awareness and conservation. Previous studies indicate that dissolved oxygen levels above 5 mg/L and moderate water temperatures are suitable for healthy freshwater ecosystems (Dodd & Smith, 2016). High water transparency is often associated with good water quality and low turbidity (Chapman, 1996). By applying GLOBE protocols and basic scientific principles, this study demonstrates an understanding of freshwater systems and supports sustainable management of local water resources.

## Research Methods

### Planning Investigations

*Describe the planning process*

#### Research Hypothesis

1. The acidity-base of the water around Phan Waterfall is within the appropriate range for natural water sources.
2. The transparency of the water around Phan Waterfall is at an appropriate level and indicates good water quality.
3. The water temperature around Phan Waterfall is within the optimal range for the organisms in the water source.
4. The amount of oxygen in the water around Phan Waterfall is sufficient and suitable for the life of aquatic organisms.

#### Materials and equipment

- Digital meter
- Transparency Meter
- Limnol Paper
- Thermometer

#### Research Method

1. The acidity-base measurement of water is taken from the area of Phan Waterfall and then used to measure the acidity-base of the water by using pH paper or a pH meter according to the GLOBE methodology, and record the measured values.
2. Measurement of oxygen content in water: the amount of dissolved oxygen in the water around Phan Waterfall is measured using a water oxygen measurement device according to the methodology of the project GLOBE and record the measurement value.
3. Water temperature: Measurement the water transparency measurement is carried out in the area of Phan Waterfall using a transparency measuring tube or appropriate equipment according to the project's methodology for GLOBE and record the measurement result.
4. Water temperature measurement, the water temperature in the area of Phan Waterfall is measured by using a thermometer to measure the water temperature according to the GLOBE project methodology, and record the temperature value.

### Carrying Out Investigations

*Describe what happened*

The investigation was conducted at Phan Waterfall, Palian District, Trang Province. The purpose of this investigation was to study the water quality of the waterfall by collecting data directly from the site. Water quality measurements were carried out using simple scientific instruments. The pH value of the water was measured using pH paper to determine the acidity and alkalinity of the water. Dissolved oxygen in the water was measured using a dissolved oxygen (DO) meter. Water transparency was measured using a transparency tube, and water transparency was measured using a transparency tube. Each parameter was measured three times to increase the accuracy and reliability of the data. All results were recorded carefully in a data table during the investigation. After completing the measurements, the collected data were analyzed by calculating the average value and comparing them with standard water quality criteria to evaluate the overall water quality of Phan Waterfall.

This research was conducted at Phan Waterfall, Palian District, Palian, Trang Province  
It is located at latitude 7.237808 degrees north and longitude: 99.843142

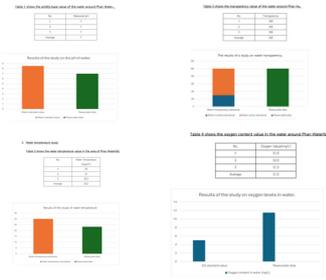


## Results

### Analyzing Data

The dissolved oxygen values were 11.0, 12.0, and 11.5 mg/L, resulting in an average of 11.5 mg/L, which is above the minimum standard of 5 mg/L and suitable for aquatic organisms. Water temperature measurements of 24.0°C, 21.0°C, and 24.5°C gave an average of approximately 23.2°C, which is appropriate for a natural waterfall environment.

The water transparency was measured at 100 cm, indicating very clear water within acceptable standards. The pH value was neutral, showing that the water is neither acidic nor alkaline and suitable for environmental use.



## GLOBE Badges

1. Be a Collaborator  
All team members worked together to collect and analyze water quality data at Phan Waterfall. Each member had a clearly defined role, such as measuring pH, dissolved oxygen, temperature, and water transparency, as well as recording and analyzing data. Collaboration helped ensure accurate data collection and allowed team members to support one another during the investigation. Working together improved efficiency, reduced errors, and strengthened the overall quality of the research.
2. Be a Data Scientist  
Students analyzed their own collected data, including pH, dissolved oxygen, water temperature, and transparency. The data were compared with standard water quality criteria to evaluate suitability for aquatic life and community use. Limitations of the data include a small number of sampling times and measurements from only one location. However, the data provide useful insights into the current water quality of Phan Waterfall and can be used for future monitoring.
3. Make an Impact  
The research was inspired by concern for local water quality at Phan Waterfall, an important natural resource for the community. The findings show that the water quality is suitable according to standard criteria. This information can raise awareness about the importance of protecting natural water sources and encouraging the community to maintain cleanliness and conservation practices. The study supports positive environmental awareness and sustainable use of local water resources.
4. Be a STEM Professional  
Students followed scientific methods based on GLOBE protocols, which enhanced accuracy and consistency in data collection. Guidance from teachers and reference to standard scientific procedures helped improve precision and supported meaningful interpretation of results. This experience allowed students to practice skills used by real STEM professionals in environmental science.

## Discussion

From the study of water quality in the area of Phan Waterfall at Palian District by measuring the acidity-base value, water transparency, water temperature, and oxygen content in the water, it was found that most of the water quality values were within the water quality standards for natural water sources.

The results of the study showed that the water is very transparent. It can be clearly seen at a depth of more than 100 centimeters. The average oxygen content in the water is  $11.5 \pm 0.5$  milligrams per liter. This is higher than the benchmark, indicating that the water is good quality. The average water temperature was  $23.2 \pm 1.9$  degrees Celsius, which is at a level suitable for the environment of the waterfall site. Therefore, it can be concluded that the water around Phan Waterfall is good quality and suitable for the life of aquatic creatures. However, water quality should be monitored continuously to maintain good water quality.

## Conclusions

#### Conclusion

Based on the results of this study, the water quality at Phan Waterfall, Palian District, Trang Province, was found to be suitable according to standard water quality criteria. The measured pH value was neutral, the water transparency reached the minimum standard of 100 cm, the average water temperature was 23.2°C, and the average dissolved oxygen concentration was 11.5 mg/L. These results clearly support the conclusion that the water quality at Phan Waterfall is appropriate for aquatic organisms.

The conclusions were reached by collecting water quality data using standard GLOBE protocols, conducting repeated measurements, and comparing the results with accepted water quality standards. The consistency of the measured values indicates reliable data and supports the overall assessment of good water quality.

#### Next Steps and Future Improvements

To improve the study, future research should include data collection over longer periods and during different seasons to observe changes in water quality over time. Increasing the number of sampling locations along the waterfall would also improve data accuracy and representativeness. Using digital sensors and data loggers could enhance measurement precision.

Future research could include additional water quality parameters such as turbidity, conductivity, and biological indicators. Long-term monitoring following GLOBE Water Quality Protocols would help track environmental changes. The results of this study can be used to raise community awareness and encourage conservation of the waterfall.

Future studies may apply advanced GLOBE protocols related to hydrology and aquatic ecosystems. Guidance from a project mentor helped students connect scientific instruments, follow proper procedures, and accurately interpret results. Working with a mentor improved confidence, data quality, and understanding of real-world environmental science practices.

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