A Comparative Study of Water Quality in Natural Ponds and Concrete Ponds at Wichienmatu School,Trang, Thailand

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Abstract

The research on comparing the water quality in natural ponds and concrete ponds at Wichienmatu School, Trang Province, aims to study the water quality in these two types of ponds within the school. The water quality was assessed by measuring pH levels, water temperature, water transparency, and dissolved oxygen content. The experiment found that The study found that the water quality in the natural pond and the concrete pond differs significantly. The pH level in the natural pond was 7.6, indicating a slightly alkaline condition, while the pH level in the concrete pond was 7.0, which is neutral. However, both values remain within a suitable range for aquatic life. Regarding water temperature, the concrete pond had a higher average temperature of 32.33°C, compared to 28.33°C in the natural pond. This difference may be due to the concrete pond's ability to absorb and retain heat more effectively than the natural pond. Additionally, the dissolved oxygen (DO) concentration was higher in the concrete pond, averaging 3.67 mg/L, while the natural pond had a lower average of 2.0 mg/L. This difference could result from variations in water circulation and biological composition between the two ponds. Meanwhile, water transparency was greater in the natural pond, suggesting a lower presence of suspended solids and microorganisms compared to the concrete pond.

Based on the findings, it can be concluded that the natural pond provides a more balanced biological environment as it supports the survival of aquatic organisms under natural conditions. However, the natural pond tends to contain more suspended solids and organic matter, which may impact water quality and cleanliness. If the water is to be used for consumption, additional treatment may be required to ensure its suitability for use.

Keywords: Concrete pond, Natural pond, Water quality, Wichienmatu School

Introduction

Research Question

Are there significant differences in water quality between natural ponds and concrete ponds?

Research Hypothesis

The water quality in the concrete pond at Wichienmatu School differs from the natural pond.

Study location

Wichienmatu School.

Materials and Equipment

Universal indicator paper (pH paper)

Thermometer

Secchi disk

Dissolved oxygen test kit

Sample containers

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Research Procedure

Study Site Selection

The study was conducted at designated locations within the natural pond and the concrete pond at Wichienmatu School.

Part 1: Measuring pH Using pH Paper

Part 2: Measuring Water Temperature Using a Thermometer

Part 3: Measuring Water Transparency Using a Secchi Disk

Part 4: Measuring Dissolved Oxygen Levels

Results

Table 1: pH Values of Water from Natural Ponds and Concrete Ponds at Wichienmatu School, Trang Province

Measurement	pH value	
	Water in Natural Ponds	Water in Concrete Ponds
1st time	7	7
2nd time	8	7
3rd time	7	7
Average	7.67	7

Research Results Part 1

The pH measurement results indicate that the average pH of the natural pond water is 7.6, which falls within the slightly alkaline range. In contrast, the average pH of the concrete pond water is 7.0, which is neutral. The comparison of pH values between the two water sources shows that the natural pond water is slightly more alkaline than the concrete pond water. However, both values remain within a range suitable for the survival of aquatic organisms.

Table 2: Water Temperature Measurements from Natural Ponds and Concrete Ponds at Wichienmatu School, Trang Province

Measurement	Temperature (°C)	
	Water in Natural Ponds	Water in Concrete Ponds
1st time	28	33
2nd time	29	32
3rd time	28	32
Average	28.33	32.33

Research Results Part 2

The water temperature measurements show that the natural pond water has an average temperature of 28.33°C, while the concrete pond water has an average temperature of 32.33°C, which is significantly higher. This temperature difference may be attributed to the structure of the concrete pond, which absorbs and retains heat from sunlight more effectively than the natural pond.

Table 3: Water Transparency Measurements from Natural Ponds and Concrete Ponds at Wichienmatu School, Trang Province

Measurement	Transparency (m)	
	Water in Natural Ponds	Water in Concrete Ponds
1st time	> pond depth	0.47
2nd time	> pond depth	0.43
3rd time	> pond depth	0.45
Average	> pond depth	0.45

Research Results Part 3

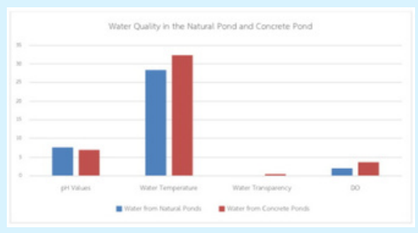
The water transparency measurements reveal that the natural pond water is less transparent than the concrete pond water due to the accumulation of sediments and biological activities occurring naturally. The average transparency of the natural pond water is 0.45 meters, indicating a higher presence of suspended solids and microorganisms compared to the concrete pond water.

Table 4: Dissolved Oxygen Concentration from Natural Ponds and Concrete Ponds at Wichienmatu School, Trang Province

Measurement	Dissolved oxygen (mg Oxygen/L)	
	Water in Natural Ponds	Water in Concrete Ponds
1st time	2.0	4.5
2nd time	2.0	3.5
3rd time	2.0	3.0
Average	2.0	3.67

Research Results Part 4

The dissolved oxygen measurements indicate that the natural pond water has an average dissolved oxygen level of 2.0 mg/L, which is lower than that of the concrete pond water, which has an average dissolved oxygen level of 3.67 mg/L. This difference in dissolved oxygen levels may result from variations in water movement, the presence of aquatic organisms, and biological processes occurring in each water source.



Bar Chart Showing the Average Water Quality Measurements from the Natural Pond and Concrete Pond

From the bar chart displaying the average values of pH, temperature, dissolved oxygen (DO), and water transparency, it was found that the ph level in the natural pond is slightly higher than that in the concrete pond, but both remain within a suitable range for aquatic life.
Meanwhile, the water temperature in the concrete pond is significantly higher than in the natural pond, likely due to the concrete structure's ability to absorb and retain heat.
Additionally, the dissolved oxygen (DO) concentration in the concrete pond is higher than in the natural pond, which may affect the ability of aquatic organisms to survive. At the same time, the water transparency in the natural pond is greater than in the concrete pond, indicating a lower presence of suspended particles. Based on the analysis, it can be concluded that the environmental conditions of water in the natural and concrete ponds differ significantly, which may impact the aquatic ecosystem and overall water quality in each pond.

Conclusion and Discussion

The study found that the water quality in the natural pond and the concrete pond differs significantly. The pH level in the natural pond was 7.6, indicating a slightly alkaline condition, while the pH level in the concrete pond was 7.0, which is neutral. However, both values remain within a suitable range for aquatic life. Regarding water temperature, the concrete pond had a higher average temperature of 32.33°C, compared to 28.33°C in the natural pond. This difference may be due to the concrete pond's ability to absorb and retain heat more effectively than the natural pond. Additionally, the dissolved oxygen (DO) concentration was higher in the concrete pond, averaging 3.67 mg/L, while the natural pond had a lower average of 2.0 mg/L. This difference could result from variations in water circulation and biological composition between the two ponds. Meanwhile, water transparency was greater in the natural pond, suggesting a lower presence of suspended solids and microorganisms compared to the concrete pond.

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