Study of Water Quality and Its Relationship with Plankton Types in Canal Area of Pru-Chee.

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Abstract

This study examines the physical and chemical water quality and the relationship between plankton and water quality in Pru Chi Public Park, Khok Lor Subdistrict, Mueang District, Trang Province. The research was conducted over two months. Water samples were collected from three points along the pond's edge, with three samples taken at each point. The measured parameters included phytoplankton, zooplankton, temperature, pH, dissolved oxygen (DO), nitrate, and alkalinity.

The results showed that the average water temperature was 28°C, DO was 4.5 mg/L, pH was 7, water hardness was 195.0 mg/L, and nitrate was 10.0 mg/L. These values were within acceptable limits for sustaining aquatic life. However, for domestic use, the water requires standard disinfection and treatment.

Plankton analysis revealed 16 genera of phytoplankton, including Euglena, Scenedesmus, and Oocystis, and 19 genera of zooplankton, such as Colurella, Uncinata, and Vorticella, along with Rotifera and Cyclopoid copepods. The presence of diverse plankton suggests that the water quality in this area can support a variety of aquatic organisms.
Keywords: Water Quality, Plankton

Research Question

The objectives of the research
1. To study the physical and chemical water quality in the Pru-Chee public park area.
2. To study the relationship between plankton as an indicator of water quality in the Phru Chee public park area.

Research questions
1. What is the physical and chemical water quality like in the Pru-Chee public park area?
2. How do the types of plankton indicate the water quality in the Phru Chi Public Park area?

Research hypothesis
1. The physical and chemical water quality in the Pru-Chee public park area, such as temperature, pH, DO, nitrate, and alkalinity measurements, will show low values.
2. The types of plankton indicate that the water quality in the Pru-Chee Public Park area is polluted.

Introduction

Water is an essential resource for the survival of all living organisms and plays a crucial role in ecosystems by maintaining environmental balance and providing habitats for aquatic life. The quality of water directly affects biodiversity and the long-term sustainability of ecosystems. If water quality deteriorates, it can lead to harmful effects on aquatic organisms and humans who depend on water for various purposes, including drinking, daily use, and agriculture. Poor water quality can disrupt food chains, decrease oxygen levels, and lead to the accumulation of harmful substances, which may cause long-term environmental issues. Therefore, regular monitoring of water quality is necessary to detect changes, prevent potential risks, and ensure the health of aquatic ecosystems.

The water source examined in this study is a canal within Phru Chee Public Park, located in Khok Lor Subdistrict, Mueang District, Trang Province. This natural water body plays an essential role in the local community by supporting biodiversity and maintaining ecological balance. Phru Chee is a wetland ecosystem that serves as a habitat for various species of aquatic and terrestrial organisms. Additionally, the park is a recreational area that provides water for different activities, including agriculture and fisheries. However, human activities and environmental changes may influence the water quality, necessitating scientific assessment to ensure its sustainability.

The research team conducted a study to assess the water quality in this area by measuring several parameters, including transparency, temperature, pH levels, dissolved oxygen (DO) concentration, and plankton diversity. These indicators provide valuable insights into the environmental conditions of the water body and the overall health of the ecosystem. Understanding these factors allows for a more comprehensive evaluation of water quality, helping to identify potential threats and implement appropriate conservation measures. The collected data will contribute to conservation efforts and guide future water resource management strategies, ensuring the sustainability of this valuable natural resource for both the environment and the local community.

Research Methods

Determination of study sites
The study area is the Pru-Chee public park, located in Kokklo Subdistrict, Mueang District, Trang Province. Water samples were collected from three points along the pond's edge to reflect the environmental differences in each area. The water samples were taken approximately 1 meter from the pond's edge at the same time (on the same day) to minimize variation caused by temporal factors.

Research methodology
1. Research preparation stage
1) Define the research topic and select the subject of study.
2) Conduct a literature review and gather relevant knowledge and theories related to the research.
3) Define the objectives of the study.
4) Determine the sampling points in the study area.
   2. Implementation stage
1) Plan the research activities.
2) Survey the area to be studied.
3) Collect water samples for measurement, including the relevant factors to be studied: geographic coordinates, pH, water temperature, nitrate, alkalinity, oxygen, and transparency.

Water sampling
1) Define the water sampling points and survey the water source area.
2) Collect water samples along the pond's edge at 3 points, 3 times per point, using a plankton net and water sampling bottles. Record the results.
3) Measure the pH of the water using litmus paper, read the value, and record the result.
4) Measure the water temperature using a thermometer at a depth of 10 centimeters. Wait 5 minutes, then read the value and record the result.
5) Measure the dissolved oxygen (DO) by testing the collected water sample with an oxygen test kit. Read the value and record the result.
6) Measure the water transparency using a Transparency Tube, immersing it in the water at 3 points, 3 times per point. Read the value and record the result.
7) Measure the alkalinity and nitrate concentration by testing the collected water sample with an alkalinity and nitrate test kit. Read the value and record the result.

Results and conclusion of the research
Geographic coordinates

Zone	Geographical Coordinates	
	Latitude (N)	Longitude (E)
Pru-Chee public park	7.54040	99.61558
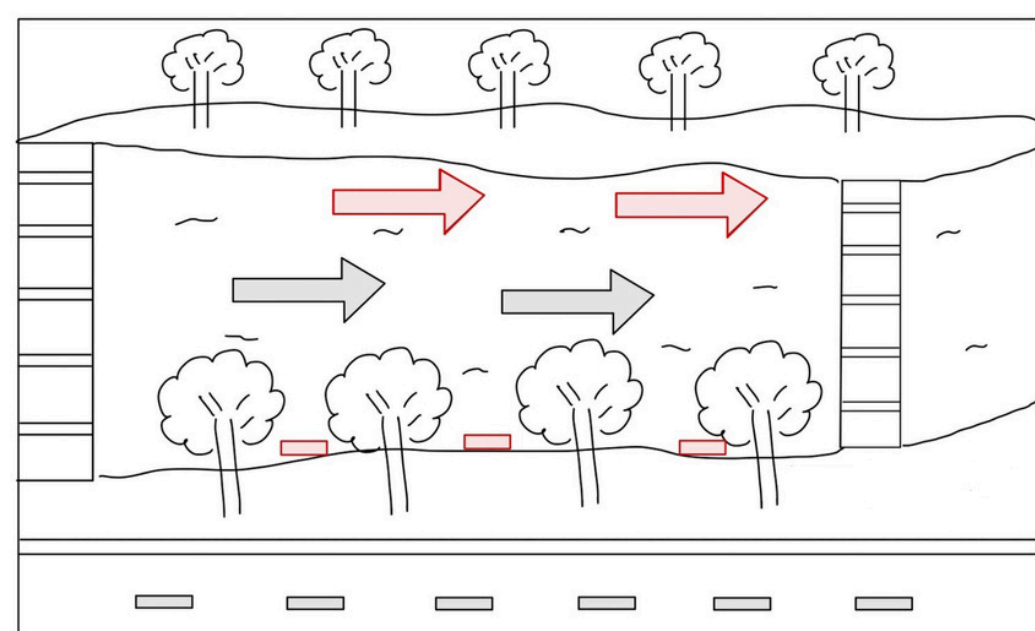
The image showing the direction of water flow, water collection, and the water storage area
*Note
→ Show the direction of water flow
→ Show the direction of water collection
→ Show the water storage area

GLOBE Badges

I AM A STUDENT RESEARCHER
We chose this emblem because we are students who conduct research seriously from formulating questions, gathering information, collecting and analyzing data to presentour findings. These processes are essential to being a researcher and reflect our commitment to learning and developing scientific skills. Receiving this emblem serves as confirmation that we have followed the research process correctly and are capable of presenting our work systematically.

I AM A COLLABORATOR
Our group worked together as a team in every step—from planning meetings, task delegation, to conducting surveys and collecting data—with everyone fully participating in these processes. In addition, we engaged with the relevant communities to ensure that our research reflected their issues and needs. This collaboration at every stage of the research process enabled us to achieve our common goals effectively and successfully.

I AM A DATA SCIENTIST
Our group encountered challenges and addressed them by seeking answers through the collection, analysis, and interpretation of data, which we then used to solve problems and better understand our surroundings. We applied principles from statistics, mathematics, and technology to ensure our analysis was accurate and to present the data in an easily understandable manner. Being recognized in this role reflects our ability to effectively use data and creatively develop new logical approaches.

Results

Measured values of the water source.
Table 1 : Measured values of the water source

Survey Point	Measured values of the water source.					
	nitrate (mg / L)	Dissolved Oxygen (mg / L)	alkalinity (mg / L)	Transparency	pH	Temperature (°C)
1	10	5	195	78.2	7	28
2	10	2.5	205	40.55	7	28
3	10	6	185	60.5	7	28
Average	10.0 ± 0.0	4.5 ± 1.47	195.0 ± 8.16	59.75 ± 15.38	7 ± 0.0	28.0 ± 0.0

1. Nitrate
Measurement of nitrate in the water source revealed an average value of 10.0 mg/L, as shown in Table 1.

2. Oxygen
Measurement of dissolved oxygen in the water source revealed an average value of 4.5 mg/L, as shown in Table 1.

3. Alkalinity
Measurement of alkalinity in the water source revealed an average value of 195.0 mg/L, as shown in Table 1.

4. Turbidity
Measurement of turbidity in the water source revealed an average value of 59.75, as shown in Table 1.

5. pH
Measurement of pH in the water source revealed an average value of 7, as shown in Table 1.

6. Temperature
Measurement of water temperature in the water source revealed an average value of 28 °C, as shown in Table 1.

Image showing aquatic organisms in the water source
Table 2 : Image showing aquatic organisms in the water source

Living organisms.	Names of living organisms.
	Scenedesmus
	Euglena
	Oocystis
	Colurella Uncinata
	Cyclopoid Copepod
	Rotifera

Table 3 : Aquatic Organisms in the Water Source

Type of organism encountered	amount
Scenedesmus	5
Euglena	6
Oocystis	5
Colurella Uncinata	7
Cyclopoid Copepod	6
Rotifera	6

According to the study, 16 genera of phytoplankton were found, including Euglena, Scenedesmus, and Oocystis. For zooplankton, 19 genera were identified including Colurella, Uncinata, and Vorticella; one phylum, Rotifera, and one order, Cyclopoid copepod, were also recorded as shown in Table 3.
Based on Table 4, the phytoplankton score used in the water quality assessment indicated that the water is classified as wastewater.

Discussion and Conclusions

Summary and Discussion of the Research Findings
1. Based on the study conducted in the Phru Chi Public Park canal, the water had an average temperature of 28°C, an average dissolved oxygen level of 4.5 mg/L, an average turbidity of 59.75 NTU, an average hardness of 195 mg/L, and an average nitrate concentration of 10 mg/L. These values correspond to the water quality standard for surface water sources classified as Type 3.
2. The study identified 16 genera of phytoplankton, including Euglena, Scenedesmus and Oocystis. For zooplankton, 19 genera were found, including Colurella, Uncinata, and Vorticella. Additionally, one phylum, Bdelloid Rotifer, and Cyclopoid copepod, belonging to the order Cyclopoida, were recorded

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