Research Name : Study of Water Quality and Types of Plankton in the Canal Area of Pru-Chee Public Park.

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Abstract

This study aims to examine the physical and chemical water quality and the relationship between plankton and water quality in the area of Pru-Chee Public Park, Khok Lor Subdistrict, Mueang District, Trang Province. The research was conducted over a period of two months. Water samples were collected from three points along the edge of the pond, with three samples taken at each point. The collected parameters included phytoplankton and zooplankton along with measurements of temperature, pH, DO (dissolved oxygen), nitrate, and alkalinity.

The study found that the physical and chemical water quality parameters were as follows: the average water temperature was 28°C, the average dissolved oxygen (DO) level was 4.5 mg/L, the average pH was 7, the average water hardness was 195.0 mg/L, and the average nitrate level was 10.0 mg/L.The water quality in the Pru-Chee Public Park area was found to be within acceptable limits for sustaining aquatic life when comparison to standard values. However, for domestic and consumption purposes, the water would require standard disinfection and general water treatment processes before use.

The study of phytoplankton and zooplankton, conducted using a plankton net and water sampling bottles from each location at a depth of approximately 10 centimeters below the surface, revealed the presence of 16 genera of phytoplankton, including *Euglena, Scenedesmus,* and *Oocystis*. For zooplankton, 19 genera were identified including *Colurella, Uncinata,* and *Vorticella*, along with one phylum, *Rotifera*, and *Cyclopoid copepod*, belonging to the order *Cyclopoida*, were recorded. The presence of multiple genera of phytoplankton and zooplankton indicates for the water quality in this area to support a diverse range of aquatic organisms to be capable of thriving in this environment.

Keywords: Water Quality, Plankton

Acknowledgements

This research on "The Study of Water Quality and Its Relationship with the Types of Plankton in the Canal Area of Pru-Chee Public Park" was successfully completed thanks to the generous support and valuable guidance we received.

We would like to express our sincere gratitude to Mr. Sakda Phaisomboon, Director of Wichienmatu School, for approving the budget for this educational research. We also extend our heartfelt thanks to Ms. Jiraporn Sirirat for facilitating the research process at various locations and for continuously providing suggestions, and careful revisions to improve our project.

We would like to thank the SMP Special Classroom Project of Wichienmatu School for providing support in terms of equipment and scientific laboratories, which greatly facilitated our research. Their support played a crucial role in the successful completion of this study.

Project Team

Mr. Thanakrit Koian

Miss Nicha Damrongsakwirun

Introduction

Water is an essential resource for the survival of living organisms and plays a crucial role in ecosystems, both in maintaining environmental balance and providing habitats for aquatic life. The quality of water directly impacts biodiversity and the sustainability of ecosystems. If water quality deteriorates, it can affect aquatic life and humans who rely on water for consumption, use, and agriculture. Therefore, monitoring water quality is vital for preventing and addressing potential long-term issues in aquatic ecosystems. The water source used for this study is the canal in the Phru Chee public park area, which is a natural water source that plays an important role for the surrounding community. Phru Chee is a wetland that helps maintain the local ecological balance and serves as a habitat for various species of animals. Additionally, it is a recreational area for the public and water to be used for various activities, such as agriculture.

The research team studied water quality data from the area under investigation by assessing transparency, temperature, pH levels, dissolved oxygen (DO) concentration, and the types of plankton found. These factors can indicate the environmental conditions of the water source and reflect the level of ecological balance. The research team conducted the study and collected data to provide useful information for the conservation and development of future water management strategies.

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 types of plankton in the Pru-Chee Public Park Canal area.

Research questions

1. What is the physical and chemical water quality like in the Pru-Chee public park area?
2. What do the types of plankton indicate about the water quality in the Pru-Chee 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.

Materials and equipment and research methodology

1) Oxygen test kit (DO)
2) Nitrate test kit
3) Litmus paper
4) Alkaline test kit
5) Thermometer
6) Transparency tube
7) Water sampling equipment
8) Plankton net
9) Microscope
10) Geographic coordinate measuring device

GLOBE Protocols

Hydrosphere

Biosphere

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.

Analysis and conclusion of the research

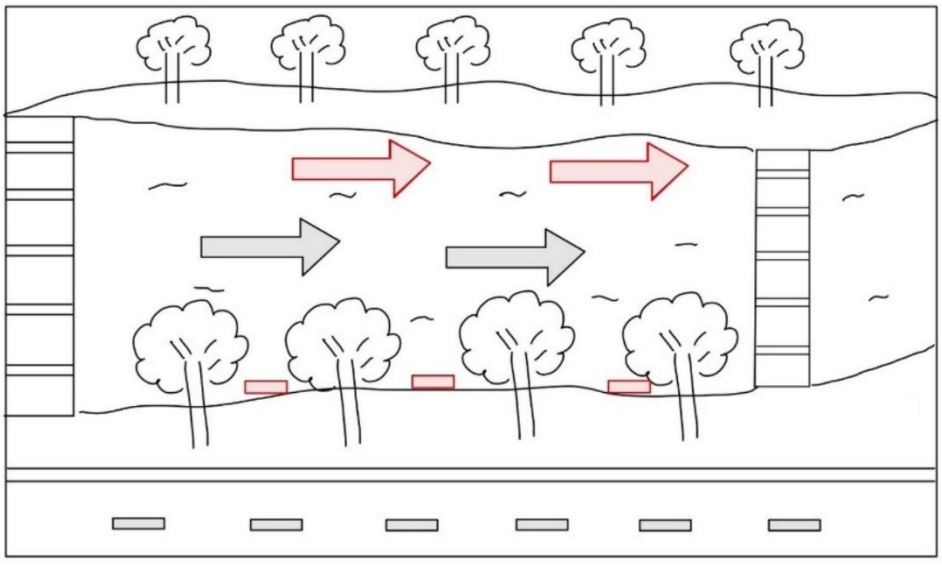
1) Analyze the collected data and compare the relationships using statistical methods, including the mean and standard deviation (SD), for pH, water temperature, nitrate, alkalinity, oxygen, and turbidity.
2) Summarize the experimental results.

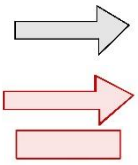
Results and conclusion of the research

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

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

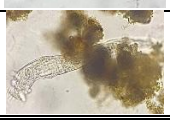
Living organisms.	Names of living organisms.
	Scenedesmus
	Euglena
	Oocystis
	Colurella Uncinata
	Cyclopoid Copepod
	Rotifera

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

Table 4 : Scores of Organisms in Water Bodies

Type of organism encountered	score
Scenedesmus	8
Euglena	10
Oocystis	6
Colurella Uncinata	5
Cyclopoid Copepod	4

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 *Cyclopoid copepod*, belonging to the order *Cyclopoida*, were recorded, 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.

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.

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.

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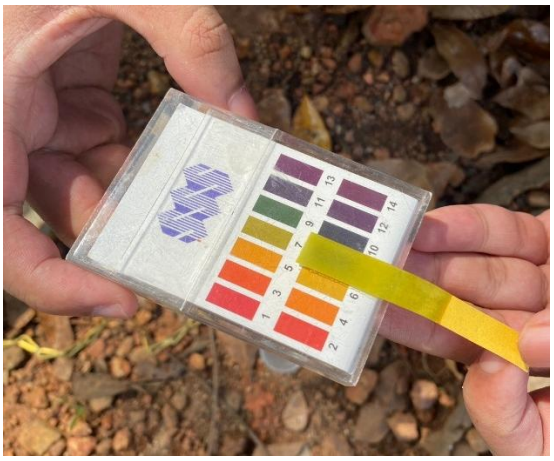
Appendix

Collected a water sample from Point 1.



Measured the pH at Point 1 using litmus paper.

Measured the DO (Dissolved Oxygen) at Point 3."

Collected a water sample from Point 2."

Collected a water sample from Point 3."

Studied plankton using a microscope.

Survey Point	Measured values of the water source.					
	nitrate (mg / L)	Dissolved Oxygen (mg / L)	alkalinity (mg / L)	Transparency	pH	Temperature (℃)
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

Table showing the measured values of the water source.