Affects the diversity of plankton from water sources in bua pond at Khao Pae Choi

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ABSTRACT

This study examines the water quality affecting plankton diversity in the Bua pond at Somdej Phra Srinakarin 95 Park (Khao Pae Choi), Trang Province, Thailand. The objectives are to analyze the water quality parameters influencing plankton diversity and to classify the types of plankton found in the pond .The physical water quality assessment revealed an average pH of 6.67 ± 0.58, a temperature of 27.67 ± 0.33°C, water transparency of 51.09 ± 22.59 cm, and a dissolved oxygen (DO) level of 6.09 ± 0.09 mg/L, indicating a normal oxygen content. Cloud cover was categorized into four types: stratus clouds (25.14%), cumulus clouds (21.5%), stratocumulus clouds (14.45%), and altostratus clouds (10.92%). A total of 16 plankton species were identified, including Micrasterias sp., Monactinus simplex, Euglena sp., Desmodesmus tropicus, Dictyosphaerium granulatum, Cymbella sp., Peranema sp., Lepocinclis spirogyroides, Volvox sp., Vorticella sp., and Paramecium spp.. The findings indicate a diverse presence of plankton, including protozoa, cyanobacteria, and animal embryos, influenced by the pond 's water quality conditions.

Keywords : Somdej Phra Srinakarin Park 95, Plankton, Water Quality, bua pond

Research objectives

To study the water quality that affects the diversity of plankton from the water source in the bua pond and study the species of plankton in the Somdet Phra Srinakarin Park. 95 (Khao Pae Choi), Trang Province

Research questions

Does water quality affect plankton diversity?

Research hypotheses

Water quality affecting the diversity of plankton species

Introduction

Water is essential for all living things, supporting survival, agriculture, industry, and ecosystems. Water quality impacts aquatic life and plankton, which include phytoplankton (responsible for photosynthesis and oxygen production) and zooplankton (which controls phytoplankton levels). A plankton bloom can reduce oxygen levels, harming aquatic life. "Somdej Phra Srinakarin 95 Park" (Khao Pae Choi) in Trang, Thailand, is a large park with diverse ecosystems, including water sources and forests. This research focuses on studying the water quality and plankton diversity in Bua Pond within the park to understand their role in water quality changes, aiding water resource management and ecosystem balance.

OPTIONAL BADGES

I AM A STUDENT RESEARCHER

In our research study, we investigated the water quality influencing plankton diversity. We conducted the study systematically and rigorously, following scientific principles. Our research examined water temperature, pH, water transparency, dissolved oxygen levels, and cloud cover, all of which affect plankton diversity. We aim to further develop and expand upon this research

I AM A DATA SCIENTIST

In our water quality research study, we examined water temperature, pH, water transparency, and dissolved oxygen levels. By studying these factors that may affect plankton quality and diversity, we systematically processed and analyzed this data using statistical and mathematical analysis to ensure the most accurate results. This allows us to present or publish the information correctly and in an easily understandable manner. The data from this research can be further developed to study the natural relationships between plankton and their diversity, which affect water quality in the future.

I AM A COLLABORATOR

From the research, we worked together with unity and cooperation among the team members, starting from the joint meetings and planning the research area, conducting site surveys, and dividing responsibilities. Mr. Norawit Kraithep, the group leader of this research, prepared research documents that align with our study. Miss. Natkitta Jitboon and Misss. Chutimon Petcharat collected and translated research documents, and edited and reviewed the posters. All team members worked together, which allowed us to carefully and effectively verify and collect research data, ensuring the selection of the most accurate and reliable information for use in the study.

Research Method Materials and Methods

Materials

1) Microscope
2) Beaker
3) Plankton net
4) DO (Dissolved Oxygen) test kit
5) Slide and cover slip
6) Sample collection bottle
7) Thermometer
8) Dropper
9) pH paper
10) Secchi Disk
11) Measuring tape

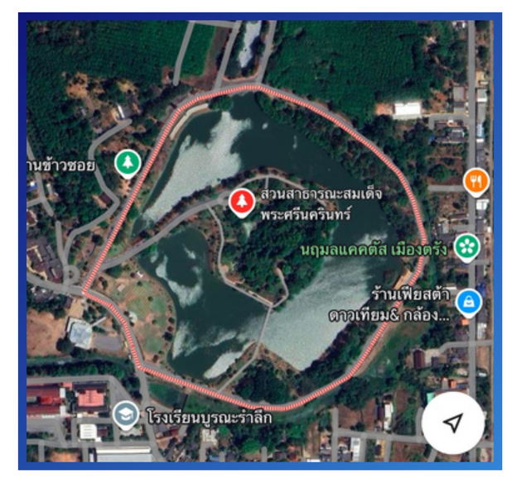
Research Methods

GLOBE protocols

- Hydrology Protocols
- *Atmosphere Protocols*

Study point determination

An area in Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Trang Province, by conducting a field survey to randomly collect water samples from the pond in Somdet Phra Srinagarindra Public Park, latitude 7°34'29" N, longitude 7°34'29" N."



1 Research Preparation Stage

1.1 Set the research topic and choose the subject to study.

1.2 Conduct research, gather knowledge, and review theories related to the research.

1.3 Define the study objectives.

1.4 Determine the sampling points within the study area.

2 Data Collection and Implementation Stage

Part 1: Water Sample Collection for Measurement According to GLOBE Principles

1. Survey and determine sample collection points in Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Trang Province. Three sample collection points are established.
2. Measure water temperature using a thermometer at a depth of 10 centimeters. Wait for 5 minutes, then read and record the value.
3. Measure the pH value of the water using pH paper. Read and record the value.
4. Measure water transparency using a Secchi disk. Immerse it into the water at three points, three times at each point. Read and record the value.
5. Measure the dissolved oxygen (DO) level by testing the collected water sample with an oxygen test kit. Read and record the value.

Part 2: Plankton Sample Collection for Study

1. Collect plankton samples for the study of plankton species.
2. Collect plankton samples using a plankton net and a water sample bottle.
3. Study plankton species using a microscope to identify different plankton species.

Part 3: Air Measurement

1. Measure air temperature using a thermometer, read and record the value.
2. Study cloud cover by calculating the average from four individuals, then record the result.

Analysis and Summary of Research Results

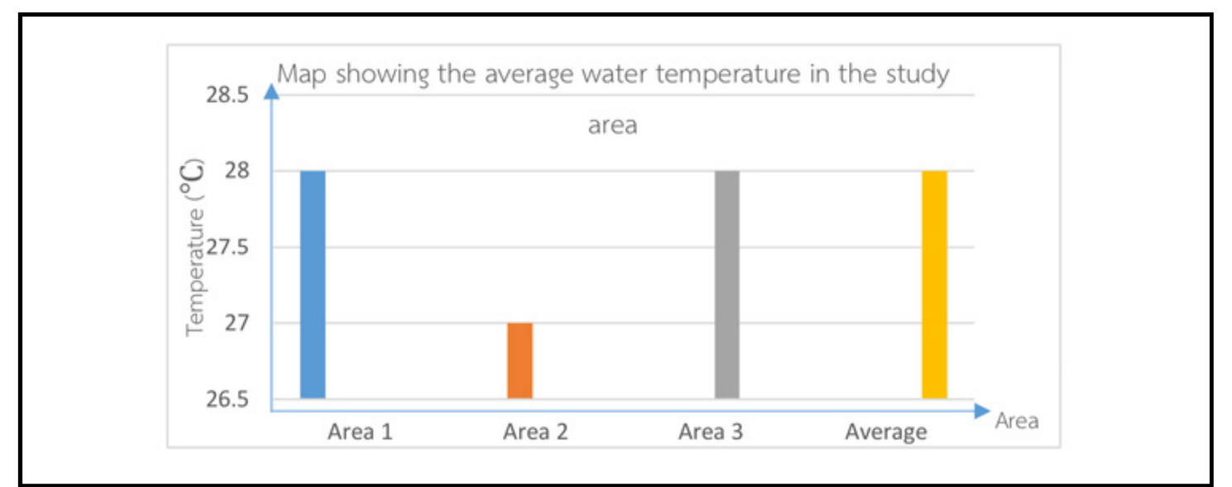
Zone	Geographic Coordinates	
	Latitude (N)	Longitude (E)
Somdet Phra Srinagarindra Park 95 (Khao Pae Choi)	7°34'29"N	7°34'29"N

From part 1: Geographic Coordinates, the study was conducted in Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Trang Province.

Part 2 shows the water temperature in the study area.

Zone	The first	The second	The third	Average (X̄) ±S.D.
Area1	27	29	28	28.0±1.0
Area2	28	28	27	27.67±0.58
Area3	27	28	27	27.33±0.58

From Part 2, the water temperature values in the study area were found to be the highest inArea 1, where the average water temperature value was measured ($\bar{x}$) 28.0±1.0 degrees Celsius,followed by the area. Area 2 measured the water temperature with an average value ($\bar{x}$) of 27.67±0.58 degrees Celsius and the least was area 3 where the water temperature was measured with an average value of ($\bar{x}$) 27.33±0.58 degrees Celsius.

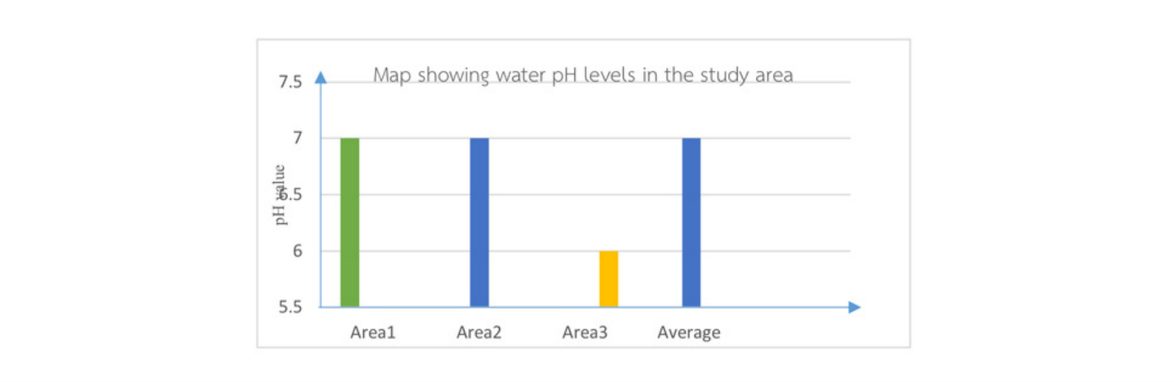


From the chart, it was found that the water in the bua pond at Somdej Phra Srinagarindra Park 95 (Khao Pae Choi), Trang Province The average temperature value was 28.0±0.72.

Part 3 shows the pH values in the study area.

Zone	The first	The second	The third	Average (X̄) ±S.D.
Area1	7	7	6	7.00±0.47
Area2	7	6	7	7.00±0.47
Area3	6	6	6	6.00±0.00

From part 3, the pH value of the area where the water was studied was found to be the highest in Area 1 and Area 2, where the average pH value ($\bar{x}$) was measured at 7.00±0.47, the least was in Area 3, where the average pH value ($\bar{x}$) was measured at 6.00±0.00.1

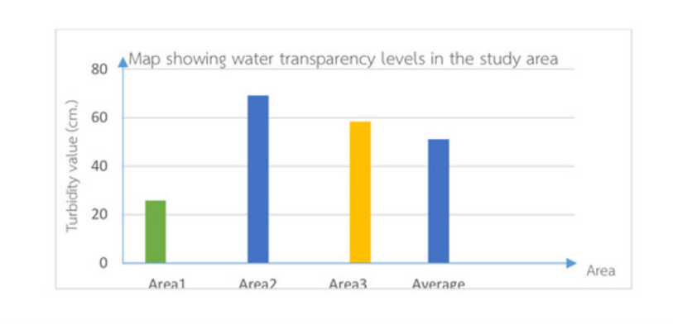


From the chart, it was found that the water in the lotus pond at Somdet Phra Srinagarindra Public Park 95 (Khao Pae Choi), Trang Province The average pH value is 7.0±0.47.

Part 4 shows the transparency values of water in the study area.

Zone	The first	The second	The third	Average (X̄) ±S.D.
Area1	21.59	25.34	30.45	25.79±3.63
Area2	69.8	70.3	67.45	69.18±1.24
Area3	45.7	83.00	46.23	58.31±17.46

From part 4, the water transparency values in the study area revealed that area 2 had the highest average transparency (69.18±1.24), followed by area 3 with an average transparency of 58.31±17.46, and the lowest transparency was found in area 1 with an average of 25.79±3



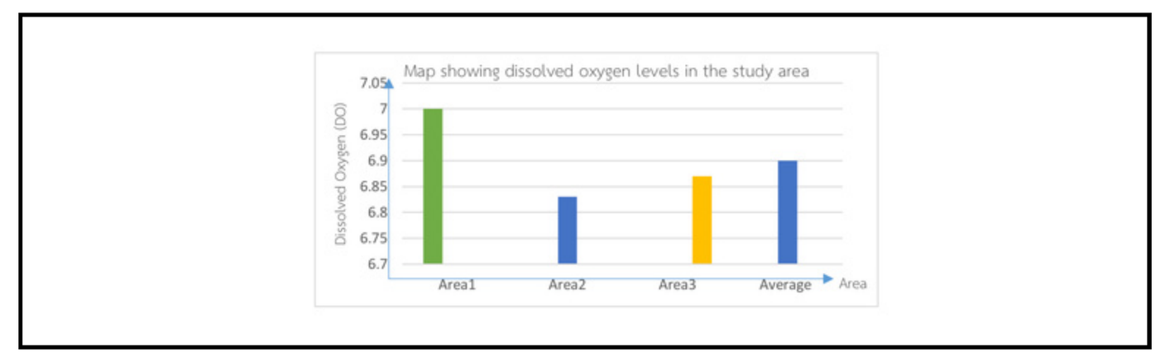
From the chart, the average water transparency in the lotus pond at Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Trang Province, is 51.09±7.44.

Analysis and Summary of Research Results

Part 5: Dissolved Oxygen Values at the Study area

Zone	The first	The second	The third	Average (X̄) ±S.D.
Area1	5.5	7.5	8.0	7.0±1.32
Area2	7.0	6.5	7.0	6.83±0.29
Area3	6.6	7.5	. 6.5	6.87±0.55

From part 5, the dissolved oxygen values in the study area show that area 1 had the highest average dissolved oxygen (7.0±1.32), followed by area 3 with an average of 6.87±0.55, and the lowest average dissolved oxygen was found in area 2 (6.83±0.29).



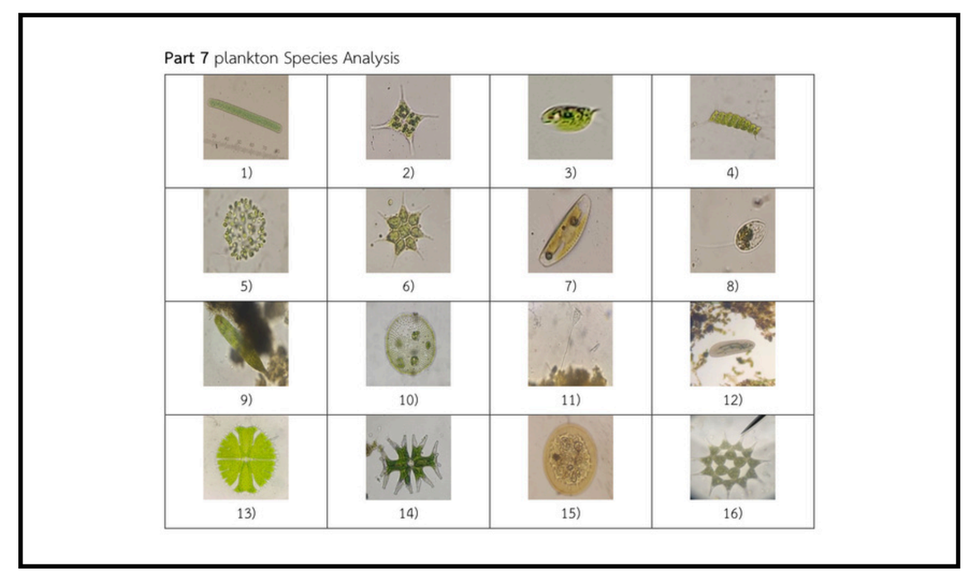
From the chart, the average dissolved oxygen in the bua pond at Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Trang Province, is 7.0±0.39.

Part 6: Physical Water Quality Analysis

Type	Area1	Area2	Area3	Average (X̄) ±S.D.
Temperature (°C)	28.0	27.67	27.33	27.67±0.33
pH value	7.00	7.00	6.00	6.67±0.58
Transparency	25.79	69.18	58.31	51.09±22.59
Dissolved Oxygen (DO)	7.0	6.83	6.87	6.09±0.09

From part 6, the analysis of physical water quality parameters revealed that all three areas had an average pH value of 6.67±0.58, indicating a neutral level. The average temperature was 27.67±0.33 degrees Celsius. The average turbidity was 51.09±22.59 cm. The average dissolved oxygen (DO) was 6.09±0.09 mg/L, suggesting a normal level of oxygen in the water.

Part 7 plankton Species Analysis



From the plankton species table, Figure 1.) Micrasterias apiculate, 2)Misrasterias mahabuleshwarensis, 3) Arcella discoides, 4)Monactinus simplex, 5) Oscillatoria sp., 6) Monactinus simplex, 7)Euglena sp., 8)Desmodesmus tropicus, 9) Dictyosphaerium granulatum,10) Monactinus simplex, 11) Cymbella sp., 12) Peraneme sp., 13) Lepocinclis spirogyroides, 14) Volvox sp., 15) Vorticella sp., 16)Paramecium spp

From part 7, a total of 16 plankton species were identified, including: Micrasterias apiculata, mahabuleshwarensis, Arcella discoides, Monactinus simplex, Oscillatoria sp.,Monactinus simplex, Euglena sp., Desmodesmus tropicus, Dictyosphaerium granulatum,Monactinus simplex, Cymbella sp., Peraneme sp., Lepocinclis spirogyroides, Volvox sp., Vorticella sp., Paramecium spp.

Part 8 : Cloud Cover Data

Type	Area1			Area2			Area3			Average (X̄) ±S.D.
	The first	The second	The third	The first	The second	The third	The first	The second	The third	
Stratus	97.5%	-	-	-	37.5%	-	55.0%	36.25%	-	25.14±33.68
Altostratus	-	-	-	98.25%	-	-	-	-	-	10.92±32.75
Stratocumulus	-	42.5%	-	-	-	-	-	-	87.5%	14.44±33.5
Cumulus	-	-	96.5%	-	-	97.0%	-	-	-	21.5±38.35

From part 8, cloud cover analysis revealed the presence of four cloud types. Stratus clouds exhibited the highest average occurrence (25.14), followed by Cumulus clouds with an average of 21.5. Stratocumulus clouds had an average occurrence of 14.45, while Altostratus clouds were the least frequent with an average of 10.92. All four cloud types appeared as distinct and separate formations.

Discussion of Research Findings

Part 1: Study of Physical Characteristics

The study of the physical characteristics of water quality in the lotus pond area revealed that: The average pH level was 6.67±0.58, indicating a moderate level. The average water temperature was 27.67±0.33°C. The average water transparency was 51.09±22.59 cm. The average dissolved oxygen (DO) level was 6.09±0.09 mg/L, indicating that the oxygen level in the water was within a normal range.

Part 2: Study of Plankton Species

The study identified 16 species of plankton in the lotus pond area, including: Micrasterias apiculata, Misrasterias mahabuleshwarensis, Arcella discoides, Monactinus simplex, Oscillatoria sp., Monactinus simplex,Euglena sp., Desmodesmus tropicus, Dictyosphaeriumgranulatum, Monactinus simplex, Cymbella sp., Peraneme sp., Lepocinclis spirogyroides, Volvox sp., Vorticella sp., and Paramecium spp.These findings indicate the presence of diverse plankton groups, including protozoa, cyanobacteria, and zooplankton larvae.

Part 3: Atmospheric Measurements

The study also measured air temperature in different locations within the study area: The highest average air temperature was recorded at Location 2, with 32.33±1.0°C. The second highest was Location 3, with 31.67±2.0°C.The lowest was Location 1, with 31.0±1.0°C. Additionally, cloud types were classified into four categories, with the following average values: Stratus clouds had the highest average value at 25.14. Cumulus clouds followed with an average of 21.5. Stratocumulus clouds had an average of 14.45.Altostratus clouds had the lowest average at 10.92. All four cloud types were distinctly separated into well-defined formations.

Conclusion

The study concluded that the water quality in the lotus pond of Somdet Phra Srinagarindra Public Park, located in Thap Thiang Subdistrict, Mueang Trang District, Trang Province, is influenced by factors such as water temperature, pH level, water transparency, dissolved oxygen levels, and cloud cover, which affect the diversity of plankton.The study identified 16 species of plankton in the research area. This research contributes valuable knowledge that can be further developed to study the ecological relationships of plankton and their diversity, which impact water quality in the future.Additionally, one species of aquatic organism, Dugesia spp., was found in the water. The study also recorded average measurements across the three study sites: water temperature 27.67±0.33°C, pH level 6.67±0.58 (moderate level), water turbidity 51.09±22.59 NTU, and dissolved oxygen (DO) 6.09±0.09 mg/L, indicating that the oxygen level in the water is within a normal range.

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