Title: A Study of Plankton Biodiversity in the Water Source of Sa Nae Daeng, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Na Ta Luang Subdistrict, Mueang Trang District, Trang Province.

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Abstract

This research, "A Study of Plankton Biodiversity in the Water Resources of Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Na Ta Luang Subdistrict, Mueang Trang District, Trang Province," aims to investigate the biodiversity of plankton in the water resources of Sa Nae Daeng Pond. The study examines water temperature, pH, dissolved oxygen (DO), cloud types, relative humidity, and air temperature.

The water quality study of Sa Nae Daeng Pond revealed an average water pH of 8, an average water temperature of 28.25°C, a dissolved oxygen (DO) range of 5.25 mg/l, and an average water transparency of 0.32 m. The average air temperature was 32.8°C, the average humidity was 51.95%, and the most prevalent cloud type was Cirrus, followed by Cumulus. The plankton biodiversity study identified 10 species of zooplankton, including *Dugesia* spp., *Ephemeroporus barroisi*, *Rotifer* sp., *Paramecium* sp., *Spirulina* sp., *Neidium productum*, *Phacus* sp., *Strongyloides stercoralis*, *Oscillatoria* sp., and *Odonata* sp. Three species of phytoplankton were identified : *Micrasterias furcata, Closterium* sp., and *Arcella discoides* Ehr.

Keywords: Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Na Ta Luang Subdistrict, Mueang Trang District, Trang Province, plankton, water quality, Sa Nae Daeng Pond.

Introduction

Background and Significance of the Project

Water is a natural resource essential for the survival of all living organisms. It is also a crucial factor in the development of various fundamental economic sectors. Plankton, meaning "drifting" or "wanderer," refers to organisms that float in water bodies with minimal resistance to currents. Due to their minute size, plankton are often difficult to see. However, microscopic examination of water samples reveals a diverse array of colorful plankton. This high diversity is attributed to the varying nutritional needs and environmental preferences of different plankton species. Plankton are broadly classified into phytoplankton and zooplankton, both of which are vital food sources for other aquatic organisms. Phytoplankton serves as the primary producer in the food chain, consumed by zooplankton, which are then eaten by juvenile fish and other aquatic animals, ultimately reaching humans. Thus, the species and abundance of all organisms in the food chain are inextricably linked. The species and abundance of phytoplankton dictate those of zooplankton, and so on, throughout the food chain. Environmental factors, therefore, play a critical role in determining phytoplankton species and abundance. Human activities, such as waste disposal into water bodies from communities and industries, disrupt this delicate balance, altering water properties and subsequently affecting plankton composition, with cascading effects on other organisms in the food chain.

Somdet Phra Srinagarindra 95 (Khao Pae Choi) Park, located in Na Ta Luang Subdistrict, Mueang Trang District, Trang Province, approximately 3 kilometers from the city center, was formerly known as Khao Pae Choi, named after its former owner, Mr. Choi. Upon his death, the land was donated to the government. The park features beautiful flora, a large pond, and a suspension bridge.

Therefore, the research team is interested in studying the biodiversity of plankton in the water source of Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 (Khao Pae Choi) Park, and the water quality, as well as the relationship between plankton and water quality. This study aims to establish a baseline for water quality management and to enhance the park's aesthetic appeal, as no prior research has been conducted in this area.

Objectives of the Research

To study the diversity of plankton in the water source of Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 (Khao Pae Choi) Park, Na Ta Luang Subdistrict, Mueang Trang District, Trang Province.

Research Question

Does the water quality of Sa Nae Daeng Pond affect the diversity of plankton?

Research Hypothesis

The water quality of Sa Nae Daeng Pond affects the diversity of plankton

Materials, Equipment, and Research Methodology

1.Cloud type observation chart
2.Beakers
3.500 mL water sample collection bottles
4.Secchi Disc
5.Microscope slides
6.Coverslips
7.Microscope
8.Plankton net
9.Universal indicator paper
10.Glass rod thermometer

11.Dissolved oxygen (DO) test kit
12.Temperature thermometer
13.Droppers
14.Measuring tape

Methodology of Measurement

GLOBE Measurement Methodology
Hydrosphere Measurement Methodology
Atmosphere Measurement Methodology

Study Site Determination

A straight line distance of approximately 50 meters is defined along the water source of Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 (Khao Pae Choi) Park, Na Ta Luang Subdistrict, Mueang Trang District, Trang Province 92000. Coordinates: Latitude 7.576598, Longitude 99.60093.

Research Methodology

1.Research Preparation Stage

1.) Define the research topic and select the study subject.

2.) Conduct literature review and gather knowledge and theories related to the research.

3.) Define the objectives of the study.

4.) Determine the sampling points within the study area

2.Implementation Stage

1.) Plan the research execution.

2.) Survey the research area.

3.) Collect water samples to study plankton species using a light microscope.

4.) Study the physical factors affecting plankton diversity in the water source at Somdet Phra Srinagarindra 95 (Khao Pae Choi) Park, Na Ta Luang Subdistrict, Mueang Trang District, Trang Province.

Part 1: Water Sampling

1.Determine water sampling points and survey the water source area.

2.Measure the pH of the water using universal indicator paper, read and record the results.

3.Measure the water temperature using a thermometer for temperature measurement at a depth of 10 centimeters, wait for 5 minutes, read the value, and then record the results.

4.Measure the dissolved oxygen (DO) level by taking the collected water and testing it with an oxygen test kit, read and record the results.

5.Measure the water transparency using a Secchi disk, immerse it in the water at 4 points, 3 times at each point, read and record the results, and observe the amount of cloud cover.

6.Measure the air humidity using a digital hygrometer.

Part 2: Plankton Sampling

1.Collect water samples along the pond's edge at 4 points, 3 times each, in a straight line over a distance of 50 meters. Use a plankton tow net and water sample bottles.

2.Study the plankton species using a light microscope. Capture images of the plankton with a mobile phone.

3.Identify the plankton species and record the results.

Analysis

1.Analyze and compare the relationships between the data using statistics, specifically the mean (X) and standard deviation (S.D.).

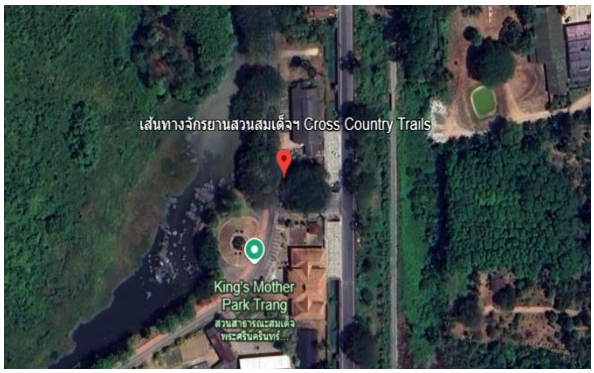
2.Estimate the percentage of cloud cover (out of 100%).

Research Results

Geographic CoordinatesThe study was conducted in the area of Somdej Phra Srinakarin 95 Park (Khao Pae Choi), Nataluang Subdistrict, Mueang Trang District, Trang Province 92000. The coordinates are shown in Table 1.

Table 1: Geographic Coordinates

Area	Geographic Coordinates	
	Latitude (N)	Longitude (E)
Sa Nae Daeng, Somdet Phra Srinagarindra 95 Public Park	7.576598	99.60093



Physical Water Quality Analysis

Table 2: Physical Water Quality (first sampling)

Species	Area 1	Area 2	Area 3	Area 4	Average (X) ± S.D.
pH value	8	8	9	9	8.5±0.5
Aquatic temperature (°C)	28	29	28	29	28.5±0.5
Dissolved Oxygen (DO) (mg/l)	7	3	6	4.5	5.125±1.375
Water transparency (m.)	0.3	0.2	0.36	0.25	0.2775±0.0525.
Air temperature (°C)	32.1	32.2	32.2	32.3	32.2±0.05
Humidity %	57	58	58	57	57.5±0.5

From the data in Table 2 (first sampling), it was found that the average pH was 8.5±0.5, the average water temperature was 28.5±0.5 °C, the average dissolved oxygen (DO) was 5.125±1.375 mg/l, and the average water transparency was 0.2775±0.0525 m. The average air temperature was 32.2±0.05 °C, and the average humidity was 57.5±0.5%.

Table 2.1: Physical Water Quality (Second Sampling)

Species	Area 1	Area 2	Area 3	Area 4	Average (X) ± S.D.
pH value	7	7	8	8	7.5±0.5
Aquatic temperature (°C)	28	29	28	27	28±0.5
Dissolved Oxygen (DO) (mg/l)	6	5	6	4.5	5.375±0.625
Water transparency (m.)	0.38.	0.56	0.48	0.0118	0.36±0.2.
Air temperature (°C)	33.6	33.3	33.2	33.3	33.35±0.125
Humidity %	47.5	45	46	47	46.375±0.875

From the data in Table 2.1 (second sampling), it was found that the average pH was 7.5±0.5, the average water temperature was 28±0.5 °C, the average dissolved oxygen (DO) was 5.375±0.625 mg/l, and the average water transparency was 0.36±0.2 m. The average air temperature was 33.35±0.125 °C, and the average humidity was 46.375±0.875%.

Table 2.2: Summary of Physical Water Quality for Both Sampling Rounds

Species	Round 1	Round 2	Average (X) ± S.D.
pH value	8.5	7.5	8±0.5
Aquatic temperature (°C)	28.5	28	28.25±0.25
Dissolved Oxygen (DO) (mg/l)	5.12	5.38	5.25±0.13
Water transparency (m.)	0.28	0.36	0.32±0.04
Air temperature (°C)	32.2	33.4	32.8±0.6
Humidity %	57.5	46.4	51.95±5.55

From the data in Table 2.2, which summarizes the physical water quality from both sampling periods, the following was found: the average pH was 8±0.5, the average water temperature was 28.25±0.25°C, the dissolved oxygen (DO) was in the range of 5.25±0.13 mg/l, the average water transparency was 0.32±0.04mg/l, the average air temperature was 32.8±0.6 °C, and the average air humidity was 51.95±5.55%.

Cloud cover analysis

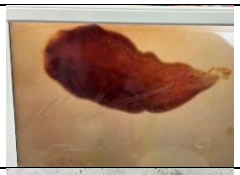
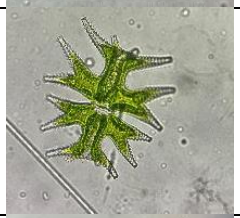
Table 3: Cloud Cover Data

Species	Round 1	Round 2	Average (X) ± S.D.
Cumulus	5%	10%	7.5±2.5
Cirrus	16%	21%	18.5±2.5

Table 3 shows the cloud cover, with Cirrus being the most prevalent, followed by Cumulus.

Analysis of Biological Water Quality

Table 4: Display of Plankton Species

Microscopic images of organisms	Species names
	*Dugesia* spp.
	*Ephemeroporus barroisi*
	*Rotifer* sp.
	*Paramecium* sp.
	*Spirulina* sp.
	*Neidium productum*
	*Micrasterias furcata*
	*Phacus* sp.
	*Closterium* sp.

Microscopic images of organisms	Species names
	*Arcella discoides* Ehr.
	*Strongyloides stercoralis*
	*Oscillatoria* sp.
	*Odonata* sp.

Table 5: Zooplankton Count Display

Species	Cell count				Average (X)
	Area 1	Area 2	Area 3	Area 4	
Dugesia spp.	1	0	0	0	0.25
Ephemeroporus barroisi	3	0	0	0	0.75
Rotifer sp.	0	0	1	2	0.75
Paramecium sp.	0	0	1	0	0.25
Spirulina sp.	0	0	2	0	0.5
Neidium productum	0	1	1	0	0.5
Phacus sp.	2	4	3	2	2.75
Strongyloides stercoralis	0	0	3	0	0.75
Oscillatoria sp.	0	3	0	2	1.25
Odonata sp.	0	0	0	3	0.75
Total	6	8	11	9	8.5

From Table 5, which shows the number of zooplankton, it was found that there is a diversity of 10 types of zooplankton : *Dugesia* spp., *Ephemeroporus barroisi*, *Rotifer* sp., *Paramecium* sp., *Spirulina* sp., *Neidium productum*, *Phacus* sp., *Strongyloides stercoralis*, *Oscillatoria* sp., and *Odonata* sp.

Table 6: Phytoplankton Count Display

Species	Cell count				Average (X)
	Area 1	Area 2	Area 3	Area 4	

Micrasterias furcata	0	0	1	0	0.25
Closterium sp.	0	0	0	1	0.25
Arcella discoides Ehr.	0	2	0	0	0.5
Total	0	2	1	1	1

From Table 6, which shows the number of phytoplankton, it was found that there is a diversity of 3 types of phytoplankton : *Micrasterias furcata*, *Closterium* sp., and *Arcella discoides* Ehr.

Summary of the experiment

The study of plankton biodiversity in the water source at Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choy), Na Ta Luang Subdistrict, Mueang Trang District, Trang Province.

The study of water quality at Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choy), Na Ta Luang Subdistrict, Mueang Trang District, Trang Province, found that the average pH of the water was 8, the average water temperature was 28.25°C, the dissolved oxygen (DO) was in the range of 5.25 mg/l, the average water transparency was 0.32 m. The average air temperature was 32.8°C, the average air humidity was 51.95%, and the cloud cover was found to be mostly Cirrus, followed by Cumulus.

Study of Plankton Diversity in the Water Source at Sanare Dang Pond, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choy), Na Taluang Subdistrict, Mueang Trang District, Trang Province: study results Zooplankton : A total of 1 0 species were found, including *Dugesia spp. , Ephemeroporus barroisi , Rotifer sp. , Paramecium sp. , Spirulina sp. , Neidium productum ,Phacus sp., Strongyloides stercoralis , Oscillatoria sp. , Odonata sp.* Phytoplankton: A total of 3 species were found, including *Micrasterias furcata , Closterium sp. , Arcella discoides* Ehr.

Discussion of Research Results

From the water quality study at Sanare Dang Pond, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choy), Na Taluang Subdistrict, Mueang Trang District, Trang Province, the average dissolved oxygen was 5.25 mg/l. According to the surface water quality standards for Category 3, this is considered normal dissolved oxygen levels. The pH value was 8, indicating that the water is alkaline. At an average depth of 0.32 meters, the average water temperature was 28.25 degrees Celsius. According to the surface water quality standards for Category 3, this is considered a high temperature. This water quality has an impact on the diversity of plankton in the Sanare Dang Pond area.

Acknowledgements

This research project, "Plankton Biodiversity in the Water Source at Sa Nae Daeng Pond, Somdet Phra Srinagarindra 95 Public Park (Khao Pae Choi), Na Ta Luang Subdistrict, Mueang Trang District, Trang Province," was successfully completed due to the kind assistance and guidance from our advisors.
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