Studying the impact of water quality on biodiversity. Wichianmatu School

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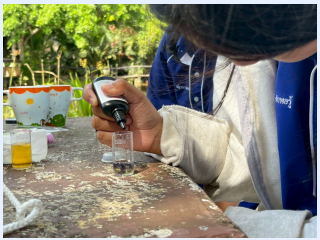



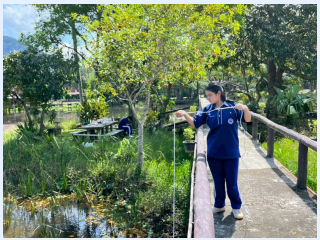


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Abstract

This study examines the impact of water quality on the biodiversity of aquatic life. The objectives of the study are: to investigate the water quality of the Khlong Lam Chan Wildlife Sanctuary, specifically focusing on water temperature, dissolved oxygen (DO), pH, and water transparency; and to study the biodiversity of aquatic life in the Khlong Lam Chan Wildlife Sanctuary, including the species of large invertebrates, plankton, and algae. This study aims to examine water quality and biodiversity in the Khlong Lam Chan Wildlife Sanctuary, Trang Province, by collecting water samples from three areas and evaluating both the physical characteristics of the water (temperature, pH, dissolved oxygen, and transparency) as well as surveying the types of aquatic organisms present. The results showed that the water had an average temperature of 28–29°C, a pH in the slightly alkaline range (8.33–8.67), and dissolved oxygen levels were good to very good (7.33–8.17 mg/L). Furthermore, the water had high transparency, indicating an environment suitable for photosynthesis and the survival of aquatic organisms.Regarding biodiversity... Fifteen species of phytoplankton, 14 species of algae, and 12 species of invertebrates were found, reflecting the abundance of primary producers and the completeness of the food chain in the freshwater ecosystem. The research findings indicate that Khlong Lam Chan is a freshwater source with suitable water quality and relatively high biodiversity, suggesting a balanced and stable ecosystem. This information can be used as a basis for sustainable conservation and monitoring of future water quality changes.

Research Question

1. To study the water quality in the Khlong Lam Chan Wildlife Sanctuary.
2. To study the biodiversity of living organisms in the Khlong Lam Chan Wildlife Sanctuary.

Introduction

Khlong Lam Chan Wildlife Sanctuary is an ecologically important wetland area, serving as a habitat and breeding ground for wildlife, particularly various species of waterfowl such as ducks and geese. The surrounding area comprises large ponds and diverse vegetation, creating a tranquil atmosphere suitable for the survival of freshwater ecosystems. Originally a wildlife sanctuary, the community donated land to the government for development into an ecotourism destination. Currently, over 100 rai of land has been constructed with bridges and pavilions for nature education. During the summer, red lotus flowers bloom profusely throughout the ponds. This research aims to study the biodiversity of living organisms and assess water quality in Khlong Lam Chan, analyzing six key factors: water temperature, dissolved oxygen, pH, water transparency, the presence of large invertebrates that can be used as bioindicators, and the types of plankton that play both producers and consumers in the food chain. Studying water quality combined with surveying the biological components can clearly reflect the abundance, biodiversity, and changes in the ecosystem in the area. Furthermore, the data obtained can be used as a basis for the conservation, restoration, and management of local water resources to ensure the sustainability of the ecosystem and surrounding communities in the future.

Research Objectives:
1. To study the water quality in the Khlong Lam Chan Wildlife Sanctuary.
2. To study the biodiversity of living organisms in the Khlong Lam Chan Wildlife Sanctuary.

Research Questions:
How diverse is the biodiversity in the Khlong Lam Chan Wildlife Sanctuary?

Research Methods

Research Hypothesis

The Khlong Lam Chan Wildlife Sanctuary has a diverse population of aquatic animals and plants, resulting in high biodiversity.

Materials

Flag,Measuring tape,pH Paper,Thermometer,Plankton towing bag,Transparency measuring plate,Dissolved oxygen test kit,Research Procedure

Part 1: Water Temperature Measurement
Water temperature is measured by immersing a thermometer in the water at a depth of approximately 10 centimeters for 3–5 minutes to allow the temperature to stabilize. The reading is then taken at eye level while the thermometer bulb remains underwater. For accuracy, a total of 3 measurements are taken by a different person, and the results are recorded in degrees Celsius (°C).

Part 2: Dissolved Oxygen Measurement
Dissolved oxygen is measured by rinsing the sample bottle with the sample water before collection. Water is then collected underwater, ensuring that no air bubbles are present. The sample is then tested within 2 hours. The measurement is repeated 3 times, and the average is calculated according to the test kit's standard.

Part3: pH Measurement with pH Paper
The acidity-basicity (pH) of the water is measured by rinsing the container with the sample water twice. Then, an appropriate amount of sample water is added, and the pH paper is immersed in the water according to the specified method. After the appropriate time, the paper is compared to the color chart to read the pH value of the sample water. :

Part4 Water Transparency Measurement
Water transparency is measured by determining the starting point of the measurement. Then, the transparency measuring pan is lowered into the water source perpendicular to the water surface until the pan touches the water surface as the starting point. Then, the pan is slowly lowered until the white color on top of the pan is no longer visible (point 2). Next, the pan is lowered another 10 centimeters before being slowly pulled up until the black and white pattern on the pan is visible again (point 3). The distance between points 2 and 3 must not exceed 10 centimeters. The measurement is repeated 3 times, and a different examiner is used each time to increase accuracy.

Part 5: Plankton Sampling
Plankton sampling is done by ensuring the drag bag is ready, releasing and dragging the bag in the water at a low speed for a specified time. The samples are then collected in bottles and examined under a microscope to identify the types of aquatic organisms.

Carrying Out Investigations

Table showing geographical coordinates.

Nature trail	Geographic coordinates	
	Latitude (N)	Longitude (E)
Khlong Lam Chan Wildlife Sanctuary	7.530429 (N)	99.754357 (E)

GLOBE Badges

I am a data scientist.
This study on the impact of water quality on biodiversity in Khlong Lam Chan examines the relationship between physical (transparency, temperature), chemical (DO, pH), and biological (large invertebrates, plankton) factors, which are crucial in Earth system science. Analysis utilizes the GLOBE database as well as data collected by the research team. The team discussed data limitations and used the analysis results to conclude on the relationship between water quality and biodiversity. The trend indicates that Khlong Lam Chan is likely to maintain good water quality in the future, provided that the factors discussed in the research team's analysis do not change.

I AM AN EARTH SYSTEM SCIENTISTI AM AN EARTH SYSTEM SCIENTIST
The study of water quality and its impact on biodiversity is interconnected with various Earth systems.
Using the GLOBE protocol, water temperature, pH, dissolved oxygen, and water transpa,rency were measured and found to be within optimal ranges for aquatic life. Water temperature was in a range conducive to metabolism and reproduction; pH was in the slightly alkaline range, which helps maintain ecological balance; dissolved oxygen was at a good to very good level; and water transparency was high, allowing sufficient light to penetrate the water, which is conducive to photosynthesis by aquatic plants and phytoplankton

Iam making an impact
A study of water quality's impact on biodiversity revealed a diverse range of organisms, reflecting the fact that the Lam Chan canal water source possesses rich biodiversity and an environment suitable for aquatic life. The presence of such a diverse array of species demonstrates that the studied water source has a suitable and abundant environment, making it worthy of conservation. Maintaining the Lam Chan canal's ecosystem and ensuring its cleanliness and sustainability is essential.

Results

The results of measurements of temperature, pH, dissolved oxygen, and transparency.

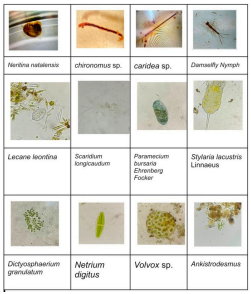
Studying species of large invertebrates, including exploring types of plankton and algae.

Table 1 shows the results of temperature, pH, dissolved oxygen, and transparency measurements.

What needs to be measured.	Area 1	Area 2	Area 3	Average (X) ± Standard Deviation
Temperature (°C)	28.07	29	28	28.36 ± 0.46
pH value	7	7.67	8	7.56 ± 0.56
Turbidity value (m)	Very transparent, 0.86 m deep.	Very transparent, 0.49 m deep.	Very transparent, 0.26 m deep.	0.54 ± 0.30
Dissolved oxygen in liquid (DO)	7.33	8.17	7.5	7.67 ± 0.44

Table 1 shows that water quality measurements in all three study areas revealed that the physical and chemical parameters of the water sources were within suitable ranges. The average temperature was 28.36 ± 0.46 °C, which is within the range conducive to the survival of most aquatic organisms. The average pH of 7.56 ± 0.56 indicates neutral to slightly alkaline water, reflecting a good ability to maintain acid-base balance in the water system. Furthermore, the water transparency averaged 0.54 ± 0.30 m, indicating high water clarity and low suspended solids. The average dissolved oxygen (DO) level was 7.67 ± 0.44 mg/L, which is considered very good and sufficient for the survival of aquatic organisms that require oxygen.Therefore, it can be concluded that the studied water sources have good water quality, suitable environments, and are conducive to the survival and maintenance of biodiversity in the aquatic ecosystem of the study areas.

Table 2 studies the types of large invertebrates, including an exploration of various plankton and algae.



Studies of biodiversity reveal the presence of diverse groups of organisms, including phytoplankton, algae, protozoa, and small to large invertebrates. This reflects the richness of life in freshwater ecosystems. The detection of various phytoplankton and algae species indicates that the water source has primary producers capable of photosynthesis and sufficient energy production for the ecosystem.The presence of various protozoa and invertebrate species suggests the complexity of the food chain and nutrient cycling processes within the water source. The study of biodiversity and the identification of certain organisms can also serve as indicators of water quality.Therefore, the presence of such a diverse array of organisms shows that the studied water source has an environment suitable for the survival of living organisms and is abundant in biodiversity.

Discussion and Conclusions

The study of the physical characteristics of the water source revealed that water temperature, pH, dissolved oxygen, and water transparency were within suitable ranges for the survival of aquatic life. Water temperature was conducive to metabolism and reproduction; pH was in the slightly alkaline range, which helps maintain ecological balance; dissolved oxygen levels were good to very good; and water transparency was high, allowing sufficient light penetration, which is conducive to photosynthesis by aquatic plants and phytoplankton.
The biodiversity study found that the water source contained a diverse range of organisms, including phytoplankton, algae, protozoa, and invertebrates ranging from small to large sizes. This indicates a relatively complete food chain and efficient nutrient cycling. Some of the organisms detected can be used as indicators of water quality, consistent with the good water quality measurements.
Therefore, based on both water quality and biodiversity studies, it can be concluded that the Khlong Lam Chan Wildlife Sanctuary has suitable water quality and relatively high biodiversity, reflecting a balanced freshwater ecosystem conducive to the survival of aquatic life.

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