Study on Water Resources and Soil Impact Near White Shrimp Farms, Thung Krabua, Yan Ta Khao, Trang.

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Abstract

The purpose of this study was to study the impact of water discharge from white shrimp ponds on water quality and soil quality in Thung Krabue sub-district. Yan Ta Khao District, Trang Province between December and January 2024 by measuring soil and water quality. Once a month , considering the acidity-base (pH) value of soil color for Soil fixation soil fertility (NPK),dissolved oxygen content in water, water temperature, water salinity, and nitrate content in water. The results of the study showed that the water from the white shrimp pond affected the surrounding water quality. The salinity of the water in the nearby water source was higher than that in the shrimp pond (5920 ppm vs. 2260 ppm), the pH of the water in the shrimp pond was lower than that of the nearby water (7.52 vs. 8.49), and the dissolved oxygen content in the shrimp pond was higher (4.25 mg/L vs. 2.58 mg/L), indicating changes in water quality that may affect the aquatic ecosystem. Soil quality was found that the soil in the area where the water received from the shrimp pond was darker. (2.5Y5/4) and is more loamy than unaffected soils. (2.5Y6/4) The acidity-base value of the soil tends to be more neutral at a depth of 10 cm. (7.04) compared to topsoil at a level of 5 cm. (6.61) The salinity of the soil at the shallow level is higher. (894 ppt at 5 cm)compared to 818.67 ppt at 10 cm) And the soil moisture value decreases as the depth increases.The nitrogen content in the soil is approximately the same at all depths. Meanwhile,phosphorus (P) and potassium (K) tend to increase in deep soils. In conclusion ,the release of water from the white shrimp pond affects the water quality and the nearby soil. In particular, the salinity, nitrate, and dissolved oxygen in water, as well as soil structure and composition may affect the ecosystem of water sources and agricultural land use in the area.

Keywords: Water Quality, Soil Quality, White Shrimp Farming

Research Question

Research objectives:
1. Study the water quality in white shrimp ponds and nearby water sources, such as studying the water temperature, water pH. Oxygen content in water, salinity of water, nitrate content in water.
2. Study the soil quality around the shrimp pond area, such as soil color, soil pH, soil temperature, soil fertility. Soil moisture and soil salinity
3. Study the impact of water discharge from white shrimp ponds that affect water quality and soil quality in the vicinity.

Research questions :
1. What is the water quality in the white shrimp pond and the water source near the shrimp pond?
2. What is the quality of the soil around the shrimp pond area?
3. Does the water discharged from the white shrimp pond affect water quality and soil quality?

Research hypotheses :
1. The water quality in the white shrimp pond is good quality and the water source near the shrimp pond is of poor quality.
2. The quality of the soil around the shrimp pond area is low quality.
3. The water released from the white shrimp pond affects water quality and soil quality.

Introduction

Thung Krabue Sub-district, Yan Ta Khao District, Trang Province

The area consists of high and low plains, suitable for agriculture such as rubber plantations and farming. Shrimp farming, including black tiger shrimp and white shrimp, is a key industry. White shrimp farming is preferred due to its fast growth, high yield, and adaptability to various salinity levels. However, it may cause environmental problems, particularly affecting soil and water quality through contamination from organic compounds, suspended substances, and toxins.

Objective
1. Study water quality in white shrimp ponds and nearby sources, including temperature, pH, oxygen content, salinity, and nitrate levels.
2. Analyze soil quality around shrimp ponds, including color, pH, temperature, fertility, moisture, and salinity.
3. Examine the impact of water discharge from shrimp ponds on surrounding soil and water quality.

Question
1. What is the water quality in white shrimp ponds and nearby water sources?
2. What is the soil quality around the shrimp pond area?



Research Methods


1. Water temperature using a thermometer


2. Measurement of dissolved oxygen content in water by the dissolved oxygen content test kit.

3. Measuring water salinity using a Salinity Meter

4. pH Measurement of Water with pH Meter


5. Soil Adhesion Measurement using a Soil adhesion comparison plate


6. Determination of nitrate content in water using the Nitrate Test kit

7. Soil pH Measurement with pH Meter


8. Soil Temperature Measurement using a thermometer

9. Measuring soil color using a soil color comparison book.

10. Measuring soil fertility N P K Test Kit

11. Measuring soil moisture using a moisture meter

12. Soil salinity measurement using a Salinity Meter

OPTIONAL BADGES

1) I AM A COLLABORATOR

Research on white shrimp ponds requires the cooperation of team members. Dividing the responsibility of collecting water samples from different points of thewell, to recording data and analyzing the results. We work together systematically. Consultations and ideas were exchanged to find the best way to study the water quality in white shrimp ponds. Water quality and soil quality around white shrimp ponds In addition, it has the cooperation of white shrimp farmers or water quality experts. This helps us better understand the environmental factors that affect water quality. This partnership has enriched our education and can be applied to practical solutions.

2) I AM A DATA SCIENTIST

Our research focused on analyzing data on water quality in white shrimp ponds. Water quality and soil quality around white shrimp ponds Chemical and physical measurements of water that affect the growth of white shrimp were used. Then, the data obtained were compared with water quality and soil quality standards to determine the relationship and trend of various factors. We use statistical analysis and visualization through graphs and tables to visualize changes in water quality and soil quality, which allows for effective forecasting and planning of well water management. Therefore, this research is not only a collection of data but also the use of data to solve problems and develop shrimp farming to be more as well.

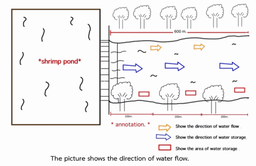
3)I MAKE AN IMPACT

This study provides an overview of the impact of white shrimp farming on water and soil quality in nearby areas. We analyzed the collected data and developed guidelines to help reduce environmental impacts, including improving farming methods and implementing effective water quality management. Additionally, this study raises awareness among farmers and local communities about the importance of environmental conservation, leading to sustainable practices that offer long-term benefits.

Results

Results and conclusions
Geographic coordinates

zone	Geographic coordinates	
	Latitude(N)	Longitude(E)
White shrimp pond	7.3753	99.6361



The picture shows the direction of water flow.

Results

1. Water quality

Record Table

Water Measurement Area	Measured value (average)				
	pH	Water salinity(ppm)	Oxygen in water (mg/L)	Water nitrates (mg/L)	Water Temperature (°C)
Water nearby	8.49 ±1	5920 ±1	2.58 ±0.35	11.67 ±7	26.33 ±2
In the shrimp pond	7.52 ±1	2260 ±1	4.25 ±0.35	10 ±0	24.5 ±0.71

From the summary table of the results of the experiment.
The study analyzed water quality during the white shrimp farming process and the wastewater discharge phase to assess potential environmental impacts. The results showed that the average water temperature during shrimp farming was 24.5 ± 0.7°C, while during wastewater discharge, it increased to 26.33°C. This rise in temperature may be influenced by various factors, including environmental conditions and farming activities. The pH level during shrimp farming averaged 7.52 ±1, while during wastewater discharge, it increased to 8.49 ± 1 According to the Department of Fisheries (2007), both values fall within the suitable range for coastal aquaculture, indicating that the water remains within acceptable conditions for shrimp farming.
However, a significant change was observed in the dissolved oxygen level. During shrimp farming, the dissolved oxygen concentration averaged 4.25 ± 0.35 mg/L, but it decreased to 2.58±0.35 mg/L during wastewater discharge. This reduction suggests a decline in water quality, which may impact aquatic life in the surrounding environment. Similarly, the nitrate concentration increased from an average of 10 mg/L during shrimp farming to 11.67±0.07 mg/L during wastewater discharge. This indicates a potential accumulation of nutrients in the water, which could contribute to environmental issues such as eutrophication.Overall, while some water quality parameters remain within acceptable ranges for shrimp farming, changes observedduring the wastewater discharge phase highlight the need for proper water management to minimize environmental impacts and maintain ecological balance.

2. Soil quality study

2.1 Soil color calibration and soil fixation table

Soil Sampling Area	Soil Color Code	Soil Texture
Soil without shrimp pond discharge	2.5Y6/4	Compact
Soil in the canal where shrimp pond water flows	2.5Y5/4	Loose

2.2 Table of measurements of various values of soil

Measurement Value		Soil at 5 cm depth	Soil at 10 cm depth
Temperature (°C)		27.29 ±1.75	26.75 ± 1.08
pH value		6.61 ±0.2	7.04 ± 0.21
Soil moisture		10 ±0.9	1 ± 0.16
Salinity (ppt)		894 ±305.46	818.67 ± 299.24
Organic matter content In soil (N P K)	N	52.92 ±10.26	51.17 ± 9.92
	P	53.63 ±15.98	76.33 ± 11.34
	K	183.67 ±38.07	199.08 ± 30.79

Summary of Soil Quality Analysis

Soil affected by shrimp pond water is darker (2.5Y5/4) than unaffected soil (2.5Y6/4), indicating changes from water discharge. Measurements at 5 cm and 10 cm depths show that soil temperature decreases with depth, while pH becomes more neutral. Soil moisture is higher at shallow depths but decreases significantly as depth increases. Nitrogen content remains stable at both depths, while phosphorus and potassium levels tend to increase in deeper soil, likely due to mineral accumulation. These changes suggest that shrimp pond discharge impacts soil properties, which may affect agricultural use.

Discussion

Acknowledgments

Research on the impact on water sources and soil quality in areas adjacent to white shrimp farming areas. In Thung Krabue Subdistrict, Yan Ta Khao District, Trang Province, this was a good success because it received a lot of kindness from the advisers.

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Organizers

Conclusions

Summary of the experiment

Based on the study of water quality in white shrimp ponds and nearby water sources. It was found that the discharge of water from the shrimp pond affected the surrounding water quality. The salinity of the water in the nearby water source was significantly higher than that of the shrimp pond (5920 ppm vs. 2260 ppm), to show the drainage from the shrimp pond had an effect on the salinity of the surrounding water source. In addition, the pH of the water in the shrimp pond was lower than that of the nearby water (7.52 vs. 8.49), while the dissolved oxygen content in the shrimp pond was higher than in the surrounding area (4.25 mg/L vs. 2.58 mg/L), which may be caused by the aeration system in the shrimp pond. For soil quality It was found that the soil in the area affected by the shrimp pond water was darker and more crumbly compared to the soil that was not affected. In addition, the soil moisture value at a shallow level (5 cm) higher than the soil at a depth (10 cm). Meanwhile, the salinity of the soil tends to decrease as the depth increases. Nutrient content in the soil (NPK) found that nitrogen was constant at both depths. Meanwhile, phosphorus and potassium increase in the deep soil.In conclusion, the results of this study confirm that the discharge of water from white shrimp ponds affects the water quality and soil quality in the vicinity. In particular, the salinity, nitrate, and dissolved oxygen in the water, as well as the structure and composition of the soil, may have an impact on the ecosystem of water resources and the use of agricultural land in the area.

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