



Assessment and Comparison of Invertebrate Biodiversity and Water Quality in Huai Yang and Huai Wa, Ban Phak Mai Yai

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Abstract

This study investigated freshwater invertebrate biodiversity and water quality at two sites in Huai Yang and Huai Wa streams, Ban Phak Mai Yai, Sisaket Province. Water and invertebrate samples were collected and analyzed for species diversity, pH, temperature, and dissolved oxygen (DO). Site 1 showed higher species diversity with five invertebrate types and seven individuals, while Site 2 had fewer species but a greater total count (22 individuals), dominated by freshwater shrimp. Water quality results indicated similar pH values (6.18–6.25) and temperatures (33.4–33.6 °C) at both sites. DO was higher at Site 2 (8.5 mg/L) than Site 1 (6.0 mg/L). Overall, water quality was classified as fair to good according to standard criteria. The findings suggest a relationship between water quality and biodiversity, influenced not only by DO levels but also by habitat and environmental conditions. This research provides baseline information for sustainable local water management and conservation.

Introduction

Freshwater invertebrate biodiversity plays a vital role in aquatic ecosystems and can serve as an effective indicator of water quality because these organisms respond rapidly to environmental changes. Studying the diversity of this group along with water quality helps assess the health of water bodies. Huai Yang and Huai Wa at Ban Phak Mai Yai, Sisaket Province, are important water sources for the local community, each with distinct characteristics. This study aims to compare freshwater invertebrate biodiversity and water quality to support sustainable local water resource management and conservation planning.



Research questions

1. How does the water quality of Huai Yang Stream differ from that of Huai Wa Stream at Ban Phak Mai Yai?
2. What is the relationship between the biodiversity and abundance of freshwater invertebrates and water quality in each study area?

Research Hypotheses

1. The water quality of Huai Yang Stream and Huai Wa Stream at Ban Phak Mai Yai is different.
2. The biodiversity of freshwater invertebrates is related to water quality in each water body

Research Objectives

1. To study the water quality of Huai Yang Stream and Huai Wa Stream at Ban Phak Mai Yai.
2. To analyze the relationship between freshwater invertebrate biodiversity and water quality in Huai Yang and Huai Wa streams at Ban Phak Mai Yai.
3. To provide guidelines for improving and developing water quality in Huai Yang and Huai Wa streams at Ban Phak Mai Yai.

Variables Involved

Independent Variable: The sampling locations for water and freshwater invertebrates (Site 1: Huai Yang Stream; Site 2: Huai Wa Stream at Ban Phak Mai Yai).

Dependent Variables: Water quality and the number of freshwater invertebrates at each study site.

Controlled Variables: The sampling methods for water and invertebrates, the time period of sampling, and the instruments used to measure water quality parameters.

Materials, Equipment, and Chemicals



Research Method

1. Submerge the hand net into the water and sweep it in areas with aquatic plants or submerged wood, making sure to reach the bottom.
 2. Move the net back and forth twice in areas with accumulated sediment.
 3. Lift the net out of the water.
 4. Pour the contents of the net into a tray, then identify and count the invertebrates found.
- Conduct a field survey at the designated study sites.



Study Site Locations
Site 1: Huai Wa at Ban Phak Mai Yai
Site 2: Huai Yang

Measure water quality
Measure water temperature
Measure pH value
Measure dissolved oxygen (DO) value

Submit the data to the GLOBE website
(<https://www.globe.gov/>)
using the Data Entry system.

Selection of Study Sites



Field Survey of the Study Sites



Measure water quality



Identification and counting of freshwater invertebrates



Enter the data into the program using the Data Entry system.

Site	Species	Abundance
Site 1	Freshwater Shrimp	7
	Snails	2
	Leeches	1
	Water Striders	0
	Aquatic Insects	2
Site 2	Freshwater Shrimp	15
	Snails	0
	Leeches	0
	Water Striders	3
	Aquatic Insects	4

Research Results

Study site	Water quality table		
	DO (mg/L)	pH	Temperature (°C)
Site 1	7.5	6.25	33.6
Site 2	7	6.18	33.4

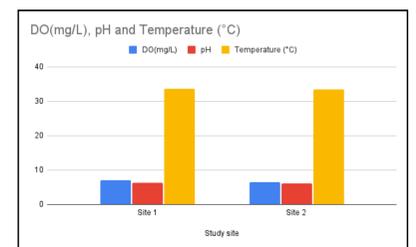


Table 1 presents a comparison of water quality at the study sites.

Bar chart showing a comparison of water quality

Study site	Types and Abundance of Invertebrates at Each Study Site				
	Freshwater Shrimp	Snails	Leeches	Water Striders	Aquatic Insects
Site 1	1	2	1	-	2
Site 2	15	-	-	3	4

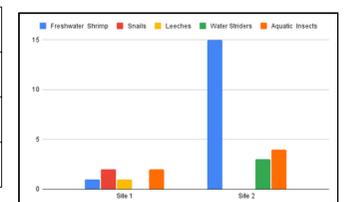


Table 2 shows the types and abundance of invertebrates.

Bar chart showing the types and abundance of invertebrates

Summary and Discussion of Research Results

The research results showed that water quality was related to the diversity and abundance of freshwater invertebrates. Site 2 had a higher dissolved oxygen level (8.5 mg/L), which resulted in a large number of freshwater shrimp being found, although species diversity was lower. In contrast, Site 1 had a lower dissolved oxygen level (6.0 mg/L) but exhibited greater species diversity, indicating that a more heterogeneous environment contributes to the abundance of aquatic organisms. Water quality at both sites showed similar temperatures, ranging from 33.4 to 33.6 °C, and slightly acidic pH values (6.18–6.25). When compared with standard criteria, overall water quality at both sites was classified as fair to good. However, continuous monitoring of pH is recommended to prevent long-term negative impacts on the aquatic ecosystem.

Research Benefits

1. The study provided detailed information on the water quality of Huai Yang Stream and Huai Wa Stream at Ban Phak Mai Yai, which can serve as baseline data for environmental assessment.
2. It was found that the biodiversity of freshwater invertebrates is related to water quality, indicating that invertebrate diversity can be used as an effective biological indicator of water body status.
3. The information obtained from this study can be applied to plan appropriate water quality improvement and management strategies, such as pollution source control, promoting community participation, and conserving biodiversity in natural water ecosystems.

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Bibliography

GLOBE Project, Institute for the Promotion of Teaching Science and Technology, Ministry of Education (IPST). (2012). Earth science across the curriculum for Grade Level 3. Education Supplies Co., Ltd., Bangkok, Thailand.
Ecological Society of Thailand. (2017). Manual for water quality assessment using large freshwater invertebrates. Bangkok: Environmental Academic Publishing.
Kaewubon, P., Van Bern, N., Kohnongbua, P., Aorsai, K., Kubaha, T., & Rahman, T. (2020). Use of freshwater invertebrates as biological indicators for water quality monitoring in Klong Pakpra, Phatthalung Province. *Burapha Science Journal*, 25(1).
Kanhitia, P., Peerawat, C., & Thanasak, C. (2015). Biodiversity of soil invertebrates and surface water quality within Mahidol University, Nakhon Pathom Province. *Journal of Applied Animal Science*, 8(2), 43–56.