

Physico-chemical Properties of Soil Associated with Polytrichum commune at Wang Hin Lat Waterfall, Trang Province Wichienmatu school



Mr. Sirawit Ponprasit , Mr. Parattakorn Kaoian Mr. Panuwit Tahri , Ms. Natcha Lianyong.
Advisors: Mrs. Orapin Noonnum , Ms. Chularat Singkaew



THE GLOBE PROGRAM

Global Learning and Observations to Benefit the Environment

Abstract

This research investigates the soil quality affecting moss populations at Wang Hin Lat Waterfall, Trang Province. The primary objectives were to examine soil quality in its natural habitat and analyze its impact on local organisms, with a specific focus on the physico-chemical properties of the soil, including pH levels, moisture content, temperature, and soil color. Additionally, the study surveyed moss species inhabiting the waterfall area.

The research methodology involved collecting soil samples from various locations around Wang Hin Lat Waterfall and observing bryophytes, such as mosses and ferns, to compare plant diversity with the soil quality at each sampling point. The findings indicate that soil quality in certain areas has reached levels that may adversely affect moss populations. Specifically, soil pH and oxygen levels below standard thresholds have resulted in a decline in moss abundance.

These results demonstrate that soil quality is directly correlated with the survival of organisms within the waterfall ecosystem. This study provides essential baseline data that can be utilized for the appropriate conservation and restoration of the environment in this area.

Research Question

How does soil quality affect the distribution of the moss species Polytrichum commune at Wang Hin Lat Waterfall?

Introduction

Soil is a fundamental natural resource that plays a vital role in sustaining life and maintaining ecosystems. It serves as a primary habitat for numerous small organisms, such as microorganisms, earthworms, and various insects. These organisms contribute to the decomposition of organic matter, facilitating nutrient cycling and enhancing soil fertility. Furthermore, soil plays a crucial role in water storage, regulating surface water runoff, and preventing soil erosion—all of which are essential processes for maintaining overall environmental balance.

Wang Hin Lat Waterfall in Trang Province is a significant natural attraction rich in biodiversity. The area surrounding the waterfall comprises diverse environmental conditions, ranging from steep banks and densely shaded areas to locations with direct sunlight exposure. Consequently, soil properties in these different areas vary, particularly in terms of soil temperature, moisture levels, and pH values. These variations directly influence the distribution, growth, and diversity of plants and soil-dwelling organisms.

Therefore, the research team is interested in studying the soil quality at Wang Hin Lat Waterfall, Yan Ta Khao District, Trang Province. This study focuses on measuring soil temperature, moisture, and pH levels at various sampling sites to analyze the relationship between soil quality and the presence of organisms in the area. This research not only provides a deeper understanding of the characteristics and properties of soil in the study area but also serves as baseline data for soil and environmental conservation. Ultimately, it aims to raise awareness about the preservation of natural resources to ensure long-term

Research Methods

Phase 1: Research Preparation

1. Issue Identification: Selecting the research topic focusing on the relationship between soil quality and Polytrichum commune.
2. Literature Review: Gathering and synthesizing theories and related research regarding bryophytes and soil physico-chemical properties.
3. Objective Setting: Defining clear goals for environmental assessment.
4. Site Selection: Designating sampling points across different ecological zones: Waterfall Tier 1, Stream Below the Dam, and Wang Hin Lat Canal.

Phase 2: Operational and Fieldwork

1. Site Survey: Conducting a preliminary survey to assess the physical characteristics of the waterfall ecosystem.
2. Environmental Measurement (GLOBE Protocols):
 - Soil Temperature: Using a soil thermometer at each point, repeating measurements 3 times to obtain a mean value.
 - Soil pH: Measuring acidity/alkalinity using a digital soil pH meter.
 - Soil Moisture: Utilizing a soil moisture meter to determine water content at a depth of 10 cm.
3. Biological Observation: Surveying the density and distribution of moss and ferns in conjunction with soil sampling.
- Phase 3: Data Management and Analysis
1. Data Entry: Recording and uploading the collected environmental data into the GLOBE Data Entry system for global database integration.
2. Statistical Analysis: Calculating the Mean (Average) values of each parameter and analyzing the correlation between soil quality and moss abundance.
3. Conclusion and Documentation: Synthesizing the results into a formal research report and bibliography.

Latitude(N)	Longitude(E)
7.3990202	99.7891285
7.6434942	99.7955480
7.4406544	99.8028436

"I am an Impactor: Through my environmental studies, I have helped revitalize Wang Hin Lat Waterfall in Yan Ta Khao, Trang. By researching and developing the local ecosystem specifically focusing on soil and moss, I have transformed the area into a lush, fertile destination. This restoration has successfully attracted more tourists, directly boosting the income and livelihoods of local vendors."

"I am a Problem Solver: My investigation into the soil and moss quality at Wang Hin Lat Waterfall revealed a mix of healthy and degraded areas. To address this, I utilized my research data to implement targeted soil recovery strategies. As a result, I successfully restored the balance of the ecosystem, ensuring the waterfall remains a vibrant, moist, and thriving environment for both the soil and moss populations."

"I am a Data Scientist: Following the GLOBE Program protocols, I collected and analyzed qualitative data regarding the relationship between soil and moss. I applied environmental research methodologies to identify key correlations and answer critical ecological questions. Ultimately, I translated these complex findings into clear presentations to share valuable insights with the community."

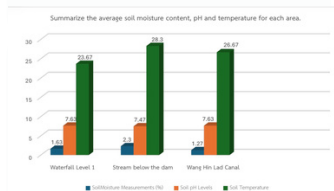
Results

Analyzing Data

- Addresses the research question(s)
- Describes the procedures for data analysis including the mathematical calculations used
- Includes a detailed analysis of the data
- Tables and graphics show patterns or trends in the data
- Print screen of GLOBE visualization page

Tables : Summarize the average soil moisture content, pH and temperature for each area.

Discovery Areas	Temperature		
	Waterfall Level 1	Stream below the dam	Wang Hin Lat Canal
Soil Moisture Measurements (%)	1.63	2.3	1.27
Soil pH Levels	7.63	7.47	7.63
Soil Temperature	23.67	28.3	26.67



Analysis of Soil Conditions Across Three Locations

The provided data compares soil characteristics—moisture, pH, and temperature—across Waterfall Level 1, the stream below the dam, and Wang Hin Lat Canal. Overall, the Stream below the dam stands out with the highest average moisture content at 2.3% and the peak temperature of 28.3°C.

In contrast, Wang Hin Lat Canal records the lowest soil moisture at 1.27%, with a moderate temperature of 26.67°C. Waterfall Level 1 maintains the lowest temperature at 23.67°C. Despite these variations in physical properties, the soil pH levels remain remarkably stable across all sites, ranging slightly from 7.47 to 7.63, indicating a consistent, slightly alkaline soil composition throughout the studied areas.

Discussion

The study of soil quality and its effects on the moss species Polytrichum commune at Wang Hin Lat Waterfall, Yan Ta Khao District, Trang Province, indicates that the moisture, pH, and soil temperature across the three study sites are within optimal ranges for moss growth. Specifically, the average soil moisture was recorded at 1.63% at the first tier of the waterfall, 2.3% at the stream below the dam, and 1.27% at the Wang Hin Lat canal. These moderate to relatively high moisture levels are crucial factors supporting moss development, as mosses rely heavily on water and humidity for their biological processes.

The soil pH in the study areas ranged from neutral to slightly alkaline, which is consistent with natural environments near water sources. This condition favors Polytrichum commune, as the species adapts well to such environments. Meanwhile, the soil temperature remained between 24°C and 28°C, an ideal range for the growth of small plants in this region. Notably, the area near the first tier of the waterfall had an average pH of 7.63. Furthermore, the stream below the dam exhibited higher soil moisture than the Wang Hin Lat canal, resulting in a higher density and wider distribution of moss. This clearly demonstrates that overall soil quality, particularly moisture, has a direct correlation with moss growth.

In conclusion, the overall soil quality significantly influences the growth of moss at Wang Hin Lat Waterfall. Areas with optimal soil conditions facilitate better distribution and growth compared to less suitable areas. These findings align with the established research objectives and the primary research question.

Conclusions

The study on soil quality affecting the moss species Polytrichum commune reveals that the study area is located at coordinates 7.3990202°N and 99.7891285°E. Soil samples were collected from three specific locations: the first tier of the waterfall, the stream below the dam, and the Wang Hin Lat canal.

The analysis of soil properties yielded the following results:

Soil Moisture: The average moisture content across sampling periods remained consistent, with an overall mean of 1.63%.

pH Levels: The average soil pH ranged between 7.4 and 7.6.

Soil Temperature: The average temperature was recorded between 24°C and 28°C.

In conclusion, the soil conditions at Wang Hin Lat Waterfall in Yan Ta Khao District, Trang Province—specifically regarding moisture, pH, and temperature—were within the optimal range. These factors effectively support the distribution of Polytrichum commune and other soil organisms in the area.

Bibliography

*The GLOBE Program. (2025). GLOBE Soil Protocols. Retrieved November 13, 2025, from <https://www.globe.gov>

Wang Hin Lat Waterfall. (2020). "Wang Hin Lat Waterfall": A Tourist Attraction in Trang. Retrieved December 30, 2025, from <https://thetravelershub.com>. [Information regarding Wang Hin Lat Waterfall, located in Ban Yang Nang, Phang Chanakha Sub-district, Yan Ta Khao District, Trang Province; a natural attraction serving as both a research site and a recreational area.]

