

# Lichen Diversity and Air Quality: A Comparison of Two Mangrove in Khanom District, Nakhon Si Thammarat.



## Researchers

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### Abstract

This study investigated the influence of air temperature and relative humidity on lichen species at the Lower Gulf of Thailand Mangrove Research Center and the Ban Sra Nai Mangrove Forest in Khanom District, Nakhon Si Thammarat Province. Here is a concise and professional English summary of your research: Abstract: Relationship Between Temperature and Relative Humidity on Lichen Species Diversity This study investigated the influence of air temperature and relative humidity on lichen species at the Lower Gulf of Thailand Mangrove Research Center and the Ban Sra Nai Mangrove Forest in Khanom District, Nakhon Si Thammarat Province. Objectives 1. To compare air temperature and its effect on lichen diversity in the Lower Gulf of Thailand Mangrove Research Center. 2. To compare relative humidity and its effect on lichen diversity across both study sites. 3. To compare lichen species compositions between the two locations. 4. To analyze the relationship between temperature, humidity, and lichen species distribution in the studied areas. Air temperature and relative humidity were measured using thermometers and hygrometers. Simultaneously, lichen surveys were conducted on trees within the designated study plots. In contrast, the Lower Gulf of Thailand Mangrove Research Center was dominated by Crustose lichens, which are more resilient to the hotter and drier conditions found at that site. Ultimately, the study concludes that air temperature and relative humidity are the decisive factors governing the types and growth patterns of lichens in these mangrove ecosystems.

### Research Questions

- How do temperature and humidity differ between the two study sites?
- Do these areas support different types and quantities of lichens?
- Is there a significant relationship between climate factors and lichen diversity?

### Introduction

The mangrove forests of Khanom District, Nakhon Si Thammarat, are vital ecosystems with varying environmental conditions between protected and community areas. Lichens—symbiotic organisms of fungi and algae—serve as essential bioindicators for air quality and ecosystem health due to their extreme sensitivity to temperature and humidity. This study investigates how microclimates in two distinct mangrove sites affect lichen diversity, providing valuable data to support local environmental conservation efforts.

The research team conducted this study to investigate the relationship between air temperature and relative humidity and their specific impacts on lichen diversity in these two areas. By comparing these environments, the study aims to provide valuable data for local environmental conservation and to demonstrate how lichens can be used as a tool to measure ecological health in mangrove habitats.

### Research Method

The study was conducted at two primary sites: the Lower Gulf of Thailand Mangrove Research Center and the Ban Sa Nai Mangrove. At each location, data was collected from three trees positioned 25 meters apart. The methodology was divided into two main parts:

- 01 Environmental Data Collection: Researchers used thermometers and hygrometers to measure air temperature and relative humidity. Measurements were taken three times per point at 09:00 and 13:00 to calculate average values.
- 02 Lichen Survey: Lichen diversity was surveyed on tree bark at a height of 130–150 cm from the ground. A 20x20 cm quadrat and magnifying glasses were utilized to identify and classify lichen growth forms into Crustose, Foliose, and Fruticose groups.
- 03 Data Analysis: The collected environmental data and lichen species records were analyzed together to determine the correlation between microclimate and biodiversity.

### Carrying Out Investigations

- Study Sites: Two mangrove areas in Khanom; 3 trees per site at 25m intervals.
- Climate Data: Measured air temperature and humidity at 09:00 and 13:00 using digital thermometers and hygrometers.
- Lichen Survey: Used 20 x 20 cm quadrats on tree bark at a height of 130–150 cm.
- Classification: Identified lichen species and growth forms (Crustose, Foliose, and Fruticose) using magnifying glasses and field guides.
- Data Analysis: Compared microclimate averages with lichen diversity to determine ecological correlations.

### GLOBE Badges

#### Be a Collaborator

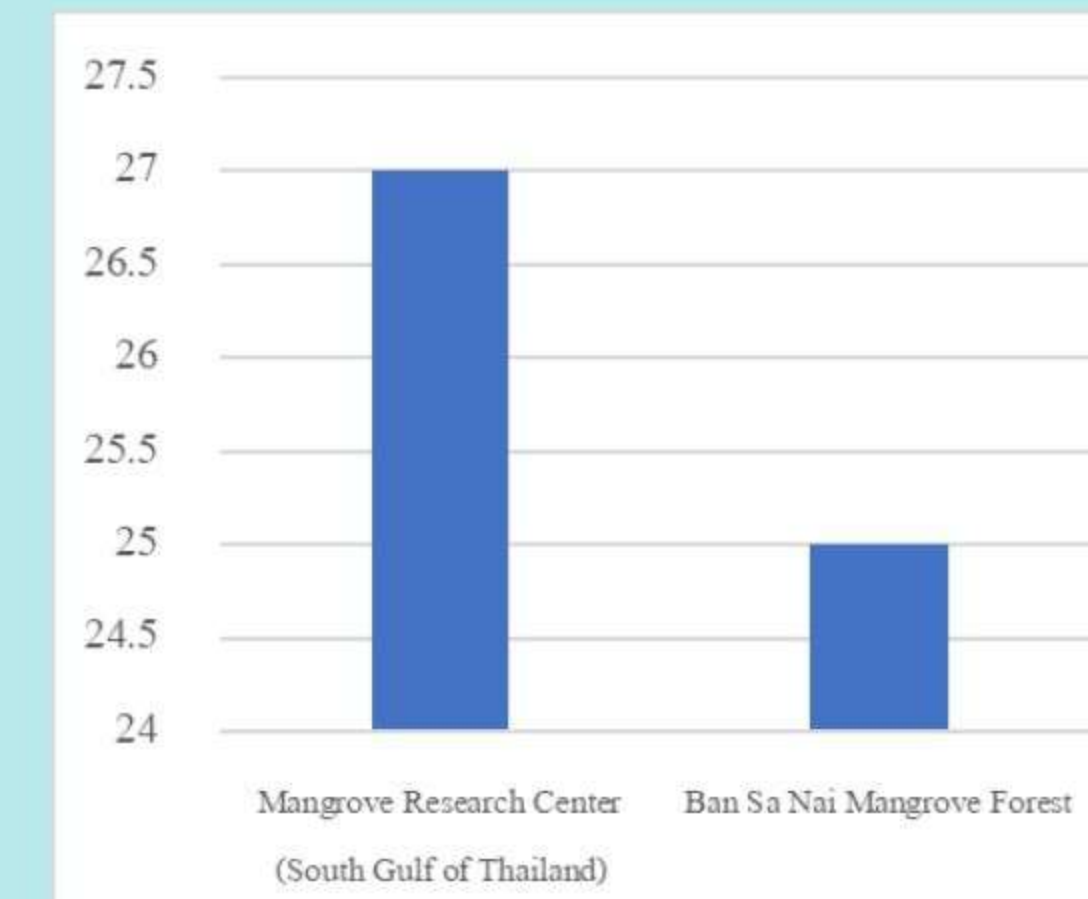
- Student Teamwork: Collaborative field research by 3 primary students from Ban Bang Nod School.
- Expert Guidance: Supported by school advisors and the director.
- Standardized Tools: Used GLOBE Program and Green World Foundation protocols for scientific data collection.

#### STEM (Be a STEM Storyteller)

- S (Science): Lichens used as bio-indicators for air quality.
- T (Technology): Data collected via thermometers and hygrometers.
- E (Engineering): Standardized 20x20 cm quadrat sampling at 130–150 cm height.
- M (Mathematics): Found Ban Sra Nai has lower temp (25°C) and higher humidity (83%), supporting more species (19 types).

### Result

#### Microclimate Comparison

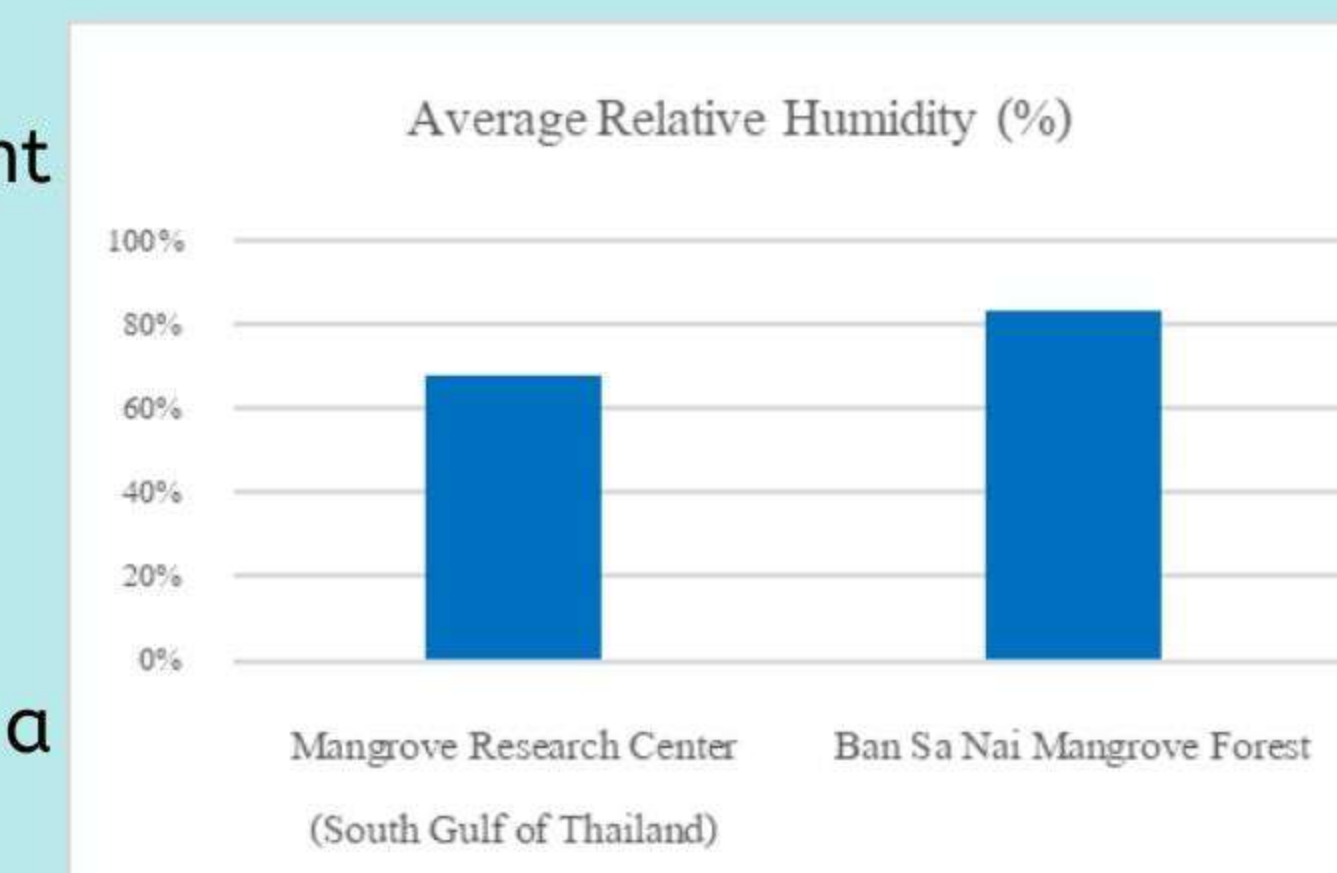


**Temperature Analysis:** The Mangrove Research Center (South Gulf of Thailand) recorded a higher average temperature of 27°C. In contrast, the Ban Sa Nai Mangrove Forest was cooler, with an average temperature of 25°C.

#### Lichen Diversity and Distribution

The environmental data collected reveals a significant difference in atmospheric moisture between the two study sites:

- Ban Sa Nai Mangrove Forest: This site recorded a high average relative humidity of 83%. (19 Types)
- Mangrove Research Center (South Gulf of Thailand): This site showed a lower average relative humidity of 68%. (16 Types)



### Discussion

The variation in lichen diversity is directly linked to the microclimate of each site. The presence of Fruticose and Foliose lichens at Ban Sa Nai suggests a high-quality environment with optimal moisture and lower thermal stress. Meanwhile, the Research Center's environment is hotter and drier, which limits growth primarily to Crustose lichens—a group known for its resilience to desiccation. This confirms that higher humidity and lower temperatures support a wider range of lichen taxa.

### Conclusion

The study concludes that Ban Sa Nai Mangrove has a more favorable environment for lichen diversity than the Research Center. The findings emphasize that air temperature and relative humidity are critical factors determining the distribution and growth of various lichen species.

### Bibliography

- GLOBE Program. (2017). Environmental Measurement Manual (Lichens). IPST.
- National Science and Technology Development Agency (NSTDA). (2020). Lichens: Tiny Detectives Monitoring Air Pollution.
- Green World Foundation. Air Detective Manual.

### The discovered lichens

