Research Reports

Factors Affecting the Abundance of Fiddler Crabs at the Hoi Pa Learning and Conservation Center, Thung Krabue Subdistrict, Yan Ta Khao District, Trang Province

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Research Title : Factors Affecting the Abundance of Fiddler Crabs at the Hoi Pa Learning and Conservation Center, Thung Krabue Subdistrict, Yan Ta Khao District, Trang Province

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Abstract

This study aimed to investigate the physical factors influencing the abundance of fiddler crabs (Uca vocans) at the Hoi Pa Learning and Conservation Center, Thung Ta Se Subdistrict, Yan Ta Khao District, Trang Province. Environmental parameters, including temperature, pH, salinity, and fiddler crab population counts, were measured using field survey methods. The results revealed a significant correlation between fiddler crab abundance and environmental factors, particularly salinity and pH, which directly affect the distribution and population size of fiddler crabs in the study area. The findings of this study can be utilized to develop appropriate conservation and management strategies for natural resources at the Hoi Pa Learning and Conservation Center.

Keywords: Factors affecting abundance, Fiddler Crabs *(Uca vocans)*

Introduction

Mangrove forests are vital ecosystems characterized by a diverse community of plant and animal species that thrive in the unique environment of muddy, brackish, and tidally inundated areas. These ecosystems are complex, comprising both biotic and abiotic components, including environmental factors such as temperature, light, rainfall, and humidity.

Fiddler crabs, also known as ghost crabs (genus Uca, family Ocypodidae), are small crustaceans that inhabit these mangrove ecosystems. They are easily recognizable by their trapezoidal carapace, long eyestalks, and vibrant coloration. Male fiddler crabs possess a distinctive enlarged claw, which they use for territorial displays, courtship rituals, and combat, while females have two equally sized smaller claws.

Mangrove forests serve as crucial habitats, providing food resources and shelter for a wide range of flora and fauna. Recognizing the ecological significance of these environments, our research team aimed to investigate the factors influencing the abundance of fiddler crabs at the Hoi Pa Learning and Conservation Center in Thung Ta Se Subdistrict, Yan Ta Khao District, Trang Province.

Research Objectives:

To investigate the physical factors influencing the abundance of fiddler crabs (Uca vocans).

Research Question:

Do physical factors affect the abundance of fiddler crabs?

Research Hypothesis:

Environmental physical factors, such as temperature, humidity, pH, and salinity, influence the habitat and behavior of fiddler crabs in the study area.

Materials and equipment

Soil Analysis (Pedosphere)

1. Measuring Tape
2. Soil pH Meter
3. Soil Meter
4. pH Paper
5. Measuring Tape
6. Quadrat

GLOBE Measurement Protocols:

- Pedosphere (Soil) Measurement Protocols
- Atmosphere Measurement Protocols

Study Site Selection:

Hoi Pa Learning and Conservation Center, Thung Krabue Subdistrict, Yan Ta Khao District, Trang Province, Thailand. Latitude (N): 7.364722 and Longitude (E): 99.586944

Research Methodology:

1. Research Preparation Phase:

1. Identification of Research Topic: Selection of the research topic and formulation of research questions.

2. Literature Review: Extensive review and compilation of relevant knowledge and theories related to the research.

3. Definition of Research Objectives: Clear articulation of the study's aims and objectives.

4. Sampling Site Selection: Determination of specific sampling points within the designated study area.

2. Implementation Phase:

1. Research Planning: Development of a detailed research implementation plan.

2. Site Survey: Initial field survey of the research area to assess site conditions.

3. Soil Quality Measurement (Pedosphere) using GLOBE Protocols: Measurement of relevant environmental parameters, including geographic coordinates, temperature, pH, soil moisture, and soil salinity, as follows:

3.1) Soil Sampling Point Selection: Identification of 10 sampling points where fiddler crabs were observed.

3.2) pH Measurement: Measurement of soil pH using a Soil pH Meter (SPM05), recording the results.

3.3) Salinity Measurement: Measurement of soil salinity using a Salinity Meter (accuracy ±3%), recording the results.

3. Atmospheric Data Collection (Atmosphere):

3.1) Measurement of air temperature and relative humidity.

4. Collect Quadrat fiddler crab population data at all 10 points 3 times, count the number of crabs in each box and observe the number of fiddler crabs in the mangrove forest, read the values and record the results.

Data Analysis and Conclusion:

1. Data Analysis and Correlation
2. Graphical Representation
3. Experimental Conclusion

Results:

Table 1: Geographic Coordinates

Study Area	Geographic Coordinates	
	Latitude (N)	Longitude (E)
The Hoi Pa Learning and Conservation Center, Thung	7.364722	99.586944

Krabue Subdistrict, Yan Ta Khao District, Trang Province, Thailand		

The study was performed at the Hoi Pa Learning and Conservation Center, a mangrove ecosystem in Thung Krabue Subdistrict, Yan Ta Khao District, Trang Province, Thailand, as indicated by the geographic coordinates (Latitude (N) 7.364722 and Longitude (E) 99.586944) presented in Table 1

Map Illustrating the Geographic Location with Coordinates Latitude 7.364722 and Longitude 99.586944

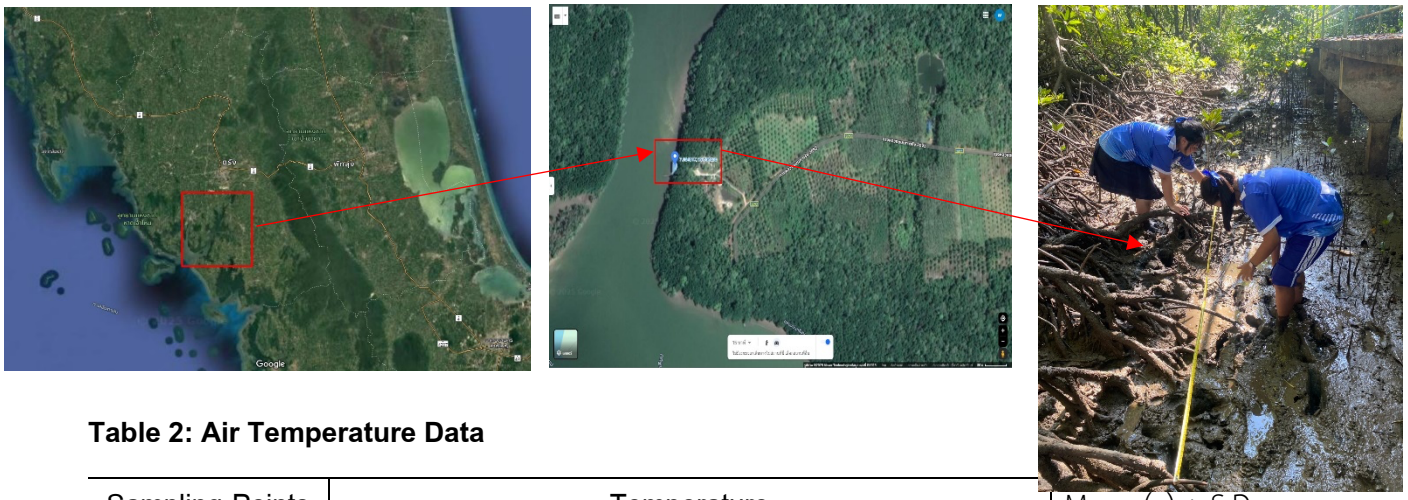

Table 2: Air Temperature Data

Sampling Points	Temperature			Mean (x) ± S.D.
	1st Measurement	2nd Measurement	3rd Measurement	
1	28	27.5	27.2	27.57±0.29
2	27.3	27.3	27.5	27.37±0.09
3	28.2	28	27.6	27.93±0.22
4	27.1	28.2	27.1	27.47±0.49
5	28.1	27.8	28	27.97±0.11
6	28.8	28.3	27.9	28.33±0.31
7	28.8	27.8	28.1	28.23±0.38
8	28.4	28.1	28	28.17±0.16
9	28.3	28	28.3	28.20±0.13
10	28.2	27.9	28.5	28.20±0.2

Table 2 presents the air temperature measurements taken at each sampling point. Temperature was measured three times per sampling point, and the mean temperature was calculated for each point. Ten sampling points were measured, with three measurements per point. The lowest mean temperature was recorded at point 2 (27.37 ± 0.09 °C), while the highest mean temperature was recorded at point 7 (28.23 ± 0.38 °C).

Table 3: Atmospheric Humidity

Sampling Points	Humidity			Mean
	1st Measurement	2nd Measurement	3rd Measurement	
1	79	80	82	80.33
2	80	80	81	80.33
3	80	81	81	80.67
4	80	81	83	81.33
5	81	82	80	81.00
6	80	80	78	79.33
7	82	79	79	80
8	78	77	75	76.67
9	78	78	77	77.67
10	78	76	78	77.33

Table 3 presents the atmospheric humidity measurements taken at each sampling point. Humidity was measured three times per sampling point, and the mean humidity was calculated

for each point. Ten sampling points were measured, with three measurements per point. The lowest mean humidity was recorded at point 8 (76.67%), while the highest mean humidity was recorded at point 3 (81.33%).

Table 4: Soil pH Values

Sampling Points	pH			Mean
	1st Measurement	2nd Measurement	3rd Measurement	
1	7.5	7.3	7.5	7.43
2	7.4	7..2	7.5	7.37
3	7.4	7.2	7.4	7.37
4	7.3	7.1	7.4	7.27
5	7.2	7.2	7.3	7.23
6	7.1	7.5	7.3	7.30
7	7	7.2	7.1	7.10
8	7.2	7.1	7.2	7.17
9	7.1	7.1	7.3	7.17
10	7.1	7.2	7.2	7.17

Table 4 presents the pH values of samples collected from each point. Each point was measured three times, and the average pH value was calculated for each sampling point. The pH was measured at 10 points, with three measurements per point. The lowest average pH was recorded at point 7 (7.10), and the highest average pH was recorded at points 1 (7.43).

Table 5: Salinity Values (ppt)

Sampling Points	Salinity Values (ppt)			Mean (x) ± S.D.
	1st Measurement	2nd Measurement	3rd Measurement	
1	9.9	10.2	10.1	10.07±3
2	10.2	10.1	10.1	10.13±3
3	9.8	10.3	10.2	10.1±3
4	10.1	9.1	10.3	9.83±3
5	10	10.1	10.2	10.10±3
6	10.1	10.2	10.1	10.13±3
7	8.9	9.1	9.8	9.27±3
8	7.6	9.3	8.8	8.57±3
9	9	8	9.7	8.90±3
10	8.9	7.6	9.7	8.73±3

Table 5 presents the salinity values (ppt) measured at each sampling point. Three measurements were taken at each point, and the mean salinity was calculated. Ten sampling points were measured, with three measurements per point. The lowest mean salinity was

recorded at point 8 (8.57 ± 3 ppt), while the highest mean salinity was recorded at points 2 and 6 (10.13 ± 3 ppt).

Table 6: Number of Fiddler Crabs

Sampling Points	Number of Fiddler Crabs			Mean
	1st Measurement	2nd Measurement	3rd Measurement	
1	3	3	3	3
2	2	2	2	2
3	3	3	4	3.33
4	1	10	3	4.67
5	4	4	3	3.67
6	5	8	9	7.33
7	8	7	8	7.67
8	14	1	13	9.33
9	3	13	15	10.33
10	12	14	10	12

Table 6 presents the number of fiddler crabs found at each sampling point. Three surveys were conducted, and the mean number of crabs was calculated. The results indicate variations in crab abundance across different areas, reflecting the distribution of fiddler crabs

within the study site. Ten sampling points were surveyed, with three counts per point. The lowest mean number of crabs was recorded at point 2 (2 individuals), while the highest mean number was recorded at point 10 (12 individuals).

Table 7: Mean Values

Measurement	Temperature	Humidity	pH	Salinity Values (ppt)	Number of Fiddler Crabs
1	28.11	79.6	7.23	9.45	5.5
2	27.89	79.4	7.21	9.4	6.5
3	27.82	79.4	7.32	9.9	7
Overall Average	27.94	79.74	7.25	9.58	6.3

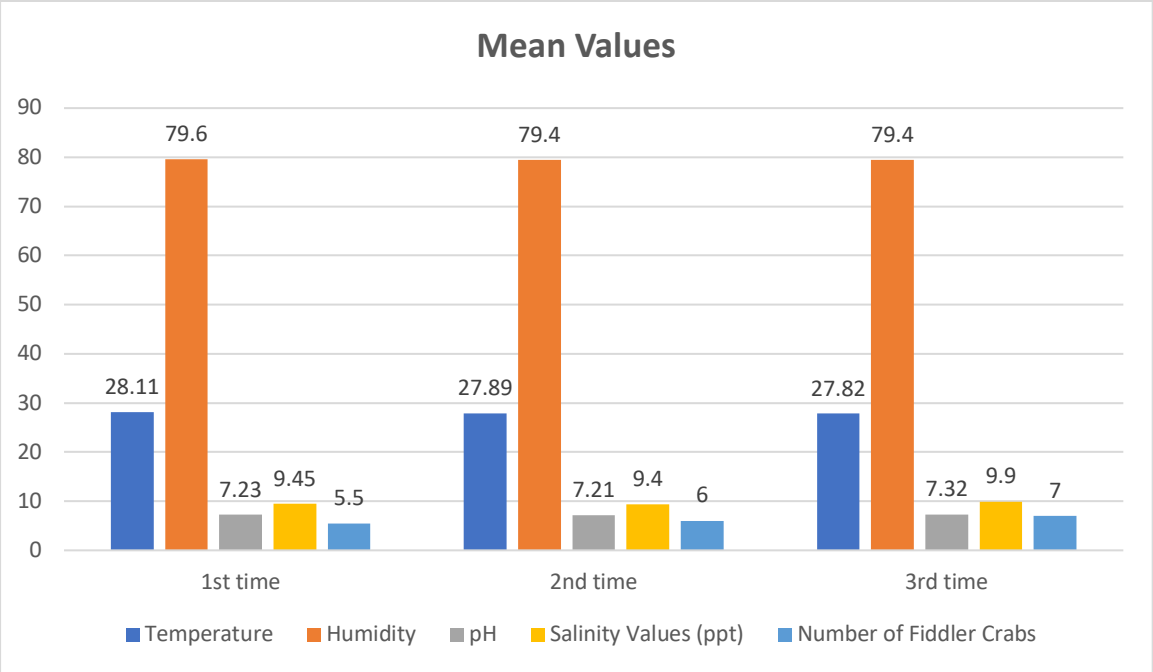

Table 7 presents the overall mean values for temperature, humidity, pH, salinity, and crab count. The average crab count was 6.3 individuals. The mean values were as follows: temperature 27.94°C, humidity 79.74%, pH 7.25, salinity 9.58 ppt, and crab count 6.3 individuals.

Summary and Discussion:

The research findings indicate that the average temperature was 27.94°C, which is considered a suitable temperature for the natural habitat of crabs. Crabs are capable of adapting to environments where temperatures are neither excessively high nor low. The average humidity was 79.74%, reflecting sufficient soil moisture for the construction of crab habitats and food sources. The average pH value of 7.25 falls within a suitable range for crab survival and may influence the growth of plants and animals in the area, including crabs, which must adapt to these environmental conditions. The average salinity of 9.58 ppt is within an appropriate range and

does not impede the survival of crabs in mangrove forest habitats. The average crab population was 6.3 individuals, suggesting a possible correlation between pH and salinity levels and crab populations in the study area. However, the natural distribution of crabs may also depend on other factors such as water sources, temperature, pH, humidity, and optimal salinity.

Conclusion:

The study revealed that the environmental conditions in the area, including temperature and humidity, are conducive to the natural habitat of fiddler crabs. Salinity and pH levels in the area may influence fiddler crab abundance. Areas with optimal pH and salinity may result in an increased fiddler crab population. This aligns with studies that have found a correlation between fiddler crabs and physical factors.

Optional Badges

I AM A STUDENT RESEARCHER

Our team, as student researchers, conducted a project focusing on the factors influencing fiddler crab abundance. We emphasized the analysis of environmental factors such as air temperature, relative humidity, soil pH, and salinity to understand their impact on fiddler

crab populations in the study area. This project allowed me to practice data collection, analysis, and scientific conclusion drawing, which are essential experiences for learning and developing research skills.

I AM A DATA SCIENTIST

My team and I conducted a project investigating the factors affecting fiddler crab abundance, with a focus on analyzing environmental variables such as air temperature, relative humidity, soil pH, and salinity to determine their correlation with observed crab populations. I applied data science methodologies to data collection, processing, and analysis. This project allowed me to enhance my data analysis and interpretation skills, leading to meaningful conclusions for fiddler crab conservation in the study area.

I AM A COLLABORATOR

My team and I conducted a research project on the factors influencing fiddler crab abundance, collaborating on data collection and the analysis of environmental factors such as air temperature, relative humidity, pH, and water salinity to study their relationship with crab populations. We worked together throughout all project phases, from initiation to completion. This project allowed me to practice teamwork, exchange ideas, and develop collaborative research skills, which are crucial experiences for learning and enhancing collaborative abilities.

Acknowledgements

The successful completion of our project, 'Factors Affecting Fiddler Crab Abundance at the Hoi Pa Learning and Conservation Center, Thung Krabue Subdistrict, Yan Ta Khao District, Trang Province,' was made possible through the invaluable support and guidance of Wichienmatu School and Ms. Sawitree Samathi. We are deeply grateful for their continuous consultation, guidance, and support throughout every stage of this research. Their expertise and dedication were instrumental in the successful completion of this study. We sincerely appreciate their kindness and extend our heartfelt gratitude.

We would like to express our sincere thanks to Wichienmatu School for providing the necessary equipment, facilities, and resources that were essential for conducting this research project.

We extend our gratitude to our families for their unwavering support and encouragement, which provided us with the emotional strength and motivation to persevere and successfully complete this research.

We also thank our fellow team members for their collaboration and encouragement throughout the challenges of this research project.

Finally, we hope that this project will be beneficial to those interested in this field of study. We apologize for any errors or shortcomings that may have occurred during this research.

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1

Conducting a field survey of the research area.

2

Determining soil sampling points.

3

Measuring pH using a Soil pH Meter SPM05.

4

Measuring salinity using a Salinity meter

5

Measuring air temperature and humidity using a DIGICON TH-02A.

6

Determining fiddler crab population using a Quadrat