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Species Composition and Abundance of Freshwater Crabs in Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan, Philippines

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An Undergraduate Thesis Submitted To The College Of Fisheries And Natural Sciences Western Philippines University Puerto Princesa Campus

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Abstract

Amalia jm. T. 2025 Species Composition and Abundance of Freshwater Crabs in Tampisaw Stream Barangay Bagong Bayan Puerto Princesa City, Palawan.

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Freshwater crabs are a diverse decapod that inhabit clean water. They are often given lesser attention compared to their marine relatives, resulting to lower number of species recorded and very limited data on their abundance. This study was conducted to assess the species composition and abundance of freshwater crabs in Tampisaw Stream, Brgy. Bagong Bayan, Puerto Princesa City, Palawan. Samples were collected using baited funnel traps and manual collections (i.e., handpicking) between February and March 2025. Three stations within the stream were established: Tampisaw Eco Park, River Campsite, and Villa Kashieka. Samples collected were placed in Styrofoam box prior to transport to laboratory for further analysis. A total of two freshwater crab species (Insulamon palawanense and Parathelphusa rasilis) were caught in Tampisaw Stream. Parathelpusa rasilis was the most abundant species in all the sampling stations which were caught mostly caught through manual collection. The samples are male-dominated, with apparent dominance of different life stage in each station which can be is attributed to the habitat characteristics of middle and lower stations with similar of vegetation.

Key Words: Aquatic Biodiversity, Conservation, Ecology, Freshwater Habitat, Species Diversity.

Introduction

The subphylum Crustacea includes freshwater crabs, with approximately 6700 species of brachyuran crabs recorded worldwide, including 14 families comprised of 238 genera and 1476 species of freshwater crabs. Among these, 1306 species are considered true freshwater crabs belonging to eight families: Pseudothelphusidae, Trichodactylidae, Potamonautidae, Deckeniidae, Platythelphusidae, Potamidae, Gecarcinucidae, and Parathelphusidae [1].

Globally, nearly 1400 species of primary brachyuran freshwater crabs spend their entire life cycle in freshwater habitats, while an additional 220 species of secondary freshwater crabs divide their lives between freshwater and saltwater environments [2]. Current estimates suggest that freshwater crab diversity is still underreported, with many taxa yet to be described. As such, Brachyura remains the most species-rich group of decapod crustaceans, representing the largest assemblage of freshwater crabs. Freshwater crabs also play a vital ecological role, serving as prey for otters and other aquatic organisms, thus forming an essential part of the tropical aquatic food web. However, their population face serious threats from habitat loss and deforestation [3].

Despite their ecological importance, freshwater crabs have his-

torically received less research attention than their marine counterparts. Described the genus *Parathelphusa* as a distinct group of freshwater crabs endemic to Southeast Asia, although freshwater crabs are found throughout the freshwater region [4].

In the Philippines, only 42 species of freshwater crabs have been documented so far [5]. However, suggested that this number could potentially double with more extensive surveys and research in many less studies areas. In Palawan, three genera of freshwater crabs have been identified: *Carpomon* (family Potamidae), and *Insulamon* and *Parathelphusa* (family Gecarcinucidae) [6]. Recorded five *Insulamon* species and one terrestrial *Carpomon* species, while reported seven species of *Parathelphusa* in the region [7, 8]. Was the first to document the abundance of freshwater crabs in Palawan along Dacoton stream who reported *Parathelphusa rasilis* as the most abundant species, including *Insulamon palawanense* and *Goosamer* sp. In rural areas of the Philippines such as Dacoton Stream, freshwater crabs also hold local economic value as an occasional food source.

Tampisaw Stream in Bagong Bayan, Puerto Princesa City is a well-known local and tourist destination, popular for swimming and other recreational water activities. However, there is a notable absence of studies specifically addressing the species composition of freshwater crabs in this area. Most research on Philippine freshwater crabs has focused on major river systems or protected areas, leaving smaller, less-studied water bodies like Tampisaw Stream largely unexplored. At present, no ecological assessments have been carried out in Tampisaw Stream, resulting in a significant gap in knowledge regarding the diversity, habitat preferences, and population dynamics inhabitants, particularly the freshwater crab. Moreover, little is known about how local environmental factors such as water quality, streambed composition, and human activities affect crab distribution in the stream. This lack of baseline data poses a challenge for effective conservation and management, especially in light of mounting threats from habitat degradation, pollution, and climate change. Addressing this knowledge gap is essential for protecting potentially endemic or vulnerable species and enhancing the broader understanding of freshwater biodiversity in the Philippines.

Objectives of the study

The general objective of this study was to assess the species composition and abundance of freshwater crabs in Tampisaw Stream, Bagong Bayan, Puerto Princessa City, Palawan.

Specifically, this Study Aimed To

1. Identify the species of freshwater crabs collected in Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan; assess the abundance of each freshwater crab species in each station; and determine the species richness and diversity index of freshwater crab species in different stations.

Materials and Methods

Study area

The study was conducted in Tampisaw Stream, Barangay Bagong Bayan, Puerto Princesa City, Palawan, Philippines. The sampling area is located in Purok Mabuhay, approximately 10 km away from Baranagay Bagong Bayan proper. Tampisaw stream has a total length of 4.5 km from the upper to the lower portion and drains to Montible River (Figure 1, Table 1).

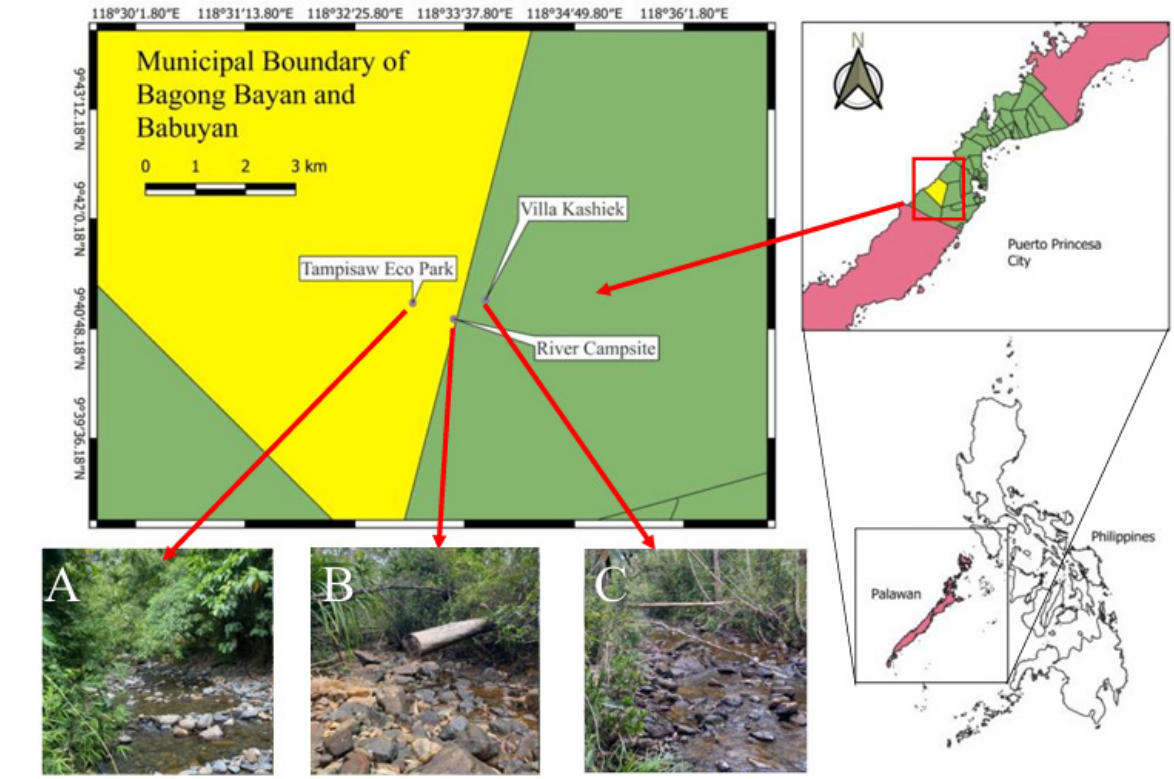


Figure 1: Map of sampling area showing the three designated sampling stations: (A) Tampisaw River and Ecopark; (B) River Campsite; (C) Villa Kashieca.

Table 1: Coordinates of the three designated sampling station: (A) Tampisaw River and Ecopark; (B) River Campsite; (C) Villa Kashieca.

Station	Name	Coordinates	
1	Tampisaw Eco Park	09º37'40.69" N	118º33'16.20" E
2	River Campsite	09º40'54.67" N	118º33'30.12" E
3	Villa Kashieka	09º41'1.734" N	118 º33'49.59" E

Sampling Procedure

The sampling in each station (i.e., Tampisaw eco park, River Campsite and Villa Kashieka) were conducted from February to March 2025 with three days consecutive of sampling which took place every other week. Freshwater crabs were gathered using two methods: manual collection and baited funnel trap (Figures 2 and 3). Freshwater crabs were manually collected before the traps in each and station and were inspected to ensure that the crabs collected were different from those that were already been counted in the traps. The process of manual collection involved turning over the big stones, searching beneath the rocks and cracks, and looking around each trap (Figure 3).



Figure 2: The *Bubo* Trap Made From Rattan And Bamboo Used In The Study (A); Placing of The Traps in one of The Stations (B).



Figure 3: Manual collection of freshwater crabs was carried out by turning over large stones and looking under boulders and in crevices (A); Additional effort was made by searching around each trap to ensure thorough collection (B).

The funnel baited traps were made of bamboo that was around 40–50 cm in length and cylindrical, with a larger entrance at one end and a smaller one at the other. To make it easier for the researcher to open the smaller opening when collecting and counting the collected crabs, a rubber was used to seal it. Grilled coconut was used as bait for the trap based on local understanding that it attracts crabs. A total of nine traps were used in all stations, with three traps per station were deployed around 5:00 PM. At 10:00 AM, after 15 hours of immersion, the traps were inspected for any crabs captured. Each sample was collected, preserved in sample 95% ethyl alcohol, and labeled properly with trap number, location, and the date of collection. Crabs were placed in the container with enough water to cover it and refrigerate for 30-60 mins. This slows down their metabolism and numbs them. The crabs were transferred to a container and left it for a several hours to ensure it is fully-euthanized.

Species Identification

Freshwater crabs collected in the sampling area were identified using external morphological characteristics. Each specimen was measured for carapace width (mm) and length (mm) using a caliper. Body weights (g) were recorded and sex was determined based on abdominal shape (males have point apron, females have rounded apron) and gonopore location to aid in species-level identification after measurement (Figure 4). Some specimens were preserved to 95% ETOH (Table2).

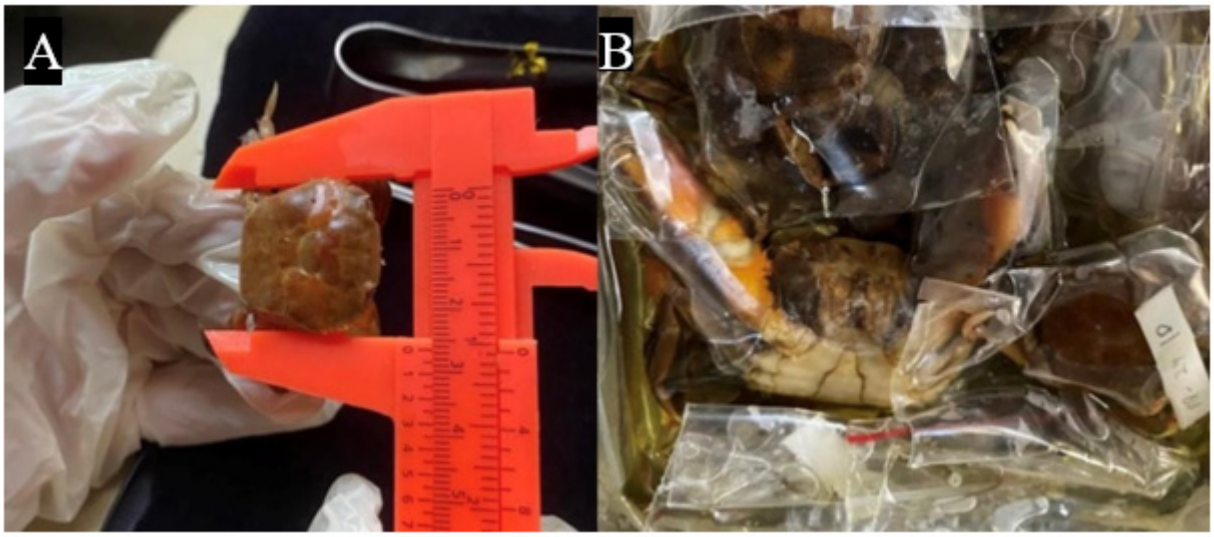


Figure 4: The Measurement of Carapace Width and Length of The Specimen (A). Specimen Preserved in Ethanol after Morphometric Measurements (B).

Data Analysis

A data analysis used include abundance which was determined by using the following formula:

$$Abundance = \frac{Number\ of\ Individuals}{Total\ number\ of\ trap\ per\ station}\ or\ Pi = \frac{n}{N}$$

Abundance of freshwater crabs per station was analyzed in One-way ANOVA in SPSS Program.

The calculation of diversity of freshwater crab species in each station of the stream used Shannon-Wiener Diversity Index Formula

$$H' = -\sum_{i=1}^{S} pi\ln(pi)$$

H′ = Shannon Diversity Index (higher values mean more diversity) S = total number of species in the community (species richness)

pi = proportion (relative abundance) of individuals belonging to the ith species

ni = number of individuals of species *ith* species

N = total number of individuals of all species ln(pi) = natural logarithm of the proportion

The Shannon- Wiener index (Shannon, 1948) was applied to assess the overall diversity of freshwater crab species in different stations of the stream.

Results

Species Diversity

Two species of freshwater crabs, *Insulamon palawanense* and *Parathelphusa rasilis*, were found across three sampling stations in the Tampisaw area (Tables 2 and 3). Their presence indicates healthy aquatic conditions and highlights the ecological significance of the stream and river habitats where these native crab species thrive (Figures 5 and 6).

Table 2: Number of samples, morphometric range, and sex of freshwater crabs collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan.

Species	n= 54	Carapace length (mm)	Carapace width (mm)	Body weight (g)	Number of samples collected		
					M	F	UD
Insulamon palawanense	32	9.3-34.9	17-31.6	6.7-17.5	11	6	6
Parathelphusa rasilis	31	9.9-35.6	10-32.8	0.9 -17.8	20	6	5

Freshwater crabs collected from Tampisaw Stream include *Insulamon palawanens*e (CL: 9.3–34.9 mm, CW: 17–31.6 mm, weight: 6.7–17.5 g, male) and *Parathelphusa rasilis* (CL: 9.9–35.6 mm, CW: 10–32.8 mm, weight: 0.9–17.8 g, male), with data indicating the wet weight, carapace length, carapace width, sex, total number of individuals, and specific collection sites for each species.

Table 3: Freshwater crab species collected in three sampling stations along Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan.

Station	Family	Scientific name
Tampisaw Eco Park	Potamidae	*Insulamon palawanense*
	Gecarcinudae	*Parathelpusa rasilis*
River Campsite	Potamidae	*Insulamon palawanense*
	Gecarcinudae	*Parathelphusa rasilis*
Villa Kasheka	Potamidae	*Insulamon palawanense*

This indicates that *Parthelphusa rasilis* is the most widely distributed species in the stream, while *Insulamon palawanense* has a more limited distribution, possibly favoring the specific environmental conditions in the Tampisaw Eco Park of the stream (Figure 7).

Family

Gecarcinucidae Rathbun, 1904 *Parathelphusa rasilis* Genus *Parathelphusa rasilis*.

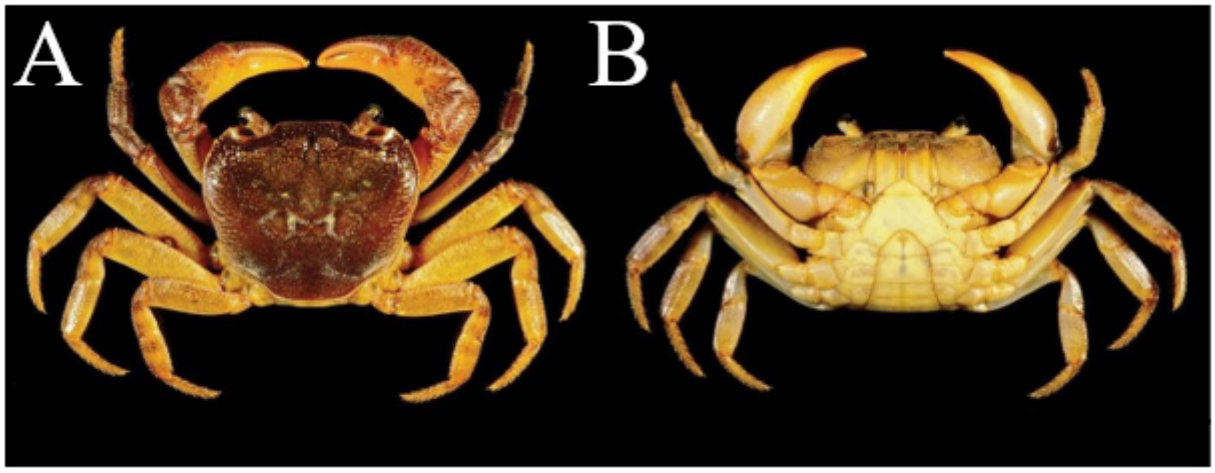


Figure 5: The *Parathelphusa rasilis* collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan: dorsal view (A); and ventral view (B).

Parathelphusa rasilis was found in shallow, slow-flowing sections of the Tampisaw Stream, mainly along muddy to sandy banks under rocks and leaf litter. It has a smooth dark brown to reddish-brown carapace, broad chelae, and short walking legs. A total of 31 individuals were collected using manual and baited funnel traps: 24 from the upper station, 3 from the middle, and 4 from the lower. Carapace lengths ranged from 9.3–35.6 mm, and widths from 17.0–32.8 mm, indicating greater abundance in the Tampisaw Eco Park section.

Family

Potamidae Ortman, 1896 Subfamily Potamscinae Bott,1970 Genus *Insulamon* Ng & Takeda,1992 *Insulamon palawanense Freitag*, 2012.

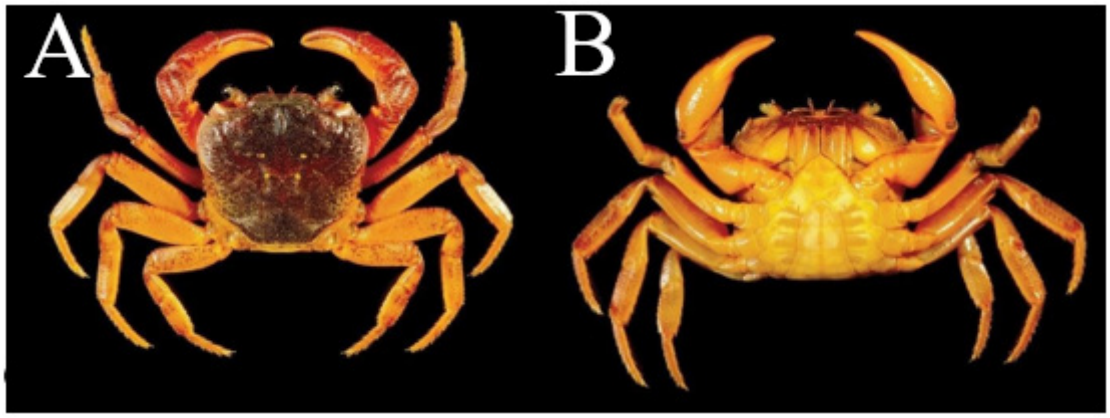


Figure 6: The *Insulamon palawanense* collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan: dorsal view (A); and ventral view (B).

Insulamon palawanense was observed in cool, fast-flowing upstream sections of the Tampisaw Stream with rocky substrates and dense riparian vegetation; the species is distinguished by its distinct reddish, pinkish, or lavender-tinted, carapace, robust chelae, and slightly flattened body adapted for hiding among stones and crevices. Manual collection was used to capture the species on the middle and lower station. A total of 13 individuals Insulamon palawanense were gathered on the upper station through manual collection, 3 of the middle and 6 individuals for the lower station. the specimen measurement reached up to 9.3mm to 34.1 mm carapace length and 29.6 mm by to 30.2 mm carapace width.

Abundance of Freshwater Crabs in Tampisaw Stream

The abundance of freshwater crabs significantly differed across the upper, middle, and lower reaches of the stream, as indicated by the statistical analysis ($F = 160.778$, $p = 0.001$) (Appendix 5). A total of 55 individuals of freshwater crabs were collected. Among these, 31 individuals were *Parathelphusa rasilis* which were captured using manual collection and baited funnel traps across the three sampling stations. *Parathelphusa rasilis* was the only caught through manual collection, while *Insulamon palawanense* was collected by baited funnel traps and handpicking, with a total of 24 individuals recorded (Figure 8).

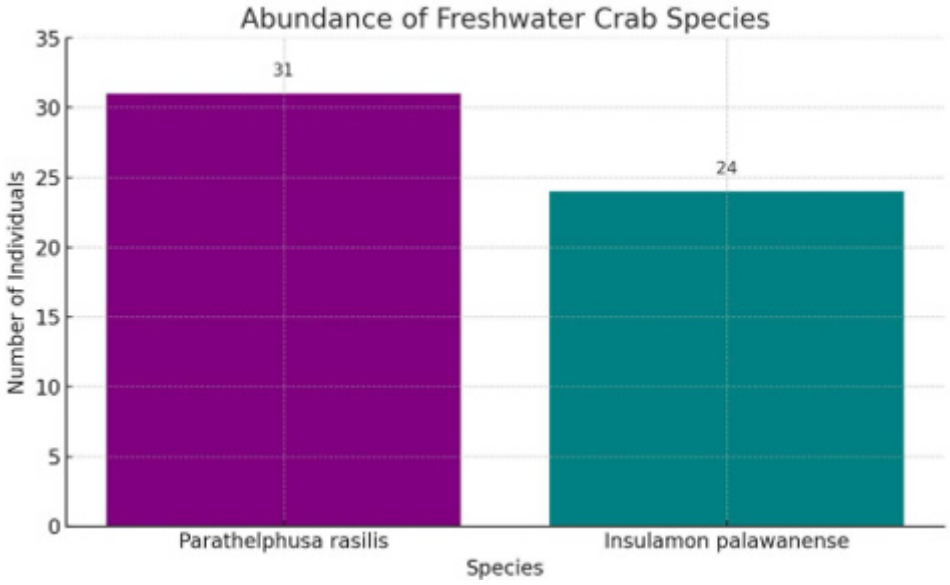


Figure 7: The abundance of freshwater crabs per species collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan.

However, it should be noted that the Inter Tropical Convergence Zone (ITCZ) brought severe rain in February which prevented the researcher from conducting manual collection and resulted to turbid water during the three-day sampling period. Among the three sampling stations, the upper station recorded the highest number of individuals from both *Parathelphusa rasilis* and *Insulamon palawanense*, followed by the lower station, while the middle station had the lowest number of individuals collected (Figure 9).

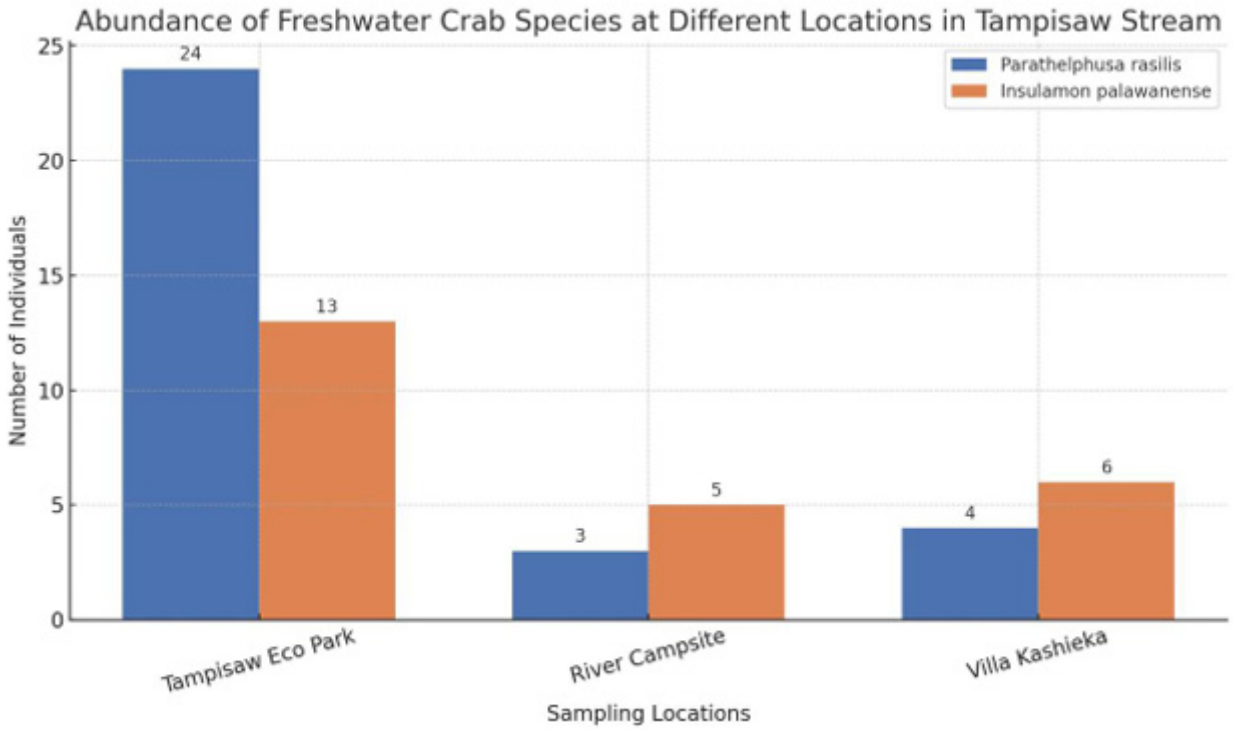


Figure 8: The abundance of freshwater crab species across the three stations collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan.

In Tampisaw Stream, the number of freshwater crab individuals caught in both the River Campsite and Villa Kashieka stations was approximately half of those recorded in the Tampisaw Eco Park. Parathelphusa rasilis was the most abundant species across all three sampling stations, while Insulamon palawanense was found only in the Tampisaw Eco Park and Villa Kahieska. The River Campsite, where Insulamon palawanense was absent, had noticeably less leaf litter and detritus compared to the other stations (Table 4). Over the one-month sampling period, Parathelphusa rasilis accounted for 31 individuals, while Insulamon palawanense accounted for 24. More individuals were captured through manual collection than by baited funnel traps. Across all stations, male, female, and juvenile individuals were present, with males being less abundant than females, exhibiting an approximate 1:3 female to male ratio in Parathelphusa rasilis. The average female-to-juvenile ratio for Parathelphusa rasilis and Insulamon palawanense was 1:1 ratio on the lowest section of River Campsite, followed by the Villa Kashieka , and highest in the Tampisaw Eco Park . Juvenile Parathelphusa. Rasilis were mostly observed in the Tampisaw Eco Park, whereas females were primarily found in the middle station. (Appendix.4)

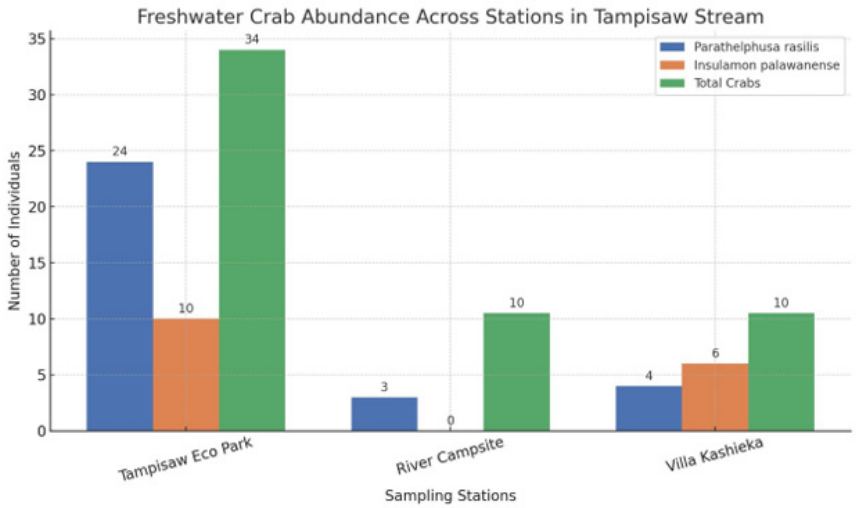


Figure 9: Abundance of male, female and juvenile freshwater crabs per station collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan.

The vegetation across the Tampisaw Eco Park, River Campsite, and Villa Kasheika of Tampisaw Stream was generally similar, consisting of tall trees, shrubs, vines, and bamboo; however, the River Campsite lacked tall trees and was dominated by shrubs and vines. Freshwater crabs were more frequently encountered in creek sections with substrates composed of variously sized broken rocks and areas with dense vegetation and higher canopy cover (Figure 5).

Table 4. Habitat description of three sampling along Tampisaw stream, Bagong Bayan, Puerto Princesa City, Palawan.

Station	Vegetation	Substrate	Canopy cover
Tampisaw Eco park	Tall trees, shrubs, and vines	Boulders and gravel a few portions of sand	80%
River Campsite	Tall trees, shrubs, bamboo and vines	Boulders and gravel a few portions of sand	50%
Villa Kashieka	Trees, shrubs, and vines	Boulders and gravel	30%

The significantly higher crab abundance recorded in Tampisaw Eco Park reach supported by Tukey's post hoc test and attributed to favorable habitat features such as dense vegetation, high canopy cover, and suitable substrate emphasizes the ecological importance of preserving pristine upstream environments to sustain freshwater biodiversity (Appendix 7).

Diversity Indices

The analysis of freshwater crab diversity through the Shannon-Wiener Index (H') highlighted clear variations across the Tampisaw Eco Park, River Campsite and Villa Kashieka sections of the stream, with diversity patterns closely tied to species abundance and environmental conditions. The Tampisaw Eco park reach recorded the highest diversity (H' = 0.702794), primarily due to a larger population of Parathelpusa rasilis (24 individuals), along with Insulamon palawanese (13 individuals). This elevated diversity is likely a result of ideal habitat features such as dense vegetation, extensive canopy cover, and favorable substrate composition, all of which create numerous ecological niches and food sources. These results support previous studies emphasizing that relatively undisturbed upstream habitats tend to sustain greater biodiversity. In contrast, the River Campsite reach exhibited significantly Villa Kashieka diversity (H' = 0.376648), with a slight dominance of Insulamon palawanese (5 individuals) over Parathelpusa rasilis (3 individuals). The decline in diversity here may be attributed to limited vegetation and fragmented habitat, which restrict ecological opportunities.

This trend is consistent with literature that highlights how changes in habitat structure can negatively impact freshwater biodiversity. The Villa Kashieka reaches showed a modest increase in diversity compared to the middle section (H' = 0.43232), but it remained less diverse than the upper reach. Insulamon palawanese (six individuals) again outnumbered Parathelpusa rasilis (four individuals), though the presence of human-related disturbance such as laundry areas and other forms of habitat disruption likely contributed to the reduced diversity observed (Appendix 9).

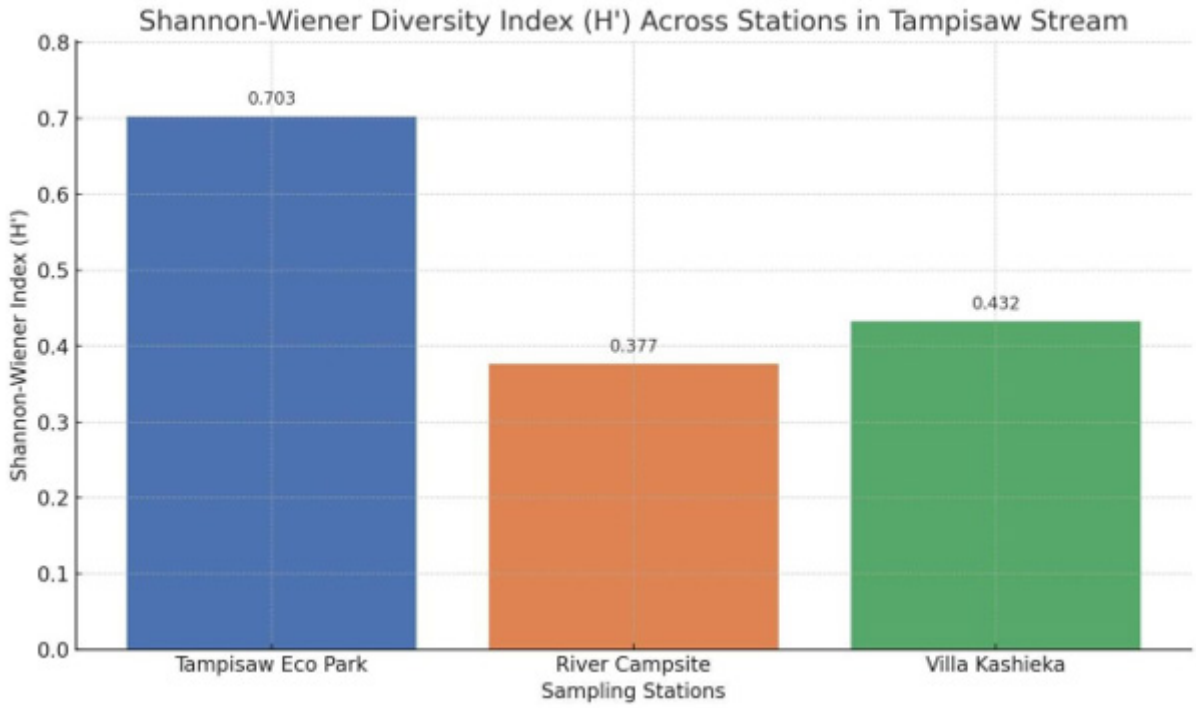


Figure 10: Diversity index of freshwater crabs collected from Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan.

Discussion

In the present study, two species of freshwater crabs belonging to two families and two generawere recorded in the Tampisaw Stream (Table 2), demonstrating higher diversity compared to other studies [9]. However, this study recorded one species fewer than that of in Dacoton Stream, wherein Insulamon palawanense and Parathelphusa rasilis were both found, including a semi-terrestrial species. The genus Parathelphusa, recorded in all three sampling stations in Tampisaw, is a distinctive group of freshwater crabs in Southeast Asia, typically inhabiting lowland freshwater habitats. According, Parathelphusa species may partially overlap in habitat with Insulamon, which was also observed in this study in both the upper and middle stations. Freitag noted that Insulamon species are semi-aquatic and typically found under boulders and roots. The vegetation canopy and substrate composition in the upper and middle stations likely provided suitable habitat for Insulamon palawanese; however, in the present study, it was observed only in the upper station. Reported that freshwater crab species are widespread and abundant in the Ogbomwen River in southern Nigeria. However, only one species was selected for their population study, with hand bait nets used for collection and abundance compared monthly across stations. In comparison, a total of 55 individuals were collected in Tampisaw Stream higher than the number recorded. In the study, Insulamon palawanense was captured exclusively by manual collection, with a total of 14 individuals. No Geosesarma sp. were recorded in Tampisaw Stream, while three individuals of this genus were collected manually in Dacoton Stream. Among the three sampling stations in the present study, the Tampisaw Eco Park recorded the highest number of individuals from both species (34), followed by the Villa Kasheika (10), and the River Campsite with the lowest (8 individuals from a single species) (Figure 9). Over the one-month sampling period, more individuals were captured through manual collection than with baited funnel traps. Across all stations, males, females, and juveniles were present, but male individuals were less abundant than females, with an approximate 1:3 female to male ratio in Parathelphusa rasilis. The average female-to-juvenile ratio for Parathelphusa rasilis and Insulamon palawanense was 1:1 ratio on the lowest section of River Campsite, followed by the Villa Kashieka , and highest in the Tampisaw Eco Park . Juvenile Parathelphusa rasilis were mostly observed in the Tampisaw Eco Park, whereas females were primarily found in the middle station. These findings were similar to those, who recorded a higher abundance and diversity of Parathelphusa rasilis cabayugan in undisturbed headwaters of Cabayugan River in Puerto Princesa City compared to the middle and lower sections affected by anthropogenic disturbances. However, the present study found contrasting results, where the forested Villa Kashieka had the lowest abundance, while the more open Tampisaw Eco Park had the highest. In the River Campsite, the most dominant vegetation was bamboo which also contributes to the few leaf litters in the said station. Freshwater crabs are known to feed mainly on plant matter, hence, the surrounding vegetation is important for their survival.

Conclusion

This study determined the diversity and abundance of freshwater crabs in Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan. A total of two species (i.e., Parathelphusa rasilis and Insulamon palawanense) were recorded among the stations surveyed. The samples collected are have mixed sexes, with the dominance of males samples. Parathelphusa rasilis was the most abundant species collected mostly by hand picking, while Insulamon palawanense were collected using both hand picking and baited traps. Among the stations, more samples were collected in Tampisaw Eco Park station. This trend is likely influenced by favorable ecological conditions in the upper station, including dense vegetation, high canopy cover, and a substrate composed of rocks, leaf litter, and woody debris. These environmental features offer ideal microhabitats for feeding, shelter, and reproduction.

Recommendations

It is recommended that further studies be conducted on the species composition and abundance of freshwater crabs across various streams in Palawan, as additional undocumented species may still exist. Future research should consider using a wider range of trap types and bait combinations to improve sampling efficiency and ensure a more comprehensive assessment of freshwater crab diversity and population distribution throughout different stream habitats.

Acknowledgment

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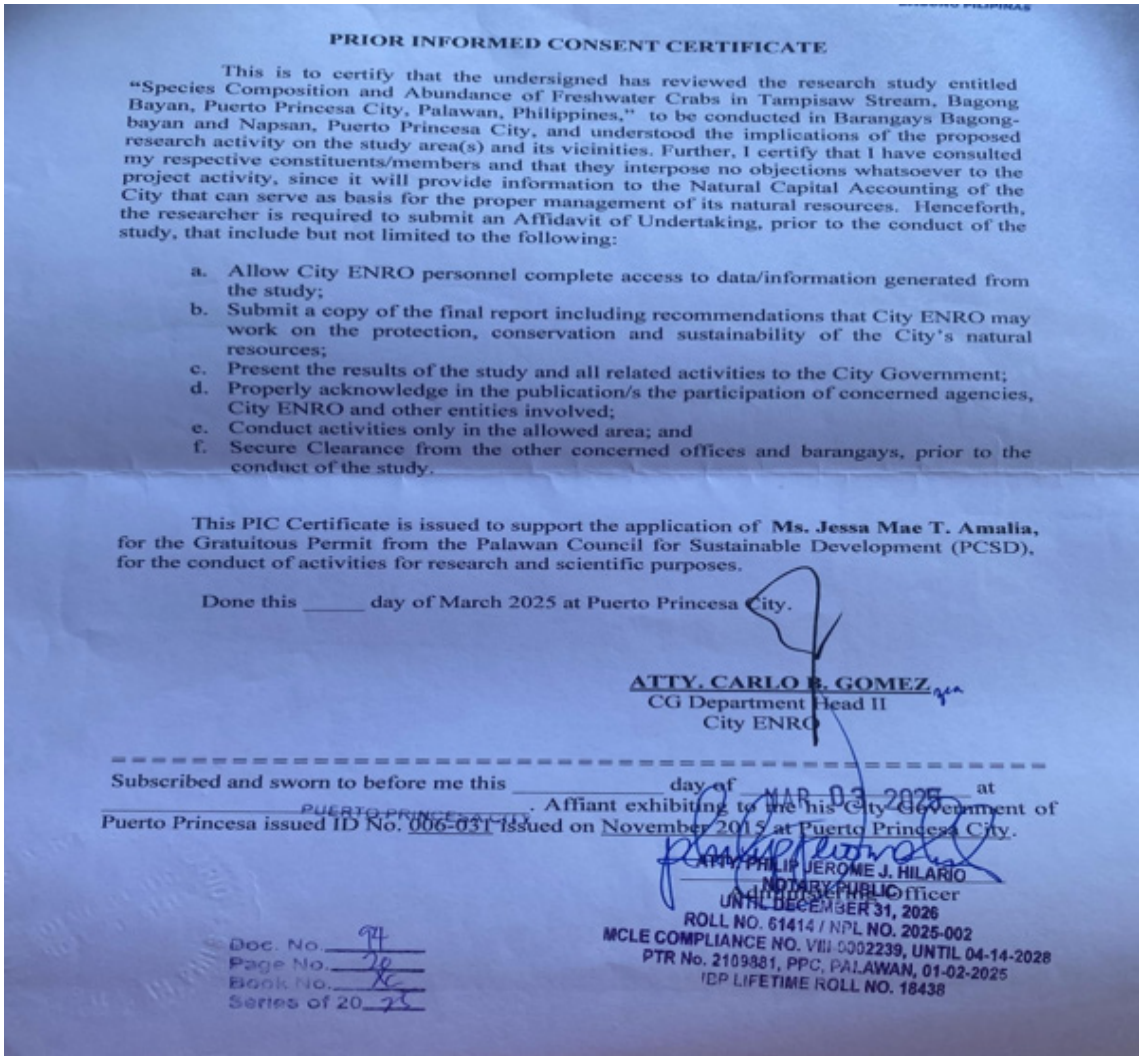
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Appendices

Appendix 1. Permission letter from the CITY CENRO conduct preliminary sampling.



PRIOR INFORMED CONSENT CERTIFICATE

This is to certify that the undersigned has reviewed the research study entitled "Species Composition and Abundance of Freshwater Crabs in Tampisaw Stream, Bagong Bayan, Puerto Princesa City, Palawan, Philippines," to be conducted in Barangays Bagong-bayan and Napsan, Puerto Princesa City, and understood the implications of the proposed research activity on the study area(s) and its vicinities. Further, I certify that I have consulted my respective constituents/members and that they interpose no objections whatsoever to the project activity, since it will provide information to the Natural Capital Accounting of the City that can serve as basis for the proper management of its natural resources. Henceforth, the researcher is required to submit an Affidavit of Undertaking, prior to the conduct of the study, that include but not limited to the following:

a. Allow City ENRO personnel complete access to data/information generated from the study;
b. Submit a copy of the final report including recommendations that City ENRO may work on the protection, conservation and sustainability of the City's natural resources;
c. Present the results of the study and all related activities to the City Government;
d. Properly acknowledge in the publication/s the participation of concerned agencies, City ENRO and other entities involved;
e. Conduct activities only in the allowed area; and
f. Secure Clearance from the other concerned offices and barangays, prior to the conduct of the study.

This PIC Certificate is issued to support the application of **Ms. Jessa Mae T. Amalia,** for the Gratuitous Permit from the Palawan Council for Sustainable Development (PCSD), for the conduct of activities for research and scientific purposes.

Done this _____ day of March 2025 at Puerto Princesa City.

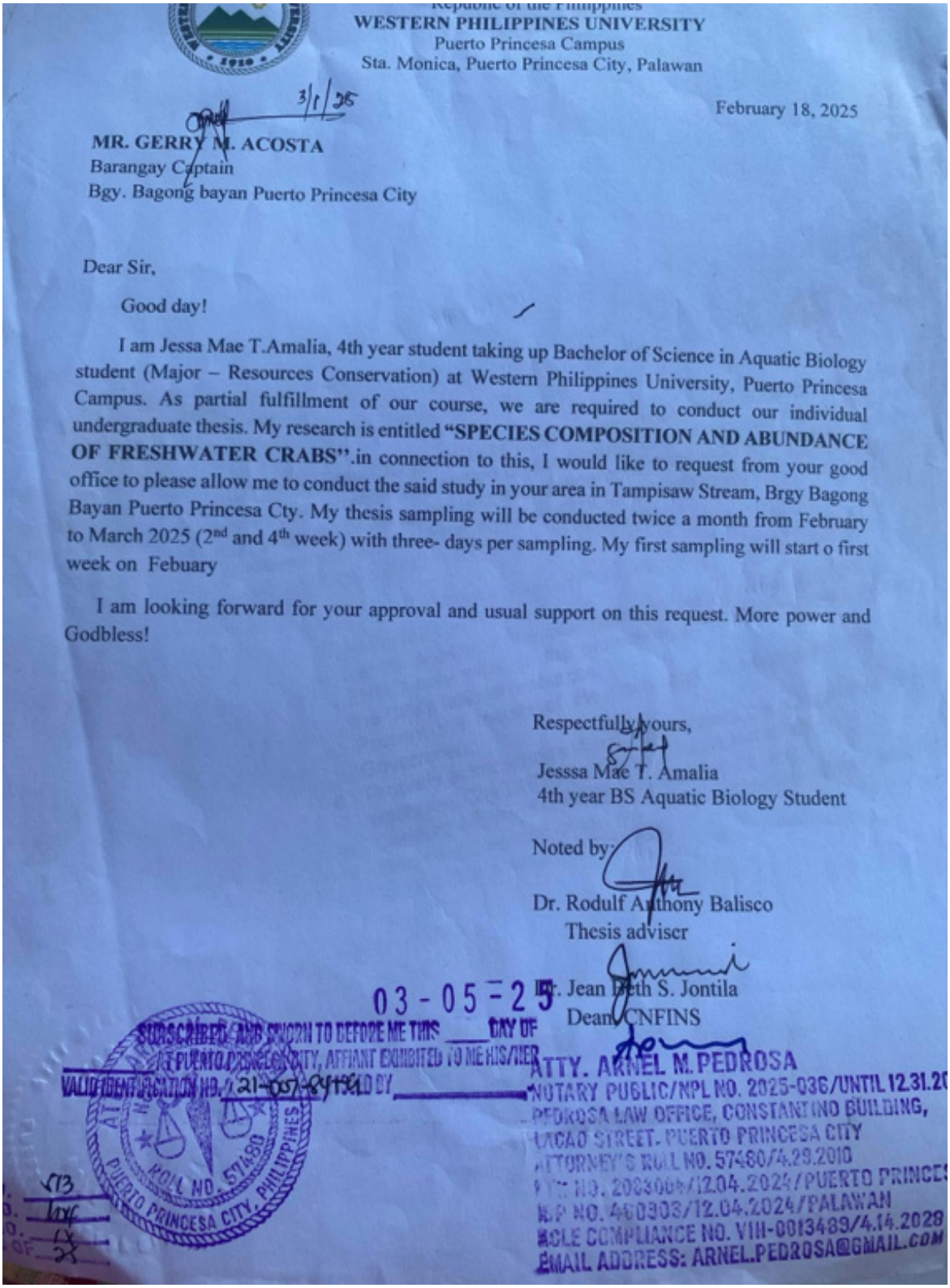
ATTY. CARLO B. GOMEZ
CG Department Head II
City ENRO

Subscribed and sworn to before me this _____ day of MAR 03 2025 at _____ PUERTO PRINCESA CITY. Affiant exhibiting to me his City Government of Puerto Princesa issued ID No. 006-031 issued on November 2015 at Puerto Princesa City.

ATTY. PHILIP JEROME J. HILARIO
NOTARY PUBLIC
Administering Officer
UNTIL DECEMBER 31, 2026
ROLL NO. 61414 / NPL NO. 2025-002
MCLE COMPLIANCE NO. VIII 0002239, UNTIL 04-14-2028
PTR No. 2109881, PPC, PALAWAN, 01-02-2025
IBP LIFETIME ROLL NO. 18438

Doc. No. 97
Page No. 20
Book No. XC
Series of 20 25

Appendix 2: Permission letter from the Barangay Captain of Bagong Bayan to conduct sampling the study area



Republic of the Philippines
WESTERN PHILIPPINES UNIVERSITY
Puerto Princesa Campus
Sta. Monica, Puerto Princesa City, Palawan

3/1/25

February 18, 2025

MR. GERRY M. ACOSTA
Barangay Captain
Bgy. Bagong bayan Puerto Princesa City

Dear Sir,

Good day!

I am Jessa Mae T.Amalia, 4th year student taking up Bachelor of Science in Aquatic Biology student (Major – Resources Conservation) at Western Philippines University, Puerto Princesa Campus. As partial fulfillment of our course, we are required to conduct our individual undergraduate thesis. My research is entitled **"SPECIES COMPOSITION AND ABUNDANCE OF FRESHWATER CRABS"**.in connection to this, I would like to request from your good office to please allow me to conduct the said study in your area in Tampisaw Stream, Brgy Bagong Bayan Puerto Princesa Cty. My thesis sampling will be conducted twice a month from February to March 2025 (2nd and 4th week) with three- days per sampling. My first sampling will start o first week on Febuary

I am looking forward for your approval and usual support on this request. More power and Godbless!

Respectfully yours,

Jesssa Mae T. Amalia
4th year BS Aquatic Biology Student

Noted by:

Dr. Rodulf Anthony Balisco
Thesis adviser

Dr. Jean Beth S. Jontila
Dean, CNFINS

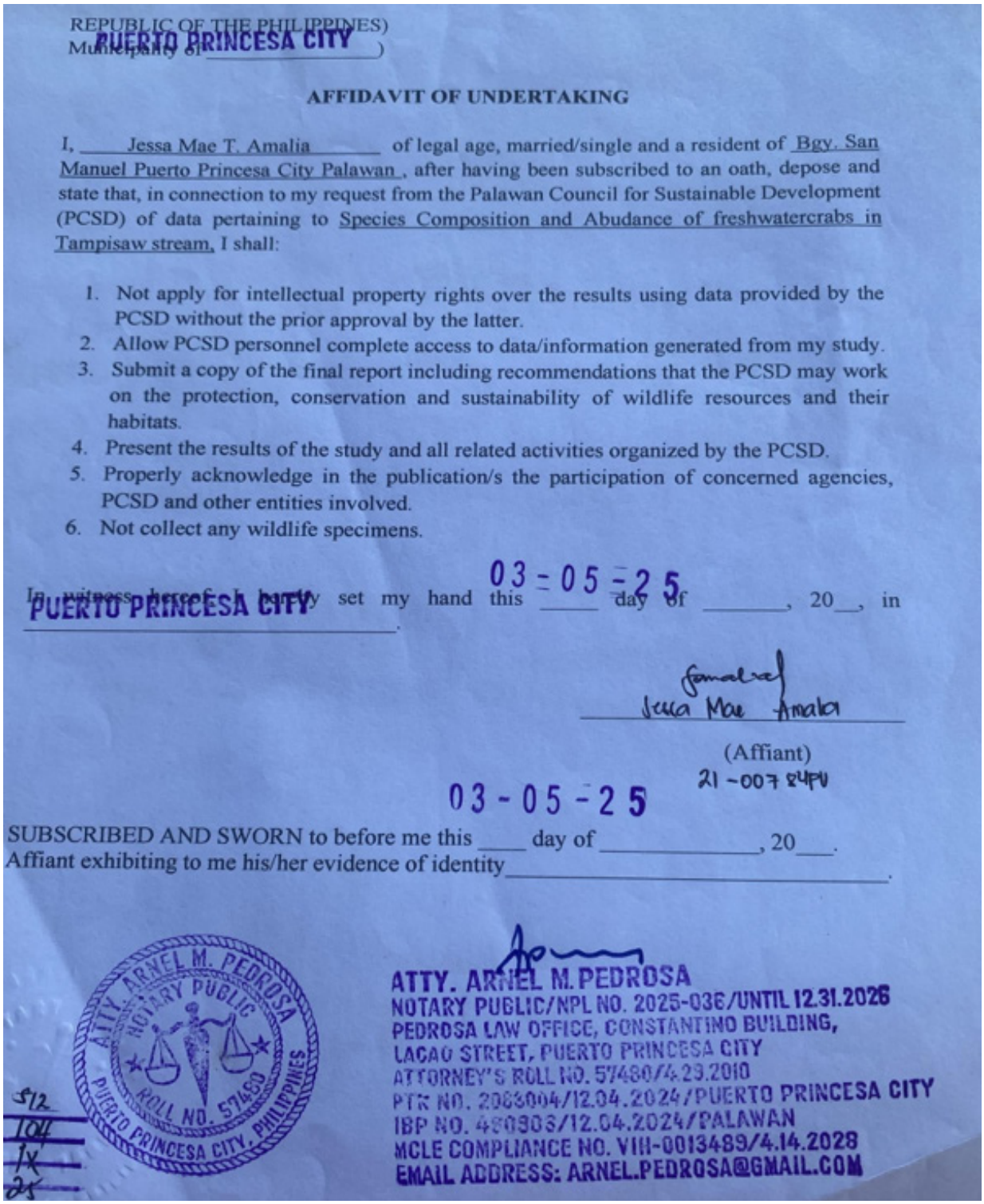
03-05-25

SUBSCRIBED AND SWORN TO BEFORE ME THIS ___ DAY OF
IN PUERTO PRINCESA CITY, AFFIANT EXHIBITED TO ME HIS/HER
VALID IDENTIFICATION NO. 21-057-841361 ISSUED BY _____

ROLL NO. 57480
PUERTO PRINCESA CITY, PHILIPPINES

ATTY. ARNEL M. PEDROSA
NOTARY PUBLIC/NPL NO. 2025-036/UNTIL 12.31.20
PEDROSA LAW OFFICE, CONSTANTINO BUILDING,
CACAO STREET, PUERTO PRINCESA CITY
ATTORNEY'S ROLL NO. 57480/4.29.2010
IBP NO. 208300/12.04.2024/PUERTO PRINCES
BAR NO. 460303/12.04.2024/PALAWAN
MCLE COMPLIANCE NO. VIII-0013489/4.14.2028
EMAIL ADDRESS: ARNEL.PEDROSA@GMAIL.COM

Appendix 3: Permission of Letter Affidavit of Undertaking



REPUBLIC OF THE PHILIPPINES)
Municipality of PUERTO PRINCESA CITY)

AFFIDAVIT OF UNDERTAKING

I, Jessa Mae T. Amalia of legal age, married/single and a resident of Bgy. San Manuel Puerto Princesa City Palawan, after having been subscribed to an oath, depose and state that, in connection to my request from the Palawan Council for Sustainable Development (PCSD) of data pertaining to Species Composition and Abudance of freshwatercrabs in Tampisaw stream, I shall:

1. Not apply for intellectual property rights over the results using data provided by the PCSD without the prior approval by the latter.
2. Allow PCSD personnel complete access to data/information generated from my study.
3. Submit a copy of the final report including recommendations that the PCSD may work on the protection, conservation and sustainability of wildlife resources and their habitats.
4. Present the results of the study and all related activities organized by the PCSD.
5. Properly acknowledge in the publication/s the participation of concerned agencies, PCSD and other entities involved.
6. Not collect any wildlife specimens.

In witness hereof, I hereby set my hand this 03-05-25 day of _____, 20__, in PUERTO PRINCESA CITY.

Jessa Mae Amalia
(Affiant)
21-007 84PU

SUBSCRIBED AND SWORN to before me this 03-05-25 day of _____, 20___.
Affiant exhibiting to me his/her evidence of identity _____.

ATTY. ARNEL M. PEDROSA
NOTARY PUBLIC/NPL NO. 2025-036/UNTIL 12.31.2026
PEDROSA LAW OFFICE, CONSTANTINO BUILDING,
LACAO STREET, PUERTO PRINCESA CITY
ATTORNEY'S ROLL NO. 57480/4.23.2010
PTR NO. 2063004/12.04.2024/PUERTO PRINCESA CITY
IBP NO. 480303/12.04.2024/PALAWAN
MCLE COMPLIANCE NO. VIII-0013489/4.14.2028
EMAIL ADDRESS: ARNEL.PEDROSA@GMAIL.COM

ATTY. ARNEL M. PEDROSA NOTARY PUBLIC ROLL NO. 57480 PUERTO PRINCESA CITY, PHILIPPINES

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Appendix 4: Species list of freshwater crabs collected from Tampisaw Stream was compiled, detailing the wet weight, carapace length, carapace width, and sex of each individual per species, along with the total number of individuals and the exact locations where each species was found.

Species	Range of CL (mm)	Range of CW (mm)	Range of weight (g)	Sex
Parathelphusa rasilis	27.3	25.6	6.7	F

Parathelphusa rasilis	9.9	9.1	1.8	M
Parathelphusa rasilis	13.7	13.2	0.9	M
Parathelphusa rasilis	10.5	10	10	juvenile
Parathelphusa rasilis	23.5	24.1	5.8	F
Parathelphusa rasilis	31.9	29.4	10.4	M
Parathelphusa rasilis	17.9	17	1.9	M
Parathelphusa rasilis	32.2	30.6	12.3	M
Parathelphusa rasilis	25.5	24.7	6.7	M
Parathelphusa rasilis	35.6	32.8	17.8	M
Parathelphusa rasilis	30.7	28.3	10.7	F
Parathelphusa rasilis	28.3	26.3	5.2	M
Parathelphusa rasilis	26.1	24.2	7.5	F
Parathelphusa rasilis	24.2	22.8	7	M
Parathelphusa rasilis	24.2	23.6	5.2	M
Parathelphusa rasilis	25.5	24.5	8.1	F
Parathelphusa rasilis	32.9	32.5	17.2	F
Parathelphusa rasilis	17.6	15.7	2.5	M
Parathelphusa rasilis	25.5	25.2	5.2	M
Parathelphusa rasilis	12.3	12	0.8	juvenile
Parathelphusa rasilis	10.5	10.1	10	juvenile
Parathelphusa rasilis	11.4	11	0.9	juvenile
Parathelphusa rasilis	16.2	15.2	1.9	M
Parathelphusa rasilis	32.2	29.5	5.4	M
Parathelphusa rasilis	27.3	26.2	8.6	M
Parathelphusa rasilis	25.3	24.3	5.7	M
Parathelphusa rasilis	12.1	12	10	M
Parathelphusa rasilis	23.5	22.3	4.3	M
Parathelphusa rasilis	13.6	12.2	1.5	M
Parathelphusa rasilis	14.7	13.4	10	M
Parathelphusa rasilis	12.8	12.2	0.9	juvenile
Insulamon palawanense	9.3	9	9.3	juvenile
Insulamon palawanense	29	27.1	9.5	M
Insulamon palawanense	30.3	29.3	11.1	F
Insulamon palawanense	26.3	25.9	7.4	M
Insulamon palawanense	20.7	21.2	4	M
Insulamon palawanense	34.9	32.2	15.5	M
Insulamon palawanense	32.9	30.9	13.7	M
Insulamon palawanense	29.6	30.2	15.5	M
Insulamon palawanense	34.1	31.6	13.7	M
Insulamon palawanense	26.7	25.5	10	M
Insulamon palawanense	27.3	25.6	17	F
Insulamon palawanense	9.9	9.3	0.9	M
Insulamon palawanense	12.7	11.6	10	F
Insulamon palawanense	11.5	10	11.2	M
Insulamon palawanense	25.3	25.2	5	M
Insulamon palawanense	17.9	15.6	2.5	F

Insulamon palawanense	23.2	22.4	5.7	F
Insulamon palawanense	9.9	9	9	F
Insulamon palawanense	11.3	10	6.2	juvenile
Insulamon palawanense	12.1	11.1	0.9	juvenile
Insulamon palawanense	9.2	9.3	9.9	juvenile
Insulamon palawanense	14.3	14.2	11.2	juvenile
Insulamon palawanense	23.7	22.1	12.7	juvenile

Appendix 5: The abundance of freshwater crabs collected per species using one -way ANOVA

Zone	Species	Abundance	f-value	Sig.
Tampisaw Eco Park	*Parathelpusa rasilis*	24	160.778	.001
	Insulamon palawanense	13		
River Campsite	*Insulamon palawanense*	5		
	Parathelpusa rasilis	3		
Villa Kashieka	*Parathelpusa rasilis*	4		
	Insulamon palawanense	6		

Appendix 6: Description of the abundance at the three sampling stations along Tampisaw Stream using one- way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	482.333	2	241.167	160.778	.001
Within Groups	4.500	3	1.500		
Total	486.833	5			

Appendix 7: The significant difference in freshwater crab abundance between the upper and the middle and lower station using Tukey Test.

Comparison	Absolute Difference	Critical Range	Result
A – B	19.50000*	1.22474	Significantly Different
A – C	18.50000*	1.22474	Significantly Different
B – C	1.00000	1.22474	Not Significantly Different

Appendix 8: Habitat characteristics of the sampling station: Tampisaw Eco park



Substrate type **Vegetation**

River Campsite



Substrate type **Vegetation**

Villa Kashieka



Vegetation **Canopy cover**

Appendix 9: The diversity of freshwater crab species across the upper, middle, and lower reaches of the stream

Shannon-Wiener (H')						
Zone	**Species**	**Abundance**	p_i	ln (p_i)	p_i ln (p_i)	H'
Tampisaw Eco Park	*Parathelpusa rasilis*	24	0.436364	-0.82928	-0.36187	0.702794
	Insulamon Palawanese	13	0.236364	-1.44238	-0.34093	
River Campsite	*Insulamon Palawanese*	5	0.090909	-2.3979	-0.21799	0.376648
	Parathelpusa rasilis	3	0.054545	-2.90872	-0.15866	
Villa Kashieka	*Parathelpusa rasilis*	4	0.072727	-2.62104	-0.19062	0.43232
	Insulamon Palawanese	6	0.109091	-2.21557	-0.2417	

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