ASSESSMENT OF ANURAN SPECIES AND ITS MICRO HABITAT PREFERENCE IN RIPARIAN AREA OF MT. GUIMBA, LOBOC, PHILIPPINES

College of Agriculture and Natural Resources
BOHOL ISLAND STATE UNIVERSITY
Zamora, Bilar, Bohol

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June 2022

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A Thesis
Presented to the Faculty of the
College of Agriculture and Natural Resources
BOHOL ISLAND STATE UNIVERSITY
Zamora, Bilar, Bohol

In Partial fulfilment
Of the Requirements for the Degree
in Bachelor of Science in Environmental Science

DAISY G. AMORA

2021

APPROVAL SHEET

This thesis entitled **"ASSESSMENT OF ANURAN SPECIES AND ITS MICRO HABITAT PREFERENCE IN RIPARIAN AREA OF MT. GUIMBA, LOBOC, PHILIPPINES"** prepared and submitted by Daisy G. Amora in partial fulfillment of the requirements for the degree BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE, has been examined and recommended for acceptance and approval for oral defense.

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ACKNOWLEDGEMENT

With deepest gratitude and appreciation, I humbly give thanks to the people who contributed much to the success of this study.

To God Almighty who gives guidance, strength, good health determination, courage and hope towards the success of this study.

Mary Beth Sarnowski, Mres, Research editor for guidance, moral and financial support in conducting the study.

Wilbert A. Aureo, Msc, Research Adviser and Statistician, for his guidance, advises, corrections and tips for the improvement of the manuscript.

Dr. Riezl P. Jose, Research Expert, for her support and expertise for the improvement of the manuscript.

Mr. Jeorge Cabilin, OIC in the Soil Laboratory room, for helping and letting the researcher used the facility while conducting the study.

Dr. Noel T. Lomosbog, Dean, of College of Agriculture and Natural Resources, for the support and permission in conducting the study.

Dr. Marrieta C. Macalolot, Campus Director, for her support and final approval of the manuscript.

Special thanks and appreciation goes to her parents for their trust, prayers, encouragement.

Special thanks and appreciation to her siblings ate Emz, manoy, ate maricon and kuya for their unending love and support. For providing the reaserchers needs financially and morally, patience and understanding.

Gabby and Albert who serves as an inspiration to the researcher and supports her in all aspects.

Barangay officials of Jimilian in Loboc for their hospitality and free accommodation.

Special thanks also to her thesis buddies: Andine, Bella, Te Nikko for their physical support, prayers and encouragements while gathering the data; also to her classmates Ivan, Jea, Analyn, Ren-ren, Evelyn, Bryan for their support and presence in conducting the study.

To all persons who were not mentioned but in one way or another gave their valuable time and assistance to pursues the study thanks to all of you.

The Researcher

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ABSTRACT

This study was conducted to determine the anuran species diversity and composition in riparian areas of Mt. Guimba. An opportunistic approach was employed to sample anuran species within 10 m x 10 m plots. The study was able to record five (5) species of anurans belonging to three (3) families under three (3) genera. The results of the study also revealed that the area was low in diversity. However, there were three endemic, two threatened and one vulnerable species that were observed, highlighting biodiversity importance. Moreover, the species under the family of Dicroglossidae (*L. magnus, L. leytensis* and *L.* visayanus) were associated to specific ecological niches defined by factors like temperature, water pH, soil moisture, relative humidity, soil pH, and soil type. R. *marina* is mostly observed in swamp and agricultural areas while *P. leucomystax* was found within low vegetation. These findings indicate the importance of riparian areas on anuran survival thus, conservation of these specific area is critical.

Chapter 1

THE PROBLEM AND THE SCOPE

Rationale

The Philippines, the world's second largest archipelago (Diesmos & Brown, 2011), is known for its high proportion of endemic fauna, particularly amphibians, of which anurans make up at least 97 percent. Anurans, or frogs, are tailless amphibians with complex life cycles and are highly sensitive and vulnerable because of their permeable skin and unshelled eggs, they are particularly vulnerable to environmental changes and variations in habitat quality, as well as slight changes in temperature and moisture (Cushman, 2006). The combinations of natural and anthropogenic factors are considered to have a substantial impact on species distributions and diversity (Aureo & Bande, 2017). Thus, any changes in their habitat, whether terrestrial or aquatic, may have an impact on their distribution and survival in a specific area (Warner, 1991).

Ecosystem management is a foundation and guiding philosophy for managing natural park diversity and conservation, in which multiple assessments are considered while making decisions (Sauer 1994; Catibog-Sinha and Heaney 2006). Human activities that have the potential to harm ecosystem quality must be studied in order to meet the current needs and pressing concerns of our environment. Environmental management practices that use data to inform them can help to create a more balanced and productive ecosystem (Forman 1990; Miller, 1996). Environmental quality can be assessed in a variety of ways. It could

be by habitat analysis, which examines the physical parameters of the organism's environment. Another option is to use or assess the area's present live creatures.

The Philippines is rich in biodiversity and Bohol Island is one of the numerous sites in the country requiring attention for conservation efforts (Jose, 2012). Considering the condition of the forest in Bohol, an ecological survey of anuran species will be conducted at Mt. Guimba, Loboc, Bohol, Philippines to determine the status and distribution of anuran in Mt. Guimba, Loboc, Bohol, Philippines. In assessing the existence of these species in the area, the researcher could provide information on the status and populations of anuran in the study area.

Literature Background

The first substantial studies on Philippine amphibians were written by an American herpetologist Edward H. Taylor in the 1920's (Alcala and Brown, 1998). In his numerous taxonomic several papers, Taylor recognized a total of 89 species of amphibian, 42 of which were identified as new species (Brown et al., 2001). Because of World War II, amphibian research received little attention between 1925 and 1944. During the next ten years, D.S. Rabor conducted amphibian, reptile, avian, and mammalian field studies (Alcala and Brown, 1998). In 1954, R.F. Inger recognized 56 species of amphibian, reducing the species level of diversity of many of Taylor's taxa (Inger et al., 2001). The type of species identification is characterized by identifiable subspecies usually in isolated range or on islands (Irschick and Shaffer 1997; Brown et al., 2001). Many new species have been

discovered in recent years, and Alcala and Brown's exhaustive research of Philippine amphibians introduced numerous species found in distinct island groupings. They devised the country's taxonomy and concepts for amphibians (Brown et al. 2000; Brown et al., 2001). Amphibian study has centered on taxonomy and systematics, biogeography and life history, and biodiversity, with an emphasis on ecological and conservation studies, from the early 1990s to the present. (Reis and Garong, 2001; Brown et al., 2001).

Anura display various behaviors depending on their environment. Due to their physiological, behavioral, morphological,and reproductive solutions for specific environmental issues encountered, anurans can be found in a large variety of habitats and microhabitats. It is believe that anurans are particularly susceptible to habitat change and serve as an indicator of habitat quality. This is due to its skin's permeability, dual life mode, physiological limitations and mobility (Diesmos, 2000; Welsh et al., 2001). Thus, any small-scale modifications to their natural habitat can reduce the likelihood of anuran recolonization and cause them to occupy a different location in the tropics (Chalcraft and Resetarits, 2003).

Anurans have a complex life cycles developing from completely aquatic creatures to mainly terrestrial ones. The reproductive phase extends from aquatic larvae to direct development into tiny frogs (Pough et al., 1998). Parental care is required for a wide range of reproductive techniques, including nest construction for egg and larval transit. Viviparity and ovoviviparity have been described (Inger et al., 1986, Pough et al., 1998). Anurans have external fertilization and the adopted mating position is amplexus, ensure the contact of sperm and egg cell

(Heying, 2003). The majority of frogs are biphasic, meaning they reproduce in an aquatic environment and then develop into free-living aquatic larvae. They hatch their eggs in water locations and then mature into adults before migrating to land (Alcala et al., 1956; Miller et al., 2003). Tadpoles are the aquatic larval stage with a gilled larval shape. The development of larvae can take anything from two weeks to 18 months. A huge number of species deposit big eggs in sheltered terrestrial locations, and the larvae spend their whole lives inside the egg membranes (Taylor, 1989). These larvae go through neoteny, or paedomorphism, and mature into adult air-breathing individuals after a few weeks or months. Adults spend the majority of their lives in terrestrial environments that may or may not be directly next to breeding sites (Duellman and Trueb, 1994), and many species are characterized by explosive breeding (Duellman and Trueb 1994, Kardong, 2000).

Numerous efforts have been made in recent research to address the conservation status of anurans (IUCN 2001, Brown et al., 2001). In the Philippines, more than 70% percent of amphibian species are endemic, and if landscape change continue, these species have a significant likelihood of going extinct soon (Hampson, 2001). The 1997 Wildlife Conservation society of the Philippines Red Data Book (WCSP 1997) creates an agreement on the need to protect the amphibians that were deemed to be in danger globally. In response to the call for a re-assessment Diesmos conducted a thorough investigation and assessed the conservation status of the Philippine amphibian (Brown et al., 2001).

The following related literatures provided the background information of this research:

Inflatable vocal sacs, created from the floor or sidewalls of the buccal cavity, act as resonance chambers in males with well-developed vocal communication. The patterns of behavior are frequently complex, with clear signs of territoriality and hostility toward competitors (Taylor 1989 and Pough et al., 1998). Most male anurans have a functional vocal system that they use to call for mating. The purpose of these breeding choruses is to announce their whereabouts and be recognized by the females. It ensures that suitable breeding or oviposition locations are available (Ovasaka and Caldbeck 1997, Penna et al.1997). Breeding is influenced by rainfall, humidity and temperature, and alteration in these abiotic factors leads to disruption of lifecycle (Aureo and Bande, 2019).

Statement of the Problem

This study undertook an ecological survey of anuran species for conservation in Mt. Guimba, Loboc, Philippines.

This research sought to answer the following:

1. What are the anurans present to the lowest taxon?

2. What are the micro habitat characteristics associated with anurans in terms of:

a. soil type, moisture and pH

b. water pH

c. micro climate

3. What is the species composition, species diversity, species richness, conservation status and endemicity?

Significance of the Study

The output of this study would be beneficial to the following:

Researcher. Some of the information collected from this research may be beneficial for other investigations in the future. It will also serve as a reference for the assessment of anuran species and its micro habitat preference in riparian areas.

The Academe. This study's output acts as one of the references for students who want to pursue similar or related research since it serves as a foundation for data formulation and as reference material.

Local Community. The results of this study will be used as a reference by educational institutions for research purposes.

Students. Students will be able to use the outcomes of this study as a guide for their own future research.

The Department of Environment and Natural Resources (DENR). As the government's primary natural resource management body, the results of this research will have a considerable impact on the area's overall value.

Local Government Unit. Government entities at the municipal and barangay levels will use the study findings as a foundation for the design of new conservation initiatives, as well as the rigorous execution of those already in place.

RESEARCH METHODOLOGY

Design

The construction of quadrats along the established transects follows the method of Williams (2004) with some modification basing on the size of the covered area. The length of transect line is about an average of 1 kilometer or set depending on size of the covered area. The ten (10 m x10 m) quadrats that were randomly establish in each site following the methods of William (2004). Transect lines were positioned perpendicular to riparian area. A 10x10 meter quadrant size was established along each transect line.

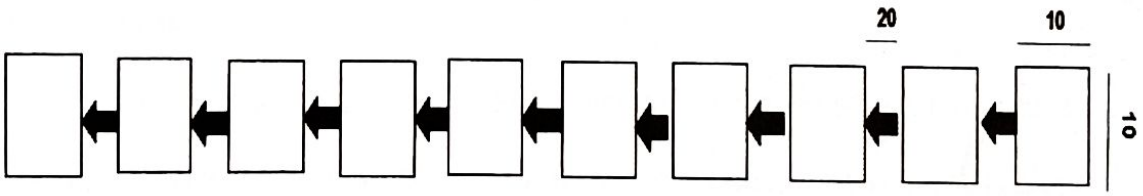

Figure 1. Layout of the establisehd plot

Environment

The survey was conducted on December 8-12, 2021 at Mt. Guimba within Barangay Jimilian, Loboc, Bohol and is sitiauted at N 09°38'42'; elevation E 124°01'31". The anuran species composition was determined along the riparian area of the selected sampling site. The area was surrounded by rice fields,

cultivated area, grassland, pond and partially has lush vegetation such as Mahogany trees, Molave, shrubs, and some native trees.

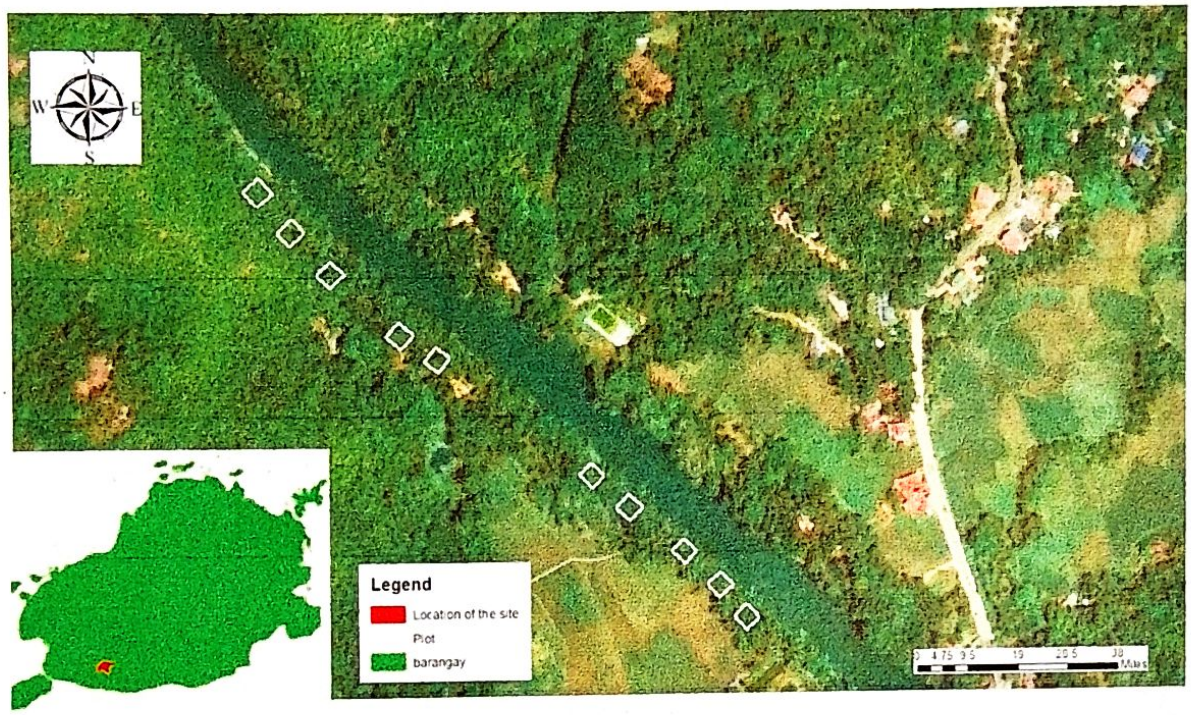

Figure 2. Location of the study site

Instrument

The materials used in this study were Jars, vernier caliper, meter stick, sling psychrometer, GPS, gloves, camera, references, record book, ballpen and pencil.

Procedure

The researcher asked permission from the Campus Director, the Dean of College of Agriculture and signed authorization letter from the municipal mayor, barangay chairman and CENRO for the chosen sites prior to conducting the study. Local guides with extensive knowledge of the forest were hired in each barangay.

Data Collection Procedure

The survey was conducted from November to December 2021. Different sampling techniques were used as specified in the standard method of amphibian monitoring (Heyer et al. 1994). We determined the presence and abundance of anurans within specific habitats in each transect site. Along the transect line a 10 m x 10 m samples quadrat was set with a distance of 20 meters between quadrats. 10 samples of soil were extracted within the established plots and was brought to the soil laboratory for soil moisture and pH analysis. For the water pH, it was analyzed by using a pH meter. By using a 250ml beaker, 50 ml water sample was extracted. A pH meter was dipped in the water sample to measure the pH of the water.

Visual Encounter Technique

In the visual encounter technique, the observers walked through a designated quadrat area along a transect line at a prescribed time. Daytime collection was carried out at 6:30 A.M. and evening collection was done unitl 10:00 P.M. Anurans were searched on the surface and under rocks, logs, trees, near streams and ponds and other debris within the designated transect areas. All cover objects that were displaced from the area were returned to their original position to avoid disturbing the habitats.

Measurement and Identification of Anuran

The encountered anurans were collected by hand grabbing and were identified based on their body length and other distinguishing characteristics. Body parts of the anuran, which are vital for identifying the organism, were measured.

Statistical Treatment

Paleontological Statistical Software Package (PAST) was used to analyze statistically the biodiversity indices such as species richness, diversity, and evenness.

DEFINITION OF TERMS

Ecosystem Is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life.

Diversity May pertain to the variation of life forms present in different ecosystems.

Environment the complex of physical, chemical, and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival.

Habitat A habitat is a place where an organism makes its home. A habitat meets all the environmental conditions an organism needs to survive.

Organisms refers to a living thing that has an organized structure, can react to stimuli, reproduce, grow, adapt, and maintain homeostasis.

Conservation the care and protection of these resources so that they can persist for future generations

Species a group of organisms that can reproduce with one another in nature and produce fertile offspring.

Microclimate is a small area within a climate zone where the climate is slightly different from the zones predictions.

CHAPTER 2

Presentation of Data and Analysis of Findings

The findings and data presentation are covered in this chapter. To accomplish the objectives of the study, the researcher employed the quantities of anuran species gathered in riparian areas across the landape of Mt. Guimba, Loboc, Bohol.

Anuran species

The following accounts of the anuran species were based on morphological characteristics and information gathered in the sampling site. A total of 30 individuals, consisting of five species from three families were collected and identified. Of the five species, one species identified under family Bufonidae; three species under Dicroglossidae and one species of Rhacophoridae. Table 1 shows the taxonomic list of observed and identified five anurans species belonging to 11 genera and five families. The identification of species was based on the description of Alcala and Brown 1998, IUCN 2006 and Diesmos et al. 2007.

Table 1. The taxonomic classification of anuran species found in the sampling sites during the sampling period.

Plot	Family	Species	Common name
1,3	Bufonidae	*R. marina*	Cane toad
10	Rhacophoridae	*P. leucomystax*	Tree Frog
4,5,6,7 and 8	Dicroglossidae	*L. leytensis*	Swamp frog
	Dicroglossidae	*L. magnus*	Giant Philippine frog
	Dicroglossidae	*L. visayanus*	Giant Visayan Frog

Rhinella marina under family of Bufonidae has a squatty appearance; short legs; tips of fingers and toes are rounded; skin at the back with tubercles and with coarse granules. It is easily identified by the size of its parotid gland behind the eye down onto the forearm.

This anuran habitat varies widely from uninhabited to urban areas. Mostly they were found in agricultural areas, grassland or areas near human settlement. Mean morphometric measurement: HbL= 35.3 mm; SVL=94.3 mm; ED=10 mm; TD=5mm; HdL=74 mm; TbL=32 mm.

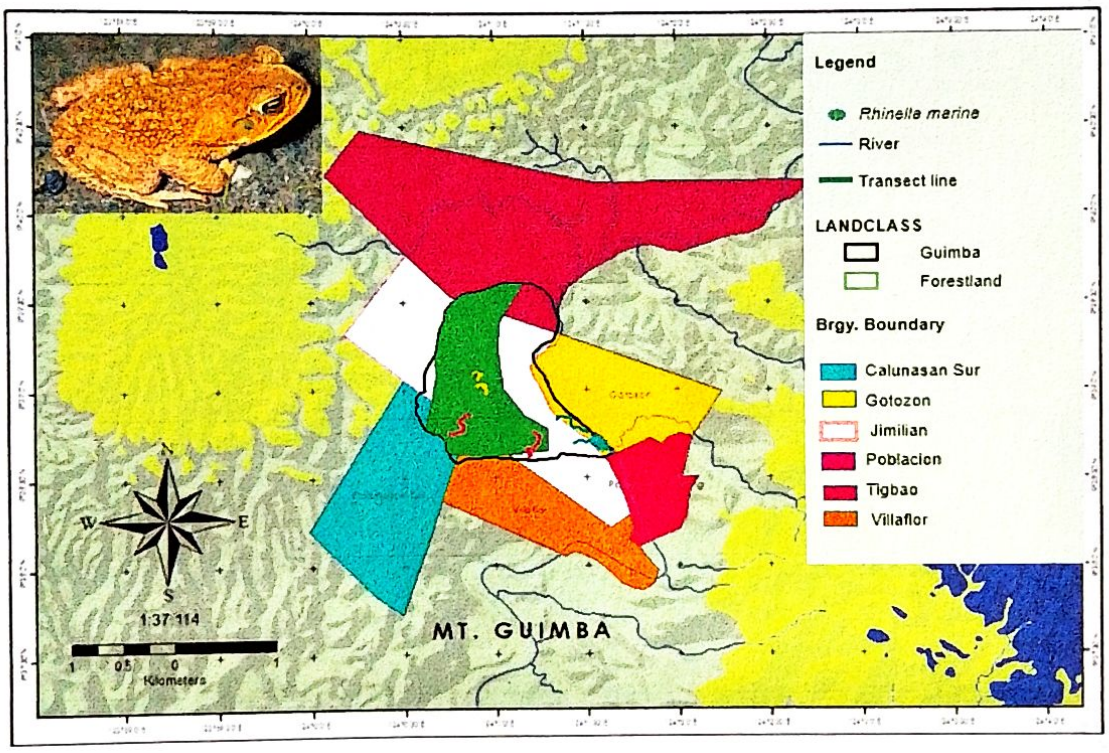

Figure 3. Distribution of *Rhinella marina*

Polypedates leucomystax has elongated body; with large slender limbs; rudimentary webs found in fingers; toes are fully webbed; pads on fingers are larger than those of toes.

This anuran was found in the grassland near rice paddies. It was seen perching on leaf axils/blades of grass and rice above the water while calling. Mean morphometric measurements: HbL= 17 mm; SVL= 52 mm; ED=6 mm; TD=5 mm; HdL=74 mm; TbL=32 mm.

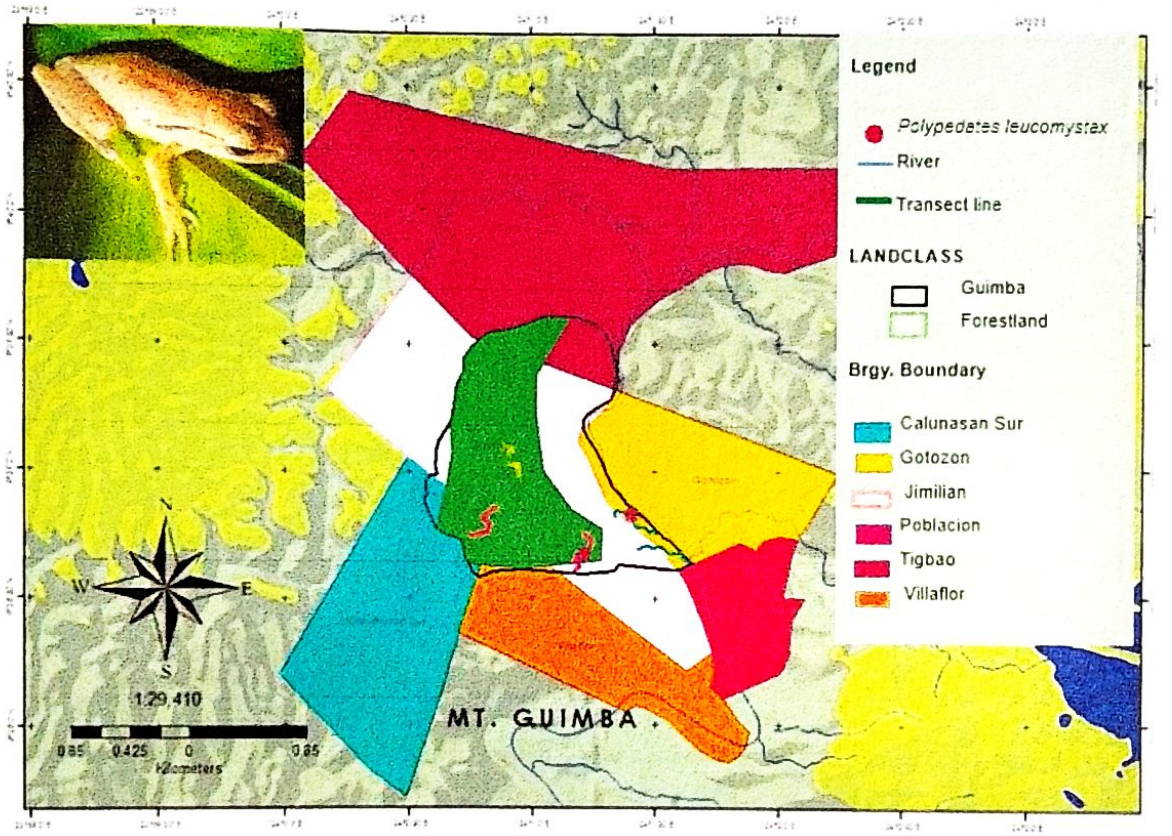

Figure 4. Distribution of *Polypedates leucomystax leucomystax*

Limnonectes leytensis under family of Dicroglossidae has a body size the same with Limnonectes magnus, fingers and toes are rounded; two dorso-lateral folds are very distinct on its back.

This anuran is usually found in areas the same with *Limnonectes magnus*. Mean morphometric measurements: HbL= 17 mm; SVL= 52 mm; ED=6 mm; TD=5 mm; HdL=74 mm; TbL=32 mm

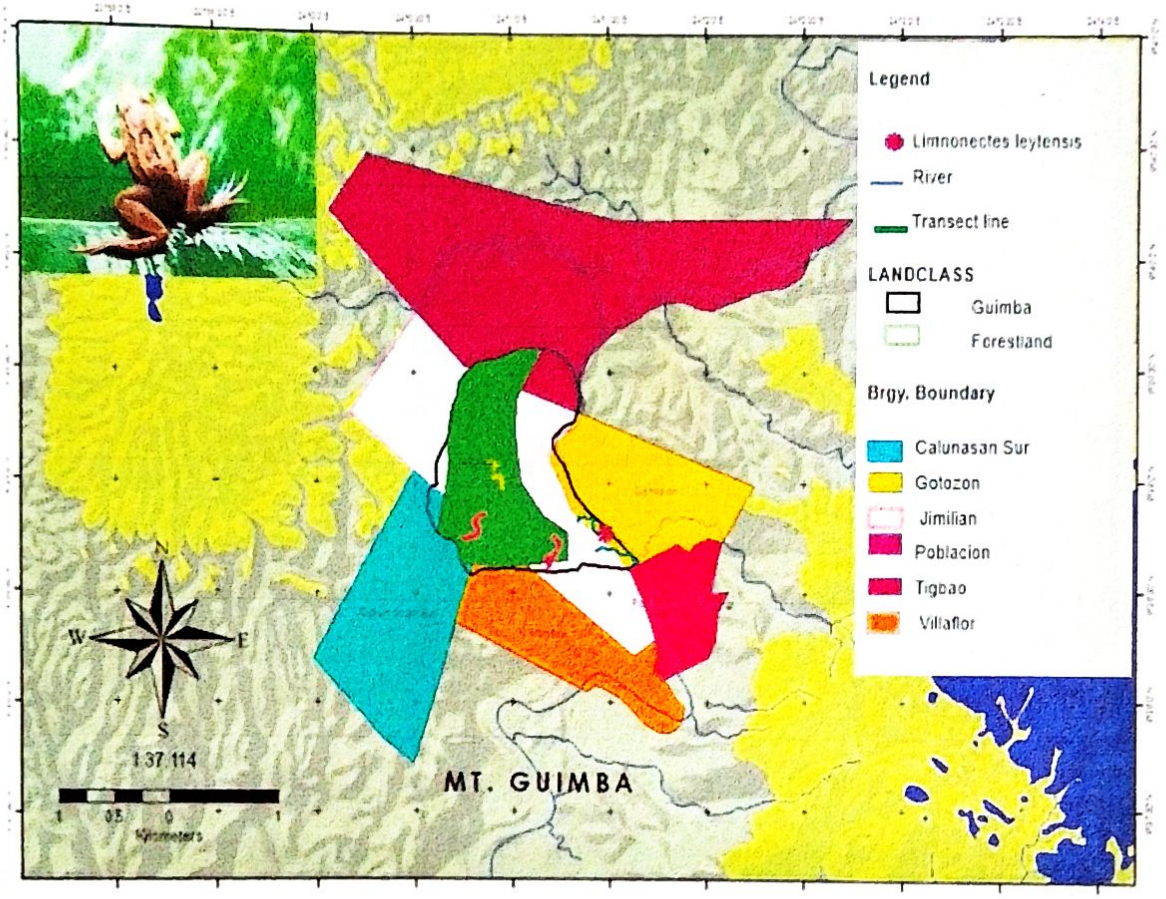

Figure 5. Distribution of *Limnonectes Leytensis*

Limnonectes magnus under family of Dicroglossidae are small to large stocky or slender body size; with fold, ridges and tubercle on the back; skin is smooth; toes with little or fully webbed; tips of fingers and toes with or without wide disks; and eyes are protruding.

This anuran was found in rice paddy field. Mean morphometric measurements: HbL= 34.5 mm; SVL= 98 mm; ED=10.5 mm; TD=7.5 mm; HdL=138 mm; TbL=60.5 mm.

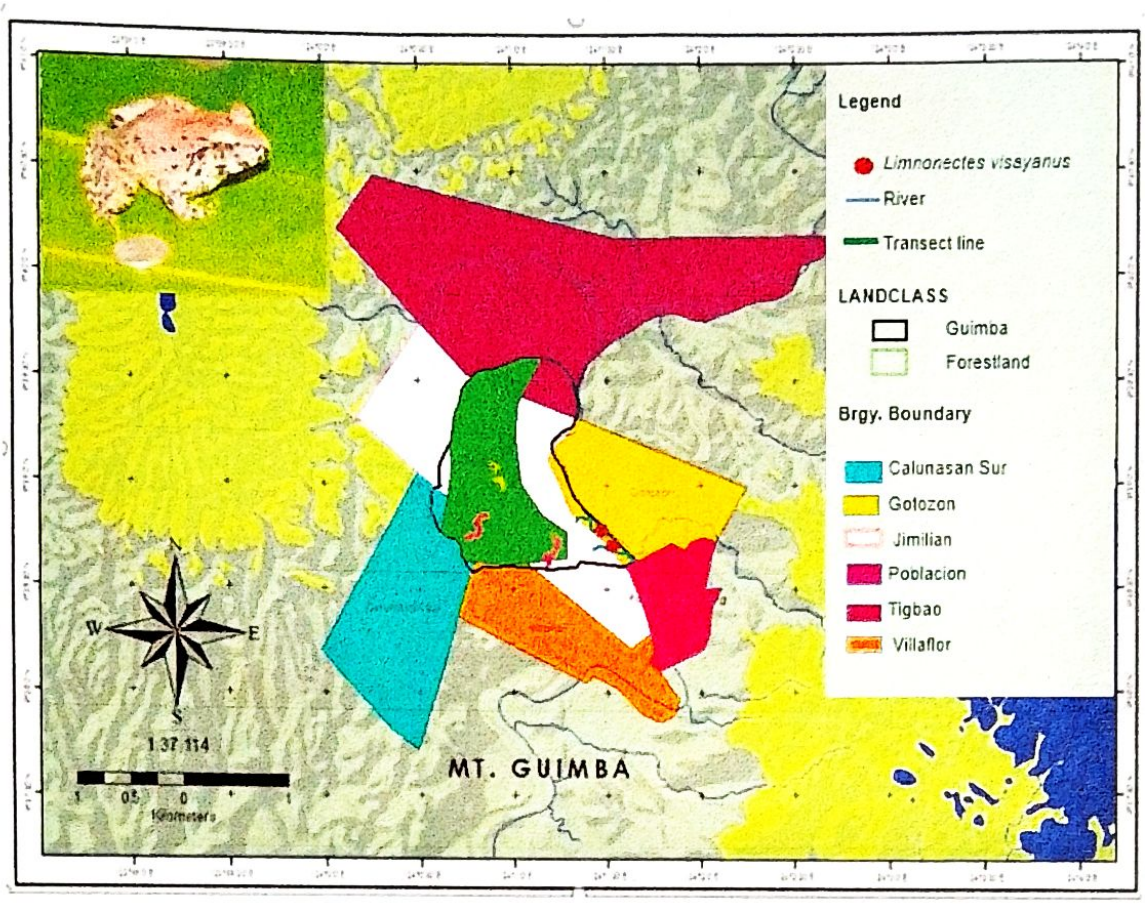

Figure 6. Distribution of *Limnonectes visayanus*

Limnonectes magnus under family of Dicroglossidae has short and muscular legs; skin on the back with irregular folds and eyes are more protruding. This anuran was found in shrubs and herbaceous plants near the riverbank.

They were observed and captured near cultivated area and agricultural site. Mean morphometric measurements: HbL= 25.5 mm; SVL= 68.27 mm; ED=6.87 mm; TD=4 mm; HdL=104 mm; TbL=44.6 mm.

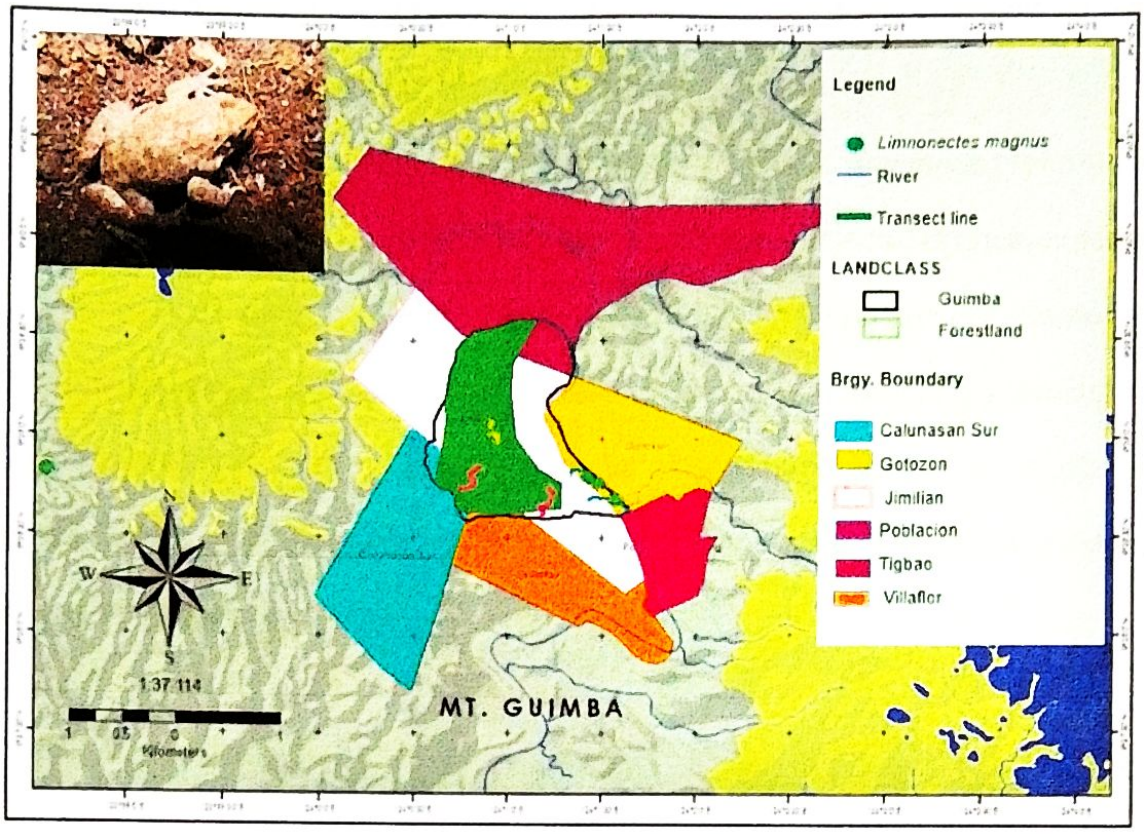

Figure 7. Distribution of *Limnonectes magnus*

Microhabitat and Microclimatic measures

Canonical correspondence analysis (CCA) was used to evaluate the relationships between the anuran species and environmental variables. CCA is a multivariate analysis method that shows the correlation between species and their environment. The influence of environmental variables: soil moisture, temperature, humidity, water presence and soil pH on anuran species was assessed.

This indicates that each species responded to a unique combination of ecological parameters. The influence of environmental variables: soil moisture, temperature, humidity, water presence and soil pH on anuran species was

measured. This shows the influence of water variables on the anuran species and also helps to determined their habitat preference.

The figure shows that *L. magnus, L. leytensis* and *L. visayanus* preferred to inhabit in agricultural area and cutivated area with the influenced of environmental factors such as water pH, temperature, relative humidity and soil pH. Moreover, the species like *R. Marina* prefers to live in any moist area such as swamp or agricultural areas while *P. Leucomystax* tends to inhabit within low vegetation areas. Based on the data collected, the mean average of environmental variables shows in (Appendix C).

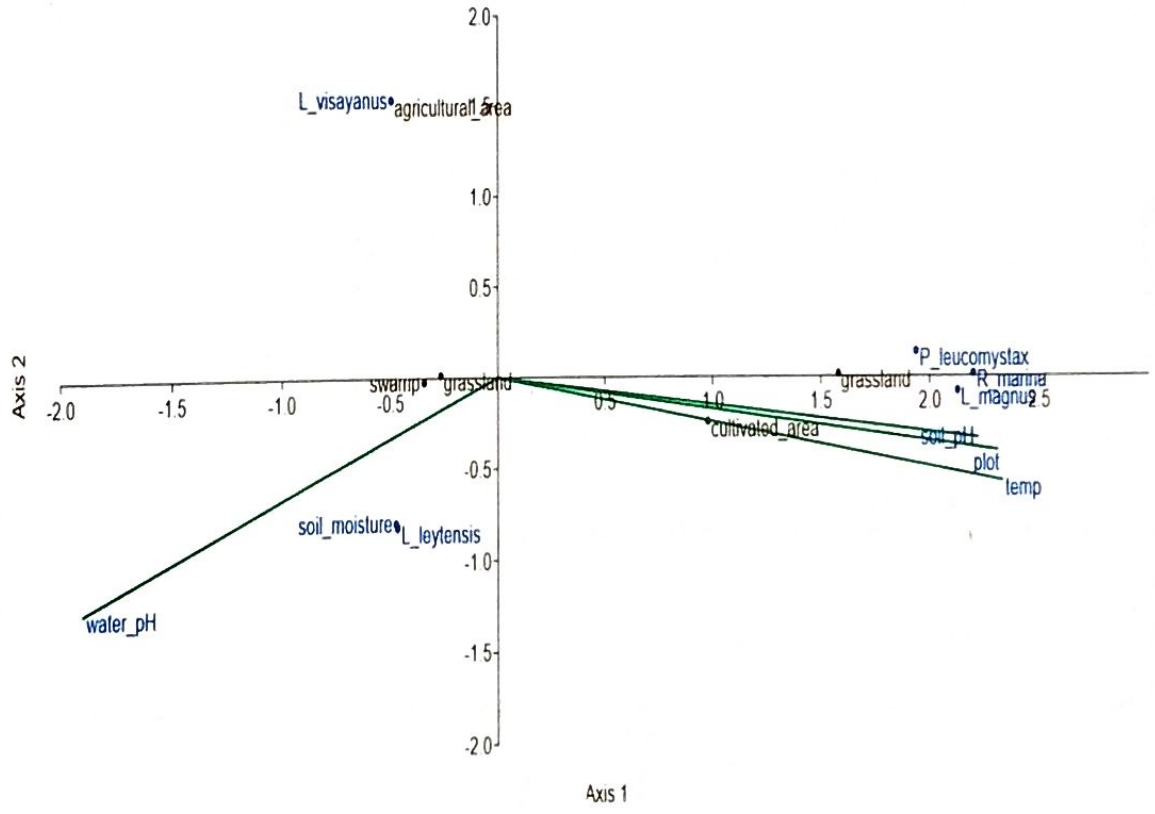

Figure 8. Canonical correspondence analysis of species and environmental association

Anuran Species Composition

Cluster analysis represents a set of exploratory techniques that can be applied to determine the similar behavior between obervations. Hierarchiral Clustering Analysis (HCA) was used to develop cluster analysis to allocate observations into groups and, then three clusters are formed. Homogeneous and heterogeneous clusters were observed and that described the interactions between observations from different ecological variables (Figure 9). In this regard, the major goal of this group of approaches is to assign observations to a small number of clusters that are internally homogeneous and heterogeneous among themselves.

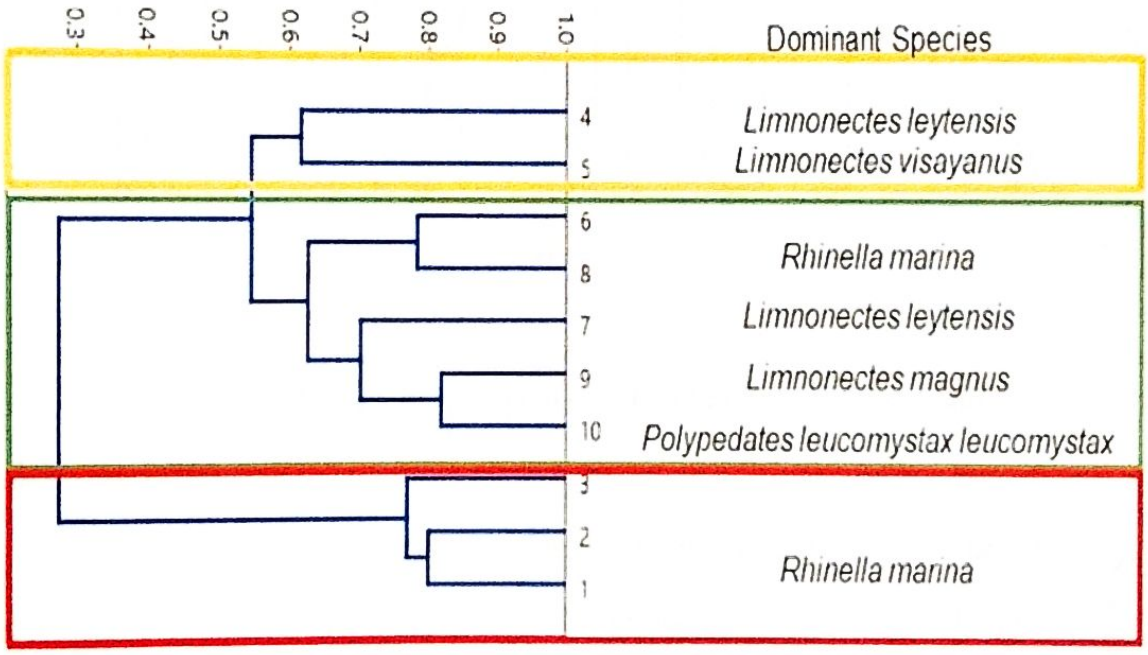

Figure 9. Dendogram of 10 sampling plots generated through UPGMA using Bray-Curtis Similarity Index. Bootstrapping was done at n=1000; Cophenitic value is 0.9671

Species Diversity

The diversity value of plot 6 is higher having a value of 1.03 compared to other plots (Figure 10). This could be due to abundance of foraging sites and breeding sites in this area. However, the overall diversity value in all sampling plots is 0.72. This implied that thesampling area is not diverse.

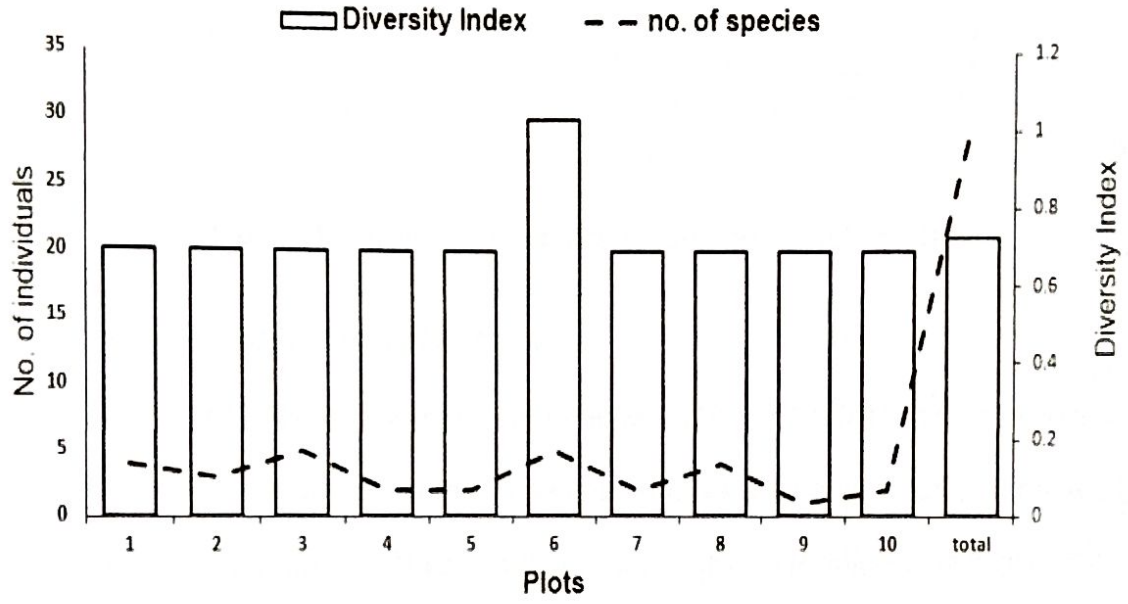

Figure 10. Species Diversity Index of anuran on each plot

Species Richness

Rarefraction is a statistical method used to evaluate anuran species richness from the results of sampling. The figure shows that it initially grows rapidly grows rapidly as the most common species are found and slightly flattens as the rarest species remain to be sampled (Figure 11). This indicates that the calculation of species richness for a given number of samples is based on rarefraction curve.

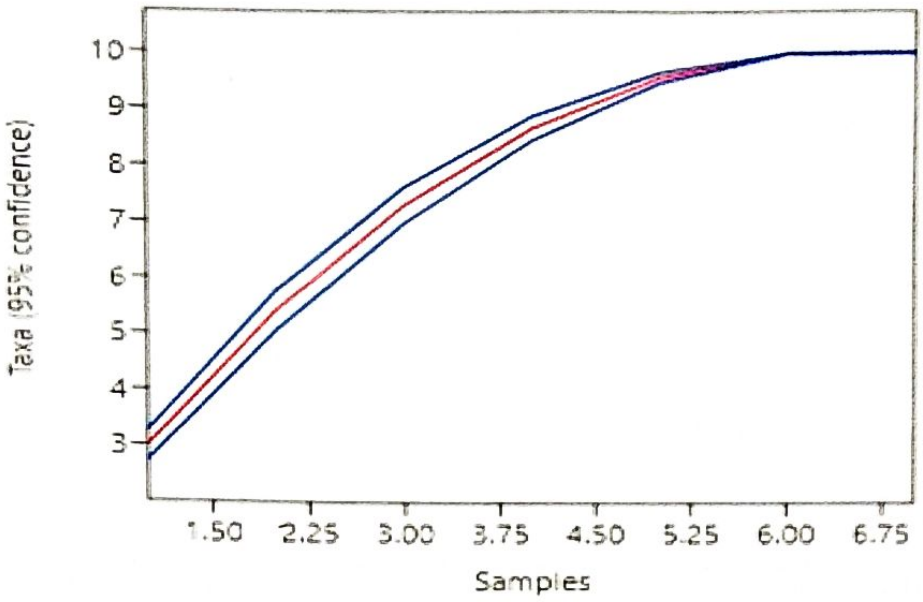

Figure 11. Sample-based rarefraction on sample plots

Conservation and Endemicity Status

The list of captured anurans with a total number of individuals per species at sampling sites shown in Table 2. The conservation status of anurans species were determined under IUCN category and were also determined DAO (list of endangered Philippine amphibians)

In terms of conservation status, the most recorded species were Least Concern species because of their adaptability to environmental changes (IUCN, 2018). There is only one near-threatened species recorded which is the *L. magnus*.

According to (DAO, List of endangered species in the Philippines 2019-09) *L. visayanus*, is the only species recorded as vulnerable species. Furthermore, three species recorded as Philippine endemic, one species (*R. marina*) recorded as an introduced species and *P. leucomystax leucomystax* was categorized as resident species.

Table 2. Species conservation status and and endemicity of anurans recorded in the sampling sites during the sampling period.

Family	Species	IUCN	DAO 2019-09	Endemicity
Bufonidae	*B. marinus*	LC	LC	Introduced
Rhacophoridae	*P. leucomystax*	LC	LC	Resident
Dicroglossidae	*L. leytensis*	LC	LC	Endemic
Dicroglossidae	*L. magnus*	NT	OTS	Endemic
Dicroglossidae	*L. visayanus*	NT	V	Endemic

Conservation Status: VU-Vulnerable, LC-Least concern, NT-Near Threatened, OTS- Other threatened species

CHAPTER 3

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

Many species of anurans are associated with aquatic environments and inhabit a wide range of habitat because of varying environmental requirements and habitat preference. This study was the first to record the anuran species along the riparian zone of Mt. Guimba specifically in Barangay Jimilian, Loboc Bohol.

The preliminary opportunistic survey recorded a near-threatened and a vulnerable species implying the area's conservation importance. In this study, it was found that there were five species of frogs (i.e:*Limnonectes leytensis, Limnonectes visayanus, Limnonectes magnus, Rhinella marina and Polypedates Leucomystax*) inhabiting cultivated area, agricultural and grassland area. Of the five species recorded, three species (*L. leytensis, L. magnus L. visayanus*) are Philippine endemics. The species *L. magnus* was categorized as near threatened by IUCN and *L. visayanus* was recorded as vulnerable species by DAO because it is presently found in small numbers within a confined range, which could lead to its extinction. It was categorized as such because it is likely in decline and facing habitat loss and over-harvesting for food across much of its range. While *P. leucomystax luecomystax* is non-endemic and *R. marina* is an invasive alien species. However, the invasive species in Family Bufonidae (*R. marina*) was visibly observed probably because these sites were near ponds and agricultural area which was discovered to be an invasive species breeding ground. *P. leucomystax*, on the other hand, was the least recorded species. Since the riparian

area is mostly characterized by agricultural area and banana trees, the absence of its preferred microhabitat may have caused its low abundance. However, several anthropogenic activities observed in the area may affect anurans richness and diversity.

Conclusions

Based on the findings, the researcher had drawn the following conclusion: This was conducted to determine the anuran species diversity and composition in riparian areas of Mt. Guimba. An opportunistic to samples anuran species within 10 m x 10 m plots was employed. The results of the study revealed that the sites was low in diversity. However, there were three endemic, two threatened and one vulnerable species that were observed, highlighting biodiversity importance. Moreover, the species under the family of Dicroglossidae (*L. magnus, L. leytensis* and *L.* visayanus) were associated to specific ecological niches defined by factors like temperature, water pH, soil moisture, relative humidity, soil pH, and soil type. *R. marina* is mostly observed in swamp and agricultural areas and *P. leucomystax* was found within low vegetation areas. These findings indicate the importance of riparian areas on anuran survival thus, conservation of these specific area is critical.

Recommendations

Anchored to the conclusions formulated, the following recommendations were addressed to all locals:

1. Rehabilitation of degraded parts of Mt. Guimba could be incorporated in the management plan.
2. Create IEC materials of the anurans as a tool to educating and raising awareness to local people.
3. Include both wet and dry seasons in the conduct of study.

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APPENDICES

Republic of the Philippines

BOHOL ISLAND STATE UNIVERSITY – Bilar Campus
Zamora, Bilar, Bohol

01 November 2021

HON. LEON A. CALIPUSAN
Municipal Mayor
Loboc, Bohol, Philippines

Dear Sir,

Good Day!

I am Daisy G. Amora, a fourth year Bachelor of Science in Environmental Science Student of Bohol Island State University – Bilar Campus.

I am Currently working on my undergraduate thesis entitled "ASSESSMENT OF ANURAN SPECIES AND ITS MICRO HABITAT PREFERENCE IN RIPARIAN AREA OF MT. GUIMBA, LOBOC BOHOL PHILIPPINES". The place is still under your Jurisdiction hence this letter. In line with this, I would like to ask for your approval to allow me to conduct a study starting November 15 – December 15 2021every weekdays, 8am – 5pm in Mt. Guimba.

Hoping for a positive response with regards to this matter. Thank you and God bless.

Respectfully yours,

DAISY G. AMORA
Researcher

Noted:

WILBERT A. AUREO, MSc (Sgd)
Research Adviser

Recommending Approval:

NOEL T. LOMOSBOG, PhD (Sgd)
Dean, CANR

Approved:

HON. LEON A. CALIPUSAN (Sgd)
Municipal Mayor

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY – Bilar Campus
Zamora, Bilar, Bohol

01 November 2021

HON. MARCELO C. ORACION
Barangay Captain
Oy, Loboc, Bohol

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Good Day!

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HON. MARCELO C. ORACION (Sgd)
Barangay Captain

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY – Bilar Campus
Zamora, Bilar, Bohol

01 November 2021

HON. TIRSO P. ARAT
Barangay Captain
Tigbao, Loboc, Bohol

Dear Sir,

Good Day!

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NOEL T. LOMOSBOG, PhD (Sgd)
Dean, CANR

Approved:

HON. TIRSO P. ARAT
Barangay Captain

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY – Bilar Campus
Zamora, Bilar, Bohol

01 November 2021

HON. VIRGILIO SARIGUMBA
Barangay Captain
Jimilian, Loboc, Bohol

Dear Sir,

Good Day!

I am Daisy G. Amora, a fourth year Bachelor of Science in Forestry Student of Bohol Island State University – Bilar Campus.

I am Currently working on my undergraduate thesis entitled "ASSESSMENT OF ANURAN SPECIES AND ITS MICRO HABITAT PREFERENCE IN RIPARIAN AREA OF MT. GUIMBA, LOBOC BOHOL PHILIPPINE". The place is still under your Jurisdiction hence this letter. In line with this, I would like to ask for your approval to allow me to conduct a study starting November 15 – December 15 2021 every weekdays, 8am – 5pm in Mt. Guimba.

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NOEL T. LOMOSBOG, PhD (Sgd)
Dean, CANR

Approved:

HON. VIRGILIO SARIGUMBA(Sgd)
Barangay Captain

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY – Bilar Campus
Zamora, Bilar, Bohol

01 November 2021

ELENA G. SUAREZ
OIC, Cenro
Upper de la paz, Cortes, Bohol

Dear Maam,

Good Day!

I am Daisy G. Amora, a fourth year Bachelor of Science in Forestry Student of Bohol Island State University – Bilar Campus.

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Respectfully yours,

DAISY G. AMORA
Researcher

Noted:

WILBERT A. AUREO, MSC (Sgd)
Research Adviser

Recommending Approval:

NOEL T. LOMOSBOG, PhD (Sgd)
Dean, CANR

Approved:

ELENA G. SUAREZ(Sgd)
OIC, Cenro

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY – Bilar Campus
Zamora, Bilar, Bohol

01 November 2021

Ssg. RENATO PALOMARES
Patrol base Commander
Quinoguitan, Loboc, Bohol

Dear Sir,

Good Day!

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DAISY G. AMORA
Researcher

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WILBERT A. AUREO, MSC (Sgd)
Research Adviser

Recommending Approval:

NOEL T. LOMOSBOG, PhD (Sgd)
Dean, CANR

Approved:

Ssg. RENATO PALOMARES (Sgd)
Patrol base Commander

PARENTAL CONSENT

Permission is granted for my/our son/daughter to participate the following Field Trip/Educational Tour/ Field Practice/Field activity.

NAME OF STUDENT: DAISY G. AMORA
COURSE: BACHELOR OF SCIENCE IN ENVIRONMTAL SCIENCE
SCHOOL: BOHOL ISLAND STATE UNIVERSITY-BILAR CAMPUS
THESIS TITLE: ASSESSMENT OF ANURAN SPECIES AND ITS MICRO HABITAT PREFERENCE IN RIPARIAN AREA OF MT. GUIMBA, LOBOC BOHOL PHILIPPINES.
DESTINATION: MT. GUIMBA, LOBOC BOHOL, PHILIPPNES
DATE: OCTOBER 2021

I/We hereby acknowledge that suffecient information has been provided by the school with respect to the planned activity, duration, location, method, of transportation, participants and supervision.

I/We hereby acknowledge that certain RISKS or INJURIES are inherent to participate in learning activities outside the school. These types of injuries may be minor or serious and may result from one's actions, or the actions or actions or inaction of others, or a combination of both.

I/We understand that the rules and regulations established for the Field Trip/Educational Tour are designed for the safety and protection of the participants and hereby undertake to inform my child to abide these rules and regulations.

I/We declare having read and understood the above Parental Consent Agreement in its emtirely and hereby consent to allow my/our child to participate, acknowledging all of the foregoing.

IN WITNESS WHEREOF, I/We hereto affix my/our signature this_____ day of _____, 20___

_____,
Philippines.

NILO P. AMORA
Parent/Guardian

SUBSCRIBED AND SWORN to before me this___th day of _____,20____at_____.

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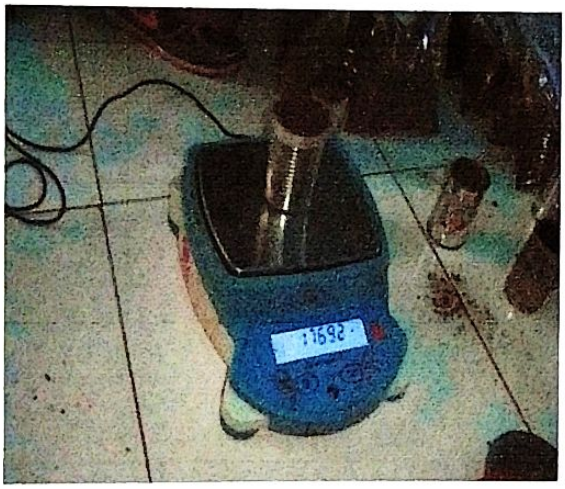
Page No._____
Book No._____

APPENDIX B

Instruments

soil pH meter

oven



Electric weighing balance

GPS

Psychrometer

APPENDIX C

Raw Data

Table 1A: Mean morphometric measurements of anurans collected in the study sites

Family	Species	MORPHOMETRIC MEASUREMENTS					
		HbL (cm)	SVL (cm)	ED (CM)	TD (cm)	HdL (cm)	TbL (cm)
Rhacoporidae	*P. leucomystax*	17	52	6	5	74	32
Dicroglossidae	*Limnonectes Visayanus*	34.5	98	10.5	7.5	138	60.5
	L. magnus	25.53	68.267	6.867	3.933	104.07	44.6
Bufonidae	*Bufo marinus*	35.3	94.3	14	5.67	105.3	54

Table 2. Mean average of micro climate

Temperature (°C)	Relative Humidity (%)
28.12	99.36
28.53	90.23
28.5	89.35
28.61	89.9
28.31	88.51

Canonical Correspondence Analysis Raw Data

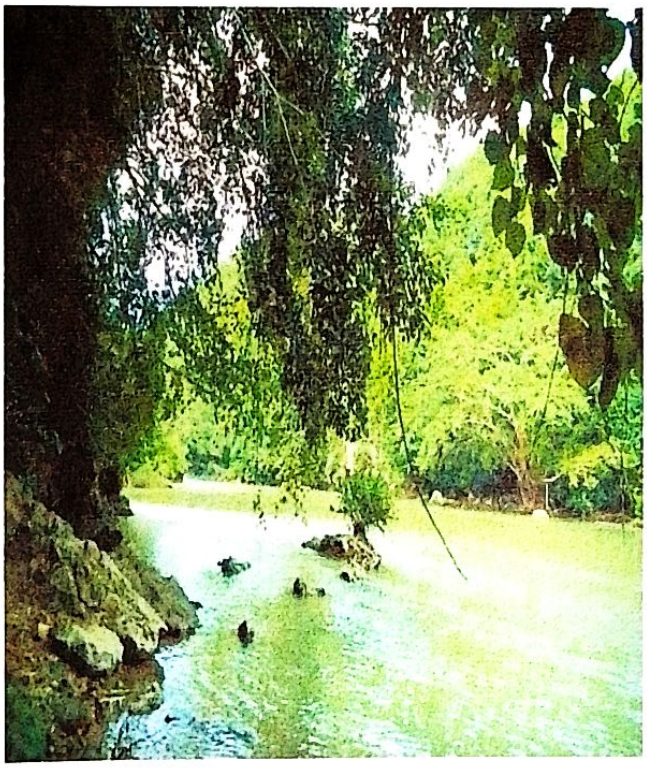
habitat_type	plot	r_humidity	temp	water_pH	soil_pH	soil_moisture	*R_marina*	*L_leytensis*	*L_magnus*	*._visayanus*	*P_leucomystax*
swamp	1	88	28	7	7.4	73.2	4	0	0	0	0
grassland	2	88	28	6.9	7.4	70.5	3	0	0	0	0
grassland	3	89	28	6.9	7.2	82.7	5	0	0	0	0
agricultural_are	4	90	28	6.9	7.5	79	0	0	0	2	0
cultivated_area	5	89	28	6.9	7.5	86.7	0	2	0	0	0
agricultural_are	6	90	28	7.1	7.4	81.4	0	0	3	2	0
agricultural_are	7	90	28	6.9	7.4	75.5	0	0	2	0	0
cultivated_area	8	94	28	7	7.5	72.6	0	0	4	0	0
cultivated_area	9	93	28	7	7.5	74.5	1	0	0	0	0
woody	10	94	28	7	7.5	82.5	0	0	0	0	2

SOIL ANALYSIS									
Plot	Composite sample number	Can weight (in grams)	Soil weight (wet)	Final fresh weight	Oven Dried weight	Final oven dried weight	Soil moisture at field capacity ((initial weight-ovendried weight/oven	Soil Ph	Soil Type
1	1	24.16	277.88	253.72	168.07	143.91	76.30463484	7.4	sandy clay
	2	23.64	273.88	250.24	169.6	145.96	71.4442313	7.4	sandy clay
	3	24.67	262.26	237.59	162.82	138.15	71.97973218	7.5	sandy clay
2	1	23.83	269.56	245.73	168.77	144.94	69.53911964	7.3	sandy loam
	2	25.25	271.69	246.44	167.53	142.28	73.20775935	7.4	sandy clay
	3	26.02	289.94	263.92	182.42	156.4	68.74680307	7.5	sandy clay
3	1	24.46	264.49	240.03	158.46	134	79.12686567	7.1	sandy loam
	2	23.99	248.72	224.73	144.77	120.78	86.06557377	7.2	sandy clay loam
	3	24.68	257.39	232.71	151.81	127.13	83.04884764	7.4	clay loam
4	1	25.42	244.22	218.8	149.13	123.71	76.86524937	7.5	sandy clay
	2	24.26	250.18	225.92	153.29	129.03	75.09106409	7.5	sandy loam
	3	24.15	247.73	223.58	144.8	120.65	85.31288852	7.5	sandy clay
5	1	23.92	251.69	227.77	140.29	116.37	95.72913981	7.5	sandy loam
	2	25.78	247.84	222.06	148.11	122.33	81.52538216	7.4	sandy clay
	3	25.06	247.28	222.22	146.64	121.58	82.7767725	7.5	sandy clay
6	1	18.99	245.74	226.75	137.43	118.44	91.44714623	7.6	sandy clay
	2	23.65	245.53	221.88	145.87	122.22	81.54148257	7.3	sandy loam
	3	26.92	264.83	237.91	165.68	138.76	71.4543096	7.4	sandy clay
7	1	25.15	248.39	223.24	155.89	130.74	70.75110907	7.6	sandy loam
	2	25.04	251.34	226.3	154.02	128.98	75.45355869	7.4	sandy clay
	3	24.98	259.47	234.49	154.92	129.94	80.46021241	7.4	sandy loam
8	1	24.04	247.43	223.39	151.47	127.43	75.30408852	7.4	sandy loam
	2	24.34	251.85	227.51	156.28	131.94	72.4344399	7.5	sandy clay
	3	23.71	257.31	233.6	161.03	137.32	70.11360326	7.5	sandy clay
9	1	25.09	256.56	231.47	158.78	133.69	73.13935223	7.5	sandy clay
	2	24.63	278.18	253.55	168.48	143.85	76.25999305	7.5	sandy clay
	3	23.67	272.89	249.22	166.79	143.12	74.13359419	7.3	sandy clay
10	1	23.99	276.39	252.4	167.55	143.56	75.81499025	7.5	sandy clay
	2	25.28	286.66	261.38	169.29	144.01	81.50128463	7.4	sandy clay
	3	28.13	288.03	259.9	164.84	136.71	90.11045278	7.5	sandy clay

APPENDIX D

Documentation

Researcher recording the ecological parameters in the area using a sling psychrometer



Sampling Sites