

**The Diversity of Bats in Rajah Sikatuna Protected Landscape  
within Sierra Bullones, Bohol, Philippines**

---

**A Thesis**

**Presented to the Graduate Studies Program**

**College of Arts and Sciences**

**University of San Carlos**

**Cebu City, Philippines**

---

**In Partial Fulfillment of  
the Requirements for the Degree  
Master of Science in Biology**

---

**by:**

**Lydia T. Jamora**

**October 2004**


**UNIVERSITY OF SAN CARLOS  
LIBRARY**

PROPERTY OF USC LIBRARY SYSTEM

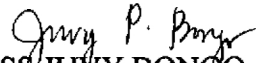
**Approval Sheet**

This thesis entitled THE DIVERSITY OF BATS IN RAJAH SIKATUNA PROTECTED LANDSCAPE WITHIN SIERRA BULLONES, BOHOL, PHILIPPINES, prepared and submitted by MRS. LYDIA T. JAMORA in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE IN BIOLOGY has been examined and is recommended for acceptance and approval FOR ORAL EXAMINATION.

**THESIS COMMITTEE**

  
MISS REIZL N. PAMAONG, M.S.  
Adviser

  
MISS ISABEL DE LOS SANTOS, M.S.  
Member

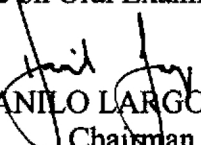
  
MISS JUDY BONGO, M.S.  
Member

  
DANILO LARGO, Ph.D.  
Chairman


---


**PANEL OF EXAMINERS**

Approved by the Committee on Oral Examination with a grade of PASSED.

  
DANILO LARGO, Ph.D.  
Chairman

  
MISS ISABEL DE LOS SANTOS, M.S.  
Member

  
MISS JUDY BONGO, M.S.  
Member

  
MISS REIZL N. PAMAONG, M.S.  
Adviser

Accepted and approved in partial fulfillment of the requirements for the degree MASTER OF SCIENCE IN BIOLOGY.

Comprehensive Examination PASSED: May 18, 1985

  
RAMON S. DEL FIERRO, Ph.D.  
Dean, College of Arts and Sciences

October 9, 2004  
Date of Oral Examination

PROPERTY OF UEC LIBRARY SYSTEM

## Abstract

The study aimed to determine the diversity of bats in Rajah Sikatuna Protected Landscape within Sierra Bullones, Bohol, Philippines. Two sampling stations, the agro-ecosystem and the forest ecosystem were established in each of the six sampling sites namely, barangays Nan-od, Canlangit, Casilay, Danicop, San Isidro, and Bugsoc that compose Rajah Sikatuna Protected Landscape.

Bats were collected through mist nets and were identified. Habitat description adapted from Heaney, et al (1998) and species composition were obtained. The diversity, relative abundance, species richness, evenness and endemicity were computed and interpreted.

Of the 17 bat species recorded, nine were fruit bats and eight were insect bats. The six barangays vary in species composition, diversity, species richness, evenness and relative abundance. *Cynopterus brachyotis*, a fruit bat, was common in both the agro-ecosystem and forest ecosystem sampling stations of the six barangays. Except for barangay Bugsoc, it was relatively abundant in the agro-ecosystem of the rest of the barangays. *Rousettus amplexicaudatus* and *Eonycteris robusta*, in addition to *Cynopterus brachyotis*, were the common species in the agro-ecosystem sampling stations in all six barangays. In the forest ecosystem, *Ptenochirus jagori* was common to the six barangays. Species of insect bats were collected in the barangays except in barangay Danicop.

Species richness was highest in the agro-ecosystem of barangay San Isidro and in the forest ecosystem of barangay Canlangit. Barangay Bugsoc, however, had the highest species richness when both agro-ecosystem and forest ecosystem sampling stations were treated as a whole. Lastly, barangay Bugsoc had the most diverse species of bats among the six barangays.

As for the relative abundance, it was barangay Bugsoc that had the highest relative abundance. Among the 17 species identified, six were endemic, two of which were insect bats.

Barangays Canlangit and Danicop had the most even distribution of bat species in the agro-ecosystem and forest ecosystem sampling stations, respectively. In considering both sampling stations, barangay Danicop had the most even or equitable distribution of bat species.

Although, both barangays Bugsoc and Nan-od had an endemicity of 40%, which is the highest value among all barangays, this result is still considered low. This is based on the percentage of collected bats in Sierra Bullones to the Philippine data (Heaney, et. al, 1987).

The results suggest that some barangays can still support a variety of bat fauna while some need to be strictly regulated.

## **Acknowledgment**

First and foremost, the Researcher would like to express her most heartfelt gratitude to God Almighty for the blessings, divine providence, wisdom, courage and perseverance He has bestowed on her especially during the process of realizing this paper. She is very grateful, too, for giving her the people who have supported, helped and in one way or another contributed to the accomplishment of this work.

The Researcher extends her gratitude to:

**Miss Reizi N. Pamaong**, her thesis adviser who suggested the idea and who constantly and patiently followed her up with the progress of her work. **Dr. Danilo Largo**, her panel chair, for his valuable suggestions, corrections and insights. **Miss Isabel de los Santos**, panel member, for her comments, corrections and suggestions for the improvement of the paper. **Miss Juvy Bongo**, panel member, for the shared knowledge of her field of expertise.

**Mr. Condrado Brigoli**, manager of DISOP-SWCF Project who gave her permission to conduct her study in Rajah Sikatuna Protected Landscape within Sierra Bullones, Bohol.

**Sherry, Allan, Junrin, Merlita, Rodel, Leslie, Adelo, Ryan and Toning**, the forestry interns and local guides who assisted in identifying the plants, putting up of the nets and in retrieving the captured bats.

**Mark, Pat and family, friends who have extended their moral support.**

**Nonie, her husband, Marijo, Ivy Rose, Carie Ann and Lizette, her daughters, who have been giving their time and effort in helping out and for their comfort and untiring support.**

**Lastly, to all those who have helped but whom the researcher fails to mention, for their contributions to the completion of this paper.**

PROPERTY OF USC LIBRARY SYSTEM

## Table of Contents

<b>Abstract</b>	.....	<b>i</b>
<b>Acknowledgment</b>	.....	<b>ii</b>
<b>Table of Contents</b>	.....	<b>iv</b>
<b>List of Tables</b>	.....	<b>vi</b>
<b>List of Figures</b>	.....	<b>vii</b>

### CHAPTER 1. INTRODUCTION

<b>Rationale of the Study</b>	<b>1</b>
<b>Review of Related Literature</b>	<b>3</b>
<b>Statement of the Problem</b>	<b>10</b>
<b>Significance of the Study</b>	<b>10</b>
<b>Scope and Limitation</b>	<b>11</b>

### CHAPTER 2. RESEARCH METHODOLOGY

<b>The Study Area</b>	<b>12</b>
<b>Collection of Bat Samples</b>	<b>14</b>
<b>Taxonomic Identification of Bats</b>	<b>14</b>
<b>Physical Description of the Habitat</b>	<b>15</b>
<b>Analysis of Data</b>	<b>20</b>

**CHAPTER 3. RESULTS AND DISCUSSION**

<b>Bat Species in Six Barangays of Sierra Bullones</b>	<b>23</b>
<b>Biological Description of Habitats</b>	<b>37</b>
<b>Comparison of Species Composition in each Barangay</b>	<b>41</b>
<b>Species Diversity, Evenness and Richness</b>	<b>46</b>
<b>Relative Abundance</b>	<b>50</b>
<b>Endemicity</b>	<b>54</b>

**CHAPTER 4. SUMMARY, CONCLUSION AND RECOMMENDATION** 58

<b>References</b>	<b>61</b>
-------------------	-----------

<b>Appendices</b>	<b>65</b>
-------------------	-----------

- A. Transmittal Letter**
- B. Accumulation Curve**
- C. Rainfall Readings from PAG – ASA**
- D. Physical and Biological Description of the Habitat**
- E. Description of Sex and Age Class of Bats**
- F. Computations of Diversity Index, Dominance and Species Evenness**

## **List of Tables**

<b>TABLES</b>		<b>PAGE</b>
<b>1</b>	<b>Species of bats collected from the six barangays compared to Philippine data</b>	<b>23</b>
<b>2</b>	<b>Number of individuals per species of bats collected from the agro and forest ecosystem sampling stations</b>	<b>42</b>
<b>3</b>	<b>Species richness and species diversity of bats for all sampling stations</b>	<b>46</b>
<b>4</b>	<b>Relative abundance of bats</b>	<b>53</b>
<b>5</b>	<b>Species list identifying the endemic species in the six barangays</b>	<b>55</b>



## List of Figures

<b>FIGURE</b>		<b>PAGE</b>
1	Map of Bohol Highlighting Sierra Bullones	13
2	Typical vegetation cover in Nan-od	15
3	Typical vegetation of Barangay Canlangit	16
4	Typical vegetation of Barangay Casilay	17
5	Typical vegetation of Barangay Danicop	18
6	Typical vegetation of Barangay San Isidro	18
7	Typical vegetation of Barangay Bugsoc	19
8	<i>Cynopterus brachyotis</i> , Common short nosed bat	25
9	<i>Eonycteris robusta</i> , Philippine nectar bat	26
10	<i>Eonycteris spelaea</i> , Common nectar bat	27
11	<i>Haplonycteris fischeri</i> , Philippine Pygmy fruit bat	27
12	<i>Macroglossus minimus</i> , Dagger - toothed flower bat	28
13	<i>Ptenochirus jagori</i> , Musky fruit bat	29
14	<i>Ptenochirus minor</i> , Lesser musky fruit bat	30
15	<i>Rousettus amplexicaudatus</i> , common rousette	31
16	<i>Emballonura alecto</i> , Philippine sheath - tailed bat	31
17	<i>Megaderma spasma</i> , Common Asian ghost bat	32
18	<i>Hipposiderus diadema</i> , Diadem round leaf bat	33
19	<i>Rhinolophus arcuatus</i> , Arcuate horseshoe bat	33

20	<i>Rhinolophus rufus</i> , Large rufous horseshoe bat	34
21	<i>Rhinolophus virgo</i> , Yellow-faced horseshoe bat	35
22	<i>Miniopterus australis</i> , Little bent- winged bat	36
23	<i>Miniopterus schreibersi</i> , Common bent- winged bat	36
24	<i>Miniopterus tristis</i> , Greater bent- winged bat	37
25	A graph showing the endemism of bat species in the six barangays	56