

**ASSESSMENT OF DIVERSITY OF MAMMALS IN MT. TAPULAO, PALAUIG,
ZAMBALES**

HANNAH AIRA R. ROLE

An Undergraduate Thesis Submitted to the Faculty of the Department of Biological
Sciences, College of Arts and Sciences, Central Luzon State University,
Science City of Muñoz, Nueva Ecija, Philippines
in Partial Fulfillment of the Requirements
for the Degree of

**BACHELOR OF SCIENCE IN BIOLOGY
(Major in Zoology)**

JUNE 2019

TABLE OF CONTENTS

	PAGE
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF APPENDICES	x
LIST OF APPENDIX FIGURES	xi
LIST OF APPENDIX TABLES	xii
ABSTRACT	xiii
INTRODUCTION	1
Background of the Study	1
Objectives of the Study	3
Significance of the Study	4
Scope and Limitation of the Study	4
Time and Place of the Study	5
REVIEW OF RELATED LITERATURE	6
Philippine Forests	6
Biodiversity in the Forest Ecosystem	6
Importance of Biodiversity in Forests	7
Ecological Importance of Mammals	8
Diversity of Mammals in the Philippines	8
Diversity of Mammals in Mt. Tapulao	9
MATERIALS AND METHODS	11
Habitat Assessment	11
Sampling Techniques	11
Non-volant mammals	11
Mist-netting	12
Ecological Parameters	12
Sources and Levels of Impacts of Environmental Degradation	14
Data Gathered	15

RESULTS AND DISCUSSION	17
Assessment and Listing of Mammalian Species in Mt. Tapulao, Palauig, Zambales	17
Percentage Occurrence of Mammals Observed	22
Ecological Parameters of Mammals Observed in Mt. Tapulao, Palauig, Zambales	23
Shannon Diversity Index of Mammals Observed	24
Biodiversity Indicator Values of Mammals Observed	25
Functions and Importance of Mammals in Mt. Tapulao	26
Problems or Threats in Mt. Tapulao	27
SUMMARY, CONCLUSION, RECOMMENDATION	34
Summary	34
Conclusion	35
Recommendation	35

LIST OF TABLES

TABLE		PAGE
1	Level of impacts of environmental degradation	14
2	Scale of impact level	14
3	Percentage occurrence of mammals observed in Mt. Tapulao, Palauig, Zambales	22
4	Ecological parameters of observed mammals in Mt. Tapulao, Palauig, Zambales	23
5	Biodiversity indicator values of mammals observed in Mt. Tapulao, Palauig Zambales	26
6	Environmental degradation in the forest ecosystem in Mt. Tapulao, Palauig, Zambales	29

LIST OF FIGURES

FIGURE		PAGE
1	<i>Rhynchomys tapulao</i>	18
2	<i>Rattus everetti</i>	19
3	<i>Ptenochirus jagori</i>	20
4	<i>Apomys brownorum</i>	21
5	Accumulated trash left behind by tourists	30
6	Road construction at the foot of Mt. Tapulao	31
7	Carcass caught in a trap	32
8	Locals with a makeshift gun used for hunting	33

LIST OF APPENDICES

APPENDIX		PAGE
A	Stations Set-up in the Study Area	41
B	Questionnaire on the Sources and Levels of Impacts on the Environmental Degradation	44
C	Certificate of Taxonomic Identification	46
D	Abiotic and Habitat factors	47
E	Fernando's Scale	48

LIST OF APPENDIX FIGURES

APPENDIX FIGURE		PAGE
1	Mossy forest at Station 1	41
2	Pine forest at Station 2	41
3	Dipterocarp forest at Station 3	42
4	Dipterocarp forest Station 4	42
5	Dipterocarp forest at Station 5	43
7	Sample Questionnaire	44
8	Sample Questionnaire	45
9	Certificate of Taxonomic Identification	46

LIST OF APPENDIX TABLES

TABLE		PAGE
1	Abiotic and habitat factors	47
2	Modified Fernando Biodiversity Scale	48

ABSTRACT

ROLE, HANNAH AIRA R., Bachelor of Science in Biology, Department of Biological Sciences, Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines, **JUNE 2019, ASSESSMENT OF DIVERSITY OF MAMMALS IN MT. TAPULAO, PALAUIG, ZAMBALES**

Adviser: ANNIE MELINDA PAZ-ALBERTO, Ph.D.

This study was done to assess the diversity of mammals in Mt. Tapulao, Palauig, Zambales. Cage trapping and mist-netting were done to catch non-volant mammals and volant mammals, respectively. Also, the ecological parameters and diversity indices were computed to determine the diversity of mammals that were present in Mt. Tapulao. In addition, the checklist of the sources and levels of impacts of environmental degradation in Mt. Tapulao was rated by CENRO and LGU employees in order to determine the problems and threats in Mt. Tapulao. There were three species belonging to the family Muridae (*Rhynchomys tapulao*, *Apomys brownorum*, and *Rattus everetti*) and a species of belonging to the family Pteropodidae (*Ptenochirus jagori*). Among the mammals that were observed, *R. everetti* got the highest Importance Value Index of 82.35%. A Shannon Diversity Index of 1.06 was computed which indicates very low diversity of mammals. In addition, mammals in Mt. Tapulao serve as food, pets, medicine, animal sacrifices, or are sold to the market. Lastly, the problems and threats to mammalian diversity in Mt. Tapulao are tourism, road construction, and hunting which posed major impacts in the area.

LITERATURE CITED

- Alviola, P. A., Duya, M. R. M., Duya, M. V., Heaney, L.R. & Rickart, E. A. (2011). Chapter 2: Mammalian diversity patterns on Mount Palali, Caraballo mountains, Luzon. *BioOne COMPLETE*, 2(1), 61-64.
- Andrade Melo, E. R., Silva, M., Gadelha, J. R. & Silva, A. P. (2015). Diversity, abundance and the impact of hunting on large mammals in two contrasting forest sites in northern amazon. *Wildlife Biology*, 21(15), 235-245.
- Asigbaase, M., Sjogersten S., Lomax B.H. & Dawoe, E. (2019). Tree diversity and its ecological importance value in organic and conventional cocoa agroforests in Ghana. *PLoS ONE*, 14(1), 1-19.
- Balatibat, J. B. (2008). Wildlife diversity studies and conservation efforts in the Philippines. *Forest Science and Technology*, 4(1), 1-4.
- Balete, D. S., Rickart, E. A., Ambal, R.G.R., Jansa, S. & Heaney, L.R. (2007). Descriptions of two New Species of *Rhynchomys* Thomas (Rodentia: Muridae: Murinae) from Luzon Island, Philippines. *Journal of Mammalogy*, 88(2), 287-301.
- Balete, D. S., Heaney, L. R., Rickart, E. A. & Veluz, M. J. (2009). Diversity patterns of small mammals in the Zambales Mts., Luzon, Philippines. *Mammalian Biology*, 74(6), 456-466.
- Balete, D. S., Rickart, E. A. & Heaney, L. R. Jr. (2011). Small mammal diversity along an elevational gradient in northern Luzon, Philippines. *Mammalian Biology*, 76(1), 12-21.
- Bernabe, J. T. (2002). A Survey on the Diversity of Mammals in the Forest Ecosystem of Pantabangan, Nueva Ecija. Unpublished undergraduate thesis. Central Luzon State University, Science City of Munoz, Nueva Ecija.
- Burgin, C. J., Collela, J. P., Kahn, P. L. & Upham, N. S. (2018). How many species of mammals are there? *Journal of Mammalogy*, 99(1), 1-14.
- Chakravarty, S., Ghosh, S. K., Suresh, C. P., Dey, A. N. & Shukla G. (2012). Deforestation: causes, effects and control strategies. *Global Perspectives on Sustainable Forest Management*, 6(2), 66-78.
- De Leon, J. (2007). The Philippine wildlife: an overview. A paper presented during the PES Policy Forum on Costing for Environmental Services: Implications to Policy.

- Department of Environment and Natural Resources Forest Management Bureau. (2010). Philippine Forest Cover.
- Department of Environmental and Natural Resources (DENR) Region 3 – Central Luzon. Mount Tapulao. Retrieved from <http://r3.denr.gov.ph/index.php/priority-programs/national-greening-program/ngp-website/91-front-slider/179-mt-tapulao>.
- Eloreta, W. X. G. (2016). Assessment of the Diversity of Animals Present in the forest Ecosystem of Sitio Bulac, Barangay General Luna, Carranglan, Nueva Ecija. Unpublished undergraduate thesis. Central Luzon State University, Science City of Muñoz, Nueva Ecija.
- Hamann, A. (2002). The north Negros forest reserve: A biodiversity hotspot at risk. *Siliman Journal*, 43(1), 85-56.
- Heaney, L., Alviola, P., Duya, M.R., Tabao, M., Gonzalez, J.C. & Balete, D. (2016). *Rattus everetti* (errata version published in 2017). *The IUCN Red List of Threatened Species* 2016. Retrieved on 03 June 2019.
- Heaney, L. R. (1993). Biodiversity patterns and the conservation of mammals in the Philippines. *Asia Life Sciences*, 2(2), 261-274.
- Heaney, L. R. (2010). Small mammal diversity along elevational gradients in the Philippines: an assessment of patterns and hypotheses. *Global Ecology and Biogeography*, 10(1), 15-19.
- Heaney, L. R., Balete, D. S. & Rickart, E. A. (2016). The mammals of Luzon island. *Mammalian Biology*, 3(14), 1895-2012.
- Jabines, A. & Inventor, J. (2007). The Philippines: Climate hotspot. *Greenpeace Southeast Asia*, 1(1), 1-3.
- Jones, K. E. & Safi, K. (2011). Ecology and evolution of mammalian biodiversity. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 366(1577), 2451-2461.
- Lasco, R. D., Villamor, G. D., Pulhin, F., Sanchez, P. A. J. & Villegas, K. (2014). Climate change and forest ecosystems in the Philippines: Vulnerability, adaptation and mitigation. *Journal of Environmental Science and Management*, 11(1), 1-14.
- Lisseanu, A. P. & Voigt, C. C. (2009). Bats on the move. *Journal of Mammalogy*, 90(6), 1283-1289.
- Mallari, N. A., Collar, N. J., McGowan, J. K. & Marsden, S. J. (2016). Philippine protected areas are not meeting the biodiversity coverage and management

effectiveness requirements of Aichi Target 11. *The Royal Swedish Academy of Sciences*, 4(5), 313-314.

- Morris E. K., Caruso, T., Buscot, F., Fischer, M., Hancock, C., Maier, T. S., Meiners, T., Muller, C., Obermaier, E., Prati, D., Socher, S. A., Sonnemann I., Waschke, N., Wubet, T., Wurst, S. & Rillig, M. C. (2014). Choosing and using diversity indices: insights for ecological applications from the German Biodiversity Exploratories. *Ecological Evolution*, 4(18), 3514-3524.
- Ong, P. S. Ph.D., Duya, M. R. M., Duya, M. V., Yngente, M. V. C., Tongco, M. D. C. Ph.D., Galindon, J. M. M. & Dalin, F. M. (2012). Inventory and assessment of biodiversity resources of Mount Tapulao, Zambales, Luzon Island, Philippines. *Diliman Science Research Foundation Inc.*, 4(1), 15-18.
- Ong, P., Rosell-Ambal, G., Tabaranza, B., Heaney, L., Pedregosa, M., Paguntalan, L. M., Cariño, A.B., Ramayla, S., Duya, P., Warguez, D., Alcala, E., Garcia, H., Pamaong, R., Gonzalez, J.C. & Lorica, R.P. (2008). *Ptenochirus jagori*. *The IUCN Red List of Threatened Species 2008*. Retrieved on 03 June 2019.
- Parmar, T. K., Rawtani, D. & Agrawal, Y. K. (2016) Bioindicators: the natural indicator of environmental pollution, *Frontiers in Life Science*, 9(2), 110-118
- Patel D. K. (2014). Biodiversity and its importance. *Journal of Biodiversity and Endangered Species*, 4(2), 260-266.
- Popa-Lisseanu, A. G. & Voigt C. C. (2009). Bats on the move. *Journal of Mammalogy*, 90(6), 1283-1289.
- Scaven, V. L. & Rafferty, N. E. (2013). Physiological effects of climate warming on flowering plants and insect pollinators and potential consequences for their interactions. *Current Zoology*, 59(3), 418-426.
- Sinclair, A. R. E. (2003). The role of mammals as ecosystem landscapers. *ALCES*, 39(1), 161-176.
- Schmidt, H. P. & Wilson, K. (2014). The 55 uses of biochar. *The Biochar Journal*. ISSN 2297-1114. Retrieved from www.biochar-journal.org/en/ct/2.
- Stuart, A. M., Prescott, C. V. & Singleton, G. (2016). Can a native rodent species limit the invasive potential of a non-native rodent species in tropical agroforest habitats? *Pest Management Science*, 72(6), 1168-1177.
- Sunlu, U. (2003). Environmental impacts of tourism. *Local resources and global trades: Environments and agriculture in the Mediterranean region*, 1(57), 263-270.

- Tanalgo, K. C. (2017). Wildlife hunting by indigenous people in a Philippine protected area: a perspective from Mt. Apo National Park, Mindanao Islands. *Journal of Threatened Taxa*, 9(6), 10307-10313.
- Thompson, I. A., Okabe, K., Tylianakis, J. M., Kumar, P., Brockerhoff, E.G., Schellhorn, N.A., Parrotta, J. A. & Nasi, R. (2011). Forest diversity and the delivery of ecosystem goods and services: Translating science into policy. *BioScience*, 61(12), 972-973.
- Wang, D. Q. & Carey, M. C. (2014). Therapeutic uses of animal biles in traditional Chinese medicine: an ethnopharmacological, biophysical, chemical and medicinal review. *World J Gastroenterol*, 20(29), 9952-9975.