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Species Composition, Endemism and Local Status of Hawkmoths (Heterocera: Sphingidae) in the two Proposed Expansion sites of Mt. Hamiguitan Range Wildlife Sanctuary, Davao Oriental, Philippines

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ABSTRACT: Sphingidae, also known as Hawkmoths or Sphinx Moths, are ecological indicators that are naturally affected by environmental stresses. They have a widespread distribution from Southeast Asia and play significant roles in the environment as indicators of the quality of habitat and biomass degradation. Mt. Hamiguitan Range Wildlife Sanctuary(MHRWS), as the only world heritage site in the Philippines, has been subjected to numerous conservation studies of flora and fauna for several years. There were significant studies on Lepidopterans in MHRWS, but there were no reports on moth species, specifically on the family Sphingidae. Thus, this study was carried out in Sitio Tagtigcup, Barangay La Union, San Isidro and Ecopark of Mansinagan, Governor Generoso, Davao Oriental to provide data on the composition, endemism and status of Hawkmoths. Light trap sampling were established using 3 × 4m white silk cloth and 250 V light bulbs in the two proposed expansion sites. A total of 6 genera with 8 species were recorded. Of the collected species, *Acosmeryx socrates, Ambulyx staudengeri* and the retramanilae were endemic to the Philippines. There were 4 uncommon or local species, three 3 common species and only one rare species recorded. This concludes that MHRWS proposed expansion sites are home of 8 hawkmoths which comprised 37.5% endemicity in the Philippine hawkmoths. Thus, this study calls for conservation and protection.

Keywords: Sphinx moth, Lepidoptera, Light trap, San Isidro, Governor Generoso

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INTRODUCTION

Sphingidae or the Sphinx Moths or Hawkmoths are environmental indicators that are easily affected by ecological stresses. They are considered as one of the major pollinators in the tropical forests (Frankie, 1975; Haber and Frankie, 1982; Frankie *et al.*, 1983; Opler, 1983; Haber and Frankie, 1989). The larvae help to control weeds and also in cross pollination of many flowering plants. They consume and convert millions of tons of plant matter into waste materials and gradually recycled into plant matter or even eaten by other animals (Mohagan *et al.*, 2011; Treadaway, 1995).

Hawkmoths have a widespread distribution from Sundaic to South Asian. They have been documented from Nepal, northeast India, southern China, Taiwan, Ryukyu Archipelago, Vietnam, Laos, Cambodia, Thailand, the Andaman Islands, Sumatra, Java, Peninsular Malaysia, Borneo and Philippines(Walker, 1856; Pittaway & Kitching, 2008; Leong & Rozario, 2009). According to Kitching and Cadiou (2000), hawkmoths are one of the few to have been well documented and inventoried on every continent. They have played roles in a variety of research programs such as in their biology, life histories, and morphology which were supported with rich information.

As the only world heritage site in the Philippines, Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS) has been subjected to various flora and fauna conservation studies for several years and is a home to endemic and threatened fauna. The data presented in this paper in the two proposed expansion sites in MHRWS needs to support its proclamation of protection on its worth. Mt. Hamiguitan is located in the eastern coast and form the southern part of Eastern Mindanao corridor. The area is one of Mindanao Island's most remarkable regions, and is one of the recognized biological hot spots (Villanueva and Mohagan, 2010). There were relevant studies on Lepidopterans in MHRWS including the study of butterflies by Mohagan and Treadaway (2010); however, there were no published reports regarding the species of moths specifically on family Sphingidae. This paper provided the data on the composition, endemism and local status of hawkmoths in the two proposed expansion sites in MHRWS for conservation.

MATERIALS AND METHODS

The study was carried out in the municipalities of San Isidro and Governor Generoso, Davao Oriental from February 4 to 11, 2018. Gratuitous permit was secured from the Department of Environment and Natural Resources (DENR), Region XI. The study was also accompanied by representatives from the Protected Area Management Board (PAMB) and the Provincial Environment and Natural Resources (PENRO) teams. Using 3 × 4m white silk cloth and 250 V light bulbs, light trap sampling was established at Sitio Tagtigcup, Barangay La Union, San Isidro and Ecopark, Upper Tibanban, Barangay Mansinagan, Governor Generoso, Davao Oriental from 6:00 pm to 2:00 am.

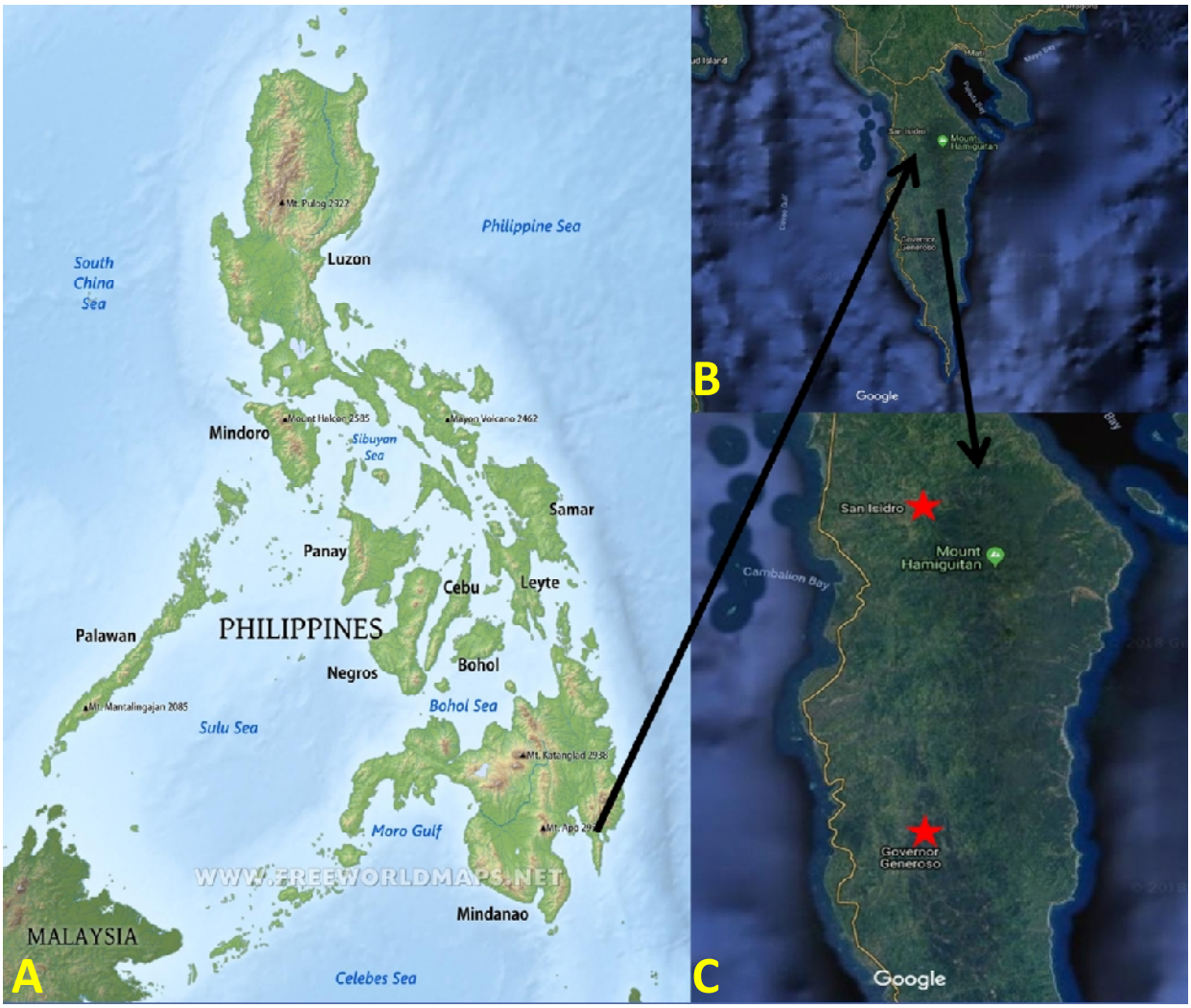

Fig. 1. Study Site. A) Philippine map, B) Map of Davao Oriental, C) Map of MHRWS showing the locations of the two expansion sites (★).

The sampling stations were carried out in a slope to ridge type location in order for the light to penetrate the deep areas of the forest. Vegetation type and composition were also observed and obtained during sampling period. Triangular-shaped glassine papers and mothballs were used to preserve the specimens. Identification, classification and status of the specimens were carried out using the checklist of Hogenes and Treadaway (1998) at the Central Mindanao University Museum, Zoology Section.

RESULTS AND DISCUSSION

A total of 8 species distributed in 6 genera of the Sphingidae family were recorded. These species were: *T. manila, T. nesus, A. pryeri* and *A. staudengeri. A. panopus panopus, A. socrates, H. boerhavae* and C. decolor respectively. Of these, 3 species are endemic to the Philippines such as, *A. socrates, A. staudengeri*, and *T. manila*. Among the species 4 were uncommon or local species such as *A. pryeri, H. boerhavae, C. decolor* and *T. manilae*, and 3 common species such as *A. socrates, A. staudengeri* and *T. nessus,* and only *A. panopus panopus* was recorded as the rare species.

The study of Nuñeza *et al*. (2016) on the Lepidopterans in Bega Watershed, Prosperidad, Agusan del Sur recorded only 4 species of moths with only 1 species of sphingid - Daphnis hypothous which was very low as compared to the results gathered. A higher species composition were recorded in the study of Karsholt and Razowski (1996), having 57 hawkmoth species and the island of Borneo of at least 100 species. There were 117 Hawkmoths recorded in the Philippines and 62 of which are found in Mindanao Island. As reported by Hogenes and Treadaway (1998) the Mindanao Island has 58% endemicity of hawkmoths. In comparison, the collected species constitute 6.8% of the overall Philippine recorded species and 12.9% in Mindanao species were recorded in MHRWS expansion sites which have lower counts.

The two expansion sites are found in a secondary forest type of vegetation which supports the study of Schuize and Fielder (2003) that there was no significant difference between primary or old-growth forest and secondary or cultivated forest in terms of diversity of hawk moths. The Tagtigcup sampling was rainy and wet and the temperature was lower (19º-24ºC) compared to Mansinagan which was sunny and dry with temperature (25º-38ºC). The difference in the weather and temperature did not affect the occurrence of sphinx moth in the two proposed expansion sites, probably because these moths have persistent wings to fly to the light source as they are crepuscular species. There were no difference between vegetation types and plant composition in the two sites but yet the sphinx moths are present in the two sites. As such, the two proposed expansion sites are worthy for the declaration, protection and expansion in MHRWS.

Table 1: Species Composition Endemism, and Local Status of Sphinx months/Hawkmoths in MHRWS.

Genus	Species	Endemism	Distribution	Local Status
Acosmeryx	*A. socrates*	Endemic	Bal, Jol, Pal, Stu	Common
Ambulyx	*A. pryeri*	-	Bal, Jol, Pal, Stu	Uncommon or Local
	A. staudengeri	Endemic	Boh, Ceb, Jol, Ley, Luz, Mar, Mas, Mdo, Mno, Neg, Pan, Pol, Sam, Sga, Sib, Siq, Taw	Common
Amplypterus	*A. panopus panopus*	-	Bon, Pal	Rare
Hippotion	*H. boerhavae*	-	Jol, Ley, Luz, Mno, Neg, Pal, Pan, Sib	Uncommon or Local
Cypha	*C. decolor*	-	Jol, Ley, Luz, Mdo, Mno, Neg, Sam	Uncommon or Local
Theretra	*T. manilae*	Endemic	Ley, Luz, Mdo, Mno, Neg, Pal, Pan, Sam, Siq	Uncommon or Local
	T. nessus	-	Bal, Boh, Bon, Ceb, Jol, Ley, Luz, Mar, Mdo, Mno, Neg, Pal, Pan, Sam, Sib, Siq	Common

Legend: Bal–Balabac, Boh – Bohol, Bon – Bongao, Ceb – Cebu, Jol – Jolo, Ley – Leyte, Luz – Luzon, Mar – Marinduque, Mas – Masbate, Mdo – Mindoro, Mno – Mindanao, Neg – Negros, Pal – Palawan, Pan –Panay, Pol –Polilio Island, Sam – Samar Taw – Tawi-tawi, Sga – Saramngani, Sib – Sinuyan, Siq – Siquijor, Stu –Sibutuc

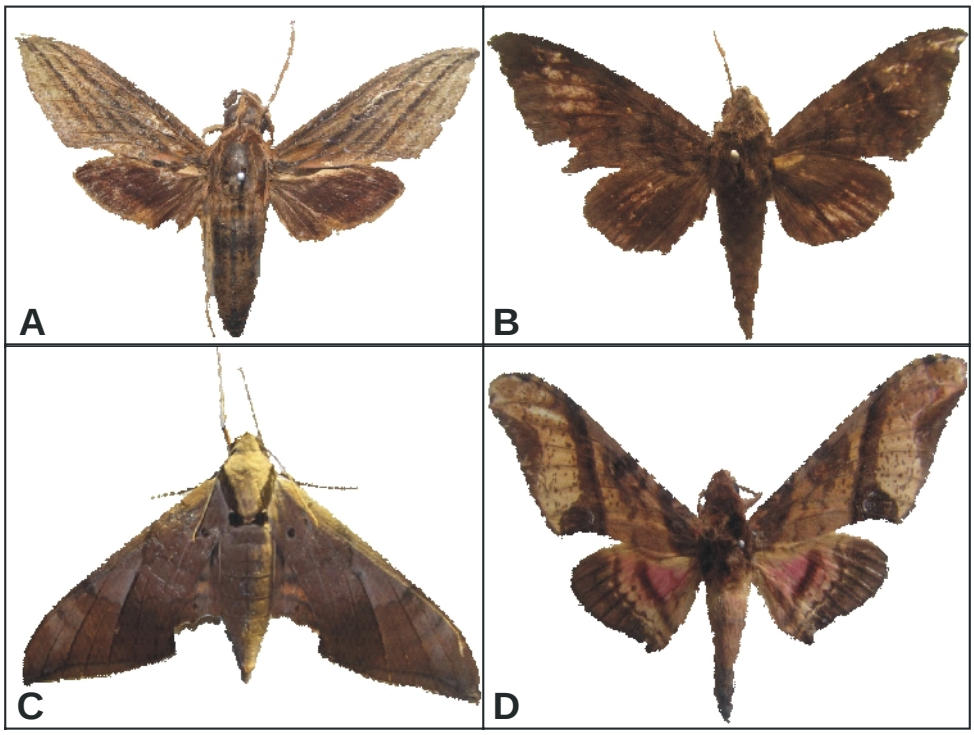

Fig. 2. Some hawkmoths in MHRWS. (A) *Theretra manila*, (B) *Acosmeryx socrates*, (C) *Ambulyx staudengeri*, and (D) *Amplyterus panopus panopus.*

CONCLUSIONS AND RECOMMENDATIONS

The proposed expansion sites of MHRWS are home to 8 species of hawkmoths, which composed 37.5% of the total endemicity in the Philippines. These species constitute 50% local or uncommon species, 37.5% common species, and 12.5% rare in the Philippines. The fact that these hawkmoths are vulnerable to anthropogenic disturbances, it is recommended that the two proposed expansion sites of MHRWS be declared as part of the protected area of MHRWS.

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