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Biodiversity and Status of Butterflies in the Vicinity of Mountain View College, Mt. Nebo, Valencia City

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Abstract - To establish a local data base on butterfly composition and richness, biodiversity of species were determined at the Agriculture Garden, Balambangan Area, Hydro II Mini-forest and Malingon Mini-forest sites of Mountain View College using 40 m line transect sampling. BIOPRO software version 2 was used in the analyses. Survey showed 49 species, 33 genera, and 5 families of butterflies. One species (2.0%) was very common, 22 species (44.9%) were common, 10 species (20.4%) were rare, and 16 species (32.7%) were undetermined. From highest to lowest, diversity indices were Malingon Mini-forest (H=1.519), Hydro 2 Mini-forest (H=1.415), Agriculture Garden (H=1.176), and Balambangan Area (H=1.146). Bray-Curtis analysis revealed 2 clusters of habitats. Cluster 1 (81% similarity) at Malingon and Hydro II Mini-forests had dense trees, river systems, and nectar sources which probably favoured the presence of rare and endemic species. Cluster II (73% similarity) at Agriculture Garden and Balambangan Area had human settlements, sparse tree distribution and inhabited by the common species. These results suggest that the highest diversity which includes rare and endemic

species could be found in dense forest habitat with presence of water sources and minimal human disturbance. Continued monitoring will establish population and species richness trends and inform ecological measures to preserve endemic and rare species.

INTRODUCTION

The order Lepidoptera (Arthropoda: Insecta) includes the winged insects known as butterflies. These insects have remarkable life cycle involving metamorphosis from egg to imago. Enthusiasts and experts have made butterflies subject of interest and research.

Butterflies in nature have two-fold roles. As pollen and nectar gatherers, butterflies pollinate agricultural crops and other plants (USDA Forest Service, 2007; Noe et al. 2005). Various species are utilized as indicators of biodiversity and habitat quality (Dirk and Hans, 2005; Lawton et al. 1998). Commercial rearing of these insects serves as alternative livelihood for rural folks (Baltazar 2007). Butterfly farming improves eco-tourism and conservation education (Sarian 2000) and caters involvement of community in managing and conserving local forest resources (Omenge 2002).

In the Philippines, 895 taxa were reported with notes in their ecological status (Treadaway 1995). In 2004, Danielsen and Treadaway, accounted 915 species and 910 subspecies. In Mindanao, there are 528 species of butterflies and 219 species of which are endemic accounting 41.5% of Philippine species (Treadaway 1995). Several taxa of Philippine butterflies are endangered or critically endangered (Danielsen and Treadaway 2004). Unless urgent actions on habitat preservation are undertaken these insects will soon be extinct.

Recent account of butterflies in the world numbered close to 20,000 species (Kristensen et al. 2007). Though several workers on butterflies are stationed in many countries, there are still vast gaps in local studies where new species are likely to be discovered. This study determines the species composition, species richness, and status of butterflies of the area and establishes a data base for local biodiversity.

MATERIALS AND METHODS

A forty (40) m line transect was established in four areas – Malingon Mini-forest, Hydro II Mini-forest, Main Campus and Agriculture Garden (henceforth designated as Agriculture Garden), and Balambangan Area. Visual sampling and sweep netting were employed to capture and monitor butterfly species. Representative specimens for each species were preserved for identification. Sampling and monitoring were done between 10:00 AM- 03:00 PM from December 2007- August 2009. Butterflies were identified and their ecological status assessed. Specimen identification was verified by local experts on butterflies. Biodiversity indices data were analyzed using BIOPRO software version 2.

RESULTS AND DISCUSSION

There were 49 species, 34 subspecies, and 2 varieties belonging to 33 genera representing 5 families of butterflies that were collected and identified (Table 1 and Plate 1). The species count represents 5.4% of the species found in the Philippines and 7.9% of species found in Mindanao (Treadaway 1995). Nymphalidae has the highest number of species while Papilionidae the least species in the study sites.

Table 1. Species of butterflies found in Mountain View College.

Family	Genus	Species	Status	
			Ecological*	Local**
Hesperiidae	1. Potanthus	1. *P. mingo mingo* Edwards 1866	Rare	Rare
	2. Pelopidas	2. *P. agna agna*	Rare	Rare
Lycaenidae	3. Jamides	3. *J. alecto manilana* Toxopeus 1930	Rare	Very rare
		4. *J. callistus callistus*	Rare	Rare
		5. *J. philatus osias*	Undetermined	Rare
		6. *J. bochus pulchior* Grose-Smith 1895	Rare	Rare
		7. *J. species 1*	Undetermined	Rare
		8. *J. species 2*	Undetermined	Rare
		9. *J. species 3*	Undetermined	Rare
		10. *J. species 4*	Undetermined	Rare
	4. Mellitus	11. *M. melanion*	Undetermined	Very rare
	5. Curetis	12. *C. nesophila*	Undetermined	Very rare
	6. Allotinus	13. *A. nivalis felderi*	Undetermined	Very rare
		14. *M. hondai* Eliot & Kawazoe 1983	Common, Endemic	Common
	8. Prosotas	15. *P. nora semperi* Fruhstorfer 1916	Common, Endemic	Common
	9. Aeromachus	16. *A. plumbeolus*	Undetermined	Rare

Continuation of Table 1

Family	Genus	Species	Status	
			Ecological*	Local**
Nymphalidae	10. Danaus	*17. D. melanippus edmondii* Lesson 1837	Common	Rare
	11. Ideopsis	*18. I. juventa manilana* Moore 1883	Common	Very rare
	12. Cethosia	*19. C.luzonica magindanica*	Undetermined	Very rare
	13. Faunis	*20. F. phaon leucis* C. & R. Felder 1861	Common	Very rare
	14. Hypolimnas	*21. H. bolina bolina* Butler 1874	Common	Rare
		22. H. anomala anomala Wallace 1869	Common	Rare
	15. Junonia	*23. J. hedonia ida* Cramer 1775	Common	Common
	16. Lassipa	*24. L. pata semperi* Moore 1899	Rare	Very rare
	17. Ptychandra	*25. P. loquinii plateni* Semper 1891	Rare	Common
	18. Neptis	*26. N. pampanga boholica*	Common	Very rare
	19. Tacola	*27. T. species 1*	Undetermined	Very rare
	20. Vagnans	*28. V. species 1*	Undetermined	Very rare
	21. Symbrenthia	*29. S. brabira sinica*	Undetermined	Very rare
	22. Vindula	*30. V. dejone dejone* Erichson 1834	Common	Very rare
	23. Orsotriaena	*31. O.medus medus*	Rare	Rare
		32. M. frederici	Rare	Common
	24. Mycalesis	*33. M. species 1*	Rare	Very common
		34. M. species 2	Rare	Very common
		35. Y. sempera chaboras	Undetermined	Rare
	25. Ypthima	*36. Y. stellera stellera*	Undetermined	Rare
		37. Y. species 1	Undetermined	Rare

Continuation of Table 1

Family	Genus	Species	Status	
			Ecological*	Local**
Papilionidae	26. Graphium	*38. G. agamemnon agamemnon* 39. Linnaeus 1758	Common	Very rare
	27. Menelaides	*40. M. deiphobus rumanzovia* 41. Eschscholtz 1821	Common	Rare
	28. Papilio	*42. P. helenus hystaspes*	Common	Rare
		43. P. polytes ledebouria	Common	Rare
	29. Appias	*44. A.olferna peducaea*	Very common	Rare
Pieridae	30. Catopsilia	*45. C. scylla asema* Staudinger 1885	Common	Very common
		46. C. scylla var.1	Common	Very common
		C. scylla var.2	Common	Very common
	31. Eurema	*47. E. alitha alitha,* C. & R. Felder 1862	Common	Very common
		48. E. blanda vallivolans, Butler 1883	Common	Very common
		49. E. hecabe tamiathis Fruhstorfer 1910	Common	Very common
	32. Leptosia	*50. L. nina terentia* Fruhstorfer 1920	Common	Very rare
	33. Pareronia	*51. P. boebera trinobantes* Fruhstorfer 1911	Common	Rare

* See Checklist of Butterflies in the Philippine Islands (Treadaway, 1995)

** Refers to the number of sightings:

Very rare - 1-3 Common - 7-10 Rare - 4-6 Very common - 11<

Ecological status of Philippine butterflies collected in the area includes 11 rare species (22.4%), 22 common species (44.9%), 16 species (32.7%) were undetermined, and 1 species (2%) is very common. Local status includes 14 (28.6%) very rare species, 22 (44.9%) rare species, 11 (22.4%) common species, and 2 (4.1%) species are very common. One species, *Jamides bochus pulchrior,* is a possible new record in Mindanao. Two endemic species, *Monodontides hondai* and *Prosotas nora semperi* were recorded in the study sites.

Table 2. Shannon index of diversity of butterflies in Mountain View College.

SAMPLE	SHANNON H MAX*
Balambangan Area	1.146
Agriculture Garden	1.176
Malingon Mini-forest	1.519
Hydro II Mini-forest	1.415

* Shannon Index Value
0.0 – 0.5 – low diversity, 0.6 – 3.0 – moderate diversity
3.1 – < – high diversity

Mountain View College has moderate diversity of butterflies with Malingon Mini-forest as the most diverse (Table 2 and Fig. 1). This suggests that Malingon Mini-forest perhaps have a wide range of food plants, abundant water sources and high humidity that favor abundance of butterfly species.

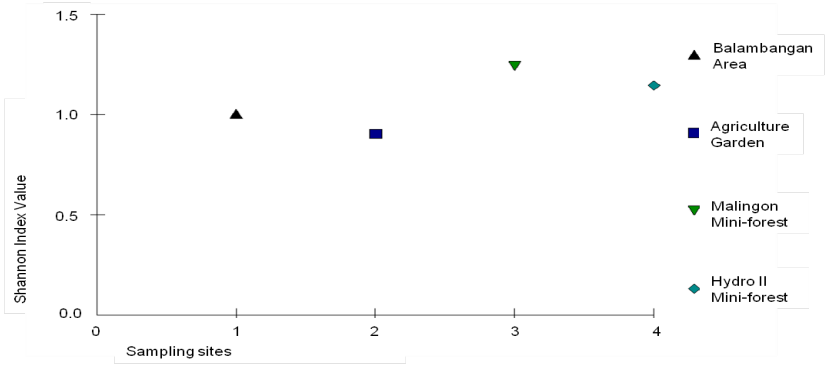

Fig. 1. Shannon plot of butterflies in Mountain View College showing diversity indices across sampling areas.

▲ Balambangan Area
■ Agriculture Garden
▼ Malingon Mini-forest
◆ Hydro II Mini-forest

Species density and abundance depict similar trends across the sampling areas. Malingon and Hydro II Mini-forests display parallel pattern as well as the Agriculture Garden and Balambangan area (Fig. 2). Malingon Mini-forest peaks butterfly density averaging 177 individuals, tagged on by Hydro II Mini-forest with 125 individuals. The Agriculture Garden and Balambangan area tied up with 46 individuals.

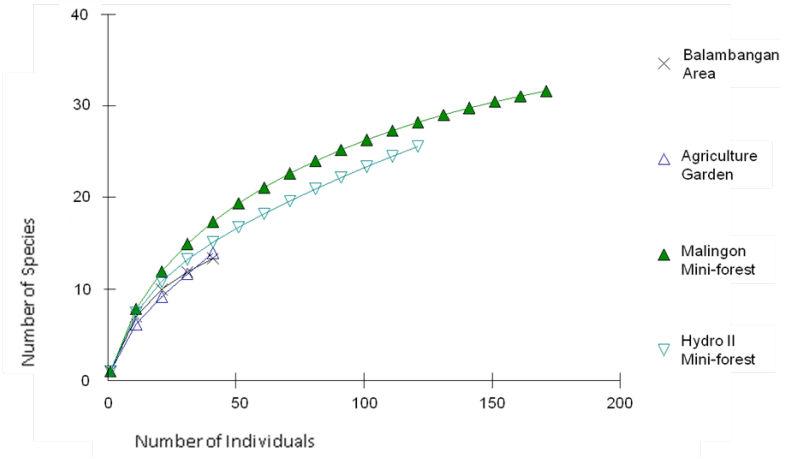

Fig. 2. Density plot of butterflies across sampling areas in Mountain View College showing the number of species and number of individuals per species.

Plate 1. Representative species from five families of butterflies found in Mountain View College.

Family **Papilionidae**

Dorsal view Ventral view

Papilio deiphobus rumanzovia Eschscholtz 1821*

Papilio helenus hystaspes C. & R. Felder, 1862*

Family Hesperiidae

Taractrocera luzonensis luzonensis Staudinger, 1889*

Pelopidas agna agna Moore, 1866*

Family Pieridae

Pareronia boebera trinobantes Fruhstorfer, 1911*

Cethosia luzonica magindanica Semper, 1888*

Eurema alitha alitha C. & R. Felder, 1862*

Hypolimnas bolina bolina Linnaeus, 1758*

Family Lycaenidae

Jamides sp. 2

Jamides callistus callistus Röber, 1886*

* Year of discovery of the species

Cluster analysis of similarity of the sampling areas indicates two clusters of habitat. Cluster I, comprised of Malingon and Hydro II Mini-forests, have 81% resemblance in terms of species composition, abundance and richness (Fig. 3). Likewise, the Balambangan Area and Agriculture Garden, forming cluster II, showed 73% similarity. The sampling areas within the two clusters of habitat showed similar ecological conditions in terms of vegetation types, abundance of water sources and degree of disturbance. Cluster 1 is characterized by dense tree distribution, abundant moisture and supply of water from nearby river and food plants, less man-made disturbances, and absence of human inhabitants. Presence of sparse tree stands, lesser water supply, human habitation, and greater man-made disturbances describe cluster II.

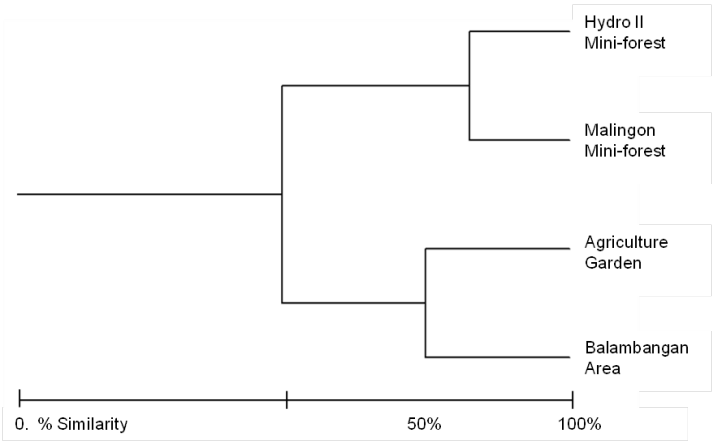

Fig. 3. Cluster analysis of similarity of sampling areas showing two clusters of habitat.

CONCLUSIONS

Mountain View College showed medium diversity of butterfly species in four sampling areas. Forty nine (49) species were collected and identified. Nearly half of the species collected were ecologically common in the Philippines but are locally rare. These results suggest that the highest diversity which includes rare and endemic species could be found in dense forest habitat with presence of water sources and minimal human disturbance. Continued monitoring will establish population and species richness trends and inform ecological measures to preserve endemic and rare species.

RECOMMENDATIONS

Further study is needed to include night, dawn and dusk sampling. Unidentified species need to be re-examined to ascertain identification and determine whether it represents a previously unidentified species, or previously unknown in the area (i.e., Mindanao). It is also suggested that regulatory measures be implemented to minimize collection of specimen that could endanger the biodiversity of butterflies in the area.

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