



INNSPUB

RESEARCH PAPER

Journal of Biodiversity and Environmental Sciences (JBES)

ISSN: 2220-6663 (Print) 2222-3045 (Online)

Vol. 8, No. 5, p. 45-51, 2016

<http://www.innspub.net>

OPEN ACCESS

Species composition and status of butterflies in two selected waterfalls of Caraga, Davao Oriental, Philippines

Cherie Cano-Mangaoang^{1*}, Charissa Joy A. Gumban², Vince R. Abarquez², Dave Mohagan³, Alma B. Mohagan⁴

¹Department of Biological Sciences, University of Southern Mindanao, Kabacan, Cotabato, Philippines

²Biology Department, Central Mindanao University, Maramag, Bukidnon, Philippines

³University Museum, Central Mindanao University, Maramag, Bukidnon, Philippines

⁴Biology Department, Central Mindanao University, Maramag, Bukidnon, Philippines

Article published on May 12, 2016

Key words: Butterflies waterfalls, Davao Oriental, Philippines.

Abstract

The municipality of Caraga is gifted by nature with waterfalls and caves situated in different barangays of the town. These waterfalls together with the type of vegetation around could be a conducive habitat for various faunal species such as butterflies, but studies had never been conducted in the municipality despite the fact that butterflies play a vital role in our ecosystem as pollinators, biomass converter, habitat quality indicator etc. The study was conducted to determine the species composition, ecological status of butterflies in selected waterfalls of Caraga, Davao Oriental. Time constrained sampling at 4 hours exposure period in the morning daily within two weeks, the collected specimens were sorted, identified, counted and photographed, marked and released after proper documentation. But few samples were preserved in 95% ethanol for barcoding and mothballs for museum display. Result revealed 28 species of butterflies of which 5 species have an endemic status: 3 Philippine endemic, 1 island endemic and 1 site endemic. 7 species are rare: *Potanthus hetaerus hetaerus*, *Potanthus mingo mingo*, *Eurema alitha alitha*, *Euploea tobleri snelleni*, *Mycalesis felderi felderi*, *Mycalesis frederici*, *Ypthima sempera chaboras* and 1 very rare – *Idea electra harmonia*. *Zizula hilax pygmaea* was collected during sampling and this is a new record of distribution. Moreover, 70% of the species are disconcordant which implies for conservation efforts to be implemented in the said area. Result further reveals that the two areas sampled are good habitat for butterflies and there's an importance of maintaining biodiversity to ensure continued existence of butterflies and other insects and animals not only in the two sampling areas but for Caraga as a whole.

*Corresponding Author: Alma B. Mohagan ✉ almohagan@gmail.com

Introduction

The municipality of Caraga is situated 07° 20'N 126°34'E about 254 kilometers from Davao City and 84 kilometers from Mati on the island of Mindanao. It lies along the eastern coast of this province, facing the Pacific Ocean. It is bounded in the north by the Municipality of Baganga, and in the south by the municipality of Manay, in the west by the Municipality of New Bataan, Davao Province, and on the east by the Pacific Ocean. Caraga coastline is irregular and the municipality is traversed by the two rivers: Caraga River in the south and Manurigao River in the north (Fig. 1). With this, the municipality is gifted by nature with waterfalls and caves situated in different barangays of the town. This body of water together with the type of vegetation found around could be a conducive habitat for various faunal species such as insects, birds, etc.

Butterfly is one of the groups of insects which is considered as the most magnificent organism of our planet due to its radiant color. These insects are always been enthralling to people from ancient times (Nidup *et al.*, 2014). Recent studies in the Philippines on butterflies had provided additional information on their status and distribution. Among these researches are conducted by Mohagan and Treadaway in Mt. Hamiguitan recorded 162 species (2010); in four key biodiversity areas: Mt. Musuan, Mt. Timpoong, Mt. Apo and Mt. Kitanglad listed 258 species by Mohagan *et al.* (2011) out of which are 105 endemic species; in Maitum Village in Tandag, Surigao del Sur (Ramirez and Mohagan 2012) with recorded 104 species of butterflies; Mt. Timpoong and Mt Hibok-hibok in Camiguin Islands (Toledo and Mohagan, 2011) with 81 species recorded and has 18 endemic species. Nacua *et al.* (2015) studied species-level diversity trend and distribution of butterflies on the open and close canopy portion of the dipterocarp forest in Cadaclan, San Fernando La Union Botanical Garden (LUBG) of North Luzon listed 104 species.

In the Philippines an estimated 1,027 species of butterfly were recorded by Treadaway and Schroeder

(2012). Despite the fact that butterflies are well studied group of insects taxonomically, scanty research had been done on butterflies species in various mountains situated in Davao Oriental. Thus, this study was conducted to determine species composition of butterflies in the municipality of Caraga as well as to know their ecological status.

Methodology

Entry protocol

Proper coordination was done before the conduct of the study in both barangay and municipal level LGUs (Local Government Units) by sending letter asking for a permission to conduct a research.

Sampling area

Two waterfalls were selected in the municipality of Caraga, one is from barangay Lamiawan known as Kapuka falls (Fig. 2). This is one of the scenic spots in the said barangay lying near the Caraga River. On the other, Magpamangao falls (Fig. 3) in barangay Mercedes is also sampled for butterflies.

Found within the territorial jurisdiction of Lamiawan, Caraga, Davao Oriental is Kapuka Falls. It has an approximate 75 meters estimated height. The type of soil is a combination of clay type of soil in the surrounding mountains and sandy type along the river banks. Patches of lowland evergreen forest surrounds the waterfalls, trees such as *Artocarpus communis*, *Shorea contorta* Vidal, species of *Cinnamomum*, *Vitex palvifora*, *Neonuclea formicaria*, *Shorea* sp, *S. guijo*, *S. polysperma*, *S. almon*, *Macaranga bicolor*, and *Ficus minahassae* are found. Canopy of forest patches are close but the waterfalls itself is expose directly to sunlight. It takes 1 hour hike from the nearby village going to the Kapuka falls and at least 300 meters hike from the disembarkation site.

Carefully nestled almost a kilometer away from barangay Mercedes is the Magpamangaw falls. It has an estimated height of 10 meters and the type of soil is sandy-loam. It is not directly penetrated by sunlight

due to tall trees near the falls such as *Gmellina arboria*, *Shorea contorta* Vidal, *Neonuclea formicaria*, *Macaranga bicolor*, *Ficus botryocarpa* and species of *Cyathea*. It takes two hours hike from the village going to the waterfalls. Nearby is an agricultural area planted with coconut, corn and mango.

Collection

Opportunistic sampling was done in the two established stations. Collection was done in the morning between 8 am to 12 noon. Butterflies were collected using a catching net.

Preservation

The three specimens of butterflies per species were soaked in ethyl acetate and were placed in the triangular wax paper with moth balls to preserve them.

Classification, identification and description

Classification and initial identification of butterflies were done using books, journals, and photographs of identified specimens and confirmed by the 4th author.

Assessment of status

Status of butterflies was assessed using the revised checklist of Treadaway and Schroeder (2012).



Fig. 1. Map of the Philippines showing the location of the Municipality of Caraga, Davao Oriental.

Analysis of Data

Biodiversity Professional version 2 by Nathaniels 2004 was used in the similarity index analysis.

Photodocumentation

Butterfly collected and pre identified in the field were photograph using Pentax W-G4 digicam. Specimens were reposit in the Zoology section of the University Museum.

Results and discussion

Twenty eight species of butterflies were identified in

the two sampling stations. Twenty six were collected from Kapuka falls or 92% of total species collected and only ten species were collected from the Magpamangaw falls (Table 1) belonging to five families: Hesperidae, Lycaenidae, Peiridae, Nymphalidae and Papillionidae. Kapuka Falls butterflies were represented by 3 genera and 5 species of Hesperids; 7 genera and 8 species of Lycaenids; 2 genera and 4 species of Pierids; 10 genera and 12 species of Nymphalids and 1 species of Papillionids. More species of butterflies were found in the Kapuka falls.

Table 1. Species composition and ecological status of butterflies in the two selected waterfalls in Caraga, Davao Oriental, 2015.

Species	Kapuka Falls	Magpamangao Falls	Status
I – Hesperidae			
1. <i>Tagiades japetus titus</i>	x	x	Common
2. <i>Taractrocera luzonensis luzonensis</i>	x		Common
3. <i>Parnara kawazoei</i>	x		Common
4. <i>Potanthus hetaerus hetaerus</i>	x		Uncommon
5. <i>Potanthus mingo mingo</i>	x		Uncommon
II – Lycaenidae			
6. <i>Catochrysops panormus exiguus</i>	x		Common
7. <i>Catochrysops strabo luzonensis</i>		x	Common
8. <i>Euchrysops cnejus cnejus</i>		x	Common
9. <i>Everes lacturnus lacturnus</i>	x		Common
10. <i>Jamides celeno lydanus</i>	x		Common
11. <i>Zizina Otis oriens</i>	x		Common
12. <i>Zizula hilax pygmaea</i>	x		Common*
13. <i>Pithecops corvus corax</i>		x	Common
III – Pieridae			
14. <i>Eurema alitha alitha</i>	x		Uncommon
15. <i>Eurema blanda vallivolans</i>	x		Common
16. <i>Eurema hecabe tamiathis</i>	x		Common
17. <i>Leptosia nina terentia</i>	x		Common
IV – Nymphalidae			
18. <i>Danaus melanippus edmondii</i>	x		Common
19. <i>Euploea tobleri snelleni</i>	x		Uncommon (only in Mindanao) - Island endemic
20. <i>Faunis phaon leucis</i>	x	x	Common
21. <i>Idea electra harmonia</i>	x		Very rare (SE-Mindanao)- site endemic
22. <i>Ideopsis juvena manillana</i>	x		Common
23. <i>Junonia hedonia ida</i>	x		Common
24. <i>Mycalesis felderi felderi</i>	x		Uncommon/Endemic
25. <i>Mycalesis frederici</i>	x		Uncommon/Endemic
26. <i>Symbrenthia hippoclus anna</i>	x		Common
27. <i>Acrophtalmia leto ochine</i>		x	Common
28. <i>Ypthima sempera chaboras</i>	x	x	Uncommon
29. <i>Ypthima stelleria stelleria</i>	x	x	Endemic
V - Papilionidae			
30. <i>Menelaides deiphobus rumanzovia</i>	x	x	common

*new Record in Davao Oriental (SE Mindanao).

This could be attributed to the type of environs it has. Forest patches can be seen near the waterfalls as well as the area is well exposed to sunlight. Nidup *et al.* (2014) mentioned that butterfly species are associated with flowers and host plant for adult and larvae as well as sunlight to stimulate body. On the other hand, few species found in Magpamangaw falls could be due to limited penetration of light and disturbances brought about by agriculture in the said area. Big trees are found along the water falls which inhibit direct penetration of light but uphill it is surrounded by agricultural land planted with coconuts and corn. Species of butterflies were obviously absent in disturbed and human impacted sites such as gardens, plantations and grasslands that might resulted to low

species richness (Clark *et al.* 2007; Rajagopal *et al.* 2011; Mohagan *et al.*, 2011 and Tiple 2012) and consequently less diverse food plants (Tiple 2012). Obvious disturbance such as cutting of grasses, shrubs and trees were observed during sampling and this might attribute to low species composition in Magpamangaw falls.

Nymphalidae dominates the species collected in the two sampling areas with 12 species (42%), followed by Lycaenidae with 8 species (31%), Hesperidae with 5 species (17%) and Pieridae with 4 species each (15%). Similar result was found out in the studies of Nidup *et al.* 2014; Akol *et al.* 2012; Majumder *et al.*, 2012 and Sarma *et al.*, 2012 that Nymphalidae ranked the

highest in number of species identified followed by Lycaenidae. This might be due to the fact that Nymphalidae is the largest family with 6000 species worldwide.



Fig. 1. Kapuka Falls, Brgy. Lamiawan, Caraga, Davao Oriental.

The data further reveals that 7 species are classified as uncommon/rare. These are *Potanthus hetaerus hetaerus*, *Potanthus mingo mingo*, *Eurema alitha alitha*, *Euploea tobleri snelleni*, *Mycalesis felderi felderi*, *Mycalesis frederici* and *Ypthima sempera chaboras*. In the identified species, one is tag as very rare species- *Idea electra harmonia* and at the same a site endemic butterfly. The rest of the species collected are common. Furthermore, three species are classified as endemic- *Mycalesis felderi felderi*, *Mycalesis frederici* and *Ypthima stelleri stelleri*; one species as island endemic (found only in Mindanao) - *Euploea tobleri snelleni*.

Out of twenty eight species of butterflies identified and collected only 5 or 17% are endemic. This indicates that endemism is low for both sampling areas. Once again it could be attributed to the condition of the surrounding areas of the Kapuka falls and Magpamangaw falls. Only forest patches are found near Kapuka falls as well as the area is just starting to recover from the effect of super typhoon

Pablo that hit the place in the year 2013. According to Cleary and Mooers (2006) that relative abundance of endemics was significantly higher in unlogged forest than logged forest and significantly higher in unburned forest than burned forest. Padhye *et al.* (2012) mentioned in their paper that disturbed habitats such as hill slopes, agricultural lands and urban habitats showed very less richness with no endemic species perhaps due to changes in the land use pattern and subsequent changes in the original landscape. Result of the study also reveals that there's one species (*Zizula hylax pygmaea*) with new record of distribution for the said area.

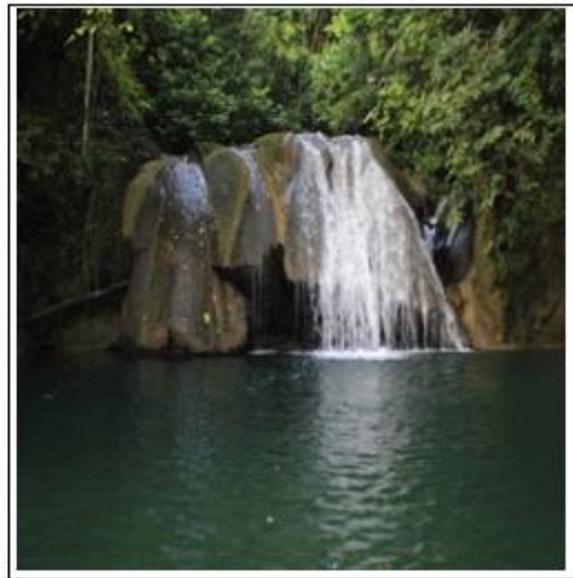


Fig. 3. Magpamangaw Falls, Brgy. Mercedes, Caraga, Davao Oriental.

Dendrogram depicting the similarity in species composition between the sampling areas showed that only 30% of the species are concordant. This means that 70% of the species of butterflies are unique for each habitat. This might be due to the difference in habitat of the two sampling areas. Kapuka falls is surrounded by forest patches and flowering plants are found along the river banks during sampling period thus there is an availability of food and little disturbance was also observed in the said area. Aside from this, Kapuka falls is located in an area wherein there's a direct penetration of sunlight. Meanwhile, in Magpamangaw falls, flowering plants are barely observed during collection period as well as uphill of

the falls are agricultural land planted with coconut and corn wherein constant cutting of grasses and other plants, thus it is quite disturbed habitat. Result of the study conducted by Ngongolo and Mtoka (2013) revealed that higher diversity of butterflies is found in revegetated site due to high number of plants species which lead to habitat heterogeneity. Nacua *et al.* (2015) mentioned in their study that

butterflies are cold blooded insects that prefer sunny areas to warm up and move around and their diversity depend on the abundance of their food plants and larval host plants. Habitat wise distribution of butterflies suggests that the undisturbed natural habitats showed maximum richness of total species (Padhye *et al.*, 2012).

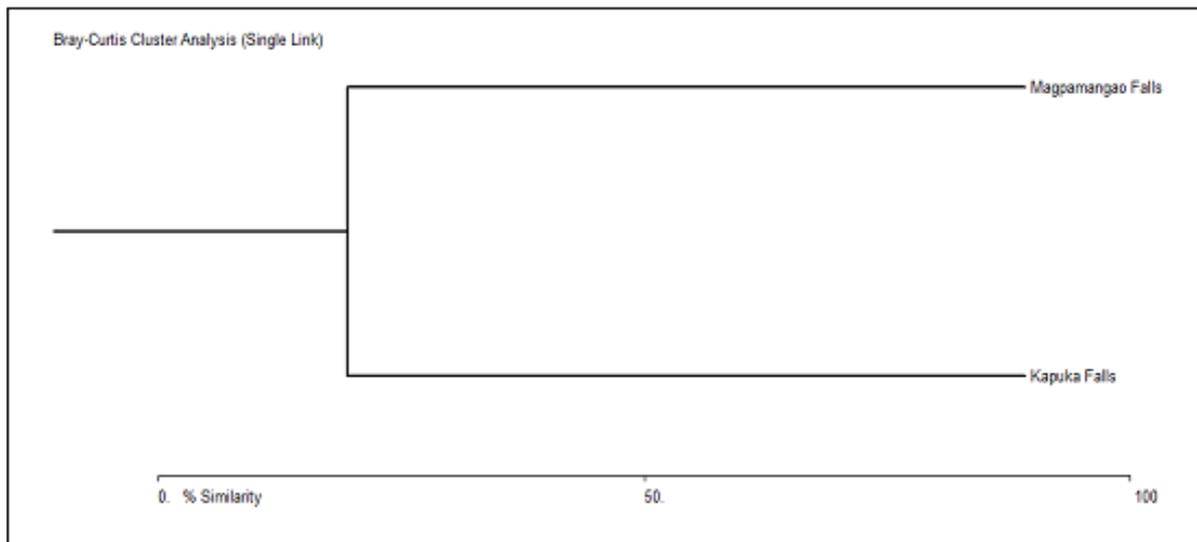


Fig. 3. Similarity index analysis of the two sampling areas based on species composition. January, 2015.

Toledo and Mohagan (2011) further mentioned in their study that more endemic butterfly species are found in an undisturbed site.

Conclusion

The two areas sampled are good habitats for butterflies and there's an importance of maintaining biodiversity and implement any conservation effort to ensure continued existence of butterflies other invertebrates and vertebrate.

Acknowledgement

The researchers are very grateful to the local government of Caraga especially to Mayor Alicia Mori, Brgy. Captains of Mercedes and Lamiawan for allowing the researchers to conduct the study in their locality.

Thanks is also extended to PO1 Mayet Capuput for the assistance during our stay at Caraga and field

sampling. Lastly to the PNP of Caraga for giving security assistance during collection period and DENR.

References

- Arya MK, Dayakrishna, Chaudhary R.** 2014. Species Richness and Diversity of Butterflies in and around Kumaun University, Nainital, Uttarakhand, India. *Journal of Entomology and Zoology Studies* **2(3)**, 153-159.
- Cleary DFR, Mooers AO.** 2006. Burning and logging differentially affect endemic vs widely distributed butterfly species in Borneo. *Diversity and Distributions (Diversity Distrib.)* **12**, 409–416.
- Mohagan AB, Mohagan DP, Tambuli AE.** 2011. Diversity of Butterflies in the Selected Key Biodiversity Areas of Mindanao, Philippines. *Asian Journal of Biodiversity* **2(1)**.

- Mohagan AB, Treadaway CG.** 2010. Diversity and Status of Butterflies across Vegetation Types of Mt. Hamiguitan, Davao Oriental, Philippines. *Asian Journal of Biodiversity* 1(1): 1-24.
- Nacua AE, Mohagan AB, Alejandro GJD.** 2015. Diversity and distribution of butterflies in the open and close canopy forests of Cadaclan, San Fernando La union botanical garden of North Luzon, the Philippines. *Journal of Biodiversity and Environmental Sciences* 6(1), 169-177.
- Nair AV, Mitra P, Aditya S.** 2014. Studies on the diversity and abundance of butterfly (Lepidoptera: Rhopalocera) fauna in and around Sarojini Naidu college campus, Kolkata, West Bengal, India. *Journal of Entomology and Zoology Studies* 2(4), 129-134.
- Nidup T, DOrji T, Tshering U.** 2014. Taxon Diversity of Butterflies in different habitat types in Royal Manas National Park. *Journal of Entomology and Zoology* 2 (6), 292-298.
- Ngongolo K, Mtoka S.** 2013. Using Butterflies to Measure Biodiversity Health in Wazo Hill Restored Quarry. *Journal of Entomology and Zoology Studies* 1 (4), 81-86.
- Padhye A, Shelke S, Dahanukar N.** 2012. Distribution and composition of butterfly species along the latitudinal and habitat gradients of the Western Ghats of India. *Check List* 8(6), 1196-1215.
- Pe'er G, van Maanen C, Turbe A, Matsinos YG, Kark S.** 2011. Butterfly diversity at the ecotone between agricultural and semi-natural habitats across a climatic gradient. *Diversity and Distributions: Journal of Conservation Biogeography* 17, 1186-1197.
- Rajagopal T, Sekar M, Manimozhi A, Baskar N, Archunan G.** 2011. Diversity and community structure of butterfly of Arignar Anna Zoological Park, Chennai, Tamil Nadu. *Journal of Environmental Biology* 32, 201-207.
- Ramirez RKC, Mohagan AB.** 2012. Diversity and Status of Butterflies in Maitum Village, Tandag, Surigao del Sur, Philippines. *Asian Journal of Biodiversity* 3(84), 74-112.
- Toledo JMS, Mohagan AB.** 2011. Diversity and Status of Butterflies in Mt. Timpoong and Mt. Hibokhibok, Camiguin Island, Philippines. *JPAIR Multidisciplinary Journal* 6, 103-116
- Tiple AD, Khurad AM, Dennis RLH.** 2007. Butterfly Diversity in Relation to a Human-Impact Gradient on an Indian University Campus. *Nota Lepidopterologica* 30(1), 179-188.
- Tiple AD.** 2012. Butterfly species diversity, relative abundance and status in Tropical Forest Research Institute, Jabalpur, Madhya Pradesh, Central India. *Journal of Threatened Taxa* 4(7), 2712-2717.