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Diversity and Status of Odonata across Vegetation Types in Mt. Hamiguitan Wildlife Sanctuary, Davao Oriental

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Abstract **-** Diversity and status of odonata in Mt. Hamiguitan Wildlife Sanctuary was determined after a year of sampling in five vegetation types: agroecosystem (400 masl), dipterocarp (900 masl), montane (1200 masl), mossy (1400 masl) and pygmy (1600 masl) using 2-Km transect walk sampling to provide information on species richness trend and ecological status of odonata. Study showed 31 species with 94% endemism for damselflies and 33.3% for dragonflies. Species richness and endemism were low in agroecosystem H'=0.631 and 1 endemic; high and increasing in the dipterocarp H'=2.298 and 4 endemic to dense montane forest with H'= 3.056 and 18 endemic; decreasing in mossy H'=2.036 and pygmy H'=1.846. The effects of disturbance on diversity showed highest in agroecosystem (d=83%), mossy and pygmy had intermediate value d=27% and d=24%. Low disturbance was observed in Montane d=10%, dipterocarp d=18.5%. Bray-curtis similarity index for species composition showed four discernible clusters

of habitats. Results suggest that odonata has preference for dense forest, undisturbed vegetation, optimum temperature and presence of aquatic habitat.

Keywords - Status of odonata, dragonflies, damselflies,

INTRODUCTION

Mindanao is the second largest island in the Philippine archipelago. Biologically, it has extensive lists of interesting flora and fauna, some of which are endemic to the island or in a particular region of the island. The region besides being biologically interesting is also rich in mineral deposits. This is currently exploited both by small and large mining operators.

Mt. Hamiguitan range is located in the eastern coast and form the southern part of Eastern Mindanao corridor. The area is one of the most interesting regions in Mindanao, and one of the identified biological hot spots. Several field expeditions have been carried during the recent years that resulted to significant improvement in our knowledge for Philippine biodiversity.

Mindanao has over a hundred species of odonata. Davao Oriental, where Mt. Hamiguitan is situated has around 60 species, which include species endemic to the area (Muller & Hamalainen, 1997). Some of these endemic species are based only on type material. However, no material is so far known from this mountain range.The ongoing habitat destruction by mining activity and other habitat stresses, and the presence of several type species from the area make faunal survey in the area urgent. The present study lists species from Mt. Hamiguitan range for the first time. Ecological indices are also preliminarily analyzed to give an initial odonatological picture in the area.

MATERIALS AND METHODS

The study was conducted in Mt. Hamiguitan Wildlife Sanctuary in the municipality of San Isidro and Mati, Davao Oriental from May

2006 to May 2007. Transect belt was established in San Isidro from Sitio Tumaliti to the peak of Mt. Mansadok, and in Mati from Sitio Magum to Lantawan 1, using the natural trail. Five vegetation types were identified and studied per transect belt, agroecosystem, dipterocarp forest, montane forest, mossy and pygmy forest. Two 20 m x 20 m plots were established for each vegetation-type to survey the diversity and assess the status of odonata.

Odonata was located, netted and recorded in each plot. Species were usually released after recording except for those not frequented. These data were used in the determination of biodiversity indices along vegetation types. Transect walk sampling was used to increase species diversity and for the determination of diversity indices along elevation gradient.

Odonata was sampled monthly from May 2006 - May 2007. It was collected using a catching net made of the silk cloth with a measurement of 25 x 60 cm. Collected specimens were euthanized, air-dried and stored in both author's collection and in the CMU Museum.

Density, species richness and Shannon-Weiner diversity index were determined using BIO PRO software version 2.0 (Nathaniels, 2000). Cluster analysis to determine the similarity of odonata composition, abundance rank, and uniqueness of habitat across vegetation types was determined using the same soft ware.

RESULTS AND DISCUSSION

A total of 31 species under 11 families of odonata are recorded from Mt. Hamiguitan Wildlife Sanctuary during the survey period. It includes two new species and two unverified species of damselflies. Though, fifty-eight percent of the recorded species are zygopteran suggesting that the area is relatively disturbed (Oppel, 2005). Species accumulation curve was met only in dipterocarp, montane and mossy forest areas, and additional sampling must be done in agro-ecosystem and pygmy. Further exploration to these areas might substantially increase the known fauna and probably more new species could be found.

Species richness and abundance are increasing from agroecosystem (1-400 masl) with 4 species to dipterocarp (400-900 masl) with 14

species, highest in montane (1000-1200 masl) with 31, mossy (1300-1400 masl) with 10 and pygmy (1500-1600 masl) with 7 species. Species noted in the study are mostly wide ranging species with no altitudinal preference. The dissimilarity in abundance and richness may be due to vegetation type rather on altitudinal difference.

Shannon-Wiener diversity index was lowest in agro ecosystem (H'=0.631), increasing in dipterocarp forest (H'=2.298), peak at montane forest (H'=3.056), decreasing from mossy (H'=2.036) and pygmy (H'=1.846). Using Kruger (2005) scale, odonata is fairly diverse in Mt. Hamiguitan at the average (H'=1.97). Odonata is highly diverse in montane and dipterocarp forests, fair in mossy and pygmy, low level in agro ecosystem (Fig.1).

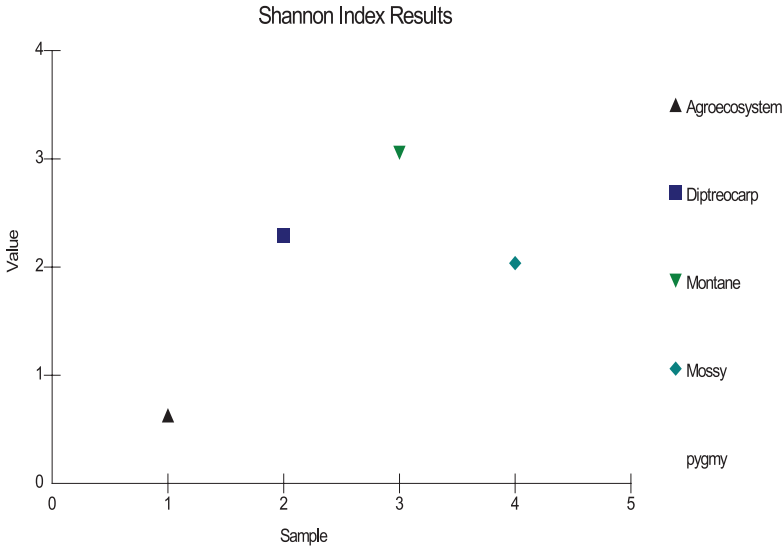

Fig. 1. Plot for Shannon diversity index of odonata across vegetation types in Mt. Hamiguitan.

Parker-Berger index measurement of disturbance on the effects of diversity showed highest in agro-ecosystem (83%), followed by pygmy (27%) and mossy (24%). The high disturbance level for odonata in agro-system is attributable to the close association of odonata with water habitat. Utilization of water resources for agricultural production

implies that this habitat is disturbed or modified for human use. Habitat disturbance even for small-scale subsistence farming has tremendous impact on odonata diversity (Oppel 2006a). Disturbance is low in dipterocarp (18.5%) and montane (10.5 %). Disturbance to these areas is primarily due to timber cutting. This implies that there is limited change in the waterways, which is located in gorges and ravenous part of the mountain. However, no data is available for phytothelmatan species which can suffer heavily from deforestation. The present study results only to one species, *Lyriothemis latro*, which suggests that the genus is an opportunistic or probably strict phytothelmatan.

Similarity of species composition using Bray-Curtis showed 4 noteworthy habitats for odonata (Fig.2). Dipterocarp and montane are two related habitats Si=45.6%. The two are both dense forest with water sources and differ primarily on altitudinal difference. The pygmy area is unique and probably the only habitat for the undescribed species noted in the survey.

The present study relies mainly on classical transect and plot sampling. Oppel 2006b demonstrates that classical sampling especially for odonatological studies require 15 months of intensive sampling for complete density estimate. The present data are based on field trip conducted every other month within a year and usually recording is done during the trek going up and down. This limits the density estimate thus the result must be analyzed cautiously.

The present study lists 94% endemism for Zygoptera and 33% for Anisoptera. This clearly demonstrates the high level of endemism in the area especially for damselflies. Eastern Mindanao is identified as center of endemism particularly members of the family Platystictidae and Platycnemididae, (Van Tol, 2005, Gassman, & Hamalainen, 2002). Unfortunately, members of this family are under threat due to habitat deterioration (Van Tol & Muller 2003, Hamalainen 2004).

To date, no conservation measure is directed primarily for odonata in Mt. Hamiguitan range and even the country in general.

CONCLUSION

The 31 species of odonata, the presence of three new species, the 94% endemic damselflies and 33.3% endemic dragonflies of Mt. Hamiguitan Wildlife Sanctuary are significant. Species richness trend

and abundance for odanata in Mt. Hamiguitan are increasing from agroecosystem, dipterocarp to montane forest. It was decreasing from mossy to pygmy forest, suggesting that odonata has preference for dense and less disturbed vegetation with water sources and optimum temperature. Low similarity of species composition of odonata in the pygmy forest to other clusters of habitats suggest that pygmy forest is a unique habitat and montane and dipterocarp forests are the favorable habitats for odonata in general and for the endemics.

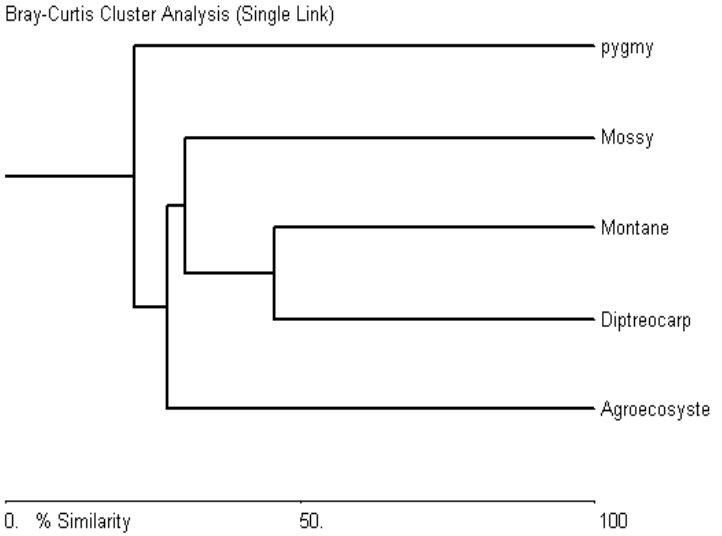

Fig. 2. Dendrogram of similarity of species composition for odonata in Mt. Hamiguitan, Wildlife Sanctuary, Davao Oriental.

RECOMMENDATION

It is recommended that additional sampling must be conducted in Mt. Hamiguitan for the study of odonata. Places where malaria and filariasis are highly occurring to investigate further the ecological function of odonata and for the conservation of odonata and the people there in.

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Fig. 3. *Idionyx philippa*

Fig. 4. *Orthetrum pruinosum clelia*

Fig. 5. *Risiocnemis erythrura*

Fig. 6. *Trithemis aurora* Burmeiser, 1839

Fig. 7. *Orthtrum sabina sabina* Brauery, 1773

Fig. 8. *Acisoma panorpides* Rambur, 1842

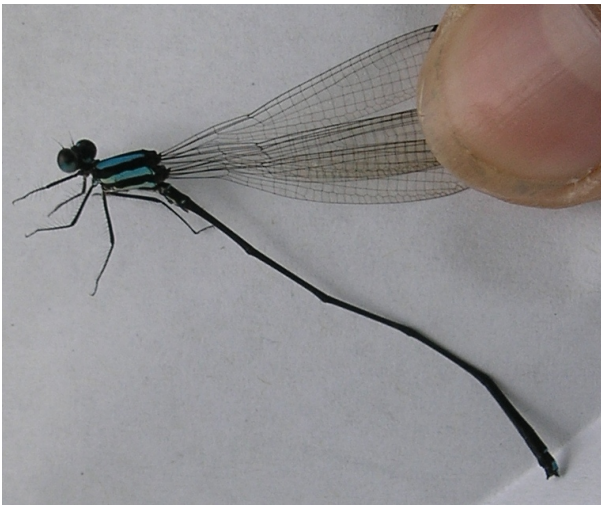

Fig. 9. *Prodasineura integra* Selys, 1882