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INVENTORY OF MANGROVE ASSOCIATED INSECTS IN ZAMBOANGA CITY, WESTERN MINDANAO

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ABSTRACT

This study primarily focused on the inventory of mangrove associated insects in Zamboanga City, Western Mindanao. It sought to identify and classify insects that are found in Mangrove areas. Point Count Method was used in this study to count the number of mangrove associated insects. More so, Net Collection Method was also used to collect insects for photograph, which will be used for clasification. There were 16 species identified and a total of 225 individuals. These were *Ceraeochrysa* sp., *Allograpta* sp., *Leucopodella* sp., *Neomyctarubida, Syrphus tricolor, Thyreus, Xylocopaviolacea, Oecophyllasmaragdina Fabricius, Monomorium minimum, Haematobiairritans, Musca domestica, Pornothemisstarrei Lieftinck, Chorthippus brunneus, Lycosidae, Diaeadorsata and Zygiella x-notata.* Among the three stations, station has the highest species richness with a Margalef's Index value of 2.49. More so, station 1 has the highest species evenness with a Pielou's Index value of 0.50. Station 3 has the lowest diversity with a Shannon's Diversity Index value of 0.74 and Simpson's Index value of 0.30. The three stations obtained a similarity index value of 0.35.

KEYWORDS: Biodiversity Index, Density, Mangrove Associated Insects, Net Collection Method, Point Count Method.

INTRODUCTION

Mangrove conservation is very important as they are extremely productive ecosystems. Because mangroves occupy the intertidal zone, they interact strongly with aquatic, inshore, upstream and terrestrial ecosystems and in this way mangroves help to support a diverse flora and fauna of marine, freshwater and terrestrial species (Macintosh & Ashton, 2002). Study of its insect biodiversity can help in determining its potential productivity and in better management of mangroves. Insects can be either harmful like pest insects which are to be managed or beneficial like honeybees which can be helpful in gaining economical productivity. They play a very important role in ecology of mangrove ecosystem. Insects, can be either permanent residents or temporary visitors of mangrove environment (Macintosh & Ashton 2002). The mangrove forests help to stabilize shorelines and reduce the devastating impact of natural disasters such as tsunamis and hurricanes. They also serve as breeding and nursing grounds for marine finfish and shellfish species of commercial importance.

The Philippines holds at least 50% (Primavera et al. 2004) of the world's approximately 65 mangrove species (Kathiresan & Bingham 2001). It is also considered as one of the top 15 most mangrove-rich countries in the world according to Long and Giri (2011). The Philippine Government adopts the Food and Agriculture Organization (FAO) definition of forest as "an area of more than 0.5 ha and tree crown cover (or equivalent stocking level) of more than 10% which includes natural and plantation and production forests" (Lasco et al. 2012). Based on this definition, the Department of Environment and Natural Resources (DENR) estimates that 7.2 million ha comprise the forest ecosystem, which is approximately 24% of the total land area as of 2003 (FMB2007). Three percent of the remaining forest cover in the country is considered as mangrove forests. Generally, mangrove area is declared by the Philippine government under Presidential Decree (PD) 705 as forest land. Mangrove forest is defined as a type of forest on tidal mudflats along the sea coast extending along the streams where the water is brackish. Mature mangrove areas do not exceed 20,000 ha, of which approximately two-thirds are in Palawan. Consequently, around 80,000 ha of mangroves left in the country were declared as wilderness and forest reserves in 1981, including all the 40,000 ha of pristine mangroves in Palawan (Primavera2002). According to the estimate of (Long &Giri2011), using remotely sensed satellite observations for the year 2000, 66 out of the 82 provinces in the

country contain mangroves with a total covered area of 256,185 ha.

Insects inflict an extensive damage to mangrove leaves and extreme cases even kill the mangrove trees. The insect – induced damage needs to be assessed in the mangroves that are ecologically very sensitive systems. Measures of species diversity are important, as their stability over (long) periods of time are frequently seen as indicators of the well-being of ecological systems. In studies related to mangrove insect biodiversity, numerous butterfly and moth species have been undertaken. Termites are an important component of the fauna but little is known about them. They burrow inside the trunks and branches of mangrove trees and maybe very important in breaking down dead wood. Ants are often abundant in the mangrove tree canopy suggesting their ecological significance but again not much is known about ants. Mosquitoes are often incredibly numerous and the degree of abundance is exceptional (Macne 1968). They are often a nuisance because of their biting of humans but also because they can be vectors of diseases such as malaria and yellow fever (Macintosh & Ashton 2002). This has often been a reason for mangroves to be regarded as wastelands.

MATERIALS AND METHOD

Description of the Study Site This study was conducted in Barangay Curuan. It is located on the east coast of Zamboanga City. The distance from City Proper is about 50 Kilometers. It borders the Barangay of Quiniput to the south and Buenavista to the north. Curuan is the largest Barangay in Zamboanga City. It covers over 7,216 hectares or 72.16 square kilometers or 6 kilometers by 12 kilometers in dimension. Curuan is a farming community but steadily modernizing its commercial center. Curuan has a large fishpond industry. Most of the fishponds are located by the estuary where most of the mangroves used to be. Curuan must learn to take care of its mangroves or it will lose a major part of its natural resources (2005). People continually cut the mangrove trees to sell them as fence posts.

There were 4 species of mangrove found in the area. Site 1 was full of Rhizophora mucronata (Lamarck 1804), Site 2 was dominated by Xylocapusgranatum (Koenig 1784) and Xylocarpus moluccensis (Roemer 1846) and Site 3 was dominated by Sonneratia ovata (Backer 1920).

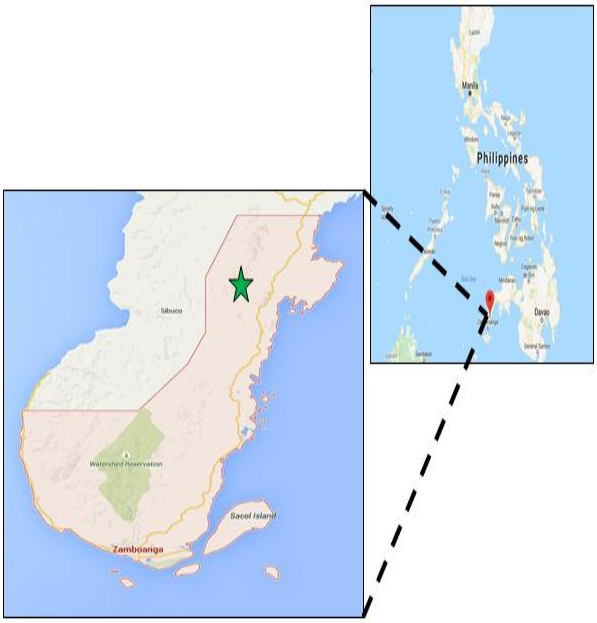

Figure 1: Map of the Philippines showing the Study Site.

Data Collection The data was collected for 3 days in April, 2018 from 8 am to 5 pm. A permit was secured from the barangay chairman of Curuan. The researcher established three study stations. Point Count Method was used way of to count the number of mangrove associated insects. More so, Net Collection Method was also used to collect insects for photograph. The photographs were brought in Western Mindano State University – College of Science and Mathematics for classification.

Statistical Analysis All data were quantitatively analysed using frequency. The species richness of the mangrove associated insects was calculated using Margalef's Index of Richness, while species evenness was determined using Pielou's Index of Evenness. Species diversity were also evaluated using Shannon's and Simpson's Diversity Index. Sorenson's Index of similarity were computed to determine the similarities of the three study sites. The computation will be assisted using a programmed excel.

RESULTS

Classification There were a total of 16 species of mangrove associated insects found in the study site. Wherein, 4 species belong to the order Coleoptera, 5 species belong to order Hymenoptera, 2 species belong to order Diptera, 1 species belong to order Odonata, 1 species belong to order Orthoptera, and 3 species belong to Araneae.

Frequency. Table 1 shows the frequency of the mangrove associated insects found in the study site. Data reveals that the order Hymenoptera is the most abundant insects with a total of 189, while Orthoptera is the least abundant insects with a total number of 2.

Furthermore, in terms of individual species, it was revealed that *Monomorium minimum* is the most abundant species with a frequency of 110 and abundance value of 36.67, while *Leucopodella* sp., *Syrphus tricolor* and *Xylocopaviolacea* are the least number of species with a frequency of 1 and abundance value of 0.33.

Table 1: Classification and Frequency of Mangrove Associated Insects in the Study Site.

Order	Family	Species	Frequency	Abundance	Total
Coleoptera	Chrysopidae	*Ceraeochrysa* sp.	8	2.67	14
	Syrphidae	*Allograpta*	3	1.00	
		Leucopodella sp.	1	0.33	
	Curculionidae	*Neomyctarubida*	2	0.67	
Hymenoptera	Eristalinae	*Syrphus tricolor*	1	0.33	189
	Apidae	*Thyreus*	12	4.00	
		Xylocopaviolacea	1	0.33	
	Formicinae	*Oecophyllas maragdina Fabricius*	65	21.67	
		Monomorium minimum	110	36.67	
Diptera	Muscidae	*Haematobiairritans*	2	0.66	6
		Musca domestica	4	1.33	
Odonata	Libellulidae	*Pornothemis starrei*	5	1.67	5
Orthoptera	Acrididae	*Chorthippus brunneus*	2	0.67	2
Araneae	Lycosidae	*Lycosidae*	4	1.33	9
	Thomisidae	*Diaeadorsata*	2	0.67	
	Araneidae	*Zygiella x-notata*	3	1.00	

Biodiversity Indices. Data in the three sites were subjected to biodiversity indices (see Table 2). In Margalef's Index of Richness, it reveals that station 2 has the highest species richness with a value of 2.49, while station 3 has the lowest species richness with a value of 1.642. This is because that there were 12 species found in station 2, while there were 8 species found in station 3.

In Pielou's Index of Evenness, it reveals that station 1 has the highest species evenness with a value of 0.05, while station 3 has the lowest species evenness with a value of 0.2624. This further implies that, station 1 is dominated by many species, while station 2 is dominated by few species.

In terms of diversity, result shows that station 1 has the highest diversity with a Shannon's Diversity Index of 1.71, while station 3 has the lowest diversity with a Shannon's Diversity Index of 0.74. This is supported by Simpson's Index of Diversity wherein, station 1 obtained a value of 0.75, while station 3 obtained a value of 0.30. This further implies that station 1 has a high species richness and evenness among the three stations.

Table 2: Biodiversity Indices of Mangrove Associated Insects in the Different Stations.

Station	*Margalef's Index of Richness*	*Pielou's Index of Evenness*	*Shannon's Diversity Index*	*Simpson's Index of Diversity*
1	2.33	0.50	1.71	0.75
2	2.49	0.33	1.40	0.64
3	1.64	0.26	0.74	0.30

Similarity Index When the data of the three stations were subjected for Sorenson's Index of Similarity, it obtained a value of 0.35. This implies that there is a 35% similarity among the three stations, hence there were 4 species commonly shared in all stations. These species are *Thyreus*, *Monomorium minimum*, *Musca domestica* and *Zygiella x-notata*.

DISCUSSION

Animals need special adaptations to live and feed in this changeable world. Ants of the genus Oecophylla are predators of other insects and are able to protect a variety of terrestrial plants against pest insects. (Joachim Offenberg, 2006).The insects especially the bees accomplish 80% of the pollination in forests (Washington, 1952). The ant Monomorium minimum lives exclusively in twigs of the mangrove tree Sonneratia alba, which forms the fringe at the wettest part of the mangrove zone (Nielsen et al, 2005). Insects are crucial components of many ecosystems, where they perform many important functions. They aerate the soil, pollinate blossoms, and control insect and plant pests. Many insects, especially beetles, are scavengers, feeding on dead animals and fallen trees, thereby recycling nutrients back into the soil. As decomposers, insects help create top soil, the nutrient-rich layer of soil that helps plants grow. Burrowing bugs, such as ants and beetles, dig tunnels that provide channels for water, benefiting plants. Bees, wasps, butterflies, and ants pollinate

flowering plants. Finally, all insects fertilize the soil with the nutrients from their droppings.

CONCLUSION

The results from this study leads to insights that there are diverse species found in Curuan Mangrove areas. Mangroves provide a habitat that supports a large number of insects at different trophic levels. The primary trophic groups are (1) herbivorous insects that feed on leaves and other plant parts, (2) saproxylic and saprophagous insects that feed on dead and decaying organic matter, and (3) parasitic and predatory insects that feed or prey on other animals. Measures of species diversity are important, as their stability over (long) periods of time are frequently seen as indicators of the well-being of ecological systems. Without insects to help break down and dispose of wastes, dead animals and plants would accumulate in our environment and it would be messy indeed. Insects are underappreciated for their role in the food web. They are the sole food source for many amphibians, reptiles, birds, and mammals (Purdue, 2014).

RECOMMENDATION

The researchers recommended that same study must be done in Barangay Curuan focusing on nocturnal insects. And lastly, the researcher recommends that same study must be done and include also different mangroves fauna found in Zamboanga City.

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