PRELIMINARY STUDY COMPOSITION OF BAT SPECIES IN UNIVERSITY OF TECHNOLOGY MARA (UITM) KUALA PILAH, NEGERI SEMBILAN, MALAYSIA

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Abstract

South-East Asia has one of the greatest distributions of bats in this world. The deep understanding of bat diversity can be a new cognizance and an eye-opener for conserving an ecological balance in our ecosystem. However, awareness relating to the bat species especially their composition and biodiversity in University of Technology MARA (UiTM) Kuala Pilah, Negeri Sembilan is insufficient. Therefore, a preliminary study of bat composition at study sites in UiTM Kuala Pilah, Negeri Sembilan was conducted. It was conducted for two months of sampling to trap and to determine the species of the organism. Fifteen individuals from three species representing two families namely Pteropodidae and Vespertilionidae were caught using mist nets. The most common caught bat in this study was *Cynopterus brachyotis* (n=9) followed by *Scotophillus kuhlii* (n=4), and *Macroglossus minimus* (n=2). Since there is no research on bat studies has ever been conducted in UiTM Kuala Pilah, this study will become the beginning and starting point for bat diversity studies. In addition, this study was conducted to assess the species and diversity of organisms at UiTM Kuala Pilah. The findings of this study show that UiTM Kuala Pilah is rich in biodiversity with precious fauna and can provide a vital basic information to help in creating awareness on the importance of preserving our forests.

Keyword: Bat, Biodiversity, Composition, Ecology.

Introduction

Malaysia comprises 32.8 million hectares of land area and about 24.8% - 75.5% was covered by forest, 9.2 million hectares were found in Sarawak, 5.9 million hectares of forest covered Peninsula Malaysia and 4.4 million hectares of forest are in Sabah (Yong, 2006) According to Muhammad (2010), natural forests in Malaysia is 44.5% of Peninsula Malaysia's total landscape of 13.20 million hectares meanwhile 4.71 million hectares is a permanent forest reserve (PFRs). It is about 24.7% (164,274 ha) from the total land area in Negeri Sembilan are 20 PFR (Muhammad, 2010). As for University of Technology MARA (UiTM) Kuala Pilah, Negeri Sembilan began operating on June 1, 2009 and mainly located at an area of 160 acres in Mukim Parit Tinggi and surrounded by hill forest.

The ecological changes as well as biodiversity of flora and fauna may influence the species to survive. Liat (1981) stated that about 40% of mammals in the world are bats species. There are two types of bats, which are megachiroptera or megabats that mostly fruit-eating bats and microchiroptera or microbats which are insect-eating bat (Liat, 1981). Meanwhile, Kingston

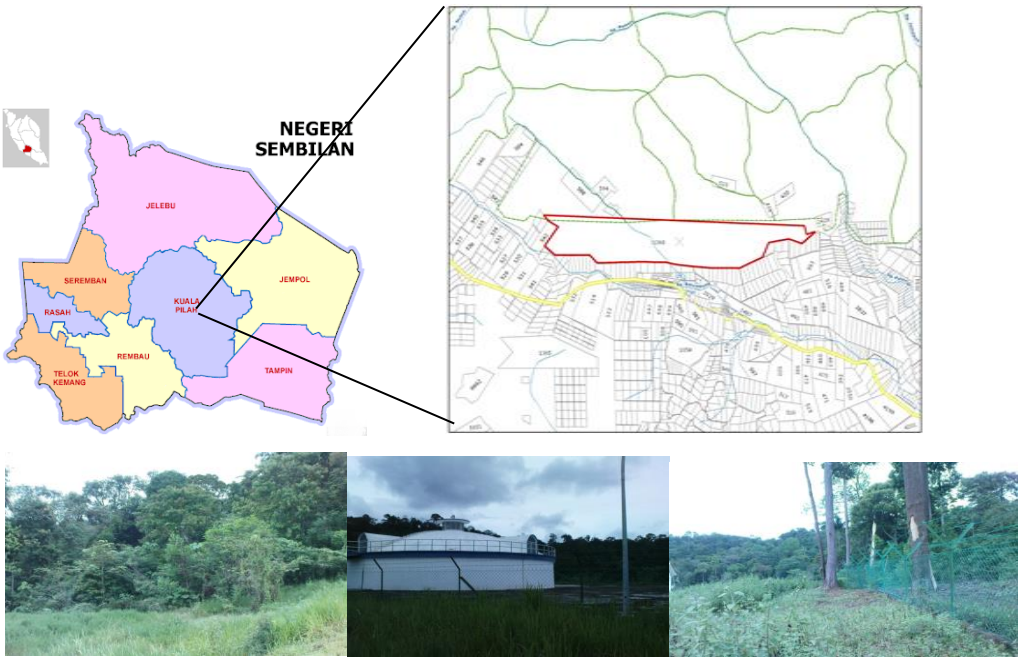
(2006) showed that at least 31 Malaysian tropical fruit plant species, including favourites such as *Durio zibethinus* (durian), *Mangifera indica* (mango), *Musa acuminate* (banana), *Psidium guajava* (guava), *Artocarpus heterophyllus* (jackfruit) and *Carica papaya* (papaya) rely on Old World fruit bats (Megachiroptera) for pollination. However, the knowledge about bat species in Universiti Teknologi MARA (UiTM) Kuala Pilah is still lacking. Therefore, preliminary study about bat diversity will give a general overview and understanding of bat species diversity in Malaysia. Since there is no research on bat studies has ever been conducted in UiTM Kuala Pilah, this study will become the beginning and starting point for bat diversity studies. Furthermore, it will provide information for any organization or individual who are interested to gain some understanding and knowledge of bat diversity in UiTM Forest Reserve.

Materials and Methods

Trapping method that was used for this study are mist-net. A total 3 mist nets were deployed at three study sites. The mist net was placed from the dusk until the dawn between 6.00 p.m. to 8.00 p.m. The mist net was setup on the ground along trails in the study side reaching the height of three meter. Every bat captured was placed in cotton bag and was brought to center point for identification. Some references such as books, journals and photographs of identified organisms were used in the process of identification. Spring balance is used to measure the weight of the bats captured and dial caliper is used to measure the forearm length (FA), head body (HB), tail length (TL), cranial, hind foot length (HF), maxillary tooth row (CM), condylobasal length (CCL) and wingspan (WSP). After the identification process of bats was completed, the captured bat was marked with black ink and released at where it was caught.

Study Area

The UiTM Kuala Pilah is located in Mukim Parit Tinggi about 8 km from Kuala Pilah town (2.7415628° N, 102.248835° E). It was built within Pelangai Forest Reserve. Three sites in UiTM Kuala Pilah were chosen to conduct this project which are site A (N 02°47.694, E 102°13.097), site B (N 02°47.727, E 102°13.240), site C (N 02°47.614, E 102°13.389).



Site A Site B Site C

Figure 1 Map of study sites at UiTM Kuala Pilah

Result and Discussion

Species composition

A total of 15 individual bats from family Pteropodidae and Vespertilionidae were captured during the 2 months period of sampling (**Table 1**). The species include *Cynopterus brachyotis*, *Scotophillus kuhlii, and Macroglossus minimus*. The highest number of bat capture was recorded at site A, in which 8 individuals were captured followed by site C and B with 4 and 3 individuals, respectively (**Table 1**). However, *C. brachyotis* or the lesser short-nosed fruit bat was the most frequently captured bat during the sampling period with a total of 9 bats, followed by *S. kuhlii* and *M. minimus* with 4 and 2 bats, respectively. Site A is a forest area covered with high trees while site B and site C are mixed area near with building of the campus. The *C. brachyotis* and *S. kuhlii,*species were captured at site A and site C while *C. brachyotis* and *M. minimus* species were captured at site B. The total number of bats caught at each site as shown in **Table 1**.

Table 1 Number of bats species at different site in UiTM Kuala Pilah

Species	Site A	Site B	Site C	Total individuals
Family : Pteropodidae				
Cynopterus brachyotis	5	1	3	9
Macroglossus minimus	0	2	0	2
Family: Verpertillionidae				
Scotophillus kuhlii	3	0	1	4
Total individuals	**8**	**3**	**4**	**15**

The captured bats are representative of small portion of bat in Peninsular Malaysia. The domination of *Cynopterus brachyotis* or fruit bat as a result of available fruit trees in the forest area such as the banana trees, rambutan trees and other fruits that can be a potential roosting and foraging areas (Ashraf & Habjoka, 2013). The highest capture rate of *C. brachyotis* agreed with other previous findings that *C. brachyotis* are the most common and abundant species in Peninsular Malaysia and are known to occupy all types of habitat such as lowland, hills, sub-montane, montane and mangrove forest, orchards, and plantations (Hasan et al., 2012, Jayaraj et al., 2012). Shafie et al. (2011) also stated that *C. brachyotis* is a common species usually found in disturbed area and they are highly adapted to any environment. While the presence of *Scotophillus kuhlii* or insectivorous bat in UiTM Kuala Pilah due to the presence of insects' population in complex vegetation which is from the forest around the campus. Besides, the huge number of street lights surrounding the UiTM Kuala Pilah forest will attract the insects out of the forest. This means that the insect prey is concentrated resulting foraging for the *S. kuhlii* bats in UiTM Kuala Pilah area. The *S. kuhlii* is a microchiropteran type which is influenced by forest type, man-made building type as roosting site and presence of insect (Azman et al*.,* 2011, Leong et al*.,* 2010, Kumaran *et al*., 2011). Finally, *Macroglossus minimus* is nectivorous bat that mainly feeds on nectar and pollen, which it can obtained from flower around the campus in UiTM Kuala Pilah. Furthermore, UiTM Kuala Pilah is full of bright

Golden Yellow Trumpet-shaped flowers that grow well in the university environment (Noormi et al., 2018). Apart from this plant, Dandelion, Weeds, Evergreen Rose and Closed Gentian were recorded in the entire campus (Noormi et al., 2018). This flowering plant may attract several nectivorous bat and make UiTM as one of their foraging sites. The image of bat species captured during sampling are shown in **Figure 2**.

(A) (B) (C)

Figure 2 Bat species captured during sampling (A= *Cynopterus brachyotis, B= Macroglossus minimus, C= Scotophillus kuhlii)*

A field guide to the mammals of South-East Asia by Francis (2008) are used to identify species of the bats. Francis (2008)stated that the *Cynopterus brachyotis* is easily to be identifying because it is generally brown to yellowish brown with a brighter collar, dark orange- brown in adult males, more yellowish in female. Their habitat is largely restricted to more mature forest, from lowlands to hills, where it has been found in both the forest under storey and the canopy. The *S. kuhlii* have short fur, upperparts uniform reddish-brown to dark brown which are under part slightly paler and greyer, ear fair, generally round, tragus broad, axe shape and strongly angled forwards. Fransis (2008) also stated that the *M. minimus* also known as nectar bat which easy to distinguish by their looks with upperparts buffy-brown with pale bases which are the under parts paler and greyer, light brown wing, long and narrow muzzle with very small teeth. Their nostril also rounded and facing forward, feed on nectar and pollen from many sources.
Some of the human activities can cause the declining in bats biodiversity. In addition, disturbance can influence biodiversity and extinction of species if disturbance occur too often (Krebs, 2001). One of the examples of disturbance is deforestation which can lead to global extinction (Reis 1995). The deforestation and fragmentation can cause an increasing habitat loss and changes landscape heterogeneity, thus affect bat communities (Willig et al., 2007). For example, Singapore is one of the countries that experienced reduction in biodiversity that loss almost 15-24 species in their country because of extensive land transformation (Lane et al. 2006).

Conclusion

The results indicated that there were 15 individuals with three species of bats representing two families in UiTM Kuala Pilah which were *Cynopterus brachyotis, Macroglossus minimus and Scotophillus kuhlii*. Abundant of food source with suitable foraging site is the best explanation associated with type of species found in this area. UiTM Kuala Pilah environment is balance ecosystem since consisting's the diverse organisms that depend each other. The findings of this study could be used as indicator for assessing the biodiversity in UiTM Kuala Pilah. Detailed research on biodiversity in this campus can help to increase the knowledge and the information

can be used to ensure continued existence of other fauna.

Acknowledgement

I am deeply indebted to the UiTM Kuala Pilah and Forestry Department, PERHILITAN for providing us facilities and assistance during our sample collection. I would like to express my thank you to my supervisor, Madam Nursyazni Binti Abdul Rahim for her personal commitment, guidance and support.

Conflict of interests

I declare that I have no conflict of interest.

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