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SHORT COMMUNICATION

Survey of Small Mammals in Bukit Taat, Tasik Kenyir, Hulu Terengganu, Malaysia

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ABSTRACT

A survey on small mammals was conducted at Bukit Taat, Tasik Kenyir from 2nd to 5th September 2014. This survey aimed to document the species diversity of small mammals in Bukit Taat. A total of eight mist nets, two four-bank harp traps and 50 cage traps baited with banana slices were used. A total of 36 individuals comprising 14 species of chiropteran but none of non-volant small mammals were recorded. *Hipposideros larvatus* (36.1% of total individuals) were recorded as the most captured species followed by *H. diadema* (19.4% of total individuals) and *Penthetor lucasi* (8.3% of total individuals). This survey formed the first list of chiropterans recorded at Bukit Taat, Tasik Kenyir, Hulu Terengganu, Malaysia.

Keywords: Bukit Taat Tasik Kenyir, chiropterans, non-volant small mammals, volant small mammals

Tasik Kenyir is known as the largest man-made lake in South-East Asia. The surrounding area was flooded in 1978 to become part of the Sultan Mahmud Hydro Electric Dam. Nested within the lake are the remainder of many hilltops and highlands that remains unsubmerged at the height of 138 m above ground. Bukit Taat is located at the southern end of Tasik Kenyir, 76 km from Kuala Terengganu (Mohd-Kamaruzaman, 2002). According to Fontaine (1988), Bukit Taat is formed by limestone deposition during the Middle Permian (270.6 – 260.4 million years ago).

Gaines and McClenagham (1980) describe small mammals as any terrestrial and arboreal species with their adult weights up to 5 kg. Small mammals can be further separated into two categories which include volant and non-volant small mammals. Chiroptera (bats) are the only small mammals which have evolve the ability to fly, hence are categorised as volant (Gaines & McClenagham, 1980) whereas non-volant (flightless) small mammals that are commonly found in South East Asia consist of Scandentia, Rodentia, Soricomorpha, and Erinaceomorpha.

The information on the diversity of small mammals and the number of species presence in Bukit Taat, Tasik Kenyir has been scarce. Hence, this survey aimed to determine the diversity of small mammals living in Bukit Taat. This collaboration survey was between students from Universiti Malaysia Sarawak (UNIMAS) and the Kenyir Research Institute of Universiti Malaysia Terengganu (UMT).

This survey was carried out in Bukit Taat, Tasik Kenyir [4º49'59.29"N, 102º42'59.81"E] (Figure 1) located approximately 1500 meters above sea level. A total of eight mist nets, two four-bank harp traps and 50 standard cage traps were set at strategic locations for three consecutive nights with a total sampling effort of 116 traps per night. Mist nets were deployed along and across the trails while harp traps were place across the opening of the trails. Cage traps were baited with ripe bananas (locally known as "*pisang emas"*) slices which was reported to be one of the preferred bait for

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small mammals (Bernard, 2003) and placed on the ground along available trail at approximately 2 m intervals. All standard cage traps were checked twice a day, at 0900 hrs and 1700 hrs.

Identification of the small mammals was done following Francis (2001), Payne *et al.* (2005), Kingston *et al.* (2006) and Francis (2008). For sample collection, representatives of each species were euthanised using chloroform and preserved as wet voucher specimen in 70% ethanol; muscle and liver tissue were preserved in 95% ethanol (Tingga *et al.,* 2012). Ectoparasites found on the body of the specimen were also collected for further studies and preserved in 70% ethanol in separate individual vials (Madinah *et al*., 2014). The ectoparasites of released individuals were collected directly from its body part using fine forceps and were marked using nail polish to avoid recapture. The voucher specimen, vial containing muscle, liver and ectoparasites were labeled with information of host species, locality, sex and date of collection following Madinah *et al.* (2011). Specimens were deposited in Centre for Kenyir Ecosystems Research museum.

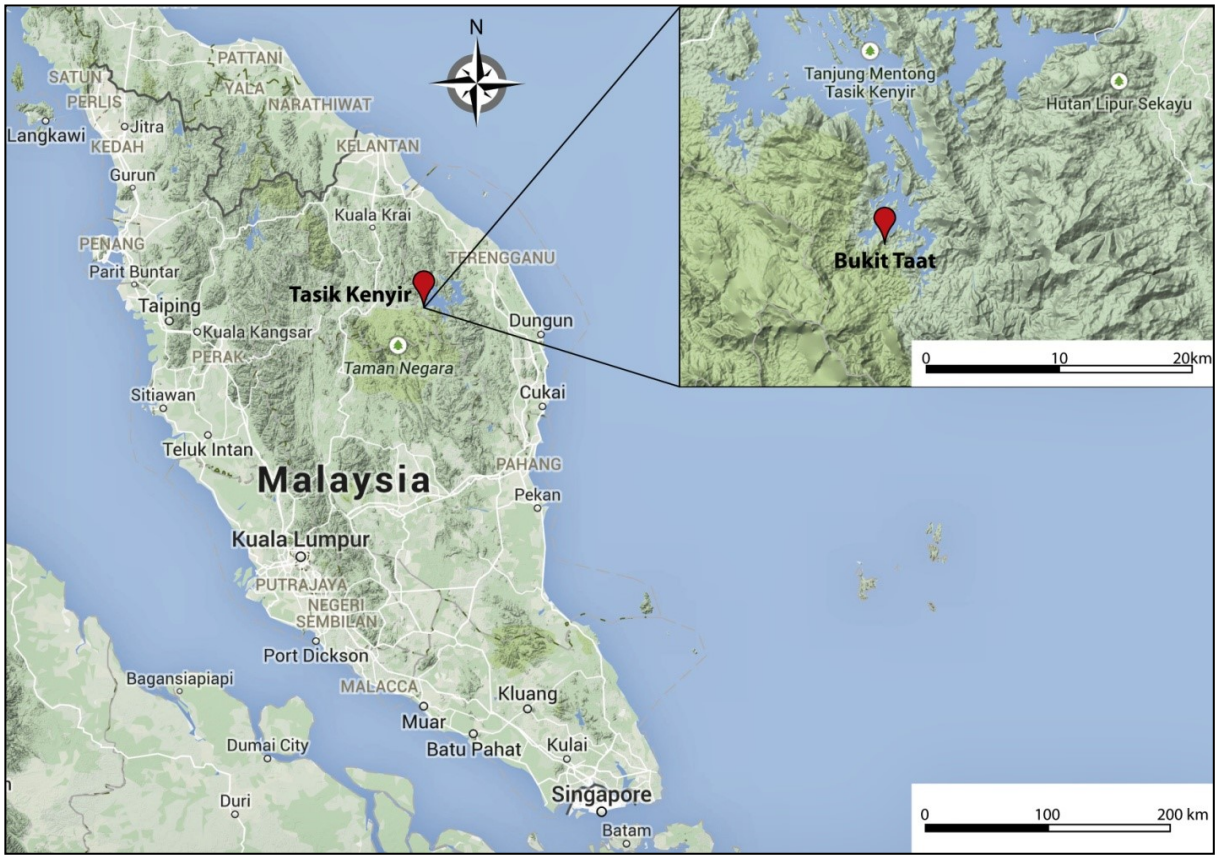

Figure 1. Map of Peninsular Malaysia with highlighting to the sampling area located at Bukit Taat, Tasik Kenyir, Terengganu, Malaysia (Source: Google Map).

A total of 36 individuals comprise of 14 species from four families of bats were sampled throughout the three days of sampling. The most abundant family of bats was Hipposideridae with 21 individuals from three species, followed by Pteropodidae with nine individuals from seven species. *Hipposideros larvatus* (family: Hipposideridae) was recorded as the most abundant species found in Bukit Taat, Tasik Kenyir with 13 individuals. Out of 14 species, nine species of bats were caught as singleton, namely, *Balionycteris maculata, Eonycteris spelaea, Macroglossus minimus, Rousettus amplexicaudatus, Hipposideros cineraceus, Rhinolophus sedulus, Rhinolophus* sp*., Myotis ridleyi* and *M. siligorensis*. However, none of the non-volant small mammals were captured at Bukit Taat. This may be due to the baits that were not attractive for the species as many fruit trees were already present in the forest and the limited sampling effort also may contribute to current finding.

Figure 2. Selected photographs of chiropterans in Bukit Taat, Tasik Kenyir (a) *Hipposideros diadema*, (b) *Hipposideros larvatus*, (c) *Cynopterus brachyotis*.

Most of the bats species captured are cave-dwelling which includes species from family Hipposideridae, Vespertilionidae (*Myotis horsfieldii* and *Myotis siligorensis*) and Pteropodidae (*Eonycteris spelaea* and *Penthetor lucasi*). Our finding is consistent with those of Payne *et al.* (2005) as *Hipposideros* spp. are predominantly found roosting in colonies in caves. Based on personal field observations, Gua Taat and Gua Bewah were the nearest caves found from the study site which might be the roosting sites of the bats and may lead to the high number of *H. larvatus* documented in our sampling. The species might inhabit the cave and were trapped while they were flying out to forage. However, as neither roosting site nor bats were found in the survey at Gua Taat during low tide, it is highly probable that the submersion of Gua Taat during high tide (Taha, 1991) could contribute to the absence of bats nesting within it. Hence, most bats caught are most likely to originate from Gua Bewah.

The abundance of water sources found around the study area may have contributed to the presence of *M. horsfieldii* (family: Vespertilionidae), as they were reported to live not far from large streams or rivers, feeding low over open surface of water (Payne *et al*., 2005). *Cynopterus brachyotis* is abundant locally and has a widespread distribution throughout Southeast Asia (Corbet & Hill, 1992). It can be found in all areas from sea level up to 1600 m on the mountain (Payne *et al.,* 2005; Rahman *et al.,* 2011).

Among all the species captured, two species were listed as near threatened by the IUCN Red List which are *M. ridleyi* and *R. sedulus*. Both species are threatened from habitat loss due to logging, agriculture, plantations and forest fires (Hutson *et al*., 2008; Hutson & Kingston, 2008).

This survey generated the first list of small mammals found in Bukit Taat, within the Tasik Kenyir area. Further surveys need to be carried out with an increase in sampling effort to determine the fauna diversity in Bukit Taat, Tasik Kenyir more accurately.

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