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MAMMALS

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ABSTRACT

Mammal surveys were carried out at 16 limestone hills in the Bau Limestone Area. Capture-recapture sampling method with mammal traps and mist nets was used. Other modes of detection such as direct and indirect observations (based on animal signs) were employed for large mammals. The result of the survey revealed the presence of 42 species from 17 families of mammals. Muridae and Sciuridae dominated in the Bau Limestone Area. The common species recorded were Muller's rat (*Sundamys muelleri*), followed by Long-Tailed Giant rat (*Leopoldamys sabanus*), Spotted-Winged Fruit bat (*Balionycteris maculata*). Large Treeshrew (*Tupaia tana*) and Dusky Fruit bat (*Penthetor lucasii*). Out of the 42 mammal species recorded, 25 species (59%) are protected by local and international law.

Keywords: limestone, mammals, species, rodents, treeshrews

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INTRODUCTION

Limestone areas are known to have high levels of endemism and are also home to many potentially ornamental plants species (Vermeulen and Whitten, 1999). As they are isolated from one another, the limestone areas are likely to vary from one another in biodiversity. Although they occupy only about 1% of the total land area in Sarawak, it is by far one of the most vulnerable habitats in the region (SBC, 2000). Among the threat to limestone areas, agriculture, mining for mineral ores and quarrying for gravel are the most serious activities affecting biodiversity. In Bau, the gold

and antimony mines that have been operating for more than 100 years (Anderson, 1965) has recently stopped but quarrying is still going on.

As far as mammals are concerned, the habitats of Bau Limestone Area can be divided into caves which are lighted at the entrance but are dark and damp inside; the steep-sided limestone hills with its jagged rocks surfaces and numerous nooks and crannies, and the heavily disturbed lowland forest where agriculture and mining has been the main source of disturbance. Such habitats are most suitable for small mammals (Tuen *et al.*, 2002).

Studies on the mammals in Sarawak limestone areas have been carried out mostly in Mulu and Niah limestone areas. These include studies on particular groups such as bats (e.g. Harrison, 1967; Hall, 1994, 1996a,b), birds (e.g. Leh and Sim, 2001; Lim and Cranbrook, 2002) and flying foxes (e.g. Harrison and Harrison, 1965-66), and also on general vertebrates (e.g. Chapman, 1985). Conversely, with the exception of a few old collections of *Penthetor lucasii*, *Tupaia minor* and *Rheithrosciurus macrotis* in Sarawak Museum, and notes on *Rhinolophus arcuatus* in Hill (1959) and Payne *et al.* (1985), little is known about the mammals from Bau Limestone Area. Where mining and agriculture have taken place, the vegetation and soils are seriously disturbed. The general lack of knowledge and the increasing threat to its biodiversity as a result of human activities has prompted a study to gather baseline information on the flora and fauna of Bau Limestone Area. We believe such information will be useful to prepare a conservation plan for the management of biodiversity of Bau Limestone hills specifically and for other limestone areas in general. This paper reports the result of a recent study on the mammal fauna of limestone hills in Bau.

MATERIALS AND METHODS

Two phases of fieldworks were conducted at Bau Limestone Area for mammals. The first phase was carried out at 16 hills, namely Gunung Meraja, Gunung Aup, Gunung Stulang, Gunung Podam, Gunung Batu Payong, Gunung Apin, Gunung Tai Ton, Gunung Krian, Gunung Pambor, Gunung Tongga, Gunung Ropih, Gunung Batu, Gunung Doya, Gunung Jebong, Gunung Tabai and Gunung Lanyang. This was conducted between 22 September 2001 and 12 April 2002; with approximately 48 days in the field and each hill was sampled once for a period of three days.

The second phase was conducted at four selected sites after the preliminary survey. The four sites were selected based on their accessibility and less disturbed characteristics. The four sites were: Site A includes Gunung Kawa, Gunung Meraja and Gunung Ropih; Site B includes Gunung Aup, Gunung Poing and Gunung Stulang, which is isolated further

southwest from the other Bau Limestone Area; Site C includes Gunung Doya; and Site D includes Gunung Tabai, Gunung Apin and Gunung Umbut. The second phase fieldwork was conducted between 6 May 2002 and 13 June 2003, with approximately 48 days in the field. Three rounds were conducted at each site, with each round lasting 3-4 days: 6-9 May 2002, 25-28 June 2002 and 22-25 April 2003 at Site A; 13-16 May 2002, 9-12 July 2002 and 20-23 May 2003 at Site B; 20-23 May 2002, 1-4 Oct 2002 and 6-9 May 2003 at Site C; and 11-14 June 2002, 29 Oct-1 Nov 2002 and 10-13 June 2003 at Site D.

Live trapping method using locally manufactured rattraps (30 cm x 14 cm x 12 cm) was used to capture non-flying small mammals. Fifty traps were used during the first phase of the survey and 90 traps during the second phase of the study. The traps were set on the ground, and tied on the branches and fallen trees randomly within the study area. The traps were baited with banana, as it was preferred by most rodents (Stuebing and Gasis, 1989). Mammal traps were checked two times a day, at 07:30 hr in the morning and 16:30 hr in the afternoon. Trapped small mammals were transferred to cloth bag, weighed and measured for Head-and-Body (HB), Tail (T) and Hind Foot (HF). Where possible, at least three voucher specimens per species were prepared and preserved in 75% alcohol, while the rest were marked (by toe clipping) and released.

Bats were studied only during the last round of the second phase of the study 22-25 April 2003 at Site A (Gunung Ropih), 20-23 May 2003 at Site B (Gunung Aup), 6-9 May 2003 at Site C (Gunung Doya), and 10-13 June 2003 at Site D (Gunung Tabai), with a total of 12 night trappings. Twenty mist nets, with dimensions of 13 m x 3 m with 3 cm mesh size and 10 m x 3 m with 3 cm mesh size, were used for this purpose. The nets were erected randomly at the base as well as on the hills, particularly at spots believed to be the bat's flight paths such as in front of caves, next to limestone walls, and across small streams, valleys and trails. The nets were checked regularly from 18:30 hr until 21:00 hr. Frequent checking is necessary in order to prevent fast escape species such as the insect bat, *Rhinolophus luctus*, from tearing the nets and escape. The nets were then checked once before midnight and at 06:30 hr the next morning. Like other small mammals, the bats were also transferred to cloth bags, weighed and measured for forearm (FA), tail (T) and ear (E). Where possible, at least three voucher specimens per species were prepared and preserved in 75% alcohol, while the rest were fitted with rings (bearing UNIMAS numbers) on the forearm and released. Skull specimens were also prepared for species confirmation purposes.

Besides trappings and mist nettings, direct (including use of binoculars) and indirect observations (based on sign such as tracks) of the other