Report on the small terrestrial mammals of the Uut Murung Region, Central Kalimantan, Indonesia

Michal Zrust[1,7], **Dominic Rowland**[1,2], **Susan M. Cheyne**[1,2,3,4], **Peter R. Houlihan**[2,5,6], **Andrea Hoeing**[1,2,8] and **Ardi M. Yunus**[1]

[1]Barito River Initiative for Nature Conservation and Communities (BRINCC), 11 The Avenue, Hitchin, Herts, SG4 9RJ, UK
[2]Orang-utan Tropical Peatland Project, Jalan Semeru No. 91, Bukit Hindu, Palangka Raya, Indonesia.
[3]Wildlife Conservation Research Unit (WildCRU), Department of Zoology, Oxford University, OX13 5QL, UK.
[4]Nocturnal Primate Research Group, School of Social Sciences and Law, Oxford Brookes University, Oxford , UK
[5]Department of Behavioral Biology, The Johns Hopkins University, Baltimore USA
[6]Department of Biology, Florida Museum of Natural History, University of Florida, Gainesville USA
[7]The Zoological Society of London, Regent's Park, London, NW1 4RY, UK.
[8]Georg-August-Universität, Conservation Biology/ WG on Endangered Species, 37075 Goettingen, Germany

Corresponding author: Michael Zrust, email: *michal@brinccborneo.org*

Abstrak

Pengetahuan tentang distribusi mamalia kecil di Kalimantan sebagian besar menunjukkan bahwa kegiatan penelitian yang telah dilakukan lebih terpusat pada bagian daerah Sabah dan Sarawak serta dataran rendah Kalimantan yang bisa dijangkau. Pada tulisan ini kami menyampaikan hasil penelitian mamalia kecil dengan menggunakan perangkap pada dua lokasi dalam ekosistem hutan dipterocarpace yang terpencil di Kabupaten Murung Raya, Kalimantan Tengah. Tujuan kegiatan ini adalah untuk mendokumentasikan guild mamalia kecil di daerah ini. Sembilan spesies mamalia kecil dijumpai pada kedua lokasi penelitian. Penelitian ini mengkonfirmasi sebaran Tikus-pohon kelabu (*Lenothrix canus*), yang merupakan publikasi ke dua dari Kalimantan Tengah, dan catatan pertama keberadaan spesies ini pada bagian utara Kalimantan Tengah. Juga menambahkan catatan keberadaan Tikus-duri perut-kastanye (*Maxomys ochraceiventer*), yang merupakan spesies dengan kategori kurang data (Data Deficient) yang sebelumnya dikatakan tersebar luas namun hanya didapatkan dalam jumlah yang sedikit.

Abstract

The known distribution of small mammals in Borneo largely reflects surveying effort, which is concentrated in the Malaysian states of Sabah and Sarawak as well as accessible low land Kalimantan. Here we present the findings of small mammal trapping surveys in two sites in a remote dipterocarp forest ecosystems in Murung Raya Regency, Central Kalimantan. To our knowledge, this is the first published account small mammal guild surveys in this region. Nine species of small mammals were found to be present over two study sites. The survey expands the confirmed distribution of the Grey Tree Rat (*Lenothrix canus*), constituting the second published record of the species in Central Kalimantan, and the first record of the species in northern Central Kalimantan. Also of note is the confirmed presence of the Chestnut-Bellied Spiny Rat (*Maxomys ochraceiventer*), a Data Deficient species thought to have a wide range yet captures are rare.

Keywords*: small mammals, distribution, Grey Tree Rat, Chestnut-Bellied Spiny Rat*

Introduction

Small mammals play a key role in forest ecosystems as important dispersers of seeds and mycorrhizal fungi, and predators of insects and seedlings (Wells et al., 2009). Information on the species distribution and diversity of small mammals is central to understanding ecological processes (Caro et al., 2001), by identifying areas of high biodiversity and prioritise areas for conservation. In addition, different species exhibit varying levels of tolerance to changes in habitat and vegetation structure depending on their life histories and habitat utilization (Meijaard and Sheil, 2008), making small mammal surveys a relatively quick and cheap method of determining ecosystem health (Avenant, 2000), as well as an important tool in understanding the effects of logging (Wells et al., 2004) and habitat fragmentation (Cuaron, 2000)

Given the grave pressures facing Borneo's forests and the lack of knowledge of how such pressures impact its

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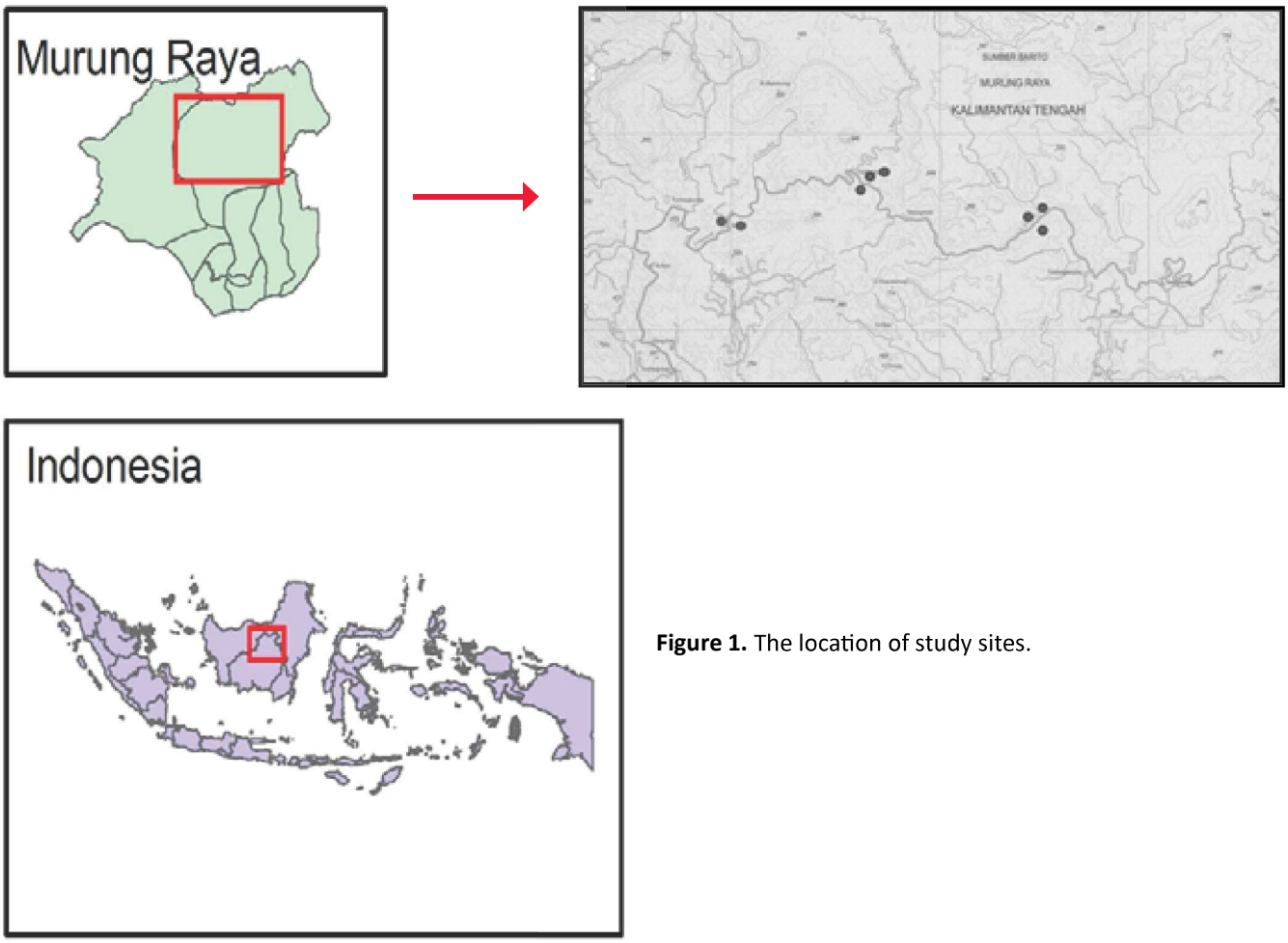

Figure 1. The location of study sites.

animal inhabitants, it is imperative that more scientific research is undertaken. As a priority, inventories of species present and their abundances need to be established. This will provide baselines from which changes in species richness can be monitored in the future and any changes of concern in these populations can be caught and diagnosed early. This is highly significant, because it allows conservation bodies to provide solid evidence of species' population declines as a direct result of habitat destruction. Once we understand the intricacies of the forest functions in this region, we can begin to direct conservation measures more efficiently, provide science-based evidence to support conservation measures, generate greater local and international awareness of the issues, and provide foundations for future work.

Despite decades of biological research in Borneo, few surveys of small mammals have been conducted and published, and survey effort has been concentrated almost exclusively to Malaysian Borneo and lowland Kalimantan (e.g. Nor, 2001; Wells et al., 2007). To our knowledge, no small mammal distribution and diversity studies from the interior of Kalimantan have been published, and no published studies exist for the upper Murung River region.

Methods

Fieldwork was carried out by MZ, DR and AMY as part of a multi-disciplinary research expedition along the Murung River, one of three primary drainage basins of the Barito River (Figure 1). The area is characterised by rugged, hilly-to-mountainous terrain, with altitude ranging between 200 to 1600m from valley bottom to the top of the mountain. In most years, drier conditions occur from July to September, with a wet season between October and January (McConkey et al., 2003).

Small mammal trappings were undertaken at two sites during July and August 2011: Site A (GPS N0 17.943

E114 25.935) at an altitude of ~150 m a.s.l. consisted of semi-disturbed community forest, situated close to a village and used by the communities for hunting, drinking water collection and low level extraction of Non-Timber Forest Products (NTFPs); Site B (GPS N0 15.144 E114 38.981) between ~150 m and ~300 m a.s.l., consisted of primary forest, largely undisturbed but occasionally frequented by local communities for hunting of large mammals. For further information on the habitat at each site, see Cheyne et al. (2015) in this volume.

Trapping grid systems using standard methodologies were employed (e.g. August, 1983; McCain, 2004) due to their ease of use and potential for future statistical analysis of resulting data (Efford, 2004; Royle, A. pers. comm.). Locally made live-capture wire mesh traps were used, as these have been shown to perform better than other kinds of live traps in catching small mammals in Borneo (Lee, 1997; Nor, 2001; Wells, K. pers. comm.; Nakagawa et al., 2007). Trapping was undertaken using two sets of 40 m x 40 m trap grids, separated by approximately 100-150 m. Each grid consisted of 16 ground traps (a total 64 traps per transect) separated by 10 m as recommended by Hammond and Anthony (2006). At each site, two grids were placed on a ridge and two grids were placed in a river valley within 10-20 m of a flowing stream.

At Site A, two grids (one on the ridge and another in the valley) were baited with dried fish and two grids were baited with fresh coconut suspended above the floor of each trap on the trigger mechanism. Traps baited with coconut received zero captures during the entire trapping duration at site A, therefore all traps at Site B were baited with fresh coconut to maximise the number of potential captures. The traps that had previously been baited with fish were cleaned with water before being used with coconut bait in Site B.

A total of 18 days of trapping was conducted at each site, providing 2304 trap nights in total. Each trap was checked twice daily; once in the morning and once in the evening, and re-baited after each successful capture, if bait was found to be missing or if bait remained after 3 days.

Identification of individuals was based on Payne et al. (1985). All individuals were weighed, measured (head-body length; ear length; tail length; and hind foot (left) length) (Caro et al., 2001) unless the situation required quick release (e.g. following treatment, if animal was found to have been injured). Capture locations were recorded and all individuals were uniquely marked using Monel (http://www.nationalband.com) ear tags for recapture purposes.

Results

Species presence, location, abundances and richness

Overall a total of 267 captures were made of 91 individuals. Nine species of small mammals were identified, with a further unknown species undergoing identification. The unidentified individual has been excluded from the following analysis. Of the nine species, eight were found at site A and 7 at site B. Simpson's Diversity Index was 0.36 and 0.25 at sites A and B respectively (Hill, 1973). Overall, 38 individuals were caught during the trapping period at Site A (across

Table 1. Small mammal species captured at Site A

Species	Number of individuals caught	Number of captures	IUCN status	Distribution extension*
Maxomys rajah	16	70	Vulnerable	No
Niviventer cremoriventer	4	22	Vulnerable	No
Maxomys whiteheadi	7	18	Vulnerable	No
Maxomys surifer	5	6	Least Concern	No
Maxomys ochraceiventer	2	5	Data Deficient	No
Leopoldamys sabanus	2	4	Least Concern	No
Lenothrix canus	1	1	Least Concern	Yes
Sundamys muelleri	1	1	Least Concern	No

* When compared to IUCN range maps

Table 2. Small mammal species captured at Site B

Species	Number of individuals caught	Number of captures	IUCN status	Distribution extension*
Maxomys rajah	20	48	Vulnerable	No
Maxomys whiteheadi	11	38	Vulnerable	No
Leopoldamys sabanus	13	30	Least Concern	No
Maxomys ochraceiventer	4	17	Data Deficient	No
Maxomys surifer	2	3	Least Concern	No
Sundamys muelleri	1	1	Least Concern	No
Tupaia Tana	1	1	Least Concern	No
Unknown (unidentified)	1	1	N/A	N/A

* When compared to IUCN range maps

127 captures) with 24 individuals caught in the valley and 14 on the ridge. *M. ochraceiventer*, *L. canus*, *S. muelleri* and *N. cremoriventer* were only caught within valleys near rivers, however, with the exceptions of *N. cremoriventer* (4 individuals captured 22 times) and *M. ochraceiventer* (2 individuals captured 5 times), *L. canus* and *S. muelleri* were only caught once.

As with Site A, *M. ochraceiventer* (4 individuals captured 17 times) was only found in valley trapping grids. *M. surifer* was also found in valley trapping grids, however, this result is not consistent within Site A where it was found in both the valley and on the ridge sites.

Movement

Only *M. whiteheadi* was captured across different grids at the same site. Out of the 11 individuals caught at Site B, two individuals were repeatedly caught in grids other than those at which they were originally caught. One individual caught on a ridge trap was caught approximately 450 m away in a valley trap 10 days later. However, out of the 11 individuals, 5 were only caught in their original grids and 4 were only caught once.

Capture rate

Total number of captures was 127 captures and 140 captures at Site A and Site B respectively, including both new captures and recaptures. However, as traps baited with fish did not succeed at catching any individuals in Site A, this comparison can only be made between coconut-baited traps at Site A and traps which had coconut bait at Site B, but had previously not had any catches in Site A (to also avoid bias due to presence of

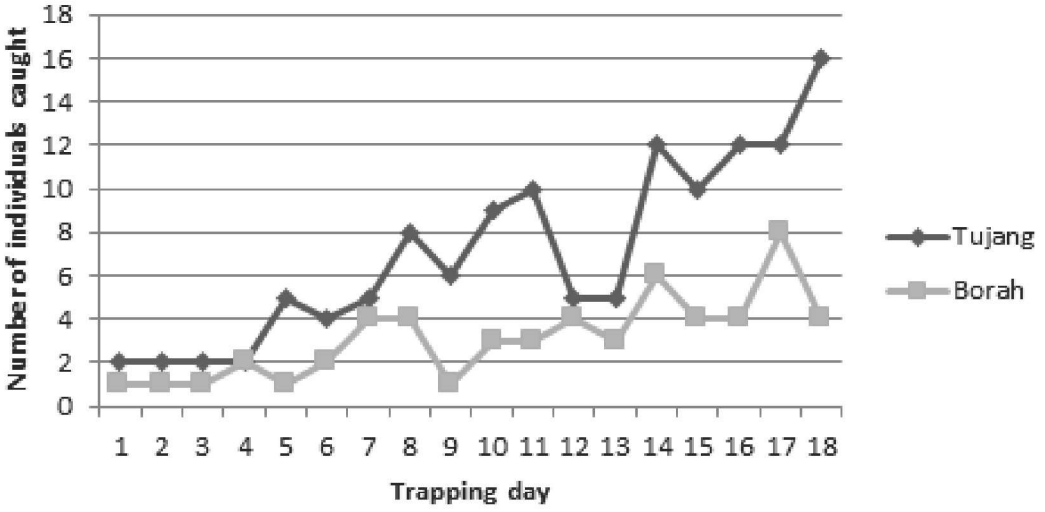

Figure 2. Total individual catches per day at Borah (Site A) and Tujang (Site B)

Table 3. Measurement ranges of the caught adult individuals.

Species (adults)	Weight (g)	Tail (mm)	Head-Body (mm)	No. of individuals measured
Lenothrix canus				No measurements taken
Leopoldamys sabanus	260-530			11
Maxomys ochraceiventer	65-103	124-179	122-154	6
Maxomys rajah	95-181	101-212	94-201	27
Maxomys surifer				Only juveniles caught
Maxomys whiteheadii	37-64	96-118	102-127	11

animal smell). With this adjustment, Site B is seen to be less productive, trapping only 56 individuals compared to the 127 at Site A. Table 3 summarises measurement ranges of the caught adult species. In general, a wide range of sizes was identified.

Conclusion

Small mammal surveys are very time-consuming, and the inference from the data must be carefully presented given small sample sizes and area covered. Conclusions on aspects such as small mammal assemblage, composition and completeness of inventories require data sets of a minimum of 500 individuals (Wells et al., 2004).

Some attention should be drawn to the absence of a number of relatively common lowland forest species, found elsewhere in Borneo, that have not been recorded here. Of particular note is extension of the known distribution range of the Grey Tree Rat *Lenothrix canus*, into the northern regions of Central Kalimantan (Ruedas et al., 2008). Previous records suggest presence of *L. canus* in the Sabangau Peat-Swamp Forest in southern Central Kalimantan (Page, 1997), as well as in Southwest Kalimantan and Malaysian Borneo. This range extension, confirms the suspicion that the limited known distribution reflects lack of survey effort rather than the true population distribution. Also of note is the capture of data deficient Chestnut-Bellied Spiny Rat *Maxomys ochraceiventer*, which supports the predicted distribution. In addition, one as yet unidentified species may be of interest; the individual was small (approximately 6-7cm in body length), almost completely dark grey in colour, but with a distinctly pink-coloured underside. The pink underside did not graduate from the dark grey, instead, starting abruptly on the stomach area almost reaching the underside of the neck. The dark grey colour ran around the inside of the legs.

The results presented here form an overview of species presence/absence in the region. This kind of survey can add important information, as the distributions and full range of habitats and forest types used by a large range of small mammals are, to date, unknown.

Our results demonstrate the continued need for small mammal surveys in the region, using a wide range of survey methods. Given the highly probable exploitation of the Uut Murung's forests for logging and mining in the near future, further surveys should attempt to examine the importance of small mammals in the maintenance of ecological functions and regeneration of forest fragments, as well as establish their use as a habitat quality indicator species for environmental impact monitoring of industrial activities. Practical difficulties of working in this remote environment, however, limit the number of traps, the type of bait, and the duration of surveys. As a result, methods themselves also require further testing to ensure their viable use in remote settings.

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