

Bukit Durang



HIDDEN JEWEL OF ULU SUAI, SARAWAK

BIODIVERSITY AT A GLANCE

EDITED BY:

Jayasilan Mohd-Azlan and Aida Shafreena Ahmad Puad



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2023

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Hidden Jewel of Ulu Suai, Sarawak
Biodiversity at a Glance

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Bukit Durang
High Conservation Value Forest

This book aims to enlighten and educate stakeholders and to present some information on species distribution to the nature enthusiast. This volume draws its material from various scientists' research and experience in this area. The images illustrated on colour plates reveal the potential of this area as an interesting site for naturalists as well as for researchers.

The introductory chapter gave insight into the importance of the High Conservation Value forest and set the scene for this book. The plant component chapters showcased the complex and unique structure of the flora diversity in the Bukit Durang area. The wildlife aspects of this book covered species from an array of taxa that includes both invertebrates and vertebrates (amphibians, fish, birds & mammals). The High Conservation Value forest is also home to several endemic species, as well as species of conservation importance. The social element chapter contributes to the history of Bukit Durang while the final chapter wraps the way forward for biodiversity conservation.

The research in Bukit Durang was made possible by the generosity of Wilmar Plantations Sdn Bhd (formerly known as PPB Oil Palm Sdn Bhd), who provided funding to Universiti Malaysia Sarawak for said research. This project is aimed to assess the selected biotic diversity i.e plant, invertebrate and vertebrate groups.



Orange-bellied Flowerpecker (*Dicacum trigonostigma*).

This common species having a wide distribution have been reported up to Kelabit highlands. In Bukit Durang area, they have been mist-netted and spotted foraging in the understory. This omnivorous species has been reported to feed on seeds of 'Senduduk' *Melastoma malabathricum*, small insects as well as pollen and nectar.

© Photo: Badiozaman Sulaiman

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Foreword

Sarawak retains some of the richest biodiversity in the world. It is home to many endemic species of conservation importance. Some of these examples can be found in Sarawak's High Conservation Value forest. From its inception, UNIMAS has put biodiversity and environmental conservation at the forefront of its research niche and agenda by setting up the Faculty of Resource Science and Technology (FRST) and the Institute of Biodiversity and Environmental Conservation (IBEC). With the establishment of these two hubs of knowledge, UNIMAS' commitment increased twofold: firstly, it mapped out the necessary measures to enhance the sustainable management of Sarawak's natural resources and secondly, being in Sarawak, with its vast biodiversity and multi-ethnic population, UNIMAS academics are also continuously collaborating with the local communities, government and non-government agencies as well as national and international researchers to study the conservation of tropical biodiversity and the global environment.

In the pursuit of research excellence, we are challenged by the need to identify

strategic partners. We continuously encourage our academics to explore external sources, especially in engaging private agencies to contribute to the various researches conducted at the University. One such effort has resulted in the signing of an MoA with WILMAR in 2014 with a project titled **"Identification and monitoring of Endangered, Rare and Threatened Species and their habitats in Wilmar's plantations in Sarawak"**. The synergy between WILMAR and UNIMAS is significant; not only that both agencies benefit through the conservation of biodiversity and environment, but it also highlights our rich expertise and skills in research, and at the same time motivates our young research minds who come to UNIMAS to learn about Biodiversity, in order to enhance their experience through industrial training at relevant agencies.

In line with the rapid developments in the oil palm industry and the increasing awareness in the need to conserve resources especially in Sarawak, this work is indeed substantial and considerably impactful in the current context of Malaysia's rich biodiversity and natural resources. The scope of work in this collaboration is an important milestone not



UNIMAS studies shows that many species of conservation importance are thriving in Bukit Durang Conservation Area.
© Photo: Wilmar

only for UNIMAS-industry linkage but also significant for biodiversity conservation and sustainable development in Sarawak.

Given that this book represents but a small sample of the amount of work done by our academics in the realm of biodiversity. I would like to commend the efforts of Wilmar Plantations Sdn Bhd (formerly known as PPB Oil Palms Sdn Bhd) who supported us in collecting information on the biodiversity in some of these areas including Bukit Durang, which forms the material for the book. The work is also expected to be important for stakeholders, for better understanding and appreciation of local biodiversity.

It is my hope that this book will contribute and encourage more people to work in this area, publish more journal articles of this kind and more funders to support in this field. I anticipate that this volume will be useful to stakeholders and for the advancement of the best management practices in general.



Prof. Datuk Dr Mohamad Kadim Suaidi
Vice Chancellor
Universiti Malaysia Sarawak

Message from Wilmar



Wilmar International Limited (Wilmar) was amongst the early adopters of the High Conservation Value (HCV) approach in the oil palm sector, and we carried out HCV assessments of our own operations from as early as 2007. Since then, our approach to conservation has expanded to include High Carbon Stock (HCS) areas, as enshrined in our No Deforestation, No Peat, No Exploitation (NDPE) Policy. Our conservation areas are sanctuaries for many threatened and endangered species, which we strive to protect.

The Bukit Durang Conservation Area (BDCA) which is located in our Saremas Group of estates, adjacent to Niah, is an important conservation site in our Sarawak operation. Since 2014, our research collaboration with the Universiti Malaysia Sarawak (UNIMAS) has provided us the necessary insights into the biodiversity of the area. The findings from the systemic monitoring done by the UNIMAS researchers alongside our team on the ground are discussed in this book. The findings from this book provide

some scientific evidence that the BDCA, although fragmented and surrounded by palm oil plantations, is a hidden biodiversity jewel.

While we remain guided by our biodiversity commitments, we are cognizant that we are limited by our knowledge and expertise in conservation efforts. Through collaborations with various strategic partners such as research institutes and universities like UNIMAS, we have been able to leverage scientific knowledge, and build capacity to help us strengthen the management of our conservation areas. Further cooperation with the local communities also helps us to ensure the survival of our conservation areas. For example, our partnership with the local longhouse communities in Saremas has enhanced the management of our conservation area. We recognize that local communities play an important role in the protection of our conservation areas and supporting conservation efforts on the ground.



Insectivore bird species plays an important role in regulating pest insects in oil palm plantations.
© Photo: Wilmar

I would like to extend my heartfelt gratitude to UNIMAS for collaborating with us to gather the findings on the BDCA and making this book the first publication by a Malaysian university to document the biodiversity in a Wilmar conservation area. We believe that real and lasting change on the ground can only be achieved through

a multi-stakeholder effort, and we look forward to continued collaboration and partnership in the years ahead.



Jeremy Goon
Chief Sustainability Officer
Wilmar International Limited

Preface

JAYASILAN MOHD-AZLAN
& AIDA SHAFREENA AHMAD PUAD

Sarawak is located in one of the world's unique biodiversity regions, it boasts a variety of habitat types, including a mix of dipterocarp forests with distinctive inhabitants. These habitats are often transformed into agriculture including oil palm plantations. However, the expansion of plantations to meet the global demand for vegetable oils should not be at the expense of our biodiversity and rural communities. It is important that oil palm growers play a significant role in sustainable development by being environmentally responsible and promote the conservation of natural resources and biodiversity. Therefore, biodiversity is one of the top agenda for Sarawak, whereby the state is determined to conserve and protect its biodiversity. This project sits in line with the University's niche area of biodiversity and environmental conservation and Sustainable Community Transformation.

As more global companies are being committed to 100% RSPO-certified palm oil, growers in Malaysia particularly in Sarawak need to be proactive to

produce sustainable oil palm which in turn can result in significant returns and be economically transformative for this industry. As such, High Conservation Value (HCV) areas within oil palm plantation concessions should not be regarded as low value. In line with the rapid developments in the oil palm industry and the increasing awareness of the need to conserve resources, especially in Sarawak, biodiversity in remnant forests such as Bukit Durang should not be ignored and is indeed substantial and considerably impactful in the current context of Malaysia's rich biodiversity and natural resources.

We are especially thankful to the Wilmar team comprising Mr Jeremy Goon, Mr Simon Siburat, Mr Gurcharan Singh, Mr Kiaw Che Weng, Mr Asrif bin Mahmud, Mr Chang Sip Woon, Mdm Perpetua George, Ms Chin Sing Yun and Ms Ginny Ng for their support in the project. We also extend our gratitude to the staff of Wilmar Plantations Sdn. Bhd, namely, Mr James Wong, Mr Edward Enggu Anak Setu, Mr Joanes Anak John, the late Mr Golan Anak



▲
Crested Fireback. © Photo: Jayasilan Mohd-Azlan

Mat, Ms Marcie Elene Marcus Jopony and Mr John Alit. The following colleagues helped with the reviews of manuscripts: Professor Cheksum Supiah Tawan, Professor Indraneil Das, Associate Professor Dr Ruhana binti Hassan, Associate Professor Dr Wong Sin Yeng, Associate Professor Dr Wong Swee Kiong, Dr Badrul Azhar Md. Sharif, Dr Jayaraj Vijaya Kumaran, Dr Mohamad Fizl Sidq bin Ramji, Mr Muhamad Ikhwan bin Idris and Ms Lisa Lok Choy Hong. We would also like to thank Research, Innovation and Enterprise Centre, Institute of Biodiversity and Environmental Conservation and the Faculty of Resource Science and Technology, UNIMAS, for logistical and administrative support. We owe a special debt of gratitude to Mr Badiozaman Sulaiman for providing images of species (Birds & Insects) that we have used in this work. Finally, we thank Wilmar for

the page layout and UNIMAS Publisher for arranging its publication. We would also like to thank Forest Department Sarawak and Sarawak Forestry Forestry Corporation for their research permits.

This book provides pictorial information on the selected species' distribution and richness in the Bukit Durang HCV area. The faunal studies include insects, fishes, amphibians, birds, bats, rodents and some larger mammals. This book intends to share the output of the research with local stakeholders, management authorities and the general public. It is hoped that nature enthusiasts and those who are interested in tropical biodiversity near this region will find this book beneficial. Finally, we hope that this book will contribute to increasing knowledge and awareness of our national pride and heritage.

Bukit Durang forest fragment (994.6 Ha) is the largest forest patch near Saremas. It is a narrow forest (700 m wide) strip (14 km long) of steep forest (slope = 35°) with difficult access.

© Photo: Wilmar

**BUKIT DURANG
CONSERVATION AREA
994.59 Ha**





Small Mammals

JAYASILAN MOHD-AZLAN, SALLY SOO KAICHEEN,
LISA LOK CHOY HONG, FAISAL A.A. KHAN

Whitehead's *Maxomys* (*Maxomys whiteheadi*) is the common and smallest *Maxomys* species found throughout Sarawak. This species has a spiny body fur with underparts and usually attracted to traps baited with banana. However, they were reported to feed mainly on insects such as ants. Despite commonly found across Borneo, their population trend has declined severely, and their conservation status is listed as Vulnerable in the IUCN red list.

© Photo: Faisal Ali

Introduction

The Bornean tropical rainforests harbour some of the most remarkable diversity of flora and fauna in the world (Jennings *et al.*, 2015; Sodhi *et al.*, 2004). Tropical biodiversity is highly threatened by land conversion for agricultural purposes. This calls for greater conservational prioritization (Wilcove & Koh, 2010; Fitzherbert *et al.*, 2008) as many have become fragmented and disconnected. There are a total of 247 species of mammals recorded in Borneo, and small mammals make up approximately 81%, which can be sub-categorized into bats, shrews, treeshrews, rats, mice, squirrels and flying squirrels (Phillipps & Phillipps, 2016). Borneo is regarded as one of the biodiversity hotspots, sustaining a high concentration of endemism, including approximately 19% of mammals (5% of the 99 bats species and 26 Rodentia), 20% of snakes and 6% of birds (Mohd-Azlan & Lawes, 2011). Small mammals (< 1kg) are extensively studied and are considered to be good indicators of habitat quality (Shazali *et al.*, 2016; Khan *et al.*, 2007) as they play significant roles in the sustenance and regeneration of forests through pollination and seed dispersal (Phillipps & Phillipps, 2016). Fruit bats are known to play a keystone role in structuring the forest community by dispersing pioneer tree species. Some small mammals also play important role in regulating insects. Some rodents are abundant in oil palm dominated landscapes, supporting predator populations such as leopard cats, owls and pythons. Therefore identifying species that are available and absent in reserves is crucial for conservation planning as well as in evaluating conservation effectiveness (Jennings, 2000). This chapter aims to describe the small mammals that were recorded in Bukit Durang High Conservation Value (HCV) area during a series of surveys.

“

There are a total of 247 species of mammals recorded in Borneo, and small mammals make up approximately 81%, which can be sub-categorized into bats, shrews, treeshrews, rats, mice, squirrels and flying squirrels.

Methodology

Bats and non-volant small mammals were sampled on three different occasions from 2014–2015, totalling 25 days. Traps were set up at three points along three transects with 100m intervals between each trap. A total of 18 mist nets ~1,872 net hours, were deployed throughout three sampling periods; where mist nets were used to capture frugivorous bats and insectivorous bats opportunistically. Mist nets were checked every 30 minutes from 1830 to 2130 to avoid bats from escaping especially the insectivorous bats. Harp traps were set up exclusively for insectivorous bats. The harp traps were moved at 100m intervals every day throughout the sampling periods

and were checked twice daily at 1830 hours and 0600 hours, accumulating 360 trap hours.

Wired mesh cage traps baited with bananas, pineapples, peanuts and oil palm fruits were used to catch the non-volant small mammals. These were set on the ground or tree branches along three transects. This study used a total of 36 cage trap sites which accumulated 900 trap hours. The traps were checked twice daily, from 0800 and 1600 and only re-baited when necessary and relocated the trap when there was no capture for two days.

Figure 1

Müller's Sundamys (*Sundamys muelleri*) is common rodent species in disturbed habitat in Malaysia. It is one of the common oil palm pest that causes serious loss in oil palm production. Rodents are omnivorous species and is known to damage fruit branches and prey on the pollinating weevil's larvae. Natural predators such as predatory birds and snakes potentially regulate its population in forested areas such as Bukit Durang.

© Photo: Faisal Ali



Figure 2

Lesser Dog-faced Fruit Bat (*Cynopterus brachyotis*) is one of the most common fruit bats in Borneo. This species is found in most habitat ranging from mangrove forest to mix dipterocarp forest including oil palm area. This species forages on fruits, leaf and nectar where the fibre wad and larger seeds are often discarded under feeding roost. The lesser dog-faced fruit bat is known to forage on over 40 plant species. Fruit bats plays an important role in the maintenance of forest ecosystems as seed dispersers.

© Photo: Jayasilan Mohd-Azlan

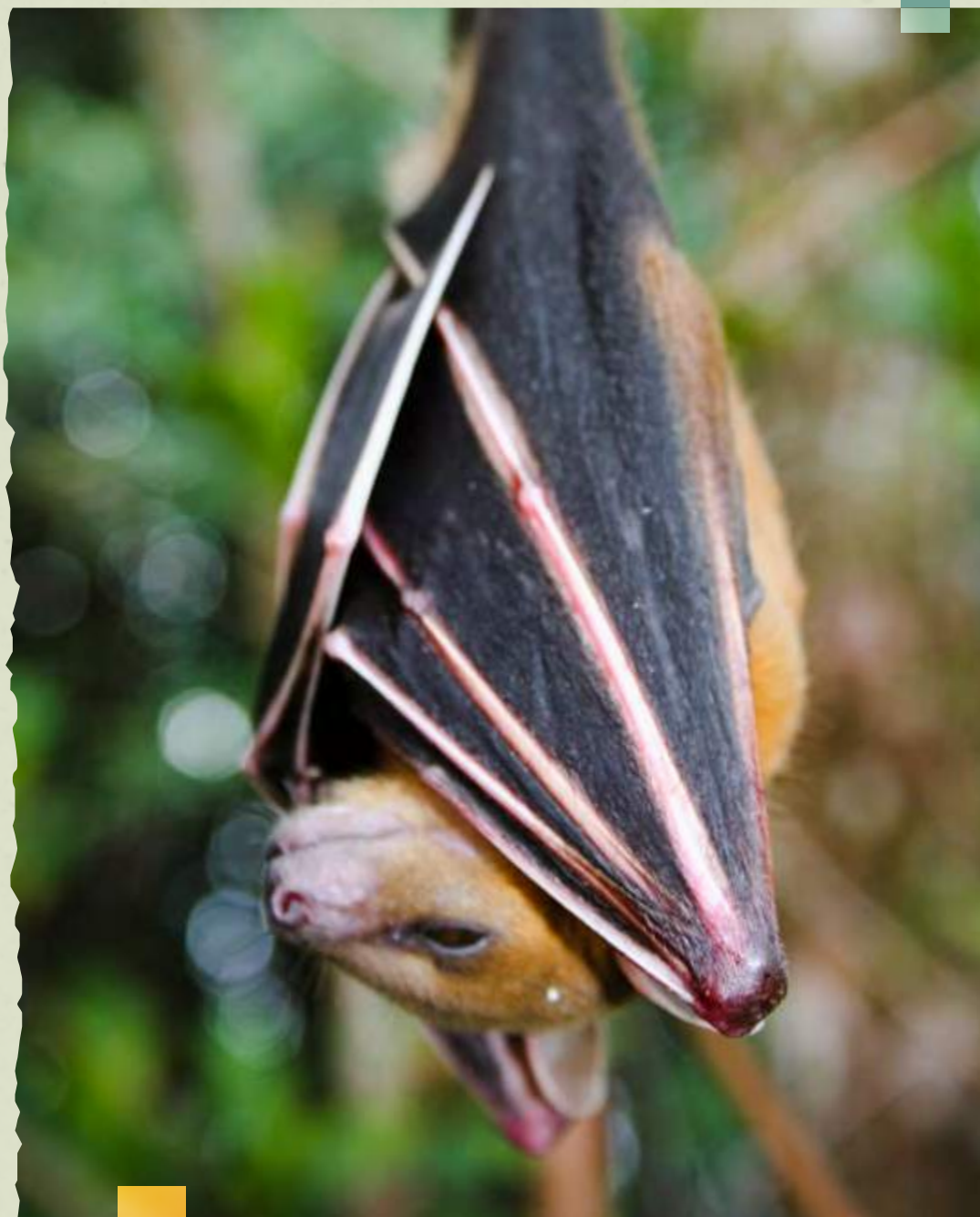




Figure 3

Bornean Horseshoe Bat (*Rhinolophus borneensis*) is one of the most widespread Horseshoe bat species found both in primary and secondary mix dipterocarp forest. This insectivore species roost inside rock crevices, hollow trees and leaf furls. Insectivore bat species uses echolocation to navigate and to prey on insects and deemed as important insect regulator, including those that are considered pest to agriculture.

Figure 4

Lesser Woolly Horseshoe Bat (*Rhinolophus sedulus*) is a forest-dependent species found mainly in primary forests. This insectivorous species was typically found roosting in hollow trees and recorded from undisturbed culvert, caves, and boulder. Studies had reported that the species was found roosting alone or in a small group along with their larger counterpart Woolly Horseshoe Bat (*Rhinolophus luctus*). *Rhinolophus sedulus* conservation status is listed as Near Threatened with a declining population trend in the IUCN red list given the rate of forest reduction in Southeast Asia.

Figure 5

Trefoil Horseshoe Bat (*Rhinolophus trifoliatus*) is an elegant bat species that can be distinguished from the rest of the species in Malaysia as it has a distinct yellowish noseleaf color. This insectivorous species is a forest-dependent species and mostly found roosting alone in tree branches. *Rhinolophus trifoliatus* conservation status is listed as Near Threatened with a declining population trend in the IUCN red list given the rate of forest reduction in Southeast Asia.

Figure 6

Spotted-Winged Fruit Bat (*Balionycteris maculata*) is the smallest fruit bat in Borneo. This is the only bat species in Borneo with obvious white to pinkish spots on its wings. This frugivorous bat species is commonly found in lowland dipterocarp forest up to 1500 asl. This forest-dependent species is known to roost in epiphytic ferns, ginger plants, and abandoned ants and termites nets. *Balionycteris maculata* conservation status is listed as Least Concern with a declining population trend in the IUCN red list.

Figure 7

Dayak Fruit Bat (*Dyacopterus spadiceus*) is not commonly recorded across Sarawak, and this may be due to trapping effort that focuses mainly on the lower canopy species. This species was reported from the upper canopy or elevated area where trapping was conducted between valleys. This frugivorous species is known to roost in cave and hollow trees. Their powerful and broader jaw muscle than *Cynopterus* is probably essential for their specialization feeding on figs. *Dyacopterus spadiceus* conservation status is listed as Near Threatened in the IUCN red list. Their population status trend is unclear as they are high flying species that made them hard to be studied.

Figure 8

Small Asian Sheath-tailed Bat (*Emballonura alecto*) is a common lowland species. This species occurs in multiple different roost types, including boulders, forest buildings, cave mouth, and other underground structures, mostly with a well-lit condition. This insectivorous bat species is a high-flying species and rarely caught under the canopy. *Emballonura alecto* conservation status is listed as Least Concern in the IUCN red list with a stable population given that this species is well adapted to human-made structures.

Figure 9

Fawn-coloured Leaf-nosed Bat (*Hipposideros cervinus*) is a common forest understory species in both primary and secondary forests. This insectivorous species is usually caught in a harp trap fixed across established forest trails where they hunt insects. Studies have documented dorsal fur color variation from bright orange, brown to grey in this species. They have been recorded roosting in a medium to a large colony, mostly in hollow trees and caves. Their conservation status is listed as Least Concern in the IUCN red list with a stable population given their tolerance to habitat disturbance.

Figure 10

Papillose Woolly Bat (*Kerivoula papillosa*) is the largest woolly bat. This insectivorous species is the most common woolly bat in Borneo found in undisturbed lowland to lower montane forest. They were found mostly roosting individually or in small groups on hollow trees and tree branches. This species are usually captured in harp traps fixed across forest trails and small streams. Their conservation status is Least Concern in the IUCN red list, but not much information is known on their population status trend.

© Photo: Faisal Ali

Table 1

LIST OF SMALL MAMMALS IDENTIFIED IN BUKIT DURANG HCVF, WITH ITS LOCAL ABUNDANCE, CONSERVATION STATUS IN SARAWAK’S WILD LIFE PROTECTION ORDINANCE 1998 AND INTERNATIONAL UNION FOR CONSERVATION OF NATURE, WHETHER THEY ARE FOREST-DWELLING (PREVIOUSLY RECORDED FROM ANY FORESTS), AND ITS DIET BEHAVIOUR.

P PROTECTED	VU VULNERABLE	I INSECTIVOROUS
LC LEAST CONCERN	U UNKNOWN	O OMNIVOROUS
NT NEAR THREATENED	F FRUGIVOROUS	

Results & Discussion

Overall, this study recorded a total of 75 individuals representing 18 species of small mammals. This includes 10 bat species (61 individuals) and eight species (14 individuals) of non-volant small mammals captured within Bukit Durang HCVF (Table 1).

Bats

A total of three frugivorous (38 individuals) and seven insectivorous (23 individuals) bats were recorded

throughout this study. This represents approximately 17% of the frugivorous bats family, Pteropodidae. The Lesser Dog-Faced Fruit Bat is the most abundant species (n=25) (Table 1). This species primarily feed on fruits, flowers, and leaf fractions, where it typically roosts in small groups in trees, under banana leaves, palm fronds, and man-made structures. The study also trapped four individuals of the relatively scarce Dayak Fruit Bat, and nine individuals of the Spotted-winged Fruit Bat.

Family	Scientific Name	Common Name	Relative Abundance	Consevation Status (C)			Guild
				SWLPO 1998	IUCN 2020	Forest	
Volant Small Mammals (Bats)							
Pteropodidae	<i>Balionycteris maculata</i>	Spotted-winged Fruit Bat*	9	P	LC	Yes	F
	<i>Cynopterus brachyotis</i>	Lesser Dog-faced Fruit Bat	25	P	LC	No	F
	<i>Dyacopterus spadiceus</i>	Dayak Fruit Bat	4	P	NT	U	F
Emballonuridae	<i>Emballonura alecto</i>	Small Asian Sheath-tailed Bat	1	P	LC	Yes	I
Vespertilionidae	<i>Kerivoula papillosa</i>	Papillose Woolly Bat	1	P	LC	Yes	I
Hipposideridae	<i>Hipposideros cervinus</i>	Fawn-coloured Leaf-nosed Bat	10	P	LC	No	I
Rhinolophidae	<i>Rhinolophus borneensis</i>	Bornean Horseshoe Bat	7	P	LC	No	I
	<i>Rhinolophus sedulus</i>	Lesser Woolly Horseshoe Bat	2	P	NT	No	I
	<i>Rhinolophus trifoliatu</i>	Trefoil Horseshoe Bat	1	P	LC	Yes	I
Nycteridae	<i>Nycteris tragata</i>	Hollow-faced Bat	1	P	VU	Yes	I
Relative Abundance			61				
Total Species			10				
Non-volant Small Mammals							
Tupaiaidae	<i>Tupaia dorsalis</i>	Striped Treeshrew	1	P	LC	U	F/I
	<i>Tupaia picta</i>	Painted Threeshrew	3	p	LC	Yes	F/I
Muridae	<i>Maxomys rajah</i>	Rajah Sundaic Maxomys	1	-	VU	Yes	-
	<i>Maxomys whiteheadi</i>	Whitehead’s Spiny Rat	1	-	VU	No	I
	<i>Rattus argentiventer</i>	Ricefield Rat	1	-	LC	No	O
	<i>Rattus exulans</i>	Polynesian Rat	1	-	LC	No	O
	<i>Rattus tanezumi</i>	House Rat	2	-	LC	No	O
	<i>Sundamys muelleri</i>	Müller’s Sundamys	4	-	LC	No	O
Relative Abundance			14				
Total Species			8				

A total of seven insectivorous bats were recorded representing approximately 9% of the insectivorous species.

These species are equipped with sophisticated echolocation abilities for navigating and catching prey. As such, they can evade the mist nets and thus resulting in lower capture rates in mist nets. Four of the forest-dwelling insectivorous species (Small Asian Sheath-tailed Bat, Papillose Woolly Bat, Trefoil Horseshoe Bat, and Hollow-faced Bat), however, were only trapped once throughout the study (Table 1). This is expected as fewer are recorded in forest understory when compared to the forest canopy, probably due to higher distribution and abundance of food resources in the canopy. Some common bat species such as the Dayak Leaf-nosed Bat (*Hipposideros dyacorum*) and the Bicoloured Leaf-nosed bat (*Hipposiderous bicolor*) were also absent from this study, suggesting additional surveys would increase the probability of recording more species. The capture effort concentrated in the understory may not accurately represent the bat diversity present in Bukit Durang forest area. Additionally, all bat species receive protected status following Sarawak Wild Life Protection Ordinance 1998.

Non-volant Small Mammals

The study recorded relatively fewer non-volant small mammals with only 14 individuals from eight species and most were only trapped once (Table 1). The two treeshrews recorded in Bukit Durang

represent 22% of the overall recorded non-volant small mammals. Both of the treeshrews are endemic to Borneo and have been recorded in mixed dipterocarp forests. These species feed on fruits and insects, making them omnivores. Whitehead's Spiny Rat has also been frequently recorded from within monoculture vegetation such as rubber trees and oil palm plantations. The Müller's Sundamys is the most abundant species with four captures as it is a synanthropic rodent frequently reported in highly disturbed habitats along streams and close to human settlement. **Among the eight species, only two are forest-dwelling species. The foraging guild of these non-volant small mammals mainly consisted of omnivores and insectivores** (Table 1). Some of these species spend substantial time on the ground while others are arboreal, and a few species are considered fossorial.

Our research indicates that isolated forest patches result in species filtering and are insufficient to support the majority of small mammals of Borneo. However, the importance of maintaining a network of forest patches despite their level of fragmentation in oil palm plantations for conserving small mammals should not be ignored. Corridors of natural vegetation can be established to connect patches of forest in the oil palm landscape to potentially mitigate the adverse effects of extinction debt and forest fragmentation on small mammal conservation.

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Bukit Durang Conservation Area provides opportunities for research and education for better understanding the ecology and to create awareness among stakeholders in Sarawak.

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