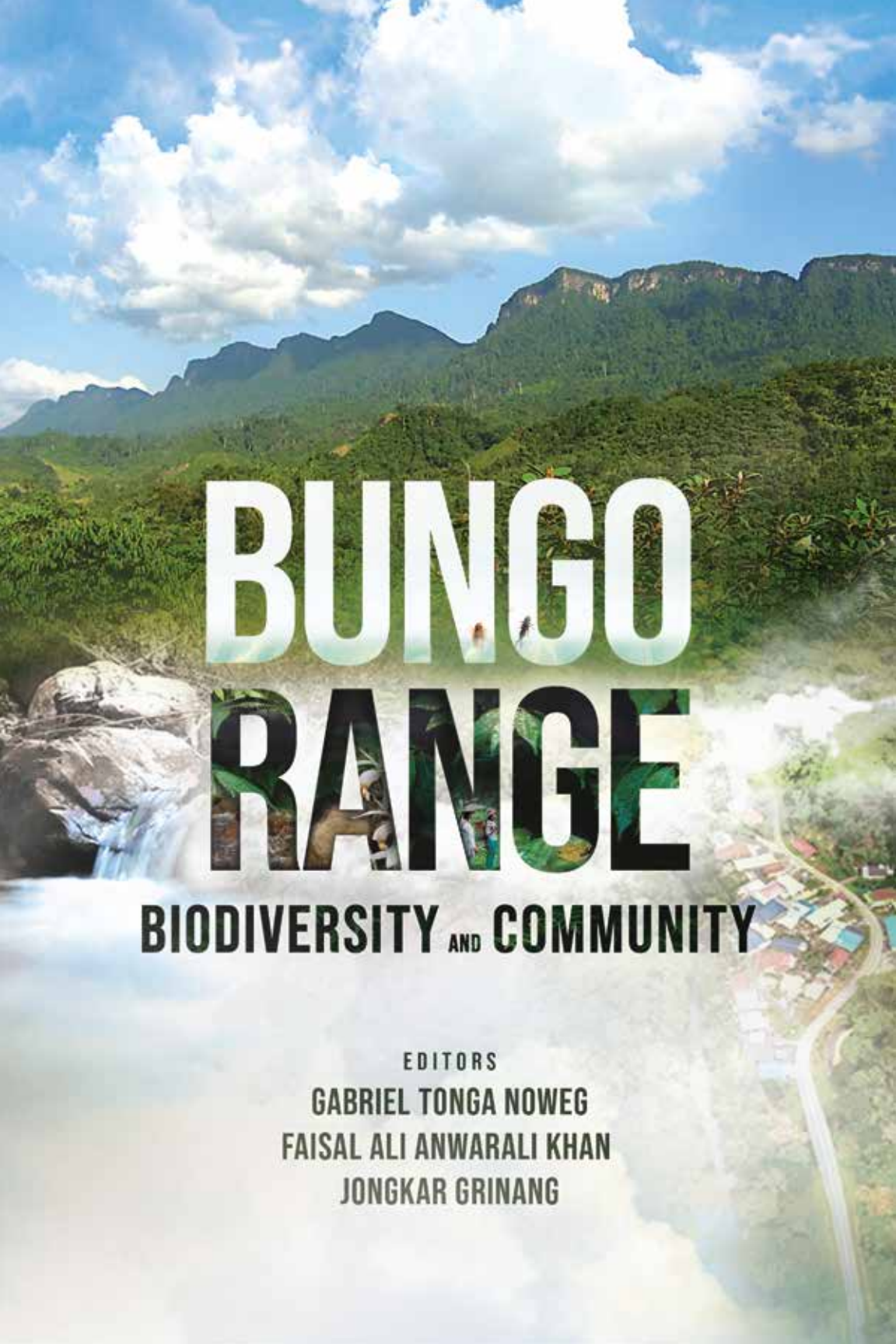

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BIODIVERSITY AND COMMUNITY

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FOREWORD

I am glad to note that this publication is another excellent milestone from Universiti Malaysia Sarawak through the Institute of Biodiversity and Environmental Conservation, in particular exploring and documenting the rich biodiversity and community in Sarawak. The biodiversity and environmental conservation is one of three niche areas of the university, which recognise the need to balance the biodiversity, habitats and human development. As such, the Research Innovation and Enterprise Centre, the university's centre responsible for research and innovation, has actively facilitated and supported research activities, and publications in various platforms available to scientific communities and the public.

I would like to thank staff of the Institute of Biodiversity and Environmental Conservation for continuously conducting good research and documenting crucial information that benefits many users including scientists across the region. It is well in line with the Institute's vision to become a leading center for research in tropical biodiversity and environmental conservation in Borneo and Southeast Asian region. I would like to congratulate the editors for their efforts in compiling and editing the data resulted from a multidisciplinary expedition in Bungo Range in December 2017 into a well indexed research book. I do believe that each article in this book serves its purpose as an important reference to academics, policy makers as well as public audiences. In particular, the findings would be a useful reference for the management plan of Bungo Range National Park that was gazetted on 26 February 2009.

To materialise the multidisciplinary expedition and the publication, the Institute had collaborated with various state agencies and local communities. Therefore, I am acknowledging their support and contribution (both financial and in-kind) to this project. They are Forest Department Sarawak, Sarawak Forestry Corporation,

Sarawak Biodiversity Centre, Sekolah Kebangsaan Tringgus, Pejabat Pendidikan Daerah Bau, Bau District Office, Bau District Council, Klinik Kesihatan Krokong, Bau District Police, Bau Fire and Rescue Station, Bau Hospital, and villagers from Tringgus settlement namely, Kg Bong, Kg Rotan and Kg Nguan. I hope similar collaborative efforts will be pursued in the near future to other protected areas in Sarawak.

To the authors, UNIMAS Publisher, and those who are involved in this publication, keep up with the good team spirit.

Finally, thank you for inviting me to pen my message in this great reading material.

Prof. Dr. Wan Hashim bin Wan Ibrahim
Deputy Vice Chancellor (Research and Innovation)
Universiti Malaysia Sarawak

PREFACE

This publication marks another significant output of the collaborative works between Universiti Malaysia Sarawak and Forest Department Sarawak on biodiversity study and conservation in the State.

In this book, the findings of multidisciplinary expedition to Bungo Range in December 2017 were compiled into 24 chapters covering biodiversity, environment and community under the theme "Bungo Range - Biodiversity and Community". The theme signifies the importance of the pristine mountainous forest of the Bungo Range that supports rich species of flora and fauna, and the uniqueness of community and their customs as well as cultures. The involvement of academics, researchers and the villages in the expedition has enhanced the exchange of knowledge, skill, and experience among the stakeholders, which are reflected in this book. In particular, the participation of the villagers in the expedition had indirectly conveyed the message of the Forest Department Sarawak on the importance of conserving the forest of Bungo Range and preserving local cultures. Ironically, the Bungo Range is becoming a popular tourism destination due to the outstanding sceneries such as mountains, waterfalls, reservoir, and the cultures (e. g., the last ring ladies). Indeed, this book will serve as a useful reading material for researchers, scientists and non-government organization in their research endeavour.

We would like to congratulate the editors, authors and those who contributed to the production of this book. We wish similar outputs shall be achieved from future collaborative work between Universiti Malaysia Sarawak and Forest Department Sarawak. Specifically, we would like to thank the community leaders and heads of department in Bau District for their support throughout the project. Yang Berhormat Miro Simuh for his strong supports of the expedition and launching of the event on 5th December 2017.

We hope this book serves the needs of the audiences either as academic reference or reading material in leisure time. Happy Reading!

Prof. Dr. Mohd Azlan Jayasilan

Director
Institute of Biodiversity and
Environmental Conservation
Universiti Malaysia Sarawak

Datu Hamden Haji Mohammad

Director
Forest Department Sarawak

INTRODUCTION

Sarawak government has voluntarily set aside more than 2.6 million hectares of lands and water bodies as conservation areas under the Heart of Borneo (HOB) Initiatives. The Sarawak's HOB area strech from the north in Limbang Division to the south at Tanjung Datu that boundaries with Sabah, Brunei and Kalimantan, Indonesia. Of the total HOB area, approximately 441,000 hectares are totally protected area comprising national parks, wildlife sanctuaries and nature reserves. The southern part of the HOB contains 10 protected areas many of which are tourism hotspots such as Bako National Park, Kubah National Park, Gunung Gading National Park, Matang Wildlife Centre and Tanjung Datu National Park.

Bungo Range is located at 10° 16' latitude and 110° 9' longitude of the southern side of the HOB, about 500 meter above the sea level. The mountainous primary forest of the area was gazetted as Bungo Range National Park on 26th February 2009 covering 8,096 heactares (**Figure 1.1**). Bungo Range is an important water catchment area in the upstream of the Sarawak Kiri River and Sarawak Kanan River, where the Bengoh Dam is built to provide water supply for Kuching population. The southern end of the Bungo Range is the boundary of West Kalimantan, Indonesia.

In 2017, a multidisciplinary expedition to Bungo Range was conducted as one of the activities organized in conjunction with UNIMAS's Silver Jubilee Celebration. The Institute of Biodiversity and Environmental Conservation had led the expedition with the support of Forest Department Sarawak and other Institutes as well as Faculties within the university. The goal of the expedition was to increase the visibility of UNIMAS not just to the Tringgus community, but also to answer the call of the Sarawak government that wants to emphasise the implementation of Digital Biodiversity

in this state. The expedition was conducted for two weeks with the launching of the event held on 5th December 2017 at Tringgus settlement area.

Despite the earliest exploration in the area back to year 1880s, there is a lack of information pertaining to biodiversity and socio-economy, which are neccesary to enhance biodiversity conservation, and boost local economic activities in the area. The expedition had produced substantial baseline data for the management of Bungo Range National Park, and highlight the area as a tourism destination, which eventually would benefit the local community in the area. The findings of the expedition are compiled herewith, comprising historical exploration in Bungo Range, water resource, aquatic biodiversity, floristics, mammals, birds, reptiles, amphibians, insects, and health and socio-economics of the locals. In summary, this book reported a total of 313 spcies of plants mainly orchids and zingers, and 298 species of wildlife among others are 105 birds, 39 mammals, 92 insects, 27 reptiles, 17 amphibians, and 59 aquatic lives. Additionally, the use of natural resources by local community in Tringgus is also presented in this book.

Because the expedition had only covered a small area of the southern section of the Bungo Range, gaps of information in this edition are expected, which suggest more explorations are needed in the near future. In this regard, the editors would like to acknowledge the contribution of the authors of each article in this edition. This edition may not stop here, and we wish to be working with you all again!

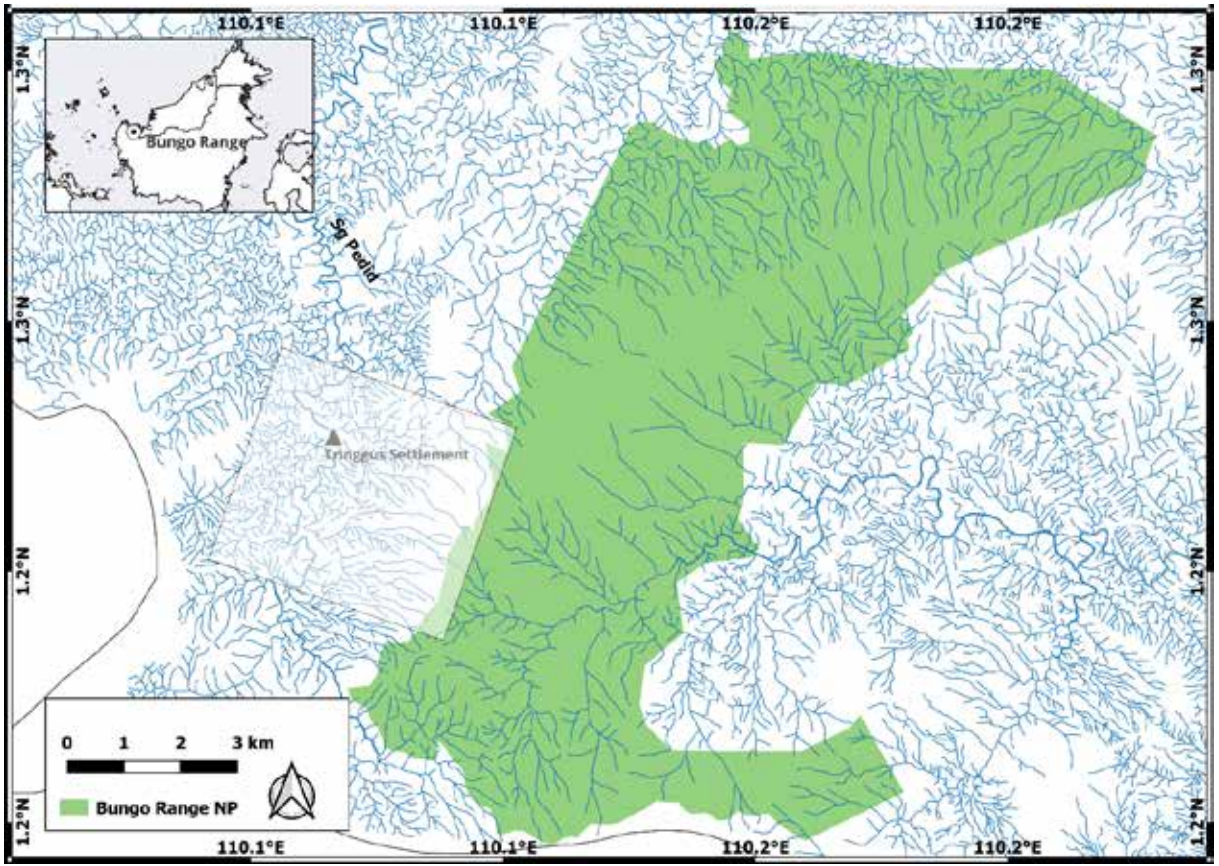

Figure 1.1. Map of Bungo Range National Park and the expedition area (shaded box).

MAMMALS OF SOUTHWESTERN BUNGO RANGE

Faisal Ali Anwarali Khan, Syamzuraini Zolkapley, Muhd Amsyari Morni, Julius William Dee, Mohammad Zahid Zainal Abidin, Praveena Rajasegaran, Yuvarajan Manivannan, Qhairil Shyamri Rosli, Norfarhana Mazlan, Roberta Chaya Tawie Tingga and Mohd Ridwan Abd Rahman

Introduction

The Bungo Range NP covers an area of 8096 hectares that consist mainly of limestone forest with some small areas of peat swamp forest and mixed dipterocarp forest (Sarawak Forestry Corporation, 2020). The presence of two major limestone caves nearby, Wind Cave and Fairy Cave Nature Reserve indicate that the geological structures, forest, and mountains in the district of Bau are unique. While the area is expected to host a large variety of flora and fauna due to its diverse surrounding ecosystems, it is one of the least explored national parks in Sarawak.

In Borneo, there are approximately 99 species of bats, 104 species of non-volant small mammals (e.g., squirrel, rodents, mice, shrew, and treeshrew) and 15 species of primates (Phillips & Phillips, 2016; Hamdan et al., 2017; Shazali et al., 2016, 2017). Bats promote the survival of fruit trees and forest plants by playing a significant role as a pest controller, pollinator and seed disperser including for those economically essential plants (Fujita & Tuttle 1991; Jones, 2012; Hodgkison et al., 2003). Likewise, the non-volant small mammals (e.g., Rodents and Scandentia) are essential seed dispersers for forest growth and an important aspect of the food chain in an ecosystem (William-Dee et al., 2019).

Primates are often considered as a vital component of the ecosystem among the tropical arboreal fauna (Tashiro, 2001). It uses a diverse range of resources in the forest for survival, indicating that they are playing a vital role in maintaining the ecology of the tropical forest through seed dispersal (Corlett, 2009). Borneo's primate community is vibrant with the presence of a large area of tropical rainforest as its main habitat and often regarded as a good indicator of both lowland and highland forest diversity (Meijaard & Nijman, 2003; Mazlan et al., 2019).

However, the information on these groups is generally limited from Bungo Range NP. In this chapter, the record of small mammals and primates from Bungo Range NP is reported (**Table 17.1**). Bats were captured using mist-nets and harp traps, whereas the rest on non-volant small mammals were captured using cage traps and pit-fall trap. Primates were recorded based on sighting and interviews conducted with the local community.

Primates

Based on the visual observations and local interviews, four species of primates have been recorded in Bungo Range NP, namely, Western Tarsier (*Cephalophacus bancanus*), Long-tailed Macaque (*Macaca fascicularis*), Pig-tailed Macaque (*Macaca nemestrina*), and Bornean Orangutan (*Pongo pygmaeus*) (**Table 17.1**, **Figures 17.1-17.2**). The elusive Western Tarsier (**Figure 17.1**) is a nocturnal primate. They can be found in primary and secondary lowland forests throughout Borneo (Phillipps & Phillipps, 2016). They feed primarily on insects and occasionally on small vertebrates such as bats, birds, and snakes (Niemitz, 1979; Abdullah, 1998; Phillipps & Phillipps, 2016; Wojciechowski et al., 2019). The macaques can be found in primary, secondary, mangrove, and swamp forests due to their non-specific diet. They are highly frugivorous but can also consume seeds, young leaves, leaf stems and insects (Chawton, 2005). Apart from the macaques, the locals also claimed few sightings of Bornean Orangutan, *Pongo pygmaeus* in the park area. The status of Borneon Orangutan was categorised as critically endangered by IUCN as the

population decreasing over the time. The viable population are known only from Batang Ai National Park and Lanjak Entimau Wildlife Sanctuary. Based on the information, Bungo Range NP can be a potential site for conserving the Orangutan beyond the Batang Ai NP and Lanjak Entimau WS. This is to ensure the long-term survival of Borneon Orangutan in the protected and unprotected forest.

Non-volant small mammals

Only three species of non volant small mammals with one individual each were recorded throughout the sampling period (**Table 17.1, Figures 17.3-17.4**). Species that were recorded include Large treeshrew (*Tupaia tana*), Least pygmy squirrel (*Exilisciurus exilis*) and Bornean shrew (*Crocidura foetida*). The low capture rate was most probably due to the rain almost every day throughout the expedition. Interestingly, no rats or mice were captured during the survey. In addition to the bad weather, most rodents may be concentrated in the orchard area, with fruiting trees adjacent to the park boundary as their primary food resources.

Large treeshrew (*Tupaia tana*) is a diurnal animal and commonly found in Sarawak (Khan et al., 2017; Zolkapley, 2019). Large treeshrew is mainly terrestrial and often spotted foraging on various fruits and insects on the forest floor or under fallen logs (Munshi-South, 2006; Munshi-South, 2007). They have dark brown on the dorsal side and reddish orange on the ventral side of the body. Distinct black stripes are present down the midline and yellow stripes are present along each shoulder (Payne et al., 1985) They could be found in a wide range of forest types; primary forest, secondary forest, lowland dipterocarp forest up to the lower montane forest, as well as plantation sites (Chung et al., 2015; Zolkapley, 2019). The other recorded species in Bungo Range NP is the least pygmy squirrel (*Exilisciurus exilis*). This species is the smallest squirrel in the world, with an average weight of fewer than 20 grams (Phillips & Phillips, 2016). Least pygmy squirrel mostly inhabits lowland and hilly areas but could also be found as high as 1,700 m a.s.l. (Koprowski & Meijaard, 2016). This squirrel is an

arboreal species and were known to feed on insects and tree bark (Thorington et al., 2005). The last of non-volant small mammals species recorded is the Bornean shrew (*Crocidura foetida*). Although elusive, the Bornean shrew is regarded as a common lowland shrew that can adapt to the various environments (William-Dee, 2019). Nevertheless, this information must be treated with caution as not much is known about the ecology of this species in Borneo. To date, there are only a few studies exclusively focusing on shrews in Borneo (e.g., Morni, 2019; Rosli, 2019; William-Dee, 2019).

Bats

Fifty individuals from 17 species of bats were recorded in Bungo Range NP (**Table 17.1, Figures 17.5-17.7**). Pteropodidae was the most speciose family with seven species in the park followed by Rhinolophidae (four) and Hipposideridae (two). The most abundant species was recorded by *Cynopterus brachyotis* followed by *Megaerops ecaudatus* and *Rhinolophus sedulus.* Six species were recorded as singletons; *Eonycteris major*, *Aethalops aequalis*, *R. affinis*, *H. dyacorum*, *Megaderma spasma,* and *Tylonycteris pachypus*. Out of the total 17 species, 11 species were known to be cave dwellers while others are forest bats (Shazali et al., 2017; Morni et al., 2018; Rajasegaran et al., 2018). This finding correlates with the existence of limestone caves in the park as well as the presence of two adjacent limestone caves: Wind Cave and Fairy Cave Nature Reserve. The capture of the endemic Borneo fruit bat, *Aethalops aequalis*, known only from higher elevations (> 1000 m), underlines the importance of the Bungo Range NP as a sub-montane forest for this species in western Sarawak (Phillips & Phillips, 2016). Although this bat is listed as Least Concerned in IUCN with an unknown population trend, this species is thought to decline due to habitat loss (Jayaraj et al., 2011; 2016).

Bungo Range NP appears to hold a diverse group of small mammals and primates. High numbers of bat species recorded during the expedition suggest that this area serves as critical habitat, especially for bats. It can also be presumed that the number of primates is

higher than that reported here from interviews and sightings. This mainly due to challenging trails that limit the distance for the primate transect survey. Future surveys should be planned during the dry season as well as sites away from orchards to avoid similar outcomes observed for non-volant small mammals and additional sampling days to cover more transects.

References

Abdullah, M. T. (1998). A note on the chance preying by a Western tarsier on Fruit bats in Malaysia Borneo. Unpublished.

Chawton, K. K. A. (2005). *Primate factsheet: Pig-tailed macaque (Macaca nemestrina) taxonomy, morphology and ecology*. Retrieved April 2020 from http://pin.primate.wisc.edu-/factsheet/entry/igtail_macaque

Chung, A. Y. C., Ajik, M. & Kimjus, K. (2015). A note on some pests of *Eucalyptus* in Sabah, Malaysia. Sandakan, Sabah. Unpublished.

Corlett, R. T. (2009). *The Ecology of Tropical East Asia.* New York: Oxford University Press.

Fujita, M. S., & Tuttle, M. D. (1991). Flying foxes (Chiroptera: Pteropodidae): threatened animals of key ecological and economic importance. *Conserv. Biol.,* 5(4): 455-463.

Hamdan, N. E. S., Ng, Y. L., Lee, W. B., Tan, C. S., Khan, F. A. A., & Chong, Y. L. (2017). Rodent species distribution and hantavirus seroprevalence in residential and forested areas of Sarawak, Malaysia. *Trop. life Sci. Res.,* 28(1): 151-159.

Hodgkison, R., Balding, S. T., Zubaid, A., & Kunz, T. H. (2003). Fruit bats (Chiroptera: Pteropodidae) as seed dispersers and pollinators in a lowland Malaysian rainforest. *Biotropica*, 35(4): 491-502.

IUCN (2020). IUCN Red List of Threatened Species. Ver. 2020-1. http//:www.iucnredlist.org. Retrieved on 30th March 2020.

Jayaraj, K. V., Ketol, B., Marni, W., Sait, I., Mortada, M. J., Khan, F. A. A., & Abdullah, M. T. (2011). Comparative distribution and diversity of bats from selected localities in Sarawak. *Borneo J. Resour. Sci. Technol.,* 1(1): 1-13.

Jayaraj, K. V., Struebig, M. & Tingga, R. C. T. (2016). *Aethalops aequalis*. The IUCN Red List of Threatened Species 2016: e.T136541A21977630. https://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T136541A21977630.en. Downloaded on 19 June 2020.

Jones, G. (2012). What bioindicators are and why they are important. In *Proceedings of the International Symposium on the Importance of Bats as Bioindicators*. Flaquer, C. & Puig-Montserrat, X. (eds.), pp. 18-19. Museum of Natural Sciences Edicions, Granollers.

Khan, F. A. A., Tahir, N. F. D. A., Rahman, S. P. H., Willium-Dee, J., Morni, M. A., Rosli, Q. S., Tingga, R. C. T., Rahman, M. R. A. & Azhar, I. (2017). Small Mammals from Samunsam Wildlife Sanctuary, Sarawak, Malaysian Borneo. *Borneo J. Resour Sci. Technol.*, 7(2): 98-106.

Koprowski, J. & Meijaard, E. (2016). *Exilisciurus exilis* (errata version published in 2017) The IUCN Red List of Threatened Species 2016: e.T8437A115087769. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T8437A22244965.en.Downloaded on 19 June 2020.

Mazlan, N., Abd-Rahman, M. R., Tingga, R. C. T., Abdullah, M. T. & Khan, F. A. A. (2019). Population genetics analyses of the endangered Proboscis Monkey from Malaysian Borneo. *Folia Primatol.*, 90(3): 139-152.

Meijaard, E., & Nijman, V. (2003). Primate hotspots on Borneo: Predictive value for general biodiversity and the effects of taxonomy. *Conserv. Biol.,* 17: 725-732.

Morni, M. A. (2019). Assessing diversity of *Crocidura monticola* sensu lato from Malaysia using genetic markers and morphology. Unpublished thesis. Universiti Malaysia Sarawak.

Morni, M. A., Khan, F. A. A., Rosli, Q. S., William-Dee, J., Tingga, R. C. T. & Mohd-Ridwan, A. R. (2018). Bats roost site preferences in Wind Cave Nature Reserve, Bau, Sarawak. *Malays. Appl. Biol.,*, 47: 57-64.

Munshi-South, J. (2006). Asocial monogamy, extra-pair paternity, and dispersal in the large treeshrew (*Tupaia tana*). Unpublished thesis. University of Maryland.

Niemitz, C. (1979). Outline of the behavior of Tarsius bancanus. In *The Study of Prosimian Behavior*. Doyle, G. A. & Martin, R. D. (eds.). New York: Academic Press.

Payne, J., Francis, C. M. & Phillipps, K. (1985). *Field guide to the mammals of Borneo*. Sabah Society.

Phillipps, Q. & Phillipps, K. (2016). *Phillipps' Field Guide to the Mammals of Borneo and their Ecology*. Kota Kinabalu: Natural History Publications (Borneo).

Rajasegaran, P., Shazali, N. & Khan, F. A. A. (2018). Microclimate and physiological effects in the roosts of cave dwelling bats: implications in roost selection and conservation in Sarawak, Malaysian Borneo. *Zool. Sci.*, 35(6): 521-527.

Rosli, Q. S. (2019). Phylogenetic, systematic and genetic diversification of Musk Shrew (*Suncus murinus*) in Southest Asia. Unpublished thesis. Universiti Malaysia Sarawak.

Sarawak Forestry Corporation. (2020). National Parks. http://www.sarawakforestry.com. Retrieved on 6th April 2020.

Shanahan, M. & Compton, S. G. (2000). Fig-eating by Bornean tree shrews (*Tupaia* spp.): evidence for a role as seed dispersers. *Biotropica*, *32*(4a): 759-764.

Shazali, N., Rajasegaran, P. Azhar, Rahman, M. R. A., Tingga, R. C. T. & Khan, F. A. A. (2016). Bats of Sarawak in totally protected areas: a review on its diversity, distribution, and conservation status. In *Glimpse of Bornean Biodiversity*. Chong, Y. L., Yeo, F. K. S. & Khan F. A. A. (eds.). UNIMAS Publisher. Pp. 33-50.

Shazali, N., Chew, T. H., Shamsir, M. S., Tingga, R. C. T., Mohd-Ridwan, A. R. & Khan, F. A. A. (2017). Assessing bat roosts using the LiDAR system at wind cave nature reserve in sarawak, Malaysian Borneo. *Acta Chiropt.*, 19(1): 199-210.

South, J. M., Emmons, L. H. & Bernard, H. (2007). Behavioral monogamy and fruit availability in the large treeshrew (*Tupaia tana*) in Sabah, Malaysia. *J. Mammal.,* 88(6): 1427-1438.

Tashiro, Y. (2001). Ecological factors influencing primate abundance and feeding activity in the Kalinzu Forest, Uganda. Unpublished thesis. Kyoto University.

Thoringtom Jr., R. W. & Hoffmann, R. S. (2005). Family Scuiridae. In *Mammals Species of the World*. Wilson, D. E. & Reader, D. M. (eds.). The John Hopkins University press, Baltimore, MD, USA. Pp. 754-818.

Willium-Dee, J. (2019). Phylogeography of Borneon shrew (Family Soricidae: *Crocidura foetida*) inferred from cytochrome b gene and species distribution modelling of Three shrews from Malaysia using maximum entropy approach. Unpublished thesis. Universiti Malaysia Sarawak.

William-Dee, J., Khan, F. A. A., Rosli, Q., Morni, M. A., Azhar, I., Lim, L. S., Tingga, R. C. T. & Rahman, M. R. A. (2019). Comparative distribution of small mammals diversity in protected and non-protected area of Peninsular Malaysia. *Trop. Life Sci. Res.*, 30(2): 131-147.

Wojciechowski, F. J., Kaszycka, K. A. & Řeháková, M. (2019). Social behavior of a reproducing pair of the Philippine tarsier (*Tarsius syrichta*) in captivity. *J. Appl. Anim. Welf. Sci*., 23(4): 493-507. doi: 10.1080/10888705.2019.1689505.

Zolkapley, S. (2018). Systematics study of genus *Tupaia* from Malaysia using cytovhrome oxidase I (COI) and morphometric analyses. Unpublished thesis. Universiti Malaysia Sarawak.

Table 17.1. List of Primates, non-volants and volants species in Bungo Range National Park and their conservation status based on IUCN 2020.

Family Species	Common name	Population trend	IUCN status
Primates			
Tarsiidae			
*Cephalophacus bancanus**	Western tarsier	Decreasing	VU
Hominidae			
*Pongo pygmaeus**	Bornean orangutan	Decreasing	CR
Cercopithecidae			
Macaca fascicularis	Long-tailed macaque	Decreasing	LC
*Macaca nemestrina**	Pig-tailed macaque	Decreasing	VU
Squirrel, Shrew and Treeshrew			
Sciuridae			
Exilisciurus exilis	Least pygmy squirrel	Unknown	DD
Soricidae			
Crocidura foetida	Bornean shrew	Unknown	LC
Tupaiidae			
Tupaia tana	Large treeshrew	Decreasing	LC
Bats			
Pteropodidae			
Aethalops aequalis	Borneo fruit bat	Unknown	LC
Balionycteris maculata	Spotted-winged fruit bat	Unknown	LC
Cynopterus brachyotis	Sunda short-nosed fruit bat	Unknown	LC
Eonycteris major	Greater dawn bat	Unknown	DD

Macroglossus minimus	Long-tongued nectar bat	Stable	LC
Megaerops ecaudatus	Sunda tailless fruit bat	Unknown	LC
Penthetor lucasi	Dusky fruit bat	Decreasing	LC
Rhinolophidae			
Rhinolophus affinis	Intermediate horseshoe bat	Stable	LC
Rhinolophus borneensis	Bornean horseshoe bat	Unknown	LC
Rhinolophus foetidus	Andersen's Woolly Horseshoe Bat	Unknown	LC
Rhinolophus sedulus	Lesser woolly horseshoe bat	Decreasing	NT
Hipposideridae			
Hipposideros cervinus	Fawn-colored leaf-nosed bat	Unknown	LC
Hipposideros dyacorum	Dayak leaf-nosed bat	Unknown	LC
Emballonuridae			
Emballonura alecto	Small asian sheath-tailed bat	Decreasing	LC
Nycteridae			
Nycteris tragata	Malayan slit-faced bat	Decreasing	NT
Megadermatidae			
Megaderma spasma	Lesser false vampire	Unknown	LC
Vespertilionidae			
Tylonycteris pachypus	Lesser bamboo bat	Unknown	LC

*Recorded based on interview with the locals;

DD=Data Deficient; CR=Critically Endangered; LC=Least Concern; NT=Near Threatened; VU=Vulnerable

Figure 17.1. Western tarsier, *Cephalophacus bancanus* (Photograph from Kubah National Park).

Figure 17.2. Long-tailed macaque, *Macaca fascicularis.*

Figure 17.3. Large treeshrew, *Tupaia tana.*

Figure 17.4. Bornean shrew, *Crocidura foetida.*

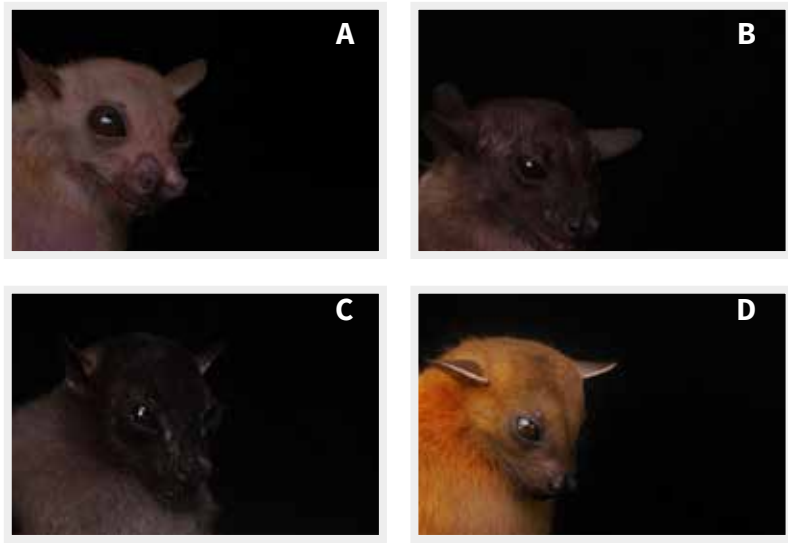

Figure 17.5. Photos of representative from frugivorous and nectarivorous bats family Pteropodidae recorded in Bungo Range National Park. A, Sunda Tailless Fruit Bat (*Megaerops ecaudatus);* B, Dusky Fruit Bat (*Penthetor lucasi*); C, Spotted-winged Fruit Bat (*Balionycteris maculata*); D, Sunda Short-nosed Fruit Bat (*Cynopterus brachyotis*).

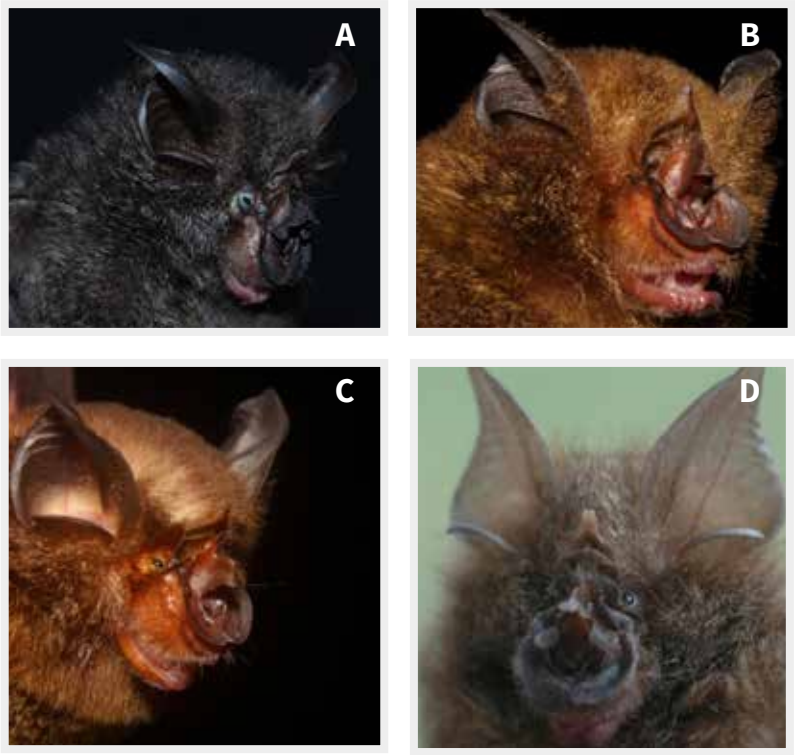

Figure 17.6. Photos of representative from insectivorous bats family Rhinolophidae captured in Bungo Range National Park. A, Lesser Woolly Horseshoe Bat (*Rhinolophus sedulus*); B, Intermediate Horseshoe Bat (*Rhinolophus affinis*): C, Bornean Horseshoe Bat (*Rhinolophus borneensis*); D, Andersen's Woolly Horseshoe Bat (*Rhinolophus foetidus*).

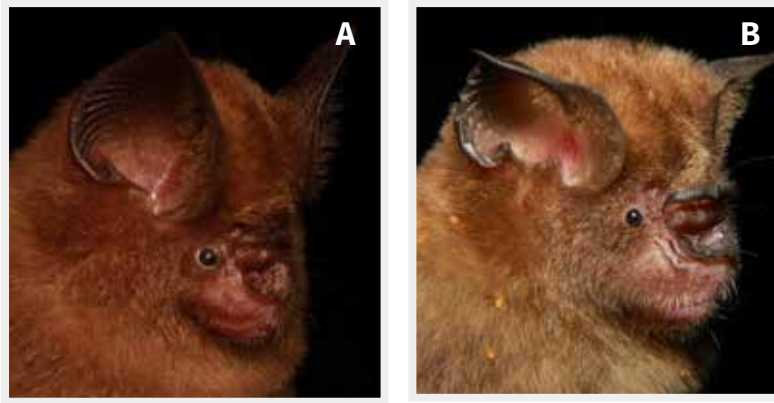

Figure 17.7. Photos of representatives from insectivorous bat family Hipposideridae captured in Bungo Range National Park. A, Dayak Roundleaf Bat (*Hipposideros dyacorum*); B, Fawn Roundleaf Bat (*Hipposideros cervinus*).

BUNGO RANGE

BIODIVERSITY AND COMMUNITY

This book highlights the significant findings from the Multidisciplinary Expedition in Bungo Range conducted on 5-10 December 2017. The expedition was organized by the Institute of Biodiversity and Environmental Conservation, UNIMAS with support from the Forest Department Sarawak. This volume is illustrated in 24 chapters covering the historical exploration of Bungo Range, a geological feature of the mountain, water resources, aquatic biodiversity, floristics, mammals, birds, reptiles, amphibians, insects, and health and socio-economics of the Tringgus community. It is reported herewith in the book that there are a total of 313 species of plants mainly orchids and zingers, and 298 species of wildlife, among them 105 birds, 39 mammals, 92 insects, 27 reptiles, 17 amphibians, and 59 aquatic lives. Additionally, the use of natural resources by the local community in Tringgus is also presented. This book can serves as a useful reference for the development and management of Bungo Range National Park, and the communities living surrounding the area.

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