



# BUNGO RANGE

**BIODIVERSITY AND COMMUNITY**

EDITORS

GABRIEL TONGA NOWEG

FAISAL ALI ANWARALI KHAN

JONGKAR GRINANG



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UNIVERSITI MALAYSIA SARAWAK

# BUNGO RANGE

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 villagers 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 5<sup>th</sup> 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  
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Environmental Conservation  
Universiti Malaysia Sarawak

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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 stretch 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.

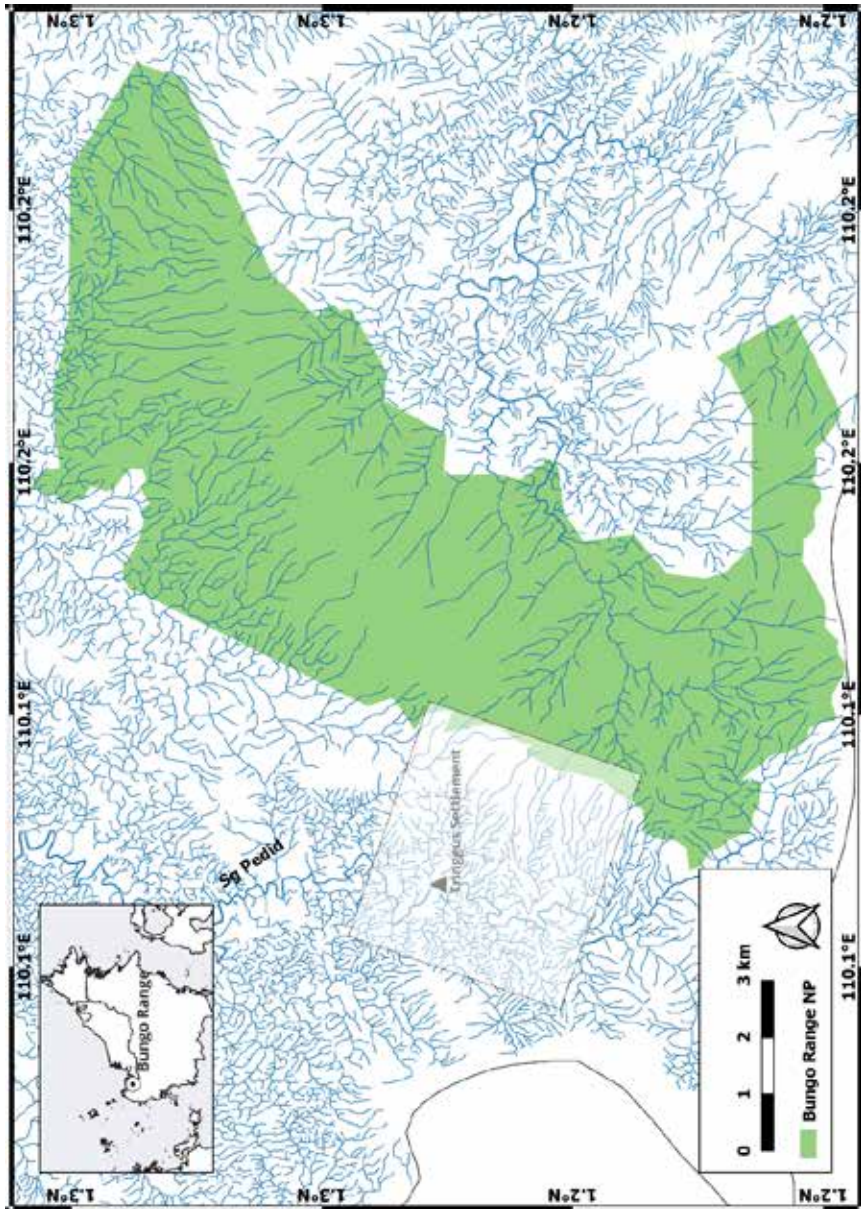
Bungo Range is located at 10° 16' latitude and 110° 9' longitude of the southern side of the HOB, about 500 meter above the sea level. The mountainous primary forest of the area was gazetted as Bungo Range National Park on 26<sup>th</sup> February 2009 covering 8,096 heactares (**Figure 1.1**). Bungo 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 5<sup>th</sup> 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 necessary 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 species 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).



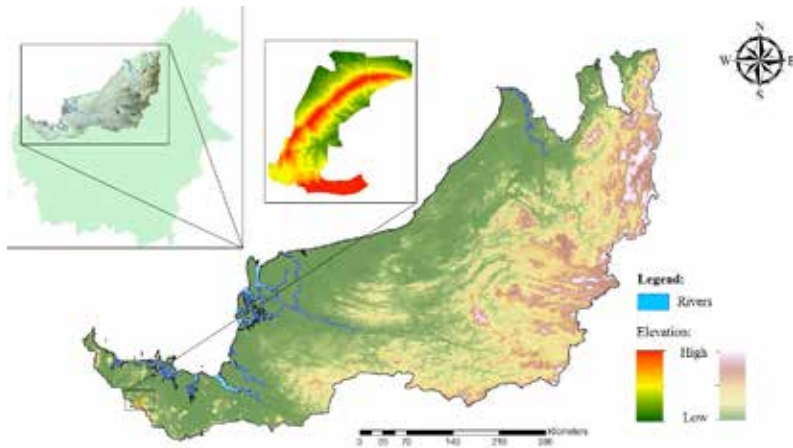


# MID-SIZED TO LARGE-BODIED TERRESTRIAL MAMMALS

Sally Soo Kaicheen, Melynda Cheok Ka Yi, Marius Joscha Maiwald and Mohd Azlan Jayasilan

Bornean tropical rainforests are home to 247 species of terrestrial mammals from 13 orders including 100 species of bats (Phillipps & Phillipps, 2016). Unfortunately, many of the tropical mammals in Sarawak exist in low population density due to forest conversion, logging, forest fire, illegal hunting, and wildlife trade, (Taylor et al., 1999; Bennett et al., 2002; Kinnaird et al., 2003; Sodhi et al., 2004; Heaney et al., 2005; Nakagawa et al., 2006; Linkie et al., 2007; Bernard et al., 2009; Gaveau et al., 2014; Brodie et al., 2015). To date, more than 40% of mid-sized to large-bodied mammals have been red-listed as species of global or regional conservation importance by the International Union for the Conservation of Nature (IUCN, 2020). This study categorized the mammals with more than 1 kilogram from the family Cercopithecidae, Manidae, Hystricidae, Ursidae, Mustelidae, Prionodontidae, Viverridae, Felidae, Elephantidae, Rhinocerotidae, Suidae, Tragulidae, Cervidae, and Bovidae as mid-sized to large-bodied mammals (O'Brien, 2008; Tobler et al., 2008).

The Bungo mountain range, straddling along the border of Malaysia and Indonesia in south-western Sarawak cover an area of 8,096 hectares. The people living in the adjacent areas to the National Park are mainly made up of the Bidayuh ethnic group living in Kg Tringgus, Kg Nyegol, Kg Sting and Kg Muk Ayun where the dependency on the forest for non timber forest produce remains high. Fruit orchards and huts can be found at the foothill along the access route from Kg Tringgus.



In order to determine the mammalian richness in Bungo Range National Park, 10 Bushnell® infra-red camera traps were set up in the secondary lowland Mixed Dipterocarp Forest for three months (6<sup>th</sup> of December 2017 until 18<sup>th</sup> of March 2018), approximately three kilometres away from Kg Tringgus (Figure 1). The camera sites are relatively close to the villager’s orchard where fruits trees (Durian, Pineapple), rattan palms, and bamboo can be spotted, with closed canopies, trees with approximately 20 m high. The camera traps were operational 24 h throughout the sampling period with infra-red sensor, set with high sensitivity, three 12 megapixels photographs captured per trigger with a two-minute interval. Camera traps were secured in metal casing and enclosed with python cable, mounted on tree around 25–30 cm above the ground in closed canopy forest, in order to reduce the photographs with over-exposure. The position of camera stations was recorded using Global Positioning System (GPS). The collected photographs were then sorted and identified to the species level, where possible photo of the same species was deemed as independent photo/event despite the number of individuals with a time gap approximately 60 minutes.

A total of 15 mid-sized to large-bodied mammals were detected within 926 camera trap nights (**Table 18.1**). Of these, 13 species (80%) were protected under the Sarawak Wild Life Protection Ordinance 1998 (SWLPO 1998) and six species (40%) were listed as Near Threatened and/or of higher conservation status under the IUCN (2020). Additionally, seven species (47%) were listed under the Convention on International Trade of Endangered Species (CITES), including the most trafficked animal in the world: the Critically Endangered Sunda Pangolin (*Manis javanica*) (Zhang et al., 2008; Shepherd, 2009; Challender et al., 2015). The Leopard Cat (*Prionailurus bengalensis*) was also detected, which is the most common of the five Bornean felid species and can be found in a wide variety of habitats including oil palm plantation (Rajaratnam et al., 2007; Mohamed et al., 2013). Additionally, the Yellow-throated Marten (*Martes flavigula*), Masked Palm Civet (*Paguma larvata*), Common Palm Civet (*Paradoxurus hermaphroditus*), Banded Linsang (*Prionodon linsang*), three porcupines (Common Porcupine – *Hystrix brachyura*, Thick-spined Porcupine – *Hystrix crassispinis*, Long-tailed Porcupine – *Trichys fasciculata*) were recorded in our study. The occurrence of hunted species such as the Bearded Pig and Muntjac in the National Park suggest that this area can serve as a refugium for these species. The non-detection of larger game animal such as the Samba Deer (no tracks were recorded as well) however, require further sampling to confirm if this species has been locally extinct.

The survival probability of many of these species in this area could be associated with tolerance of the species to disturbance, persecution and highly interfered by biotic and abiotic factors (Kira, 1991; Sekercioglu et al., 2008; Post et al., 2009). The mammals recorded in this study were mainly disturbance-tolerant which have also been recorded in secondary and disturbed forest elsewhere (Rajaratnam et al., 2007; Nakashima et al., 2010; Mohamed et al., 2013; Nakashima et al., 2013). Some villagers from Kg Tringgus, are dependent on wildmeat where hunting occurs at least once a

week. It is plausible to suggest that various level of intrusion in this area, especially near to the villages, may have influenced the animal's detection in our study.

As a conclusion, secondary forests still hold significant importance in biodiversity conservation and serve as a refuge for many forest species when primary forest is being logged. Therefore, the conservation values and the capability of logged and secondary forest around Bungo Range National Park in sustaining medium- to large-bodied mammals should not be ignored (McShea et al., 2009; Velho et al., 2012; Brodie et al., 2015).

**Table 18.1.** List of mid-sized to large-bodied mammals recorded in Bungo Range National Park with their protection and conservation status.

Family	Scientific Name	Common Name	Protection and Conservation Status		
			SWLPO 1998	IUCN 2020	CITES 2016 Appendices
Hystricidae	<i>Hystrix brachyura</i> (Linnaeus, 1758)	Malayan Porcupine	P	LC	-
	<i>Hystrix crassispinis</i> (Günther, 1877)	Thick-spined Porcupine	P	LC	-
	<i>Trichys fasciculata</i> (Shaw, 1801)	Long-tailed Porcupine	N/A	LC	-
Sciuridae	<i>Rheithrosciurus macrotis</i> (Gray, 1867)	Tufted Ground Squirrel	TP	Vu	-
Manidae	<i>Manis javanica</i> (Desmarest, 1822)	Sunda Pangolin	P*	Cr	I
Felidae	<i>Prionailurus bengalensis</i> (Kerr, 1792)	Leopard Cat	P	LC	I, II

Viverridae	<i>Hemigalus derbyanus</i> (Gray, 1837)	Banded Civet	P	NT	II
	<i>Paguma larvata</i> (C.E.H. Smith, 1827)	Masked Palm Civet	P	LC	III
	<i>Paradoxurus hermaphroditus</i> (Pallas, 1777)	Common Palm Civet	P	LC	III
	<i>Prionodon linsang</i> (Hardwicke, 1821)	Banded Linsang	P	LC	III
Mustelidae	<i>Martes flavigula</i> (Boddaert, 1785)	Yellow-throated Marten	P	LC	III
Herpestidae	<i>Herpestes brachyurus</i> (Gray, 1837)	Short-tailed Mongoose	P	NT	-
Suidae	<i>Sus barbatus</i> (Müller, 1838)	Bearded Pig	N/A	Vu	-
Cervidae	<i>Muntiacus muntjak</i> (Zimmermann, 1780)	Southern Red Muntjac	N/A	LC	-
Erinaceidae	<i>Echinosorex gymnurus</i> (Raffles, 1822)	Moon Rat	N/A	LC	-

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### Abbreviations

P – Protected; TP – Totally Protected; N/A – Not Protected (Sarawak Wild Life Protection Ordinance 1998).

N/A – Not stated, LC – Least Concern, NT – Near Threatened, VU – Vulnerable, En – Endangered, Cr – Critically Endangered (International Union for Conservation of Nature (IUCN) Red List of Threatened Species).

I – Appendix 1, II – Appendix 2, III – Appendix 3 (The Convention on International Trade in Endangered Species of Wild Fauna and Flora)



**Figure 18.1.** Images of animals and the time of activities. Top – Tufted Ground Squirrel, Middle – Sunda Pangolin, Bottom – Leopard Cat

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# 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 serve as a useful reference for the development and management of Bungo Range National Park, and the communities living surrounding the area.