

The background of the cover is a vibrant landscape photograph. At the top, a blue sky is filled with large, white, fluffy clouds. Below the sky, a range of dark, forested mountains stretches across the horizon. In the middle ground, a dense, green forest covers the slopes of the mountains. On the left side, a waterfall cascades over large, grey rocks. On the right side, a small village with colorful buildings is visible, situated on a hillside. The overall scene is bright and natural, representing the biodiversity and community mentioned in the title.

BUNGO RANGE

BIODIVERSITY AND COMMUNITY

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BUNGO RANGE

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CONTENTS

Foreword	ix
Preface	xi
Introduction	1
Theme: Geological Study and Zoological Exploration	5
Geology of Bungo Range, Bau	
Historical Account of Zoological Explorations	
Theme: Water Quality and Aquatic Biota	23
Water Quality of Pedid River and The Tributaries	
Fish Fauna of Pedid's Tributaries	
Macroinvertebrates of Pedid River and The Triburaies	
Theme: Flora Environment	45
Understorey Flora of Southwestern Bungo Range	
Hapaline (Araceae: Angiosperm) of Borneo	
Orchids of Bungo Range	
The Importance of Forest Regeneration in Protecting Economically Important Tree Species	
Theme: Terrestrial Fauna Environment	91
Odonata of Bungo Range	
Butterflies of Southwestern Bungo Range	
Bird Mites of Southwestern Bungo Range	
The Anurans of Southwestern Bungo Range	

The Reptiles of Bungo Range	
Birds of Southwestern Bungo Range	
Mammals of Southwestern Bungo Range	
Mid-Sized to Large-Bodied Terrestrial Mammals	
Theme: Community, Culture and Health Environment	167
A Brief Note on Tringgus	
In The Search of A Story: The Tringgus Oral Narrative	
Traditional Knowledge of Tringgus Community	
Tagang Systemon Pedid River	
Waterborne Parasites in Tringgus Villages	
<i>Burkholderia</i> from Selected Villages in Bungo Range	
Bungo Villagers' Rendition of Nose and Throat Cancer	
List of Contributors	241
Editors Info	255
Index	259

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 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

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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 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 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!

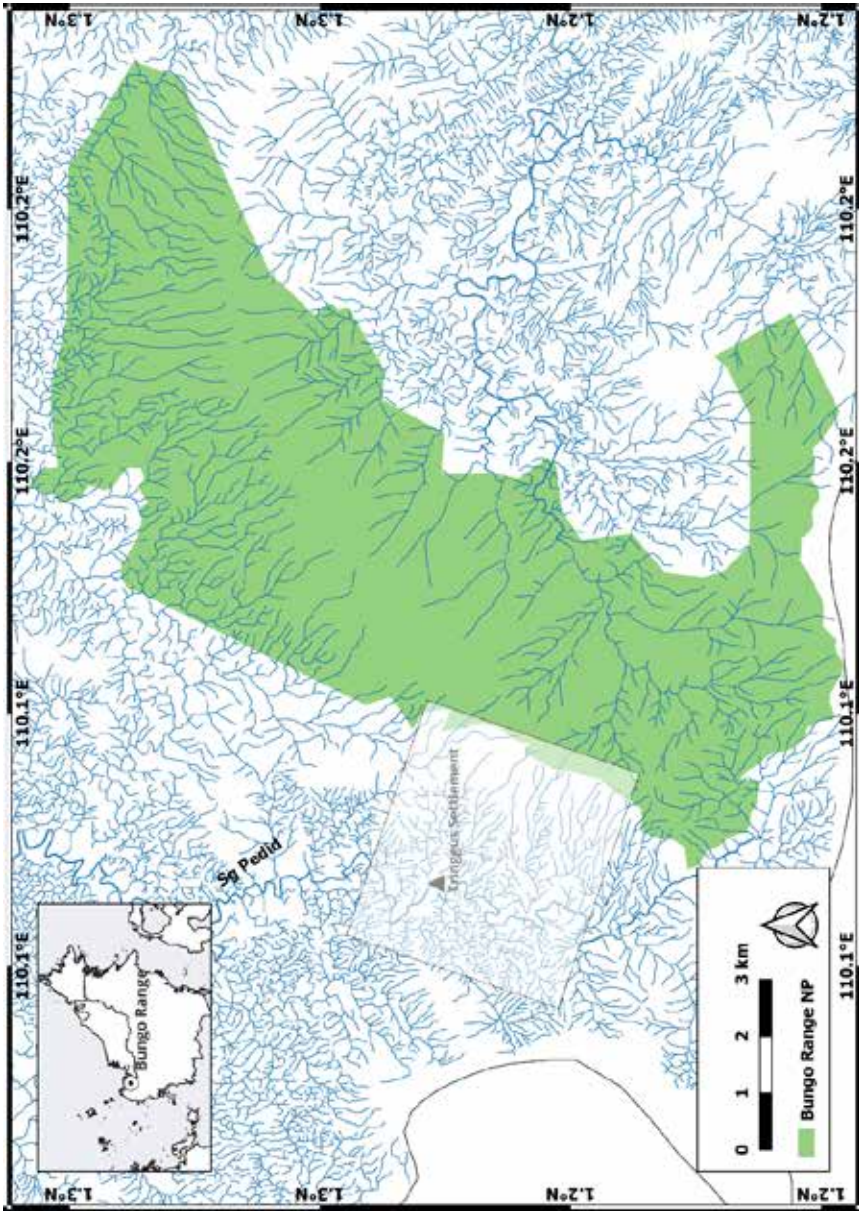


Figure 1.1. Map of Bungo Range National Park and the expedition area (shaded box).



THEME:
**GEOLOGICAL STUDY
AND ZOOLOGICAL
EXPLORATION**

THE ANURANS OF SOUTHWESTERN BUNGO RANGE

Ramlah Zainudin, Nooraina Atira Alaudin, Muhammad Fadzil Amram, Dasi Ong Yaqut Ong, Nur Hidayah Zulkefli, Julius Anak Georgy and Nurnatasha Amira Rosdi

Bau (Sarawak gold mining town) is located about 1 hour drive from Kuching, Sarawak and surrounded by beautiful limestone formations such as Fairy and Wind Caves. In 26th February 2009 Bau mountain ranges known as Bungo Range was gazetted as Nature Reserve with a size of 8.096 ha. The exact location of Bungo Range lies at 1° 16' latitude and 110° 9' longitude. It is one of the 400,000 hectares that will be included in the future of Heart of Borneo initiatives. The area is an important water catchment area, located upstream of Sg Sarawak and covers primary and secondary forests. Thus the study area is important for the documentation of biodiversity for future management and preservation.

Results from a five-day sampling trip carried out at Bungo Range, Bau Sarawak discovered 17 species of frogs in total (**Table 14.1**). This comprises about 25% of the total species known from Borneo. The species collected (**Figure 14.1**) were represented by six families namely Bufonidae (6 species), Megophryidae (3 species), Ranidae (2 species), Microhylidae (2 species), Rhacophoridae (2 species) and Dicroglossidae (1 species). Most of the species found are secondary forest dwellers that occupy slightly disturbed fragmented forest. Examples of forest species recorded in the area include *Ansonia spinulifer*, *Microhyala borneensis*, *Gastrophrynoides borneensis* and *Kalophrynus heterochirus*, while the forest edge dwellers include *Chalcorana raniceps* and *Polypedates marotis*.

Table 14.1. List of anurans found at Bungo Range, Bau Sarawak Malaysia.

Family	Scientific name	Common name
Bufonidae	<i>Ansonia longidigita</i> Inger 1960	Long-fingered slender toad
	<i>Ansonia minuta</i> Inger 1960	Dwarf slender toad
	<i>Ansonia spinulifer</i> Macquard 1890	Spiny slender toad
	<i>Ingerophyrnus divergens</i> Peters 1871	Forest toad
	<i>Pelophyrne guentheri</i> Boulenger 1882	Günther's dwarf toad
	<i>Pelophyrne signata</i> Günther 1872	Lowland dwarf toad
Dicroglossidae	<i>Limnonectes kuhlii</i> Tschudi 1838	Kuhl's Creek Frog
Megophryidae	<i>Leptobranchella gracilis</i> Günther 1872	Sarawak Slender litter frog
	<i>Leptobranchium abbotti</i> Cochran 1926	Lowland litter frog
	<i>Leptobranchella juliandringi</i> Eto, Matsui and Nishikawa 2015	Dring's dwarf litter frog
Microhylidae	<i>Kalophyrnus heterochirus</i> Boulenger 1900	Variable sticky frog
	<i>Microhyla borneensis</i> Parker 1928	Borneo narrow-mouthed frog
	<i>Gastrophrynoides borneensis</i> Boulenger 1897	Borneo narrow-mouthed toad
Ranidae	<i>Chalcorana raniceps</i> Peters 1871	White-lipped frog
	<i>Staurois guttatus</i> Günther 1858	Black-spotted rock frog
Rhacophoridae	<i>Philautus tectus</i> Dring 1987	Obscure bush frog
	<i>Polypedates macrotis</i> Boulenger 1891	Dark-eared tree frog



Figure 14.1. Photographs of frog species found at Bungo Range, Bau. A, *Ansonia minuta*, B, *Ansonia spinulifer*, C, *Ingerophrynus divergens*, D, *Pelophryne guentheri*, E, *Pelophryne signata*, F, *Limnonectes kuhlii*, G, *Leptolalax gracilis*, H, *Leptobrachium abbotti*, I, *Kalophrynus heterochirus*, J, *Microhyla borneensis*, K, *Philautus tectus*, L, *Gastrophrynoides borneensis*.

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.