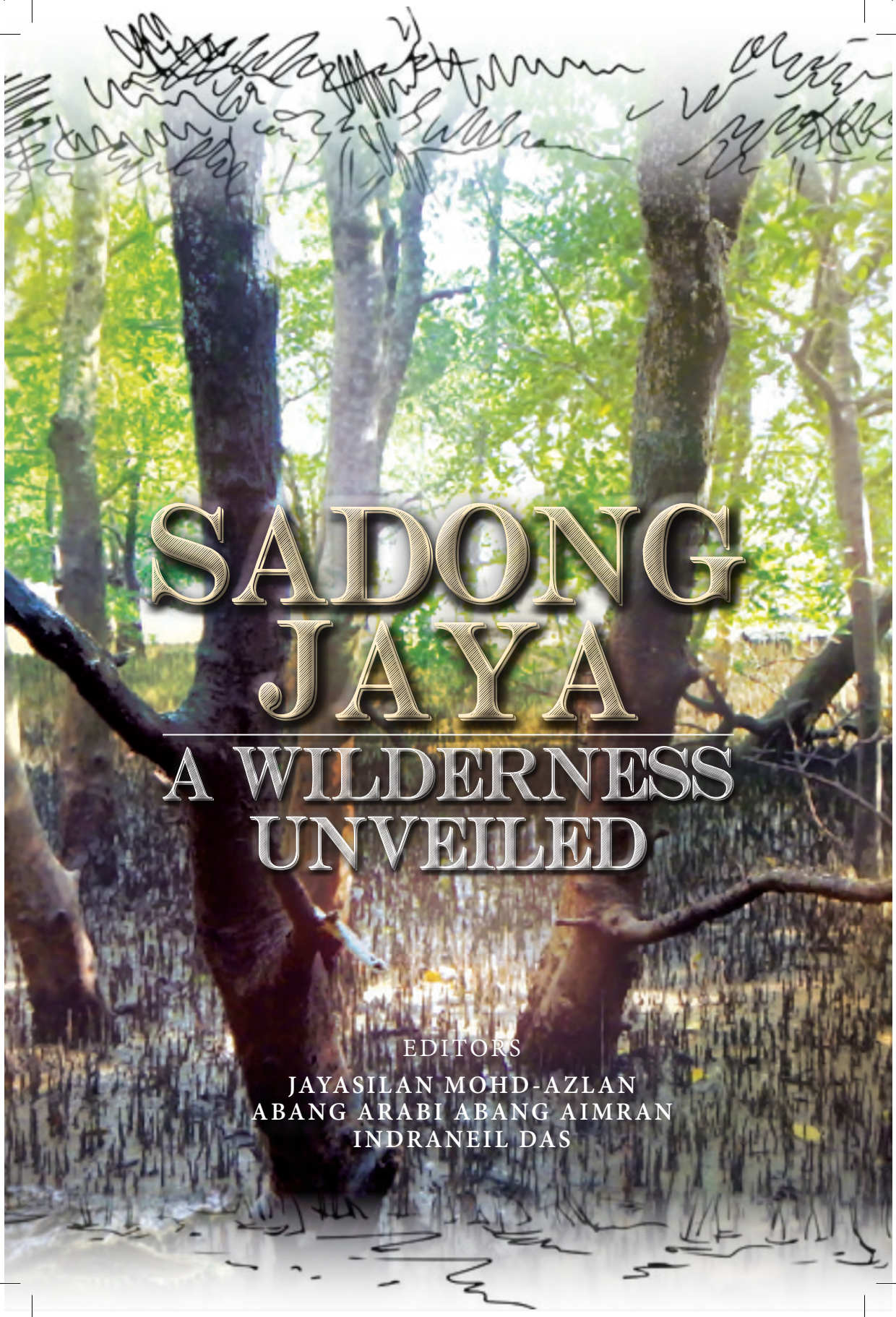

SADONG JAYA
A WILDERNESS UNVEILED
EDITORS
JAYASILAN MOHD-AZLAN
ABANG ARABI ABANG AIMRAN
INDRANEIL DAS

Sadong Jaya Drone Shots
by Mohamad Fizl Sidq Ramji

SADONG JAYA

A WILDERNESS UNVEILED

SADONG JAYA

A WILDERNESS UNVEILED

EDITORS

JAYASILAN MOHD-AZLAN
ABANG ARABI ABANG AIMRAN
INDRANEIL DAS

UNIVERSITI MALAYSIA SARAWAK

SADONG JAYA
A WILDERNESS UNVEILED

Published in Malaysia by
UNIMAS Publisher,
Universiti Malaysia Sarawak,
94300 Kota Samarahan,
Sarawak, Malaysia.

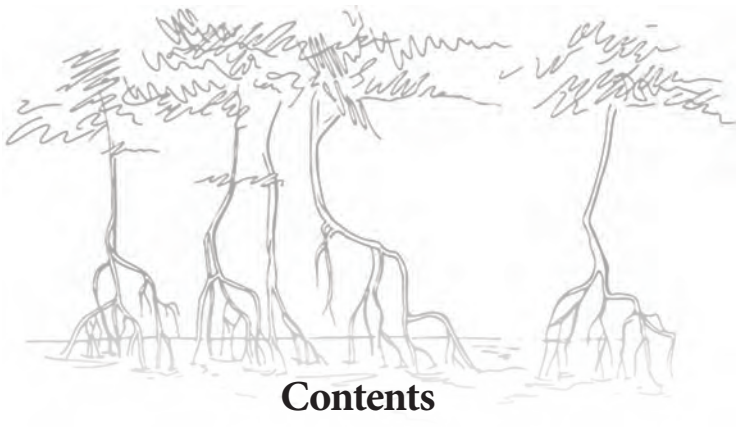
Co-publisher
Sarawak Forestry Corporation,
Lot 218, KCLD, Jalan Tapang,
93250 Kota Sentosa, Kuching,
Sarawak, Malaysia

Printed in Malaysia by
Lee Ming Press Sdn Bhd
No. 48, Jalan Ellis,
93300 Kuching,
Sarawak, Malaysia.

Cover: Pneumatophores of *Sonneratia alba* and *Avicennia marina* at the Sungai Semera Estuary. Photo: Ismail Jusoh

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

SADONG JAYA : A WILDERNESS UNVEILED / EDITORS JAYASILAN MOHD-AZLAN,
ABANG ARABI ABANG AIMRAN, INDRANEIL DAS.
ISBN 978-967-2298-43-4
1. Mangrove ecology--Malaysia--Sadong Jaya (Sarawak).
2. Mangrove forests--Malaysia--Sadong Jaya (Sarawak).
3. Biodiversity--Malaysia--Sadong Jaya (Sarawak).
4. Government publications--Malaysia.
I. Jayasilan Mohd-Azlan. II. Abang Arabi Abang Aimran.
III. Indraneil Das, 1964-.
577.6980959522



Contents

Foreword

Sarawak's mangrove forests are some of the most endangered habitats, and their continued exploitation for a variety of purposes raises the need for substantial research. Many of us here in Universiti Malaysia Sarawak wade into such forests, in the hopes of generating new, critical knowledge. I would like to commend the efforts by Sarawak Forestry Corporation Sdn. Bhd. for their support in collecting data on the biodiversity of Sadong Jaya Mangroves, which forms the material for the book. The work is also expected to be important for local communities, to aid them better understand, appreciate and perhaps use their resources sustainably, such as an interpretation tool to guide ecotourists and others to the Sadong Jaya Mangroves.

As will be evident to the readership, a variety of approaches have been taken by the authors of this volume. The volume's Editors, J. Mohd-Azlan, Abang Arabi and Indraneil Das emphasize the unusual conservation importance of mangrove forests. Ismail Jusoh present a brief description of the plant diversity. Within the zoological sciences, separate contributions lead by a specialist include investigations on insects by Wan Nuraine; ichthyological communities by Fatimah A'tirah; description of the bird diversity by Mohamad Fizl Sidq Ramji; a description of the frogs and reptiles by Indraneil Das; and the small mammal community by Faisal Ali. The book wraps up with chapters on related social elements, such as use of natural resources by Mohamad Suhaidi, and finally, the ecotourism potential of Sadong Jaya by Dayang Affizah.

I hope, in some small way, this volume will be useful to stakeholders, be it the business sector or the wider public, to whom we remain connected through our common thoughts on biodiversity protection and appreciation for nature.

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

Message

Sarawak is located within one of the world's biodiversity hotspots, and home to a variety of landscapes, that include mangrove forests. Mangrove ecosystems are among the most threatened habitats in the world. An important source of primary productivity, its ecosystem functions and refuge to a diverse biota, the value of such forest types have remained underappreciated in terms of being brought under the formal protected areas system.

Biodiversity is one of the top state agendas, whereby the State of Sarawak, with the establishment of Sarawak Forestry Corporation (Park and Wildlife) 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. This book, based on new research by the staff of our two institutions, brings together information on species, their habitats and other aspects of natural history, and the human community's perception on conservation and sustainable use.

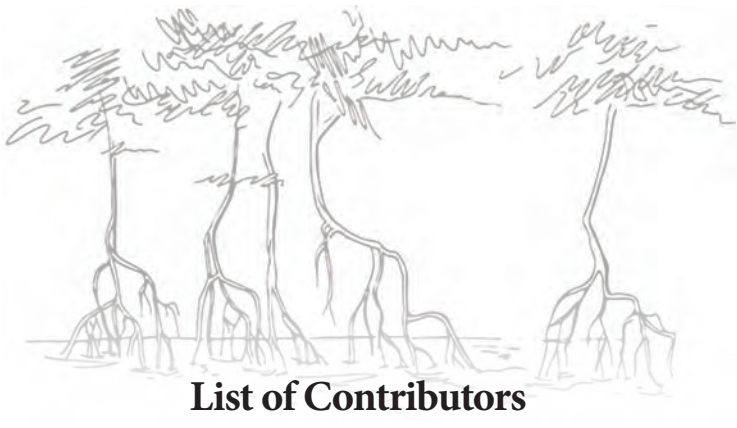
Identifying the distribution, densities and habitat use of plant and animal species in mangrove forests are often seen as a challenge. Nevertheless, these data are essential for understanding their ecology, and in facilitating management of such critical ecosystems.

The faunal studies include, insects, fishes, frogs, reptiles, birds, bats, rodents, shrews and primates. Information on how anthropological activities interrelate with biodiversity is highlighted, and is shown to be a component of biodiversity function whereby the dependence of humans on natural resources and mangrove landscapes remain entwined.

This book is intended for local stakeholders, management authorities, naturalists, researchers and for the general public. It is hoped that nature enthusiasts and those who are interested in tropical biodiversity will find this book beneficial. Finally, we hope that this book will contribute to increasing the knowledge and awareness of our national heritage.

Prof. Dr Wan Hashim Wan Ibrahim
Deputy Vice Chancellor, Research and Innovation, UNIMAS

Mr[illegible]vald Braken Tisen
Deputy CEO, Sarawak Forestry Corporation (Park and Wildlife)



List of Contributors

Mohd Zahid Zainal Abidin
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; mzahid292@yahoo.com

Abang Arabi Abang Aimran
Sarawak Forestry Corporation, Lot 218, KCLD, Jalan Tapang, Kota Sentosa, 93250 Kuching, Sarawak, Malaysia; arabi@sarawakforestry.com

Dayang Afizzah Awang Marikan
Faculty of Economics and Business, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; amdaffizah@unimas.my

Faisal Ali Anwarali Khan
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; akfali@unimas.my

Kamsiah Ali
Faculty of Social Sciences and Humanities, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; akamsiah@unimas.my

Raja Nur Atiqah Raja Azizi
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; raja_tiqah@yahoo.com

Paschal Dagang
Forestry Corporation, Lot 218, KCLD, Jalan Tapang, Kota Sentosa, 93250 Kuching, Sarawak, Malaysia; paschald@sarawakforestry.com

Indraneil Das
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; idas@unimas.my

Julius anak William Dee
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; julius9214@yahoo.com

Marcellinus Isaac Stia Dominic
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; 19020142@siswa.unimas.my

Farah Nabillah Abu Hassan Aidil Fitri
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.

Ratnawati Hazali
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; hratnawati@unimas.my

Hilda Jelembai Neilson Ilan
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.

Dayang Hafizah Abang Iskandar
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; 58538@siswa.unimas.my

Wan Nurainie Wan Ismail
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; wiwnurainie@unimas.my

Syameera Jemat
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia;
59217@siswa.unimas.my

Emy Ritta Jinggong
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; rittaemy@gmail.com

Ismail Jusoh
Plant Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; jismail@unimas.my

Veronica Leah
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; vleahcambers@gmail.com

Yuvarajan Manivannan
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; yuvanyuv7@gmail.com

Wahap Marni
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; mwahap@unimas.my

Veronica Martin
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; veronica95martin@gmail.com

Fatimah A'tirah Mohamad
Aquatic Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; amfatimah@unimas.my

Mohammad-Azlan Jayasilan
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; azlan@unimas.my

Muhd Amsyari Morni
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; amsyari.morni92@gmail.com

Mohd Nasarudin Harith
Aquatic Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; hmnasarudin@unimas.my

Awang Khairul Ikhwan
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; akikhwan576@gmail.com

Lisa Lok Choy Hong
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; lisalokchoyhong@gmail.com

Norfarhana Mazlan
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; farhanamz@outlook.com

Neilson Ilan Mersat
Faculty of Social Sciences and Humanities, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; mnilan@unimas.my

Mohamad Jalani Mortada
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; mmjalani@unimas.my

Harris Norman Mustaffa
Aquatic Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; mfmkamal@unimas.my

Ng Wen Teng
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; 17020165@siswa.unimas.my

Anthony Keegan Pine
Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak 94300 Kota Samarahan, Sarawak, Malaysia; tonykpine@gmail.com

Praveena Rajasegaran
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; praveenarasi94@gmail.com

Mohamad Fizl Sidq Ramji
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; rmfizl@unimas.my

Ahmad Irfan Abdul Razak
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; 40409@siswa.unimas.my

Isa Sait
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; sisa@unimas.my

Mohamad Suhaidi Salleh
Faculty of Social Sciences and Humanities, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; smsuhaidi@unimas.my

Siti Nurlydia Sazali
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; ssnurlydia@unimas.my

Nur Nadhirah Izzaty Selamat
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; 17020160@siswa.unimas.my

Shafri Semawi
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; sshafri@unimas.my

Sundai Silang
Forestry Corporation, Lot 218, KCLD, Jalan Tapang, Kota Sentosa, 93250 Kuching, Sarawak, Malaysia;
sundai@sarawakforestry.com

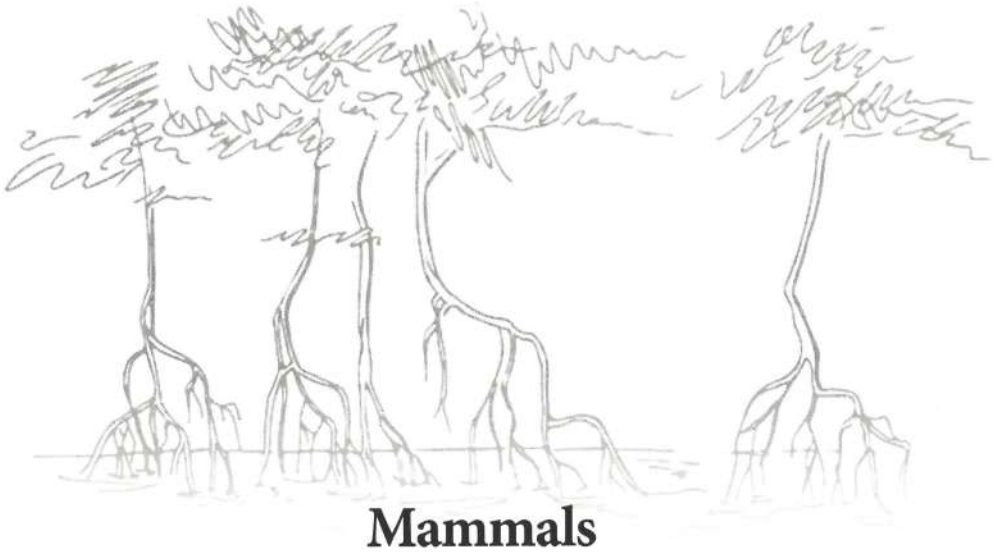
Wan Nur Syafinaz Wan Azman
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; wannursyafinaz@gmail.com

Richard Toh
Aquatic Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; trichard@unimas.my

Teo Su Yee
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; 58130@siswa.unimas.my

Farah Zaini
Faculty of Social Sciences and Humanities, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia;
zfarah@unimas.my

Syamzuraini Zolkapley
Animal Resource Science and Management Programme, Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; syamzuraini@gmail.com



Mammals

Faisal Ali Anwarali Khan, Emy Ritta Jinggong, Wan Nur Syafinaz Wan Azman, Norfarhana Mazlan, Mohammad Zahid Zainal Abidin, Muhd Amsyari Morni, Julius William Dee, Yuvarajan Manivannan, Praveena Rajasegaran, Syamzuraini Zolkapley, Raja Nur Atiqah Raja Azizi, Shafri Semawi, Paschal Dagang and Sundai Silang

Introduction

Over 50% of the land surface in south-east Asia, including Borneo, has been converted for agricultural use, contributing to the high rate of deforestation (Zhao *et al.*, 2006), such development severely impacting the mammalian faunas. Primates are often considered crucial among the tropical arboreal faunas (Eisenberg and Lockhart, 1972). They use a range of forest resources, suggestive of vital roles in the ecology of tropical forests, including seed dispersal (Corlett, 2009). Borneo's primate community is a vibrant one, and often regarded as useful indicators of both lowland and highland forest diversity (Meijaard and Nijman, 2003). Western Sarawak harbours 11 of 14 primate species known from Sarawak State (Phillipps and Phillipps, 2016). The current population trend of many primate species in Sarawak shows a marked decrease due to habitat loss and illegal hunting. Therefore, field surveys for primates are necessary to document distribution ranges, especially in localities undergoing rapid development.

Borneo is also known as a biodiversity hotspot for bats, with a total of 99 species recorded (Phillipps and Phillipps, 2016). Bats diversity in tropical rainforests is directly influenced by the complex ecological interaction between the fauna and the forest (Kumaran *et al.*, 2011). They depend on forests and are also sensitive to disturbance and landscape change (Struebig *et al.*, 2008). Bats play essential roles in tropical rainforests and perform ecosystem services. Fruit bats help maintain genetic diversity by cross-pollination of many species of plants and act as seed dispersers (Fujita and Tuttle, 1991). Insectivorous bats, on the other hand, are consumers of nocturnal flying insects and have an essential role in controlling and suppressing insect abundance (Jones, 2002;