

FAUNA OF MALAYSIA

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WILDLIFE MANAGEMENT AND SUSTAINABILITY

#Selamatkan
HutanauMalaysia



FAUNA OF MALAYSIA

**WILDLIFE
MANAGEMENT
AND
SUSTAINABILITY**

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Published in Malaysia by / Diterbitkan di Malaysia oleh

DEPARTMENT OF WILDLIFE AND NATIONAL PARKS (PERHILITAN)
PENINSULAR MALAYSIA
KM 10, Jalan Cheras
56100 Kuala Lumpur, Malaysia

<https://www.wildlife.gov.my>
E-mail: pakp@wildlife.gov.my



Cataloguing-in-Publication Data

Perpustakaan Negara Malaysia

A catalogue record for this book is available from the National Library of Malaysia

ISBN 978-967-5557-55-2

Design: PERHILITAN
Layout: PERHILITAN

Design by / Rekaan Oleh : Percetakan Rita
Printed in Malaysia by / Dicitak di Malaysia oleh :

Foreword

I am glad to find that our researchers in Malaysia, from Peninsular Malaysia, Sabah, and Sarawak, are contributing to the writing of this book. This book is written based on diversity aspects of wildlife, management, and sustainability, and on integrating diverse species of flora and fauna in Malaysia. I believe that the scientific discoveries made through the collection and reporting of baseline data on flora and fauna have inspired all researchers including Malaysian and international researchers, to write this book. They had discovered more than they were looking for.

The publication throughout this book is the result of such collaborative work with 17 Malaysia agencies and bodies, and 8 international agencies such as the Department of Wildlife and National Parks (PERHILITAN) Peninsular Malaysia (PERHILITAN), the Sarawak Forestry Department, Malaysian Nuclear Agencies, and other national bodies such as UNIMAS, UMS, UM, UTHM, UKM, UniZA, UPM, USIM, and Cardiff University.

It thus gives me great pleasure to write the foreword to this informative books, which containing 25 chapters on various aspect of the diversity of wildlife related to management and sustainability throughout Malaysia. I congratulate all the authors for contributing to this informative book and I hope this books will be useful to all stakeholders and to those who remain connected through our reliance on conserving our wildlife.

YBhg Dato' Abdul Kadir Abu Hashim
Director General
Department of Wildlife and National Parks (PERHILITAN),
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Preface

In 2020, Malaysia declared the complete extinction of the Sumatran rhinoceros (*Dicerorhinus sumatrensis*). As a tribute, this book has highlighted the front page of our lost iconic Sumatran rhino as a stark reminder for our future generations that time will judge us if we have done enough for our Malaysia wildlife.

This book also highlights the status, previous records, and general views of the Malaysian community about the extinction of the Sumatran rhino. In addition to the lessons learned from the extinction of this species, the content in this book also highlights the management and sustainability of other wildlife, consisting of flora and fauna found in Peninsular Malaysia and the Bornean islands of Sabah and Sarawak.

Serves as a guide for future generations of students, teachers, researchers, planners, managers, and also the public. The facts and figures are important for wildlife authorities to make informed decisions in order to sustain the wildlife existence and to prevent further extinction of large-sized species such as Malayan Tiger, Seladang, Sambar Deer, Tapir, Elephant, Siamang and Orangutans.

This book covers 25 manuscripts with a combination of diversity aspects of wildlife management and sustainability and integrating diverse species of flora and fauna such as gelam, local herbs, lichens. The fauna includes Sumatran rhinoceros, Proboscis monkey, Terrapin, Western tarsier and other species of non-human primates. In general, the chapter includes the legislation as well for forest management, managing human-wildlife conflict, and sustainable ecotourism development.

We hope the book series on fauna of Malaysia on wildlife management will be the major source of reference for students and teachers to understand the basic concepts and principles of ecology and environmental sustainability.

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Table of Contents

Foreword	iii
Preface	iv
Contributors	v - ix
<hr/>	
01 Perceptions on the Sumatran rhinoceros conservation in Malaysia <i>Jephie Sompué, Mohd Samsudin Mohd Suri & Mohd Tajuddin Abdullah</i>	1 - 11
<hr/>	
02 Some evidences of Sumatran rhinoceros presence in Temenggor Forest Reserve, Perak <i>David Magintan, Mohammad Rufino Baipura Bin Muhammad, Cosmas Ngau & Dennis Ten Choon Yung</i>	12- 16
<hr/>	
03 The Evolution of Sarawak Forestry Legislation in Forest Management <i>Denny Kana Joshua & Jayasilan Mohd -Azlan</i>	17 - 41
<hr/>	
04 Managing human-wildlife conflicts through wildlife value orientation <i>Jephie Sompué, Keet-Yee Hoh & Emily Gilbert</i>	42 - 72
<hr/>	
05 Phytochemical preference of dusky leaf monkey (<i>Trachypithecus obscurus Obscurus</i>) in gunung ledang, Johor, Malaysia <i>Hidayah Haris, Mohd Faudzir Najmuddin, Nursyuhada Othman, Nur Asmira Md-salleh, Eddyutowo Yulinda Wahyuni, Nur Hartini Sariyati, Furzani Pa'ee, Bañrul Munir Md-zain & Muhammad Abu Bakar Abdul-latiff</i>	73 - 85
<hr/>	
06 Semoq beri tribe and sustainable ecotourism development in Tasik Kenyir <i>Azlinzuraini Ahmad, Nurul Izni Kamarulzaman, Nor Aqilah Kamarudi, Ramle Abdullah, Muhammad Abi Sofian Abdul Halim, Mohamad Asmawi Ibrahim, Muhammad Fuad Abdullah, Candyrilla Vera Bartholomew, Sholehah AB Rahman, Mohd Noor Afiq Ramlee, Mohd Fadli Hussin, Muhamad Aidil Zahidin & Mohd Tajuddin Abdullah</i>	86 - 99
<hr/>	
07 Gelam: Morphology, ecology and distribution in Kelantan <i>Alia Diyana Mohamed Hassim, Appalasaamy Sugaruthi, Arumugam Niuaarani & Javaraj Vijaya Kumaran</i>	100 - 111
<hr/>	
08 DNA profiles of local herbs in Sarawak <i>Rosmawati Saat, Zuliza Ahmad, Siti Lyan Kamarol & Hasneza Iboi</i>	112 - 123
<hr/>	
09 Analysis of trace elements in epiphytic lichens from Kelantan and Terengganu, Malaysia <i>Boon Siong Wee, Shakirah Abd Shukur, Azian Hashim, Shamsiah Abdul Rahman, Md Suhaimi Elias, & Nazaratul Ashifa Abdullah Salim</i>	124 - 128
<hr/>	
10 Sago Wastewater: Characterization and Degradation by TiO ₂ photocatalysis <i>Devagi Kanakaraju, Wong Soon Pang & Muhammad Mashur Besar</i>	129 - 138
<hr/>	
11 Hydrodynamic flows in mangrove swamps of the Merbok Estuary, Malaysia <i>Fang Yenn Teo, Ju Lian Chong, & Roger Falconer</i>	138 - 146
<hr/>	
12 Paddy agroecosystem as the pathway of aquatic alien fish species invasion <i>Mohamad Aqmal-Naser & Amiruddin Ahmad</i>	147 - 161
<hr/>	
13 Dynamic morphological awareness assessment and conservation of <i>Macrobranchium rosenbergii</i> (de man, 1879) from the Nyatoh River, Terengganu: insight on morphometric variation by morphotype and sexual characteristics <i>Okomoda Victor Tosin, Hon Jung Liew, Suhairi Mazelan, Mohd Sabri Muda, Zaidi Ibrahim, Iffa Rezuan Rusdi, Rohisyamuddin Othman, Nurul Hayati Ismail, Gusti Afis Gusti Roslan, Sairatul Dahlanis Ishak, Ahmad Najmi Ishak, Nor Azman Kusan, Marina Hussain, Norainy Husin, & Mhd Ikhwanuddin</i>	162 - 183
<hr/>	
14 Translating biological knowledge to conservation management of Malaysia's mud crab populations <i>Hanafiah Fazhan, Mohamad Jalilah, Annette Jaya-Ram, Sairatul Dahlanis Ishak Qingyang Wu, Mhd Ikhwanuddin & Khor Waiho</i>	184 - 202
<hr/>	
15 Spatial and temporal pattern of fish assemblages in Setiu Wetlands, Terengganu, Malaysia <i>Siti TafzilMeriam Sheikh Abdul Kadir, Meii Mohamad-Norizam, Nor Bakhiah Baharim, Takaomi Arai, Hiroyuki Motomura, Mohd Lokman Husain, Mazlan Abd. Ghaffar & Mohd Azmi Ambak</i>	203 - 230
<hr/>	
16 Semoq beri tribe and sustainable ecotourism in Tasik Kenyir <i>Nor Ashikin Samiran, Anuar Mcafee, Nur Farah Wahida Mohd Zakir, Nur Khairunnisa Ismal Zulkarnain, Noor Hafifa Razali, Nurin Nayli Mohamad Nasir, Mazrul Aswady Mamat, Hasrulzaman Hassan Basri, Nobuyuki Yamaguchi & Mohd Tajuddin Abdullah</i>	231 - 248
<hr/>	
17 The unique behaviour of <i>Nasalis larvatus</i> in Bako National Park <i>Mohamad Kombi, Halik Akop, Anuar Japar, Mohd Tajuddin Abdullah & Madinah Adrus</i>	249 - 255
<hr/>	
18 Review of non-human primates in Malaysia: Conservation status and their distribution <i>Madinah Adrus & Nur Aida Md Tamrin</i>	256 - 268
<hr/>	
19 Small mammals and birds of Pulau Redang, Terengganu Archipelago <i>Nur Dayana Zulkifli, Hannah Syakirah Ab Hamid, Mazrul Aswady Mamat, Nobuyuki Yamaguchi & Mohd Tajuddin Abdullah</i>	269 - 281
<hr/>	
20 Assessment of small mammals and avifauna in Tasik Kenyir and Gong Badak, Terengganu <i>Hannah Syakirah Ab Hamid, Nur Dayana Zulkifli, Mazrul Aswady Mamat, Nobuyuki Yamaguchi & Mohd Tajuddin Abdullah</i>	282 - 295
<hr/>	
21 Autopsy report on <i>Nasalis larvatus</i> in Bako National Park <i>Zainal Zahari Zainuddin, Wahap Marni, Madinah Adrus, Siali Aban & Mohd Tajuddin Abdullah</i>	296 - 302
<hr/>	
22 Sequence variation and phylogenetics relationships of Western Tarsier (Primate: <i>Cephalopachus bancanus</i>) inferred using partial sequences of the cytochrome b segment of the mitochondrial DNA <i>Muhamad Aidil Zahidin, Mohd-Ridwan Abd Rahman, Norehan Abd Jalil, Nur Mukminah Naharuddin, Millawati Gani & Mohd Tajuddin Abdullah</i>	303 - 320
<hr/>	
23 Molecular and sero-epidemiological study of Leptospirosis on non-human primates in Matang and Bako in Sarawak <i>Siva Thayaparan, Fairuz Amraan, Ian D. Robertson & Mohd Tajuddin Abdullah</i>	321 - 332
<hr/>	
24 Field survey of primate species in selected areas of Sarawak <i>Millawati Gani & Ho Licia</i>	333 - 341
<hr/>	
25 Animal road mortality in a highly urbanised environment <i>Norbet Simon, Syaqqinah Ayob, Ehwani Ngadi & Norhayati Ahmad</i>	342 - 355
<hr/>	
Glossary	356
Index	357 - 363
About the Editors	364 - 365
Summary	366

AUTOPSY REPORT ON *Nasalis larvatus* IN BAKO NATIONAL PARK

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ABSTRACT

An individual of *Nasalis larvatus* was reported injured by Mr Siali Aban on the 18th January 2012, which was probably due to a fight more than a week ago. However, according to the Bako National Park canteen operator, the animal was first sighted with injury about three weeks ago. The animal was tranquilized by a team of trained UNIMAS staff on the 22 January 2012 using Tilatamine and Zolazepam (Zoletil 100) at a dosage of 3-5 mg per kilogram. Induction time was 9 minutes and recovery occurred after about 60 minutes. Animal was treated with topical antiseptics and the wound dressed. Animal died after 2 ½ hours. Eight ml of blood was collected from the heart about 15 minutes after death. Post mortem was carried out on the 24 January 2012 for 4 hours by Dr Zainal Zahari Zainuddin, assisted and witnessed by Mohd Tajuddin Abdullah, Siali Aban, Wahap Marni, Madinah Adrus and postgraduate students.

Keywords: *Nasalis larvatus*, tranquilized, post mortem, recovery.

INTRODUCTION

Nasalis larvatus or known by its common name as proboscis monkeys, are known as a unique non-human primate among Old World Monkeys and are endemic to the island of Borneo (Bennett & Gombek, 1993; Rowe, 1996). The natural habitats for this species are lowland coastal rainforests which contain mangroves and peat swamp forests (Salter *et al.*, 1985). They are folivore-frugivores colobines, eating mostly young leaves, unripe fruits, flowers and animal prey (Bennett & Davis, 1994; Rowe, 1996). These animals are classified by the IUCN Red List of Threatened Species (2017) as endangered, totally protected species under laws of Malaysian Borneo (Sarawak- under Wildlife Protection Ordinance 1998 and Sabah- under Wildlife Conservation Enactment 1997) and are listed in the CITES Appendix I. This species is experiencing a decrease in population due to threats especially caused by human activities such as agriculture, logging and

expansion of habitation. These activities affect their specialised diet and habitat specificity, which in turn results in their declined population (Meijaard & Nijman, 2000; Sha *et al.*, 2008; Bismark, 2010).

Bako National Park is known as the first and the smallest national park in Sarawak (2,728 hectares) and located between longitudes 110°26' to 110°36' E and latitude 1°42' to 1°44' N, and altitude ranges from sea level up to 244 meters (Hazebroek & Kashim, 2000). This park was covered with seven different types of forest namely beach forest, cliff vegetations, mixed dipterocarp forest, peat swamp forest, heath or kerangas forest, mangrove forest and shrub land forest (Hazebroek & Kashim, 2000, Zaini & Ilias, 2005). The main attraction for tourists in this national park is *N. larvatus* and this park also inhabited by other fauna such as 23 species of mammals including bearded pig (*Sus barbatus*), silver-leaf monkeys (*Trachypithecus cristatus*), long-tailed macaques (*Macaca fascicularis*) and colugo or flying lemur (*Galcopterus variegatus*), 150 species of birds and 24 species of reptiles (Hazebroek & Kashim, 2000; Dzullhelmi & Abdullah, 2009).

An individual of *N. larvatus* was reported injured by the park manager. A team of trained UNIMAS staff was sent to the park to save this monkey. However, this individual is identified as having died during treatment. Thus, autopsy reports have been issued by a veterinary doctor and this is the first autopsy report for this species in Bako National Park.

Case Study

An individual of *Nasalis larvatus* (Figure 1) was reported injured by Mr Siali Aban (Bako National Park Manager) on the 18th January, 2012, in Bako National Park, probably due to a fight more than a week ago. However, according to the Bako National Park canteen operator, the animal was first sighted with injury about three weeks ago. The animal was tranquilized by a team of trained UNIMAS staff (Table 1) on the 22 January, 2012, using Tilatamine and Zolazepam (Zoletil 100) at a dosage of 3-5 mg per kilogram. Induction time was 9 minutes and recovery occurred after about 60 minutes. The animal was treated with topical antiseptics and the wound dressed. The animal died after 2 ½ hours. Eight ml of blood was collected about 15 minutes after death. The real situation of Autopsy Report on *Nasalis larvatus* from Bako National Park, Sarawak, is shown in Figure 1 below. Post mortem was carried out on 24 January 2012 for 4 hours by Dr Zaimal Zahari Zainuddin, assisted and witnessed by Mohd Tajuddin Abdulah, Siali Aban, Wahap Marni, Madinah Adrus and postgraduate students (Table 2).

Autopsy Report

The animal has been identified as an adult male *N. larvatus* from Bako National Park, Sarawak (BNP). Detailed information on postmortem results are as follows;

A. General Body Condition

Animal is emaciated and dehydrated.



Figure 1: The Autopsy Report on *Nasalis larvatus* from Bako National Park, Sarawak (photographs by Hafez). (A) Discomfort of an open wound, (B) Tranquilized using Tilatamine and Zolazepam (Zoletil 100) at a dosage of 3-5 mg per kilogram, (C) Induction time was 9 minutes. Taking physical measurements, (D) Treating the wound, and (E) Examining and treating the wound.

Table 1: List of persons during the tranquilization by a team of trained FRST/UNIMAS staff.

No	Name	Designation
1	Wahap Marni	Science Officer, FRST, UNIMAS
2	Madinah Adrus	Graduate Research Assistant; host-parasite
3	Mohamad bin Kohdi@kombi	Sarawak Forestry Department staff
4	Elvy Quatrin anak Deka	MSc student; histology
5	Sarina Mat Yasin	Research Assistant; molecular study
6	Nurshilawati Abdul Latip	BSc Animal Resource Science and Management Programme student; scribe breath calculation
7	Nur Mukminah Naharuddin	BSc Animal Resource Science and Management Programme student
8	Nursyafiqah Shazali	BSc Animal Resource Science and Management Programme student
9	Azuan Roslan	BSc Animal Resource Science and Management Programme student
10	Rahmat Libar	BSc Animal Resource Science and Management Programme student
11	Cinderiana Anne anak Richard	BSc Animal Resource Science and Management Programme student
12	Norsuhana Sabran	BSc Animal Resource Science and Management Programme student
13	Ungku Mahfuzah Ungku Mahmood	BSc Animal Resource Science and Management Programme student
14	Hafez	Photographer

Table 2: List of persons during the post mortem

No	Name	Designation
1	Zainal Zahari Zainuddin	Wildlife Veterinarian, BORA, Sabah.
2	Wahap Marni	Science Officer, FRST, UNIMAS
3	MT Abdullah	Primate Research Leader, Department of Zoology, UNIMAS
4	Siali Aban	Bako National Park Manager
5	Madinah Adrus	Graduate Research Assistant; host-parasite study
6	Mohd Hanif Ridwan	Graduate Research Assistant; primate genome study
7	Mohd Isham Mohd Azhar	MSc student; host-parasite study
8	Elvy Quatrin anak Deka	MSc student; anuran ecology/vocalisation/histology
9	Nurshilawati Abdul Latip	BSc Animal Resource Science and Management Programme student; scribe
10	Hafez	Photographer
11	Laila	Observer

B. Intergumentary

- Deep laceration (8.5x3cm) anterior lateral of right thigh with evidence of cellulitis and some areas of necrosis. Granulation tissues observed. Myiasis with large 1cm maggots of *Chrysomya* species (fly). Puncture wound ventral to lesion with areas of hematoma.
- Deep laceration (2.5x1cm) on the anterior surface of the left foot at the region of the metacarpus. Wound is dry and healing.
- Mastitis of left mammary gland with abscess
- Pox-like lesions on the dorsal surface of the nose extending to the lower left and right eyelids. Lesion is circular, flattened, red and measured 1-2mm diameter.

C. Muscular – skeletal

Myositis and necrosis of muscles with several sinuses that extended deeper into the musculature. Maggots were observed within and in between the muscles. There were also evidence of hemorrhage and degenerative changes of the muscles involved.

D. Digestive System

Hydroperitonium with reddish fluid (50mls). A few endoparasites (helminth) were observed in the third chamber of stomach, small intestine (duodenum) and large intestine.

E. Respiratory System

- Frothy exudate in the trachea.
- Right lung was edematous with frothy white exudate in the bronchi and bronchioles. Mild congestion. Hydrothorax with serum-like exudate (5mls).
- All lobes of the left lung (diphragmatic, mediastinal and visceral) were severely congested. There was severe pulmonary edema. Hydrothorax with reddish exudate (53mls).

F. Hematopoietic System

- Heart - Hydropericardium with reddish brown fluid amounting to 15mls. Petechial to point brush hemorrhage of the pericardium of the left ventricle.
- Liver - Petechial hemorrhage of the dorsal surface of the liver. There was an area of necrosis, 6-7cm diameter extending to the liver parenchyma.
- Spleen - no significant finding

G. Urinary System

Kidney - Left and right kidney are moderately congested.
Urinary bladder - 120 mls of urine in bladder. Normal coloration

H. Tentative Diagnosis

Septicaemia, pulmonary edema and stress.

Several samples have been collected during postmortem for laboratory analysis (bacteriology, parasitology, virology, histology) such as lung, heart, kidney, liver, abscess, pelvic and mesenteric lymph nodes, pox - like lesion, ody fluids - peritoneal, thorax and pericardial fluids, and small and large intestine, rectum (endoparasite). The summary list of samples taken for various tests are shown in Table 3 below:

Table 3: List of samples taken for various tests

No	Sample	Purpose	Agency
1	Maggots	Identification	Department of Zoology, UNIMAS
2	Blood	Plasmodium	Malaria Research Center, UNIMAS
		DNA Genomics	Molecular Ecology Lab, FRST, UNIMAS
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
3	Body fluid	Virus (monkey pox)	Makmal Diagnosa Veterina, Kota Samarahan
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
4	Urine	Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
5	Muscle tissue	Histology	Medical Faculty UIMAS
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
6	Heart	Histology	Medical Faculty UIMAS
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
7	Lymph nodes	Histology	Medical Faculty UIMAS
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
8	Liver	Histology	Medical Faculty UIMAS
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
9	Kidney	Histology	Medical Faculty UIMAS
		Bacteria	Makmal Diagnosa Veterina, Kota Samarahan
10	GIT content	Parasitology	Department of Zoology
		Metagenomics	Future students, Department of Zoology
11	Skin	Museum	Department of Zoology
12	Skeleton	Museum	Department of Zoology

CONCLUSION

As a conclusion, the animal was injured with severe lacerations and hemorrhages of the right thigh. The exposed wound subsequently became infected. There were myiasis and suppuration. The animal was immune-suppressed due to the wounds, stress from other individuals, inability to forage for food, toxemia, viraemia (from pox – like lesions). Collectively, this would result in a bacterial infection and subsequently septicemia and death. Although blood was collected 15 minutes after death, the post mortem changes was not significant in the diagnosis.

ACKNOWLEDGEMENTS

We would like to thank all the trained UNIMAS team for their hardwork during the field trip. This study was supported and funded by a UNIMAS-MGRC research grant Proboscis Genome Project, led by Professor Dr. Mohd Tajuddin Abdullah and colleagues.

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INDEX

A

Abiotic
Acentrogobius viridipunctatus
Acrochordonichthys rugosus
Aenictus sp.
Ageratum conyzoides
Alepes djedaba
Allenbatrachus grunniens
Alouatta pigra
Alouatta seniculus
Ambassis interrupta
Ambassis kopsii
Ambassis urotaenia
Ambassis vachelii
Amphilophus citrinellus
Anabas testudineus
Anabas testudineus
Apis dorsata
Aplocheilichthys armatus
Apogon amboinensis
Arachnida
Arctictis binturong
Arcyobius baliurus
Arius maculatus
Arothron immaculatus
Ascaris spp.
Atule mate
Aulopareia unicolor
Avicennia spp.

B

Banded leaf-monkey
Banded linsang
Barbonymus gonionotus
Barbonymus schwanefeldii
Barking deer
Basillus subtilis
Batagur affinis
Batagur affinis affinis
Batagur affinis edwardmolli
Batagur baska
Bathygobius sp.
Bauto

Betta imbellis
Biodiversity
Biotic
Birds
Black leopard
Black marsh turtle
Blumea balsamifera
Borneo elephant
Borneo Orangutan
Bos gaurus
Bos javanicus
Brachirus orientalis
Brachydanio albolineata
Brevitrygon heterura
Bridelia retusa
Bridelia stipularis
Bruguiera spp.
Bruguiera parvifolia
Brunei
Bukin Ramin
Bukit Merah Laketown Resort
Butis butis

C

Calamus balingensis
Calamus caesius
Calamus conirostris
Calamus insignis
Calamus laevigatus
Calamus manan
Calamus potyostachys
Calamus scipionum
Calamus sedens
Callinectes sapidus
Callionymus belcheri
Callithrix jacchus
Cambodia
Camponotus sp.
Cancer pagurus
Canis aureus L.
Canis familiaris dingo
Canis lupus
Canis lupus familiaris
Canis mesomelus
Capricornis sumatraensis
Capsicum annuum
Carangoides praeustus

Carangoides praeustus
Caranx sexfasciatus
Carebara affinis
Carebara diversus
Carebara silene
Carlito syrigha
Cassis fistula
Cebus apella
Cebus capucinus
Cephalopachus lariang
Cephalopachus dentatus
Cephalopachus bancanus
Cephalopachus bancanus bancanus
Cephalopachus bancanus borneanus
Cephalopachus bancanus natunensis
Cephalopachus bancanus saltator
Chanda spp.
Channa lucius
Channa striata
Chelon melinopterus
Chelonodontops patoca
Chilopoda
Chiropotes chiropotes
Chrysomya sp.
Civettictis civetta
Clarias batrachus
Clarias gariepinus
Clarias macrocephalus
Clouded leopard
Colobus guereza
Common house gecko
Conservation
Crematogaster rogenhoferi
Crematogaster sp.
Crenimugil seheli
Cuon alpinus
Cyclocheilichthys apogon
Cynoglossus bilineatus
Cynoglossus puncticeps

D

Daemonorops angustiflora
Daemonorops calicarpa
Diacamma sp.
Dicerorhinus sumatrensis
Dichotomyctere nigroviridis

Dirinaria sp.
Dorylus orientalis
Dorylus sp.
Drepane punctata
Drombus key

E

East Africa
Echeneis naucrates
Ecotourism
Elaeis guineensis
Elephant
Elephantopus scaber
Elephas maximus
Encrasicholina punctifer
Endau-Rompin National Park
Entamoeba histolytica
Epinephelus coioides
Epinephelus diacanthus
Epinephelus sexfasciatus
Epinephelus striatus
Esomus metallicus
Eurynorhynchus pygmaeus
Evolution
Extinction

F

Favonigobius melanobranchus
Favonigobius reichei
Felis bengalensis
Felis marmorata
Felis planiceps
Felis temmincki
Fibramia amboinensis
Ficus sp.
Flat-headed cat
Freshwater fishes
Fungi

G

Galago senegalensis
Galeopterus variegatus
Gambaran
Gambusia affinis
Gaur
Gazza minuta

Gelam

Gerres erythrourus
Gerres filamentosus
Gerres limbatus

Gerres oyena
Gerres spp.
Giardia lamblia
Glossogobius aureus
Glossogobius circumspectus
Glossogobius giuris
Glossogobius giuris
 Golden cat
 Greater mouse-deer
Grewia sp.

H

Halodule pinifolia
Halophila ovalis
Hampala macrolepidota
Hapalemur aureus
 Hati kijau
Helarctos malayanus
Heliopais personata
Helostoma temminckii
Herklotsichthys dispilonotus
Herklotsichthys quadrimaculatus
Hevea brasiliensis
Hexanematichthys sagor
Himantura uarnak
Hippocampus spinosissimus
Hippocampus trimaculatus
 Hong Kong
Hylobates abboti
Hylobates agilis
Hylobates albibarbis
Hylobates funereus
Hylobates lar
Hylobates muelleri
Hyporhamphus limbatus
Hypsibarbus wetmorei
Hystrix brachyura

I

Ilisha elongata
Ilisha megaloptera
 India

Indonesia
 Insecta
 Invertebrates

J

Johor

K

Kapuas River
Karalla daura
 Kayu Haji Samad
 Kedah
 Kelantan
 Kinabatangan River
Klebsiella pneumonia
Korthalisa laciniosa
 Kuala Selangor Nature Park

L

Labiobarbus spp.
 Large Porcupine
Lates calcarifer
Leiognathus equulus
Leiognathus spp.
 Lemuk Relah
 Leopard cat
Lepidocephalichthys hasselti
Leptobarbus hoevenii
Leptoecilichthys javanicus
Leptospira alexanderi
Leptospira biflexa
Leptospira borgpetersenii
Leptospira broomii
Leptospira fainei
Leptospira inadai
Leptospira interrogans
Leptospira kirschneri
Leptospira kmetyi
Leptospira licherasiae
Leptospira meyeri
Leptospira noguchii
Leptospira santarosai
Leptospira spp.
Leptospira wolbachii
Leptospira wolffii
Lethrinus genivittatus

Lethrinus lentjan

Lichen
 Liningkung
 Loas
 Long-tailed macaque
Loris tradigardus
Lutjanus russellii
Lutjanus argentimaculatus
Lutjanus fulviflamma
Lutjanus johnii
Lutra perspicillata
Lutra sumatrana

M

Macaca arctoides
Macaca fascicularis
Macaca fuscata
Macaca mulatta
Macaca nemestrina
Macaca sylvanus
Macaca thibetana
Macrobranchium amazonicum
Macrobranchium lar
Macrobranchium macrobrachion
Macrobranchium rosenbergii
Macrotermes sp.
 Malay weasel
 Malayan porcupine
 Malayan sun bear
 Malayan tapir
 Malayan tiger
 Malayan wild dog
 Malaysia
 Mammals
 Marbled cat
 Marine fishes
Martes flavigula
Megalops cyprinoides
 Melaka
Melaleuca accedens
Melaleuca acrifolia
Melaleuca acuminata F. Muell
Melaleuca acuminata subsp. acuminata
Melaleuca acuminata subsp. websteri
Melaleuca acutifolia
Melaleuca agathosmoides

Melaleuca aglaia
Melaleuca alternifolia
Melaleuca amydra
Melaleuca biconvexa
Melaleuca bisulcata
Melaleuca blackwelliana
Melaleuca blaerifolia Turcz
Melaleuca blepharosperma
Melaleuca boeophylla
Melaleuca brongniartii
Melaleuca cajuputi
Melaleuca cajuputi subsp. cajuputi.
Melaleuca cajuputi subsp. cumingiana
Melaleuca cajuputi subsp. platyphylla
Melaleuca calcicola
Melaleuca calyptroides
Melaleuca campanae
Melaleuca camptoclada
Melaleuca capitata
Melaleuca cardiophylla
Melaleuca cyrtodonta
Melaleuca dawsonii
Melaleuca dealbata
Melaleuca deanei
Melaleuca decora
Melaleuca quinquenervia
Melaleuca spp.
Melaleuca teretifolia
Metroxylon sagu
Microcos tomentosa
Monodactylus argenteus
Monopterus javanensis
Morinda coreia
 Mosses
 Mount Kinabalu
Muntiacus muntjak
Muraenesox cinereus
Mustela mudipes
 Myanmar
Mycobacterium kansasii
Mycobacterium tuberculosis
Mystacoleucus obtusirostris
Mystus castaneus
Mystus gulio
Mystus nigriceps
Mystus singurigan

N

Nasalis larvatus
Necora puber
Neofelis nebulosa
Neolissocheilus spp.
 Nepal
Nisaetus cirrhatus
 Non-primate
Notopterus notopterus
Nuchequila longicornis
Nycticebus c. coucang
Nycticebus c. insularis
Nycticebus bengalensis
Nycticebus c. menagensis
Nycticebus coucang
Nycticebus kayan
Nycticebus sp.
Nypa sp.

O

Odontoponera denticulata
Oesophagostomum spp.
Ophiocara porocephala
 Orangutan
Oreochromis niloticus
Oryza sativa
Oryzias javanicus
Osphronemus goramy
Osteochilus vittatus
Osteomugil perusii
Ostorhinchus aureus
Oxyeleotris marmorata
Oxyeleotris marmoratus
Oxyeleotris urophthalmus
Oxygaster anomalura
Oxyurichthys ophthalmonema

P

Pachycondyla astuta
Pachycondyla sp.
 Pahang
Pomadasya kaakan
 Pangolin
Panthera leo
Panthera pardus

Panthera tigris
Papio anubis
Parachela maculicincta
Paramonacanthus pusillus
Parkia speciosa
Parmotrema sp.
Pegasus laternarius
Pelates quadrilineatus
 Penang
 Perak
Periophthalmodon schlosseri
 Perlis
Pheidole sp.
 Philippines
Photopectoralis bindus
 p-hydroxyphenyl
Physis sp.
 Pig-tailed macaque
Pisodonophis cancrivorus
Planiliza subviridis
Plasmodium knowlesi
Platycephalus cultellatus
Platycephalus indicus
Platycephalus spp.
Plectocomia elongate
Plotosus lineatus
 Poikilohydric
Polynemus spp.
Polyrhachis sp.
Pomacanthus sp.
Pomadasya argenteus
Pongo abelli
Pongo p. morio
Pongo p. pygmaeus
Pongo pygmaeus
Pongo tapnultensis
Portunus pelagicus
Portunus sanguinolentus
Presbytis chrysomelas
Presbytis f. robinsoni
Presbytis f. femoralis
Presbytis femoralis
Presbytis frontata
Presbytis hosei
Presbytis melalophos
Presbytis neglectus

Presbytis f. ignita
Presbytis rubicunda
Presbytis sabana
Presbytis siamensis
Presbytis siamensis siamensis
 Primates
 PrimaTourism
Prionodon linsang
Pristolepis fasciata
 Proboscis monkey
Prolemur simus
Propithecus edwardsi
Psammogobius biocellatus
Pseudorhombus arsius
Pterygoplichthys pardalis
Puntigrus tetrazona

R

Rasbora paviana
Rasbora trilineata
Rasbora vulgaris
Rastrelliger kanagurta
 Red-eared terrapin
 Reptiles
Rhinogobius similis
Rhizomys pruinosus
Rhizophora apiculata
Rhizophora mucronata
Rhizophora sp.
 Rome
 Rotan batu
 Rotan duduk
 Rotan jernang
 Rotan kerai
 Rotan manau
 Rotan mantang
 Rotan sabong
 Rotan sega
 Rotan semambu
 Rotan semut
 Rotan tanah
 Rotan tawau
 Rotan tunggal

S

Sabah
Saguinus fuscicollis
Saguinus niger
Saguinus oedipus
Saimiri boliviensis
Saimiri oerstedii
Saimiri sciureus
 Sambar deer
 Sarawak
Sardinella fimbriata
Sardinella gibbosa
Scatophagus argus
Scomberoides tol
Scylla olivacea
Scylla paramamosain
Scylla serrata
Scylla tranquebarica
Secutor ruconius
 Sekayu Recreational Forest
 Selangor
 Semenggoh Nature Reserve
 Sepilok Orangutan Rehabilitation Centre
 Serow
 Siamang
Siganus fuscescens
Siganus guttatus
Siganus javus
Siganus vermiculatus
Sillago aeolus
Sillago asiatica
Sillago parvisquamis
Sillago sihama
 Smooth otter
Sonneratia spp.
 Species
Sphyaena forsteri
Sphyaena putamae
Staphylococcus aureus
Stolephorus dubiosus
Stolephorus indicus
Strongylura strongylura
 Stump-tailed macaque
 Sumatran rhinoceros
 Sungai Bering

Sungai Mendelum
 Sungai Panis
 Sungai Perias
 Sungai Singor
 Sungai Talang
Sus barbatus
Sus scrofa
 Sustainability
Sympalangus syndactylus

T
 Taiwan
Tapirus indicus
Tarsius bancamus
Tarsius bancamus bancamus
Tarsius bancamus borneanus
Tarsius bancamus natunensis
Tarsius bancamus saltator
Tarsius dentatus
Tarsius lariang
Tarsius spectrum
Tarsius syrichta
Tarsius wallacei
 Tasik Kenyir
 Tawai Forest Reserve
 Telupid
 Temenggor Forest Reserve
Terapon jarbua
 Terengganu
Termitidae spp.
Tetramorium sp.
 Thailand
Thryssa hamiltonii
 Titanium dioxide
Tor tambra
Toxotes jaculatrix
Trachicephalus uranoscopus
Trachypithecus cristatus
Trachypithecus o. carbo
Trachypithecus o. halonifer
Trachypithecus o. obscurus
Trachypithecus o. styx
Trachypithecus obscurus
Trachypithecus selangorensis
Tragulus napu
Trichopodus pectoralis

Trichopodus trichopterus
Trichopsis vittata
Trichosomus trichopterus
Tripodichthys bleekeri
Tupaia glis
Turneriella parva
Tylosurus acus melanotus
Tylosurus spp.

U
 Ungka borneo

V
Valamugil sebeli
 Vascular plants
 Vietnam
Vitex canescens
Vitex limonifolia
Vitex sp.
Viverra zibetha
Viverricula indica
Vulpes vulpes

W
 White-handed gibbon
 Wild pig

Y
Yarica hyalosoma
 Yellow-throated marten

Z
Zenarchopterus dunckeri

ABOUT EDITORS

Madinah Adrus is an academician of the Animal Resource Science and Management Programme at the Faculty of Resource Science and Technology, Universiti Malaysia Sarawak (UNIMAS), Malaysia. She has a Master of Science and doctorate in Zoology from UNIMAS and interested in wildlife parasitology (ecto and endo parasites) as a model of studies in order to contribute to a basic understanding of the way our biological world functions. She has experience in conducting research on host-parasites association relating their impact on human and ecosystems and has published several refereed journal and book chapters. She has also been an expert on parasitological analysis regarding ectoparasites on small mammals and endoparasites on non-human primates in Malaysia since her masters degree and Ph.D studies related to that area.



In a distinguished career spanning three decades, **Dato' Abdul Kadir bin Abu Hashim** commenced his service with the Department of Wildlife and National Parks (PERHILITAN) Peninsula Malaysia in April 1992. He has held various roles within PERHILITAN, including Research Officer, Chief of Taman Negara Pahang, Director of PERHILITAN State of Perak, and Chief of Enforcement Division before assuming the position of Director-General of PERHILITAN in August 2016.



He is an alumnus of the University Putra Malaysia, Serdang, Selangor, having obtained his Bachelor's degree in Forestry Management in 1990. In 2000, he completed his postgraduate studies, earning a Master of Science in Conservation and Biodiversity from The University of Leeds, United Kingdom. Over his extensive 30-year career, he has amassed a wealth of experience and expertise in the field of wildlife research, particularly specialising in research related to the Sumatran Rhino. Furthermore, he has been actively engaged in conducting wildlife inventories and joint enforcement operations with other enforcement agencies throughout Peninsular Malaysia.

One of his significant contributions to enforcement was as the catalyst for an unofficial joint enforcement operation with the Malaysian Armed Forces (ATM) known as Ops Jelai, commencing in 2006. This operation was aimed at curbing incursions by foreign nationals from Thailand, Vietnam, Cambodia, and Myanmar, who were frequently trespassing into our forests to steal valuable resources such as agarwood and engage in wanton wildlife poaching within our National Parks and Wildlife Reserves. Building on the successes of Ops Jelai, in January 2014, the official Malaysia Biodiversity Enforcement Operation Network (IMBEON) was launched in collaboration with the ATM to enhance enforcement efforts aimed at preventing encroachments and the illegal extraction of the nation's biodiversity treasures by foreign nationals within our National Parks.

On the 21 July 2019, Dato' Abdul Kadir bin Abu Hashim delivered his inaugural public lecture on wildlife conservation and management as Visiting Professor, Universiti Malaysia Terengganu. Recently in 2023, Dato' Abdul Kadir bin Abu Hashim was being awarded the Royal Seri Paduka by HRH Sultan of Kelantan for his significant contributions to the nation.

Muhamad Aidil Zahidin graduated with an MSc and BSc in Zoology from the Universiti Malaysia Terengganu (UMT) and the Universiti Malaysia Sarawak (UNIMAS). He has a keen research interest in human and non-human primates, especially in their biogeography, ecology and molecular genetics. His last work on Orang Asli's genetics allowed him to understand the extent of prehistoric migrations and the peopling of Southeast Asia. He has also been involved in scientific expeditions and published the findings in books, book chapters, indexed journals and a local magazine. Presently, he is a Ph.D. candidate at the Universiti Sains Malaysia (USM) Health Campus and researches molecular haematological disease.



Muhammad Abdul Latiff Abu Bakar is an Associate Professor at the Faculty of Applied Sciences and Technology (FAST) at Universiti Tun Hussein Onn Malaysia. He holds a PhD from Universiti Kebangsaan Malaysia (UKM) in the areas of primatology, conservation biology, and genetics. His current research focuses on Next Generation Sequencing, particularly metagenomics, mitogenomics, and eDNA for wildlife. Additionally, he is interested in the fields of ethnobiology and molecular ethnozology, particularly in exploring the relationships between humans and wildlife in Malaysia.



Mohd Tajuddin Abdullah graduated from the Institute Teknologi MARA with a diploma and pursued further studies at West Virginia University, where he earned an MSc in Wildlife Management. He then went on to the University of Queensland, where he earned a PhD in Zoology. He has nearly four decades of experience in the field, teaching, and supervising postdoctoral, PhD, MSc, and BSc research projects at UMT, UPM, and UNIMAS. He is also a fellow of the Academy of Science Malaysia and has been awarded the DIMP for his significant contributions to the discovery of knowledge that is useful to science and society. He won three National Book Awards in 2017, 2019, and 2021.



Summary

This book is a complete guide to the wildlife of Malaysia. It has contributions from 17 local and 8 international agencies. Learn about the diverse species of flora and fauna found in Peninsular Malaysia, Sabah, and Sarawak and the scientific discoveries made through the collection and reporting of baseline data. With 25 chapters covering topics such as wildlife management, sustainability, and legislation, this book serves as a guide for students, researchers, policymakers, and wildlife authorities to make informed decisions and prevent further extinction of large-sized species such as the Malaysian Tiger and Orang Utan.

This book also highlights the impact of human activities on wildlife, including the devastating extinction of the Sumatran Rhinoceros. A tribute to this lost iconic species, the book features the front page of the Sumatran Rhinoceros as a stern reminder for future generations to conserve Malaysia's wildlife. Through lessons learned from the extinction of this species, the book provides insights on sustainable ecotourism development, managing human-wildlife conflict, and habitat protection.

With a focus on diversity and sustainability, this informative book is a must-read for anyone interested in the conservation and preservation of Malaysia's unique and diverse wildlife. From gelam and local herbs to non-human primates, readers will learn about the wonders of Malaysia's flora and fauna and how to care for and protect these species for future generations.



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