

FAUNA OF MALAYSIA

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WILDLIFE MANAGEMENT AND SUSTAINABILITY

#Selamatkan
HutanauMalaysia



FAUNA OF MALAYSIA

**WILDLIFE
MANAGEMENT
AND
SUSTAINABILITY**

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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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THE UNIQUE BEHAVIOUR OF *Nasalis larvatus* IN BAKO NATIONAL PARK

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ABSTRACT

One of the attractions for tourists to visit Bako National Park is the presence of *Nasalis larvatus* (Proboscis Monkey) in the National Park. Therefore, in this chapter the unique behavior of *N. larvatus* in Bako National Park has been studied and recorded and is likely to be different from elsewhere. There were seven categories of behaviors that were successfully recorded, comprising various activities and movement patterns which involved their feeding, resting, agonistic, grooming, solicitation, copulation and locomotion. The categories are then break down into several characteristic activities and actions, such as, jumping, leaping, quadrupedal walking, chasing, slapping, biting, facial threats, postural threats, grooming, solicitation, copulation and others miscellaneous behavior. The most frequently observed behaviors during the observations of this research were eating, traveling and resting. Reports on the behavioral data provided are important to help improve our understanding of the behavioral patterns of wild *N. larvatus* in Bako National Park.

Keywords: Proboscis Monkey, *Nasalis larvatus*, unique, Bako National Park, behaviour.

INTRODUCTION

Proboscis monkeys (*Nasalis larvatus*) are large and sexually dimorphic Colobines that are endemic to the island of Borneo (Brunei, Indonesia (Kalimantan) and Malaysia (Sabah and Sarawak)) and are classified by the IUCN (1996) as endangered, and are listed in the CITES Appendix I (Bennett & Gombek, 1993; Rowe, 1996). In Sarawak, less than 1,000 animals are thought to remain in patchily distributed populations (Bennett & Sebastian, 1988) and in Sabah it was found to be more widespread and abundant than previously thought, with a minimum population size of 5,907 individuals found along major coastal river systems (John *et al.*, 2008) and these species are also totally protected animals under the Sarawak Wildlife Protection Ordinance 1998 and Sabah Wildlife Conservation Enactment 1997.

The natural habitat of *N. larvatus* includes lowland coastal rainforests that contain mangroves and peat swamps (Salter *et al.*, 1985). This species is restricted to the coastal areas and areas near rivers because the interior has soils that are low in minerals and salts, which are a necessary part of its diet (Bennett & Sebastian, 1988). The species is mostly folivorous (about 52% of all feedings) and frugivorous (about 40% of all feedings), and prefers young leaves and unripened non-fleshy fruits (Bennett & Sebastian, 1988; Yeager, 1989). The diet of this species changes with availability throughout the year (Yeager, 1989). Kawabe and Mano (1972) stated that the mangrove trees serve as a key feature of habitat, providing leaves as food for the proboscis monkey and a place to rest or sleep. Davis (1962) and Kern (1964) also stated that the major habitat-type of the proboscis monkeys is nipah mangrove or a nipah-mangrove-mixed forest in the tidal swamp.

In Sarawak, several areas had been gazetted as totally protected areas such as national parks, wildlife sanctuaries and nature reserves due to the presence of *N. larvatus*. The areas included Samunsam Wildlife Sanctuary, Kuching Wetland National Park, Sebuyau National Park, Maludam National Park, Rejang Mangrove National Park, Niah National Park and Bako National park. Bako National Park is known as a totally protected area with sizeable populations of *N. larvatus*. This park attracts many tourists and the reason of the attraction is the presence of *N. larvatus* and other flora and fauna. Thus, the objective of this chapter is to determine the unique behaviour of *N. larvatus* in Bako National Park.

Bako National Park, Kuching, Malaysian Borneo

This study was conducted from December 2011 to December 2012 at Bako National Park (Figure 1) located about 30 km northeast of Kuching, at latitude 01° 41' N and longitude 110° 26' E and altitude ranging from sea level to 244 meters (Hazebroek & Abang Kashim, 2000). Covering an area of 2,727 hectares and known as the oldest, smallest national park in Sarawak (Hazebroek & Abang Kashim, 2000), this park contains a diverse type of vegetation comprising of seven distinct type of vegetations that includes beach forest, cliff forest, mangrove forest, tropical heath forest (kerangas forest), mixed-dipterocarp forest, padang or grassland vegetation and peat swamp forest (Ashton, 1971; Hazebroek & Abang Kashim, 2000). The park has accessible a wide range of habitats and ecosystem for flora and fauna (Anderson, 1961; Rothschild, 1971). There is no major river in the vicinity of except for the Asam streamlet.

The park is not only inhabited by *N. larvatus* but also 23 species of mammals, 150 species of birds and 24 species reptiles such as the bearded pig (*Sus barbatus*), silver-leaf monkeys (*Trachypithecus cristatus*), long-tailed macaques (*Macaca fascicularis*) and colugo or flying lemurs (*Galeopterus variegates*). This area is an important tourism spot, and many tourists visited the park regularly to see the popular *N. larvatus*. The number of visitors increased during weekends and public holidays. Some group of the *N. larvatus* are used to the presence of humans in their natural habitat.

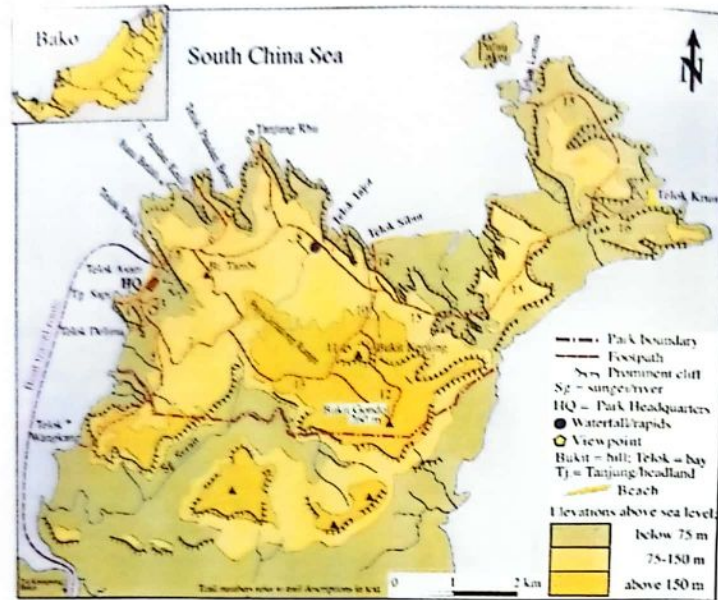


Figure 1: Study Area (Source: adapted from Hazebroek & Abang Kashim, 2000).

Behavior Observation

Direct observation was done at around 0600 hours from the sleeping site that had been located earlier in the evening before and all activities observed were recorded into several categories. Scan-sampling (Altman, 1974) of behaviour were obtained at 10 minutes' intervals during most observations in which one or more monkeys remained visible after the first contact. There are several different categories of behavioural patterns, which are modified from Lehner (1979). All behavioural data were also collected using a focal animal sampling method (Altmann divided into four categories: feeding, travelling, resting, agonistic and others).

The trails of Telok Asam, Lintang, Ulu Asam, Paku, Telok Delima, Telok Asam Mangrove and Pulau Lakei had physical and geographical factors, which not allow us to follow them if they fled to the cliff and boulders areas. Data were collected from late December 2011 to December 2012, and conducted as early as 0600 in the morning until they are out of sight or fleeing to the cliff area.

The Unique Behaviour Recorded

The unique behaviour of *N. larvatus* is rare to be seen and observed, as the animals are timid. The image recorded was taken with constant observations to ensure that they are rarely exhibited behaviour and seen with continuous observation. Movement involves the activities of jumping, leaping, walking on their hands and legs or running on two legs

Jumping is usually done when moving to another tree that might be quite far to cross or reach. Leaping is movement that involves both hands (Figure 2A), swinging from branch to branch in the same tree with a shorter distance. Quadrupedal walking involved moving on the branch in the same tree or on the ground in a slow manner (Figure 2B). Movement or moving actively happened during the feeding hours where they need to move from one branch to the other branch to forage on young leaves that are limited. *Nasalis larvatus* are arboreal, spending their nights in taller Padada trees (Kawabe & Mano, 1972), but there are moments when they move on the grounded quadrupedal walking.

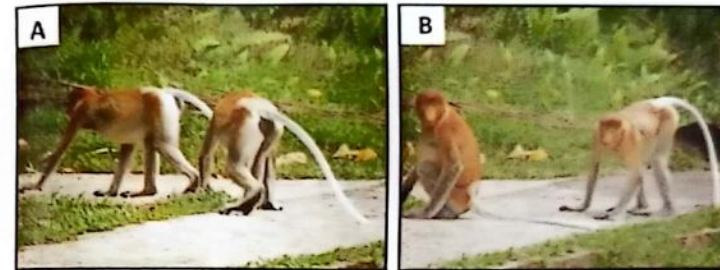


Figure 2:(A) Leaping movement involves both hands and (B) Quadrupedal walking involves moving on the ground in a slow manner.

The swimming skill of the monkeys as mentioned by Napier (1985) and Yeager (1991) was observed when they swim across Sg. Asam. The morphology of webbing fingers and toes, and sufficient body fat support their ability to swim (Figure 3).

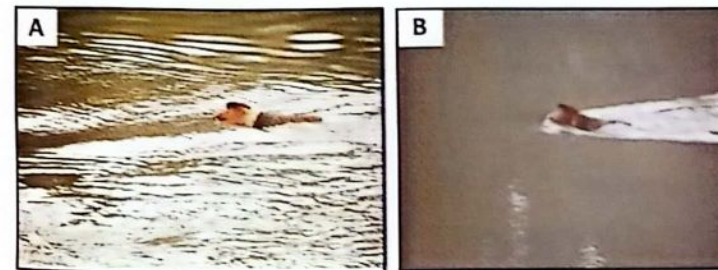


Figure 3: Swimming skills of *N. larvatus*.

During resting time, *N. larvatus* station themselves in one place either to sleep, scratch, yawn or self-grooming. Other behaviour during resting is sleeping while sitting with eyes close and this happened for a few minutes without moving any part of the body. Sleepy action seems to be obvious during resting (Figure 4), where actions like leaning the body to the trunk and even lying with face down on the branch assumed that the night sleep is more for alertness and anti-predator strategy.



Figure 4: Sleeping patterns of *N. larvatus* in Bako National Park.

The most obvious resting behaviour of the *N. larvatus* is not confronting the observer but showing its rear or sitting sideways. Agonistic interaction and action consists of chasing, slapping, biting, vocalising, facial threats and postural threats. Most of this agonistic behaviour happened among juveniles and sub-adults. The sub-adults use them to disturb the juveniles with chases and facial threats for which the juveniles would vocalise with fear.

Feeding peaks usually happened in the morning and at dusk but it depends on the weather (Figure 5). During this activity, they select young leaves, fruits and the soft parts of the leaves by plucking, pulling, picking and even breaking the small branches of the trees. In this process, biting and chewing was done until all the food is consumed but it also happened that part of the leaf are thrown away even before being consumed. Food intake was either directly by the mouth, holding the branch without the activities of pulling, plucking or breaking. Searching for another young leaf was usually done while eating and chewing, so the next move would be directly to the leaf to be consumed.

CONCLUSION

The study on the behaviour of the *N. larvatus* has its own significance in managing and conserving the habitats in ways that will benefit both the resources of the park and the need of the *N. larvatus* in terms of the natural environment. Their behaviour may have potential health risk to the visiting community in the park area that must be periodically monitored by the authorities. Nevertheless, further study on the behaviour activities and patterns should be done to understand more and some functions had still not been determined. Hence, knowledge for the unique behaviour would help us to improve our understanding of *N. larvatus* conservation and the management needs of this endangered species.



Figure 5: Feeding behaviour of *N. larvatus* in Bako National Park. (A) Feeding on biansu leaves. (B) Feeding on ketapang leaves. (C) Feeding on pandan leaves. (D) Feeding on bird-nest fern leaves. (E) Feeding on bark of wild palm. (F) Grabbing pandan leaves.

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Aenictus sp.
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Allenbatrachus grunniens
Alouatta pigra
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Ambassis interrupta
Ambassis kopsii
Ambassis urotaenia
Ambassis vachelii
Amphilophus citrinellus
Anabas testudineus
Anabas testudineus
Apis dorsata
Aplocheilus armatus
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Arcyobius baliurus
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Arothron immaculatus
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Banded linsang
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Barking deer
Basillus subtilis
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Batagur affinis edwardmolli
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Felis planiceps
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Herklotsichthys quadrimaculatus
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Hylobates funereus
Hylobates lar
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Ilisha megaloptera
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Indonesia
 Insecta
 Invertebrates

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

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Lates calcarifer
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Leiognathus spp.
 Lemuk Relah
 Leopard cat
Lepidocephalichthys hasselti
Leptobarbus hoevenii
Leptoptilos javanicus
Leptospira alexanderi
Leptospira biflexa
Leptospira borgpetersenii
Leptospira broomii
Leptospira fainei
Leptospira inadai
Leptospira interrogans
Leptospira kirschneri
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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
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Lutra sumatrana

M

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Macaca fascicularis
Macaca fuscata
Macaca mulatta
Macaca nemestrina
Macaca sylvanus
Macaca thibetana
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Macrobrachium lar
Macrobrachium macrobrachion
Macrobrachium rosenbergii
Macrotermes sp.
 Malay weasel
 Malayan porcupine
 Malayan sun bear
 Malayan tapir
 Malayan tiger
 Malayan wild dog
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 Marbled cat
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Megalops cyprinoides
 Melaka
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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
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Melaleuca cajuputi subsp. cajuputi.
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Oxyeleotris marmoratus
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Oxygaster anomalura
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Pachycondyla sp.
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Pomadasya kaakan
 Pangolin
Panthera leo
Panthera pardus

Panthera tigris
Papio anubis
Parachela maculicincta
Paramonacanthus pusillus
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Pegasus laternarius
Pelates quadrilineatus
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 Perak
Periophthalmodon schlosseri
 Perlis
Pheidole sp.
 Philippines
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Physis sp.
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Pisodonophis cancrivorus
Planiliza subviridis
Plasmodium knowlesi
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Platycephalus indicus
Platycephalus spp.
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Polynemus spp.
Polyrhachis sp.
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Pomadasya argenteus
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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
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Presbytis siamensis siamensis
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 Rotan jernang
 Rotan kerai
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 Rotan mantang
 Rotan sabong
 Rotan sega
 Rotan semambu
 Rotan semut
 Rotan tanah
 Rotan tawau
 Rotan tunggal

S

Sabah
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Saguinus niger
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Saimiri boliviensis
Saimiri oerstedii
Saimiri sciureus
 Sambar deer
 Sarawak
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Sardinella gibbosa
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Scylla olivacea
Scylla paramamosain
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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
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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 borneamus
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 trachipterus
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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