



Life from Headwaters to the Coast

SAMUNSAM

Wilderness Rediscovered

Edited by

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FOREWORD

Malaysia's largest State, Sarawak, on the island of Borneo, is home to some of the world's richest biodiversity, including endemics, economically valuable species, as well as species of conservation importance. Some of the best examples of such plants and animals can be found in Sarawak's extensive network of protected areas. Many of us here in Universiti Malaysia Sarawak continue to explore Sarawak's biodiversity, with the hopes of generating critical knowledge at these sites. This book represents but a subset of work done by our academics in the realm of biodiversity research. I would like to commend the efforts by Sarawak Forestry Corporation Sdn. Bhd. who supported us in this task, by providing a research grant. The work is 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 naturalists in Samunsam.



As will be evident to the readership, a variety of approaches have been taken by the authors of this volume. J. Mohd-Azlan, Lisa Lok and Indraneil Das provide the backdrop to the project, including introductory information on Samunsam. Siali and Tisen from SFC provides a brief account of the development of the site as a Wildlife Sanctuary. Subsequent chapters deal with the zoological components of the Sanctuary's biodiversity, including crabs (Jongkar Grinang), termites (Wan Nurainie Wan Ismail and colleagues), dragonflies and damselflies (Rory Dow), fishes (Fazimah Aziz and colleagues), amphibians and reptiles (Indraneil Das and his team), a separate chapter on the Painted Terrapin (James Bali), investigations on the bird diversity (Mohamad Fizl Sidq Ramji and colleagues); small mammal community (Faisal Ali and colleagues); a separate chapter focussed on the Proboscis Monkey (Ahmad Fitri Aziz and colleagues) and the larger mammals (Mohd-Azlan Jayasilan and his team). The book wraps up with chapters on related social elements, such as use of natural resources (Mohamad Suhaidi and his team), and finally, the ecotourism and entrepreneurial potential of Samunsam (Dayang Affizah).

It is my hope that this book will contribute in at least a small way of encouraging more people to work in the field, publish more articles of this

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kind and new sponsors would emerge to provide support. I anticipate that this volume will be useful to stakeholders to whom we remain connected through our common views on biodiversity conservation for future generations.

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



MESSAGE

The State of Sarawak boasts one of the most extensive networks of protected areas in Malaysia. The western tip of Sarawak is an important area for biodiversity conservation where iconic protected areas, such as Tanjung Datu National Park and Samunsam Wildlife Sanctuary are located.

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 wildlife and natural landscapes. This project sits in line with the University's niche area of biodiversity and environmental conservation and sustainable community transformation. This book, based on research collections by the staff of our two institutes, brings together information on species, their habitats and other aspects of natural history, and the perceptions of the human community on conservation and sustainable use.

Identifying the distribution, densities and habitat use of animals in tropical rainforest are essential for understanding their ecology, and in facilitating management of our biodiversity-rich protected areas. This book attempts to enumerate these species, many of which remain undetected in the dense tropical rainforest. The faunal studies include inventories of crabs, termites, dragonflies and damselflies, fishes, frogs, reptiles, birds and mammals of the area, a critical first step towards understanding our natural heritage. The work also highlights how the local communities interact with biodiversity, and their deep dependence with such natural resources in Samunsam.

This book is written for local stakeholders, management authorities, naturalists, researchers and for the general public. An understanding of our biodiversity may influence the support of the complex needs of conservation in this ever-challenging environment. It is hoped that nature enthusiasts and those who are interested in tropical biodiversity will find this book beneficial.



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Acknowledgement is here made to the authors who have gathered these data, substantially increasing our knowledge and awareness of an important part of our national heritage.

Prof. Dr. Wan Hashim Wan Ibrahim
Deputy Vice Chancellor (Research & Innovation)
Universiti Malaysia Sarawak

Mr. Oswald Braken Tisen
Deputy CEO
Sarawak Forestry Corporation (Park and Wildlife)



PREFACE

The Expedition to Samunsam Wildlife Sanctuary, located near the western tip of Sarawak State, approximately 100 km from Kuching city, was held over the years 2019–2020. It was undertaken by the staff and students of Universiti Malaysia Sarawak, in collaboration with the Sarawak Forestry Corporation, the latter agency providing funding and on-the-ground support, besides joining forces in some of the field data collection.

The diversity of forest types (necessitating different sampling protocols) and eventually, the arrival of the Covid-19 pandemic, were major challenges on the ground, leading to reduced resources available for sampling. Despite these shortcomings, the multidisciplinary team from our two agencies could satisfactorily conduct what is essentially a rapid biodiversity survey, and bring the results out for our stakeholders in time.

Promotion of protected areas as tourist attraction and for research activities has been high on the State's agenda, being seen as an important driver of socioeconomic growth. It can also help governmental agencies such as ours remain engaged with the public for conservation, network with researchers locally and globally and incorporate new knowledge into conservation management plans.

The project was funded by Sarawak Forestry Corporation (GL/F07/SAMUNSAM/2019). We are especially thankful to Paschal Dagang and Taha Wahap for their assistance in the project. We also extend our gratitude to the staff of Samunsam Wildlife Sanctuary, namely, Mohamad Khalid B. Mohamad Zakeria, Mr. Japri and Mr. Shukur for their help. We would also like to thank Research, Innovation and Enterprise Centre, the Faculty of Social Sciences, the Faculty of Economics and Business, the Institute of Biodiversity and Environmental Conservation and the Faculty of Resource Science and Technology, UNIMAS for logistical and administrative support.

The following colleagues helped with reviews of manuscripts: Aaron M. Bauer, Henry Bernard, Kelvin Egay, Melvin Gumal, Jason Hon, David T. Jones, Kelvin K.P. Lim, Lo May Chiun, Suhaili bin Mokhtar, Peter K.L. Ng, Andrew Alek Tuen, Chan Kin Onn, Albert Orr, Pang Sing Tyan, Mustapha Abdul Rahman, Tan Heok Hui and Darren Yeo. We owe a special debt of gratitude to our friends and colleagues, Chien C. Lee, Research Associates of the Institute of Biodiversity and Environmental Conservation, UNIMAS, for providing images of species that we have used in this work.

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Finally, we thank Chan Hin Ching for designing the page layout and Datuk Chan Chew Lun, Natural History Publications (Borneo) Sdn Bhd, and Sarawak Forestry Corporation and UNIMAS Publisher for arranging its publication.

If this guide contributes to the enhancement of knowledge and compel readers to think anew about conservation of this important protected area, and inspire local stakeholders to take pride in their biodiversity, we would consider the project a success.

*Jayasilan Mohd-Azlan
Abang Arabi Abang Aimran
Indraneil Das*



AMPHIBIANS AND REPTILES

*Indraneil Das, Wong Jye Wen, Veronica Martin,
Veronica Leah, Awang Khairul Ikhwan and Izneil Nashriq*

Samunsam Wildlife Sanctuary is located in the western part of Sarawak, and is reportedly the first Sanctuary in the State, being gazetted in 1979. It encompasses an area of around 69 sq km, that stretches from the international border with Kalimantan Barat, Indonesia, to the coast. The original intention of the gazettelement was the protection of the Proboscis Monkey (*Nasalis larvatus*) and its habitat. However, significant population of the Saltwater Crocodile (*Crocodylus porosus*) and the Painted Terrapin (*Batagur borneoensis*) have been reported from the coastal portion of the region.

The original area gazetted as a Wildlife Sanctuary is located on an essentially flat, undulating terrain, comprising swamps vegetated by mangrove forests, that grade into lowland rainforest landwards, that includes representatives of riverine forest, Bornean heath (Kerangas) and some mixed dipterocarp forests. The annex to the Sanctuary, made possible by the inclusion of area across the Trans-Borneo Highway (also referred to as Pan-Borneo Highway or Asian Highway 150), comprises small swampy areas at the foothills of steep hill dipterocarp forests.

Despite its geographical proximity to Kuching, there remains a general lack of understanding of the biodiversity of Samunsam. Reasons include till recent difficulties in accessing the area, lack of freshwater to permit residence in order to conduct inventories and the nature of the habitats themselves (including mangrove swamps). Consequently, only a few groups have been studied in any detail, including the smaller mammals (Khan, 2017), hornbills (Rubis, 2001), termites (Jamil *et al.*, 2017) and dragonflies and damselflies (Dow, 2016). There appears to have been no inventories of the herpetofauna of the area, apart from several species mentioned in a general guide to the Sanctuary (Hazebroek and Kasim, 2000).

The current report describes the results of a rapid (eight-day) biodiversity assessment to collect data on the occurrence and abundance of amphibians and reptiles of Samunsam Wildlife Sanctuary and adjacent areas of western Sarawak, through field observations and collections. The primary objectives are to evaluate species richness of herpetofauna at the study site as well as understand the importance of the Sanctuary as a reservoir of the fauna vis-à-vis the IUCN Red List.

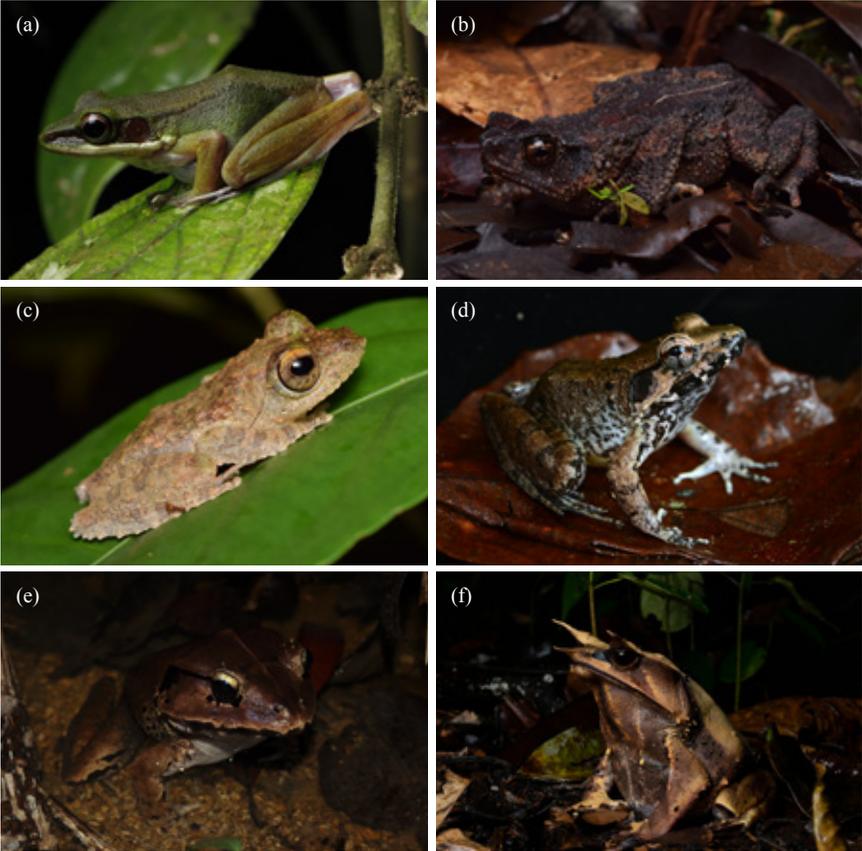


Fig. 1. (a) *Hylarana raniceps*. Photo: Veronica Leah; (b) *Ingerophrynus quadriporcatus*. Photo: Wong Jye Wen; (c) *Kurixalus chaseni*. Photo: Wong Jye Wen; (d) *Limnonectes paramacrodon*. Photo: Indraneil Das; (e) *Limnonectes malesianus*. Photo: Wong Jye Wen; (f) *Megophrys nasuta*. Photo: Wong Jye Wen.

The distributional and ecological data generated are expected to be of value for activities such as land-use planning, conservation of particular taxa and for the use of species in understanding ecological processes. It will also be useful for basing regional Red Lists and for understanding the conservation and management requirements of individual species, and important for management planning activities for the Wildlife Sanctuary.

Data were gathered through field work (3–7 September and 26–31 October 2019). We made observations along transects as well as via boat and road cruising, at the area centred around the Sanctuary Headquarters (in

September 2019) and in the annex of the Sanctuary, across the Trans-Borneo Highway, along the northern slopes of the Pueh massif (in October 2019). For all individual frogs and reptiles encountered, the following data were collected from the mangrove forests, lowland hill dipterocarp forests, grassy verges, and rural, built-up areas, with tarred roads: location (using a handheld Global Positioning System; Garmin GPSMap62s), species, behaviour, habitat association, and any other detail. Field technique included standard methods employed for herpetofaunal studies worldwide for similar rapid-techniques (as mentioned in McDiarmid *et al.*, 2012): observations along transects (= ‘visual encounter surveys, involving 3–5 people covering trails at all times of the day, and particularly during dusk, after evening showers), pitfall and adhesive trapping, as well as boat and road crusing.

A total of 26 reptile species and 15 amphibian species were recorded from the site (see Checklist. An overall impression of the fauna is that it represents the coastal and lowland forest south-east Asian herpetofauna, including a few mangrove species, the rest comprising human commensals that have invaded areas of disturbance in the proximity.

How important is the herpetofaunal assemblage from a conservation perspective? We apply the current (version 2021–1) of the IUCN Red List to the known fauna, to determine which species are protected in Samunsam Wildlife Sanctuary. A major caveat here is that the known fauna is primarily the result of a rapid survey (an additional species, the Bornean Green Keeled Pit Viper, *Tropidolaemus subannulatus*, not encountered by us was reported by Hazebroek and Kasim, 2000). The global conservation list too is not without limitations, as 11 of the 40 species (nine reptiles and two amphibian species) are in the ‘Not Evaluated’ list. Although these are supposedly the widespread, often common species, recent data on a few such groups suggest the existence of cryptic species (sensu Bickford *et al.*, 2007), and future systematic work- genetic, acoustic and morphological- has the potential of recognising additional species within these complexes, each with smaller ranges and habitat requirements, adding to the conservation burden.

In terms of conservation value, the most important herpetofaunal species recorded was the Painted Terrapin (*Batagur borneoensis*). The species is listed as ‘Critically Endangered’ in the IUCN Red List, and was previously a subject of an *ex-situ* conservation programme in the region. It is known to be associated with the mangrove tree of the genus *Sonneratia* (Moll, 1985; Guntoro 2012). A species known from Samunsam is the Bornean Earless Monitor (*Lanthanotus borneensis*), recorded from the Park Headquarters based on a black-and-white print photograph from the 1960s. Although not evaluated by the IUCN, the species is listed as “Totally Protected” by

the wildlife laws of Sarawak. Three amphibian species are recorded are in the Near Threatened category, including the Long-fingered Stream Toad, *Ansonia longidigita*, the Malaysian River Frog, *Limnonectes malesianus* and the Masked Frog, *Limnonectes paramacrodon*. All are obligates of lowland forests, a threatened landscape from logging and other forms of habitat loss on Borneo.

A major portion of the species encountered—10 amphibians and 15 reptiles are classified as ‘Least Concern’. Several are lowland forest obligates, especially those that are restricted or have life histories centred around rocky mountain streams (including the Brooke’s Water Skink, *Tropidophorus brookei*), yet, the substantial area they occupy across Borneo (and in many species, beyond) are thought to be the rationale for not including them in a higher threat class.

As mentioned before, these inventories are necessarily preliminary, and additional species are predicted (based on availability of habitat), particularly those known from nearby areas such as Tanjung Datu and Gunung Gading (see inventories in Das *et al.*, 2015, 2017).



Fig. 2. *Crocodylus porosus*. Photo: Indraneil Das; (b) *Batagur borneoensis*. Photo: Indraneil Das; (c) *Aeluroscalabotes felinus*. Photo: Wong Jye Wen; (d) *Cnemaspis kendallii*. Photo: Indraneil Das.

The herpetofauna at the site is those typically encountered in mangrove and lowland hill dipterocarp forest sites of south-east Asia. Disturbance, at the edges have added to the biodiversity, with the arrival of human commensal species of geckos, such as the Common Asian Toad, *Duttaphrynus melanostictus*, the Asian House Gecko, *Hemidactylus frenatus* and the Flat-tailed Gecko, *H. platyurus*.

The Saltwater Crocodile, *Crocodylus porosus* has been recorded previously from the site (Hazebroek and Abang Kasim 2000) and several were observed during these surveys (see Checklist), comprising hatchlings and subadults.

Finally, the species recorded were based on two short-term sampling sessions using RBI techniques. Long-term sampling has the potential to increase the species inventory of herpetofauna of Samunsam significantly, taking into account the rarity of certain groups (such as snakes and caecilians) and the cryptic lifestyles of several lizard and snake groups, and the restricted breeding activities of the amphibians. It has been said before that completing a species inventory for tropical herpetofaunas may take a person's entire life (Das, 1996). Finally, life history studies need to be conducted on these species, especially those that are endemic to Borneo or in any form restricted or recognised as being under threat of extinction.

We thank the Sarawak Forestry Corporation for a grant (GL/F07/SAMUNSAM/2019) to conduct these studies. Mohd Azlan Jayasilan served as the Principal Investigator, and invited us to collect data on the herpetofauna. We thank Siali Aban, Sarawak Forestry Corporation, for assistance with logistics. Isa Sait and Rahah binti Yakup assisted us in the field. Field work was conducted under permit WL6/2019 and (13)JHS/NCCD/600-7/2/107(Jld2). The late Ken Scriven provided the record for *Lanthanotus borneensis* from Samunsam. Finally, we thank Aaron M. Bauer and Chan Kin Onn for comments.

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Checklist of Amphibians and Reptiles

Checklist of amphibians and reptiles of Samunsam Wildlife Sanctuary, Sarawak (current 6 April 2020), as recorded during a rapid assessment of the fauna in October to November 2019. The list is necessarily preliminary, and additional species are expected when long-term sampling of the herpetofauna is conducted. Abbreviations for IUCN Red List (version 2021–1) include: CR = Critically Endangered; LC = Least Concern; NE = Not Evaluated and NT = Near Threatened. Asterisk indicate Bornean endemics.

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Sl	Species	Common Name	IUCN Listing	Habitat	Remarks
AMPHIBIA					
Bufonidae					
1.	<i>Ansonia longidigita</i> Inger, 1960*	Long-fingered Stream Toad	NT	Lowland dipterocarp forests	Hill stream obligate
2.	<i>Duttaphrynus melanostictus</i> (Schneider, 1799)	Common Asian Toad	LC	Human settlements	Human commensal
3.	<i>Ingerophrynus quadriporcatus</i> (Boulenger, 1887)	Four-ridged Toad	LC	Lowland dipterocarp forests	
Dicroglossidae					
4.	<i>Fejervarya cancrivora</i> (Gravenhorst, 1829)	Mangrove Frog; Crab-eating Frog	LC	Creeks, human settlements	One of few saline-resistant amphibians
5.	<i>Limnonectes conspicillatus</i> (Günther, 1872)*	Common Creek Frog	NE	Lowland dipterocarp forests	
6.	<i>Limnonectes leporinus</i> (Andersson, 1923)*	Giant River Frog	LC	Lowland dipterocarp forests	Stream and river obligate
7.	<i>Limnonectes malesianus</i> (Kiew, 1984)	Malaysian River Frog	NT	Lowland dipterocarp forests	
8.	<i>Limnonectes paramacrodon</i> (Inger, 1966)	Masked Frog	NT	Swampy portion of stream	
Megophryidae					
9.	<i>Megophrys nasuta</i> (Schlegel, 1858)	Horned Frog	LC	Lowland dipterocarp forests	
Microhylidae					
10.	<i>Kalophrynus heterochirus</i> (Boulenger, 1900)	Variable Sticky Frog	LC	Lowland dipterocarp forests	
Ranidae					
11.	<i>Chalcorana raniceps</i> (Peters, 1871)	White-lipped Frog	LC	Lowland dipterocarp forests	

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Sl	Species	Common Name	IUCN Listing	Habitat	Remarks
Rhacophoridae					
12.	<i>Kurixalus chaseni</i> (Smith, 1924)*	Bornean Frilled Tree Frog	NE	Marshes within lowland forests	
13.	<i>Polypedates colletti</i> (Boulenger, 1890)	Collett's Tree Frog	LC	Marshes within lowland forests	
14.	<i>Polypedates macrotis</i> (Boulenger, 1891)	Dark-eared Tree Frog	LC	Marshes within lowland forests and forest edges	
15.	<i>Polypedates otitophus</i> (Boulenger, 1893)*	File-eared Tree Frog	LC	Lowland dipterocarp forests	
REPTILIA					
Crocodylidae					
16.	<i>Crocodylus porosus</i> Schneider, 1801	Saltwater Crocodile	LC	Creeks, river mouth	Juveniles and subadults sighted
Geoemydidae					
17.	<i>Batagur borneoensis</i> (Schlegel & Müller, 1844)	Painted Terrapin	CR	Creek at river mouth	Single individual sighted
Agamidae					
18.	<i>Bronchocela cristatella</i> (Kuhl, 1820)	Crested Green Lizard	NE	Trees and shrubs; forest edge	At forest edge
19.	<i>Draco quinquefasciatus</i> Hardwick & Gray, 1827	Five-banded Flying Lizard	NE	Lowland dipterocarp forests	
20.	<i>Draco sumatranus</i> Schlegel, 1844	Common Flying Lizard	NE	Trees in beach forest	

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Sl	Species	Common Name	IUCN Listing	Habitat	Remarks
21.	<i>Gonocephalus liogaster</i> (Günther, 1872)	Blue-eyed Angle-headed Lizard	NE	Lowland dipterocarp forests	
Eublepharidae					
22.	<i>Aeluroscalabotes felinus</i> (Günther, 1864)	Cat Gecko	LC	Lowland dipterocarp forests	Member of a species complex
Gekkonidae					
23.	<i>Cnemaspis kendallii</i> (Gray, 1845)*	Kendall's Day Gecko	LC	Lowland dipterocarp forests	
24.	<i>Cyrtodactylus consobrinus</i> (Peters, 1871)	Peters' Bent-toed Gecko	NE	Lowland dipterocarp forests	
25.	<i>Cyrtodactylus pubisulcus</i> Inger, 1958*	Grooved Bent-toed Gecko	LC	Lowland dipterocarp forests	
26.	<i>Gekko monarchus</i> (Duméril & Bibron, 1836)	Warty House Gecko	NE	Human settlements at Telok Melano	Edge species
27.	<i>Hemidactylus frenatus</i> Duméril & Bibron, 1836	Asian House Gecko	LC	Human settlements at Telok Melano	Human commensal
28.	<i>Hemidactylus platyurus</i> (Schneider, 1792)	Flat-tailed Gecko	NE	Human settlements at Telok Melano	Human commensal
Lanthanotidae					
29.	<i>Lanthanotus borneensis</i> Steindachner, 1878*	Bornean Earless Monitor	NE	Park Headquarters	Based on a black-and-white photograph taken in the 1960s
Scincidae					
30.	<i>Dasia vittata</i> (Edeling, 1864)*	Bornean Striped Tree Skink	LC	Mangrove tree	
31.	<i>Eutropis multifasciata</i> (Kuhl, 1820)	Common Garden Skink	LC	Lowland dipterocarp forests, also human habitations	Edge species

AMPHIBIANS AND REPTILES

Sl	Species	Common Name	IUCN Listing	Habitat	Remarks
32.	<i>Eutropis rudis</i> (Boulenger, 1887)	Black-banded Ground Skink	NE	Lowland dipterocarp forests	Forest species
33.	<i>Subdoluceps bowringii</i> (Gmelin, 1799)	Spotted Supple Skink	NE	Lowland dipterocarp forests; also human habitations	Edge species
34.	<i>Tropidophorus brookei</i> (Gray, 1845)*	Brooke's Water Skink	LC	Lowland dipterocarp forests	Hill stream obligate
Varanidae					
35.	<i>Varanus salvator</i> (Laurenti, 1768)	Water Monitor Lizard	LC	Creeks, human settlements	Often a human commensal
Colubridae					
36.	<i>Ahaetulla prasina</i> (Boie, 1827)	Oriental Vine Snake	LC	Forest edges	Edge species
37.	<i>Boiga nigriceps</i> (Günther, 1863)	Black-headed Cat Snake	LC	Lowland dipterocarp forests	Member of a species complex
38.	<i>Gonyosoma oxycephalum</i> (Boie, 1827)	Red-tailed Racer	LC	Edge of road	
Crotalidae					
39.	<i>Tropidolaemus subannulatus</i> (Gray, 1842)	Bornean Keeled Green Pit Viper	LC	Lowland dipterocarp forests	Illustrated in Hazebroek & Abang Kasim (2000)
Natricidae					
40.	<i>Xenochrophis trianguligerus</i> (Boie, 1827)	Triangled Keelback Water Snake	LC	Lowland dipterocarp forests	Hill stream obligate
Xenopeltidae					
41.	<i>Xenopeltis unicolor</i> Reinwardt, 1827	Sunbeam Snake	LC	Lowland dipterocarp forests	



Fig. 3. (a) *Cyrtodactylus pubisulcus*. Photo: Indraneil Das; (b) *Gekko monarchus*. Photo: Wong Jye Wen; (c) *Gonocephalus liogaster*. Photo: Indraneil Das; (d) *Lanthanotus borneensis*. Photo: Indraneil Das.



A view of coastal region of Samunsam at low tide, showing exposed tidal pools and sandy beaches. Photo: Badiozaman bin Sulaiman.