BAKO

Biodiversity Between Land and the Sea

Life from Headwaters to the Coast

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AMPHIBIANS

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The amphibian fauna of Bako National Park remains poorly known, compared to the more accessible protected areas of western Sarawak, such as Kubah, Gunung Gading or Gunung Santubong. Contributing factors include the relatively complicated access, requiring a road — and then, a boat-journey, a relative shortage of bodies of freshwater, particularly, large rivers and of high hills. Nonetheless, as of August 2022, a total of 26 species of amphibians have been recorded from the Park (see Checklist). The fauna comprises four bufonids, five dicroglossids, two megophryids, five microhylids, five ranids and five rhacophorids. Of these, nine species are Bornean endemics.

As with the other terrestrial fauna of the Park, the amphibians are typical of lowland mixed dipterocarp forests of Borneo or of blackwater peat swamps, with one capable of residing in saline environments. Species of potential interest to visitors to the Park include the Mangrove Frog, *Fejervarya cancrivora*, which is one of few in the world capable of surviving in saltwater with salinity up to 2.8%, achieved by increasing urea production and retention. In Bako, they have been noted to breed in the mud wallows created by the Bearded Pigs, *Sus barbatus*. Others show occupancy of unusual microhabitats- the Swamp Toad, *Ingerophrynus quadriporcatus* and the Masked Swamp Frog, *Limnonectes paramacrodon*, are specialists of acidic peat swamps, males of the first-mentioned species forming large calling aggregations around black-water areas surrounding the Park Headquarters.

The Matang Narrow-mouthed Frog, *Microhyla nepenthicola*, is another interesting species, breeding solely within the pitchers of a single species of Pitcher Plant, *Nepenthes ampullaria*. In such habitats, the tadpoles take under two weeks to complete metamorphosis. Five other amphibians here — two Dwarf Toads, *Pelophryne* species and three species of Sticky Frogs, genus *Kalophrynus*, have non-feeding tadpole stages — their mothers provide them with enough yolk reserves to complete metamorphosis. One frog species, the Obscure Bush Frog, *Philautus tectus*, has bypassed the tadpole stage altogether, producing baby frogs that hatch out of their eggs laid on land. The high proportion — over a quarter — of the amphibians of Bako breed in phytotelms, suggestive of the shortage of surface bodies of freshwater at the site.

As in other parts of Borneo, there are frogs in Bako that infrequently descend from their arboreal habitats, including forest canopy, microhabitats. The Harlequin Tree Frog, *Rhacophorus pardalis*, is one such example, approaching suitable vegetation adjacent to waterbodies to create foam nests. These frogs are capable of spectacular glides between trees, an efficient locomotor strategy shown by several other animals of the rainforests here that permits movement without descending from their high perches.

Three frog species in Bako are invasive that follow humans to new areas: the Common Asian Toad, *Duttaphrynus melanostictus*, the Green Paddy Frog, *Hylarana erythraea* and the Four-lined Tree Frog, *Polypedates leucomystax*. It is assumed that these species benefitted from the opening up of the forest with the establishment of the Park.

Much remains to be learnt of the natural history of the amphibians of Bako. It is hoped that the availability of checklists and illustrated accounts will encourage better access and encouragement to students to take up such studies.

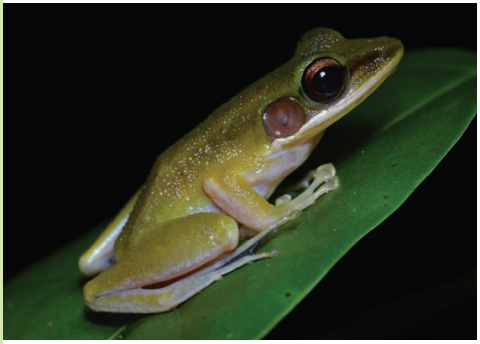

Fig. 1. *Hylarana raniceps*.

Fig. 2. *Ingerophrynus quadriporcatus.*

Fig. 3. *Microhyla nepenthicola.*

Fig. 4. *Rhacophorus pardalis*.

Checklist

Amphibians recorded at Bako National Park. Current: 26 August 2022.
Bornean endemics indicated with an asterisk.

Species	Common Name	IUCN Listing	Habitat	Remarks
BUFONIDAE				
Duttaphrynus melanostictus (Schneider, 1799)	Common Asian Toad	LC	Around Park Headquarters	Human commensal
Ingerophrynus quadriporcatus (Boulenger, 1887)	Swamp Toad	LC	Swamp habitats	Peat swamp specialist
Pelophryne guentheri (Boulenger, 1882)*	Günther's Dwarf Toad	LC	Dipterocarp forests	Tree-hole breeder
Pelophryne signata (Boulenger, 1895)	Lowland Dwarf Toad	LC	Dipterocarp forests	Tree-hole breeder
DISCROGLOSSIDAE				
Fejervarya cancrivora (Gravenhorst, 1829)	Mangrove Frog	LC	Mangrove and coastal areas	Saline-resistant species
Limnonectes hikidai Matsui & Nishikawa, 2014*	Hikida's Stream Frog	NE	Hill streams in dipterocarp forests	Rocky stream obligate
Limnonectes kong Dehling & Dehling, 2017*	Burly Stream Frog	NE	Hill streams in dipterocarp forests	Rocky stream obligate
Limnonectes paramacrodon (Inger, 1966)	Masked Swamp Frog	NT	Swamp habitats	Blackwater species
Occidozyga aff. *laevis* (Günther, 1858)	Yellow-bellied Puddle Frog	LC	Seepages in dipterocarp forests	Species complex
MEGOPHRYIDAE				
Leptobrachium ingeri Hamidy, Matsui, Nishikawa & Belabut, 2012*	Inger's Large-eyed Litter Frog	LC	Hill streams in dipterocarp forests and swamp habitats	Blackwater species
Leptolalax dringi Dubois, 1987*	Dring's Litter Frog	LC	Hill streams in dipterocarp forests	Rocky stream obligate; assigned by some recent authors to *Leptobrachella*

Species	Common Name	IUCN Listing	Habitat	Remarks
MICROHYLIDAE				
Kalophrynus heterochirus Boulenger, 1900*	Short-fingered Sticky Frog	LC	Dipterocarp forests	Endotrophic tadpoles
Kalophrynus intermedius Inger, 1966*	Intermediate Sticky Frog	LC	Dipterocarp forests	Endotrophic tadpoles
Kalophrynus meizon Zug, 2015	Large Sticky Frog	NE	Dipterocarp forests	Endotrophic tadpoles
Microhyla nepenthicola Das & Haas, 2010*	Matang Narrow-mouthed Frog	LC	Kerangas and dipterocarp forest edges	Endotrophic tadpoles
Nanohyla petrigena (Inger & Frogner, 1979)*	Pot-hole Narrow-mouthed Frog	LC	Hill streams in dipterocarp forests	Rock-hole breeder
RANIDAE				
Chalcorana raniceps (Peters, 1871)	White-lipped Frog	LC	Hill streams and side pools in dipterocarp forests	Generalised pond and stream-breeder
Hylarana erythraea (Schlegel, 1837)	Green Paddy Frog	LC	Around Park Headquarters	Human commensal
Pulchrana baramica (Boettger, 1900)	Brown Marsh Frog	LC	Swamp forests	
Pulchrana glandulosa (Boulenger, 1892)	Rough-sided Frog	LC	Swamp forests	
Pulchrana signata (Günther, 1872)	Striped Stream Frog	LC	Hill streams in dipterocarp forests	Rocky stream obligate
RHACOPHORIDAE				
Philautus tectus Dring, 1987	Obscure Bush Frog	LC	Kerangas and dipterocarp forests	Endotrophic tadpoles
Polypedates colletti (Boulenger, 1890)	Collett's Tree Frog	LC	Dipterocarp forests	
Polypedates leucomystax (Gravenhorst, 1829)	Four-lined Tree Frog	LC	Around Park Headquarters	Human commensal
Polypedates macrotis (Boulenger, 1891)	Dark-eared Tree Frog	LC	Dipterocarp forests	
Rhacophorus pardalis Günther, 1858	Harlequin Tree Frog	LC	Dipterocarp forests	