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Herpetofauna of Two Habitats in Northeast Pulau Langkawi, Kedah, Peninsular Malaysia

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ABSTRACT Ten species of amphibians, four species of lizards and one species of snake were recorded from two habitats of northeast Pulau Langkawi, Kedah. These were amphibians – *Bufo asper, B. melanostictus, Fejervarya limnocharis, Limnonectes blythi, L. malesianus, Microhyla berdmorei, Polypedates leucomystax, Rana chalconota, R. erythraea, R. hosii*; lizards – *Draco melanopogon, D. volan, Gekko gecko, Mabuya multifasciata*; and snake – *Chrysopelea paradisi.*

ABSTRAK Sepuluh spesies amfibia, empat spesies cicak dan satu spesies ular direkod dari timur laut Pulau Langkawi, Kedah. Amfibia ini terdiri – *Bufo asper, B. melanostictus, Fejervarya limnocharis, Limnonectes blythi, L. malesianus, Microhyla berdmorei, Polypedates leucomystax, Rana chalconota, R. erythraea, R. hosii*; cicak – *Draco melanopogon, D. volan, Gekko gecko, Mabuya multifasciata*; dan ular – *Chrysopelea paradisi.*

(Herpetofauna, Pulau Langkawi, Kedah)

INTRODUCTION

Lying off the north-western coast of Peninsular Malaysia, Pulau Langkawi is the largest among an archipelago of 99 islands collectively known as Langkawi [1]. Pulau Langkawi is the main island of Langkawi group, in the Straits of Malacca, Peninsular Malaysia. It lies just south of the Thai island of Tarutao. Approximately 18 miles (29 km) long and 10 miles (16Km) wide, with an area of 203 square miles (526 square Km), it rises to 2,887 feet (880 m) at Gunung Raya [2]. The Pulau Langkawi consists of four rock formations [3]. The oldest, known as Machinchang Formation consists of mainly quartzite and subordinate flagstone. This formation is conformably overlain by the Setul Formation, which is composed of mainly limestone with minor sandstone and shale. The Singa Formation consisting of mainly mudstone and shale minor sandstone unconformably overlays the Machinchang and Setul Formations. The youngest rock formation is known as Chuping Formation, consisting of limestone (dolomitic) and conformably overlays the Singa Formation. In addition to these formations, granite is also widespread in the islands. The temperature in Pulau Langkawi ranges from 22.5°C to 34.5°C and the rainfall varies from 69.0 to 870.0 mm/month [4].

Island ecosystems of Pulau Langkawi are in general more vulnerable to change than those of the Peninsular Malaysia mainland. With respect to amphibians and reptiles, habitat alteration and destruction, fuelled by uncontrolled human activities on the island, can be major causes of population decline. For example, amphibians (frogs and toads) are hypersensitive towards changes in the environment; their permeable skin has direct contact with the surrounding. This makes them one of the best nature's bio-indicators of environmental health, especially water bodies (e.g. streams and rivers) that are present on the island. Their catastrophic decline serves as a warning that we are in a period of significant environmental degradation. Many developments took place on the island and vast forested areas were cleared up to make way for agriculture, housing estates, recreational areas, hotels and business centres. These activities some how or other jeopardised the survival of the hypersensitive amphibians and reptiles present on Pulau Langkawi.

Many amphibians and reptiles are expected to be present on Pulau Langkawi. Most of them were

not encountered during the expedition recently, but the published treatises on the herpetofauna e.g. Cantor [5], Boulenger [6], Smith [7], Berry [8], Tweedie [9], Denzer & Manthey [10], Cox *et al.* [11] and Chan-ard *et al.* [12], show that they existed on this island. This scientific survey was organized by the University Malaya Maritime Research Centre (UMMRec) in conjunction of the Second Scientific Expedition to Pulau Langkawi (from 7th to 10th April 2004). The aims of the survey are to annotate and compare the herpetofauna present at the selected habitats.

MATERIALS AND METHODS

Two survey sites were selected *viz.* Lubuk Semilang (LSRF) and Durian Perangin (DPRF) Forests. Both of the sites were gazetted as recreational forest. LSRF consists of lowland dipterocarp forest vegetations. It has a small rocky stream with little flowing water but with good vegetation and tree covers; these made the area moister and cooler. It is less disturbed by human activities. DPFR consists of disturbed lowland dipterocarp forest vegetations. It is an open area with small rocky stream; less flowing water and vegetation and tree covers and exposed to direct sunlight. The streams that existed at both sites are classified as first order (1°), that is the smallest unbranched tributaries [13]. The water quality from both streams is suitable for body contact (e.g. bathing) and other recreational purposes.

The survey was carried out from 7th to 10th April 2004. Transect Visual Encounter Survey (TVES) was the method employed to survey the amphibians and reptiles. At night TVES was carried out with the aid of torchlight for amphibians and lizards or snakes. The same method was used during the day. This involved four persons walking along a predefined distance (i.e., transect) along the small stream, for a set period of time (one to two hours). The observers walked in the same direction at a certain distance apart, in order to prevent the same animal being recorded twice. Each observer searched through the microhabitats present on the ground and above, without having to climb any tree. Photographs were taken for each specimen of amphibian encountered which was then captured by hand and kept inside a plastic bag (18 cm X 24 cm). The amphibian specimens were brought back to base camp to be identified and snout-vent (SV) length to be measured with a pair of callipers. One of the fingertips was cut-off and kept in RNA Stabilization Reagent or 99.5% ethanol for molecular studies (results of these studies are not reported in this paper). The specimens were labelled and preserved in 70% alcohol or fixed in 4% formalin for future taxonomy references. Several photographs were taken of snake and lizard that were encountered during the survey. Scientific nomenclature largely follows Berry [8], Inger and Stuebing [14] and Frost [15] for amphibians, Denzer and Manthey [10] and Chan-ard *et al.* [12] for lizards, and Tweedie [9] and Lim [16] for snakes.

RESULTS AND DISCUSSION

Fifty-seven specimens representing 10 species of amphibians with 43 individuals representing 4 families (Bufonidae, Microhylidae, Ranidae and Rhacophoridae), four species of lizard with 14 individuals representing 3 families (Agamidae, Geckkonidae and Scincidae) and one individual representing one species of snake from the family Colubridae were collected (Tables 1 and 2).

The small stream of Lubuk Semilang Recreation Forest (LSRF) yielded seven species of anurans *viz. Bufo asper* Gravenhorst (Plate2), *B. melanostictus* Schneider (Plate1), *Limnonectes blythi* Boulenger, *L. malesianus* (Kiew), *Rana chalconota* (Schlegel) (Plate3), *R. hosii* Boulenger (Plate7) and *Fejervarya limnocharis* (Gravenhorst) (Plate4). *Limnonectes blythi* (Boulenger) and *Bufo asper* Gravenhorst were the most abundant species in this study site, each with nine individuals, followed by *Bufo melanostictus* and *Rana erythraea* (Schlegel) (Plate6) with five individuals each (Table 1). *Limnonectes blythi* and *L. malesianus* are listed as near threatened by ICUN, Conservation International, and NatureServe [17]. Three individuals of *Mabuya multifasciata* (Kuhl) were the only reptiles found at the LSRF (Table 2) during the night survey. The lizards were found resting inside the crevice of the tree bark at night and none of the reptiles were encountered during the day.

Table 1. Anurans (frog and toad) recorded from Lubuk Semilang Recreational Forest (LSRF) and Durian Perangin Recreational Forest (DPRF).

Species	Common Name	No. of individuals	
		LSRF	DPRF
Bufo asper	River Toad	9	1
Bufo melanostictus	Common Sunda Toad	5	0
Fejervarya limnocharis	Grass Frog	0	1
Limnonectes blythi	Malaya Giant Frog	9	1
Limnonectes malesianus	Peat Swamp Frog	6	0
Microhyla berdmorei	Berdmore's Narrow-mouthed Frog	0	1
Polypedates leucomystax	Four-lined Tree Frog	0	1
Rana chalconota	White-lipped Frog	1	0
Rana erythraea	Green Paddy Frog	5	0
Rana hosii	Poisonous Rock Frog	3	0

Table 2. Reptiles (lizard and snake) recorded from Lubuk Semilang Recreational Forest (LSRF) and Durian Perangin Recreational Forest (DPRF)

Species	Common Name	No. of individuals	
		LSRF	DPRF
Chrysopelea paradisi	Paradise Flying Snake	0	1
Draco melanopogon	Black-bearded Gliding Lizard	0	5
Draco volan	Common Gliding Lizard	0	2
Gekko gecko	Common Tokay Gecko	0	1
Mabuya multifasciata	Many-lined Sun Skink	3	2

The small stream of Durian Perangin Recreation Forest (DRRF) harboured five species of anurans *viz. Bufo asper, Fejervarya limnocharis, Limnonectes blythi, Microhyla berdmorei* (Blyth) and *Polypedates leucomystax* (Boie) (Plate5). One individual of each anuran species was found (Table 1). Five reptile species were found at this study site *viz. Chrysopelea paradisi, Draco melanopogon* Boulenger (Plate9), *D. volan* Linnaeus, 1758, *Gekko gecko* Linnaeus, 1758 and *Mabuya multifasciata* (Kuhl, 1820) (Plate8). The most abundant species was *D. melanopogon* with six individuals, followed by *D. volan* and *M. multifasciata* with two individuals respectively and *C. paradisi* and *G. gecko* with one individual each (Table 2). *Draco* spp., *M. multifasciata* and *C. paradisi* were encountered during the daytime. The snake *C. paradisi* was sighted running after the Frog *P. leucomystax.*

Three species of anurans and one species of lizard were common to both study sites. More anuran species were found at LSRF compared to DPRF (Table 1). This was due to the LSRF area having more vegetation covers and being wetter than DPRF. Anurans prefer to occupy watery or moist and cooler habitat not only for breeding, but for basic survival [14]. Most anurans actively avoid dryness whenever possible. In order to avoid dryness some anurans live on the ground under the dead leaves, borrow in the soil, perch on shrubs or trees or live in or by the water bodies. Most of the anurans are hardly found during the daytime of observations.

Plate 1. *Bufo melanostictus*

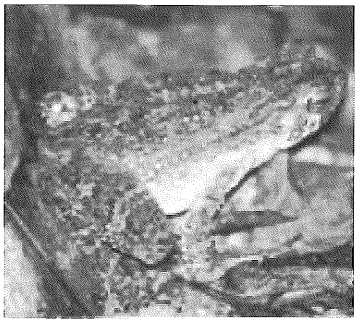

Plate 2. *Bufo asper*

Plate 3. *Rana chalconota*

Plate 4. *Fejervarya limnocharis*

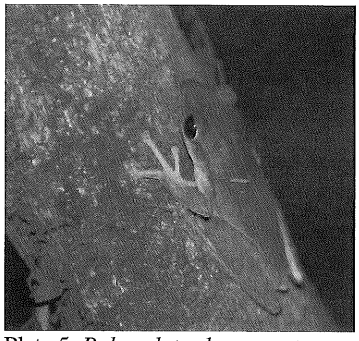

Plate 5. *Polypedates leucomystax*

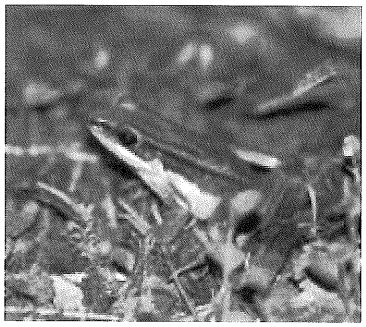

Plate 6. *Rana erythraea*

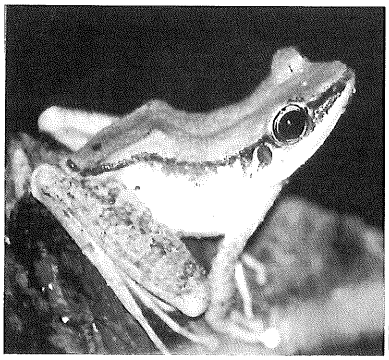

Plate 7. *Rana hosii*

Plate 8. *Mabuya multifasciata*

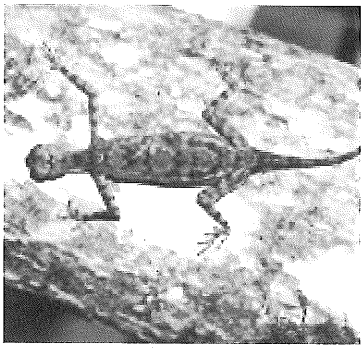

Plate 9. *Draco melanopogon*

Plates 1-9. Herpetofauna found at two habitats in the northeast Pulau Langkawi, Kedah.

There are more reptiles especially lizards at DPRF, which has more open area, compared to LSRF and allowed direct sunlight. Most of the lizards (cold blooded creature), need to bask and expose themselves to sunlight to warm their bodies. For example, *M. multifasciata* at the Endau-Rompin Johor [18] and *Calotes versicolor* (Changeable Fence Lizard) found at the University Malaya Campus, Kuala Lumpur take between one to two hours to bask in order to warm their body, after that the lizards pursue foraging activities (*pers. observ.*). *Fejervarya limnocharis* was only found at the DPRF and *B. melanostictus* at LSRF respectively (Table 1). These anurans are normally confined to disturbed habitats associated with human activities [19]. *Bufo melanostictus* for example has adapted well to the environmental disturbances created by mankind. The species have not been listed in an undisturbed forest surveyed and they are good indicator for any disturbed habitat especially forested area [19].

Overall, the number species of amphibians and reptiles found and collected during this expedition was rather low compared to the

herpetofauna specimens (15 anuran species) previously collected in Pulau Langkawi by Berry [8] and (50 anuran and 50 reptile species) collected in Pulau Tioman by Lim and Lim [20]. This may be due to the sampling time in the month of April, which is one of the driest periods in Pulau Langkawi. In many cases, the numbers are usually low during this period. Another survey will be attempted during the wet season.

CONCLUSION

A variety of threats are impacting herpetofauna especially amphibian species in Langkawi Island. The conditions of habitats will greatly determine the presence of herpetofauna in these areas. Dry season naturally causes the number of herpetofauna to decline in these areas. Habitat loss and degradation are by far the greatest threat to amphibians at present. Although habitat loss and degradation affect a much greater number of species, the rate at which a species declines is usually much slower, and there are a number of strategies, such as the creation of protected areas, to counter this threat.

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REFERENCES

1. World Facts US. (2004). Langkawi, Malaysia. WorldFacts US. (download on 22/11/2004). http://worldfacts.us/Malaysia-Langkawi.htm
2. Encyclopædia Britannica Inc. (2004). Langkawi Island, Malaysia. Encyclopædia Britannica Inc. (download on 22/11/2004). http://www.britanica.com/eb/article?tocId=9047100
3. Ibrahim, A. and Juhari, M.A. (1997). The correlation of the Landsat TM Images Characteristic with the Geologic Information: A preliminary result of a case study in Langkawi Islands, Malaysia. (download on 26/10/2004) http://www.gisdevelopment.net/aars/acrs/1997/ts10/ts10005pf.htm
4. Malaysian Meteorological Service. (2004). Monthly weather bulletin; April 2004. http://www.kjc.gov.my/english/publication/table/t4_4.htm (assessed on 22/11/04)
5. Cantor, T.E. (1847). Catalogue of Reptiles inhabiting the Malayan Peninsula and Islands. *J. Asiatic. Soc. Bengal* (Reprint 1966 by A. Asher & Co., Amsterdam) **16**: 607 – 1078.
6. Boulenger, G.A. (1912). *A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore including the adjacent islands*. Reptilia and Batrachia. Taylor and Francis, London. pp294.
7. Smith, M.A. (1930). The reptilian and amphibian of the Malay Peninsula. *Bull. Raffles Mus.*, **3**: iii – 135.
8. Berry, P.Y. (1975). *The Amphibian Fauna of Péninsular Malaysia*. Tropical Press, Kuala Lumpur, +x130pp.
9. Tweedie, M.W.F. (1983). *The Snakes of Malaya*. Third Edition. Singapore National Printers. 167pp.
10. Denzer, W & Manthey, U. (1999). A nominal checklist of the lizards inhabiting Peninsular Malaysia and Singapore. *Raffles Bull. Zool.*, **39**(2): 309-322.
11. Cox, M.J., Dijk, P.P. Van, Nabhitabhata, J. & Thirakhupt. (1998). A photographic guide to snakes and other reptiles of Peninsular Malaysia, Singapore and Thailand. Asia Books Co. Ltd., Bangkok. pp 1 – 144.
12. Chan-ard, T., Grossmann, W., Gumprecht, A. and Schulz, K.D. (1999). *Amphibian and Reptiles of Peninsular Malaysia and Thailand: An illustrated checklist.* Bushmaster Publications, Wüerselen, Germany. 240 pp.
13. Horton, R.E. (1945). Erosional development of streams and their drainage basins. *Bull. Geol. Soc. Amer.* 56: 275 – 370.
14. Inger, R.F. & Stuebing, R.B. (1997). *A Field Guide to the Frogs of Borneo*. Natural History Publications (Borneo). Sdn. Bhd. 205 pp.
15. Frost, D.R. (2004). Amphibian Species of the World: an Online Reference. Version 3.0 (22 August, 2004). American Museum and Natural History. (assessed on 22/11/04)
16. Lim, B.L. (1983). *Poisonous Snakes of Peninsular Malaysia*. Third Edition. Malayan Nature Society, Kuala Lumpur. +vii71pp.
17. IUCN Conservation International and Nature Serve (2004). IUCN Red List Status

Amphibians. Global Amphibian Assessment. http://www.globalamphibians.org/assessment.htm (assessed on 22/11/04)

18. Daicus, B. and Hashim, R. (2004). Herpetofauna of the Western Region of Endau-Rompin, Johore, Peninsular Malaysia. *Malaysian Journal of Science* **23**: 65 – 72.
19. Kiew, B.H., Lim, B.L. & Lambert, M.R.K. (1996). *To determine the effects of logging and conversion of primary forest to tree crop plantations, on herpetofaunal diversity in Peninsular Malaysia* In: *Conservation, Management and Development of Forest Resources*: Proceedings of the Malaysia-United Kingdom Programme Workshop. p 9-10.
20. Lim, K.K.P & Lim, L.J. (1999). The Terrestrial Herpetofauna of Pulau Tioman, Peninsular Malaysia. *Raffles Bull. Zool., Suppl.* **6**: 131-155.