AN ANNOTATED CHECKLIST OF HERPETOFAUNA OF LANGKAWI ISLAND, KEDAH, MALAYSIA

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Abstract: The herpetofauna of Langkawi Island was recorded during the Scientific & Heritage Expedition of the Langkawi Islands, Kedah from 10 – 15 April 2003. The reptiles such as snakes, lizards and turtles and amphibians such as toads and frogs were captured or observed and then identified. The reptiles and amphibians were captured and observed during trekking bouts along used and unused trails, along rivers and streams and during chance encounters.

The results showed that 15 species of amphibians from 5 families and 23 species of reptiles from 11 families were present on Langkawi Island. The most common frog species were the Answering Froglet *(Microhyla heymonsi)*, the Malayan House Frog (*Polypedates leucomystax*) and the Malayan Pond Frog (*Rana erythraea*) while the least common amphibians were the Black-eyed Ground Toad (*Leptobrachium nigrops*) and the Granulated Puddle Frog (*Occidozyga lima*).

Of the reptiles, there were 13 species of lizards, three species of turtles, and seven species of snakes. The most commonly encountered reptiles were the Water Monitor (*Varanus salvator*) and the Many-lined Sun Skink (*Mabuya multifasciata*) and Common Butterfly Lizard (*Leiolepis belliana*).

Keywords: Herpetofauna, amphibian, reptile, Langkawi Island

INTRODUCTION

Malaysia, with its hot and wet tropical climate presents a very conducive environment for the existence and survival of two classes of vertebrates namely the amphibians and the reptiles. Berry (1975) listed 86 species of amphibians present in Peninsular Malaysia while Inger and Stuebing (1989) recorded 150 species in the state of Sabah, in East Malaysia. Tweedie (1983) and Ibrahim and Abd-Halim (2002) listed about 140 species of snakes whereas Cox *et al.*, (1998) recorded 320 species of reptiles in Thailand, Peninsular Malaysia and Singapore. Despite this tremendous diversity, frogs, toads, snakes, lizards and turtles do not play a prominent role in scientific studies and research in our country and hence only a few studies have been published on the inventory, population,

community structure and other aspects of amphibian and reptilian ecology (Ibrahim *et al.*, 1999; Ibrahim *et al.*, 2002). This is mainly attributed to the lack of interest and support from various authorities and also minimum understanding of the importance of these vertebrates in the ecological processes of an ecosystem.

Global amphibian and reptilian populations are on the decline and presently their numbers are threatened by the destruction of their natural habitats and environmental pollution and degradation (Porter, 1972; Duellman and Trueb, 1985; Blaustein and Wake, 1990). In Malaysia, forest frog species are threatened by logging and development and hence they are vulnerable to extinction (Kiew, 1984). Although as far as we know no data exists for reptiles, it is widely believed that environmental pollution, habitat destruction and over-harvesting will have a detrimental effect on Malaysian reptile populations. Different amphibian and reptilian communities are known to inhabit different habitats (Dash and Mahanta, 1993; Inger, 1966; Porter, 1972) but again only a few studies have been done pertaining to this aspect (e.g. Kiew, 1972; Noorsham *et al.*, 2000a; Noorsham *et al.*, 2000b and Ibrahim *et al.*, 2002).

This work then reports the results of a rapid and intensive survey of the herpetofauna of the island of Langkawi, Kedah which was undertaken during the Langkawi Development Authority (LADA)-Forestry Department (Peninsular Malaysia)-Malayan Nature Society's Scientific & Heritage Expedition of the Langkawi Islands in April 2003. The main objectives of our survey was to gauge the reptilian and amphibian diversity and to list down the herpetofauna species of the island of Langkawi. Of course the list is not exhaustive or final, however the information from this survey could be used for future herpetofauna studies and for its long term monitoring purposes.

STUDY AREAS

The main collecting sites for amphibians and reptiles were a few small rivers and streams and also wet and swampy grounds around the island. These include Sungai Korok near Kampung Buku, Sungai Datai in Datai Bay at the northern part of the island, Sungai Lubok Tuna near Kampung Ewa and Sungai Perangin near the Seven Wells Waterfall and Sungai Lubok Semilang. Other sites include the wet grounds at Pantai Kok, abandoned paddy fields along the Jalan Matsirat and roadside ditches and culverts along the Kuah-Padang Lallang road and of course the grounds of the Mutiara Burau Bay Beach Resort. Additional surveys also were conducted in Machinchang Forest Reserve, Burau Bay area, Datai Bay and Bukit Sawak Forest Reserve.

MATERIALS AND METHODS

The herpetofauna of Langkawi Island was recorded during the Scientific & Heritage Expedition of the Langkawi Islands, Kedah from 10 – 15 April 2003. Amphibians were collected mainly at night by field parties comprising 3, 4 and even 8 persons working from 2000 hrs to 2300 hrs. Collectors wade through streams or wet grounds shining torchlights to locate frogs and toads, which were then captured by hand grabbing, or by using sweep nets. In addition amphibian eggs and larvae were also collected in the

daytime. Captured animals were positively identified and then released near the point of capture. Voucher specimens for future reference were deposited in the School of Distance Education and School of Biological Sciences, Universiti Sains Malaysia. The main references used to identify frog specimens were Inger (1966), Berry (1975), Inger and Stuebing (1989) and Inger and Stuebing (1997).

Surveys for reptiles were carried out for six consecutive days. In addition, nightly forays were carried out to collect nocturnal reptiles for five consecutive nights. The reptiles were captured and observed during trekking bouts along used and unused trails, along rivers and streams. The records of reptiles during the study were the combination of direct searches (terrestrial turtles, lizards), chance observations (snakes) and active searching and catching of specimens (lizards). Lizards were captured by hand or by sweep nets, while smaller snakes were caught by nets and poles. Specimens captured or observed were identified by referring to Lim & Das (1999), Tweedie (1983) Cox *et al.* (1998) and Chan-Ard *et al.* (1999) and later released near the point of capture. Estimated total effort of 78 man-days was used for the surveys during the study period.

RESULTS

The Order Anura was represented by fifteen species from five families. Family Ranidae was the largest group comprising eight different species, followed by Family Microhylidae with three species, Family Bufonidae with two and Families Pelobatidae and Rhacophoridae with one species each.

Taxonomic group of the Order Squamata and Suborder Lacertilia (lizards) was represented by thirteen species from five different families, while Suborder Serpentes (snakes) was represented by seven species from four different families. Order Chelonia (turtles) was represented by three species from two different families. Family Scincidae and Colubridae recorded the highest number of species with four species respectively, followed by Agamidae and Gekkonidae with three species respectively.

NOTES ON SPECIES COLLECTED AND RECORDED

AMPHIBIANS

Pelobatidae

This family was very poorly represented with only one species of pelobatid was found namely *Leptobrachium nigrops.*

Leptobrachium nigrops.

Three Gosner stage 25 larvae were collected in some rocky puddles at Sungai Perangin near the base of the Seven Wells waterfalls.

Bufonidae
The toads were also poorly represented with two species identified: *Bufo asper* and the common *B. melanostictus.*

Bufo asper
A total of 10 specimens were captured. Six adults and two sub adults were found at Sungai Korok, while two juveniles were collected at Sungai Perangin near the Seven Wells waterfalls.

Bufo melanostictus
Twelve individuals were collected at the banks of a small river and on some wet grassy puddles at Pantai Kok and two adults were collected in the grounds of Mutiara Burau Bay Beach Resort.

Ranidae
Eight species from two genera from the true frog family Ranidae were collected. This represents 53 % of amphibian species found on Langkawi. Members of this family were captured from all collecting sites. Three of these species (*Rana blythi, R. chalconota* and *R. glandulosa*) are known to be forest species, three others (*R. cancrivora, Occidozyga laevis* and *O. lima*) are usually found in semi-disturbed areas, while the other two (*R. limnocharis and R. erythraea*) are commensal of man and commonly found in agriculture areas as well as near human habitation.

Rana blythi
Six specimens (four adults and two sub adults) were collected from Sungai Korok, four from Sungai Datai, two from Sungai Temurun and three more from Sungai Lubok Tuna.

Rana cancrivora
Six specimens were found near the mouth of a small-unnamed river at Pantai Kok.

Rana chalconota
Five adults were collected from the rocks and boulders in Sungai Datai.

Rana erythraea
Six adults and five young specimens were found at Sungai Korok, seven adults and two youngs were collected from Pantai Kok, two adults were found at Sungai Temurun and six youngs were captured from a fallow rice field along Jalan Padang Matsirat.

Rana glandulosa
This is a very elusive species. No specimens were caught but two were heard calling at Sungai Lubok Tuna and two more were also heard calling at Sungai Perangin.

Rana limnocharis
Seven adults were collected at Pantai Kok and four more were caught at the paddy field along Jalan Padang Matsirat.

Occidozyga laevis
Two adult specimens were collected from the small river at Pantai Kok.

Occidozyga lima
Two adult specimens were found at Sungai Korok.

Rhacophoridae
Only one species of tree frog (*Polypedates leucomystax*) was found by our team. This species is one of the commonest frogs in Malaysia and can be found in many different habitats and in various degrees of reproduction and development. The eggs are enveloped in white frothy mass termed a foam nest and attached to branches, tank sides and drain sides above water.

Polypedates leucomystax
Two adults were caught, seven adults were heard calling, two egg mass were found in a drain culvert and some larvae were seen in the same drain culvert at Sungai Korok. At Pantai Kok ten adults were collected, four adults were heard calling, a pair was found mating, six spawns were seen and some larvae were found.

Microhylidae
This family, consisting of narrow-mouthed frogs, is essentially tropical in its distribution with only a few species living in temperate climates (Inger and Stuebing 1997). Some members of this family are usually found in built up areas. On Langkawi it was represented by three species namely *Microhyla butleri*, *M. heymonsi* and *Kaloula pulchra*

Microhyla butleri
Eight adult specimens were found in some swampy land near Pantai Kok.

Microhyla heymonsi
Six adults were collected from the Sungai Korok area while another fifteen were found in waterlogged grass at Pantai Kok.

Kaloula pulchra
Two adult specimens were collected from a drain culvert under the road leading to Mutiara Burau Bay Resort at Pantai Kok.

REPTILES

Suborder Lacertilia (Lizards)

Agamidae
Only three species were recorded which are frequently found and observed in the surveyed areas and are common species of forest habitats, These three species can also be found in open habitats, such as parks, gardens, and forest edges (Tweedie and Harrison, 1988).

Draco volans, Common Gliding Lizard
Three individuals of this gliding lizard were captured in Gunung Machinchang Forest Reserve and Bukit Sawak Forest Reserve. *Draco volans* was captured while sitting and stalking for insects on a tree branch.

Bronchocela cristatella, Green Crested Lizard
Individuals of this agamid species were observed on branches of small trees and shrubs in Machinchang Forest Reserve and Bukit Sawak Forest Reserve.

Calotes versicolor, Garden Fence Lizard
An open habitat species and frequently observed in the bushes and shrubs close to human settlements. Individuals of this were species recorded in Burau Bay.

Scincidae
The skink species recorded during this survey occurs in all types of habitats.

Mabuya multifasciata, Many-lined Sun Skink
The most common skink and abundant member of this family and frequently sighted on the forest floor and on the ground in all the sites visited. This species had also been observed basking and preying in open habitats and near human settlements.

Mabuya macularia, Speckled Forest Skink
A specimen of this species was recorded on the forest floor in Gunung Machinchang Forest Reserve.

Sphenomorphus maculatus, Streamside Skink
An individual of this species was observed on the forest floor in Datai Bay.

Emoia atrocrostata, Mangrove Skink
A single individual of this species observed basking on the tree trunk in Sungai Kilim-Kisap Mangrove Reserve.

Gekkonidae
Three species of geckos were collected during the survey. *Gekko gecko* and *Hemidactylus frenatus* are the common species frequently observed in inhabited areas, while *Gekko smithi* is the only true forest species (Tweedie & Harrison, 1988).

Gekko gecko, Tockay Gecko
Three individuals and of this species were captured inside the bathroom and another two were caught inside the workers canteen at the Mutiara Burau Bay Resort.

Hemidactylus frenatus, Spiny-tailed House Gecko
This house gecko was captured and sighted on the ceiling of the workers canteen and hostel at the Mutiara Burau Bay Resort. They were also recorded at the workers hostel at Datai Bay and other human settlements.

Gekko smithi, Forest Gecko
This forest species was recorded through vocalization and a single specimen was observed in the Gunung Machinchang Forest Reserve.

Uromasticidae
Two species of butterfly lizards are known to occur in Peninsular Malaysia. Only one species was recorded in this survey.

Leiolepis belliana, Common Butterfly Lizard
There were three to four colonies of this beautiful lizard observed at the Mutiara Burau Bay Resort beach and its nearby surroundings. They emerge and become active in the morning sunshine; basking and foraging, and retreating into their burrows swiftly when approached. Their activities seem to cease in the late afternoon. Four to five young were observed emerging from the same burrow with their mother.

Varanidae
The varanid species recorded during this survey are common and frequently observed in all habitat types. *Varanus salvator* (Water Monitor) is the most widespread of all varanids because of their ability to adapt to new and disturbed areas (Traeholt, 1994).

Varanus salvator, Water Monitor
Individuals of this species were observed in Datai Bay, Burau Bay, Sungai Kilim-Kisap Mangrove Reserve and Gunung Machinchang Forest Reserve.

Varanus bengalensis, Clouded Monitor
Two individuals were observed at Burau Bay while digging for foods and quickly climbed a nearby tree when approached.

Suborder Serpentes (snakes)

Boidae
Only one species from this family was recorded.

Python reticulatus, Reticulated Python
One specimen was sighted on the forest floor in Gunung Machinchang Forest Reserve.

Viperidae
Only one species of viper was found by our team.

Calloselasma rhodostoma, Malayan Pit-viper
The snake was observed during the night in an open field at Datai Bay.

Elapidae
Only one species of this venomous family was recorded.

Naja kaouthia, Monocellate Cobra

One road kill specimen was observed adjacent to Bukit Sawak Forest Reserve.

Colubridae
Four species of colubrid snakes was recorded during this survey and they occur in various types of habitat.

Boiga dendrophila, Mangrove Snake
One specimen was observed resting on a tree branch in Sungai Kilim-Kisap Forest Reserve.

Ahaetulla prasina, Oriental Whip Snake
This species was recorded moving between tree branches in Gunung Machinchang Forest Reserve.

Chrysopelea paradisi, Paradise Tree Snake
A specimen of this beautiful snake was recorded moving between shrubs in Gunung Machinchang Forest Reserve.

Boiga cynodon, Dog-toothed Cat Snake
One road kill specimen was observed on the road to Datai Bay adjacent to Bukit Sawak Forest Reserve.

Order: Chelonia (turtles)

Trionychidae
One species of this soft-shell turtle was recorded in our survey.

Dogania subplana, Malayan Soft-shell Turtle
A specimen of this species was recorded in Sungai Datai at Datai Bay and another was caught in Sungai Lubok Tuna.

Bataguridae
Two species of this family were recorded in this survey. *Cuora amboinensis* (Asian Box Turtle) and *Siebenrockiella crassicollis* (Black Marsh Turtle) commonly occur in lowland streams in Tasik Bera (Norsham *et al.*, 2000a).

Cuora amboinensis, Asian Box Turtle
A specimen of this species was observed near a stream at Datai Bay.

Siebenrockiella crassicollis, Black Marsh Turtle
One individual was recorded from Sungai Lubok Semilang,

DISCUSSION

Although checklist information are always under valued as containing no useful, quantitative data, however systematic, intensive and comprehensive data collection could help in conservation and management programs (Droege *et al.*, 1998). It must be noted that the other wildlife groups such as mammals and birds can be systematically listed from trappings and direct observations, but the collection and observation of amphibian and reptile species is entirely dependent on opportunistic sightings and upon chance encounters in their natural habitat especially for reptilian taxa such as snakes and lizards. Certainly, there will be some species, especially the arboreal, nocturnal and secretive ones, which have not been adequately sampled or listed. Specific niches such as high canopy and forest dwelling species were not thoroughly sampled and these niches are home to different species of both amphibians and reptiles (Berry, 1975; Inger and Stuebing, 1997).

The low number of amphibian and reptilian species recorded in our study may be due to the nature of our study which was carried out in a limited period of time and it was certainly not possible to record all the species present in the forest and on the entire island. It is also due to the limited forest coverage and survey areas that have been covered in our study. A reasonable checklist of both these animal taxa can be compiled if a longer period of survey had been conducted and a more extensive study area covered. For example Norsham *et al.* (2000a) only recorded a total of nine species of frogs and 17 species of reptiles from their nine days sampling in the northern part of the Belum Forest Reserve. Kiew (1987) also recorded a low number of herpetofauna from Ulu Endau, Johore with 24 species of amphibians, 14 species of snakes, nine species of lizards and three species of turtles. A longer period of time and a bigger study area coverage probably would result in more number of species observed and recorded as shown by Norsham *et al.* (2000b) in Tasek Bera Ramsar Site which recorded a total of 19 species of amphibians and 41 species of reptiles.

Another possibility may due to the nature of island habitats such as Langkawi Island with a relatively different habitat compared to tropical lowland forests in terms of species richness. Surveys by Kiew *et al.* (1995), Diong *et al.* (1995), Lim *et al.* (1995a; 1995b) in the Temenggor Forest Reserve recorded a total of 24 species of amphibians, 23 species of snakes, 21 species of lizards and seven species of freshwater and land tortoises and turtles, compared to 15 species of amphibians, seven species of snakes, 13 species of lizards and three species of turtles documented in the present study.

There are two lizards species and two snakes species that were not recorded in our study but was collected in other surveys. The species are *Cyrtodactylus pulchellus* (Malayan Forest Gecko), *Cyrtodactylus quadrivirgatus* (Four-striped Forest Gecko), *Dryophis rubescens* (Brown Whip Snake) and *Elaphe flavolineata* (Yellow-striped Rat Snake) (Chan-Ard *et al.*, 1999).

Varanus salvator (Water Monitor) and *Python reticulatus* (Reticulated Python) are catalogued as Other Protected Animal in the Protection of Wildlife Act, 1976, while no species of amphibian is presently protected by Malaysian Law.

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Appendix 1. Amphibians and reptiles recorded during the Langkawi Scientific and Natural Heritage Expedition, 10-19 April 2003.

Family/Species	Common name	Protection status
Amphibians		
Frogs and toads		
Pelobatidae		
1. *Leptobrachium nigrops*	Black-eyed Ground Toad	NP
Bufonidae		
2. *Bufo asper*	Giant Forest Stream Toad	NP
3. *Bufo melanostictus*	Common Toad	NP
Ranidae		
4. *Rana blythi*	Malayan Giant Frog	NP
5. *Rana cancrivora*	Mangrove Frog	NP
6. *Rana chalconota*	Copper-cheeked Frog	NP
7. *Rana erythraea*	Malayan Pond Frog	NP
8. *Rana glandulosa*	Glandular Frog	NP
9. *Rana limnocharis*	Paddy Field Frog	NP
10 *Occidozyga laevis*	Common Puddle Frog	NP
11. *Occidozyga lima*	Granulated Puddle Frog	NP
Rhacophoridae		
12. *Polypedates leucomystax*	Malayan House Frog	NP
Microhylidae		
13. *Microhyla butleri*	Noisy Froglet	NP
14. *Microhyla heymonsi*	Answering Froglet	NP
15. *Kaloula pulchra*	Painted Toad	NP
Reptiles		
Lizards		
Gekkonidae		
16. *Gekko gecko*	Tockay Gecko	NP

17. *Hemidactylus frenatus*	Spiny-tailed House Gecko	NP
Family/Species	Common name	protection status
18. *Gekko smithi*	Forest Gecko	NP
Agamidae		
19. *Draco volans*	Common Gliding Lizard	NP
20. *Bronchocela cristatella*	Green Crested Lizard	NP
21. *Calotes versicolor*	Garden Fence Lizard	NP
Varanidae		
22. *Varanus salvator*	Water Monitor	P
23. *Varanus bengalensis*	Clouded Monitor	TP
Scincidae		
24. *Mabuya multifaciata*	Many-lined Sun Skink	NP
25. *Mabuya macularia*	Speckled Forest Skink	NP
26. *Sphenomorphus maculatus*	Streamside Skink	NP
27. *Emoia atrocrostata*	Mangrove Skink	NP
Uromasticidae		
28. *Leiolepis belliana*	Common Butterfly Lizard	NP
Serpentes(Snakes)		
Boidae		
29. *Phyton reticulatus*	Reticulated Phyton	P
Colubridae		
30. *Boiga dendrophila*	Mangrove Snake	NP
31. *Ahaetulla prasina*	Oriental Whip Snake	NP
32. *Chrysopelea paradisi*	Paradise Tree Snake	NP
33. *Boiga cyonodon*	Dog-toothed Cat Snake	NP
Elapidae		
34. *Naja kaouthia*	Monocellate Cobra	NP
Viperidae		
35. *Calloselasma rhodostoma*	Malayan Pit-viper	NP

Chelonians (Turtles)

Family/species	Common name	Protection status
Trionychidae		
36. *Dogania subplana*	Malayan Softshell Turtle	NP
Bataguridae		
37. *Cuora amboinensis*	Asian Box Turtle	NP
38. *Siebenrockiella crassicollis*	Black Marsh Turtle	NP

Note:

Common names for amphibians follow Kiew (1984)
Protection status : P = Protected
NP = Not Protected
TP = Totally Protected