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Checklist of the Herpetofauna of Bukit Perangin Forest Reserve, Kedah, Malaysia (Senarai Semak Spesies Herpetofauna di Hutan Simpan Bukit Perangin, Kedah, Malaysia)

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ABSTRACT

Bukit Perangin Forest Reserve, Kedah Malaysia is a popular forest park well known for its clear rivers and streams, interesting sedimentary rock formations and a rich biodiversity in flora and fauna. However to date no report on the amphibians and reptiles of this forest has ever been published. Therefore, from January 2009 to May 2010, herpetofauna surveys were conducted at Bukit Wang Recreational Forest, which forms a part of the Bukit Perangin Forest Reserve. The results of the survey showed that a total of 15 species of amphibians belonging to 6 families and 15 species of reptiles belonging to 7 families were found in the study area. These constitute the first records for the amphibians and reptiles in this forest. The herpetofauna checklist showed that the most abundant amphibians were from the family Ranidae while the most abundant reptiles were from the family Gekkonidae.

Keywords: Amphibians; Bukit Perangin Forest Reserve; reptiles

ABSTRAK

Hutan Simpan Bukit Perangin, Kedah Malaysia adalah sebuah taman hutan yang popular, terkenal dengan sungai-sungai yang jernih, pembentukan batu enapan yang menarik dan biodiversiti yang kaya dengan flora dan fauna. Walau bagaimanapun, setakat ini tiada laporan mengenai amfibia dan reptilia daripada hutan ini pernah diterbitkan. Oleh itu, dari Januari 2009 hingga Mei 2010, tinjauan herpetofauna telah dijalankan di Hutan Rekreasi Bukit Wang, yang merupakan sebahagian daripada Hutan Simpan Bukit Perangin. Hasil daripada tinjauan menunjukkan bahawa sebanyak 15 spesies amfibia yang terdiri daripada 6 famili dan 15 spesies reptilia yang terdiri daripada 7 famili telah ditemui di kawasan kajian. Ia merupakan rekod yang pertama untuk amfibia dan reptilia di dalam hutan ini. Senarai spesies herpetofauna menunjukkan amfibia yang paling banyak dijumpai adalah daripada famili Ranidae manakala reptilia adalah daripada famili Gekkonidae.

Kata kunci: Amfibia; Hutan Simpan Bukit Perangin; reptilia

The tropical rainforest of Malaysia is one of the most complex and richest forests in the world, rich not only in terms of numbers of species but also in terms of diversity of habitats and ecosystems. As one of the world's twelve most biologically diverse countries (Nazri Khan & Mohd Yunus 2007), the forests support extensive reptile and amphibian communities that are active throughout the year. With an abundance of reptile and amphibian habitats, the opportunities for scientific discovery of new species are endless. Das and Norsham (2007) reported that 600 herpetofauna species (203 species of amphibians and 397 species of reptiles) have been recorded from Peninsular Malaysia and its offshore islands, and from East Malaysia (Sabah and Sarawak on Borneo and associated island on Borneo). According to their study, they found that 93 species of amphibians and approximately 256 species of reptiles were identified to be present in Peninsular Malaysia.

A number of herpetofauna checklists of Peninsular Malaysia have been compiled by many herpetologists (Belabut et al. 2010; Chan et al. 2009a, 2009b; Das & Norsham 2007; Grismer et al. 2006; Grismer et al. 2004; Ibrahim et al. 2008; Lim et al. 2010). The latest checklist revised by Chan et al. (2010a) reported the total number of amphibians species present in Peninsular Malaysia at 107 including 17 toads (Bufonidae), 15 fanged frogs (Dicroglossidae), 11 leaf litter frogs (Megophryidae), 21 small mouthed frogs (Microhylidae), 19 true frogs (Ranidae), 21 tree frogs (Rhacophoridae) and three caecilians (Ichthyopidae). Grismer et al. (2010) listed from their surveys, a total of 107 species of herpetofauna from Banjaran Bintang in Perak. A herpetofauna survey by Chan et al. (2010b) at Gunung Panti Forest Reserve, Johor recorded 37 species of frogs, one turtle, 27 lizards and 11 snakes. Another amphibian and reptile survey conducted by Chan et al. (2009b) in Pasoh Forest Reserve, Negeri

Sembilan found 23 species of reptiles and amphibians of which 5 species have never been discovered before in the study area.

The main purpose of this study was to survey the reptiles and amphibians of Bukit Perangin Forest Reserve, Kedah. This study is vital for the amphibian and reptile biodiversity inquiry in Malaysia because it provides information that could be used for future herpetofauna conservation programs. If no effort is made in order to enhance herpetofauna conservation, we may lose a few species before we can thoroughly study them and we can even lose some species before we actually discover them.

MATERIAL AND METHODS

STUDY SITE

Bukit Wang Recreational Forest (N6° 19.126' E100° 28.954', elevation 105 m above sea level) is a 20 ha virgin jungle reserve situated in Compartment 24 (865 ha) of the Bukit Perangin Forest Reserve (12,958 ha) (Figure 1). It is surrounded by four hills namely Bukit Hangus (470 m) to the north, Bukit Besar (461 m) to the west, Bukit Buluh (440 m) to the east and Bukit Tunggul Besar (260 m) to the south. It is situated approximately 40 km north of Alor Star the state capital of Kedah and 12 km north east of Jitra. This park is a lowland dipterocarp forest, which is suitable for habitation of various species of flora and fauna. The dominant plant species that can be found are palm

trees and rows of Seraya trees (*Shorea curtisii*) which are more than 120 cm in diameter that grow naturally. Another plant is Yellow Saraca (*Saraca thaipingensis*) with yellow flowers which are found throughout the park. Interestingly, this park has been known to be populated with medicinal plants including the famous Tongkat Ali (*Eurycoma longifolia*) (Abu Thalib and Chan 2007). There is a small stream named Tosak River which is about 15 km long that flows through this park. This park is a favourite place for recreational activities such as camping, treasure hunts and jungle trekking. Facilities that have been developed include chalets, campsites, public toilets, a children's pool, rest-huts, foot reflexology path, surau, bridges, walkways, 351 steps on the rocky escarpment and a multipurpose hall for tourists and visitors.

SAMPLING METHODS

Field surveys were conducted during the day and sampling activities were carried out 2 to 3 h during night time by field parties comprising 5-6 persons. These activities involved walking along a 1.5 km length of the riparian zone of Tosak River that flows through the park and along 3 km of forest trails crisscrossing the forest area, looking for any reptiles or amphibians. Counts were made for observed species while encountered species were captured by using scoop nets or by hand grabbing and placed in individual plastic bags before they were brought back to the laboratory for processing. At the laboratory, selected specimens were photographed and morphometric measurement of individuals for each specimen was recorded. Voucher

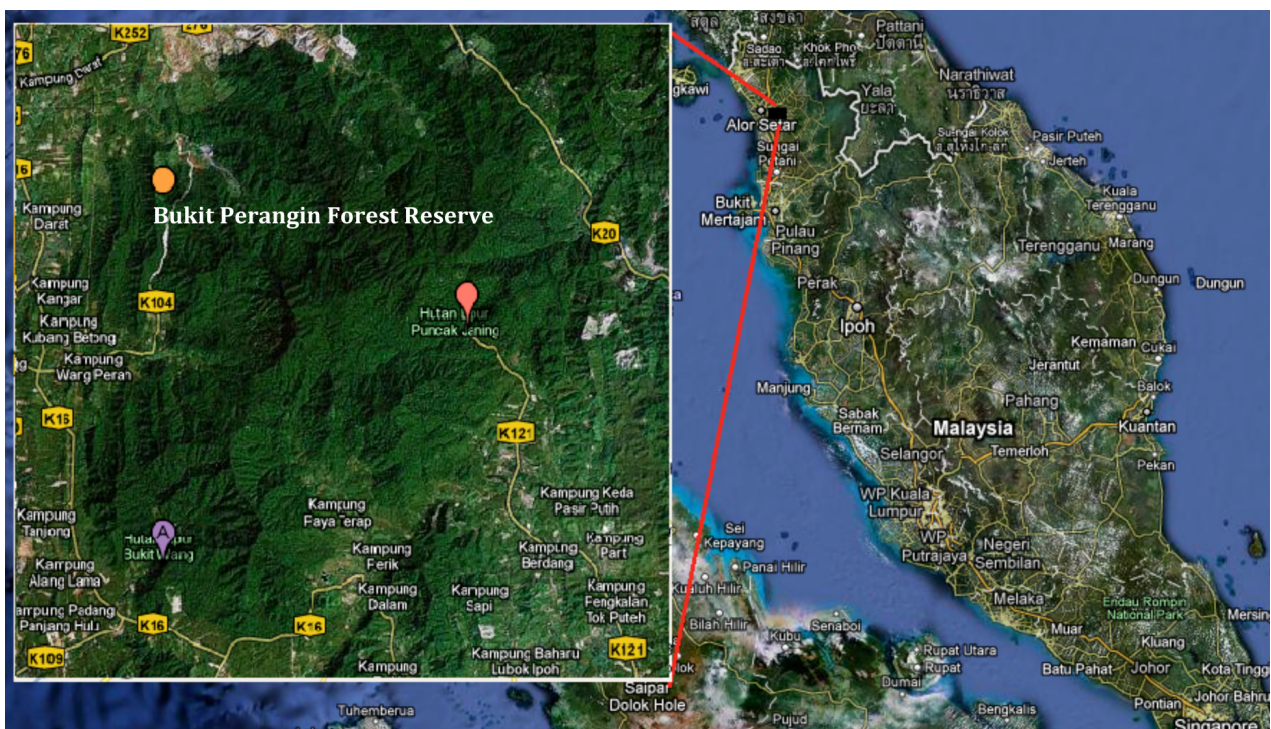


FIGURE 1. Map of Bukit Wang Recreational Forest. Source: Google maps (2010)

specimens were then preserved in 10% formalin and stored in 70% ethanol for future reference, and deposited in the Amphibian and Reptile Collections, Universiti Sains Malaysia (ARC-USM) for future reference. Herpetofauna taxonomy was based on Inger and Stuebing (1997), Cox et al. (1998), Ibrahim et al. (2008) and Norhayati et al. (2009).

RESULTS

Samplings were carried out at the study site, beginning January 2009 till end of May 2010. In this study, a total of 30 herpetofauna species were successfully recorded (Table 1). The amphibians were represented by 14 anuran

species from five families and one Gymnophiona species. Out of the 14 anuran species, seven species were from the family Ranidae, followed by Bufonidae with three species, from the Dicroglossidae with two species and a single species, respectively representing by the Megophryidae and Rhacophoridae. We also discovered one species of ichthyophiid namely *Caudacaecilia nigroflava*. The Ranidae was the largest group totaling seven species. This is due to the fact that most of the ranid frogs were riparian species which normally dominate the herpetofauna of streams and rivers. All were collected along the riparian zone of Tosak River. *Odorrana hosii*, *Phrynoides aspera* and *Polypedates leucomystax* were considered

TABLE 1. The amphibians and reptiles recorded from Bukit Perangin Forest Reserve

No.	Family	Species	Common Name*	Conservation status
1	Ichthyophiidae	<i>Caudacaecilia nigroflava</i>	Kuala Lumpur Caecilian	Data deficient
2	Ranidae	<i>Hylarana labialis</i>	White-lipped Frog	Least concern**
3		<i>Hylarana nicobariensis</i>	Cricket Frog	Least concern
4		<i>Odorrana hosii</i>	Poisonous Rock Frog	Least concern**
5		<i>Odorrana monjerai</i>	Mount Jerai Frog	Data deficient
6		<i>Hylarana picturata</i>	Spotted Stream Frog	Least concern**
7		<i>Hylarana glandulosa</i>	Rough-sided Frog	Least concern
8		<i>Hylarana nigrovittata</i>	Black-striped Frog	Least concern
9	Bufonidae	<i>Phrynoides aspera</i>	River Toad	Least concern
10		<i>Duttaphrynus melanotictus</i>	Asiatic Toad	Least concern
11		<i>Ingerophrynus parvus</i>	Dwarf Toad	Least concern
12	Megophryidae	<i>Leptobrachium hendricksoni</i>	Spotted Litter Frog	Least concern
13	Rhacophoridae	<i>Polypedates leucomystax</i>	Four-lined Tree Frog	Least concern
14	Dicroglossidae	<i>Occidozyga laevis</i>	Puddle Frog	Least concern
15		<i>Fejervarya cancrivora</i>	Crab-eating frog	Least concern
16	Gekkonidae	<i>Ptychozoon lionotum</i>	Smooth-backed Gliding Gecko	Data deficient
17		<i>Cyrtodactylus macrotuberculatus</i>	Bend-toed Gecko	Data deficient
18		<i>Hemidactylus frenatus</i>	Spiny-tailed House Gecko	Data deficient
19		<i>Hemidactylus brookii</i>	Brook's House Gecko	Data deficient
20		<i>Gehyra mutilata</i>	Four-clawed Gecko	Data deficient
21		<i>Gekko monarchus</i>	Spotted House Gecko	Data deficient
22	Agamidae	<i>Draco abbreviatus</i>	Fringed Flying Lizard	Data deficient
23		<i>Draco melanopogon</i>	Black-bearded Gliding Lizard	Data deficient**
24	Scincidae	<i>Mabuya macularia</i>	Speckled Forest Skink	Data deficient
25		<i>Eutropis multifasciata</i>	Many-lined Sun Skink	Data deficient
26	Varanidae	<i>Varanus salvator</i>	Water Monitor Lizard	Data deficient**
27	Pythonidae	<i>Python reticulatus</i>	Reticulated Python	Data deficient**
28	Elapidae	<i>Naja sumatrana</i>	Equatorial Spitting Cobra	Data deficient**
29	Colubridae	<i>Rhabdophis chrysargos</i>	Speckle-bellied Keelback	Data deficient**
30	Geoemydidae	<i>Heosemys spinosa</i>	Spiny Terrapin	Endangered **

*Based on <http://www.ecologyasia.com/html-menu/species-list.htm>

**Protected under Wildlife Conservation Act 2010 (Act 716)

the most abundant species whereas four species namely *Caudacaecilia nigroflava*, *Hylarana picturata*, *Hylarana glandulosa* and *Hylarana nigrovittata* were classified as rare species at the study site.

Lizards were represented by 11 species belonging to four different families. Family Gekkonidae was represented by six species and had the highest species number followed by families Agamidae and Scincidae comprising two species each and the Varanidae with one species. In this survey, we also observed three species of snakes from three different families, while order Chelonia (turtles) was represented by only one species from family Geoemydidae.

DISCUSSION

The highest abundance of amphibian species found were from the family Ranidae because ranid frogs commonly inhabit the riparian area along Tosak River that flows through the rocky landscape in the Bukit Wang Recreational Forest. From the 1930 to 1980s, Bukit Wang was a catchment area and a permanent source for supplying drinking water (Abu Thalib & Chan 2007). There were some clean water species such as *Hylarana labialis*, *Hylarana luctuosa*, *Odorrana hosii*, *Hylarana picturata* and *Hylarana glandulosa* present at the study area. A member of the family Bufonidae namely *Duttaphrynus melanotictus* is known as a well adapted species especially near to disturbed habitat (Belabut et al. 2010) and were mostly found dwelling around the chalets and along the forest trails. *Phrynoidis aspera* and *Ingerophrynus parvus* could easily be found among rocks and along the sandbanks of Tosak River. Species such as *Fejevaryia cancrivora*, *Occidozyga laevis* and *Polypedates leucomystax* were seen around the bushes and grasses along the forest trail and near shallow pools. Only one juvenile caecilian (*Caudacaecilia nigroflava*) was encountered by chance on a smooth rock in Tosak River.

The presence of abiotic factors such as microclimate and microhabitat at the Bukit Perangin Forest Reserve influenced the number of families of reptiles. Most of the species of lizards occupied the undisturbed forest areas where they perched on the sides of trees and crawled on the rock surfaces while other species such as turtles were dependent on permanent sources of water such as rivers and ponds. *Hemidactylus frenatus* from the family Gekkonidae was frequently found at the study site. Members of this common species were always found crawling on the ceiling and walls of man-made buildings such as chalets, public toilets and also rest-huts. Two individual species of *Gekko monarchus* were captured inside a public toilet and another one captured on the ceiling of a rest-hut adjacent to the forest. At night, *Cyrtodactylus macrotuberculatus* was found on the surface of a rocky landscape. *Ptychozoon lionotum* was captured on a yellow saraca tree (*Saraca thaipingensis*) during a field survey along the forest trail. Another two species namely *Hemidactylus brookii* and *Gehyra mutilata* were found crawling on the ceilings of

a retail store in the park. *Mabuya macularia* and *Eutropis multifasciata* were caught by hand on the rocks near the river. One species of Water monitor lizard (*Varanus salvator*), three species of snakes (*Python reticulatus*, *Rhabdophis chrysargos*, *Naja sumatrana*) and also one species of turtle (*Heosemys spinosa*) were seen but we were unable to catch them. Therefore these species were recorded as observed animals.

Conservation challenges are often associated with the amount of knowledge available on the species. Perhaps not surprisingly, the herpetofauna of Borneo is much better known and their biology and distribution better understood because of long-term researches conducted by many herpetologists such as Inger and his associates, starting from 1989 till 2007 (Das & Norsyam 2007). The rapid decline of amphibians and reptiles around the world are due to many factors such as physical habitat destruction or direct modification, ultraviolet radiation, acidification and other chemical pollutants, diseases and also changes in climate and weather (Gardner 2001). Therefore, there is a need to assess the current status of herpetofauna diversity and the level of information available on amphibian and reptile species in Peninsular Malaysia.

Based on the conservation status assigned to the Malaysian amphibians and reptiles under the IUCN's 'Red List', the Spiny Terrapin (*Heosemys spinosa*) found in this area is classified as an 'Endangered' species (Table 1) and the rest of the reptiles species were classified as 'Data Deficient'. All amphibian species recorded were considered as 'Least Concern' by the IUCN except for two species namely *Caudacaecilia nigroflava* and *Odorrana monjerai* which were classified as 'Data Deficient'. However, the species from these families namely *Draco melanopogon* (Agamidae), *Varanus salvator* (Varanidae), *Python reticulatus* (Pythonidae), *Naja sumatrana* (Elapidae) and *Rhabdophis chrysargos* (Colubridae) are protected under the Wildlife Conservation Act 2010 (Act 716). All amphibian species recorded were considered as 'Least Concern' except for two species namely *Caudacaecilia nigroflava* and *Odorrana monjerai* which were classified as 'Data Deficient'. *Caudacaecilia nigroflava* or Kuala Lumpur Caecilian is one of three caecilian species recorded in Peninsular Malaysia and because it is difficult to find, only a few herpetologists reported that they found this species in their surveys (Grismer et al. 2006 & Grismer et al. 2004; Lim et al. 2010; Shahrul Anuar and Ibrahim 2006). Meanwhile, only three species of amphibians namely *Hylarana labialis*, *Odorrana hosii* and *Hylarana picturata* are protected under the Wildlife Conservation Act 2010 (Act 716). Therefore, the habitats of these herpetofauna which are categorized as endangered, protected and rare must not be disturbed or altered so as to ensure the continued survival of those creatures.

Preliminary surveys of Bukit Perangin Forest Reserve contributed to the discovery of 30 species of herpetofauna. Checklists are interesting to compile and can encourage the search for rare or seldom found species and are also helpful

in indicating the presence, abundance and distribution of certain species. Therefore, the results of this survey are expected to give a good indication on the pattern of herpetofauna distribution and abundance in Peninsular Malaysia. Restricted time, limited area of coverage for sampling activities and sighting herpetofauna by chance contributed to the limited finding of herpetofauna in this study. We hope in future, an intensive and long term survey which covers a larger study area and unexplored trail areas such as 15 km trekking trail from Bukit Wang to Puncak Janing Recreational Forest can result in the discovery of many more new records.

The fact that the conservation status of 16 out of the 30 species recorded is categorized as "Data Deficient" reflects the sorry state of herpetofauna inquiry in Malaysia. Practically no clue or knowledge on these species is available other than their presence and distribution information in checklists and records. It is imperative that more effort, time and money be pumped into basic research on the biology and ecology of these animals since it is common knowledge that they play crucial roles in ecosystems functions and they provide other service to man and society.

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