DIVERSITY AND DENSITY OF AMPHIBIANS AT SUNGAI KAMPI, TELUK KAMPI, PENANG NATIONAL PARK, MALAYSIA

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ABSTRACT

The abundance and diversity of anurans were examined along a river at Teluk Kampi, Penang National Park for three consecutive nights from 28th till 30th June 2011. Specimens were sampled along a 100 m line transect along Sungai Kampi. The local assemblage of anurans was composed of five species, with Commensal Frog *Hylarana* cf. *labialis* being the most abundant. The Shannon-Wiener Diversity Index (H') of the anurans obtained was 3.040, Simpson's Index (D) obtained from this study was 0.407, whereas Simpson's Evenness was 0.608. The results showed that the presence of anurans in term of species variety and abundance at this particular stretch of river is quite low. In spite of the variations of microhabitat along the stretch of Sungai Kampi, the nearness to the sea limits the variety of anuran species at the site.

Keywords: Anurans, *Hylarana labialis*, Line transect, Microhabitat, Tropical forest,

INTRODUCTION

Penang National Park is the smallest national park in Malaysia, and also world's smallest national park, with a size of 25.63 km^2. The Park is unique as it has different types of habitat including a meromictic lake, wetlands, mangroves, mudflats, coral reefs and turtle nesting beaches. Overall, the park consists of granite hill slopes with heights exceeding 75 m a.s.l. Only 10% of the total area has slopes that are less than 18°. It was gazetted in April 2003, and currently home to 417 species of flora and 143 species of fauna (DWNP, 2000). However, some group animals are still understudy, especially those under the class of Amphibia, as the census done on the year 2000 focused on mammals, birds and insects. Currently, there are few publications on herpetofauna of Penang National Park. Studies done by Ibrahim *et al.* (2003; 2008) only covered the areas that are opened to public, within Activity Zone of the national park. This study reports on the diversity and density of amphibians along Sungai Kampi, an almost undisturbed area of Penang National Park located within the Protection Zone (Figure 1). In this study, we studied (i) the diversity of anurans particularly found on Sungai Kampi, (ii) the density of anurans available, and (iii) the microhabitat of the anurans along Sungai Kampi.

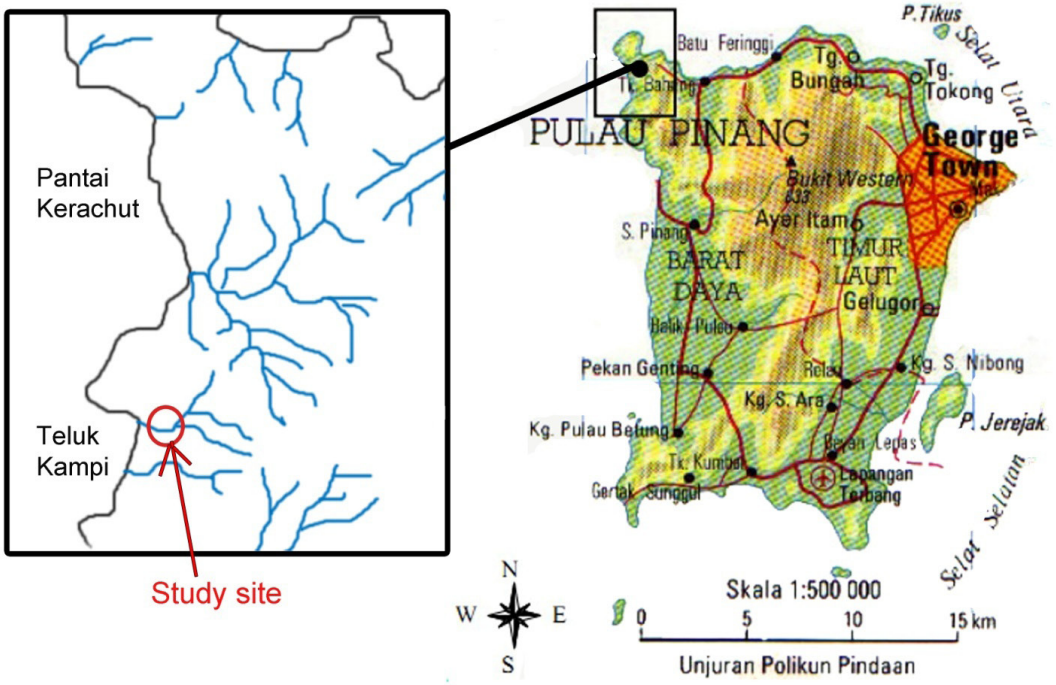

Figure 1. Collection site (modified from Penang map).

METHODOLOGY

This study was undertaken during the biodiversity inventory programme organized by Department of Wildlife and National Parks (DWNP). It was conducted along Sungai Kampi, where the river flows into Teluk Kampi (Figure 1). The geographic coordinates of the sampling location is N 5.4415' E 100.1831', with elevation of 12 m a.s.l. Line transect samplings were conducted 100 m along Sungai Kampi from 2015 hours to 2215 hours, for three consecutive nights starting 28 June till 30 June 2011. Total sampling effort spent was 24 man-hours. The study site is 130 m from the river mouth, made up 20m of the lower part of the sampling area is of sandy terrain, whereas about 75 m upstream is of rocky terrain with occasional large boulders forming a shallow waterfall and some small riffles. The river depth range from 5 cm to 60 cm, and width range from 70 cm to 510 cm wide. Canopy cover is scarce near the river mouth (estimated 70% light penetration) and become more dense going upstream (estimated 35% light penetration).

The amphibians collected were identified based on Berry (1975), Ibrahim *et al.* (2005) and Das (2010), and the species names were updated according to Frost (2011). Anurans were categorized into adult and sub-adult according to their snout-vent length (SVL). Sex was determined based on the presence of vocal sacs and nuptial pads on males. All captured animals were released at the end of the study after initial voucher specimens were preserved. Two of each species were kept as voucher specimens (voucher no. TNPP031 to TNPP037). Voucher specimens are housed at Institute of Biodiversity, Lanchang, Pahang and at University Sains Malaysia, Penang. Density and diversity indices were calculated using methods suggested by Anderson *et al* (1979), and Krebs (1999).

RESULTS AND DISCUSSION

A total of 37 anurans were captured during this study, comprised of 22 *Hylarana* cf. *labialis*, 9 *Ingerophrynus parvus*, 3 *Limnonectes malesianus*, 2 *L. blythii,* and a *Polypedates* cf. *leucomystax* (Table 1). Tadpoles of *Hylarana* cf. *labialis* are also observed at 20 m of the line transect. Juveniles were only captured on the second day of sampling period. Two juveniles from *H.* cf. *labialis* and two from *I. parvus*, each consisted of one male and one female of the species. Six anurans escaped during the first sampling, three *H.* cf. *labialis*, two *L. blythii* and a *L. malesianus*. The densities of anuran (individual per 100m^2) were as follow: *H.* cf. *labialis* (=0.105), *I. parvus* (=0.043), *L. blythii* (=0.010), *L. malesianus* (=0.014), and *P.* cf. *leucomystax* (=0.005). The Shannon-Wiener Diversity Index (H') obtained was 3.040. Surprisingly, the Shannon-Wiener Diversity Index showed a moderate value even though only five species of anurans were found in the study site. The Simpson's Index (D) obtained from this study was 0.407, whereas Simpson's Evenness (E) was 0.608. The distribution of species is uneven in the area, as *H.* cf. *labialis* were found in great amount compared to the other species, one or two individuals. This was due to the fact that the study site is close to river mouth where the foliage is scarce, and salty wind comes from the sea makes the site unsuitable for most forest anuran species. On the other hand, *H.* cf. *labialis* is known to survive in a wide range of habitats, from disturbed areas to secluded forests, thus make them able to resist the salty influence from the sea.

Table 1. Summary of collected and observed species according to day

Date	**Common name**	***Species name***	**Collect**		
			M	**F**	**total**
Day 1	White-lipped frog	*Hylarana* cf. *labialis*	6	5	11
28/6/11	Blyth's giant frog	*Limnonectes blythii*	-	2	2
	Golden tree frog	*Polypedates* cf. *leucomystax*	-	1	1
Day 2	White-lipped frog	*Hylarana* cf. *labialis*	3	4	7
29/6/11	Dwarf toad	*Ingerophry nusparvus*	5	4	9
	Malesian frog	*Limnonectes malesianus*	1	-	1
Day 3	White-lipped frog	*Hylarana* cf. *labialis*	2	2	4
30/6/11	Malesian frog	*Limnonectes malesianus*	-	2	2

The microhabitat along Sungai Kampi can be divided into four types, (i) Rocky boulders, (ii) Sandy bank, (iii) Fallen logs and branches, and (iv) Shrubs, that grows along the river side. Table 2 recorded the spot where the anurans were caught. Simpson's Index of Diversity of the microhabitat was 1.878 and Simpson's Evenness Index (E) was 0.469. The study site is mostly sandy bank with shrubs that grow at the edge of the bank. *H.* cf. *labialis* remained on the low vegetation during this study.

Table 2. Summary of micro-habitat where the anurans were captured.

Microhabitat	**Relative abundance in study site (Pi)**	**No. of anurans found**	**Species found**
Rocky boulder	0.003	4	*L. blythii, L. malesianus*
Sandy bank	0.7	10	*L. malesianus, I. parvus*
Fallen logs and branches	0.05	3	*H.* cf. *labialis*
Shrubs	0.2	20	*H.* cf. *labialis, P.* cf. *leucomystax*

We also observed and recorded the presence of four species of reptiles, namely Giant Anglehead Lizard (*Ganocephalus grandis*), Malayan Soft-shell Turtle (*Dogonia subplana*), Blunt-headed Slug Snake (*Aplopeltura boa*), and Triangle Keelback (*Xenochrophis trianguligerus*).

CONCLUSION

The location of the study site that is only meters away from the sea, limits the number and species of anurans captured, as the callings of many other anuran species can be hear resonating from upstream. We believe that there are many species of anurans to be discovered deep in the forest reserve. More study is needed to build an extensive list of herpetofauna available in Penang National Park's Protective Zone.

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