AMPHIBIAN FAUNAL DIVERSITY OF BERALIYA MUKALANA PROPOSED FOREST RESERVE

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Introduction

Sri Lanka is a biodiversity hotspot rich in herpetofaunal assemblages (Bossuyt *et al.*, 2004; Meegaskumbura *et al.*, 2002). Favorable environmental factors such as high rainfall and humidity and the high density of undergrowth found in this region support a rich diversity of herpetofauna. A total of 103 species of amphibians have been recorded (De Silva, 1996; Dutta & Manamendra-Arachchi, 1996; Manamendra-Arachchi & Pethiyagoda, 1998; Manamendra-Arachchi & Pethiyagoda, 2001a; Manamendra-Arachchi & Pethiyagoda, 2001b; Manamendra-Arachchi & Pethiyagoda, 2005; Meegaskumbura & Manamendra-Arachchi, 2005) and 87 species belonging to 16 genera are endemic to the island. Among those genera, *Lankanectes*, *Nannophrys*, and *Adenomus* have been considered as relic genera (Manamendra-Arachchi & Pethiyagoda, 2006; Pethiyagoda *et al*., 2006).

The Sri Lanka amphibian diversity is very high due to the varied geology, altitude, climate, geography and habitats which support a wide distribution. Sri Lanka has various ecological zones, i.e., dry zone, intermediate zone and wet zone. Most of the species are recognized by lowland wet zone rain forest and vegetational floristic region (Bambaradeniya *et al*., 2003; Gunatillake & Gunatillake, 1990). The Sri Lanka amphibian fauna may also be grouped by their habitats, such as arboreal, burrowing, terrestrial and aquatic. According to the De Silva (1994) and Wijesinghe & Dayawansa (2002), the endemic species belonging to these four groups are found in the wet zone rain forest. Sri Lanka has been fortunate as a fair proportion of their natural habitats are found throughout the wet zone rain forest.

Sri Lanka's natural forest areas still constitute over 12% of the total land area (Tan, 2005). The natural forests in the island are rapidly diminishing as a result of the expansion of settlements and agricultural land, leading to adverse impacts on the rich biodiversity (Bambaradeniya *et al*., 2003). The loss of natural forests over the past 100 years has led to the extinction of seventeen species of scrub frogs *Philautus* spp. (Manamendra-Arachchi & Pethiyagoda, 2005). One of the biggest drawbacks for conserving amphibian fauna of the country is the lack of knowledge of their distribution and ecology. Therefore, we believe this paper would contribute to and enhance the current knowledge of amphibian diversity within the Beraliya Mukalana Proposed Forest Reserve.

Study area

The Beraliya Mukalana Proposed Forest Reserve (BMPFR) area belongs to Alpitiya and Niyagama secretariat divisions of Galle District, between the northern latitudes 6º14' and 6º18' and eastern longitudes 80º11' and 80º14' (Somasekaran, 1988). The study area is accessible via the Alpitiya – Pitigala main road in the northern part and the Alpitiya – Waturuvila main road in the southern part (7 km from Alpitiya town junction). The Beraliya Mukalana forest covers 4,639 hectares and falls in the southwestern wet zone. This area has a several small mountains, Atuwagala Kanda being the highest mountain at 540 feet, and the forest area is 400 feet above sea level. The forest reserve receives the southwestern monsoon and the annual rainfall is 3,660 mm and the average annual temperature is 28ºC. The BMPFR vegetation can be categorized as lowland evergreen rain forest (Gunatillake & Gunatillake, 1990) and has a rich biodiversity like any other

rain forest in the area. The study area has a rich floristic diversity and its composition is a very good evidence for identifying a primary rain forest (Ashton *et al*., 1997).

Methodology

The present study was carried out during 2004 and 2005. A total of 16 days were spent for fieldwork during the two years. General area surveys were carried out in different habitat types within the BMPFR. Surveys were conducted both day and night. All amphibian habitats such as water bodies, under rocks, logs and decaying vegetation, and in trees and bushes for arboreal amphibians were thoroughly searched for the presence of specimens. All collected species were examined carefully and noted down before being released back to the same habitats. The diagnostic keys given by Dutta and Manamendra-Arachchi (1996), Manamendra-Arachchi & Pethiyagoda (1998), Manamendra-Arachchi and Pethiyagoda (2005) and Manamendra-Arachci and Pethiyagoda (2006) were used for species identification. Basic environmental parameters were recorded at the locations where specimens were collected.

Results

During the survey, 22 species of amphibians belonging to four families consisting of 14 genera, including 11 endemic amphibian species, were recorded in BMPFR. Species from the endemic genus *Lankanectes, Nannophrys, Adenomus* were found in BMPFR. Most of the species were recorded during the rainy season, especially in the well-shaded canopy covered areas. Several species were also recorded within the home gardens dominated by Areca-nut plants (*Areca catechu*). Among the 22 species, only one species represented the caecilians.

The most common and abundant species present in BMPFR are: *Bufo melanostictus, Microhyla rubra, Limnonectes limnocharis, Euphlyctis cyanophlyctis, E. hexodactyla,* and *Hoplobatrachus crassus*. Caecilians were the least abundant (5%). Atukorale's Toad (*Bufo atukoralei*), *Bufo noellerti, Philautus cavirostris, Polypedates cruciger, Polypedates longinasus* and Yellow Banded Caecilian (*Ichthyophis glutinosus*) are also occasionally found within the forest. Ten species recorded from BMPFR are considered as nationally threatened in IUCN-Sri Lanka's **1999 Red List of Threatened Fauna and Flora of Sri Lanka** national status report.

Discussion

Adinomus kelaartii was observed during both day and night, usually in close proximity to streams. It is a semi-arboreal species and inhabits rock boulders in streams (Manamendra-Arachchi, 2000). They were mostly found at ground level. Three specimens of *Bufo atukoralei* were recorded from a single locality in a home garden habitat. The common house toad *Bufo melanostictus* is a widely distributed and commonly found nocturnal species in the study area. It is mainly seen in cleared or disturbed habitats in home gardens, and rarely found inside the forest. Two specimens were seen inside the forest and 17 specimens were observed outside the forest near decaying logs and with rocky surfaces. *Bufo noellerti* is a terrestrial species and is rarely recorded near human habitations (Manamendra-Arachchi & Pethiyagoda, 1998). We also observed this species in trees about 1m above ground level in wet barks.

Common bull frog *Kaloula taprobanica* is a commonly seen species and it is recorded from human settlements such as in home gardens and agricultural lands. *Microhyla rubra* and *Ramanella variegate* appear to be uncommon in this forest, as they were recorded from a single locality. Their calls were heard near a temporary pool during the rainy season. Many of them were heard calling from the grass. About 13 specimens of Red narrow mouth frog were recorded in this area. Kandamby (2001) recorded 22 amphibian species from Galle District. However, two *Philautus* species were mistakenly identified as these two species are extinct in Sri Lanka. The White-bellied pug snout frog is an uncommon Microhylid frog that was recorded in the survey, and is mostly seen during the night time. Three specimens were recorded in the home gardens under rocks and inside the houses.

Hoplobatrachus crassus is the largest of the Sri Lankan frogs and very common in this area. Nine adults and 10 juveniles were seen near the streams. A juvenile with a yellowish green color line on the vertebral area and around the eyes was observed crossing a forest path at night. A smaller percentage was recorded from the paddy field. *Fejervarya limnocharis* is another very common species recorded from the grassland near temporary small ponds, pools and paddy fields. They are seen in large numbers everywhere in the study area. *Euphlyctis cyanophlyctis* and *Euphlyctis hexodactyla* are very common species and were recorded from temporary rain water pools and ponds inside the BMPFR; 24 specimens were recorded from this area. The Sri Lanka wood frog *Rana gracilis* is rare in this area; it is terrestrial or partly arboreal in habit and occasionally seen in small numbers sitting on the sides of the paddy fields and inside the wells. It is active during the night and during the daytime is seen resting under the rocks.

Rana temporalis was found in rocky habitats with streams and in the leaf litter in the rain forest throughout the wet zone. *Lankanectes corrugatus* has been recorded on the margins of slow flowing steams, in rocky areas of streams as well as in leaf debris. This species is essentially a sub-montane one, being recorded from the lower foothills. *Nannophrys ceylonensis* was rare and its distribution is restricted to the low country wet zone forest. They were found mainly under boulders and on wet flat rocky surfaces (Cascade habitats). *Rana auratiaca* is a semi-arboreal species which was seen under wet logs and on the leaf litter layer. It was also recorded near slow flowing streams and pools surrounding very damp substrates.

The tubercle shrub frog *Philautus cavirostris* was recorded three times resting inside the monastery lavatory. In addition, this species was recorded in Dediyagala, Kanneliya in Galle District (Kandamby & Batiwita, 2001). *Philautus hoipolloi* is a common species in this area and the male's call can be heard 1-2m above ground level. The nesting behavior of this species was also documented; 17 eggs were laid in a 1- 2 cm hole dug by the female. Common Hourglass Tree Frog *Polypedates cruciger* was frequently recorded within the human settlements but was not observed within the forest areas. The Chunam Tree Frog *Polypedates maculates* is also recorded from the home gardens. Their calls were heard at night from the trees adjoining the small pools about 10 feet above ground level. A total of 18 specimens were recorded from the study area. *Ichchiophis glutinosus* is very rare in this area; it was found only one time near Deniya Oya. This species is usually found in daytime under big wet logs.

Conclusions and recommendations

Preliminary indications are that the BMPFR site is of high amphibian diversity interest and importance. However, the survey period was short and it is recommended that similar more long-term surveys be conducted. Habitat loss and deterioration remain the predominant threats to BMPFR amphibian populations. Tree frogs, especially of the genus *Philautus* and *Polypedates longinasus*, show patchy distribution due to their specificity of habitat. The slash and burn technique of shifting cultivation involves the cutting of forest patches for agricultural practices, which destroys the habitat of *Philautus*.

This and other human activities involving cutting of trees will contribute to decline of such arboreal species of anurans. An advantage which has perhaps been overlooked as regards monitoring by members of the local communities is that it helps to raise awareness of the value of species and habitats. If this awareness can be integrated into conservation and management effects, then the likelihood of biodiversity conservation is higher than otherwise might be the case.

Acknowledgements

The authors wish to thank Dr. Channa Bambaradeniya, Mr. Mendis Wickramasinghe, Mr. Naalin Perera, Mr. Dilup Chandranimal, Mr. Sarath Ekanayake, Mr. Bathiya Kekulandala, Mr. Roshan Rodrigo, Mr. Prasanna Samarawickrama, Mr. Sandun Perera, Mr. Suranjan Fernando and Mr. Nalinda Peiris, Mr. Vimukthi Weerathunga, Mr. Pradeep Samarawickrama and Mr. Sampath Goonatilake (IUCN – The World Conservation

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Union, Sri Lanka) for their valuable assistance. We would also like to thank Mr. Kelum Manamendra-Arachchi (WHT – Wildlife Heritage Trust of Sri Lanka) for his comments on this article. Finally, we thank Mr. Chamila Soysa, Mr. Toshan Peiris, Mr. Panduka Silva, Mr. Asanka Udayakumara and Mr. Devaka Jayamanna (YZA – Young Zoologists' Association of Sri Lanka) for their kind help during the field visit and other work in BMPFR.

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Table 1: List of Amphibian species recoded from the Beraliya Mukalana Proposed Forest Reserve.
(Abbreviations: TR – Threatened Species and E – Endemic species)

	Family and Scientific name	Common name	Status
Family :- Bufonidae			
01	*Adenomus kelaartii*	Kelaart's dwarf toad	E / TR
02	*Bufo atukoralei*	Atukorale's dwarf toad	E / TR
03	*Bufo melanostictus*	Common house toad	
04	*Bufo noellerti*	Nollert's toad	E / TR
Family :- Microhylidae			
05	*Kaloula taprobanica*	Common bull frog	
06	*Microhyla rubra*	Red narrow mouth frog	
07	*Ramanella variegata*	White-bellied pugsnout frog	
Family :- Ranidae			
08	*Euphlyctis cyanophlyctis*	Skipper frog	
09	*Euphlyctis hexadactylus*	Sixtoe green frog	
10	*Fejervarya limnocharis*	Common paddy field frog	
11	*Hoplobatrachus crassus*	Jerdon's bull frog	
12	*Lankanectes corrugatus*	Corrugated water frog	E / TR
13	*Nannophrys ceylonensis*	Sri Lanka rock frog	E / TR
14	*Rana aurantiaca*	Small wood frog	TR
15	*Rana gracilis*	Sri Lanka wood frog	E / TR
16	*Rana temporalis*	Common wood frog	
17	*Philautus hoipolloi*	Home Garden's Shrub frog	E
18	*Philautus cavirostris*	Tubercle shrub frog	E
19	*Polypedates cruciger*	Common hour-glass tree frog	E / TR
20	*Polypedates longinasus*	Sharp-snout saddled tree frog	E / TR
21	*Polypedates maculatus*	Chunam tree frog	
Family :- Ichthyophiidae			
22	*Ichthyophis glutinosus*	Common yellow-band caecilian	E / TR