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Herpetofaunal Diversity of Zoological Survey of India Campus, Itanagar, Arunachal Pradesh, India

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Abstract

The present study is based on herpetofaunal observations made from November 2019 to November 2020, as well as the study of both collections made from the study area and deposited in the National Zoological Collection (NZC) of the Zoological Survey of India (ZSI), APRC, Itanagar. The herpetofaunal diversity of ZSI campus, Itanagar, comprises 37 species under 32 genera, 14 families and 3 orders. Reptiles (78%) are found to be more diverse than the amphibians (22%) in the area. The herpetofauna of the ZSI campus represents 12% and 27% of the total Amphibian and Reptilian diversity of the state, respectively. The occurrence of one endangered species, *Coura mouhotii* (Gray, 1862) and quite a few taxa of legal protection value, highlights the importance of the herpetofaunal diversity of the ZSI campus, Itanagar.

Keywords: Arunachal Pradesh Regional Centre, Eastern Himalaya, Herpetofauna, IUCN, Wildlife Protection Act Schedule

Introduction

The Northeastern Himalayan state of Arunachal Pradesh is rich in its faunal as well as floral resources. Most part of the state falls under the Eastern Himalayan Biodiversity hotspot (Myers *et al.*, 2000), and it is also a faunal gateway of Indo-Chinese and Indo-Malayan elements. Being in the transition zones of Palaearctic and Oriental Bio-geographic regions, due to edge effect, the state possesses biotic element from both the regions, as well as have its exclusive components, and thus it represents Indo-Chinese, Indo-Malayan, Indo-Burmese and Indian biotic components (Captain & Bhatt, 2000). This has earned the state the distinction of one of the main corridors for eastern entrance to the 'Indian sub- region'. Owing to its unique geographic position coupled with a wide altitudinal range from as low as 150 m to more than 5000m; the state has a variety of habitats and ecosystems conducive for thriving biodiversity. However, the full potential of the state is not ascertained as most part of the landmass remains unexplored due to rough and inaccessible terrain.

Studies on herpetofaunal diversity of the state were probably initiated with the pioneering works of Annandale (1912a,b), who has described numerous taxa of both Amphibia and Reptilia from the Abor Hill Expedition. Subsequently, several workers contributed to the present knowledge on herpetofauna of the state. Notable contributions on amphibians of the state were made by Smith (1929), Chanda (1994), Pawar & Birand (2001), Sarkar & Ray (2006) and Bordoloi & Borah (2009). On the other hand, the works of Smith (1931, 1935, 1943), Sanyal & Gayen (1987), Captain & Bhatt (2000), Borang & Bhatt (2001) and Sanyal & Gayen (2006) contributed to our present knowledge of reptilian fauna of the state. The present herpetofaunal diversity of the state comprises 65 species of Amphibians (Ohler *et al.*, 2018) and 108 species of Reptiles (Chandra *et al.*, 2018). The Arunachal Pradesh Regional Centre of the Zoological Survey of India (ZSI), Itanagar, was established in the year 1983 under the Seventh Five Year Plan by the Government of India in the realisation of the rich biodiversity of the state and to tap the rich faunal wealth of the Himalayan state of Arunachal Pradesh. The present study reports the herpetofauna diversity from the ZSI campus at Itanagar for the first time.

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Material and Methods

Study Area

The Zoological Survey of India, Itanagar campus is situated between 27.076 N -27.079 N latitudes and 93.597 E - 93.600 E longitudes and is spread over an approximate area of about 7 Acres (Figure 1). The altitude of the campus varies from 200- 234 m. Though the ZSI campus is located in the Itanagar township, it has quite good forest patches, as apparent from the image. The vegetation cover of the area comprises woodland, scrubland, grassland and swampy aquatic vegetation, which becomes very thick and dense, especially during the monsoon season, providing suitable habitat for the faunal components, including herpetofauna. A stream also passes behind the campus.

Sampling Methodology

The presence of herpetofauna was actively observed for a complete annual cycle from November 2019 to November 2020, covering all the seasons. The observations were made by Visual Encounter Survey through randomized walkalong with an active searching method. The collected individuals were brought to the laboratory for identification. Specimens are identified using standard literature (Smith, 1931, 1935; Sharma, 2002, 2003; Chanda, 2000; Mathew & Sen, 2010; Ahmed *et al.*, 2009). Only the species which were not present in the National Zoological Collection (NZC) of Zoological Survey of India (ZSI), Arunachal Pradesh Regional Centre (APRC), Itanagar, were deposited in the museum as voucher specimens, and the rest were released back to their natural habitat after identification and necessary measurements. Besides, both the identified and unidentified museum specimens of herpetofauna present in NZC of ZSI, Itanagar, which has been collected over the years, were also consulted. Further, an extensive literature survey was also done to collect the information on the herpetofauna of the area.

Results and Discussion

This is the first-ever report on the herpetofaunal diversity of the Zoological Survey of India campus in Itanagar, Arunachal Pradesh and its surrounding areas. Altogether 37 species under 32 genera of herpetofauna have been recorded so far from the area. This comprises of 8 species of Amphibians representing 7 genera, 4 families and 1 order, while Reptiles were represented by 29 species belonging to 25 genera, 10 families and 2 orders (Table 1). The herpetofauna of ZSI campus is dominated by reptiles (78%), while amphibians account for only 22%. The higher diversity of reptiles is mainly because of the presence of suitable habitats like forests and swamp areas, while lack of aquatic habitats may be the plausible reason for substantial less diversity of amphibians. Among the reptiles, snakes (54%) are dominant, followed by lizards (18%), and turtles accounted for only 5% (Figure 2).

Source-Google Earth Pro.

Figure 1. Map showing Zoological Survey of India, Itanagar Campus.

Table 1. Herpetofauna recorded from the ZSI campus at Itanagar [Sighting status: MC-Most Common; C–Common; LF–Less Frequent; R–Rare]

Sl. No.	Species Name	Common Name	IUCN Status	WPA Schedule	Sighting Status
	Class AMPHIBIA				
	Order ANURA				
	Family BUFONIDAE				
1.	*Duttaphrynus melanostictus* (Schneider, 1799)	Common Asian Toad	LC	--	C
	Family DICROGLOSSIDAE				
2.	*Euphlyctis cyanophlyctis* (Schneider, 1799)	Indian Skipping Frog	LC	--	MC
3.	*Hoplobatrachus tigerinus* (Daudin, 1803)	Indian Bull Frog	LC	IV	C
4.	*Minervarya pierrei* (Dubois, 1975)	Pierre's Cricket Frog	--	--	C
5.	*M. syhadrensis* (Annandale, 1919)	Syhadra Cricket Frog	--	--	LF
	Family RANIDAE				
6.	*Hydrophylax leptoglossa* (Cope, 1868)	Assam Forest Frog	LC	--	MC
	Family RHACOPHORIDAE				
7.	*Polypedates teraiensis* (Dubois, 1987)	Terai Tree Frog	LC	--	C
8.	*Zhangixalus smaragdinus* (Blyth, 1852)	Large Green Tree Frog	LC	--	LF
	Class REPTILIA				
	Order SQUAMATA				
	Family AGAMIDAE				
9.	*Calotes versicolor* (Daudin, 1802)	Oriental Garden Lizard	--	--	MC
10.	*C. jerdoni* (Gunther 1870)	Jerdon's Forest Lizard	--	--	R
	Family GEKKONIDAE				
11.	*Hemidactylus frenatus* (Dumeril and Bibron, 1836)	Asian House Gecko	LC	--	C
12.	*H. brookii* (Gray, 1845)	Brook's House Gecko	LC	--	C
13.	*Gekko gecko* (Linneaus, 1758)	Tokay Gecko	LC	--	R
	Family VARANIDAE				
14.	*Varanus bengalensis* (Daudin, 1803)	Bengal Monitor Lizard	LC	I	C
	Family SCINCIDAE				
15.	*Eutropis multifasciata* (Kuhl, 1820)	Many Lined Grass Skink	LC	--	C
	Family TYPHLOPIDAE				
16.	*Typhlops diardii* (Schlegel, 1839)	Diard's Blind Snake	LC	IV	R
17.	*Indotyphlops braminus* (Daudin, 1803)	Brahminy Blind Snake	--	IV	R
	Family COLUBRIDAE				
18.	*Amphiesma stolatum* (Linnaeus, 1758)	Striped Keelback	--	IV	C
19.	*Coelognathus radiata* (F. Boie, 1827)	Copper-headed Trinket	--	IV	MC
20.	*Dendrelaphis pictus* (Gmelin, 1789)	Painted Bronzback	--	IV	MC

21.	*Elaphe mandarina* (Cantor, 1842)	Mandarian rat snake		IV	C
22.	*Lycodon jara* (Shaw, 1802)	Yellow-spotted Wolf Snake	LC	IV	C
23.	*Oligodon albocinctus* (Cantor, 1839)	White-barred Kukri Snake	--	IV	C
24.	*O. cinereus* (Günther, 1864)	Black-barred Kukri Snake	--	IV	C
25.	*Oreocryptophis porphyraceus* (Cantor, 1839)	Black-banded Trinket	--	IV	C
26.	*Ptyas korros* (Schlegel, 1837)	Indo-Chinese Rat Snake	--	IV	C
27.	*Rhabdophis himalayanus* (Günther, 1864)	Himalayan Keelback	--	IV	C
28.	*R. subminiatus* (Schlegel, 1837)	Red-headed Keelback	LC	IV	C
29.	*Fowlea piscator* (Schneider, 1799)	Checkered Keelback	--	II	LF
	Family ELAPIDAE				
30.	*Bungarus niger* (Wall, 1908)	Greater Black Krait	--	IV	LF
31.	*Calliophis macclellandi* (Reinhardt, 1844)	McClelland's Coral Snake	--	IV	LF
32.	*Naja kaouthia* (Lesson, 1831)	Monocled Cobra	LC	II	LF
	Family LAMPROPHIIDAE				
33.	*Psammodynastes pulverulentus* (H. Boie, 1827)	Common Mock Viper	LC	IV	C
	Family VIPERIDAE				
34.	*Trimeresurus stejnegeri* (Schmidt, 1925)	Stejneger's pit viper	LC	IV	LF
35.	*Protobothrops mucrosquamatus* (Cantor, 1839)	Brown spotted pit viper	LC	IV	LF
	Order TESTUDINES				
	Family GEOEMYDIDAE				
36.	*Cuora mouhotii* (Gray, 1862)	Keeled Box Turtle	EN	--	R
37.	*Cyclemys gemeli* (Fritz *et al.*, 2008)	Assam Leaf Turtle	--	--	R

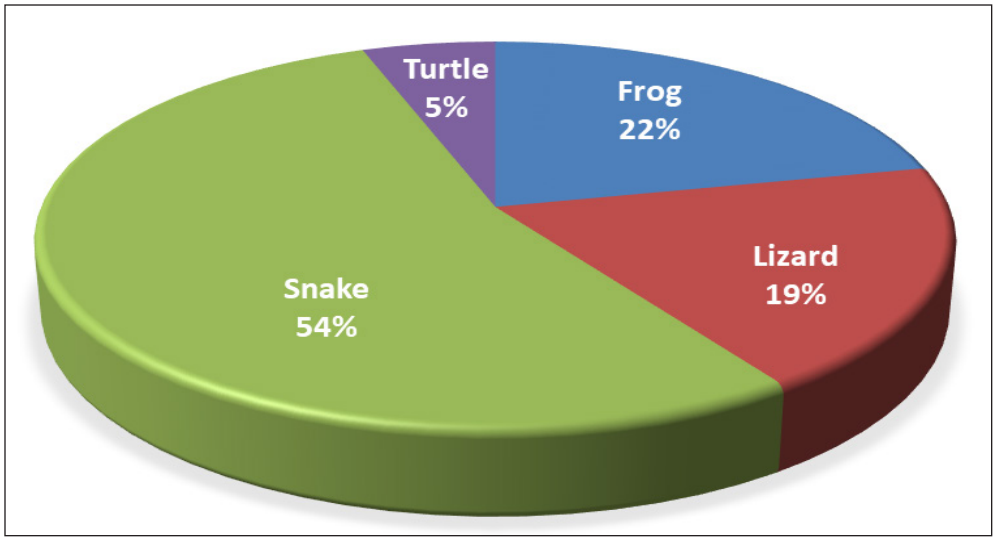

Figure 2. Composition of the herpetofauna of ZSI campus, Itanagar.

The amphibian fauna of the study area is represented by the members of Anurans only. Among the Amphibians, the family Dicroglossidae comprised of 4 species followed by Rhacophoridae with 2 species, while Bufonidae and Ranidae are represented by 1 species each. All the genera are represented by one species each except the Dicroglossid genus *Minerverya* which is represented by two species.

Among the Reptiles, Colubridae family shows the highest diversity with 12 species followed by 3 species each of Geckkonidae and Elapidae, 2 species each of Agamidae, Typhlopidae, Viperidae, Geoemydidae and the rest 3 families, namely Varanidae, Scincidae and Lamprophiidae, have only one represented species (Figure 3). In terms of generic representation, 4 genera namely *Calotes*, *Hemidactylus*, *Oligodon* and *Rhabdophis* have 2 species each while rest of the all genera have only one representative species. Out of 29 species of Reptiles, 21 species are snakes and members of two family's viz. Elapidae and Viperidae are deadly venomous, while two species of Colubridae, namely *Rhabdophis himalayanus* and *R. subminiatus,* and the only representative of Lamprophiidae (*Psammodynastes pulverulentus*) are mildly venomous. One of the Testudines species recorded from the ZSI campus, i.e., *Cyclemys gemeli* is also the first confirmed report of the species from the state.

According to conservation assessment based on IUCN status, one species of Testudines (*Coura mouhotii*) is the only taxa of conservation importance recorded from the ZSI campus. Apart from that 6 species of amphibians and 12 reptilian species were categorised under Least Concern, while the rest are not assessed yet. As per sighting record and availability of voucher specimens in the museum, among amphibians, *Euphlyctis cyanophlyctis* and *Hydrophylax leptoglossa* are the most abundant in the area. On the other hand, in the case of reptilian fauna, *Calotes versicolor* and *Coelognathus radiata* are the most common in the area, while the rest are more or less common except members of Elapidae, Viperidae and Geoemydidae which are either less frequent or rare in occurrence.

In terms of legal protection, the Indian Bullfrog, *Hoplobatrachus tigerinus* (Daudin, 1803) is the only amphibian which falls under WPA Schedule-IV and CITES Appendix-II. Among the reptiles, *Varanus bengalensis* (Daudin, 1803) is the only species which enjoys high protection under WPA Schedule-I and CITES Appendix-I, while *Naja kaouthia* (Lesson, 1831) and *Fowlea piscator* (Schneider, 1799) are protected under WPA Schedule-II and CITES Appendix—II and III respectively. Out of the remaining 26 reptilian species, 19 are covered under WPA Schedule-IV but has no protection under CITES. On the other hand, 3 reptilian species, namely *G. gecko*, *C. gemeli* and *C. mouhotii* are protected under CITES Appendix-II but has no protection under WPA, 1972.

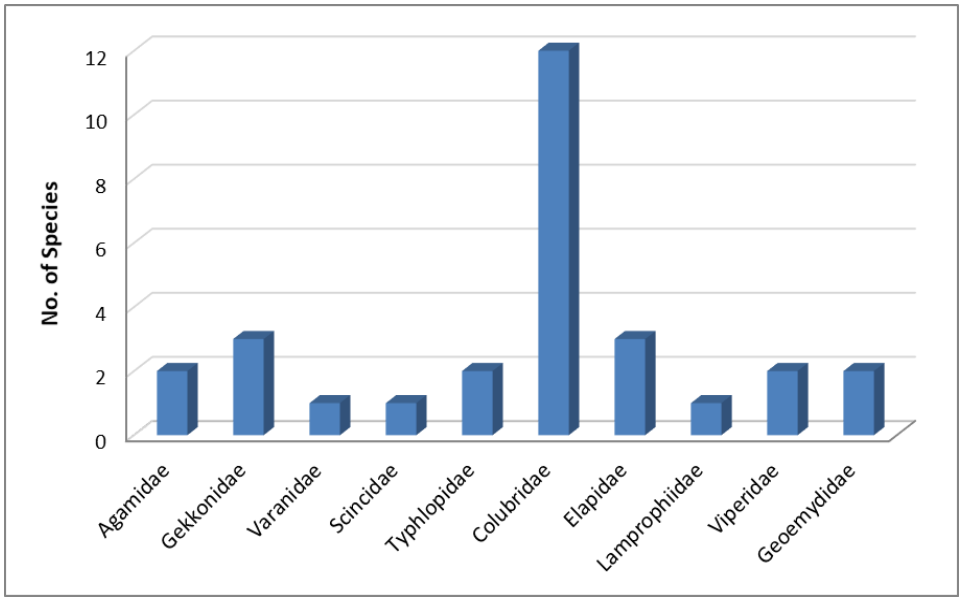

Figure 3. Family-wise distribution of Reptilian fauna of ZSI campus, Itanagar.

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Plate 1

Euphlyctis cyanophlyctis

Hoplobatrachus tigerinus

Hydrophylax leptoglossa

Polypedates teraiensis

Zhangixalus smaragdinus

Duttaphrynus melanostictus

Plate 2

Calotes versicolor

Hemidactylus brookii

Gekko gecko

Eutropis multifasciata

Oligodon albocinctus

Rhabdophis himalayanus

Cuora mouhotii

Cyclemys gemeli