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## Diversity of snakes in and around Mysore, Karnataka, India

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### Abstract

Climate change and rapid habitat degradation have led to a rapid decline in the population of snakes. Hence constant monitoring of their diversity and wellbeing is necessary. During the present study under our Sarpa Sathi project, we surveyed for snake diversity using time-constrained search, incidental encounters in and around the Mysore city, Karnataka, India, for the first time. During the study period of three years, we have identified 24 species of snakes, belongs to 7 families, among which 18 are non-venomous, 2 mild venomous and 4 are venomous. The study indicate a decent diversity of snakes in the region and highlight on the need for increased efforts towards conservation of these important members of food web.

**Keywords:** Snakes, rapid, diversity and wellbeing, Sarpa Sathi project

### Introduction

Among vertebrates, reptiles are one of the most successful yet poorly known and highly threatened group of organisms. Reptile population is on the decline as a result of habitat loss, environmental pollution, unsustainable use of natural resources and global climate change (Ana *et al.*, 2010) [2]. In an urban area, human exploitation and ignorance towards the reptiles, especially snakes also add up towards the decline in their population (Ingle *et al.*, 2019) [7].

India is home to 572 species of reptiles, of which 304 species are snakes (Aengals *et al.*, 2018) [1]. In spite of such numbers, reptiles in India are often poorly studied and remain misunderstood. In recent times, studies on diversity and distribution of snakes were done by Sirsat *et al.* (2016) [15], Kale *et al.* (2019) [8], Prabhakar *et al.* (2020), in Maharashtra, Pradhan *et al.* (2014), in Orissa, Das and Baishya (2018) [3], in Assam, Manhas *et al.* (2016) [10] in Jammu and Kashmir, Dhawal *et al.* (2021) [5], in Rajasthan; which not only provide us with a better understanding of snakes but also act as a reference for future studies. In Karnataka, barring the works of Ganesh *et al.* (2013) [6], Pasar and Paul (2016) [12], very few studies were undertaken in the recent years to understand the species composition and distributions of snakes. Thus, the present study is aimed at documenting the diversity and distribution of snakes in Mysore and adjoining areas to assess species composition in an urban habitat.

### Materials and Method

#### Study Area

The study area was Mysore city located in between 12° 18' 26" north latitude and 76° 38' 59" east longitude. The city is located at an altitude of 2530 ft (770m) above mean sea level. Most of the study site falls under urban ecosystem with a few patches of fragmented vegetation at places. The climate being tropical savanna climate bordering on a hot semi-arid climate under the Köppen climate classification.

#### Survey and observation

The data is collected during several field visits throughout the last year. Random active searches were undertaken during day as well as night to get a more diverse result. The same process was repeated across all seasons to get accurate estimation of species. Data collection works were carried out via visual encounter. Possible microhabitats such as leaf litters, burrows, fallen logs were examined with utmost care. In some cases, species observed during rescue calls were also taken into account while compiling the data.

Sighted individuals were examined and thereafter photographed. No specimen was preserved and upon completion of data collection, specimens were released into suitable habitat. For correct identification field guides and books of Daniel (2002) <sup>[4]</sup> and Whitaker (2006) <sup>[16]</sup> were followed.

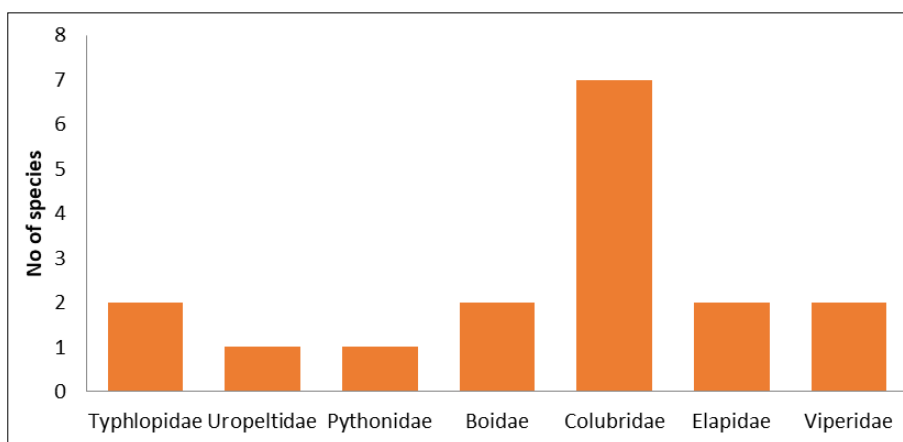
### Results and Discussions

During our studies, we found a total of 24 species belonging to 7 families. Out of which 14 species belongs to family Colubridae, making it the most abundant (Figure 1). Elapidae, Viperidae, Boidae, Typhlopidae each contributed two species and family Pythonidae and Uropeltidae both contributed one species each. Among these, 4 species are highly venomous with known human casualty, 2 species are mildly venomous with no record for human casualty and the rest 18 species were non-venomous (Figure 2). Four species, *Naja naja*, *Bungarus caeruleus*, *Daboia russelii*, *Echis carinatus* commonly known as 'Big Four' (Whitaker et. al. 2015) <sup>[17]</sup> were also found during the study in spite of our study area being an urban area. According to Luiselli *et al.* (2020) <sup>[9]</sup>, abundance of venomous snake species depends on many factors such as human population density, agricultural methods and land use strategies. Thus presence of the 'Big four' reflects a healthy snake population in the study area. Although it seems that our study area supports a rich diversity of snakes, it cannot be made certain without more detailed study with relation to species abundance as well as species richness. Snake populations in any urban area faces continuous challenges, such as mortality of snakes increase due to their attraction to roads as a mean of thermoregulation

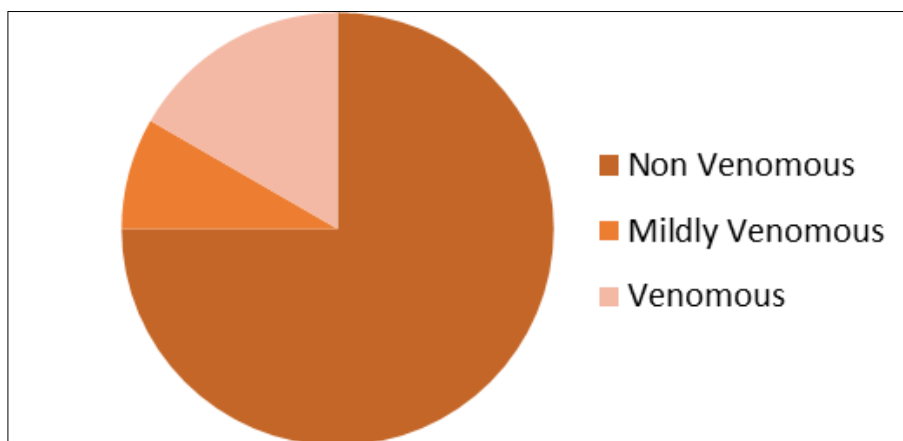
early in the morning (Pawar *et al.*, 2020) <sup>[11]</sup>. Also, habitat destruction, insufficient breeding grounds and human exploitation of natural resources negatively affect snake populations (Ingle *et al.*, 2019) <sup>[7]</sup>.

In the current scenario, our study is only a small step towards conserving the vulnerable snake diversity in and around Mysore. To safeguard the existing diversity, further understanding on this topic is required, which can only be procured through long term and detailed research. Thus, this study is meant to work as a stepping stone for any further projects in this field to conserve the snake diversity not only in Mysore but also in any urban area.

There is a rich ophiofaunal diversity at Mysore, Karnataka. For the rarely observed species, there is a possibility that population of these species may be rapidly declining. However in absence of earlier data it is difficult to ascertain the extent of the issue. Thus long term studies are warranted to safeguard the existing biodiversity. According to our estimates Mysore and the surrounding area supports a rich diversity of snakes, possibly, much more than observed during the project duration. There is an increasing loss of biodiversity including the snake diversity as a result of global environmental changes including human mediated habitat loss and climate change (Pimm 2008) <sup>[13]</sup>. Thus there is a dire need to be properly studied in order to come up with a plan not only to conserve the species and their habitats but also to reduce human-snake conflict by spreading awareness. Further there is also a dire need for methods of improved forecasts and modelling for enhancing conservation efforts for the snake diversity of the region.



**Fig 1:** Number of snake species in different families as per abundance



**Fig 2:** Number of species of snake as per venom

**Table 1:** Check-list of snake species observed during the study

Family	Snake species
Typhlopidae	<i>Indotyphlop braminus</i> <i>Grypotyphlop acutus</i>
Uropeltidae	<i>Uropeltis ellioti</i>
Pythonidae	<i>Python molurus</i>
Boidae	<i>Gongylophis conicus</i> <i>Eryx johnii</i>
Colubridae	<i>Ptyas mucosa</i> <i>Fowlea piscator</i> <i>Amphiesma stolatum</i> <i>Rhabdophis plumbicolor</i> <i>Coelognathu helena</i> <i>Lycodon aulicus</i> <i>Lycodon striatus</i> <i>Oligodon arnensis</i> <i>Oligodon taeniolatus</i> <i>Argyrogena fasciolata</i> <i>Dendrelaphis tristis</i> <i>Sibynophis subpunctatus</i> <i>Ahaetulla nasuta</i> <i>Boiga trigonata</i>
Elapidae	<i>Bungarus caeruleus</i> <i>Naja Naja</i>
Viperidae	<i>Daboia russelii</i> <i>Echis carinatus</i>



**Fig 3:** A- *Indotyphlop braminus*; B- *Uropeltis ellioti*; C- *Python molurus*; D- *Gongylophis conicus*; E- *Eryx johnii*; F- *Ptyas mucosa*; G- *Fowlea piscator*; H- *Rhabdophis plumbicolor*; I- *Coelognathus helena*; J- *Lycodon aulicus*; K- *Lycodon striatus*; L- *Oligodon arnensis*; M- *Oligodon taeniolatus*; N- *Argyrogena fasciolata*; O- *Dendrelaphis tristis*; P- *Ahaetulla nasuta*; Q- *Boiga trigonata*; R- *Bungarus caeruleus*; S- *Naja Naja*; T- *Daboia russelii*; U- *Echis carinatus*.

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