

Diversity of Snake Species in and Around Sahyadri College Campus, Shivamogga (D), Karnataka (S), India

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ABSTRACT

Snake populations are quickly declining as a result of habitat loss driven on by humans and other environmental factors. So, it is essential to continuously evaluate their individuality and wellbeing. As a result, the study focuses on the diversity and also rescuing of snakes in Sahyadri College, Shivamogga District. Sahyadri College campus is located in the Shivamogga city's outskirts with an area of 85 acres. It is the oldest and one of the largest institutions in Shivamogga. The campus has thick greenery and a wide variety of flora and fauna. A preliminary survey on snake diversity was carried out from September 2021 to February 2022; it revealed 13 species of snakes from 5 families. Out of all identified species, 3 were venomous and 10 were non-venomous. Among the species, the Colubridae family is more dominant than others. Spectacled cobra (*Naja naja*) and Indian rat snake (*Ptyas mucosa*) are predominantly reported venomous and non-venomous snakes, respectively. When compared to all 6 months, we got a highest number of snakes in the month of September and a lowest in January. The rich diversity in the campus is the main reason for the variety of species. The Brahminy Worm Snake (*Ramphotyphlops braminus*) population was found to be in increasing trend. In the study area, we identified that accidental deaths, fear of snake bites, and workers cutting and trimming weedy plants along the road side were the major threats to snake fatality by human beings. The study indicates a decent diversity of snakes in the region and highlight on need for increased efforts towards conservation of these important members of food web.

Key words : Venomous Snake, Non-venomous Snake, Snake Rescue, Reptiles, IUCN

Introduction

Snakes are flexible, limbless and elongated reptiles. These are found almost all over the world. The habitats in which they live determine the shapes of their bodies (Bansode *et al.*, 2016). The earliest vertebrates to adapt to living on dry land were reptiles. These are cold-blooded organisms with scaly bodies that breathe through their lungs (Hsiang *et al.*, 2015). The most important predators are reptiles, their activities support the maintenance of the natural balance in the environment (Whitaker and Captain, 2015).

Reptiles are one of the most successful groups of vertebrates, yet they are also one of the least recognized, understood and highly endangered group of organisms (Pauwels *et al.*, 20007). Snakes are highly evolved reptiles and belongs to the Kingdom: Animalia, Phylum: Chordata, Class: Reptilia, Order: Squamata, Suborder: Serpents. Snakes are classified into many families based on their physical characteristics, such as scale arrangements and pattern, dentition, skeletal anatomy and sensory organs. For the conservation and protection of the various plant and animals that exist on earth, the study of

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biodiversity is essential. Considering snake diversification, fewer studies have been conducted (Barbo *et al.*, 2011). Therefore, more research studies must be done for collecting of highly valuable information for protection and safeguarding of snake species. Only few percentages of people have proper knowledge about the snakes (Chittaragi *et al.*, 2014).

Snakes are very important creatures in the nature because as predators they feed on many harmful bugs and insects those may cause damage to humans. For farmers, snakes are essential because they feed on mice, small mammals and other tiny organisms that might ruin crops (Hussain *et al.*, 2017). The venom of many snakes has medical importance and few of them are essential in the synthesis of various drugs. The role of snakes in the food chain is important [Dufton, 1993]. Their removal or absence may have a serious influence on the ecosystem's balance. The fear of snake bite and poor knowledge leads to the killing of snakes (Mukadam and Kadam, 2016).

Around 3619 different species of snakes have been identified worldwide, in India, 279 different species, comprising 28 different families, have been identified (Phashi and Kumara, 2021). It constitutes approximately 10% of the total snake species found in the world that are venomous and 80% of them are non-venomous (Manhas *et al.*, 2017). Considering that just 52% of the known species have been evaluated for the International Union for Conservation of Nature's (IUCN) Red list of threatened species, it is probably the most ignored group in conservation prioritizations (Guedes *et al.*, 2014). Because of habitat loss, environmental degradation, unethical resource usage, and climate change, the trend in snake

population is declining (Zipkin *et al.*, 2020).

Thus, the current research aims to documenting the diversity of snake species in and around Sahyadri College campus. Also rescuing snakes from challenging situation and released it into a suitable habitat.

Materials and Methodology

Study Area

The Sahyadri College campus is located on the Shivamogga city's outskirts at the coordinates 13°54'59.7"N and 75°35'37.2"E with an area of 85 acres shown in Map 1. It is the oldest and one of the largest institutions in Shivamogga. The campus has thick greenery and a wide variety of flora and fauna. Shivamogga is situated in the heart of the Western-Ghats region. The Malnad region consists of the Western-Ghats chain where many rivers originate. The difference in rainfall within the district is the major contributing factors to the variety of flora and fauna. The forests of Shivamogga district consists of evergreen and semi-evergreen forests.

The survey was conducted from September 2021 to February 2022. To obtain a more varied result, a variety of active searches were conducted at random times during the day and at night. The survey was done by random active searches made by walking throughout the campus and road sides by searching snakes under rocks, leaf litters, bushes, wood logs and rock crevices. In some cases, species observed during rescue calls were also taken into account while compiling the data. Sighted individuals were examined and the photos were taken using iPhone-



Map 1. Study Area: Sahyadri College Campus, Shivamogga, Karnataka

13 and Canon 6D (55-125mm lens) camera. No specimen was preserved and upon completion of data collection snake species were released into suitable habitat. For further identification, the field guides and books of Daniel (2002), Khaire (2015) and Whitaker (2015) were followed.

Results and Discussion

Snakes frequently find their way into a buildings or gardens. For many people, just seeing a snake can be frightening. Meanwhile anybody encounters it, they

become terrified and kill or get rid of it. A few people, who have good sense, believing that the snake should not be harmed and should be carefully evacuated from that palace, decide to act wisely rather than panic. They call as soon as possible to the local Fire Brigade, Forest Department or non-governmental organization (NGO) for snake rescuers. Several Indian cities engaged in the practice of saving snakes (Janani *et al.*, 2016).

The principal reason for this reptile fauna's population reduction and rise in conflicts between human beings and snakes is habitat degradation. It is one of



Fig. 1. Snake species recorded in study area

the targeted faunas experiencing problems as a result of anthropogenic technological developments. A few states and cities in India undertake snake rescuing (Willson, 2017). The current study has recorded and analyzed the diversity of snake species in and around Sahyadri College campus over a period of six months.

A total number of 172 individuals under 13 snake species were recorded in the study area during the survey period from September 2021 to February 2022 (Figure 1). Among them 3 venomous and 10 nonvenomous snake species belonging to five families were recorded (Table 1 and Graph 1). Table 2 represents, when compared to all snake species, In-

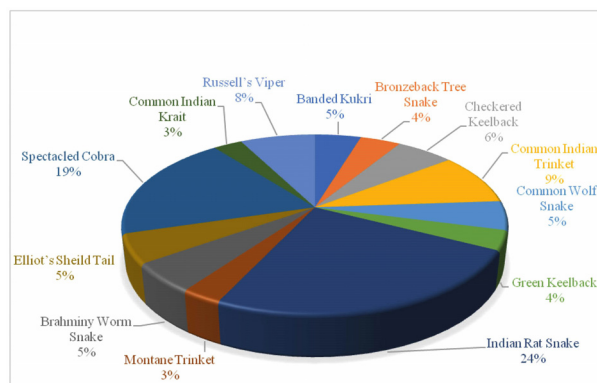
dian rat snake (42 individuals) was dominant species in the study area. In venomous group, spectacled cobra was highest in number i.e., 33 individuals and common Indian krait was least in number i.e., 5 individuals. In non-venomous category, Indian rat snake was highest in number i.e., 42 individuals and montane trinket snake was least in number i.e., 5 individuals. Sayeswara *et al.*, 2015, worked on snake diversity in Shivamogga city, they were got 24 species of snakes belongs to 8 families (Sayeswara *et al.*, 2015).

All species of rescued snakes was under 5 families like Colubridae, Typhlopidae, Uropeltidae, Elapidae and Viperidae. The family Colubridae was

Table 1. Checklist of snake species in Sahyadri College Campus, Shivamogga, Karnataka.

Sl. No	Common Name	Scientific name Type	IUCN Status	Population Trend	Acc. to IUCN
Family: Colubridae					
1.	Banded Kukri	<i>Oligodon arnensis</i> (Shaw, 1802)	Non-Venomous	LC	Stable —
2.	Bronzeback Tree Snake	<i>Dendrelaphis tristis</i> (Daudin, 1803)	Non-Venomous	LC	Stable —
3.	Checkered Keelback	<i>Xenochrophis piscator</i> (Schneider, 1799)	Non-Venomous	LC	Stable —
4.	Common Indian Trinket	<i>Coelognathus helenae</i> (Daudin, 1803)	Non-Venomous	LC	Stable —
5.	Common Wolf Snake	<i>Lycodon aulicus</i> (F.Boie, 1827)	Non-Venomous	LC	Stable —
6.	Green Keelback	<i>Marcropisthodon plumbicolor</i> (Cantor, 1839)	Non-Venomous	LC	Stable —
7.	Indian Rat Snake	<i>Ptyas mucosa</i> (Linnaeus, 1758)	Non-Venomous	LC	Decreasing
8.	Montane Trinket	<i>Coelognathus helena monticollaris</i> (Schulz, 1992)	Non-Venomous	V	Decreasing
Family: Typhlopidae					
9.	Brahminy Worm Snake	<i>Ramphotyphlops braminus</i> (Daudin, 1803)	Non-Venomous	LC	Increasing
Family: Uropeltidae					
10.	Elliot's Sheild Tail	<i>Uropeltis ellioti</i> (Gray, 1858)	Non-Venomous	LC	Stable —
Family: Elapidae					
11.	Spectacled Cobra	<i>Naja naja</i> (Linnaeus, 1758)	Venomous	LC	Stable —
12.	Common Indian Krait	<i>Bungarus caeruleus</i> (Schneider, 1801)	Venomous	LC	Stable —
Family: Viperidae					
13.	Russell's Viper	<i>Daboia russelii</i> (Shaw & Nodder, 1797)	Venomous	LC	Decreasing

Note: IUCN- International Concern for Nature and Natural Resources, LC-Least Concern and V-Vulnerable



Graph 1. Percentage of snake species diversity in Sahyadri College Campus, Shivamogga.

having highest in number like 8 species under non-venomous category. The family typhlopidae and uropeltidae each contains one species of non-venomous type like *Ramphotyphlops braminus* and *Uropeltis ellioti* respectively. The family Elapidae and Viperidae contains two and one species of venomous snakes i.e., *Naja naja*, *Bungarus caeruleus* and *Daboia russelii* respectively.

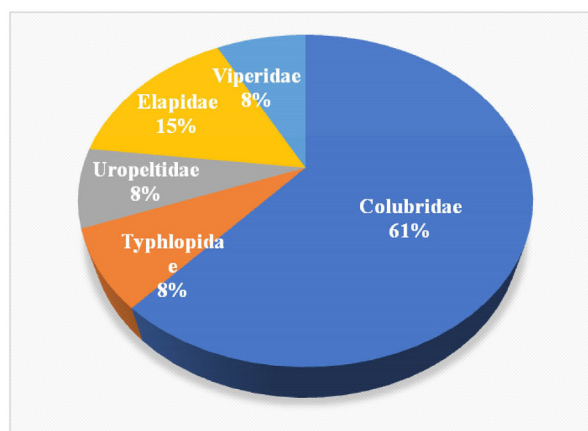
According to International Union for Conservation of Nature and Natural resources (IUCN) status the 13 snake species belonging to 5 families was least concern (LC) and only one family like colubridae (*Coelognathus helenamonticollaris*) is under vulnerable (V). Likewise population trend according to IUCN, under colubridae family six species were stable and remaining two were decreasing trend, typhlopidae contain only one species which under increasing trend, uropeltidae of one species is stable status, two species of elapidae family is under stable and finally only one species of venomous snake like *Daboia russelii* of viperidae family shows decreasing in trend (Table 1). The result agrees with the findings of Phashi and Kumara 2021 who studied the snake diversity in and around villages of Shankaraghatta, Shivamogga, it was found that the 25 species of snakes belonging to 7 families were reported in one year of study.

Among the venomous species, Spectacled Cobra -*Naja naja* was the most abundant (19%) followed by Russell's viper -*Daboia russelii* (8%) and Common Indian Krait -*Bungarus careuleus* (3%). The non-venomous species rescued were Indian rat snake-*Ptyas mucosa* (24%) followed by Common Indian Trinket -*Coelognathus helenae* (9%), checkered keelback-*Xenochrophis piscator* (6%), Banded Kukri -*Oligodonarnensis* (5%), Common Wolf Snake -

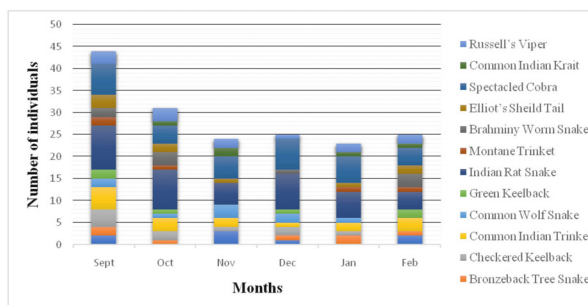
Lycodonaulicus (5%), brahminy worm snake-*Ramphotyphlops braminus* (5%), Elliot's Shield Tail-*Uropeltis ellioti* (5%), Green Keelback -*Marcropisthodonplumbicolor* (4%), Bronzeback Tree Snake -*Dendrelaphis tristis* (4%) and Montane trinket-*Coelognathus helenamonticollaris* (3%) (Graph 1). An earlier study conducted by Pawar *et al.*, (2020) reported 25 species of snakes representing 10 families in the Mumbai, West Coast of India.

According to the present study, The colubridae family has highest number of snake species (61%) and the family elapidae has 15%. Likewise, the families viperidae, uropeltidae and typhlopidae was contains 8% of snake species respectively (Graph 2). The Table 2 shows month wise number of snake species was recorded in the study period. The Graph 3 clearly shows monthly wise snake species recorded over a 6 months study period. In the month September shows highest number species recorded and least in January month. The results are in correlation with those observed in other studies Fellows, 2015; Dharwal *et al.*, 2021; Chettri and Chhetry, 2013.

In the month of September, we identified a



Graph 2. Percentage of snake families in Sahyadri College campus, Shivamogga



Graph 3. Month wise snake diversity recorded at Sahyadri College Campus, Shivamogga

greater number of snake individuals because it was rainy season. Snakes are more active during this season for hunting and breeding due to higher availability of prey.

Also snakes are ectothermic means their body temperature is regulated by their environment. During rainy seasons snakes are more active due to increased humidity which can help them maintain their body temperature (Raskey *et al.*, 2012). Some snake's species like Indian rat snake, Spectacled cobra, Common wolf snake, Common Indian trinket, Checkered keelback and Russell's viper were found inside the Hostels, Academic sections (different departments) and Library. They were rescued safely and released back into the suitable habitat. No fatalities associated with the snake bites were recorded during the study period. In this study, we rescued snakes by using aluminum hooked stick and a cotton bag. Human kill snakes out of fear or misunderstanding and roadkill are the threats for snakes identified in the study area. No injured snakes were found. The rescued snakes were released back to the nearest forest within the period of 1-2 hours. The photos have been captured for the further documentation.

This research helps in the documentation of the snake species which are found in the study area. This documentation helps to identify the snake species, type of snakes i.e., venomous or non-venomous

and to know about the IUCN status of snake species. This study contributes to the sharing of information to students and staffs of the institution about snake species, their behavior and ecological benefits.

Conclusion

Snakes are most fascinating creatures in the world and some of them are in endangered. These are found in different size, shape and colour due to their mode of life. Snakes are important because they play a vital role in ecology. They control the rodent population and help to prevent the crops damages in the agricultural fields.

Due to the habitat loss, pesticides used in agricultural areas, mining, deforestation and human settlement the snake population were drastically decline. According to the findings of the results, concluded that the availability of 13 snake species belongs to 5 families (172 individuals) in Sahyadri College campus which shows that paucity information about snake species and their distribution in the study area

Humans mistakenly believe that snakes provide a significant hazard to themselves, while in reality, they pose a significant harm to snakes. People kill snakes for their safety without knowing its impact on the ecosystem and also the food chain. Snake bite is not a major problem because now a days there is an antidote for every snake bite. Local people kill

Table 2. Month wise snake species recorded in the study area from September 2021 to February 2022

Sl.No	Common Name	Sept	Oct	Nov	Dec	Jan	Feb	Total
Family: Colubridae								
1.	Banded Kukri	2	0	3	1	0	2	08
2.	Bronzeback TreeSnake	2	1	0	1	2	1	07
3.	Checkered Keelback	4	2	1	2	1	0	10
4.	Common Indian Trinket	5	3	2	1	2	3	16
5.	Common Wolf Snake	2	1	3	2	1	0	09
6.	Green Keelback	2	1	0	1	0	2	06
7.	Indian Rat Snake	10	9	5	8	6	4	42
8.	Montane Trinket	2	1	0	0	1	1	05
Family: Typhlopidae								
9.	Brahminy Worm Snake	2	3	0	1	0	3	09
Family: Uropeltidae								
10.	Elliot's Sheild Tail	3	2	1	0	1	2	09
Family: Elapidae								
11.	Spectacled Cobra	7	4	5	7	6	4	33
12.	Common Indian Krait	0	1	2	0	1	1	05
Family: Viperidae								
13.	Russell's Viper	3	3	2	1	2	2	13
	Total	45	30	24	25	23	25	172

both the venomous and non-venomous snake due to lack of knowledge and fear of being bitten. Lack of awareness is the only reason for killing.

Therefore, there is an urgent need to do thorough research in order to develop a strategy that would protect the species and their habitats while also raising knowledge about how to reduce conflicts between human and snakes.

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