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Diversity and Distribution of Snakes in and around Solapur District of Maharashtra

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ABSTRACT

Snakes are one of the widest spread vertebrates on the globe, mostly they prefer arid zone of the globe in terms of diversity. Collected data are based on reports from volunteers, snake friends and rescuers for the period of two years which is from 2018-2020 and 20 species of snakes reported from in and around Solapur district of Maharashtra, of that 6 species were venomous and 14 were semi-venomous and non-venomous from 6 families namely Elapidae, Viperidae, Colubridae, Natricidae, Erycidae and Sibynophiidae were found. Major five venomous species, i.e. Spectacled Cobra, Russell's viper, Common Krait, Slender Coral Snake and Saw Scaled Viper were noticed. Occurrence of Albino spectacled cobra in the residential area of Solapur city away from main natural habitats was a remarkable finding of this study. Snake species named Indian Spectacled Cobra, Common Krait, Indian Rat snake, Checkered keel back, Common Sand Boa, Common trinket, Common wolf snake, Common Kukri found throughout year in all seasons whereas Russell's Viper and Saw scaled viper mostly found during June to October as they are most active during this period and species named Indian Smooth Snake, Green Keel-back, Red Sand Boa, Green Vine Snake, Common cat snake found during monsoon season (June to September). The juvenile and young snakes also found during monsoon season. Need of snake's conservation to balance the ecosystem and to protect the food chain is a main challenge identified. Continuous monitoring on snake species diversity of the region is suggested.

HIGHLIGHTS

- 20 snake species were reported, with 6 being venomous and 14 being semi-venomous or non-venomous.
- The importance of snake conservation is highlighted as a means to balance the ecosystem and protect the food chain.
- The study contributes to local snake ecology and underlines the importance of conservation efforts to maintain the ecological balance in the Solapur district.

Key words: *Snakes, Diversity, Conservation, Solapur, Venomous and Non- venomous*

Introduction

In the phylogenic tree snakes are placed in the sub order serpents of class Reptiles under Phylum Chordata. Thin, elongated, cylindrical, limbless body, specific scaly and colour pattern, speechless, shy nature, presence of Jacobson's organ, bifid tongue with transverse cloaca are the key characteristics of snakes (Rajesh Kumar Rai., 2020). Snakes represent a powerful model for the lineage terres-

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trial vertebrate in term of high adaptability, species richness, morphological and ecological diversity and also for understanding the processes involved in preliminary adaptation and evolution (Sourabhsulabh and Pushpraj shivahare, 2018).

There are approximately about 3783 known snake species recorded under 28 families in the globe, out of which 279 species of snakes are found only in the India (Janani *et al*., 2016., Pawar *et al.,* 2020). India covers approximately 10 % of the total snake species found in the world and out of which 13 known species are venomous (Aengals *et al*., 2012., Amit Manhans *et al*., 2015., Uetz and Hosek., 2016) They inhabit from seas to deserts, swamps, lakes and even the outer Himalayas; one can find snakes in almost all the habitat types of India. The venomous snakes include only about 58 species and there are only 4 species of snakes that are dangerous to men, namely, Cobra, Krait, Russell's viper and Saw-scaled viper (Jadhav *et al.,* 2018). Habitat destruction, scarcity of prey animals, pollution, road kills and destruction by humans are the major threats for the survival of snakes (Todd, 2010 and Uetz, 2000). Therefore, it needs continuous monitoring on diversity and distribution of snakes in an ecosystem.

The Solapur district in India is named after its town headquarter 'Solapur' believed to be derived from two words 'sola' meaning sixteen and 'pur' meaning village. The Solapur is in the south east edge of the state and endowed with a variety of natural resources in the plains of Bhima, Sina and Man Rivers. The climate of the district, in general is dry and extreme. The vegetation is divided into tropical dry deciduous forests (Champion and Seth, 1968), the open scrub forests and vast grasslands. The dry deciduous forests and thorny scrub forests play a vital role in the local ecosystem by performing many ecological functions such as ground-water recharge, flood control, retention of nutrients and sediments, and provide habitat for a large number of birds, insects, mammals, reptiles, spiders and microbes (Garad *et al.,* 2015).The climate of the region supports the vegetation that can be thorny forests, tropical dry deciduous forests, and vast tracts of grasslands. The land is drought-prone and semiarid and it is in the Deccan thorn scrub forests eco region

Although many studies have been undertaken to evaluate the species diversity and distribution of snakes in India, barring the work of Walmiki *et al.* (2012), no scientific studies have been carried out on the species composition and distribution of snakes of Solapur; hence, the present study is undertaken. In the present study, an attempt has been made to document the diversity and distribution of snakes in Solapur district and its adjoining areas to assess the impact of anthropogenic activities.

Materials and Methods

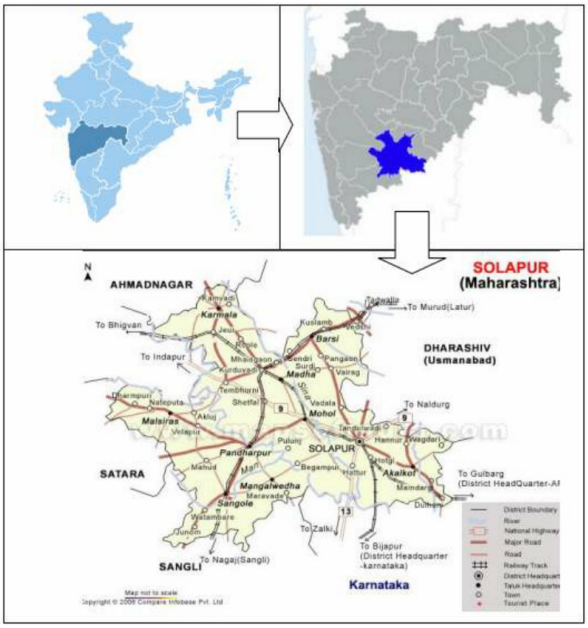
Study area

The present study was carried out in Solapurdistrict of Maharashtra state, India. The district Solapur (17.68°N 75.92°E) is in the south east edge of the state and endowed with a variety of natural resources in the plains of Bhima, Sina and Man Rivers. Solapur falls under the category of dry (arid and semiarid) climate according to the Köppen climate classification. The district is predominantly an agrarian tract. The climate of the region supports the vegetation that can be thorny forests, tropical dry deciduous forests, and vast tracts of grasslands.

Study Location

To determine diversity and distribution of snake species in various habitats in Solapur region the data was collected from volunteer, snake friends, rescues, reports on road kills and field observations. The data was collected during year 2018 to 2020. The snake

Map and location



species were categorised as venomous, semi-venomous and non-venomous. All snakes were photographed using Cannon Ixus 145 points and shoot camera, for correct identification of snakes, Field guides and books of Daniel (2002), Whitaker (2006) and Petty (2019) were followed.

Table of species

Results and Discussion

Varied diversity of snakes with 20 species representing 6 families was observed in and around the Solapur district of Maharashtra and reported the occurrence of snake species. Number of species of snakes distributed in each family reveals that 10 species belongs to family Colubridae, 4 species of Elapidae and 2 speciesof Viperidae, 2 species of Erycidae, 1 species each of Natricidae and Sibynophiidae family was seen. During present study, 12 species of non-venomous snakes (60%),2 species of semi-venomous snake (10%)and 6 species of venomous snakes (30%) were recorded (Figs. 2; Tables 1). Most of the species of snake are Not Evaluated or Least Concern by IUCN red list. The result indicates that 60% of snake species were non-venomous but once they seen in public place, suburban areas or in the cultivation fields they were killed/injured by local people. At very few occasions the people who were aware about the importance and conservations of snakes, they informed to the Animal Rahat, an organisation working for the welfare of the working animals in few districts of Maharashtra, a district of Uttar Pradesh and Karnataka andsnake friends in near-by area and the snake species were saved.

It was found that the major habitats preferred by snakes are intruded by human being and there is impact of human activities. From the snake species recorded during this study, the Indian Spectacled Cobra, Common Krait, Indian Rat snake, Checkered keel back, Common Sand Boa, Common trinket, Common wolf snake, Common Kukri species found in the study area throughout year in all seasons whereas Russell's Viper and Saw scaled viper found during the month of October to June as their most active period and in rest of the time these species remain inactive and rarely sighted. The species like Indian Smooth Snake, Green Keel-back, Red Sand Boa, Green Vine Snake, Common cat snake occurred during monsoon season (June to September). The juvenile and young snakes are also found during monsoon because it is hatching period and also abundance of food is available during this period.

From that most common snake species were Indian Spectacled Cobra, Common Wolf snake, Common krait, Russell's Viper, Common Sand Boa, Common Trinket Snake, Common Kukri snake,

Table 1. Preliminary checklist of snakes (Order: Squamata) recorded in and around Solapur

Sr. No	Family	Scientific Name	Common Name	Type/ Category	IUCN Status
1	Elapidae	*Naja naja*	Indian Spectacled Cobra	Venomous	LC
		Naja naja	Albino Indian Spectacled Cobra	Venomous	LC
		Calliophis melanurus	Slender Coral snake	Venomous	LC
		Bungarus caeruleus	Common Indian Krait	Venomous	LC
2	Viperidae	*Daboia russelii*	Russell's Viper	Venomous	NE
		Echis carinatus	Saw-scaled Viper	Venomous	NE
3	Colubridae	*Ahaetulla nasuta*	Green Vine Snake/ Long-nosed Whipsnake	Semi- Venomous	NE
		Boiga trigonata	Common Cat snake	Semi-Venomous	NE
		Coelognathus Helena	Common Trinket Snake	Non-Venomous	NE
		Oligodon arnesis	Common Kukri	Non-Venomous	NE
		Ptyas mucosa	Indian Rat Snake	Non-Venomous	NE
		Lycodon aulicus	Common Wolf Snake	Non-Venomous	NE
		Xenochrophis piscator	Checkered Keelback/ Asiatic Water-snake	Non-Venomous	NE
		Argyrogena fasciolata	Banded Racer	Non-Venomous	NE
		Coronella brachyura	Indian Smooth snake	Non-Venomous	NE
		Lycodon flavomaculatus	Yellow Spotted Wolf Snake	Non-Venomous	NE
4	Natricidae	*Macropisthodon plumbicolor*	Green keelback	Non-Venomous	NE
5	Erycidae	*Eryx johnii*	Red sand boa	Non-Venomous	NE
		Eryx conicus	Common sand boa	Non-Venomous	NE
6	Sibynophiidae	*Sibynophis subpunctatus*	Duméril's Black-headed Snake	Non- venomous	NE

NE- Not Evaluated, LC- Least Concern.

Banded Racer and Yellow-spotted Wolf Snake prefer night time for feeding, hence encountered during night time while Indian Rat snake, Checkered keel back and Green Keel back often spotted during day time by the locals and reported. In the study area, in crop fields of Ground nuts, Jowar (Sorghum), Wheat and other pulses crops, the snake species encountered during harvesting of these crops were Indian Spectacled Cobra, Russell's viper, Rat Snake, Common Sand Boa, Red Sand Boa and Common Kukri snake. All these species are predatory on the field Rat, Brown Mouse, Young ones of Hare, eggs and young ones of land birds.

Jadhav *et al.* (2018) correlated the species of snake in their study area in and around the Nanded city, the species were identical and nature of habitat are interconnected, he recorded 26 species of snakes which include 10 species of venomous snakes whereas 2 semi-venomous and 16 non-venomous species. He also noted that the number of snake species are killed by local people's due fear of death and lack of knowledge regarding snakes.

Pawar *et al.* (2020) study the snake in diversity and distribution in adjoining areas of Panvel and reported the various species of snakes which are identical to present study. The distribution of snakes particularly in Maharashtra state are same in some instance. He reported 25 species of snakes representing 10 families and 23 genera. He also reports that mortality of snakes in residential complexes is due to lack of awareness regarding ecological role of snakes and fear of snake bite. It is recommended to create awareness among general public about role of snakes in ecological food chain and also sustainable utilization of natural resources.

Rout *et al.* (2014) has observed the snake diversity in Palghar region of District Thane, Maharashtra and found 25 species of snakes that includes 07 venomous, 03 semi-venomous and 15 were non-venomous.

Karangutkar *et al*. (2013) studied the faunal diversity of Kolak estuary Vapi, Gujrat and found 10 different species of snakes.

Lewis *et al*. (2010) studied on the herpetological observations from field expeditions to North Karnataka and South West Maharashtra and found 28 species of snakes. From the all above mentioned studies it can be concluded that, in India in various States including Maharashtra the non-poisonous snake species were found in maximum number as compared to the poisonous and semi-poisonous snakes.

Andrew (2009) reported the presence of 21 species of snakes from Oman in United Arabian region, presence of Russell's viper species was found as one of the dominant species of this region. Nande and Deshmukh (2007) reported 32 snake species in Amravati district. Joshi (2015) reported 22 species of snakes in Buldhana district.

Walmiki *et al*. (2012) studied the herpetofauna of Maharashtra nature park at Mumbai and found 24 species of snakes belonging to 06 families; in this study he found that Daboia russelii (Russell's Viper) were commonly and abundantly cited snakes of this region.

Conclusion

It is concluded that 20 species of snakes were recorded which includes12 species of non-venomous snakes, 2 species of semi-venomous snake and 6 species of venomous snakes in and around Solapur

city. The present study reveals that the non-venomous snakes were found in maximum number as compared to the venomous and semi-venomous snakes. The natural resources, dry land, open scrub forests, vast grasslands, different vegetation favours the acclimatization of snake in and around Solapur city. The study also observed that most of the snakes were reported from the Rural, Semi urban and residential area. Lack of knowledge, fear of bite, mishandling and careless behaviour were the main reasons behind the snake killings. Snakes were not at all responsible for any mishap. Continuous monitoring on the snake species diversity of this region is essential.

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