

Original Research Article

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Current Status and Diversity of Ophidians (Reptilia: Squamata: Serpents) in Bhopal, Madhya Pradesh, Central India

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ABSTRACT

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A survey was conducted on the status and diversity of ophidians of Bhopal between November 2015 and September 2016. Seventeen species of snakes belonging to 17 genera and 06 families (Boidae, Colubridae, Elapidae, Pythonidae, Typhlopidae and Viperidae) were recorded during this study period. Family colubridae contributed the maximum (08 species) number of species whereas family Typhlopidae contribute minimum (1 species). *Ptyas mucosa* and *Xenochrophis piscator* was found common among non-venomous snakes while the rarest was *Dendrelaphis tristis* and *Lycodon aulicus* belonging to the family Colubridae. Among venomous snakes *Naja naja* was observed common where *Echis carinatus* was found rare in present study. Mortality due to vehicular killings and with the hands of human was observed to be the main threat in the area. Although some of the species are well scheduled in wild life protection act 1972 still peoples are unaware about the protocols given. Thus we suggest awareness programs should be organized to aware local residents about the ecology and importance of these species in an ecosystem.

Introduction

Snakes are the most feared group of reptiles in world since their appearance but the majorities of them are non-venomous and are valuable to both humans and ecosystem. They are known to be friends of farmers besides helpful in maintaining the ecological equilibrium. Snakes inhibited all over the world except some very cold regions like the Arctic Region. There are about 3,619 species of snakes were in records under 26 families all over the world (Uetz and Hošek, 2016).

While in India about 279 species of snakes comprising of 28 families have been recorded so far (Aengals *et al.*, 2011). Though researchers had studied and documented snakes from different parts of the state but still snakes of Madhya Pradesh are poorly known especially from Bhopal. Nineteen species of snakes were reported by Pasha *et al.*, (2000) from Pench National Park. Ingle (2002) enlisted 30 species of snakes from Malwa region of Madhya Pradesh. Chandra

and Gajbe (2003) had recorded ocellate shield tail snake (*Uropeltis Ocellate*) from Pachmarhi Biosphere Reserve. Chandra and Gajbe (2005) compiled a list of 39 species of snakes which belonged to 06 families from different parts of the state Madhya Pradesh. Chandra (2009) had documented 08 species of snake's belonging to 06 families from Pachmarhi biosphere reserve. Pragatheesh and Rajvanshi (2013) studied the road mortality of snakes at Nation highway -7 along the Pench National park of Madhya Pradesh and recorded 490 such incidents. Dubey and Khare, (2013) reported 12 species of reptiles which belongs to 16 families from Chhatarpur District, Madhya Pradesh. Around 31 species of snakes under 06 families (Boidae, Colubridae, Elapidae, Typhlopidea, Uropeltidae and Viperidae) have been compiled from Satpura Tiger reserve and Panchmarhi Biosphere (Fellows, 2015). In Bhopal very little attention has been given to studies related to ophidians. Manhas *et al.*, (2015) while working on diversity of herpetofauna documented 7 species of snakes from inside the campus Barkatullah University, Bhopal. While Manhas *et al.*, (2015) has enlisted 17 species of snakes from Bhopal region Whereas, 11 species of snakes from Barkatullah University were recorded by Manhas *et al.*, (2016).

However no systematic study on the status of ophidians of Bhopal region is on record, so an effort was made to provide current status of these serpents with their comprehensive list.

Study area

The present investigation was carried out in Bhopal region, the capital of the Madhya Pradesh state, central India (Figure 1). It is geographical located at latitude 23° 14' 01"N and longitude 77° 23' 36"E having an average elevation of 527 masl (1,729 ft.). The region has irregular elevation and small hills within its restrictions viz., Idgah hills and

Shyamalahills in the northern region, Katara hills in south region and Arera hills in the central region. The climate here is humid subtropical with hot summer and a humid monsoon season where summers start in late March and go on till mid-June, the average temperature during which remains around 30°C (86 °F), with the peak of summer in May, when it regularly exceed 40°C (104 °F) while monsoon starts in late June and ends in late September.

Materials and Methods

The study was conducted in Bhopal between November 2015 and September 2016. The study on live snake specimens was carried out during the study period to know presence and their current status in Bhopal. No specimen was harmed during the study. Field observations were done all over day but importance was given to morning and night observations when snakes are more active than other times, to sight the snakes. Results of some opportunistic sightings of snakes have also been incorporated in the list. The whole study area was thoroughly surveyed following visual encounter survey. The snakes that were observed more than 20 times considered very common and are denoted as "VC", common (C) which were sighted 15–20times, fairly common (FC) were sighted 5–15 times and rare (R) which were observed 1–5 times. The specimens were identified on the basis of literature documented earlier and field guide books (Smith, 1943; Daniels, 2002 and Whitaker and Captain, 2004).

Results and Discussion

Seventeen species of snakes (Table 1) belonging 06 families were sighted from Bhopal during the present investigation. Among them, 01 species (06%) belong to the family Typhlopidae, 01 species (6%) of Pythonidae, 08 species (47%) of Colubridae, 03 species (17%) of Elapidae and 02 species

(12%) of Viperidae and 02 species (12%) of Boidae (Figure 2). Out of all 17 species enlisted 05 species (*Python molurus*, *Ptyas mucosa*, *Xenochrophis piscator*, *Naja naja*, *Ophiophagus hannah* and *Daboia russelii*) of snakes under 04 family were protected under Sch II (Part II) whereas other 12 species were under Sch IV of Indian Wildlife Protection act, 1972 are presented in table 1.

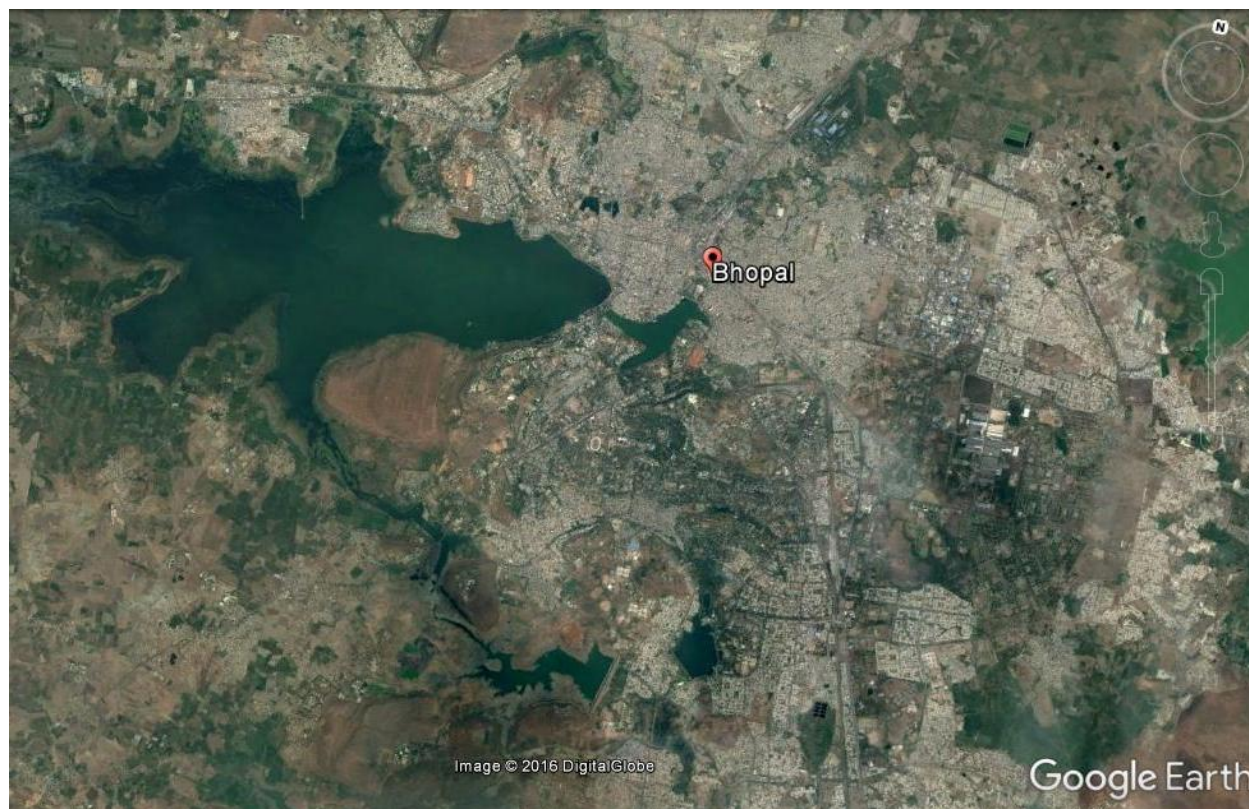
The total recorded species from present study area contributes 43.58% of snakes compared to the Madhya Pradesh (39 species: Chandra and Gajbe, 2005), 6.09% snakes of India (279 species: Aengals *et al.*, 2011) and 0.53% of World (3169 species: Uetz & Hošek, 2016).

Four species (24%) of snakes are very common (VC), six species (35%) are common (C), two species (12%) are fairly common

(FC), and five species (29%) were observed rare (R) in Bhopal region (Figure 3). Overall, Checkered Keelback (*Xenochrophis piscator*) followed by *Ptyas mucosa* were observed the most common and *Lycodon aulicus* followed by *Dendrelaphis tristis* was rarest.

Five venomous species of snakes observed in Bhopal region out of which 03 species falls under three genera (*Bungarus*, *Naja* and *Ophiophagus*) belonging to the family Elapidae and two species (*Daboia russelii* and *Echis carinatus*) under family Viperidae. The species *Ophiophagus hannah* was observed at Van Vihar national park Bhopal. Among the venomous species of snakes Spectacled Cobra (*Naja naja*) was found common whereas *Echis carinatus* was observed rare in current study.

Fig.1 Bhopal region (MP)



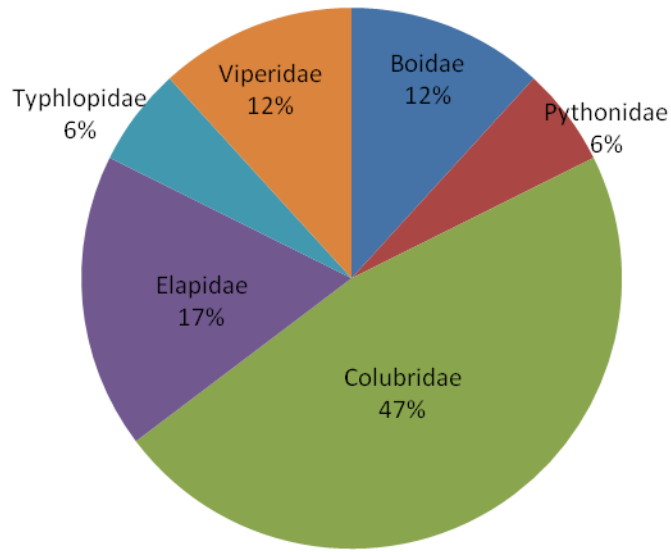


Fig.2 Percentage contribution of ophidian families during present investigation

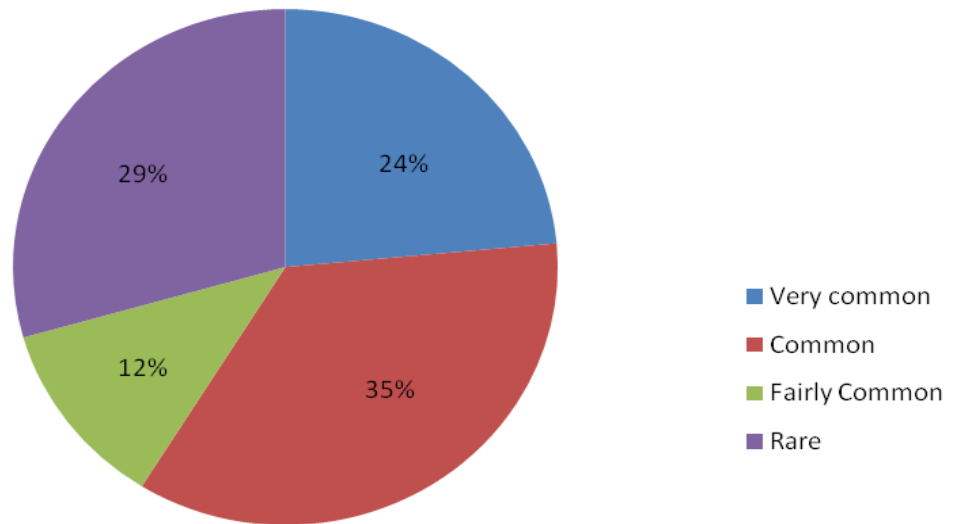


Fig. 3 Frequency in sighting of ophidians during present study

Table.1 List of snakes observed in Bhopal (MP) along with their status (Local, WPA 1972 and IUCN 2016) India

S.No	Family	Scientific name	Common name	Status (Bhopal)	Schedule in Protection act, 1972	IUCN Status
1	Boidae	<i>Eryx conicus</i>	Common Sand Boa	C	Sch IV	NE
2		<i>Eryx johnii</i>	Red Sand Boa	R	Sch IV	NE
3	Pythonidae	<i>Python molurus</i>	Indian rock Python	R	Sch I (Part II)	NE
4		<i>Amphiesma stolata</i>	Buff-Striped Keelback	C	Sch IV	NE
5		<i>Argyrogene fasciolatus</i>	Banded Racer	C	Sch IV	NE
6		<i>Coelognathus helena</i>	Common trinket	FC	Sch IV	NE
7		<i>Lycodon aulicus</i>	Common Wolf Snake	R	Sch IV	NE
8	Colubridae	<i>Dendrelaphis tristis</i>	Common Bronze Back	R	Sch IV	NE
9		<i>Oligodon amensis</i>	Banded Kukri Snake	C	Sch IV	NE
10		<i>Ptyas mucosa</i>	Indian Rat snake	VC	Sch II (Part II)	NE
11		<i>Xenochrophis piscator</i>	Checkered Keelback Water Snake	VC	Sch II (Part II)	NE
12	Elapidae	<i>Bungarus caeruleus</i>	Common Indian Krait	C	Sch IV	NE
13		<i>Naja naja</i>	Spectacled Cobra	VC	Sch II (Part II)	NE
14		<i>Ophiophagus hannah</i>	King Cobra	----	Sch II (Part II)	VU
15	Typhlopidae	<i>Ramphotyphlops braminus</i>	Brahminy Worm snake	FC	Sch IV	NE
16	Viperidae	<i>Daboia russelii</i>	Russell's Viper	C	Sch II (Part II)	NE
17		<i>Echis carinatus</i>	Indian saw-scaled Viper	R	Sch IV	NE

Note: VC =Very common; FC= fairly Common; C=Common; R=Rare; NE= Not Evaluated

Out of the all species sighted, 03 species (*Ptyas mucosa*, *Xenochrophis piscator* and *Amphiesma stolata*) were observed to have semi-aquatic behavior whereas 05 species including *Argyrogene fasciolatus*, *Coelognathus helena*, *Dendrelaphis tristis* and *Ptyas mucosa*) was observed to have semi-arboreal and 02 species (*Eryx conicus* and *Eryx johnii*) semi-fossorial activities. Eight species of snakes were observed to be completely terrestrial in Bhopal region. Many species of snakes die due to vehicular movements mostly during the peak months of the year. During this investigation the species sighting was observed maximum in monsoon months (From Mid-June to Mid-September). Before these months snakes were in active or been in aestivation as no species was sighted before monsoon. Because snakes are ectothermic animals and they require optimum heat to do their daily activities and in this region the summers receive very high temperature fluctuations whereas after monsoon the activity slows down up to mid-November thereafter the activities of these creatures stop completely till favorable climatic conditions. The mortality of snakes because of vehicular passage threatened snake species in this region of the state mostly during monsoons (Manhas *et al.*, 2015).

Further investigations are required to be conducted to know the comprehensive ecology of the snakes that are residing in this portion of the country viz., Bhopal (MP). The habitat is being degraded due the destroying forests. In urban localities the species was being killed mainly because of the fear and unawareness between locals.

Furthermore, human created appliances and their settlements near forest trail and agricultural practices are also a reason for the destruction of the habitat of snakes. Thus all these reason are causing unsustainable diversity of snake species, so there is an

urgent need of minimizing these tribulations for future better improvement of snake diversity in Bhopal.

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