

**Review Article**

**A preliminary assessment of snakes and monitor lizards encountered during Covid-19 lockdown in Agra, India**

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***Abstract***

India had undergone a strict lockdown in the year 2020 to curtail the spread of novel coronavirus. Human mobility was restricted and the time spent in and around houses was unlimited. This may have added to the increased frequency of encounters with snakes, monitor lizards, and other urban wildlife. We assessed the data of snakes and monitor lizards rescued during the lockdown in 2020 and compared it with 2018 and 2019 data. During the lockdown, there was an increase in the number of encounters with snakes and monitor lizards but species diversity, seasonality, and activity pattern remained similar with the previous two years. The rescue activity is also an important opportunity to spread awareness among the public about the local snakes and monitor lizards. The overall impact of the lockdown on snakes and other reptiles will be assessed over the years as more data becomes available.

Keywords: reptile, snake, monito lizard, rescue, conflict, covid-19, awareness.

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**Introduction**

In the year 2020, India had undergone a complete lockdown where human mobility was restricted to curtail the spread of COVID-19. During the pandemic, there have been several interesting wildlife encounters reported throughout our country on social and print media. Urban wildlife that resides around human habitation faced new challenges during this pandemic (Corllet *et al.* 2020). Most of us spent time in our homes like never before and managed to engage ourselves in activities like gardening, cleaning, and exploring our surroundings daily. We speculate that this may have led to the increase in the frequency of encounters with snakes,

monitor lizards, and other urban wildlife that thrives around us. Moreover, we all know that because of urbanization, encroachment, degradation of natural spaces, and other human disturbances there has been an increase in the number of encounters with snakes (Pareek and Singh 2021; Gayen 2019; Roshnath 2017; Purkayastha *et al.* 2011) and with other wildlife. An average of 58000 people dies annually due to snake bites in our country (Suraweera *et al.* 2020). Yet human-snake interactions have received very less attention (Ramesh and Nehru 2019). Snakes have always been associated with our culture and are also a cause of fear among people (Pareek and Singh 2021; Gayen *et al.* 2019; Roshnath 2017).

### **Study area and methods**

Wildlife SOS, a non-government organization, has been running a 24 hours helpline with Uttar Pradesh Forest Department for wildlife rescues in Agra, Mathura, and nearby districts (Figure 1) for more than 15 years. When a call for a rescue is received, the contact details are transferred to the rescuer who notes down the address of the location. After the rescue is over, the rescuer enters all the details in a predesigned form and gets it signed by the caller. Photographic documentation of the rescue and the species is done on the location itself. The rescued snake or monitor lizard is released immediately or on the same day in a suitable natural area. If the snake or monitor lizard is found injured, it is brought to the hospital for its treatment and released after its recovery. These rescue details are entered in a spreadsheet and also reported to the Uttar

Snakes are important (Gibbons *et al.* 2000) because they help us to keep a check on rodent populations (Pandey *et al.* 2016) and act as prey to some mammals and birds. Likewise, Monitor lizards are scavengers that help us to control pests and keep the environment clean. They do not attack humans unless provoked. Although most of the snakes, monitor lizards, and other reptiles are protected under The Wildlife (Protection) Act, 1972, they receive no mercy when sighted (Gayen *et al.* 2019; Roshnath 2017). They face many other challenges such as illegal trade (Joshi *et al.* 2021; Marshall *et al.* 2020); persecution for superstitious beliefs, killed for their meat, skin, and other body parts, etc. Pradesh Forest Department. Translocation of rescued snakes is a topic of research and debate (Ramesh and Nehru 2019; Roshnath 2017; Barve *et al.* 2013). Translocation may have negative impacts on the snakes and as well as on humans. We looked at the patterns of the snakes and monitor lizards encountered and rescued in the years 2018 and 2019. We compared it with patterns during the lockdown of the year 2020. We wanted to know if there was an increase in the number of encounters during the lockdown. Which species of snakes were encountered more? Where did most of the encounters happen? What time of the day did the most encounters occur? Do these patterns tell us something about their ecology and behavior?

### **Results and discussion**

The total number of snakes and monitor lizards rescued in 2018 and 2019 were 309 and 408

respectively. In 2020, we saw that there was a clear increase (564) in the number of calls received for the rescue of snakes and monitor lizards from the city. A maximum number of snakes and monitor lizards were rescued during autumn (September-November) followed by monsoon (July-August) season (Table.1). The pattern remained unchanged throughout these three years. Agra, Mathura, and other adjoining districts are situated on the banks of the river Yamuna. During the monsoon, the river is flooded and many reptile species migrate to cities and adjoining villages through canals and drainages. Overall, these cities have limited forest patches.

The most common species rescued in these three years (Table.2) were Indian Rat Snake (*Ptyas mucosa*), Indian Rock Python (*Python molurus*), Common Wolf Snake (*Lycodon aulicus*), Spectacled Cobra (*Naja naja*), Common Indian Monitor (*Varanus bengalensis*), Common Krait (*Bungarus caeruleus*), and Checkered keelback (*Xenochrophis piscator*). Indian Rat snake (Whitaker and Captain 2008) is a diurnal species. It is commonly found throughout the Indian subcontinent. Its diet is eclectic which includes frogs, toads, rats, birds, lizards, and other small vertebrates. It inhabits a wide range of habitats. It is a very fast snake and can escape quickly. Indian Rock Python (Daniel 2002) is diurnal and nocturnal species depending on the extent of human disturbances. Pythons hibernate in the winter season and can be sighted while basking during the day. Being a large-bodied snake it constricts its prey and prefers to eat mammals and birds. Pythons are forest (dense or open) dwellers or inhabit river banks or lakes. Interestingly, of all the pythons

rescued from Agra and nearby districts, 33% were from houses, 31% were from farms and fields, 15% from commercial and public facilities, and 9% from the roads, 11% of pythons escaped before their rescue. Common Wolf Snake (Daniel 2002) is nocturnal species. It is commonly found near and in human habitation throughout the country. It can easily climb vertical walls and is mostly rescued from the crevices, ceilings, and roofs. Its diet consists of lizards, geckos, skinks, and mice. Spectacled Cobra (Daniel 2002) is one of the most common venomous snakes found in the country. It is most active during the night but may venture out during the day in search of its prey. Its diet consists of frogs, toads, birds, rodents, snakes, and eggs of invertebrates. It inhabits a wide range of habitats. Common Indian Monitor Lizard (Daniel 2002) is a widely distributed diurnal species. It is a burrow dweller but also inhabits crevices on the ground or rocks. It eats a wide variety of prey like frogs, fish, small turtles to small mammals, and birds. Common Indian Krait (Daniel 2002) is a widely distributed venomous species. It is very active and alert during the night. It is found near human habitation, in farms and fields, in rodent burrows, and termite mounds. Its diet consists mostly of snakes but it consumes rats and frogs too. Checkered keelback (Whitaker and Captain 2008) is a freshwater snake that is commonly found throughout the country in water bodies and paddy fields. It feeds on frog's eggs, tadpoles, frogs, fishes, and water insects. They are reported to eat rats and birds too. The snake is active during the day and night.

In 2020, 20% of the snakes escaped from their location of sight before the rescuer reached. These were recorded and were categorized as unidentified snakes. Snakes could manage to escape because of their elusive nature and if given a

chance, they would prefer to slither away from human encounters. It can also be because of the disturbance from the people or the inability of the people to keep a track of its movement because of fear. At times, people just call for the rescue even if they have sighted it in their backyard or near their residence, sometimes a few hours earlier. 80% of the rescues were of non-venomous species. Common Cobra and Common Krait are the only two venomous species of snake rescued from the city. In 2020, 60% of the rescued snakes were from domestic residences. This was similar to 2019 (64%) and 2018(56%) data. Other rescues in the year 2020 were from commercial and public facilities (10%) such as schools, offices, restaurants, warehouses, religious places, shops, showrooms, and even from a hospital, 9% were from farms and fields and around 2% were from the roads. Most of the rescue calls received were concentrated during the day (Figure 2) and that also coincides with the human activity peak hours.

### Conclusions

It may be early to assess the overall impacts of the pandemic and lockdown on the encounters of snakes, monitor lizards and, other wildlife, but such evaluations are possible. Scientific rescue of snakes and monitor lizards provides us an excellent opportunity to interact with the civil society and educate them about the endangered species and the laws. At the same time, we have been able to document the diversity, trends in seasonality and frequency of encounters, activity pattern of the snakes, and monitor lizards. The information can be

very useful for further research, develop conservation plans and strategies to manage human-snake interactions effectively.

**Table 1: Number of rescues in different season**

Season	2018	2019	2020
<b>Winter</b> (December-January)	27	43	39
<b>Spring</b> (February-March)	22	21	24
<b>Summer</b> (April-June)	56	56	91
<b>Monsoon</b> (July-August)	84	122	154
<b>Autumn</b> (September-November)	150	166	256





Pictures showing the role of rescue and awareness activities. Copyright Wildlife SOS.

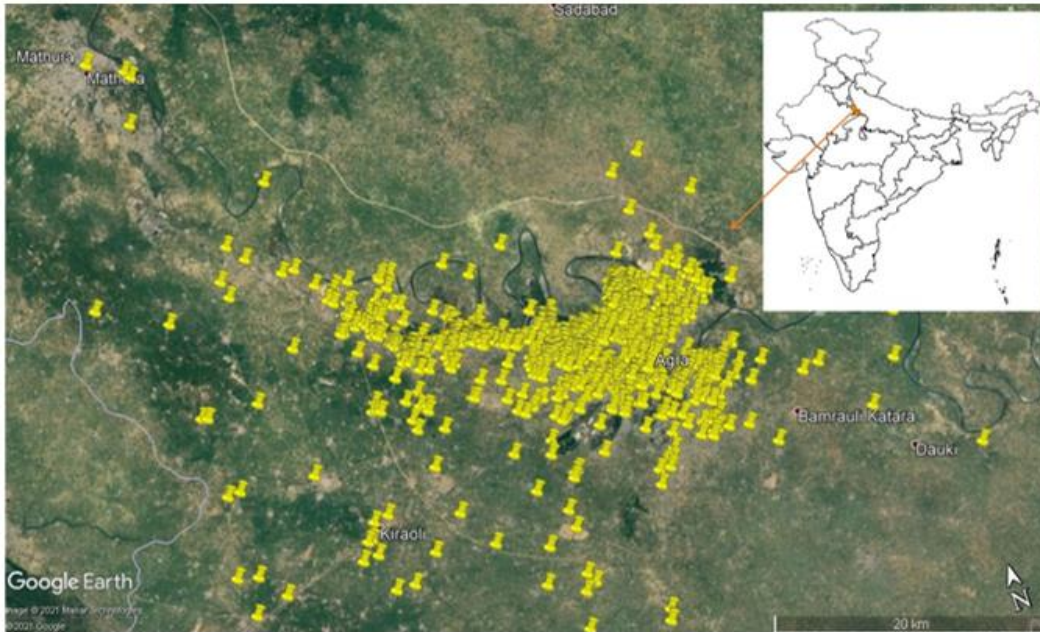


Figure 1. GPS locations of human-reptile (snakes and monitor lizards) encounters in Agra, Mathura and adjoining districts.

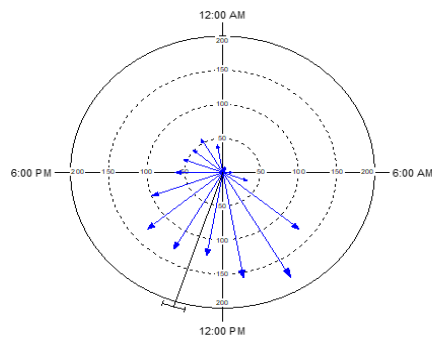


Figure 2 Time of rescue calls received

**Table 2: Species rescued during the years**

Species	2018	2019	2020
Indian Rat Snake ( <i>Ptyas mucosa</i> )	65	66	101
Indian Rock Python ( <i>Python molurus</i> )	86	86	93
Common Wolf Snake ( <i>Lycodon aulicus</i> )	66	84	93
Spectacled Cobra ( <i>Naja naja</i> )	46	60	71
Common Indian Monitor ( <i>Varanus bengalensis</i> )	28	33	41
Common Krait ( <i>Bungarus caeruleus</i> )	22	20	23
Checkered keelback ( <i>Xenochrophis piscator</i> )	11	8	10
Black Headed Royal Snake ( <i>Spalerosophis atriceps</i> )	3	3	8
Common Sand Boa ( <i>Spalerosophis atriceps</i> )	1	9	6
Common Cat Snake ( <i>Boiga trigonata trigonata</i> )	2	2	4
Red sand boa ( <i>Eryx johnii</i> )	7	0	3
Common Kukri Snake ( <i>Oligodon arnensis</i> )	0	1	0
Russell's Kukri Snake ( <i>Oligodon taeniolatus</i> )	0	1	0
Leith's Sand snake ( <i>Psammophis leithii</i> )	0	1	0
Unidentified snakes	2	34	111

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