

Ophiofauna Diversity of Dhaltangarh Forest of Odisha, India

Sambit Kumar Dwibedy¹

¹Khallikote University, PG Department of Zoology, Berhampur, Odisha, India

Abstract: A small study was undertaken in Dhaltangarh forest to explore snake diversity. Studies were conducted by systematic observation, catching by snake-stick & photographic capture. The study yielded 19 snake species including a huge Burmese python species. Out of the total snakes, 5 were found to be venomous, one was mildly venomous and rest 13 were non-venomous. It was concluded that this forest is rich in snakes belonging to Colubrid family. It was also revealed that mimicry is the main cause of the death of some non-venomous snakes in this forest.

Keywords: Dhaltangarh, Odisha, Ophiofauna, Venomous, Mimicry

1. Introduction

Ophiology is a sub-discipline of herpetology that deals with the scientific study of snakes. Snakes are a major group of reptiles included under sub-order Ophidia of order Squamata. Snakes have consolidated as the most successful lineage among living reptiles in terms of species richness, morphological and ecological diversity. They are also the most feared group of reptiles in world since in their appearance but the majorities of them are non-venomous and are valuable to both humans and ecosystem [1]. Snakes along with lizards are included under Order Squamata.

There are about 3,619 species of snakes were in records under 26 families all over the world [2]. There are 518 species of reptiles found in India out of which Snakes dominates with 279 species [3]. More than 80 species of snakes have been reported in Odisha including, 20 marine snake species [4].

Snakes are limbless reptiles having an elongated body with scales which are arranged in rows [5]. A snake is characterized as a great elongation of the body, accompanied by complete absence of anterior limbs, great reduction or complete absence of hind limbs, associated elongation of internal organs with reduction or loss of one of the lungs, a peculiarly efficient mode of locomotion by wriggling with extreme flexibility of vertebral column aided by distinctive character of transverse plates [4]. Snakes are different from lizard in that they lack eyelids, limbs and external ear. Other Characteristics of snakes include a transverse cloacal opening, more movable skull than other reptiles, presence of paired copulatory organ called hemipenes in male, keratinous scale that cover the body, shedding of the outer epidermal layer (ecdysis) [6]. Other evolutionary trends for many snakes include the loss or reduction of limbs and the ability to lose their tail (caudal autotomy).

Sub-order Ophidia includes 11 snake family. Snakes can be found on all continents except Antarctica, and they have conquered the most divergent environments from the mountains of the Himalayas to the coral reefs of the Pacific Ocean [5]. There are snakes that spend all their life in the

water, others that live underground in holes and burrows that they or other animals have dug, and yet others that spend their lives high up in the canopy of trees. Most snakes reproduce by laying eggs but some species give birth to fully developed young. Certain species of snake like pythons or the king cobra even guard and protect their eggs.

An interesting phenomenon called Batesian mimicry is observed among some snakes. Batesian mimicry is a form of mimicry in which an innocuous species has evolved imitate the warning signals of a potentially harmful species directed at one or several common predators [7]. Warning signals may be patterns, colors, shape, behavior, odours and sounds [8] [9] [10] [11] [12]. Batesian mimicry confers an advantage –i.e., protection from predation [13]. But it is also associated with a risk factor, i.e., people think these snakes venomous and hurt them in fear of being bitten. This is the main cause of snake depletion.

The snakes are integral part of the forest eco-system as their positions in the food chain as predator make them important in the nutrient flow. Snakes play key ecological roles in controlling rodent pests [14] [15]. They maintain the balance of nature and serve a lot to mankind. Due to anthropogenic pressures snakes are depleting sharply from the earth. Snakes populations are influenced by microhabitat factors such as soil, pH, humidity, leaf litter and woody debris [16]. Among reptiles, snakes are top predators and therefore a decline in their numbers may have serious consequences for the functioning of many ecosystems [17].

2. Literature Survey

In most of the parts of the earth herpetologists are trying to provide the actual assessment of snakes. In India, also many works have been done accurately and many new species were discovered. Many ophiologists of Odisha also did some assessment of the ophiofauna in an excellent way.

Twenty-five species of snakes were reported by Rout *et al.*, (2015) from Kuldhia Wildlife Sanctuary, Mayurbhanj, Odisha [18]. Pradhan, Mishra & Sahu (2014) enlisted 20 species of snakes belonging to 17 genera and 5 families from

Gandhamardan Hills of Western Odisha [19]. Dutta et al., (2009) compiled a list of 33 species of snakes from Similipala Biosphere Reserve of Odisha [4].

Some new species of snakes have been discovered recently in Odisha. A new snake species named *Lycodon Odishi* was claimed to be discovered by Mallik et al., (2014) in Ganjam [20]. Another species named *Ahetualla anamala* was discovered by Dr Pratyush Mohapatra in Mayurbhanj. Still some areas of Odisha are remained uncovered in this field. Many species of snakes are becoming extinct before they come to human knowledge. A wildlife study was performed in the Dhalatangarh RPF of Odisha. But it was a preliminary step to assess the ophio-fauna of the desired forest. The work was carried out by me and it yielded an interesting checklist of ophiofauna diversity.

3. Materials and Methods

3.1 Study Area

The Odisha state of India has a geographical area of 155,707 sq. km. The recorded forest area of this state is 52,472 sq. km (SFR 1999). Jagatsinghpur district is one of the coastal districts of Odisha which lies between 19° 58' & 20° 23'N latitude and between 86° 30' & 86° 45' E longitudes. Dhalatangarh is a small forest of Jagatsinghpur. It is in Raghunathpur block of Jagatsinghpur district, located 15 kilometers away from Jagatsinghpur town. It is a reserve protected forest, under the control of Cuttack forest division. It is located on the shore of dead Hansua river, between longitude 20° 316295' & 20° 317496'N and latitude 86° 2462941' & 86° 232296'E (Google Map). It has a total geographical area of 279.03 acre. A canal named Taladanda No-8, is going through this forest. The forest is surrounded by 10 villages named-Ramachandrapur, Deulisahi, Ganailo, Nalibara, Pandra, Kakudia, Balansa, Mundala, Gopalpur & Brahmanbadi. Two villages are situated inside the forest named- Badagada & Sanagada.

During summer the temperature is more than 27° C and the minimum temperature is recorded during winter as 15°C. Scattered grasslands, Deer park, Lord Gopinath Temple and Dhruva's birth place are the fascinating attraction of this forest. Dhalatangarh is an excellent habitat of many rare flora and fauna. More than 50 species of plants are seen here out of which many have a great medicinal value. Dhalatangarh is dominated by plants like teak, thorny bamboo, coromandel ebony, Indian gooseberry etc. Faunal diversity of this forest ranges from invertebrates like several spiders, scorpions to vertebrates like deer.



Figure 1: Dhaltangarh Reserve Protected Forest



Figure 2: Board showing way to Forest office



Figure 3: Board showing area of the forest



Figure 4: Hansua river, on the shore of which Dhaltangarh is located



Figure 5: Road passing through Dhaltangarh

3.2 Methodology

The duration of the study was 9 months, from 14th August 2016 to 15th May 2017 with 63 days of sampling in the region. The study was focused on ophidian diversity of Dhaltangarh. The study area covers an area of 279.03 acre. Studies were conducted by systematic observation, hand picking method & photographic capture. Collections of species were done along the river banks, canal, ponds, swampy areas, forest trails, forest floor and around human habitations. The materials used to create this research paper were a camera, key to Indian snakes ([21], [4], [22], [23]), measuring scale, spade, binocular, torch & a snake catching stick. Intensive searches during dusk and night were done to locate crepuscular, nocturnal species. Some snakes were observed from the tree with the help of 8x40 Bushnell binoculars. A few snakes were captured and measured with the help of snake catching stick. Blind snakes were observed by digging the soil with the help of a spade. Extensive photo documentation was done. Larger specimens were photographed at the site. Smaller snake specimens were

captured and taken to the nearer forest office and photographed there for study in greater details. Nikon D5600 camera was used to take the picture of the animals. Only those species with confirmed identification are listed in this paper. Exhaustive interviews were carried out with local people and forest staffs.



Figure 6: Snake catching stick and snake hook



Figure 7: Picture taken during sampling

4. Results & Discussions



Figure 8: *Indotyphlops braminus*



Figure 9: *Rhityphlops acutus*



Figure 10: *Python bivittatus*



Figure 11: *Gongylophis conicus*



Figure 12: *Oligodon arnensis*



Figure 13: *Amphiesma stolatum*



Figure 14: *Xenchrophis piscator*



Figure 15: *Xenchrophis sanctijohannis*



Figure 16: *Ahetula nasuta*



Figure 17: *Naja naja*



Figure 18: *Bungarus fasciatus* killed by local people



Figure 19: *Bungarus caeruleus*



Figure 20: *Daboia ruselii*

The study yielded 19 ophidian species. From the survey and assessment work, it was found that the ophidian species present are belonging to 6 Families and 15 genera (Table 1). The snake fauna of Dhaltangarh comprises members of family Typhlopidae, Pythonidae, Boidae, Colubridae, Elapidae and Viperidae. The local name/vernacular names, English names & scientific names are given in Table 2 along with their IUCN status.

In snakes, from all the 6 families found Colubridae dominates over other 5 families. Ten species belong to Colubridae family, 4 species belong to Elapidae, 2 no of species to family Typhlopidae and one to each Boidae, Pythonidae and Viperidae. The percentages of snakes belonging to different families are mentioned in the figure 21.

Out of the 19-snake species 5 snake species are venomous, one is mildly venomous and the rest thirteen are non-venomous (Figure 22). Monocled cobra, spectacled cobra, Common krait, Banded krait and Russell Viper are the deadly poisonous snakes of this forest. Green vine snake is mildly poisonous and the rest are the non-venomous snakes observed in this forest.

Out of the 19 species, three are completely fossorial (*Indotyphlops braminus*, *Rhinotyphlops acutus* and *Gongylophis conicus*), three are arboreal (*Python bivittatus*, *Ahetula nasuta* and *Dendrelaphis tristis*), three are mainly aquatic (*Xenchrophis sanctijohannis*, *Xenchrophis piscator* and *Enhydris cnhydris*) and the rest are land-dwelling reptiles. Most of the snakes found in this forest are mainly nocturnal and crepuscular.

In Dhaltangarh forest species like rat snake, chekered keel back and common krait are of common occurrence. But species like Burmeese python and *Naja naja* are few. *Typhlops* are rarely seen due to their burrowing secretive habits but they are abundant inside the soil. *Naja kaouthia*, *Enhydris cnhydris* and *Ptyas mucosa* are present in this forest abundantly but unfortunately not photographed.

Batesian mimicry was the most eye-catching phenomenon observed among some non-venomous snake species of this forest. Common kukri, Indian wolf snake and Barred wolf snake are the three-unknown species to this area. These three species are mistaken as venomous snake due to their resemblances to some venomous snakes. Common Kukri snake mimics to banded krait; Indian wolf snake and Barred wolf snake mimics to Common krait and sand boa mimics to Russell viper. The mimicry of these 4 non-venomous species often led them towards their death. People kill these 4 species in ignorance as thinking them venomous snakes.

Table 1: Species Systematic Position

Family	Genus	Species	
Typhlopidae	<i>Indotyphlops</i>	<i>braminus</i>	
	<i>Rhinotyphlops</i>	<i>acutus</i>	
Pythonidae	<i>Python</i>	<i>bivittatus</i>	
Boidae	<i>Gongylophis</i>	<i>conicus</i>	
	<i>Ptyas</i>	<i>mucosa</i>	
Colubridae	<i>Oligodon</i>	<i>arnensis</i>	
	<i>Amphiesma</i>	<i>stolatum</i>	
	<i>Xenchrophis</i>		<i>piscator</i>
			<i>sanctijohannis</i>
	<i>Dendrelaphis</i>	<i>tristis</i>	
	<i>Lycodon</i>		<i>aulicus</i>
			<i>striatus</i>
	<i>Enhydris</i>	<i>cnhydris</i>	
<i>Ahetulla</i>	<i>nasuta</i>		
Elapidae	<i>Naja</i>	<i>Naja</i>	

		<i>kaouthia</i>
	<i>Bungarus</i>	<i>fasciatus</i>
		<i>caeruleus</i>
Viperidae	<i>Daboia</i>	<i>ruselii</i>

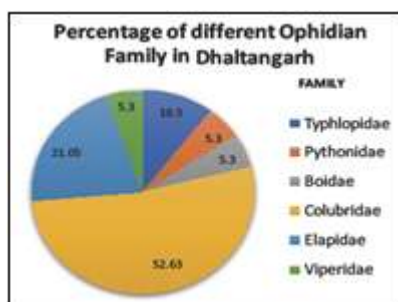


Figure 21: Pie chart showing percentage of different Ophidian family of Dhaltangarh

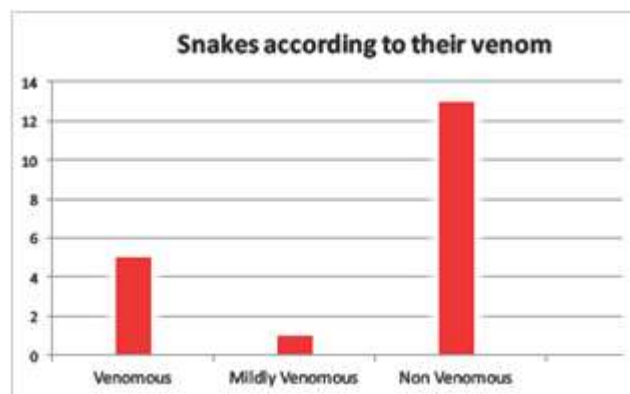


Figure 22: Bar chart showing snakes with respect to their venom

Table 2: Species scientific name along with local name, English name and IUCN status (NV-Non-venomous, MV-Mildly-venomous, V-Venomous, L.C-Least concerned, VUL- Vulnerable, N.T- Near threatened)

Sl No	Scientific Name	Common Name	English Name	Venom	Iucn Status
1	<i>Indotyphlops braminus</i>	Sana domundia	Brahminy blind snake	NV	L.C
2	<i>Rhinotyphlops acutus</i>	Bada domundia	Beaked worm snake	NV	L.C
3	<i>Gongylophis conicus</i>	Bali boda	Common sand boa	NV	L.C.
4	<i>Python bivittatus</i>	Ajagara	Burmese python	NV	N.T
5	<i>Ptyas mucosa</i>	Dhamana	Indian rat snake	NV	L.C
6	<i>Oligodon arnensis</i>	Kukri sapa	Common kukri snake	NV	L.C
7	<i>Amphiesma stolatum</i>	Mati biradi	Buff striped keelback	NV	L.C
8	<i>Xenchrophis piscator</i>	Dhanda	Checkered keelback	NV	L.C
9	<i>Xenchrophis sanctijohannis</i>	Dhanda	St John's keelback	NV	LC
10	<i>Dendrelaphis tristis</i>	Kanala / Kandanala	Bronzeback tree snake	NV	L.C
11	<i>Lycodon aulicus</i>	Kaudia Chiti	Indian wolf snake	NV	L.C
12	<i>Lycodon striatus</i>	Kaudia Chiti	Barred wolf snake	NV	L.C
13	<i>Enhydryis cnydris</i>	Kauchia	Smooth scaled water snake	NV	L.C
14	<i>Ahetula nasuta</i>	Laudankia	Green vine snake	MV	L.C
15	<i>Naja naja</i>	Naga / Gokhara	Spectacled cobra	V	L.C
16	<i>Naja kaouthia</i>	Tampa	Monocled cobra	V	L.C
17	<i>Bungarus fasciatus</i>	Rana	Banded krait	V	L.C
18	<i>Bungarus caeruleus</i>	Chiti sapa	Common krait	V	L.C
19	<i>Daboia ruselii</i>	Chandana boda	Russell viper	V	L.C

5. Conclusion

Major causes of loss of snakes in the Dhaltangarh RPF are forest fire based habitat loss, Destruction of forest by local people, vehicular passage and ignorance of local people. Many snakes die due to vehicular movements mostly during the monsoon. Local people were found to kill both the venomous and non-venomous snakes in fear of being bitten. The local people depend upon this forest for firewood collection and they use the forest as the grazing field of their cattle. This causes the destruction of the forest. As the snakes are the integral part of forest ecosystem, any harm to them will deplete not only their population but also affect the entire biodiversity of Dhaltangarh forest.

Only two species of *Typhlops* were identified. Very little information was found relating to *Typhlops*. Further studies will shed more light on these burrowing species.

The habitat of these reptiles is being degraded due to the destruction forests. So, there is an urgent need for conservation of this forest to save ophiofauna resources.

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Author Profile



Sambit Kumar Dwibedy completed his post graduation degrees in Zoology from Khallikote University, Berhampur in 2017. Currently he is working in the field of herpetology. Previously he worked on the batrachofauna diversity of Dhaltangarh RPF and reported 10 amphibian species. He is also working as a faculty in CNCB Academy of Science and Technology, Cuttack.