

Spatio-Temporal Dynamics of Large Mammals and Birds in Eco-Tourism Zone of Nanda Devi National Park

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ABSTRACT: Eleven mammals viz. Snow Leopard (*Uncia uncia*), Himalayan Musk deer (*Moschus leucogaster*), Himalayan Black Bear (*Ursus thibetanus*), Himalayan Tahr (*Hemitragus jemlahicus*), Red Fox (*Vulpes vulpes*), Leopard Cat (*Prionailurus bengalensis*), Himalayan Weasel (*Mustela sibirica*), Beech Marten (*Martes foina*), Blue Sheep (*Pseudois nayaur*), Wild boar (*Sus scrofa*), Pika (*Ochotona himalayana*) and five birds viz. Himalayan Monal (*Lophophorus impejanus*), Himalayan Snow Cock (*Tetraogallus himalayensis*), House Sparrow (*Passer domesticus*), Chukor Partridge (*Alectoris chukar*) and Himalayan Scaly Breasted Thrush have been recorded from ecotourism zone of Nanda Devi National Park.

Keywords: Sign Survey; Photo-capture; Large Mammals and Spatio-Temporal Dynamics.

INTRODUCTION: The Himalaya is one of the biodiversity hot spot. The fragile mountains of the Himalaya are of high conservation significance due to their floral, faunal, geo-hydrological, ecological and socio-cultural and aesthetic values. Apart from providing ecosystem services to millions of people in the hills and plains of Northern India, the Himalaya holds an entire gamut of biological diversity including highly endangered, rare and endemic species to this region. The Nanda Devi National Parks is the least disturbed Protected Area in the Western Himalaya and designated as Natural World Heritage Site by UNESCO.

MATERIAL AND METHODS:

Study Area: The Nanda Devi Biosphere Reserve located at latitude 30° 24' N to the longitude 79° 53' E spreads across three districts namely Chamoli, Pithorogarh, and Bageshwar in the state of Uttarakhand. It supports over 1,000 species of plants including fungi, lichens and bryophytes, and 520 species of fauna.^{1,2,3} NDBR has two core zones namely Nanda Devi National Park (624.62 Km²) and Valley of Flowers (87.5 Km²). Nanda Devi National Park is located at 30°16' to 30°32' N longitude & 79°44' to 80°02' E latitude. It covers 624.62 km² area, of which 65 km² area is under forests, 20 km² area under alpine meadow, 36 km² area is rocky and 504 km² area is under snow/glaciers. The altitude ranges between

3,500m (the basin) to 7,817m (Nanda Devi West). The Nanda Devi National Park was closed for general public since 1983 and has since remained closed for all types of visitors due severe damage to the ecosystem of NDNP caused by human activities, especially reckless mountaineering and trekking.⁴ However, ecotourism zone is open for general public during June to October every year. The ecotourism zone of Nanda Devi National Park involves a high altitude 9 km trekking route between 4000m-4380 m and extends from Latakharak to Dibrugeta. The intensive study area (ISA) comprising of Dhaul Ganga Valley and Rishi Ganga Valley, covering about 6 km² of ecotourism zone of Nanda Devi National Park was assessed for the mammalian diversity using sign surveys and camera trapping techniques during the study carried out during October to November 2012. The camera trap locations are shown in Figure 1.

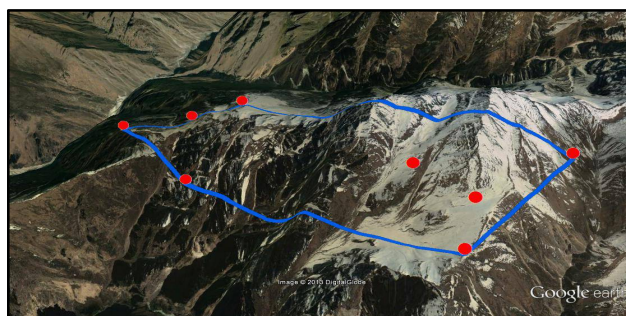


Figure 1: Camera trap Locations.

Methodology: The indirect signs (Pug Mark, Scarp Mark, Scats) of different carnivore species viz. Snow Leopard, Himalayan Black Bear, and Red Fox were recorded. The encounter rates (Number of sign/Total length) were derived from the animal signs. Totally eight trap locations were selected along the narrow ridge lines, valley bottoms, nearby scent sprayed

rocks, junction of trails, vegetation and constrained travel path in an area of 6 km².

RESULTS AND DISCUSSIONS: There are three major carnivores species confirmed through indirect evidences from the study area such as Snow leopard, Himalayan Black Bear and Red Fox (Table 1 and Figure 2).

Table 1: List of Indirect evidences of Mammalian Species recorded in the Study Area and its Encounter Rate.

Sl. No.	Name of the Species	Total Number of signs Recorded	Place of Record	Encounter Rate
1	Snow Leopard	8	Latakharakh to Dharansi	0-4
2	Red Fox	3	Lata to Latakarak	1-8.85
		62	Latakarak-Dharansi	
3	Himalayan Black Bear	8	Lata-Latakarak	0.33-1
4	unidentified carnivore	8	Lata-Latakarak	1.14
5	unidentified small carnivore	12	Lata-Latakarak, Latakarak-Dharansi	0-1.7

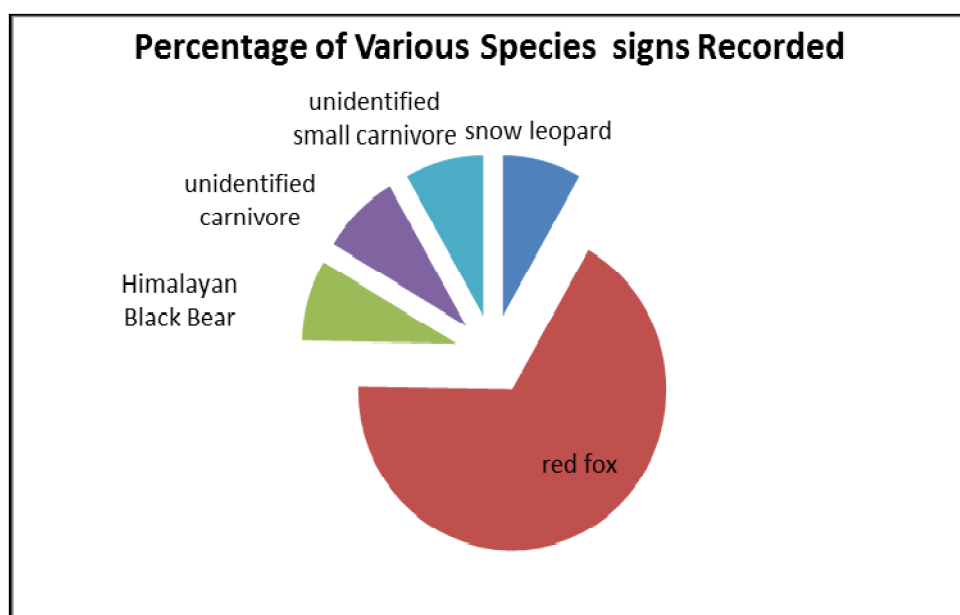


Figure 2: Pie Chart Showing the Percentage of Indirect Evidences of various mammals of Study Area.

Totally 28 snow leopard signs were recorded during this study period all of them were recorded in Latakharakh to Dharasi and the encounter rates ranged from 0-4 scats and sign/distance. They were 65 numbers of red fox scats was collected 3 in Lata - Latakarak and 62 in Latakarak - Dharansi areas the encounter rate ranged from 1-8.85. Only 8 Himalayan Black Bear scats were collected from the Lata - Latakarak region and the encounter rate was 0.33-1. The encounter rates of unidentified carnivore were 1.14 and unidentified small carnivore species rate was 1.14. Camera trap sampling carried for 65 days (520 trap nights) resulting in a total of 203 photo-captures that include 142 photo-captures of mammals and 61 photo-captures of birds. A total of 11 mammalian species and five avian species were identifies and recorded from the photo-capture data (Table 2, Figure 3 and Plate 1).

Table 2: List of Animals recorded through Camera trapping during the Study Period.

Sl. No	Order	Species Name	Red List Status	Photographic percentage
1	MAMMALS	Snow Leopard (<i>Uncia uncia</i>)	Endangered	6.3
2		Himalayan Musk deer (<i>Moschus leucogaster</i>)		3.5
3		Himalayan Black Bear (<i>Ursus thibetanus</i>)	Vulnerable	2.1
4		Himalayan Tahr (<i>Hemitragus jemlahicus</i>)	Near Threat-ened	1.4
5		Red Fox (<i>Vulpes vulpes</i>)	Least Concern	38.7
6		Leopard Cat (<i>Prionailurus bengalensis</i>)		0.7
7		Himalayan Weasel (<i>Mustela sibirica</i>)		3.5
8		Beech Marten (<i>Martes foina</i>)		19.0
9		Blue Sheep (<i>Pseudois nayaur</i>)		20.4
10		Wild boar (<i>Sus scrofa</i>)		2.8
11		Pika (<i>Ochotona himalayana</i>)		1.4
12	AVES	Himalayan Monal (<i>Lophophorus impejanus</i>)	Least Concern	0.3
13		Himalayan Snow Cock (<i>Tetraogallus himalayensis</i>)		
14		House Sparrow (<i>Passer domesticus</i>)		
15		Chukar Partridge (<i>Alectoris chukar</i>)		
16		Himalayan Scaly Breasted Thrush	-	

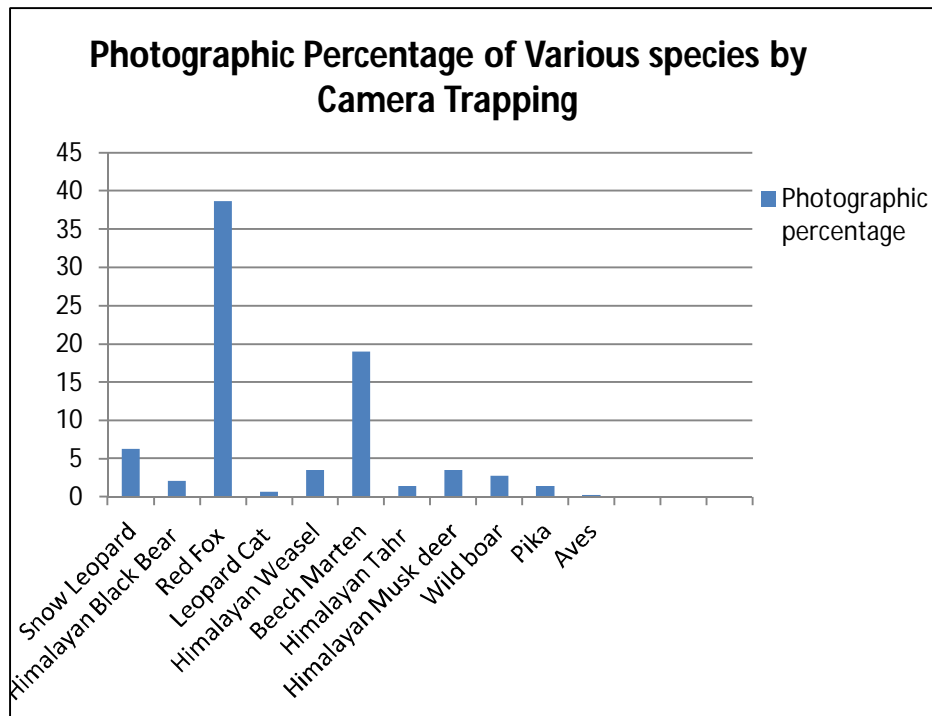


Figure 3: Photographic Percentage of various species by Camera trapping.

Plate 1: Photographs of Animals captured through Camera Trapping.



Snow Leopard



Himalayan Black Bear



Red Fox



Leopard Cat



Beach Marten



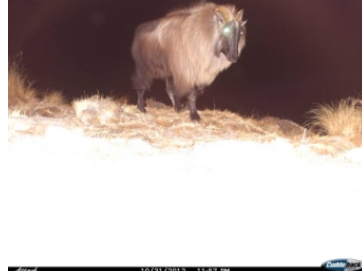
Himalayan Weasel



Blue Sheep



Himalayan Musk deer



Himalayan Tahr



Wild boar



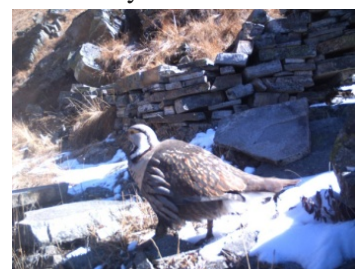
Himalayan Monal Male



Himalayan Monal Female



Chukor Partridge



Himalayan Snow Cock



Himalayan Scaly Breasted Thrush

CONCLUSION: Maximum numbers of photo-captures were obtained during the month of November (72.53%). During the entire exercise, the highest

photographic percentage was recorded in Red fox 38.73% followed by snow leopard 6.33%. The Himalayan black bear had low photo-capture percentage

(2.11%). Among the prey species, blue sheep had maximum photo-captures (20.42%) followed by Himalayan Musk deer (3.52%).

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REFERENCES:

1. Chander H. (2015). Diversity of Lichens in the Valley of Flowers National Park, India. In: Bharti P.K. and Bhandari G. (eds.) Biodiversity, Biotechnology and Environmental Conservation. Discovery Publishing House, New Delhi, p 31-40.
2. Chander H. (2016) Diversity and Distribution of Macrofungi and Lichens in the Nanda Devi Biosphere Reserve. In: Arya M. K., Bharti P. K. and Joshi R. (eds.) Biological Diversity and Ecology. Discovery Publishing House, New Delhi, p 184-207.
3. Chander H. (2016). Diversity and Distribution of Macrofungi in the Valley of Flowers National Park. *J. Biol. Chem. Chron.* 2016, 2(2), 36-41.
4. Sathyakumar, S. (2004) Conservation status of Mammals and Birds in Nanda Devi National Park: An assessment of changes over two decades. In: Biodiversity Monitoring Expedition Nanda Devi 2003. A report to the Ministry of Environment & Forests, Govt. of India. Uttaranchal State Forest Department, Dehradun, p 1-13.