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Status of large mammalian species in Urgam beat of Nanda Devi Biosphere Reserve (NDBR), Uttarakhand, India

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Abstract

The current study was conducted in Urgam beat of the Nanda Devi Biosphere Reserve, in the month of April 2017. The study area is covered by 2350 ha and located in Urgam forest beat in NDBR, Chamoli district Garhwal Himalaya in Uttarakhand state. A total of 8 large mammals species were recorded during the study period. Direct and indirect methods were used to assess the diversity of large mammals found in the study area. Six trail-transects of different lengths were laid and total distance 16 km were covered within 45 hours effort. Density of large mammals was recorded based on the presence and absence in the study area. The result shows that maximum encounter rate (5.44 group/km) was estimated for *Hemitragus jemlahicus*. The maximum density was observed for *Hemitragus jemlahicus* (14.50±2.89) followed by *Semnopithecus schistaceus* (5.06±0.52). This is a short term study in this area but further detailed study will be needed for the conservation and management aspect.

Keywords: Density, diversity, Garhwal, mammals, NDBR, Urgam

1. Introduction

India is very rich in biological diversity; mammalian diversity is one of the most important attributes. About 397 species of mammals are found in India, out of which 18.4% are endemic and 10.8 % are threatened [8]. Information on mammal distribution and diversity pattern is crucial for understanding the ecological and evolutionary determinants of spatial heterogeneity in biodiversity. Spatial study of species distributions has been carried out for several taxa, but it remains poorly understood in the mammalian community especially in herbivores [2, 6].

Due to fragmentation and degradation of habitats large mammals are relatively more prone to extinction as a consequence of their bigger size and home range. A study key-stone species of jungle like leopards, bears and musk deer are more fascinating to the humans [4]. Large carnivore predators are extensively studied and their morphology, habitat, distribution and other attributes are accounted. Himalaya constituting 6.4% of the total geographical area of India is less studied out of ten recognized bio-geographic zones of India, although it is considered as more fragile and more diverse in flora as well as in fauna [4]. The alpine and sub-alpine forests, grassy meadows and moist mixed deciduous forests provide diverse habitat for endangered species, there are about 241 species (65%) recorded from the Himalaya and 29 (37%) of mammalian species listed under Schedule I of IWPA, 1972 [9].

The scientific information on diversity of large mammalian species is lacking in the study area. Therefore, the present study was carried out the investigating the mammalian diversity in the Urgam beat of the Nanda Devi Biosphere Reserve.

2. Materials and Methods

2.1 Study Area

The study was carried out in a part of the Nanda Devi Biosphere Reserve (NDBR) which is known as a World Heritage Site; towards western boundaries of the biosphere is Urgam beat. The study area is located in the Chamoli district, Garhwal-Himalaya in Uttarakhand State (30°32'30"-30°37'30"N and 79°30'00"-79°35'00"E) covered by 2350 ha.

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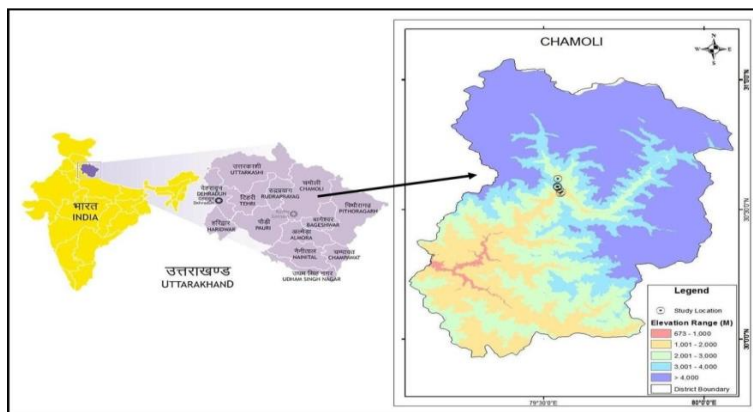


Fig 1: Mape of the study area in the Chamoli district (Urgam beat)

2.2 Data collection

To assess the status and distribution of large mammals direct as well indirect evidences were recorded. For large mammals trail were monitored during dawn and dusk for the direct sightings. Six trail-transect of different length were laid throughout the study area and monitored three times. A total distance of 16 km was covered and 45 hours were spent on trails monitoring. A total of 48 sampling plots were established for indirect evidences and between two consecutive plots an interval of 100 m was maintained. On each sampling plot pellet group/scat of different mammalian species were counted within 10 m radius circular plots and the pellets/scats were identified on the basis of their shape, size and color.

2.3 Data analysis

The sighting of different mammal species was used to

calculate encounter rate (ER) with reference to distance and time. ER is obtained as: $ER = n / l$ or $ER = n / t$ where n is the number of animal sighted, l is the distance travelled and t is the total time spent [1].

Mammal density was estimated by pellet group or scats for each sample plots and later on data were pooled to calculate total density of animals in study area. All statistical tests were performed using MS Excel.

3. Results and discussion

The study revealed that large mammalian species present in Urgam beat of Nanda Devi Biosphere Reserve and it is supported by the presence of direct and indirect evidences of *Hemitragus jemlahicus*, *Naemorhedus goral*, *Capricornis thar*, *Semnopithecus schistaceus*, *Ursus thibetanus*, *Panthera pardus fusca*, *Vulpes vulpes* and *Macaca mulatta* (Table 1).

Table 1: Status of different large mammal species in the Urgam beat, NDBR

| S. No. | Species | Scientific Names | Direct evidence | Indirect evidence | IUCN Status |
|--------|--------------------|--|-----------------|-------------------|-------------|
| 1. | Himalayan tahr | <i>Hemitragus jemlahicus</i> (Smith, 1826) | + | + | NT |
| 2. | Himalayan goral | <i>Naemorhedus goral</i> (Hardwicke, 1825) | + | + | NT |
| 3. | Himalayan serow | <i>Capricornis thar</i> (Hodgson, 1831) | - | + | NT |
| 4. | Gray langur | <i>Semnopithecus schistaceus</i> (Hodgson, 1840) | + | + | LC |
| 5. | Asiatic black bear | <i>Ursus thibetanus</i> (G. Cuvier, 1823) | - | + | VU |
| 6. | Indian leopard | <i>Panthera pardus fusca</i> (Meyer, 1794) | - | + | NT |
| 7. | Red fox | <i>Vulpes vulpes</i> (Linnaeus, 1758) | + | + | LC |
| 8. | Rhesus macaque | <i>Macaca mulatta</i> (Zimmermann, 1780) | + | + | LC |

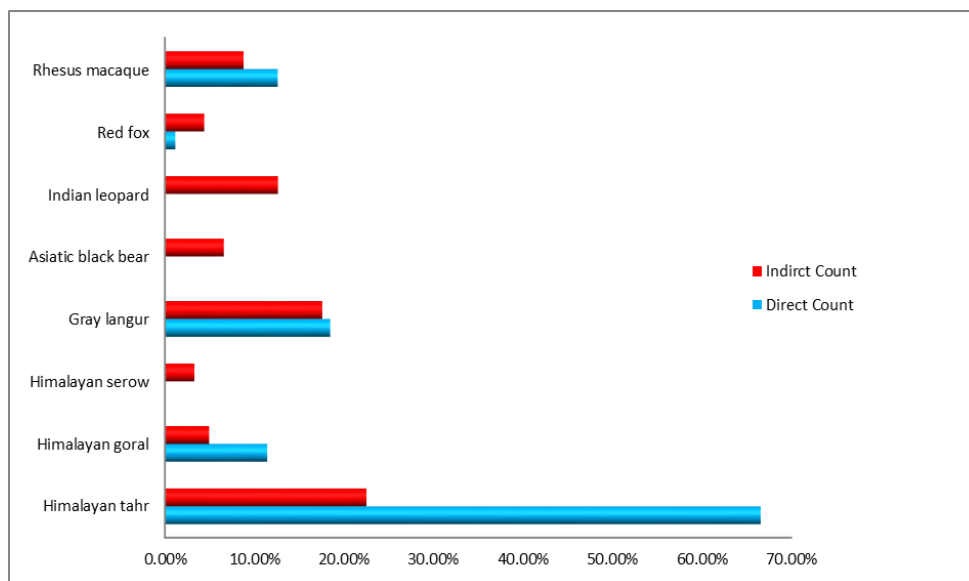


Fig 2: Diversity of large mammals in Urgam beat, NDBR

Large mammal diversity was estimated from the total counts through direct and indirect evidences recorded (8 species) during the study period. Similarly, Haleem *et al.* has recorded 28 mammal species from the Kedarnath Wildlife Sanctuary [4]. Maximum diversity of *Hemitragus jemlahicus* (60.37% direct and 27.89% indirect), followed by the *Semnopithecus schistaceus* (16.76% direct and 21.77% indirect) was observed. There was no direct sighting recorded for *Ursus thibetanus*, *Panthera pardus fusca* and *Capricornis thar* but indirect evidence scat/pellet group was recorded during the study (Table 1 and Fig 1).

3.1 Encounter rate

The overall encounter rate (group/km) was maximum for *Hemitragus jemlahicus* (5.44 group/km) followed by *Semnopithecus schistaceus* (1.90 group/km), *Macaca mulatta*

(1.13 group/km), Goral (0.88 group/km), *Panthera pardus fusca* (0.48 group/km), *Vulpes vulpes* and *Ursus thibetanus* showed a similar encounter rate (0.25 group/km) and *Capricornis thar* showed the minimum encounter rate (0.13 group/km). The encounter rate (groups/hr) of *Hemitragus jemlahicus*, was recorded maximum (1.93 groups/hr) followed by *Semnopithecus schistaceus* (0.67 groups/hr) and *Macaca mulatta* (0.40 groups/hr), *Naemorhedus goral* (0.31 group/hr), *Panthera pardus fusca* (0.17 group/hr), *Vulpes vulpes* and *Ursus thibetanus* showed similar encounter rate (0.09 group/hr) and *Capricornis thar* showed the minimum encounter rate (0.04 group/hr) (Table 2). A high encounter rate was found in open ground areas from the forest edge, probably due to animals feeding on open ground at the forest edge [3]. A study also conducted on ungulate encounter rate in Kedarnath Wildlife Sanctuary by Sathyakumar [7].

Table 2: Average encounter rate per hour and per km. of large mammals in Urgam beat, NDBR

| S. No. | Mammal Species | Scientific Names | ER/km | ER/hr. |
|--------|--------------------|--|-------|--------|
| 1. | Himalayan tahr | <i>Hemitragus jemlahicus</i> (Smith, 1826) | 5.44 | 1.93 |
| 2. | Himalayan goral | <i>Naemorhedus goral</i> (Hardwicke, 1825) | 0.88 | 0.31 |
| 3. | Himalayan serow | <i>Capricornis thar</i> (Hodgson, 1831) | 0.13 | 0.04 |
| 4. | Gray langur | <i>Semnopithecus schistaceus</i> (Hodgson, 1840) | 1.90 | 0.67 |
| 5. | Asiatic black bear | <i>Ursus thibetanus</i> (G. Cuvier, 1823) | 0.25 | 0.09 |
| 6. | Indian leopard | <i>Panthera pardus fusca</i> (Meyer, 1794) | 0.48 | 0.17 |
| 7. | Red fox | <i>Vulpes vulpes</i> (Linnaeus, 1758) | 0.25 | 0.09 |
| 8. | Rhesus macaque | <i>Macaca mulatta</i> (Zimmermann, 1780) | 1.13 | 0.40 |

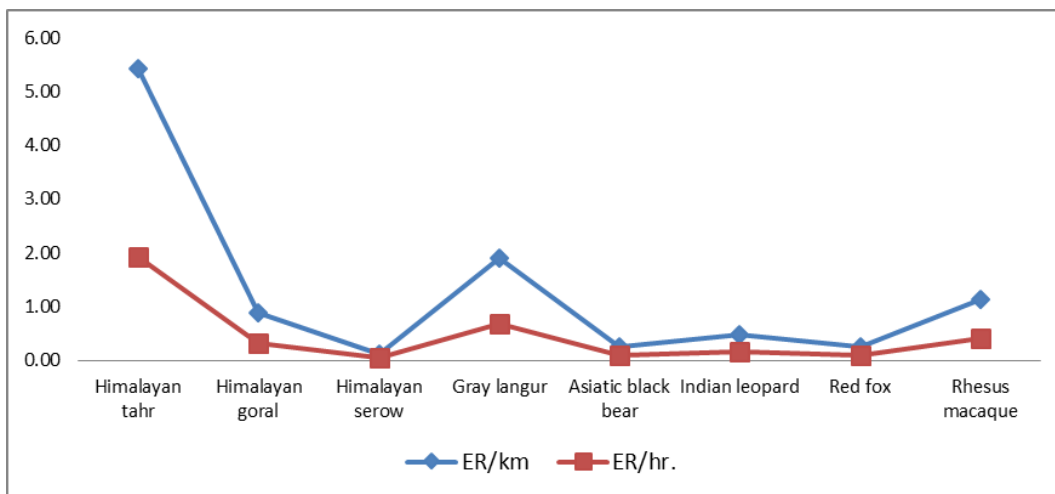


Fig 3: Average encounter rate per hour and per kilometer of large mammals in Urgam beat, NDBR

3.2 Density estimation

The density of animals was recorded according to their presence and absence in the study site. The pellet group for herbivore and scat for carnivore animals were recorded from all transects. *Hemitragus jemlahicus* density was found maximum (14.50 ± 2.89) followed by *Semnopithecus*

schistaceus (5.06 ± 0.52) was observed. Lowest density was recorded for *Capricornis thar* (0.33 ± 0.17) (Table 3). Haleem *et al.* was recorded maximum mean pellet group density and scat density for musk deer and red fox from Kedarnath Wildlife Sancturay [4].

Table 3: Mean density (Density ± SE) of different mammalian species at surveyed sites in Urgam-IV beat

| S. No. | Species | Scientific Names | Mean density ± SE |
|--------|--------------------|--|-------------------|
| 1. | Himalayan tahr | <i>Hemitragus jemlahicus</i> (Smith, 1826) | 14.50 ± 2.89 |
| 2. | Himalayan goral | <i>Naemorhedus goral</i> (Hardwicke, 1825) | 2.33 ± 0.80 |
| 3. | Himalayan serow | <i>Capricornis thar</i> (Hodgson, 1831) | 0.33 ± 0.17 |
| 4. | Gray langur | <i>Semnopithecus schistaceus</i> (Hodgson, 1840) | 5.06 ± 0.52 |
| 5. | Asiatic black bear | <i>Ursus thibetanus</i> (G. Cuvier, 1823) | 0.67 ± 0.34 |
| 6. | Indian leopard | <i>Panthera pardus fusca</i> (Meyer, 1794) | 1.28 ± 0.37 |
| 7. | Red fox | <i>Vulpes vulpes</i> (Linnaeus, 1758) | 0.67 ± 0.38 |
| 8. | Rhesus macaque | <i>Macaca mulatta</i> (Zimmermann, 1780) | 3.00 ± 1.06 |



Fig 4: Images of direct and indirect evidences collected from Urgan beat, NDBR; 1= *Semnopithecus schistaceus* in habitat; 2= Scat of *Panthera pardus fusca*; 3=Scat of *Ursus thibetanus*; 4= Scat of *Vulpes vulpes*; 5= *Hemitragus jemlahicus* in habitat

4. Conclusion

The present work is related to diversity of large mammal in the Urgan beat of the NDBR. The aim of the study was different kinds of human-wildlife interactions happening in the area and to know the contribution of large mammals living in the area. So we decided to study diversity of large mammals in the area. We found 8 species of large mammals in the area based on the direct or indirect evidences collected during the study period.

5. Acknowledgement

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6. References

1. Fox JL, Sinha SP, Chundawat RS, Das PK. A field survey of snow leopard presence and habitat use in North Western India. (IN) Freeman, H. (ed.) Proceedings of the Fifth International Symposium, International Snow leopard Trust and Wildlife Institute of India, 1998.
2. Gomez-Gonzalez S, Cavieres LA, Teneb EA, Arroyo J. Erratum: Biogeographical analysis of species of the tribe

- Cytiseae (Fabaceae) in the Iberian Peninsula and Balearic Islands. *Journal of Biogeography*. 2004; 31:1659-1671.
3. Gowda HTR, Kumara V. Line transect method for estimating encounter rate of large mammals in a Dry Deciduous Forest of Lakkavali range of Bhadra Wildlife Sanctuary, Karnataka. *Bioremediation, Biodiversity and Bioavailability*. 2009; 3(2):100-103.
4. Haleem A, Ilyas O, Syed Z, Arya SK, Imam E. Distribution, status and aspects of ecology of mammalian species in Kedarnath Wildlife Sanctuary, Uttarakhand Himalayas, India. *Journal of Materials and Environment Science*. 2014; 5(3):683-692.
5. Kittur S, Sathyakumar S, Rawat GS. Assessment of spatial and habitat use overlap between Himalayan tahr and livestock in Kedarnath Wildlife Sanctuary, India. *European Journal of Wildlife Research*. 2010; 56(2):195-204.
6. Oertli S, Muller A, Steiner D, Breitenstein A, Dorn S. Cross-taxon congruence of species diversity and community similarity among three insect taxa in a mosaic landscape. *Biological Conservation*. 2005; 126(2):195-205.
7. Sathyakumar S. Habitat ecology of major ungulates in Kedarnath Musk deer Sanctuary, Western Himalaya. Ph.D. thesis, Saurashtra University, Rajkot, 1994.
8. State of Environment Report. Ministry of Environment and Forest Report, 2009.
9. Baalu TR. Wildlife Protection Act 1972 as amendments up to 2006. Natraj Publisher. Dehradun, India, 2010.