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Wild Mountain Ungulates of Rakchham-Chhitkul Wildlife Sanctuary in Trans-Himalayan Baspa (Sangla) Valley, District Kinnaur, Himachal Pradesh, India

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Strictly as per the compliance and regulations of:

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Abstract- **Biodiversity is the essence and manifestation of evolutionary history of life on earth and species is the most conspicous form of the biodiversity. Ungulates are the hoofed mammalian species of vertebrates. Exploration of Rakchham-Chhitkul Wildlife Sanctuary present in the Baspa (Sangla) valley, district Kinnaur in Himachal Pradesh, India revealed the presence of three species of wild ungulates, belonging to three genera and two Families Moschidae and Bovidae of Order Artiodactyla. It was further observed that no wild member of Order Perissodactyla was present in the study area. It was found that the Bharal or Blue Sheep is the most populous ungulate in the sanctuary area.**

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I. Introduction

Himalaya the youngest mountain systems in the world had originated as a result of tectonic movements of the continental plates and are believed to be still growing. The formation of Himalayas resulted in new barriers and corridors, which influenced the dispersal of flora and fauna. Being the meeting point of two biogeographic realms, viz., the Oriental and Palaeartic (Mani, 1974) it provides various habitat that harbours certain unique and endemic taxa thus being designated as a global biodiversity hotspot (Mittermier *et al.*, 2004). The Trans-Himalaya landscape is a high elevation land lying north of the Greater Himalayan range characterized by extreme cold, low precipitation and rugged terrain of mountains. The global mammalian fauna is represented by 5416 species belonging to 154 families and 29 orders (Wilson and Reeder, 2005). Of these, 428 species i.e., 7.81% of the global mammalian species are reported from India, representing 48 families and 14 orders (Sharma *et al.,* 2014). The Indian Himalaya harbours about 291 species belonging to 39 families and 13 orders in which the Trans-Himalayas contributes 40 species (Sharma *et al.*, 2015 [A]). Himachal Pradesh despite being a smaller state with only 1.7% of total geographical area of the country, contributes 27% of mammalian species with 107 species belonging to 77 genera, 25 families and 9 orders (Chakraborty *et al.,* 2005). A total of 21 species of mammals from Himachal Pradesh figure in Schedule I of the Indian Wildlife (Protection) Act, 1972. An updated information on mammalian fauna of Himachal Pradesh reports the presence of 111 species (Sharma and Saikia, 2009). The Ungulates which means having hooves, is a group of mammals in which the terminal phalanx is encased in a sturdy hoof and includes the mammals of order Perissodactyla and Artiodactyla. Majority of large herbivores on this planet are ungulates. With the exception of Antartica, they are found in nearly all biomes and zoogeographical regions. There are about 257 species belonging to 95 genera of ungulates worldwide, while India is home to 41 species belonging to 28 genera (Sharma *et al.*, 2015[B]). Ungulates form major component of the Himalayan mammalian fauna. In total, 19 ungulates species belonging to four families viz. Mocshidae, Cervidae, Bovidae and Equidae inhabit the Himalayas (Bhatnagar, 1993). They form the major prey base for the large carnivores of the area like snow leopard and Himalayan black bear. In Himachal Pradesh, nine species of ungulates are present. They are goral, Himalayan musk deer, Himalayan tahr, barking deer, wild boar, sambhar, serow, Himalayan ibex, and blue sheep or bharal (Vinod, T.R. and S. Sathyakumar, 1999)

a) Study Area

Present study has been conducted in Rakchham- Chhitkul Wildlife Sanctuary located in the Baspa (Sangla) valley with geo-coordinates of latitude $31^0$14'22" N - $31^0$28'37"N and longitudes $78^0$17'31"E - 78^0 31'30"E covering an area of about 304 Km^2 in the northeast corner of Kinnaur, a tribal district in Himachal Pradesh, India (Fig. 1). The Baspa River is the main river of the valley and accordingly the entire valley is also known as Baspa Valley which is characterized by mountains covered with perpetual snow cover (Deota et al., 2011). These rugged, precipitous peaks represent two of the world's greatest mountain ranges namely Great Himalayan range and Dhauladhar ranges on the right and left bank of Baspa river respectively. The altitude of Baspa valley ranges from 2,800 masl to 5,486 masl. The temperature varying from -15°C to 18°C, mean rainfall 463 mm and annual snowfall 1,130 mm.

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The ecological characteristics changes very sharply in the mountains due to steep gradient. Thus there is a great variation in climatic conditions in the valley. The parts of the sanctuary up to altitude 3,400 m get good precipitation in the form of rain or snow but beyond that the precipitation is scanty and mainly in the form of snow (Negi and Banyal 2015). The forest type of this sanctuary includes Lower Western Himalayan Temperate Forest, Upper Western Himalayan Temperate Forest and Sub-Alpine Birch-Fir Forest.

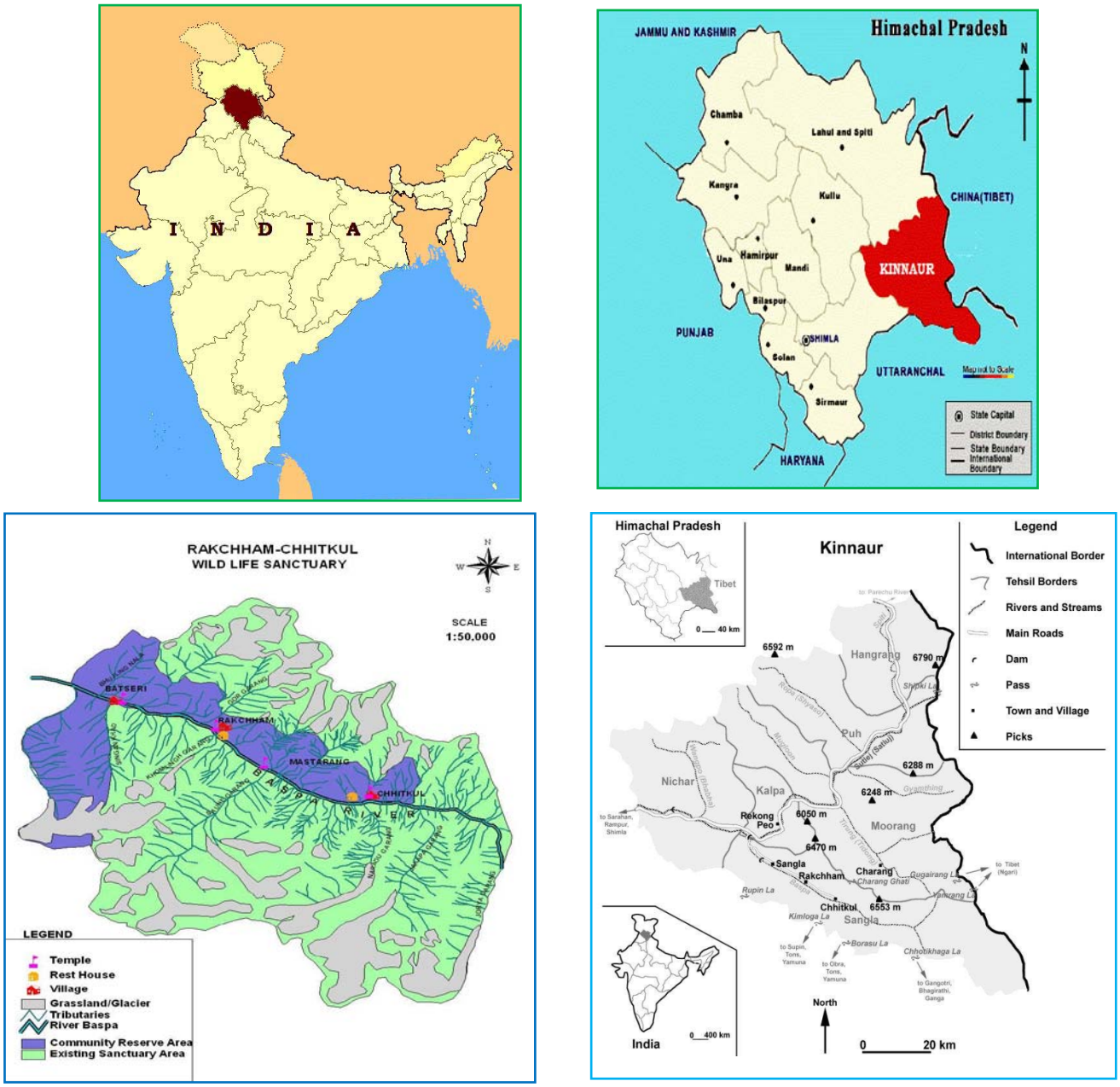

Figure 1: Map of Baspa valley, the study area in District Kinnaur, Himachal Pradesh, India (Source: mapsofindia.com and diagrammatic map of Baspa Valley).

The vertebrates of Himalayas in general and ungulates in particular has engaged the attention of many distinguished investigators since long, who have conducted studies on various aspects of ungulates in different parts of the Himalaya including Himachal Pradesh (Jerdon 1867, Blanford 1888-1891, Pocock 1907, Wynter-Blyth 1951, Schaller 1977, Prater 1980, Gaston et al., 1981, Tak and Kumar 1987, Rodgers and Panwar 1988, Negi 1992, Cavallini 1992, Gaston and Garson 1992, Bhatnagar 1993, Chudawat 1994, Bhatnagar 1997, Manjrekar 1997, Alfred et.al.,2002, Chakraborty *et al.* 2005, Namgail T. 2006, Sharma and Saikia, 2009, Sharma and Saikia 2013). However, the present study area of Rakchham-Chhitkul wildlife sanctuary has received very little attention of the investigators due to severe cold climate, and inaccessible habitat. Only a few studies have been conducted on diversity and ecology of vertebrates of

this sanctuary area (Wynter-Blyth, 1948; Narang, 1989; Negi and Banyal, 2015 A&B, Negi and Banyal, 2016 A&B and Negi and Banyal, 2017). The present study is the first of its kind and will act as baseline literature for further studies on the biodiversity of thus far neglected area.

II. Methodology

a) Stratification of the Study Area

The study area is present at the cusp of Great Himalayan and Trans Himalayan range thus presenting vast altitudinal, geological and ecological gradient. Apart from the altitude, there are major environmental differences present between the north-facing slopes and the south-facing slopes corresponding respectively with the left bank and the right bank of the Baspa River. The study area was divided in to three altitudinal zones viz., Zone-I: The area from Sangla to Kharogla (2700 to 3000 m) which support the forests of lower level fir like Tosh, Zone-II: The area from Rakchham to Mastarang (3050 to 3300 m) supporting the forests of Deodar and Blue pine and Zone-III: Area from Chhitkul to Dumti (3450 to 4200 m) supporting the tracts of blue pine, birch & rhododendron forests, and alpine meadows. Some areas which are traditionally famous for the presence musk deer like Brennalo in the forest of Chhitkul meaning Nullah or vale of Musk deers were especially earmarked.

b) Collection of Data

The data was collected by using a combination of direct and indirect methods. The direct methods utilized sighting of animals as the main data whereas indirect methods relied on quantification of indirect evidences such as pellet groups, scats, and hoof marks in a predetermined sampling unit. The direct evidences were made by using line transects method (Burnham *et al.*, 1980). The entire procedure of line transect sampling was performed by walking on local footpaths due to difficult terrain of the study area. The footpaths were monitored in morning and evening hours which generally coincide with maximum activity period of animals.

III. Results & Discussion

Present study revealed the presence of 3 species of wild ungulates, belonging to three genera and two Families Moschidae and Bovidae of Order Artiodactyla. It was further observed that no wild member of Order Perissodactyla was present in the study area.

Table 1: Systematic list of wild Ungulates observed in Rakchham-Chhitkul Wildlife Sanctuary, Baspa (Sangla) Valley, District Kinnaur, Himachal Pradesh (India).

Order: Artiodactyla Owen, 1848 Family: Moschidae Gray, 1821						
S. No.	Common Name	Scientific Name	IUCN REDLIST CATEGORY	IW(P)A SCHEDULE	CITES APPENDIX	Zone of Presence
1	Musk Deer	*Moschus chrysogaster* Hodgson, 1839	EN	I	I	II,III
Family: Bovidae Gray, 1821						
2	Himalayan Goral	*Naemorhedus goral* Hardwicke, 1825	NT	III		I
3	Bharal	*Pseudois nayaur* Hodgson, 1833	LC	I	I	II,III

Abbreviations

IUCN: International Union for Conservation of Nature and Natural Resources; **EN**: Endangered; **VU**: Vulnerable; **NT**: Near Threatened; **LC**: Least Concern; **IW (P)A**: Indian Wildlife (Protection) Act, 1972. **CITES**: Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Musk Deer is an elusive animal having long, coarse and brittle hair. It is without any horn and facial glands, the structures present in all deers and instead possess a gall bladder which is absent in all other deers. In addition to this they also possess a caudal gland and a musk gland. The canines in male are 2-3 inches long, projecting out of the mouth. It is very active and progresses by series of leaps. During present study this species has been recorded in zone II as resident and rare species although it is present in zone III as well. The species was mainly recorded from higher reaches of the sanctuary mainly on the left bank of river Baspa though in Zone II i.e upto Mastarang it is present on right bank of the river as well. The present study supports the solitary nature of Himalayan Musk deer as shown by Green (1985). Similarly the traditionally famous area of Brennalo in the forests of Chhitkul was actually found to harbour the species. The reason for this could be attributed to the fact that this particular area is rich in *Rhododendron campanulatum* that provide perfect hide

and food to this animal. The direct sighting of the species was recorded twice, but indirect evidences were recorded on every visit to this earmarked area. The species is declared as Endangered (EN) by the IUCN, listed in Appendix I in CITES and placed under Schedule I in Indian Wildlife (Protection) Act, 1972.

The Himalayan Goral is a stout and slender goat-like animal having small, irregularly curved, pointed horns in both sexes, body colour is grey suffused with black. The throat patch, chin, upper lips and jaw underside are white. A dark stripe extends down the spine and onto the forelegs. During present study this species has been recorded in zone I as resident with local migration and a common species. The Himalayan Goral was restricted to the lower altitudinal areas of the sanctuary. They were reported from the both banks of the Baspa River. It is placed in Schedule-III of the Indian Wildlife (Protection) Act, 1972 and declared Near Threatened by IUCN.

The blue sheep or Bharal is a unique mountain ungulate that displays the characteristics of both sheep and goat. The colour of coat is of slaty-blue which becomes red-brown in summer and more distinctly slaty grey in winter. The colour blends perfectly with the blue shale and rock of the open hill-sides. The body is sturdy, tail is short with black tip. Back of legs and underparts are white. The large rounded, smooth horns with fine striation, line of growth, are directed up and sideward in males while in females shorter, straighter. Many sheep like characters shown by this wild goat is the result of convergent evolution as the species has settled in a habitat which is usually occupied by sheep (Schaller 1977). Being intermediate between the sheep and goat they graze like sheep and climb to high and inaccessible cliffs like goats. These are the animals of high altitude which can ascend to 5000m during summers and rarely below 3600 m in the winters. They are found between tree line and snow line where plenty of grass and shrub is available for feeding. During present study this species has been recorded from zone II and III as resident with local migration and a common species. This species was mainly recorded from the alpine reaches in the areas of village Chhitkul right from the Mustarang area to Dumti area, during spring to autumn and they probably migrate to Uttrakhand side during the winters. As opposed to Musk deer which prefers thickly forested areas, the blue sheep prefers the more open, barren and rocky areas. It appears that these are the most populous among the species of large mammals found in this sanctuary area. They are the main prey species of the Snow Leopard and other predators. It is declared as Least Concern (LC) by the IUCN, listed in Appendix I in CITES and placed under Schedule I in Indian Wildlife (Protection) Act, 1972.

The study area has of late witnessed various anthropogenic development activities like tourism, road construction and hydroelectric projects. These will have a synergistic effect on many extinction drivers, such as habitat fragmentation and degradation, diseases and climate change. Further the local people traditionally hunted these wild animals for meat, skin and horns. The musk deer is hunted specifically for its musk because of high price of the musk in international market. Many local people in the area have access to guns and unfortunately the existing regulations to ban the hunting are seldom enforced. Further many outsiders acquire the permission from Government, to extract the medicinal herbs and plants from the sanctuary area, in the garb of which they actively albeit secretly engage their labourer into hunting of the wild animals of this area. All these anthropogenic activities are going to be detrimental to the wild life of this area and these activities are already beginning to show its baleful effect on the total biodiversity including the ungulates. Presence of these unique and endangered species of ungulates in the present study area accentuates the conservation importance of this sanctuary.

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