# An Overview of the Distribution and Abundance of Wild Fauna and Livestock in Baltal-Thajwas Wildlife Sanctuary, Kashmir Himalaya

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## Abstract

Habitat destruction is one of the significant causes of biodiversity loss around the globe. Conservation of wildlife and its habitat thus demands serious attention through robust protected area (PA) network. Efficient management of PAs plays a key role towards achieving this goal. Baltal-Thajwas Wildlife Sanctuary (WLS) located in the Kashmir Himalaya represents one such PA that lacks proper documentation and management of its faunal diversity and habitats. This study presents an overview of the distribution and abundance of wild fauna and livestock in the area. Our results validate the ecological significance of the area in terms of its faunal assemblage and biogeography. Besides documenting seven species of global conservation significance, the study provides the evidence for landscape connectivity and species movement across the adjacent Trans-Himalayan region. We also observed overstocking, livestock depredation, increasing number of permanent *Yatri* camps, and nomadic human settlements in the area, and evidence of their negative impact on wild ungulate space use. These issues could hinder conservation efforts in the area. The information generated through this study will help preparing an efficient management action plan necessary for the protection, conservation, and management of this unique landscape and its inhabiting rich fauna.

**Keywords:** Faunal diversity, habitat loss, Kashmir Himalaya, overstocking, wildlife management

## Introduction

Incessant decline and loss of biodiversity is one of the world's most pressing crises (Butchart *et al.,* 2010; Johnson *et al.,* 2017). Besides climate change, overexploitation of natural resources, invasive species, poaching, infrastructure development, and wildlife diseases (Parmesan, 1996; Xu *et al.,* 2009; Kaeslin *et al.,* 2012; Maxwell *et al.,* 2016), habitat destruction has been recognized as one of the most significant drivers of global biodiversity loss (Ceballos *et al.,* 2015; Segan *et al.,* 2016). Considering the relentless loss

of wildlife habitats worldwide (Brooks *et al.,* 2002), a robust and efficiently managed global PA network is mandatory to ensure the preservation of earth's rich natural heritage. India represents one of the 17 mega-diverse countries (Williams, 2001; Dar and Khuroo, 2020), but ranks much lower in terms of its protected area coverage (5.02%) compared to its total geographical area (UNEP-WCMC and IUCN, 2021). The Himalaya on the other hand though representing a global biodiversity hotspot (Zachos and Habel, 2011), is not much different in terms of its land area under protection. Kashmir Himalaya situated in the north-western extremity of the Himalayan range holds a special position in this natural arrangement not only because of the panoramic splendor but also due to its affluent biodiversity (Mani, 1974; Rodgers *et al.,* 2000; Dar and Khuroo, 2020). Positioned at the junction of the Eurasian and Palaeotropical bio-realms, the region is endowed with swarming floral and faunal diversity (Mani, 1974; Dar *et al.,* 2001), providing refuge to approximately half of the biodiversity found in the Indian Himalaya (Dar and Khuroo, 2020). It also represents a unique bio-region primarily owing to its complex topography and habitat heterogeneity along a wide elevational gradient (Dar *et al.,* 2001; Husain, 2001), and thereby offers an array of wildlife habitats. This landscape (including trans-Himalaya) encompasses a total of 54 PAs including five National Parks (NP), 14 Wildlife Sanctuaries and 34 Wildlife Conservation Reserves (WCR). Inspite of having a decent PA network large portions of wildlife habitat still remain unexplored in this region (Sathyakumar and Bashir, 2013; Pal *et al.,* 2016). The situation is illustrated from the fact that quite a good number of notified PAs in the region still lack a working management plan. An evident reason is the lack of scientific documentation of the inhabiting biodiversity and improper assessment of the prevailing threats to the species and their habitats at the local level. Baltal-Thajwas WLS represents one such PA in the Kashmir Himalaya for which a comprehensive management plan is yet to be drafted since its notification in 1987. Since, designing an efficient management plan for an area requires reliable ecological information engendered through standard scientific approach (Hannah *et al.,* 2007), assuming it as a matter of urgent priority, we conducted multiple surveys to generate baseline information on the distribution and abundance of the megafauna and livestock in Baltal-Thajwas WLS as an important step towards achieving this goal.

**Study area**

Baltal-Thajwas WLS lies in the Zanskar mountain range of the North-West Himalayan Biogeographical zone of India (Rodgers *et al.,* 2000). Located between 34°37' N and 74°36' E in the Ganderbal district of J&K, it encompasses the famous Thajwas Glassier and remains flanked by large snow laden peaks of 'Sonamarg'. It covers an area of 219.2 km² with an altitudinal range of 2,579 to 5,385 m (**Figure 1**). The sanctuary also encompasses the Baltal Amarnath Trekking route that leads to the famous *Hindu* pilgrimage (*Yatra*) destination "Shri Amarnath Cave Temple" located in Pahalgam, Anantnag, J&K. The

topography of the area is mostly hilly with broken rocky cliffs. The area experiences an irregular temperate climate with moderate temperature during summer and very low temperature during winter. The major part of precipitation is during winter mainly in the form of snow (Husain, 2001), while the average annual rainfall varies from 43 mm (summer) to 142 mm (early spring).

**Methodology**

Reconnaissance surveys were carried out during August, 2014. This included sign surveys and trail monitoring during which sampling was done mainly along natural trails inside the WLS. During the reconnaissance surveys, five different sampling trails with varrying lengths (4-8 km) were identified and marked for intensive sampling. Later in October, 2014 a rigorous sampling exercise was carried out during which each trail was sampled repeatedly. In order to acquire maximum possible coverage of the area, surveys were done in two teams each visiting different parts of the sanctuary, thereby increasing the sampling effort. Same sampling protocol was followed by both the teams which included walking along natural trails, ridges and *nullahs* (Chundawat, 1992). The main aim of the intensive sampling was to document the presence of megafauna (mammals and birds), and livestock, and to record threats to their habitat. The occurrence locations of species encountered, livestock grazing and nomadic human settlements, and permanent *Yatri* camp sites were plotted on the map of the area to get an overview of their distribution and land use with respect to the WLS boundary. We also calculated the encounter rates (number/km walk) of signs/sightings of the megafauna encountered as a measure of their relative abundance in the area. The overall sampling covered *Sarbal, Baltal, Dumeel, Rail pathri, Mangi kottha, Bradimarg, Phyangdu, Sangam, Kala Mata, Rainur, Zojilla phadd, Pohal pathri, Naye,* and *Ranga doori* areas, respectively.

**Results**

We report the occurrence of 10 species of charismatic wild fauna in the study area primarily through direct sightings, and indirect evidences (scats, pellet groups, tracks, scrapes; **Table 1**). Among these, seven species were of global conservation significance, categorized as critically endangered (1), endangered (1), vulnerable (2) and near threatened (3) on the IUCN Red list of threatened species (IUCN, 2020). All the recorded species typically belonged to the high altitude fauna including few with Trans-Himalayan characteristics such as the Himalayan brown bear (*Ursus arctos isabellinus)*, Himalaya ibex (*Capra sibrica)*, Himalayan marmot *Marmota himalayana*, and Himalayan snowcock *Tetraogallus himalayensis*. Species occurrence increased with increasing elevation, and maximum incidence was observed in the elevation range of 3,250 to 3,750 m (**Figure 2**). The occurrence and distribution of recorded wildlife species, livestock, nomadic human settlements and permanent *Yatri* camps along the elevation range is described in **Figures 3**

**& 4**, respectively. While comparing the relative abundance of wild fauna, highest encounter rate was observed for Himalayan marmot (0.456 ± 0.179/km walk) and the lowest for snow leopard (0.026 ± 0.019/km walk). Snow leopard occurrence was however recorded only through tracks and pugmarks at higher elevations. The overall trend in species encounter rate was as marmot>red fox>brown bear>ibex>Himalayan vulture>bearded vulture>musk deer>black bear>snowcock>snow leopard, respectively (**Figure 5**). Livestock in the area mainly comprised of goat and sheep, horses and cattle, however presence of guard dogs was also observed during sampling (**Table 1**). Moreover, livestock grazing, and occurrence of nomadic human settlements and permanent *Yatri* camps were primarily recorded from *Mali, Sarbal, Rail pathri, Mangi kottha, Happat gund, Baltal-dumail, Thajwas, Bradimarg Top,* and *Kala Mata* areas of the WLS.

**Table 1: Encounter rates (meant ± standard error) of animal sightings and signs and their elevation range recorded during sampling in the Baltal-Thajwas WLS.**

| Species | IUCN status | Evidence | Mean | (±) SE | Altitude (m) |
|---|---|---|---|---|---|
| ***Wild fauna*** | | | | | |
| Himalayan brown bear | CR | S, SC, TR | 0.229 | 0.104 | 3160-3725 |
| Asiatic black bear | VU | SC, TR | 0.075 | 0.027 | 2986-3329 |
| Snow leopard | VU | TR | 0.026 | 0.019 | 3760-3769 |
| Red fox | LC | S, SC, TR | 0.259 | 0.048 | 3019-3751 |
| Himalayan ibex | NT | S, PT | 0.150 | 0.059 | 3744-3770 |
| Musk deer | EN | PT, TR | 0.079 | 0.027 | 3138-3725 |
| Himalayan marmot | LC | S, SC, BU | 0.456 | 0.179 | 3484-3757 |
| Himalayan snowcock | LC | S | 0.050 | 0.027 | 3620-3725 |
| Himalayan vulture | NT | S | 0.145 | 0.062 | 3017-3704 |
| Bearded vulture | NT | S | 0.082 | 0.030 | 3057-3751 |
| ***Livestock*** | | | | | |
| Horse | - | S, DG | 4.432 | 1.590 | 2652-3587 |
| Goat/Sheep | - | S, DG | 38.616 | 20.063 | 2684-3728 |
| Cattle | - | S | 2.000 | 0.985 | 2710-2758 |
| Guard dog | - | S | 0.710 | 0.322 | 2684-3533 |

[*] CR = critically endangered, EN = endangered, VU = vulnerable, NT = near threatened, LC = least concern

[#] S = sighting, SC = scat, TR = track, PT = pellet, BU = burrow, DG = dung

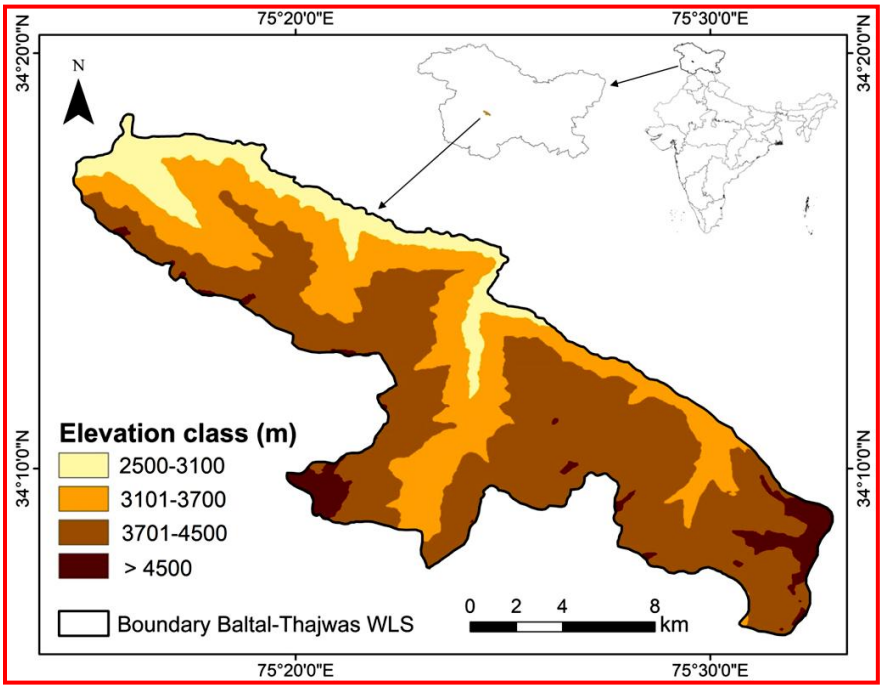


**Figure 1: Location of Baltal-Thajwas WLS and different elevation classes in the area.**

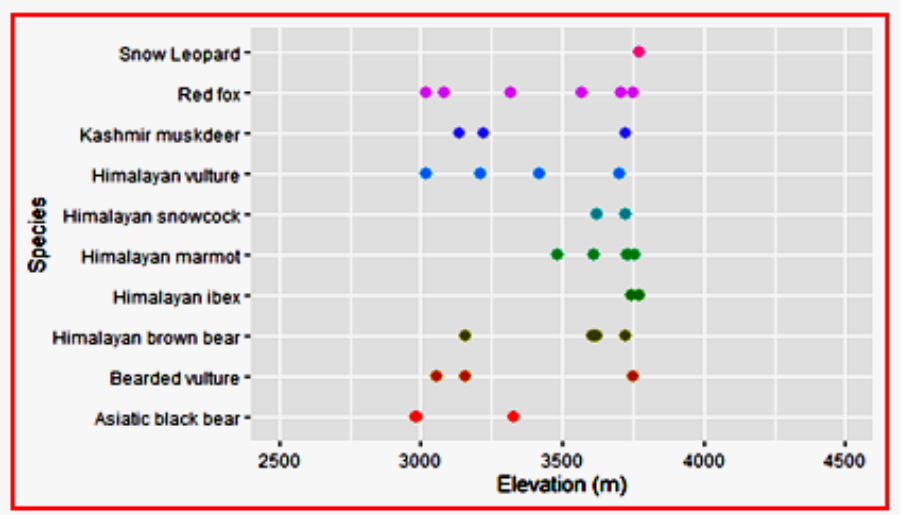


**Figure 2: Species distribution along the elevation gradient in Baltal-Thajwas WLS.**

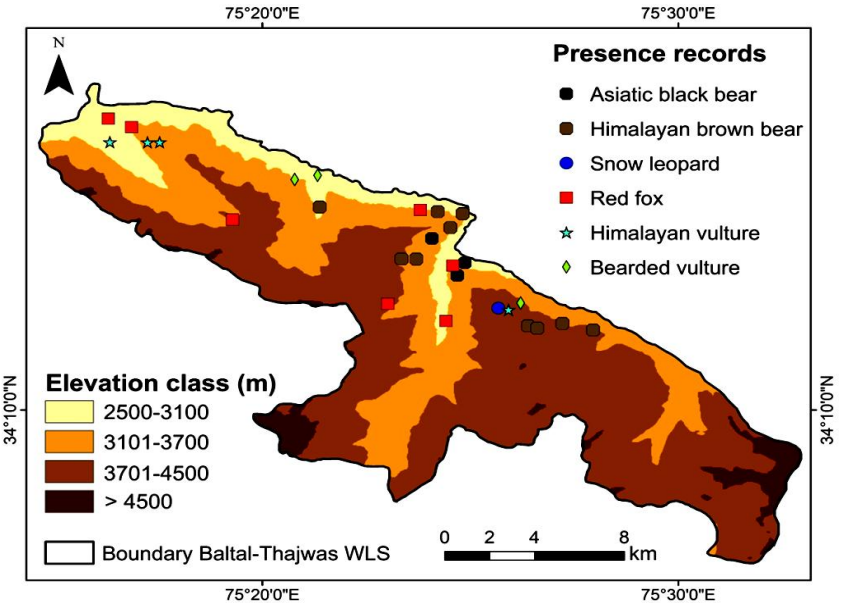


**Figure 3: Occurrence and distribution of carnivores and raptors along the elevation gradient in Baltal-Thajwas WLS.**

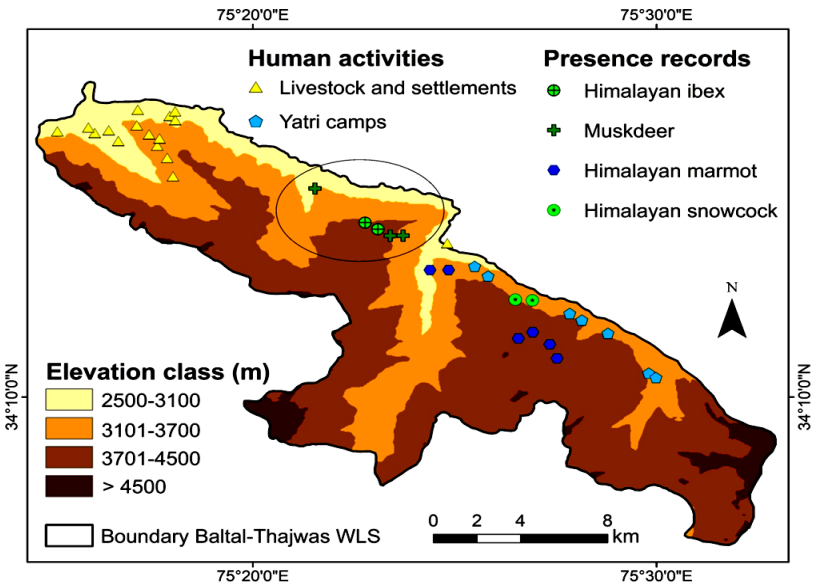


**Figure 4: Occurrence and distribution of herbivores with respect to livestock, human settlements and *Yatri* camp sites in Baltal-Thajwas WLS.**

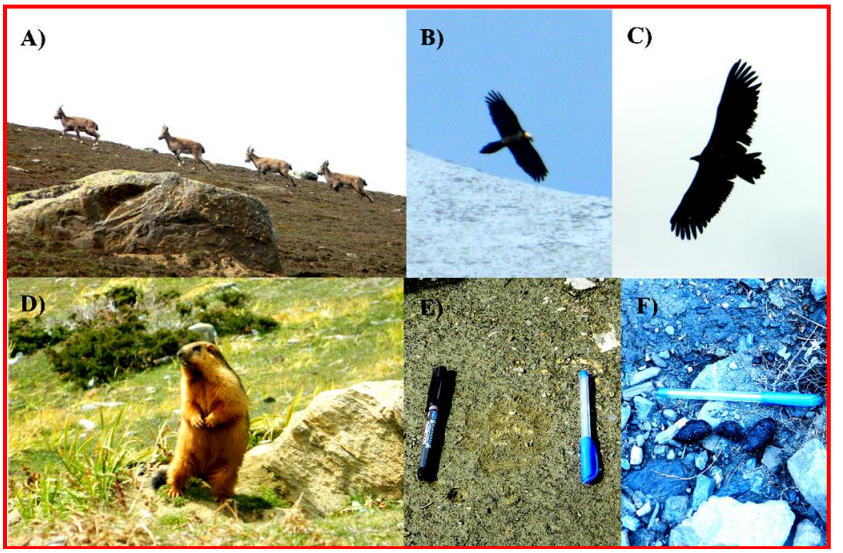


**Figure 5: Photographic evidence of species presence through sightings and signs A) Himalayan ibex, B) Bearded vulture, C) Himalayan vulture, D) Himalayan marmot, E) Snow leopard pugmark/track, and F) Red fox scat recorded in Baltal-Thajwas WLS.**


**Figure 6: Photographic evidence of anthropogenic activities A) nomadic human settlements, B) livestock grazing, C) livestock depredation by carnivores, and D) firewood collection by herders inside the Baltal-Thajwas WLS.**

**Discussion**

The minimum requisite information for effective management of wildlife and its habitat within protected areas includes knowing what species are present, their distribution within the area, and their relative abundance across different habitat types (Sheng *et al.*, 2010). Detection of seven vertebrate species of global conservation importance within a small protected area recorded during a short sampling period validates the ecological significance of this WLS in terms of its faunal assemblage as well as its biogeography. The occurrence of Trans-Himalayan transient species in the area also demonstrates landscape connectivity and movement of species from the higher reaches of Kargil and Ladakh potentially through the *Zojilla* pass. Although, the altitudinal distribution of species showed maximum occurrence at higher elevation in the study area, a comprehensive sampling effort covering the entire elevation range of the study area is further required to draw meaningful ecological inference on the species distribution. But, based on the occurrence records of species, livestock, nomadic human settlements and permanent *Yatri* camp sites observed during this short study, some sort of spatial segregation by wild ungulates could be observed with respect to livestock and nomadic human settlements, and permanent *Yatri* camp sites in the area (**Figure 4**). This provides preliminary evidence for the negative impact of anthropogenic factors on the space use of wild ungulates in the area. However, no such difference in the overall space use was observed among other groups of animals with respect to human induced activities. Although, the indices of relative abundance of species seem to have a reliable trend while considering their overall ecological and biogeographical patterns (i.e. red fox being generalist and common; musk deer being cryptic and rare; marmots being habitat specific and abundant), accurate assessment of their abundance and density using spatially explicit sampling techniques is needed to know their population size in the area.

From the management perspective, we noticed certain issues that could hinder conservation action in the area. Escalating pressure on the natural habitat due to overstocking, continuous expansion of nomadic human settlements and herders to higher elevations, phase-wise establishment of transient *Yatri* camps at shorter distances, livestock depredation by carnivores, and excessive collection of Non-timber forest products (NTFP) by nomadic and semi-nomadic herders particularly during the summer season are few concerns that demand serious attention (**Figure 6**). Further, while trying to understand the patterns of livestock holding by herders at different elevations and habitats, we observed maximum number of sheep and goat in the alpine scrub forest. These areas serve as excellent grazing grounds for wild ungulates at higher elevations. But presumed to be the potential sites for Yatri camps, these areas remain flooded by humans and livestocks during summer thereby degrading the prime habitat of the wild animals (Bashir and Ahmad, 2019).

Since, an efficiently managed wildlife protected area demonstrates the sensitivity and will of all the stakeholders towards wildlife conservation. For Baltal-Thajwas WLS, immediate attention and action is required from the government, managers as well as local people to safe guard this unique and rich biodiversity zone having huge significance even beyond its boundaries. As it harbors important wildlife species and crucial wildlife corridors to the Sindh forest Division in the Zanskar Range, Kashmir forest Division, upper Dachigam NP, and the adjacent forests of Overa and Aru WLS (Suhail, 2000; Naqash and Sharma, 2011), efficient protection and management is essentially needed to safeguard its rich natural heritage. Due to its unique biogeographic position adequate management interventions could further benefit the conservation of this entire landscape. Based on this preliminary assessment we recognized a huge scope for comprehensive research on various ecological and management aspects. We therefore, recommend long-term research and monitoring in the area to ensure proper protection and conservation of this unique landscape through efficient management action.

**Note:** Based on this report and other similar assessments, the Department of Wildlife (J&K) has drafted a comprehensive Management Plan for thr Sanctuary that will be released very soon.

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