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Occurrence and population Estimates of Himalayan Ibex (*Capra Ibex Sibirica*) in Chitral district, Pakistan

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Abstract

The current study investigated the distribution and population of Himalayan Ibex (*Capra Ibex sibirica*) in the Chitral area of Khyber Pakhtunkhwa. The distribution of the species was determined by conducting field surveys of the study area fortnightly from September 2017 to March 2018. Direct and indirect signs of the species were searched at different sampling sites. The population of the species was estimated by using the "Vantage Point Count" method. The results revealed the occurrence of Himalayan Ibex at only two sampling sites in the study area, where field sightings, and faecal pellets of the species, were recorded. The study concludes that there is a low population of Himalayan Ibex in the study area, where a total of 51 individuals of the species were counted at two sites including 23 individuals at Jubistal site and 28 at the Rorigal Pasteur site. The study recommends investigating the causes of this low population and taking measures to increase the population of Himalayan Ibex.

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Introduction

Himalayan Ibex (*Capra Ibex sibirica*) is a member of the family Caprinae and is a common ungulate in the northern region of Pakistan (Schaller, 1977; Hess *et al.*, 1997; Anonymous, 1998). It is closely similar to wild goat (*Capra falconeri*) and inhabits mountains at a higher elevation (Khan, 2010). It lives in a precipitous landscape where it needs power but not speed. For that reason, it holds stocky legs with tough forelimbs to climb and jump along with rocks (Schaller, 1977). Its quickness on steep terrain makes it hardly ever susceptible to attack from a wolf (*Canis lupus*); however, its primary predator is the snow leopard (*Panthera uncia*). Himalayan Ibex is closely associated with the presence of rough, precipitous terrain (Dzieciolowski *et al.,* 1980, Fox *et al.,* 1992) although it may move further from escape terrain during the early morning and evening feeding bouts.

The Himalayan Ibex is distributed in many countries of Asia including Pakistan (Reading and Shank, 2008; Xu *et al.,* 2012), Afghanistan (Heptner *et al.,* 1966; Habibi, 1997), where it is reported from northern areas of Pakistan (Reading and Shank, 2008; Li *et al.,* 2015). It also inhabits Karakoram, Himalayas and Trans-Himalayan regions of Jammu and Kashmir (Fox and Johnsingh, 1997).

In Pakistan, the Himalayan Ibex (*Capra Ibex sibirica*) is found in arid mountains of the inner Himalayas, Hindu Kush, and the Karakoram. Its habitat extends from a rough landscape of the alpine region in Gilgit-Baltistan as well as Ghizer and Baltistan districts and some parts of Khyber-Pakhtunkhwa comprising of Chitral, Dir, Swat, Kohistan and Mansehra districts (Roberts, 1997; Ali, 2008). The species shares its distribution range with other mountain ungulates, including Laddakh Urial (*Ovis vignei vignei*) and markhor (*Capra falconeri cashmiriensis* and *C.f. falconeri*) in lower parts of its western distribution.

The territory occupied by Ibex generally has 'Alpine scrub' (Champion and Seth, 1968) or dry alpine prairieland vegetation (Schweinfurth, 1957). Such areas are characterized by scattered and open bush-land mainly with herbaceous and shrub species. Furthermore, in such areas, the production of annual biomass is comparatively low during summer, therefore, Ibex seasonally ventures into thinly forested slopes in lower parts of their range, as in northern Pakistan (Schaller, 1977) and Central Asia (Heptner *et al.,* 1966).

In the Himalayan region, the Siberian Ibex consumes more than forty plant species (Awasth *et al.,* 2003). The forage consumed by Himalayan Ibex also supplies a considerable amount of water and depending on this water; it can go for multiple days when water is not available (Fedosenko and Blank, 1982).

The major threats to Himalayan Ibex in its range include poaching stress and foraging competition with livestock, however, its distribution in Pakistan is wide-ranged and its population status is satisfactory (Nawaz *et. al.*, 2009). The Himalayan Ibex is classified as “Least Concern” worldwide (IUCN, 2019) as well as in Pakistan (Sheikh and Molur, 2004), but it is a significant herbivore in an ecosystem. Various studies have shown that this species faces interspecific competition with domestic livestock in the Himalayan rangelands. Although the species is reported from different parts of the Chitral (Din and Nawaz, 2008) however, scientific ecological data are lacking from Ustoi, Gangarwat, Chimirsan Pasteur, Jubistal and Rorigal Pasteur in the Chitral District. Therefore, the current study aimed at determining its distribution and estimating its population in the selected sites of the study area.

Materials and methods

Study area

The current study was carried out in five selected sampling sites (Ustoi, Gangarwat, Chimirsan Pastuer, Jubistal and Rorigal Pasteur in the Chitral District) of Khyber-Pakhtunkhwa province, Pakistan (Fig. 1). The study district is famous for having populations of endangered Kashmir Markhor and Snow leopard. The topography is generally steep to very steep (>45^{o}) and elevation varies from 1500-4950 m above mean sea

level. The climate is dry, characterized by hot summers in lower areas and cold summers at upper elevations. The mean annual temperature is 16°C while the mean annual precipitation is 445 mm (Ali, 2008). However, the annual precipitation is low (200 mm) in the upper Chitral area and it is mostly received as snow at higher elevations (NWFP and IUCN-P, 2004).

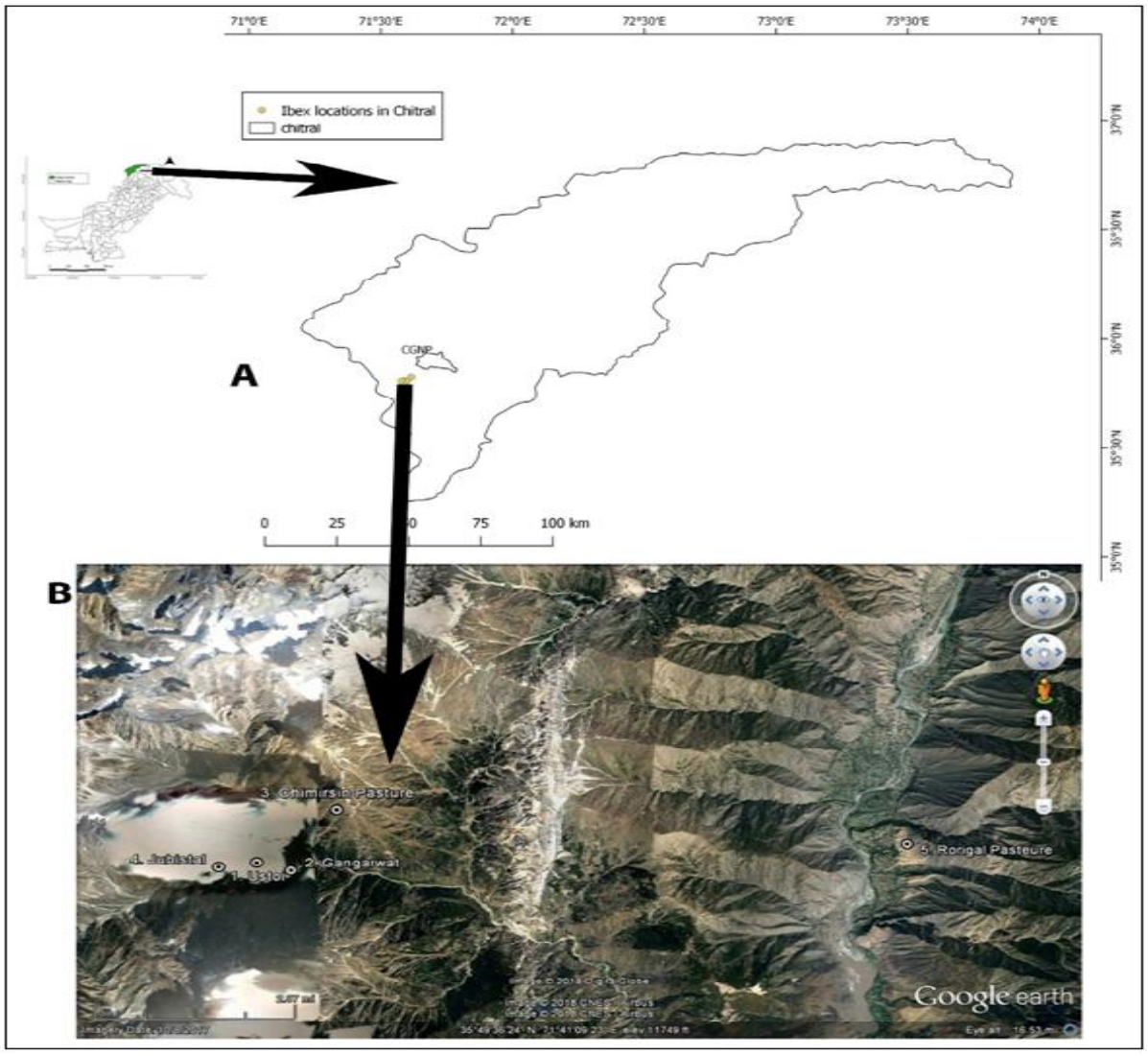

Fig. 1. A) Map of Pakistan showing the location of Chitral District **B)** Google Earth map showing locations where the Himalayan Ibex were field sighted.

Field surveys

Fortnightly surveys were conducted in October 2017 and continued up to March 2018 at different elevations, during which a total of seven field visits were made. During surveys, direct and indirect signs of the species were recorded such as "faecal pellets", and "footmarks" to confirm its occurrence in the study area (Table 1). Geographical coordinates of locations found positive for the occurrence of the signs of the ungulate species were recorded using Geographical Positioning System (GPS, Garmin eTrex Vista) device. Besides, direct field observations of the species were made in the early morning and late in the evening, using binoculars and a spotting scope. A digital camera was used to photograph the Himalayan Ibex in the field when sighted.

Population estimates

For population estimation of the species, fixed Point Count Method following Zaccaroni *et al.* (2018), was used. Animals were scanned from a high "Vantage point" along ridgelines, both in the morning and late

in the afternoon or evening when they usually feed. The vantage points, where the Ibex individuals were sighted and counted from, were open areas with considerable elevation, also having nearby water sources (Fig. 1B). The selection of vantage points was made, keeping in mind the fact that the observation point (Ibex individuals) must be visible to the observer. In this study, the observation points (Himalayan Ibex) were in front of the vantage points. Hence it was easy to observe and count the animals. The animals were counted by the naked eye as well as by using binoculars. The counting was done carefully so that the animal must not be counted twice. The vegetation of the vantage points consisted of grasses and other stunted growth shrubs.

Results

The occurrence of Himalayan Ibex

Among all five sampling sites surveyed, the Himalayan Ibex was found to occur at only two sites (Jubistal and Rorigal Pasture) sites in the study area. Direct sightings of Himalayan Ibex were made at two different sampling sites; Jubistal and Rorigal Pasture of Rumboor valley (Fig. 1). The indirect signs of Himalayan Ibex recorded included its "fecal pellets" at positive sampling sites, although some tree scratches and soil diggings were also found in a few places.

Table 1. Details of sampling sites selected in Chitral District for data collection about Himalayan Ibex occurrence and Population estimates.

Sr. no.	Sampling sites	Area surveyed	Geographical coordinates	Elevation (m)	General habitat features
1	Ustoi	3 km²	N 35.80858 E 71.588927	3124	Dominant herbs and grass: *Bergenia, Festusa*
2	Gangarwat	1 km²	N 35.806138 E 71.598857	2823	Dominant trees: *Juniperus*, *Quercus ilex*
3	Chimirsan Pasteur	2 km²	N 35.824647 E 71.615500	3139	Dominant tree: *Salix* and grasses
4	Jubistal	2 km²	N 35. 807388 E 71. 578218	3055	Dominant tree: *Prunus cubernea, Quercus ilex*
5	Rorigal Pasteur	2 km²	N 35.813602 E 71.789575	3026	Dominant plant: *Fraxinus*

Maximum signs of Himalayan Ibex were recorded on the northeastern aspect of the sampling sites compared to southern, northwestern and eastern aspects. It could be because the northeastern aspects have got more variety of vegetation while southern, northwestern and eastern aspects contain less dense vegetation, fewer water sources, and high disturbance areas. Thus, the Himalayan Ibex preferred the Northeastern aspect of the NP for feeding and denning. The general characteristics of the habitat of the NP where the Himalayan Ibex were found included vegetation that was mostly in stunted form, dominated by grasses, herbs, and bushes such as, *Bergenia, Poa, Festusa, Spiraea, Primula, Berberis, Polygonum spp.* and stunted willows (*Salix species*). Trees and bushes with stunted growth were found in the lower part of Jubistal and Rorigal Pasture. Among trees like the *Juniperus excelsa, Fraxinus xanthoxyloides, Quercus baloot, Salix spp., Betula utilis* stands on the northern aspects and gorges were prominent. The area consisted of various water sources (springs, lakes) important for the Himalayan Ibex occurring there.

Population estimates

The individuals of Himalayan Ibex, field observed and counted from "Vantage Points" were in the form of herds during the time of observations (Fig. 2). The observations were recorded during December 2017, which is the rutting season. In this season the animals are easy to field observe and count. Out of a total of five sampling sites, the Ibex were recorded at two

sites only viz., Jubistal and Rorigal Pasture of Rumboor valley (Table 2). At Sampling site 1 (Jubistal site; 3124 m asl), 23 individuals of Himalayan Ibex were recorded while at the second sampling site (Rorigal Pasture; 2823 m asl), 28 individuals were field observed, giving a total population of N= 51 Ibex in the study area.

This is important to mention that Himalayan Ibex were observed living on the cliffs or slopes.

Table 2. Population estimates of the Himalayan Ibex at selected sampling sites in the Chitral district.

Site no.	Site name	Geographical coordinates	Elevation (m)	Area surveyed	Ibex sighted (N)	Ibex density (per km²)
1	Jubistal	N 35. 807388^0 E 71. 578218^0	3124	2 km²	23	11.5
2	Rorigal Pasteur	N 35. 813602^0 E 71. 789575^0	2823	2 km²	28	14.0
3	Ustoi	N 35.808582^0 E 71.588927^0	3139	3 km²	0	0
4	Chimirsan Pasteur	N 35.824647^0 E 71.615500^0	3055	2 km²	0	0
5	Gangarwat	N 35.806138^0 E 71.598857^0	3026	1 km²	0	0
	Total			10	51	mean density 5.1

Discussion

Diverse habitat and rich faunal diversity make the northern parts of Pakistan famous and valuable (Virk *et al.,* 2003) in the context of biodiversity resources. The large mammalian fauna of the northern region includes Himalayan lynx *Lynx lynx isabellina*, Himalayan Ibex, snow leopard, common leopard *Panthera pardus* and markhor. Despite competition with livestock for forage as well as continuous hunting pressure, Himalayan Ibex is categorized as a "Least Concern" species internationally as well as in Pakistan (Sheikh and Molur, 2004; Nawaz *et al.,* 2009). Its quickness on steep terrain makes it hardly ever susceptible to attack from the grey wolf (*Canis lupus*); however, its primary predator is the snow leopard (Dzieciolowski *et al.,* 1980, Fox *et al.,* 1992). It may move further from escape terrain during early morning and evening feeding bouts. Snow cover can be a problem for Himalayan Ibex. They usually limit their movements and become restricted to specific areas when heavy snowfalls if adequate forage is available. Movements are confined to steep areas where wind and insulation allow for variable snow depth (Fox *et al.,* 1992). In the current study, we investigated its occurrence in different areas of CGNP, and also estimated its population in the study area, to develop a strategy for its conservation. We recorded Himalayan Ibex at only two sampling sites in the study area at an elevational range between 2823 m and 3124 m. The other three sampling sites surveyed were although at a similar elevational range (3026 m to 3139 m) did not show any sign of occurrence of this species, so the Himalayan Ibex is limited to only two sampling sites within approximately 4 km² area. No earlier studies are available from CGNP regarding the occurrence and population estimates of this species. However, other published studies have reported that the Himalayan Ibex is distributed in Pakistan where it inhabits Karakoram, Himalayas and Trans-Himalayan regions of Jammu and Kashmir (Fox and Johnsingh, 1997). The range of the Himalayan Ibex is shared with other mountain ungulates, it overlaps with that of Laddakh Urial and markhor in lower parts of its western distribution. It inhabits along with Marco polo sheep in the Karakorum Range (Roberts, 1977, Schaller, 1977). Furthermore, its range is overlapped with different argali sub-species like blue sheep or bharal in the west, south-west and northern periphery of the Tibetan plateau (Schaller *et al.,* 1987, Mallon, 1991

and Fox *et al.,* 1992). In the current study, the Himalayan Ibex were observed inhabiting the steep cliffs or slopes, indicating that barren mountains and cliffs' texture probably provide perfect camouflage to them against their predators and make it hard to observe them except at close encounters. Earlier on Sobanskiy (1988) and Fedosenko and Blank (2001) had reported that Himalayan Ibex mostly inhabits steep mountains from 5000-6,700 m above sea level (asl) and open alpine grazing lands and cliffs. When the winter season starts, it moves to the lower parts of its habitat due to heavy snowfall.

Fig. 2. Field photograph showing a herd of the Himalayan Ibex at sampling site "Jubistal" in the Chitral Gol National Park.

The population of the Himalayan Ibex was found limited to only two sampling sites, where a total of only 51 individuals of Ibex were counted. This shows a low population of the species in the NP. No previous study estimates are available from this NP for comparison or population trend of the species. A few earlier published population estimates of Himalayan Ibex include Hameed (2010) who reported 174 Ibex in various parts of Chitral district (Pakistan); among those are 73 in Bashqar Gol, 29 in Shachu Gol, 30 in Phagram Gol, 11 in Reshun Gol and 31 in Shandur area that connects Ghizer district of Gilgit Baltistan and Chitral district of Khyber Pakhtunkhwa. Ali *et al.* (2008) estimated 122 individuals of the Himalayan Ibex in Upper Neelum Valley (Azad Jammu & Kashmir, Pakistan). Din and Nawaz (2008) counted a total of 429 Ibex in the whole District of Chitral (Pakistan) with 184 in Ujnu Gol, 128 in Zewar Gol and 117 in Sha Junali. In comparison with the published results, the findings of the current study are important since these add to the already estimated population of Himalayan Ibex in other parts of Chitral District but not from the current study locations. Khyber Pakhtunkhwa Forest Department in 1992 reported 2,545 animals in the whole province of Khyber Pakhtunkhwa.

Conclusion

The study concludes that there is a low population of Himalayan Ibex in the study area, where a total of 51 individuals of the species were counted at two sites including 23 individuals at Jubistal site and 28 at the

Rorigal Pasteur site, while the other three sites surveyed were found negative regarding the occurrence of the species. The study recommends investigating the causes of this low population and taking measures to increase the population of the Himalayan Ibex.

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Declaration of interests

All authors declare that there is no conflict of interest.

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