Habitat Characteristics and Preference of Himalayan Ibex (*Capra ibex sibrica*) in Hushe Valley in Central Karakorum National Park, Pakistan

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ABSTRACT

Himalayan ibex *(Capra ibex sibirica)* is a subspecies of *Capra ibex*, and is evenly distributed throughout the upper comparatively dry mountains of Gilgit-Baltistan, Pakistan. It is categorized as a *Least Concern* species globally as well as in Pakistan, however its presence in the Karakorum mountain plays a significant role in the economy of the region as dozens of trophy hunting of this specie takes place in the region every year and generates handsome money to the local inhabitants of the mountainous community. The characteristic habitat analysis and preference was important as the ibex move downwards during winter to cope the fodder shortage after heavy snowfall. This may expose the ibex to potential threats of predation by predators, poaching and competition for food with livestock during winter season. Therefore, the study was conducted to analyze the characteristic habitat feature and preference of Himalayan ibex during winter season in Hushe valley of Karakorum range.

INTRODUCTION

In Pakistan Himalayan ibex *Capra ibex sibirica* is the most abundant species of Caprinae in Pakistan (Schaller, 1977). It is limited to relatively dry peaks of the inner Himalayas, Karakoram, and Hindu Kush. Ibexes are equally widespread throughout higher mountain ranges of the Gilgit, Diamir, and Baltistan districts, and the northern part of the Chitral District.

The ibex predominantly inhabits mountainous regions from 5000-6,700 masl in rocky terrain and open alpine meadows and cliffs, comes down to lower elevations during the winter (Fedosenko and Blank, 2001). On a hot day prefers shaded areas, and the ibex tends to remain near steep, escape terrain (Fedosenko and Blank, 2001). Usually ibex live in herds of over 100 animals, but more typically forming small groups that vary considerably in size, averaging 6-30 animals, depending on the region (Reading *et al*., 1997, 1999, 2007, 2008; Fedosenko and Blank, 2001).

At day time, they spend the day in alternating periods of activity and rest. Himalayan ibex do not go too far away from cliffs, which serve as protection (Fedosenko and Blank, 2001). The cliff provides shelter during warm periods in the summer and during bad weather in the winter (Fedosenko and Savinov, 1983). Himalaya ibex live in a complex landscape, which apart from rugged mountains; comprises of alpine meadows for grazing, streams for watering, and level areas with scree between rocks for resting. They could stay on slightly sloping grassy areas for long periods or even incline to wet meadows for grazing and prefer steppe vegetation, firm soil, and areas with less snow cover during winter (Zavatskiy, 1990).

The distribution and number of Himalayan ibex depends on the availability of sizeable rocky areas and lack of deep snow. They avoid thick coniferous taiga tall grass, gentle slope and damp swampy areas (Sokolov, 1959). In the distribution of Himalayan ibex, depth of snow cover is an important factor and sometimes it is the only reason of their absence in some surrounding areas and mountains. Population density rises from the border towards the inner parts of mountains because of a decrease in snow level inside the interior parts. The species shows loyalty to their home range; animals troubled by predators coming back

to their home place within some days. But, snow cover and lack of food in snowy areas forces them to seasonally change their home ranges or even migrate (Fedosenko and Savino, 1983). They move from the upper rocky zone to lower elevation during autumn, (Sobanskiy, 1988). In winter season they migrate from one mountain range to other sometimes and in so doing have been seen crossing valleys below 2135 m altitude (Roberts, 1977).

Anthropogenic activities in combination with livestock grazing have changed the numbers, distribution, and movements of ibexes. They were enforced to the steppes, flood lands and forest-steppes, to less favorable parts of the mountains (rocks, rocky deserts, and mountain tundra). The natural habitat was broken for numerous populations (Fil, 1977; Smirnov and Tkachenko, 1992).

In Hushe Valley, due to strict conservation efforts of local communities during the last one and half decades, the population of ibex is also expected to increase in combination with the livestock population, due to which there might be high pressure on rangeland of the valley especially during winter when ibex comes down in search of food. This study therefore intends to analyze the habitat characteristics and their preference in the Karakorum range of the valley.

MATERIALS AND METHODS

The study was conducted in the winter season from 15 November 2012 to15 February 2013 (Fig. 1). The duration of the study period was constrained by the remoteness and inaccessibility of the study area. Two permanent transects, one 7 km in length upstream from Hushe village (centre point) to Dumsum Junction and the second 5 km long downstream from Hushe village (centre point) to Hushe bridge, were established along the Hushe river. Twelve major locations and three vantage points on each location were identified based on abundance of ibex population. Each trail was walked nine to ten times during the whole study period. Each time, observations while walking were made at all three vantage points of twelve locations. The total of 28 observations on average were taken. The Field observations were aided by 8x40mm binoculars and a 15-45X spotting scope (1.2). When a group of animals was encountered, the location, time, date, species, number and habitat characteristics such as distance to the cliff, slope angle, elevation, and snow cover % were recorded in the designed format. The association of ibex with respect to habitat characteristics was calculated by taking the number of observations out of total 28 observations. All habitat variables were visually estimated except location and elevation, which was determined by using a Global Positioning System (GPS), model E Trex 30. For

estimating the proportions of available habitat, Google Earth Pro was used to find out the total estimated covered area of the ibex habitat, with the help of GIS experts at the WWF office in Gilgit. The whole valley was sampled for the study of biomass cover and productivity in another study by the author; therefore, the habitat characteristics were easily noted during the survey in winter (Raza *et al.*, 2014). The total area was estimated as 172 km^2 with Google Earth Pro.
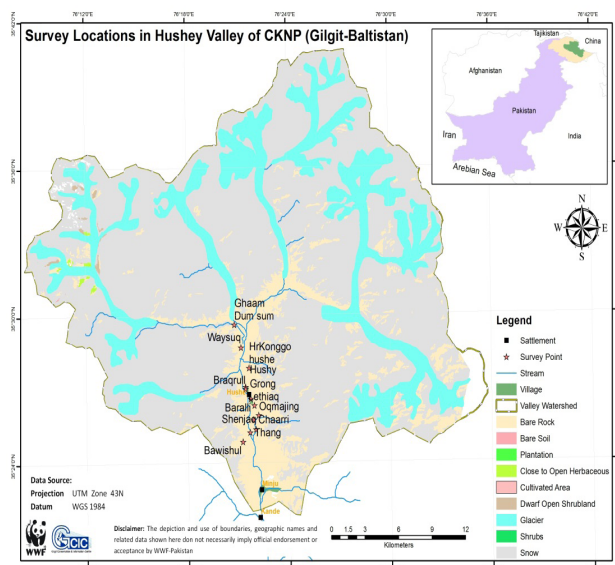

Fig. 1. Survey locations of Himalayan ibex in Hushe Valley during 2013.

Fig. 2. Observing habitat of ibex in winter Hushe Valley 2013.

RESULTS

In 25% observations, ibex was found on slopes with partial snow cover, followed by 21% on cliffs and in 14% observations the ibex were found on areas fully covered with snow. Only 2% of the observations were on scree and barren areas. There was a significant difference in use of different habitat types (Table I). Ibex showed a preference for

Table I. Distribution of ibex with respect to habitat types during winter 2012-13.

Habitat type	Number of observations	Percent observation	χ^2	df	P value
Cliff/Rocks	6	21.43	5.5	1	0.019
Slopes with partial snow	7	25.00			
Full Snow covered	4	14.29			
Dry grassland patches	3	10.71			
Broken areas	4	14.29			
Scree (rock debris)	2	7.14			
Barren	2	7.14			
Total	28	100.00			

Table II. Distribution of Himalayan ibex with respect to cliff distance (m) in winter 2012-13.

Distance to cliff	Number of observations	Percent observation	χ^2	df	P value
Very close to cliff (1-25)	8	28.57	3.714286	2	0.156118045
Close to cliff (25-50)	14	50.00			
Away from cliff (51-80)	6	21.43			
Total	28	100.00			

Table III. Distribution of Himalayan ibex with respect to slopes in winter 2012-13.

Slope Angles (%)	Number of observations	Percent observation	χ^2	df	P value
Very steep (90)	4	14.29	6.5	2	0.038774208
Steep (70-80)	15	53.57			
Moderate (60-70)	9	32.14			
Total	28	100			

Table IV. Distribution of Himalayan ibex with respect to altitudes in winter 2012-13.

Altitude (m)	Number of observations	Percent observation	χ^2	df	P Value
3000-3200	9	32.14	7.714286	3	0.05230078
3200-3400	12	42.86			
3400-3600	4	14.29			
3600-above	3	10.71			
Total	28	100			

sloping areas with a snow cover habitat. Almost 50% of the observations of ibex were close to the cliffs, while only 21% of the observations were away from cliffs (Table II). There was a significant preference of ibex to live close to cliffs (25-50 m). Table III shows that 53% of Himalayan ibex were observed on steep slopes (70-80%), 32% were observed on moderate (60-70%) slopes and there was a significant difference in the use of different slope angles. In the present study, 42% of the ibex were observed in between 3200-3400 m altitude and there was no significant difference in use of altitudinal variations (Table IV).

DISCUSSION

There was a significant difference in use of habitat types by the ibex. The high preference was shown towards slopes with partial snow cover habitats. Himalayan ibex preferred steep rocky areas in southwestern Laddakh, India (Fox *et al.*, 1992). Schaller (1977) linked the affinity of Himalayan ibex for steep rugged terrain with avoidance of

predation. Hussain (2010) showed that 15% of Himalayan ibex remain on smooth slopes in the Nagar district of Gilgit-Baltistan. Bhaatnagr (1997) found that Himalayan ibex spent 72% of their time on smooth areas as opposed to rocky areas in Laddakh, India.

The distribution with respect to cliff distance showed a significant preference of ibex towards areas close to cliffs (25-50 m), as 50% percent of the observed ibex were in such habitats. This preference might be because the ibex want to avoid being preyed on by snow leopards. The findings of Feng *et al*. (2007) in China also support the present study. The 53% of Himalayan ibex were observed on steep slopes (70-80 %). There was a significant difference in use of different slope angles. Bhaatnagr (1997) also reported similar results for Himalayan ibex in Laddakh, India.

In the present study, 42% of the ibex were observed in between 3200-3400 m altitude and there was no significant difference in habitat preference at various altitudes. This may be because the ibex comes to a lower altitude in search of food. Snow cover and lack of food in snowy areas forces them to seasonally change their home ranges or even migrate (Fedosenko and Savino, 1983). They move from the upper rocky zone to lower elevations during autumn, (Sobanskiy, 1988). In winter season they migrate from one mountain range to other, sometimes have been seen crossing valleys below 2135 m altitude (Roberts, 1977).

This study revealed that there is a good population and considerable number of trophy sized ibex in the particular region during winter season, therefore, the number of licenses may need to increase for the sustainable conservation of ibex and co-existence of both livestock and ibex, to reduce the pressure on rangeland grasses.

CONCLUSION

There was a significant difference in the use of habitat types by the ibex. The high preference was shown towards slopes with partial snow cover habitats which showed link and the affinity of Himalayan ibex for steep rugged terrain to avoid predation. The distribution with respect to cliffs and steep slopes might be to avoid being preyed on by snow leopard. In the present study, the ibex came to lower altitudes in search of food. Snow cover and lack of forage in snowy areas forces them to seasonally change their home ranges. Therefore, there might be an increased risk of predation by snow leopard and poaching by hunters. The downward movement in winter may also cause shortage of food for domestic livestock and competition may occur among them. The results of the study will be helpful for conservationists for planning of conservation strategies.

Statement of conflict of interest
    The authors have declared no conflict of interest.

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