

Population and Distribution of Himalayan Ibex, *Capra ibex sibirica*, in Hushe Valley, Central Karakoram National Park, Pakistan

Ghulam Raza,^{1,2*} Sarwat N. Mirza,² Maqsood Anwar,³ Ishtiaq Hussain,⁴ Sher Wali Khan,⁴ Khalil Ahmad,⁴ Muhammad Ali Nawaz⁵ and Naseer Ahmad⁶

¹Department of Environmental Sciences, Karakorum International University Gilgit-Baltistan, Pakistan

²Department of Forestry and Range Management, PMAS-Arid Agriculture University, Rawalpindi, Pakistan

³Department of Wildlife Management, PMAS-Arid Agriculture University, Rawalpindi, Pakistan

⁴Department of Biological Sciences, Karakorum International University, Gilgit-Baltistan, Pakistan

⁵Country Director Snow Leopard Foundation Pakistan

⁶Department of Environmental Sciences, COMSATS Institute of Information Technology, Abbottabad, Pakistan

Abstract. The current study determined total population, trophy sized Himalayan ibex (*Capra ibex sibirica*) and its distribution during winter season in Hushe valley of Central Karakoram National Park (CKNP) Gilgit-Baltistan. The valley has been declared as a community-controlled hunting area for the last one and half decades. This study was conducted from 15 November 2012 to 15 February, 2013. Two permanent trails (one upstream from Hushe village to Dumsum junction and one downstream from Hushe village to Hushe bridge) were established along the Hushe river for data collection. Total ibex population in the study area was estimated 593 individuals during the entire study period out of which 43 trophy sized, which were 7.25% of the total population. ANOVA for total ibex population showed significant differences from different locations ($p=0.001$) at $P<0.05$. The mean trophy sized ibex were 5.25 ± 1.60 , 3.75 ± 0.72 and 1.75 ± 0.24 at high, mid and low latitude ranges, respectively from the study area found an increasing ratio of trophy size over total ibex population in certain areas of Hushe. The ibex population seems to be increasing due to conservation efforts by the community and sensitization through government and conservation agencies. This study revealed that there is a considerable number of trophy size ibex in the valley, which suggest potential of trophy hunting in the valley and appropriate use of wildlife resources for recreation, ecological values and economic purposes.

Key words: Himalayan Ibex, population, trophy size, Hushe valley, Gilgit-Baltistan

INTRODUCTION

Mountains occupy nearly 24% of the global land surface and directly support over 12% of the world's population that lives within mountain regions (Sharma *et al.*, 2010). Mountain areas provide suitable habitat for a number of wildlife species including threatened species. The Northern parts of Pakistan are famous for having diverse habitat and being rich in faunal diversity (Virk *et al.*, 2003). Himalayan ibex (*Capra ibex sibirica*) is one of the ungulates inhabiting these areas. Despite competition with livestock for forage as well as continuous hunting pressure, it is categorized as a least concern species internationally as well as in

Pakistan (Sheikh and Molur, 2004; Nawaz *et al.*, 2009).

The Himalayan ibex is distributed in neighboring countries of Pakistan, including China (Reading and Shank, 2008; Xu *et al.*, 2012), India (Gaston *et al.*, 1981; Fox and Johnsingh, 1997; Namgail, 2006; Namgail *et al.*, 2006), Afghanistan (Habibi, 1997; Heptner *et al.*, 1961) and in northeastern Uzbekistan, Tajikistan, Kyrgyzstan mountains and in northern Pakistan (Reading and Shank, 2008; Li *et al.*, 2015) and found in Karakoram, Himalaya and Trans-Himalayan regions of Jammu Kashmir (Fox and Johnsingh, 1997). In Gilgit-Baltistan, the species is still abundant in Ishkoman, Yasin and Hunza. The ibex population in three regions (Gilgit, Diamir and Baltistan) was reported between 9,000 and 10,000 (Hess *et al.*, 1997). It occurs in the comparatively dry mountains of the interior Himalayas, Karakorum and Hindukush and evenly distributed throughout the

* Corresponding author: ghrazabalti@yahoo.com,
ghulam.raza@kiu.edu.pk

0030-9923/2015/0004-1025 \$ 8.00/0

Copyright 2015 Zoological Society of Pakistan

upper mountains of Gilgit-Baltistan (Roberts, 1997).

Himalayan ibex predominantly inhabits mountainous regions from 5000-6,700 m.a.s.l in rocky terrain and open alpine meadows and cliffs, and comes down to lower elevations during autumn and winter season (Sobanskiy, 1988; Fedosenko and Blank, 2001). Generally, ibex are compelled to migrate from one place to another and change their habitat under severe food shortage period (Fedosenko and Savino, 1983). They could stay on slightly sloping grassy areas for long periods of time or even incline to wet meadows for grazing (Zavatskiy, 1990).

The presence of wildlife is important for the livelihood of residents of the area since the wildlife attracts tourists and is a source of income generation through trophy hunting, which provide income through labor work as porters, guides and by providing hotel services for tourists. In Gilgit-Baltistan, the handsome incomes made by the local community has been earned from Ibex trophy hunting. The present study was conducted to assess the population and trophy size of Himalayan Ibex, and their extent of occurrence in winter season at different locations of Hushe valley. The ibex comes down from higher to lower elevation due to shortage of food and can easily count the number with least chance of error during winter. The results of the study will be helpful for range management, population dynamics and conservation of wild ungulates. There was no scientific data available about the population status and its distribution in the valley. The availability of scientific data about population and distribution of ibex will be helpful for conservation and can be used for allocation of quota for trophy hunting in the valley.

MATERIALS AND METHODS

Study area

The study was conducted in a community controlled hunting area of Hushe valley, 34 km away from district headquarter, Khaplu, Ganche with total 140 households and is the last human settlement of Baltistan (Raza *et al.*, 2014). It is one of the wildlife conserved areas controlled by the local community for trophy hunting with the help of International Union for Conservation of Nature

(IUCN) Pakistan in 1997. Regarding estimated population of ibex, exact number is not clear yet but has been reported in thousands in the whole valley (Anonymous, 2005). The study area falls within the buffer zone of the Central Karakoram National Park (CKNP) which was established in 1993 and is the largest national park of Pakistan spreading over 10,000 km² (www.cknp.org.pk) it includes Gilgit, Skardu, and Ghanche Districts (Hussain *et al.*, 2011).

Survey of ibex

The study was conducted in the winter season from 15 November 2012 to 15 February 2013. The duration of the study period was constrained by the remoteness and inaccessibility of the study area. Two permanent transects; the first one, 07 km in length, upstream from Hushe village to Dumsum Junction and the second one was 05 km long downstream from Hushe village to Hushe bridge. Both were established along the Hushe river. Each trail was walked at least 04 times during the whole study period. Twelve locations and three vantage points on each location were identified on the basis of ibex population on the two selected transects. Field observations noticed from nearest locations possible and observation too far from the vantage points were aided by Visionary Classic 8x40 Binoculars and a spotting scope 15-45X (Visionary V60) to minimize the chances of error (Ransom *et al.*, 2014). Whenever a group of animals was encountered, time, date and number of individuals were noted. GIS based map was developed for ibex habitat by using Global Positioning System (GPS), model (E Trex 30 Garmin). The ibex was further categorized as trophy size according to standard horn size for Gilgit-Baltistan where minimum horn length of 90 cm adopted from Shackleton (2001). There were two groups of observer team comprising three members in each team who surveyed the ibex. The team members were well trained with experience in surveying of Wildlife. Two of the members were experienced hunter. However the confusing counts were double checked by two members at the same time to avoid chances of human and equipment error. The morning and late after noon time was used to count exact number when animals were more busy in grazing (Xu *et al.*,

2012).

Statistical analysis

Data collected from the field area were analyzed for mean, standard error and frequency in percentage (%) for basic statistics by using MS Excel 2010. ANOVA was also computed for total ibex population by statistical software package (Statistix version 8.1 USA) and the mean values were compared for least significance difference (Steel *et al.*, 1997).

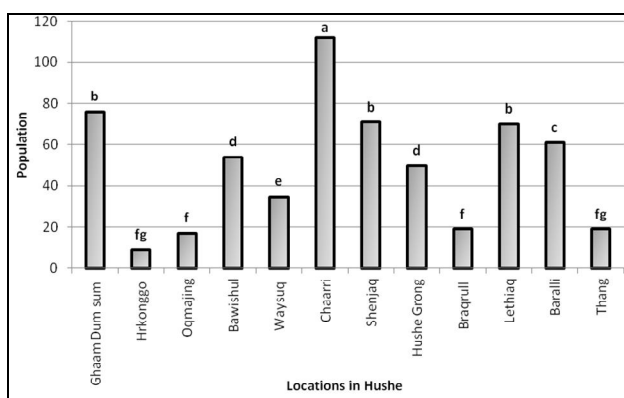


Fig. 1. Mean ibex population from various locations of Hushe Valley during winter 2012-13 (Results with same letters are not significantly different at P<0.05).

RESULTS

A total of 593 individuals of ibex was recorded inclusive of all age groups (Table I). Ibex population was maximum 268 (45.19%) at site B followed by site C 169 (28.50%) and lowest at site A with 156 (26.31%). However, site specific population showed that total number of ibex were maximum 112 (18.89%) at Chaari and minimum ibex of 9 (1.52%) were found at Hrkonggo. ANOVA result showed significant difference among ibex population distributed at different locations (p= 0.001) at P<0.05 (Fig. 1).

Site specific number of trophy size ibex distribution is presented in (Table I). The cumulative ratio of trophy sized ibex to total ibex population was also reported maximum (0.35) at site A than that of sit B (0.26) and site C (0.22). However, the maximum ratio of trophy size ibex to

total ibex population with respect to a specific location was reported to be higher (0.18) at Ghaam Dumsum of site A followed by other locations (0.11) at three locations viz. Bawishul, at Waysuq in CKNP area Hushe (Table I).

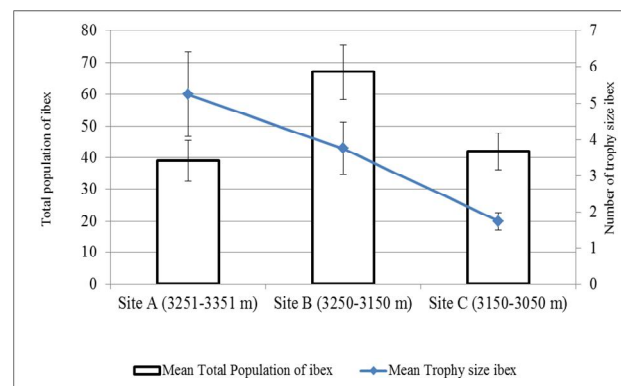


Fig. 2. Distribution of total and trophy size ibex at three altitudinal range in Hushe

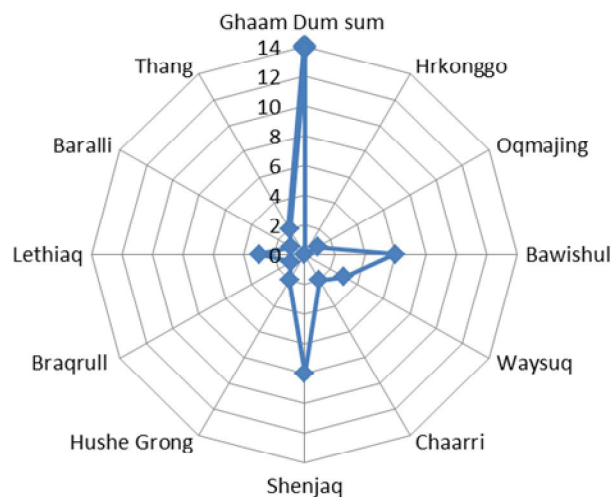


Fig. 3. Location specific mean trophy size of ibex in Hushe Valley, CKNP.

The distribution trend of trophy size ibex in the selected area showed that it was much confined to higher altitude. The mean number of trophy size ibex was 5.25±1.60, 3.75±0.72 and 1.75±0.24 at higher (>3600 m), mid (3400-3600 m) and lower (2300-3400 m) altitudinal gradients, respectively (Fig.2). Mean trophy size ibex (43) were seen from 12 locations accounting for 7.25% of total ibex

Table I.- Distribution of ibex population during the study period (November 2012- February 2013).

Ibex location at their habitat	Site wise total population (%) N=593	Total population (%) recorded from each locations		Population of Trophy size (%)	Ratio of trophy size to total population
3600 m and above (Site A)	26.31	Ghaam Dumsum	(12.8)	18.42	0.18
		Hrkonggo	(1.5)	0.00	0.00
		Oqmajing	(2.8)	5.88	0.06
		Bawishul	(9.1)	11.11	0.11
3400-3600 m (Site B)	45.19	Waysuq	(5.9)	8.57	0.09
		Chaarri	(18.8)	1.79	0.02
		Shenjaq	(11.9)	11.27	0.11
		Hushe Grong	(8.4)	4.00	0.04
3200-3400 m (Site C)	28.50	Braqrull	(3.2)	5.26	0.05
		Lethiaq	(11.8)	4.29	0.04
		Baralli	(10.3)	1.64	0.02
		Thang	(3.2)	10.53	0.11
Grand total	100.00			7.25	

population during winter of 2012-2013. The maximum number of trophy size ibex was recorded from the location Ghaam Dumsum (14) followed by Shenjaq (8) and Bawishul (6) (Fig.3).

DISCUSSION

The present study showed that a total of 593 ibex were found within an altitudinal range of 3200-3750 m in winter. Their distribution were confined in this range during winter season due to acute shortage of food as a result of snow accumulation in their habitat, hence compelled to moved from the upper areas to nearby human settlements. The result also supports findings of Fedosenko and Blank (2001) that ibex shifts to lower elevations up to 2000 m during winter season in mountainous regions and prefer to move in less snow covered areas into a larger group (Grignolio *et al.*, 2004). The extent of occurrence of ibex population in winter season was more prominent at mid altitude (3400-3600 masl) due to availability of food and less interference of human beings. In the distribution of 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. The movement of ibex have strong influence by snow cover in alpine areas (Parrini *et al.*, 2003; Apollonio

et al., 2013). The trophy ibex were more confined to the higher altitude (>3600 m) as compared to other age groups of the population. This might be due to their adaptability having larger body size to access food by digging with their hooves and horns than that of smaller ibex even in heavy snow by foraging up to 30-40 cm depth of snow (Roberts, 1997). The presences of trophy size ibex at particular places may also be to avoid predation, due to presence of shelter.

CONCLUSIONS

The present study concluded that the ibex comes down to lower elevations in search of food to nearby settlements but the trophy size population were restricted to certain limits (3600 m). A significant number of trophy size ibex were found in Hushe valley suggesting potential for increase permit quota for trophy hunting by Government organizations and local conservation committee. However, further studies need to be conducted in order to assess the the population dynamics over longer period of time for sustainable conservation of wild ungulates. The community controlled hunting programme in this valley seems to be effective for conservation, therefore it may replicated in other parts of Gilgit-Baltistan for sustainable use of wildlife resources.

ACKNOWLEDGEMENT

The authors are thankful for assisting in preparation of GIS based map of ibex survey in the Hushe valley by WWF-Pakistan (Gilgit-Baltistan), team members of Hushe community and the Snow Leopard Foundation (SLF) for field support during the study.

REFERENCES

- ANONYMOUS, 2005. HAGLER BAILLY PAKISTAN, 2005. *Central Karakoram Protected Area. Volume II: Baseline Studies*. IUCN Pakistan, Karachi.
- APOLLONIO, M., BRIVIO, F., ROSSI, I., BASSANO, B. AND GRIGNOLIO, S., 2013. Consequences of snowy winters on male mating strategies and reproduction in a mountain ungulate. *Behav. Proc.*, **98**: 44-50.
- CENTRAL KARAKORAM NATIONAL PARK PAKISTAN, 1990. <http://www.cknp.org.pk/AboutUs.htm>: Date, 4-07-2014.
- FEDOSENKO, A.K. AND SAVINOV, E. F., 1983. The Siberian ibex. In: *Mammals of Kazakhstan* (eds. E. V. Gvozdev and V. I. Kapitonov). Nauka of Kazakh SSR, Alma-Ata **3**:1– 246
- FEDOSENKO, A. K. AND BLANK, D. A., 2001. *Capra sibirica*. *Mamm. sp. American Society of Mammalogists*, **675**: 1-13.
- FOX, J. L. AND JOHNSINGH, A. J. T., 1997. *Wild sheep and goats and their relatives: status survey and conservation action plan for Caprinae* (ed. D. M. Shackleton). IUCN, Gland, Switzerland, pp. 215–231.
- GASTON, A. J., GARSON, P. J. AND HUNTER, M.L., 1983. The status and conservation of forest wildlife in Himachal Pradesh, Western Himalayas. *Biol. Conserv.*, **27**: 291-314.
- GRIGNOLIO, S., ROSSI, I., BASSANO, B., PARRINI, F. AND APOLLONIO, M., 2004. Seasonal variations of spatial behaviour in female Alpine ibex (*Capra ibex ibex*) in relation to climatic conditions and age. *Ethol. Ecol. Evol.*, **16**: 255-264.
- HABIBI, K., 1997. *Wild sheep and goats and their relatives: status survey and conservation action plan for Caprinae* (ed. D. M. Shackleton). IUCN, Gland, Switzerland, pp. 204–211.
- HEPTNER, V. G., NASIMOVICH, A. A. AND BANNIKOV, A.G., 1961. Mammals of the Soviet Union. Artiodactyla and Perissodactyla. *Vysshaya Shkola, Moscow, USSR* **1**:1–776.
- HESS, R., BOLLMANN, K., RASOOL, A.A., CHAUDHRY, A., VIRK, T. AND AHMAD, A., 1997. *Wild sheep and goats and their relatives: status survey and conservation action plan for Caprinae* (ed. D. M. Shackleton). IUCN, Gland, Switzerland, pp. 239–260.
- HUSSAIN, I., BANO, A. AND ULLAH, F., 2011. Traditional drug therapies from various medicinal plants of Central Karakoram National Park, Gilgit-Baltistan Pakistan. *Pak. J. Bot.*, **43**:79-84.
- <http://www.caprinae.com/en/trophies/himalayan-ibex> Date, 12-07-2014.
- LI, Y., YU, Y.Q. AND SHI, L., 2015. Foraging and bedding site selection by Asiatic ibex (*Capra sibirica*) during summer in Central Tianshan Mountains. *Pakistan J. Zool.*, **47**: 1-6.
- NAMGAIL, T., 2006. Winter habitat partitioning between Asiatic ibex and blue sheep in Ladakh, Northern India. *J. Mount. Ecol.*, **8**: 7-13.
- NAMGAIL, T., BHATNAGAR, Y.V. AND FOX, J. L., 2006. *Pastoral production and wildlife conservation in a trans-Himalayan Wildlife Reserve in Ladakh*. Issues of Pastoralism in the Himalayan Region. G.B. Pant Institute of Himalayan Environment and Development.
- NAWAZ, M.A., SHADIE, P. AND ZAKARIA, V., 2009. *Central Karakoram Conservation Complex Draft Management Plan* IUCN.101pp.
- PARRINI, F., GRIGNOLIO, S., LUCCARINI, S., BASSANO, B. AND APOLLONIO, M., 2003. Spatial behaviour of adult male Alpine ibex *Capra ibex* in the Gran Paradiso National Park, Italy. *Acta Theriol.*, **48**: 411-423.
- RANSOM, J. I., POWERS, J. G., GARBE, H. M., OEHLER SR, M. W., NETT, T. M. AND BAKER, D.L., 2014. Behavior of feral horses in response to culling and GnRH immunocontraception. *Appl. Ann. Behav. Sci.*, **57**: 81–92.
- RAZA, G., MIRZA, S. N., AKBAR, M., HUSSAIN, I., ALI, M., HYDER, S., KHAN, S. W., ALI, S., RAZA, M. AND AHMAD, N., 2014. An assessment of surface features and vegetative cover in Alpine rangelands of CKNP Region, Pakistan. *J. Biodiv. Environ. Sci.* **5**: 274-279.
- READING, R. AND SHANK, C., 2008. *Capra sibirica*. In: *IUCN 2014. IUCN red list of threatened species*.
- ROBERTS, T.J., 1997. *The mammals of Pakistan*. Revised Edition, Oxford University Press Karachi, Pakistan. pp. 525.
- SHACKLETON, D. M. (Eds.), 2001. *A review of community-based trophy hunting programs in Pakistan*. The World Conservation Union (IUCN-Pakistan), pp. 28.
- SHARMA, E., CHETTRI, N. AND OLI, K., 2010. Mountain biodiversity conservation and management: A paradigm shift in policies and practices in the Hindu Kush-Himalayas. *Ecol. Res.*, **25**: 909–923
- SHEIKH, K.M. AND MOLUR, S., 2004. (Eds.) *Status and red list of Pakistan's Mammals. based on the conservation assessment and management plan*. IUCN Pakistan, pp. 312.
- SOBANSKIY, G.G., 1988. *The game animals of the Altai*

- Mountains*. Nauka, Novosibirsk, USSR.
- STEEL, R.G.D., TORRIE, J.H. AND DICKEY, D.A., 1997. *Principles and procedures of statistics. A biometrical approach*. 3rd ed. McGraw Hill Inc., New York.
- VIRK, T. A., SHEIKH, K.M. AND MARWAT, A. H., 2003. *Northern areas strategy for sustainable development*. IUCN Pakistan, Northern Areas Programme, Gilgit, pp. 47.
- XU, F., MA, M., WU, Y. AND YANG, W., 2012. Winter daytime activity budgets of asiatic ibex *Capra sibirica* in Tomur National Nature Reserve of Xinjiang, China. *Pakistan J. Zool.*, 44: 389-392.
- ZAVATSKIY, B.P., 1990. Ecology of the Siberian ibex of the west Sayan. In: *The ecological and economical aspects of the conservation and the efficient utilization of the game animals and vegetable eatables resources of the Siberia* (ed. M. H. Smirnov). Sayano-Shushenskiy Reserve, Shushenskoe, USSR, pp. 32-34.

(Received 14 September 2014, revised 31 October 2014)