

Leopard Predation Risks Associated with Hangul Deer (*Cervus hanglu hanglu*) in Dachigam National Park, Kashmir, India

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ABSTRACT

The population of critically endangered and endemic deer of Kashmir *Cervus hanglu hanglu* commonly known as hangul has been fluctuating for the last fifty years with a declining trend. At present the species primarily occurs in a small area of Dachigam National Park (DNP), Kashmir with a population of nearly 200 individuals. Among the possible causes of decline in hangul population, predation by common leopard (*Panthera pardus*) seems to be of a serious concern for wildlife managers. The present study aims to highlight leopard predation risks associated with hangul through the examination of leopard scats. Leopard scats were searched along trails, roads and riparian forests from January 2007 to December 2008. It was hypothesized that predation on deer by leopard would be more in winter as in summer cattle could serve an easily accessible prey to the leopard. Chi-Square analysis revealed significant difference in the frequency of occurrence of hangul hairs from winter and summer scats ($p < 0.05$).

Keywords: Hangul, Predation risks, Leopard, Dachigam

INTRODUCTION

Kashmir red deer (*Cervus hanglu hanglu* Wagner), the state animal of Jammu and Kashmir is endemic to Indian sub-continent. It is locally known as 'Hangul' because of food it takes 'Indian horse-chestnut' locally known as 'Han Doon' or because of antlers it bears. The antlers are known as 'Heng' vernacularly. It is a large, dingy brown cervid with a small orange-white rump patch that is bordered by a broad black band and a black tail. It is placed under Schedule-I of both the Indian Wildlife (Protection) Act, 1972 and the Jammu & Kashmir Wildlife (Protection) Act, 1978. It has also been listed among the top 15 conservation priority species by Government of India (MOEF 2011). The estimated individuals in the beginning of

1900s were about 3000-5000 which had shrunk down to about 1000-2000 by 1947 and subsequently reported as low as 180-250 in 1965 (Gee, 1965) and 140-170 in 1970 (Holloway, 1970). The estimated individuals left over in the area till 2011 were 218 ± 13.96 (Charoo *et al.*, 2011). Grazing by domestic livestock in upper altitudes of the park, poaching, natural resource extraction by locals, predation and loss of habitat have all been considered as possible causes of decline (Ward, 1925; Stockley, 1936; Gee, 1965; Schaller, 1969; Holloway, 1971; Kurt, 1978; Inayatullah, 1985). Leopard acts as an apex predator in Dachigam National Park (DNP) which is the only abode of hangul deer in Kashmir. Among big cats,

leopard (*Panthera pardus*) is the most widely distributed member extending across much of Africa and Asia from the Middle East to the Pacific Ocean (Nowell and Jackson, 1996; Sunquist and Sunquist, 2002; Hunter *et al.*, 2013). This is largely due to its generalistic hunting and feeding behavior (Bertram, 1999). Leopard shows a wide range of habitat use ranging from tropical rainforests to arid savannas, and from subalpine mountains to the edges of urban areas (Bailey, 1993). The information on various aspects of endemic and critically endangered hangul deer including its relationship with leopard is therefore, needed with a view to meet conservation demands. Leopard is known to have the broadest diet of the larger obligate carnivores (Mills and Harvey 2001; Hayward *et al.*, 2006). It is known to feed on a variety of mammalian species (Johnsingh 1983; Rice, 1986; Karanth and Sunquist 1995; Henschel *et al.*, 2005; Shah *et al.*, 2009). It is also reported to feed on several deer species (Ahmed and Khan, 2008; Ramesh *et al.*, 2009; Shah *et al.*, 2009; Mondal *et al.*, 2011). The present study is aimed to provide a preliminary information on leopard predation risks associated with hangul which may be useful for wildlife managers in launching detailed studies for understanding the dynamics of leopard-hangul interactions in the park.

MATERIAL AND METHODS

The study was carried out in Dachigam National Park (DNP), (34°10' & 34°20' N and 75°54' & 75°80'E), located at 21 km Northeast of Srinagar in the state of

Jammu & Kashmir, India (Fig. 1). The park has a total area of 141 km² which is divided into lower (26 km²) and upper (115 km²) Dachigam on the basis of altitudinal and vegetation differences in the area. The leopard predation risks associated with hangul deer were assessed by examining leopard scats. Fresh leopard scats were collected whenever encountered in lower Dachigam (LD) along eight transects of 1 km each along trails and riparian forests from January 2007 to December 2008. The scats in Upper Dachigam (UD) were searched along three transects of 2 km each from May to October as the area becomes inaccessible for the rest of the year due to snow and extreme cold. Scats were searched during two visits in each month. Old and decayed scats were excluded from the analysis. Leopard scats were differentiated from that of other carnivore species on the basis of its diameter (Norton *et al.*, 1986; Rabinowitz 1989), pointed ends and numerous lobes (Edgaonkar and Chellam, 2002).

The data was maintained on seasonal basis to record variation in frequency of occurrence of hangul hairs from collected scats. The collection of scats in UD was restricted to six months from May to October. The leopard scats were washed in bowl and sieved through 1mm mesh. The scat contents were then teased apart with forceps and undigested hairs were used for identifying hangul (Karanth and Sunquist, 1995; Mukherjee *et al.*, 1994; Biswas and Sankar, 2002; Shah *et al.*, 2009). The seasonal data was

recorded in terms of frequency of occurrence of hangul hairs in scats.

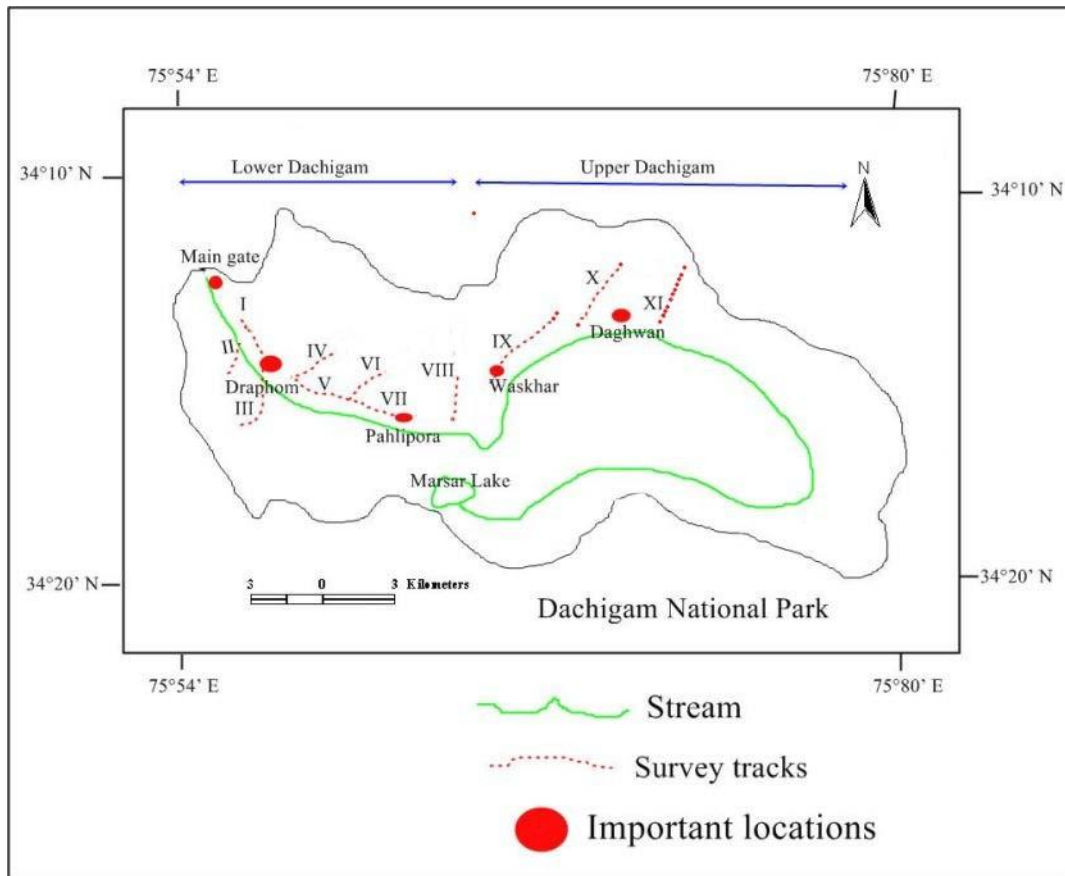


Fig. 1. Dachigam National Park showing transects I to XI

RESULTS AND DISCUSSION

The frequency of occurrence of hangul hairs in leopard scats was highest in winter

(34.7%) followed by autumn (24%), spring (22.2%) and summer (10%). (Table 1).

Table 1. Frequency of occurrence of hangul hairs in leopard scats

Season	No. of scats analysed (n)	No. of scats containing hangul hairs	Frequency of occurrence
Spring	18	4	22
Summer	30	3	10
Autumn	25	6	24
Winter	23	8	34.7

Cervids form a major component of the leopard’s diet (Ahmed and Khan, 2008; Ramesh *et al.*, 2009; Shah *et al.*,

2009; Mondal *et al.*, 2011). There are reports of 20 to 37 prey species in the diet of leopard from India and Africa (Osoky,

1998; Bodendorfer *et al.*, 2006; Ahmed and Khan, 2008) confirming its opportunistic hunting behavior. The opportunistic feeding tendency of leopard may not spare hangul which becomes its easy target in winter. The deer comes down to lower reaches due to extreme cold and thick snow cover on upper reaches, and remain concentrated in a small belt of LD and may become easy prey to leopard. Some prey species tend to congregate in small areas in deeper snow as forage becomes unavailable elsewhere (Fuller, 1991; Peterson, 1977). Leopard has the broadest diet selection pattern among large predators (Hayward *et al.*, 2006). It is known to consume 10 prey species in Sariska with cervids as the major contributors (62.8%) to the diet (Mondal *et al.*, 2011). Chital, Sambar and common langur are the preferred prey species for leopard in Nagarhole (Karanth and Sunquist, 1995) and Madumalai (Ramesh *et al.*, 2009). Leopard shows preference for wild ungulates especially deer species (Ahmed and Khan, 2008, Ramesh *et al.*, 2009, Mondal *et al.*, 2011). It is also known to feed on domestic cattle (Johnson *et al.*, 1993; Shah *et al.*, 2009; Mondal *et al.*, 2011). Nine prey species have been identified in the diet of leopard from DNP with dog, langur, hangul and rodents as preferred prey items (Shah *et al.*, 2009). The cattle, sheep and goat put together contributed a significant amount (18.3%) to the diet of the leopard in DNP during summer and autumn (Bhat 2008, Shah *et al.*, 2009). It is related to presence of heavy cattle stock during these seasons in DNP that are an easily accessible prey for leopard (Shah *et al.*, 2009). There is ample

evidence of leopard predation on hangul deer in DNP (Shah *et al.*, 2009). The shifts in the diet selection of leopard may be related to relocation of cattle from DNP in colder months to warmer areas of Jammu region making hangul more prone to predation. Karanth and Sunquist (2000) related predator activity to that of prey species. The present study mainly focused on seasonal variation in the frequency of occurrence of hangul hairs in leopard scats. Chi-Square analysis revealed significant difference in the frequency of hangul hairs from winter and summer scats ($p=0.029$, $z = -2.19$). This may exacerbate the already existing problem of hangul deer and therefore, long-term studies on leopard diet selection and shifts are needed to reveal the predation pressure on hangul which is a matter of concern for wildlife managers.

RECOMMENDATIONS

The Department of Wildlife Protection, Govt. of Jammu & Kashmir in consultation with the competent ecologists should conduct annual census of leopard to know its exact status in the park. The detailed studies are needed to understand and manage dynamics of hangul-leopard interactions in the park. The study on evaluation of prey abundance in the park and biomass of each prey species consumed by leopard with special reference to hangul would reveal the true picture of prey-predator dynamics.

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