

FIRST REPORT ON THE BIODIVERSITY OF KHUNJERAB NATIONAL PARK, PAKISTAN

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Abstract

Biodiversity of Khunjerab National Park (KNP) was carried out during May and June, 2006 to establish baseline information about existing plant wealth and wildlife including flora, reptiles, birds and mammals in order to make some vantage points for future monitoring of key wildlife species. Using different direct and indirect investigation techniques, 14 different valleys and Nullahs of KNP were surveyed and observations on various habitats were recorded. Four types of vegetation zones were identified including Dry Alpine Scrub, Moist Alpine Pastures, Dry Alpine Plateau Pastures and Sub Alpine Scrub and Birch Forests. So far, 62 plant species belonging to 45 genera and 25 families were identified. Of them, 4 grasses and one species of Liliaceae were determined. The most important family that contributed in floristic composition of this project area was Primulaceae (11.29%), followed by Asteraceae (9.68%), Boraginaceae (6.45%), Brassicaceae (6.45%), Poaceae (6.45%) and Rosaceae (6.45%); whereas, rest of the families had fewer species. The animal diversity includes two reptilian, 46 avian and 25 mammalian species. In addition, 16 faunal species (two reptilian, 13 avian and one mammalian) were recorded for the first time from the study area. For observing wildlife and future studies in KNP, 18 vantage points were marked in different valleys and Nullahs and threats to different wildlife species were studied as poisoning the carnivores, illegal hunting, over grazing and food competitions through domesticated species.

Introduction

The area under present Khunjerab National Park (KNP) is famous due to core habitats for several large mammals such as Marco Polo sheep, Blue sheep, Himalayan Ibex, Tibetan wild ass, Brown bear, Snow leopard, Indian wolf etc. However, it was primarily the drastic fall in the numbers of Marco Polo sheep during early 1970's that caused the establishment of Khunjerab National Park in 1975 with the major purpose of protecting Marco Polo sheep (*Ovis ammon polii*) in its natural habitat (Khan, 1996). Khunjerab is actually a combination of two words "Khoon" and "Jerab". As explained by the local community, the word "Khoon" means Blood, and "Jerab" means, river in the Wakhi language. The reason for this name "Khunjerab" as explained by the locals is that in the old times, when Karakoram Highway (KKH) did not exist, many people used to die every year while crossing Khunjerab River during traveling on the old silk route.

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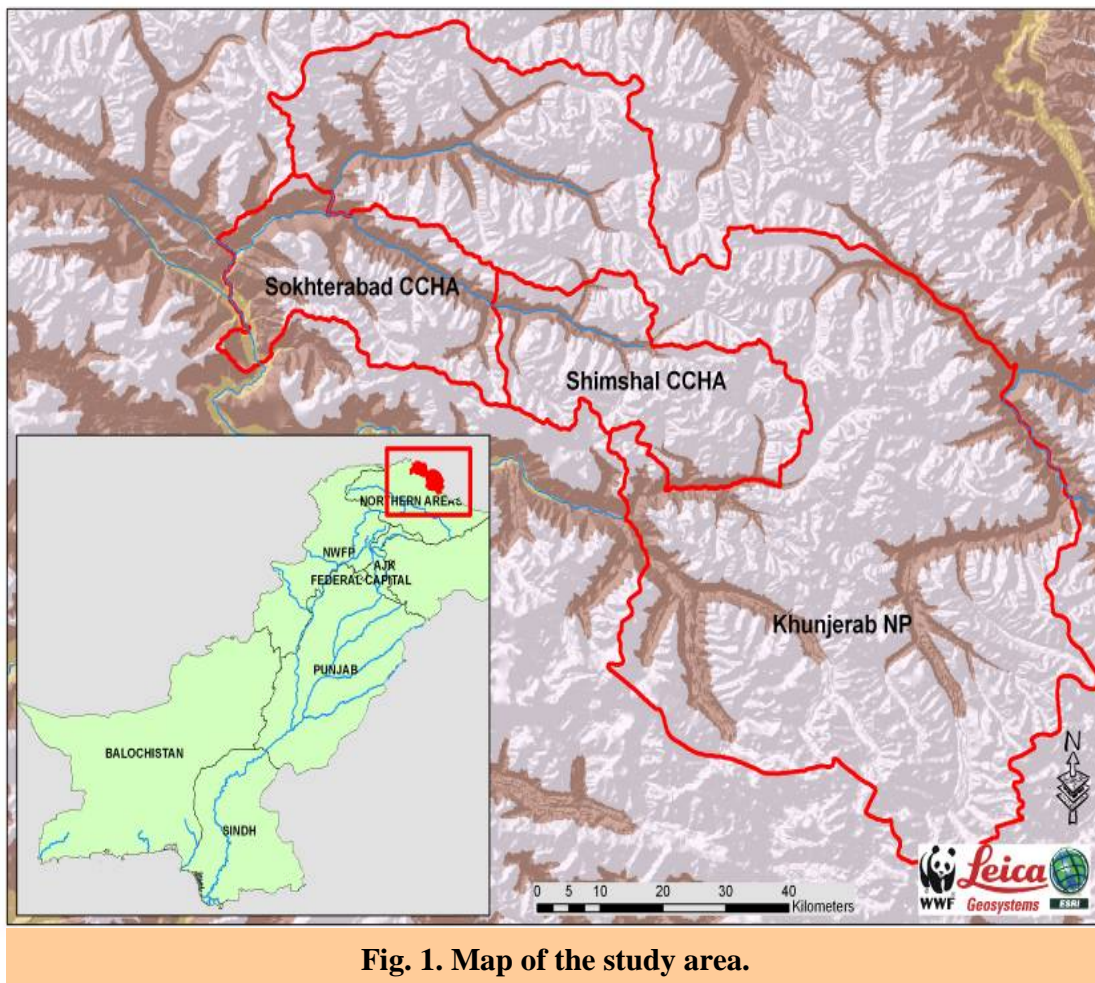


Fig. 1. Map of the study area.

Geographically the park lies in the extreme northeastern corner of Pakistan in northern part of the former Hunza State known as Gojal between the coordinates $74^{\circ} 55'$ E to $75^{\circ} 57'$ E and $36^{\circ} 01'$ N to $37^{\circ} 02'$ N that covers an area of $6,150 \text{ km}^2$ (Khan, 1996) (Fig. 1). The Park comprises of three main valleys i.e., Khunjerab, Ghujerab and Shimshal. The Khunjerab valley starts from Sost village at KKH and ends at the Khunjerab pass at Pak-China border. The Khunjerab River flows from the watershed of the Pak-China border. Many small tributaries join it in the way until it joins Hunza River near Khudabad. Different nullahs in Khunjerab valley include; Dhee, Qarchenai, Toghroqin, Ferzindur, Barkhun, Perpek, Arbobkuk, Gozkil, Padekishk, Koksil and Kooz. The Ghujerab valley which forms the main tributary of the Khunjerab River also provides a link between the valleys of Khunjerab and Shimshal.

The wildlife of KNP is composed of a blend of Palearctic and Indo-Malayan elements containing taxa of Ethiopian region that makes the biodiversity of KNP very interesting and diverse in nature. Due to very difficult, tough and dangerous tracks and terrains, the northern areas of the country have remained least explored regarding wildlife resources. The present study was conducted with the objectives to determine the distribution and status of different wildlife species, to mark vantage points at different locations to facilitate future wildlife studies including animal and plant diversity and assess the major problems and threats to wildlife in the study area.

Biodiversity of KNP has not been extensively studied. Floral diversity is first time reported in this paper. However, a few studies have been carried out on avian and

mammalian wildlife resources of KNP by different wildlife biologists. Wegge (1988) and Ahmed (1989) conducted surveys of endangered species of KNP. Studies done by Roberts (1997) on mammals, Roberts (1991 and 1993) on birds and Blumstein (1991 and 1993) and Blumstein and Robertson (1995) on mammals are the main reference points for the existing animal wildlife situation in KNP. Blumstein (1996) has described 86 bird species from KNP whereas Khan (1996) has listed 87 bird species belonging to 11 orders and 30 families. Khan (1996) has reported 24 mammalian species belonging to 7 orders and 13 families. Besides, Mertens (1969) and Minton (1966) have also contributed in animal diversity from the study area.

Materials and Methods

Four teams of experts of various fields were constructed to investigate biodiversity of KNP including flora, reptiles, birds and mammals along their association with certain microhabitats. Almost all the important nullahs and valleys in KNP were visited including Dhee, Dhee Saar, Aagh, Zoi Saam, Wologh Dor, Toghraqueen, Padekishk, Arbab Kook, Kooz, Shetanjerab, Koksil, Parapik and Barkhun Nullahs and Qarchenai, Furzeen and Shimshal valleys and Khunjerab top.

Floristic survey: Plant specimens were collected, pressed, dried and mounted on standard herbarium sheets. The same were identified using various floristic materials (Jafri, 1966; Nasir & Ali 1970-1989; Ali & Nasir 1989-1997; Ali & Qaiser, 1993-2009; Matthew, 1981-83; Batanouny, 1981; Boulos, 1991). Flora of Pakistan (Nasir & Ali 1970-1989; Ali & Nasir 1989-1997; Ali & Qaiser, 1993-2009) was mostly consulted for correct specific name. Local names were recorded based on verbal communication with the local inhabitants and presented in Table 1.

Reptilian survey: To study the reptilian fauna, field visits were carried out between 10:00 am to 3:00 pm. Stone turning, looking at and through bushes, observing large trees keenly, walking along streams, and turning scattered debris accumulated under trees were various means used to find lizards and snakes. Fast moving Agamid lizards were collected by striking with stick. Some specimens were pulled out with the help of long forceps from crevices in stones while a few were collected by hand from under the stones. Collected lizards were killed by injecting concentrated formalin at the site of heart and then formalin was injected in belly, neck, legs and tail for preservation. A tag number was allotted to each specimen and tied with the left hind limb for identification and later detailed studies. Preserved specimens were stored in 10% formalin in air tight plastic jars and field notes were prepared. These specimens were identified with the help of literature (Khan, 2006).

Avifaunal survey: For bird watching, all the potential habitats were visited especially during dawn and dusk and most of the birds were identified without using binoculars. Some birds were identified after keenly observing with binoculars and consulting the hand book for bird identification. For a few birds which could not be identified in the field, some basic information about color, size, habits and habitat were recorded and photographs from different angles were taken to facilitate their identification after consulting reference books (Roberts, 1991; 1993).

Table 1. Present flora of KNP along with their family names and vernacular names.

S. No.	Family	Plant species	Vernacular name
1.	Amaryllidaceae	<i>Allium carolinianum</i> DC. (1227)	Catch-piuk
2.	Asteraceae	<i>Artemisia brevifolia</i> Wall. ex DC. (1234)	Trukht-pesk/Kumpah
3.		<i>A. gmelinii</i> Web. ex Stech (1235)	Sweet-pesk
4.		<i>Cirsium arvense</i> (L.) Scop. (1244)	Chishk
5.		<i>Crepis flexuosa</i> (DC.) Bth. \$ Hk. f. (1246)	Churki/Thote-Woosh
6.		<i>Taraxicum officinale</i> F. H. Wiggers (1286)	Talkh Ting
7.		<i>Waldheimia tomentosa</i> (Dene.) Regel (1288)	Shardun-bet
8.	Betulaceae	<i>Betula utilis</i> D. Don (1238)	----
9.	Boraginaceae	<i>Arnebia euchroma</i> (Royle) I.M. Johnston. (1233)	Pushk
10.		<i>Eritrichium canum</i> (Benth.) Kitam (1250)	Khak Woosh
11.		<i>Lapula patula</i> (Lehm.) Nels. \$ Macbr. (1255)	Thot-woosh
12.		<i>Lindelofia stylosua</i> (Kar. \$ Kir.) Brand (1257)	Quoi-woosh
13.	Brassicaceae	<i>Brassica rapa</i> L. (1239)	Sholo-Woosh
14.		<i>Draba altacia</i> (C.A.M.) Bunge (1247)	Rukhon-spreg
15.		<i>Lepidium apetalum</i> Willd. (1256)	Yurk-woosh
16.		<i>Sisymbrium loeselli</i> L. (1283)	Sholumoosh
17.	Capprifoliaceae	<i>Lonicera asperifolia</i> (Dcne.) H.\$ T. (1258)	Shapeen/Patekesh
18.		<i>L. semenovii</i> Regel (1259)	Shapeen/Patekesh
19.	Chenopodiaceae	<i>Chenopodium album</i> L. (1241)	Shaleet
20.		<i>C. foliosum</i> (Moench) Aschers (1242)	Sheleet-woosh
21.	Crassulaceae	<i>Rhodiola heterodonta</i> (Hook. f. et Thoms.) A. Bor. (1273)	Quoi-spreg
22.		<i>R. himalensis</i> (D. Don) S.H. Fu (1276)	Quoi-spreg
23.	Cupressaceae	<i>Juniperus excelsa</i> M.B. (1254)	Yerz-Gal
24.		<i>J. communis</i> L. var. <i>saxatilis</i> (1255)	Yerz-Gal
25.	Cyperaceae	<i>Carex borii</i> Nelmes (1240)	----
26.		<i>Kobresia septatonodosa</i> T. Koyama (1245)	----
27.	Elaeagnaceae	<i>Hippophae rhamnoides</i> L. (1252)	Zakh
28.	Ephederaceae	<i>Ephedera intermedia</i> (Regel) Stapf. (1249)	Yemuk
29.		<i>E. gerardiana</i> Wall. ex Stapf. (1250)	Shait-yemuk
30.	Fabaceae	<i>Astragalus himalayanus</i> Kl. (1237)	----
31.		<i>A. strictus</i> Grah. Ex Bth. (1236)	----
32.		<i>Cicer microphyllum</i> Benth. (1243)	Zlup/Krush-woosh
33.		<i>Trifolium repens</i> L. (1287)	Nogor-woosh
34.	Grossulariaceae	<i>Ribes alpestre</i> Dcne. Ex Jacq. (1277)	----
35.	Plantaginaceae	<i>Plantago lanceolata</i> L. (1263)	----
36.	Poaceae	<i>Alopecurus himalaicus</i> Hk.f. (1228)	----
37.		<i>Poa balbusa</i> L.(1264)	Noz
38.		<i>P. pratensis</i> (L.) J.E. Sm. (1265)	Noz
39.		<i>Stipagrostis plumosa</i> (L.) Munro ex T. Anderss (1284)	
40.	Polygonaceae	<i>Rheum spiciforme</i> Royle (1273)	Shapod
41.		<i>R. tibeticum</i> Maxim. Ex Hk.f.(1274)	Shapod
42.	Primulaceae	<i>Androsace baltistanica</i> Y. Nasir (1229)	Glob-spreg
43.		<i>A. muscoidea</i> Duby (1230)	Quoi woosh
44.		<i>A. rotundifolia</i> Hardw. var. <i>glandulosa</i> (1231)	----
45.		<i>A. russellii</i> Y. Nasir (1232)	----
46.		<i>Primula denticulate</i> Sm. (1269)	Thou-spreg
47.		<i>P. macrophylla</i> var. <i>macrophylla</i> D. Don (1270)	Banufsha
48.		<i>P. macrophylla</i> var. <i>moorcroftiana</i> Wall. ex Klatt (1271)	Banufsha
49.	Ranunculaceae	<i>Ranunculus arvensis</i> L. (1272)	Zat-spreg
50.	Rosaceae	<i>Fragaria nubiola</i> Lindl. Ex Lacaita (1251)	----
51.		<i>Potentilla eriocarpa</i> Wall. ex Lehm. (1267)	Gool-hambu
52.		<i>P. dryadanthoides</i> Juz. (1268)	Zat-spreg
53.		<i>Rosa webbiana</i> Wall. ex Royle(1278)	Cheer-reer
54.	Rubiaceae	<i>Rubia tibetica</i> Hk. f.(1279)	Sheet-pesk
55.	Salicaceae	<i>Populus pamirica</i> Kom. (1266)	Tugruk
56.		<i>Salix alba</i> L. ssp. <i>alba</i> (1280)	Wunuk
57.		<i>S. pycnostachya</i> N.J. Anderss. (1281)	Yunuk
58.	Scrophulariaceae	<i>Scrophularia scabiosifolia</i> Bth. (1282)	Quoi-woosh
59.	Tamaricaceae	<i>Myricaria squamosa</i> Desv.(1260)	Tark
60.		<i>M. germanica</i> ssp. <i>alopecuroides</i> Schrenk. (1261)	Tark
61.		<i>Tamarix leptostachya</i> Bge. (1285)	----
62.	Zygophyllaceae	<i>Peganum hermalia</i> L. (1262)	Spandar

Mammalian survey: For observing large mammals, field trips were mostly arranged early in the morning and different direct and indirect observation methods were applied. For diurnal mammals like Blue sheep, Himalayan Ibex, Marco Polo sheep etc., direct observation methods were used while for nocturnal large mammals like Brown bear, Snow leopard, Red fox and Indian Wolf, indirect observation methods such as, observing pug marks, fecal material, territory marking signs etc., were used. Most of the small mammals, like marmots, rodents, lagomorphs etc., were directly observed in the day time whereas for nocturnal small mammals different live traps were used. Mammals were identified by following the work of Roberts (1997).

Results and Discussion

Vegetation and flora: The area of the park mostly consists of huge mountains with snow covered peaks, ravines, valleys and nullahs. Physical erosion, land slides and glaciers were commonly seen in different valleys of the Park. Most of the valleys are characterized by stony beds and surrounded by hill slopes of gravels and hailstones while others had hill slopes with about 50% soil particles. Some valleys like Dhee and Qarchenai showed sparse vegetation along with grasses on hill slopes and large plants like bushes and trees in the beds along water channels. In some valleys like Arbobkuk, the Nullah bed is covered with grasses and had a pasture like appearance. The Padekishk Nullah had bare slopes with less ground vegetation however, *Artemisia* exists here predominantly. In Togthroqin, there were gentle slopes below glacial moraines with predominant existence of *Artemisia* spp. and *Betula utilis*. *Myricaria* and *Salix* species were found along the river bed. Shimshal valley also holds some agricultural areas. The complete list of plant species is provided in Table 1. Following four types of vegetation zones were identified in the KNP.

Dry alpine scrub: Species like *Artemisia* spp., *Juniperus excelsa* and *Rosa webbiana* were found on the dry slopes and *Myricaria germanica* and *Hippophae rhamnoides* were observed along the stream beds. *Populus nepalensis*, *Salix* spp., and *Betula utilis* were noticed on moist places.

Moist alpine pastures: This vegetation zone consists of *Primula macrophylla*, *Potentilla desertorum*, *Gentiana* spp., *Anemone* spp., *Plantago lanceolata*, *Saxifraga sibirica*. In this zone, grasses *Poa bulbosa* and *Poa sinaica* were prominent.

Dry alpine plateau pastures: This zone was dominated by *Primula* spp. Woody plant species included *Lonicera quinquelocularis* and *Artemisia* spp. The most common grass species were *Setaria* spp., *Poa bulbosa*, *Poa sinaica*, *Phleum* spp. and *Carex* spp. commonly observed on moist places.

Sub alpine scrub and birch forests: This zone was marked along stream beds and ravines mainly consisting *Salix* spp., *Betula utilis*, *Myricaria germanica* and *Hippophae rhamnoides* plant species. *Poa bulbosa* and *Poa sinaica* were the main grass species. *Potentilla* spp., and other forbs also existed.

Ecological linkages of wildlife species: In the permanent snow fields and cold deserts, as in the northern most regions, the vegetation is often xerophytic in nature characterized

by *Salix* spp., *Juniperus communis*, *Rubia tibetica* and *Potentilla desertorum*. The same type of xeromorphism have been reported from various parts of the country by various authors (Kandari, 1990; Hajra & Rao, 1990; Asmus, 1990; Hussain *et al.*, 2000; Qureshi, 2008a, b, Qureshi *et al.*, 2009) On Khunjerab top, herbs and grasses attract a number of primary consumers like Himalayan Ibex, Marco Polo sheep, Cape hare etc., during summer season,. Golden Marmots which hibernate during winter are frequently seen during summer season. All these primary consumers in turn attract the predators like Snow leopard and Indian wolf. Among birds, Snow partridge and Snow cock also reach these heights to feed on soft grasses. These birds are attractive for raptors like Golden eagle and Eurasian Sparrow hawk. Soft leaves, buds, flowers and the seeds attract a variety of insects, which in turn attract the birds like Wagtails and Redstarts.

Alpine zone where mountains extend above coniferous tree line is characterized with species like *Artemisia maritima*, *Juniperus excelsa* and *Rosa webbiana* moist alpine pastures with species like *Primula macrophylla*, *Potentilla desertorum*, *Gentiana* spp., *Anemone* spp., *Plantago lanceolata*, *Saxifraga sibirica*, *Poa bulbosa* and *Poa sinaica*. Such habitats in KNP are the home for Brown bear, Snow leopard and Himalayan ibex. Brown bear feeds on vegetation, roots and ground insects and also upon Marmots and some times even digs them out of their burrows. Tibetan Red fox, Indian wolf and Weasels are also found feeding on rodents. Himalayan ibex, Cape hare and Pikas can easily be seen here. During warmer summer days, these areas become rich in insect fauna. Resultantly, insectivorous bird species arrive here for feeding as well as for nesting. Chukar partridge, Snow pigeon, Red billed chough, Yellow billed chough, Common Swift, Wagtails, Horned larks, Wheatears, finches etc., forage and breed in these areas. Golden eagles, Sparrow hawks and Lammergeyers are also found here.

Sub-alpine scrub and birch forests that exist along stream beds and ravines; consist mainly of *Salix* spp., *Betula utilis*, *Myricaria germanica*, *M. squamosa*, *Hippophae rhamnoides*, *Poa bulbosa* and *Poa sinaica*. This type of habitat supports different rodents like Field mouse, Golden marmot and Migratory hamster; Lagomorphs like Cape hare and Karakoram Pika and also the Tibetan red fox. These plant species are also attractive for various birds like Pipits, Wheatears, Wagtails, Finches, Redstarts, Chiffchaffs, Doves, Choughs and Thrushes.

Ecological adaptations of wildlife species: Many animals are able to avoid harsh climatic conditions such as extremes of cold and dryness by adapting their behavior in such a way that they spend most of their time in more equable conditions. In alpine zone and in far northern regions of KNP where snow covers the ground most of the year and the summer season is very short, the species like Brown bear, Golden marmot, Field mouse and Migratory hamster are found. As the mammals are homoeothermic endotherms, they can maintain their body temperature between 35 and 42°C with metabolic heat. Thus, these animals hibernate during winter to avoid extremes of the cold. During hibernation, hypothalamus of the brain lowers the metabolic, heart and respiratory rates. Fat deposited in the body is utilized during this winter sleep and after arousal from winter sleep, the animal is very weak and may have had lost one third to one half of its body weight.

Some mammals like Himalayan ibex and Tibetan red fox do not hibernate and have to withstand prolonged periods of low temperatures. They develop a dense undercoat of wool like hair which interlock and trap layers of insulating air beneath the protective outer layer of guard hairs. They shed most of their under-wool during the spring molt but

in early summer can avoid high temperatures by seeking shade or moving up to high altitudes. Thus, Himalayan ibex have brown coat color in summer and early fall and grow a thick whitish coat for winter.

Unlike similar sized marmots, hares also do not hibernate during the winter and exhibit local migration by descending to areas with less snow to search for edible vegetation. Pikas remain active throughout the winter and neither migrate to winter grazing grounds nor do they hibernate rather they use to collect, dry and store the vegetation (food) to eat during the long winter. Marco Polo sheep which is found mostly on the Chinese side is hunted largely by individuals from Chinese Border Security Forces. This sheep, during its breeding season (May to August), migrates to Qarchenai and Wologh Dor valleys in KNP as it finds these areas in Pakistan very secure lambing grounds. Thus, for their survival they have adopted the phenomenon of local migration.

Reptiles observed during the survey: Fifteen specimens of two lizard species were collected from Dhee, Qarchenai and Shimshal valleys (Table 2).

Birds observed during the survey: Forty six avian species belonging to 9 orders and 21 families were recorded during the survey (Table 3).

Mammals observed during the survey: Using direct and indirect observation techniques, 14 mammalian species belonging to 5 orders, 10 families and 14 genera, were recorded. Eleven mammals (Marco Polo Sheep, Cap Hare, Common Pipistrelle, Grey long Eared Bat, Common Red Fox, Field Mouse, Himalayan Ibex, Golden Marmot, Karakoram or large Eared Pika, Migratory Hamster and Blue Sheep) were observed directly while three (Brown Bear, Snow Leopard and Indian Wolf) were recorded on the basis of indirect observations like pug marks, faecal materials and territory marking signs. The IUCN status (Kashif & Molur, 2005) of the observed mammalian species is also given (Table 4).

New distribution records

Reptiles: No reptilian species were reported earlier from KNP and the two recorded species during the present study (*Laudakia himalayana* and *Laudakia pakistanica*) make the first records of Saurians in KNP.

Birds: Out of the 40 recorded bird species, 13 were identified for the first time from KNP (Table 5). Among these 13 species, 9 were recorded from Shimshal valley suggesting the potential of the area regarding avian fauna.

Mammals: Prior to the present survey, only Common Pipistrelle (*Pipistrellus pipistrellus*) among chiropterans was reported from the park but during the present study, Grey Long Eared Bat (*Plecotus austriacus*) was also observed in the KNP.

Vantage points marked during the survey: For monitoring wildlife and future wildlife studies in the Park, 18 Vantage Points were marked in different valleys and nullahs in the park (Table 6).

Table 2. Reptiles observed during the survey.

S. No.	Order	Family	Scientific name	Common name	Status
1.	Squamata	Agamidae	<i>Laudakia himalayana</i>	Himalayan Rock Agama	Common
2.	Squamata	Agamidae	<i>Laudakia pakistanica</i>	Pakistan' Rock Agama	Common

Table 3. Birds observed during the survey.

S. No.	Common name	Zoological name	Family	Order
1.	Black Redstart	<i>Phoenicurus ochruros</i> S.G Gmelin	Muscicapidae	Passeriformes
2.	White Capped Redstart	<i>Chaimorrornis leucocephalus</i> Vigors	Muscicapidae	Passeriformes
3.	Blue Whistling Thrush	<i>Myophonus caeruleus</i> Scopoli	Muscicapidae	Passeriformes
4.	Blue Rock Thrush	<i>Monticola solitarius</i> L.	Muscicapidae	Passeriformes
5.	Desert Wheatear	<i>Oenanthe deserti</i> Temminck	Muscicapidae	Passeriformes
6.	White Winged Redstart	<i>Phoenicurus erythrogaster</i> Guldenstadt	Muscicapidae	Passeriformes
7.	Common Rose Finch	<i>Carpodacus erythrinus</i> Pallas	Fringillidae	Passeriformes
8.	Fire Fronted Serine	<i>Serinus pusillus</i> Pallas	Fringillidae	Passeriformes
9.	Great Rose Finch	<i>Carpodacus rubicilla</i> Guldenstadt	Fringillidae	Passeriformes
10.	Plain Mountain Finch	<i>Leucosticte nemoricola</i> Hodgson	Fringillidae	Passeriformes
11.	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall	Motacillidae	Passeriformes
12.	Masked Wagtail	<i>Motacilla alba personata</i> Gould	Motacillidae	Passeriformes
13.	Citerine Wagtail	<i>Motacilla citreola</i> Pallas	Motacillidae	Passeriformes
14.	White Wagtail	<i>Motacilla alba</i> L.	Motacillidae	Passeriformes
15.	Red Billed Chough	<i>Pyrhcorax pyrrhcorax</i> L.	Corvidae	Passeriformes
16.	Yellow Billed Chough	<i>Pyrhcorax graculus</i> L.	Corvidae	Passeriformes
17.	Raven	<i>Corvus corax</i> L.	Corvidae	Passeriformes
18.	Golden Oriole	<i>Oriolus oriolus</i> L.	Oriolidae	Passeriformes
19.	Lesser Whitethroat	<i>Sylvia curruca</i> L.	Sylviidae	Passeriformes
20.	Brown Dipper	<i>Cinclus pallasii</i> Temminck	Cinclidae	Passeriformes
21.	Eurasian Chiffchaff	<i>Phylloscopus collybita</i> Vieillot	Phylloscopidae	Passeriformes
22.	Greenish Warbler	<i>Phylloscopus trochiloides</i> Sundevall	Phylloscopidae	Passeriformes
23.	Horned Lark	<i>Eremophila alpestris</i> L.	Alaudidae	Passeriformes
24.	House Sparrow	<i>Passer domesticus</i> L.	Passeridae	Passeriformes
25.	Rock Bunting	<i>Emberiza cia</i> L.	Emberizidae	Passeriformes
26.	Wall Creeper	<i>Tichodroma muraria</i> L.	Sittidae	Passeriformes
27.	Brown Accentor	<i>Prunella fulvescens</i> Severtzov	Prunellidae	Passeriformes
28.	Radde's Accentor	<i>Prunella ocularis</i> Radde	Prunellidae	Passeriformes
29.	Long Tail or Rufous Back Shrike	<i>Lanius schach</i> L.	Laniidae	Passeriformes
30.	White Cheeked Bulbul	<i>Pycnonotus leucogenys</i> J.E Gray	Pycnonotidae	Passeriformes
31.	Lammergeier	<i>Gypaetus barbatus</i> L.	Accipitridae	Falconiformes
32.	Himalayan Griffon Vulture	<i>Gyps himalayensis</i> Hume	Accipitridae	Falconiformes
33.	Eurasian Sparrow Hawk	<i>Accipter nisus melaschistos</i> Hume	Accipitridae	Falconiformes
34.	Eurasian Kestrel	<i>Falco tinnunculus</i> L.	Falconidae	Falconiformes
35.	Chukor Partridge	<i>Alectoris chukar</i> J.E. Gray	Phasianidae	Galliformes
36.	Himalayan Snow cock	<i>Tetraogallus himalayansis</i> G.R Gray	Phasianidae	Galliformes
37.	Snow Pigeon	<i>Columba leuconota</i> Vigors	Columbidae	Columbiformes
38.	Eurasian or Western Turtle Dove	<i>Streptopelia turtur</i> L.	Columbidae	Columbiformes
39.	Golden Eagle	<i>Aquila chrysaetos</i> L.	Accipitridae	Accipitriiformes
40.	Common Sandpiper	<i>Actitis hypoleucos</i> L.	Scolopacidae	Charadriiformes
41.	Little Stint	<i>Calidris minuta</i>	Scolopacidae	Charadriiformes
42.	Eurasian Cuckoo	<i>Cuculus canorus</i> L.	Cuculidae	Cucliformes
43.	Oriental Hawk Cuckoo	<i>Cuculus varius</i> L.	Cuculidae	Cucliformes
44.	Hoopoe	<i>Upupa epops</i> L.	Upupidae	Coraciiformes
45.	Common Moorhen	<i>Gallinula chloropus</i> L.	Rallidae	Gruiformes

Table 4. Mammals observed during the survey.

S. No.	Order	Family	Scientific name	Common name	Status IUCN 2005
1.	Chiroptera	Vespertilionidae	<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	LC
2.	Chiroptera	Vespertilionidae	<i>Plecotus austriacus</i>	Grey Long-eared Bat	NT
3.	Carnivora	Canidae	<i>Canis lupus</i>	Indian wolf	EN
4.	Carnivora	Canidae	<i>Vulpes vulpes montana</i>	Common Red fox	DD
5.	Carnivora	Ursidae	<i>Ursus arctos</i>	Brown Bear	CR
6.	Carnivora	Felidae	<i>Uncia uncia</i>	Snow leopard	CR
7.	Artiodactyla	Bovidae	<i>Capra ibex sibirica</i>	Himalayan Ibex	LC
8.	Artiodactyla	Bovidae	<i>Pseudois nayaur</i>	Blue sheep	EN
9.	Artiodactyla	Bovidae	<i>Ovis ammon polii</i>	Marco Polo Sheep	CR
10.	Lagomorpha	Leporidae	<i>Lepus capensis</i>	Cape Hare	VU
11.	Lagomorpha	Ochotonidae	<i>Ochotona macrotis</i>	Karakoram Pika	LC
12.	Rodentia	Sciuridae	<i>Marmota caudata aurea</i>	Golden marmot	LC
13.	Rodentia	Muridae	<i>Apodemus rusiges</i>	Field Mouse	VU
14.	Rodentia	Cricetidae	<i>Cricetulus migratorius</i>	Migratory Hamster	LC

(Legend: LC = Least Concern, NT = Near Threatened, EN = Endangered, DD = Data deficient, CR = Critically Endangered, VU = Vulnerable)

Table 5. Newly recorded birds in KNP.

S. No.	Common name	Zoological name	Location
1.	Eurasian Turtle Dove	<i>Streptopelia turtur</i>	Dhee, Qarchenai, Padekishk
2.	Oriental Hawk Cuckoo	<i>Cuculus varius</i>	Dhee, Qarchenai,
3.	Common Rose Finch	<i>Carpodacus erythrinus</i>	Shimshal, Dhee, Qarchenai,
4.	Common Moorhen	<i>Gallinula chloropus</i>	Dhee,
5.	Blue Throat	<i>Erithacus svecicus</i>	Shimshal, Dhee
6.	Eurasian Chiffchaff	<i>Phylloscopus collybita</i>	Shimshal, Qarchenai, Dhee
7.	Radde's Accentor	<i>Prunella modularis</i>	Barkhun, Koksil, Dhee
8.	Blue Rock Thrush	<i>Monticola solitarius</i>	Shimshal, Furzeen
9.	House Sparrow	<i>Passer domesticus</i>	Shimshal
10.	Indian Pipit	<i>Anthus novaeseelandiae</i>	Shimshal, Dhee
11.	Rock Bunting	<i>Emberiza cia</i>	Shimshal
12.	Rufous Backed Shrike	<i>Lanius schach</i>	Shimshal, Dhee, Qarchenai
13.	White Cheeked Bulbul	<i>Pycnonotus leucogenys</i>	Shimshal

Threats to wildlife in KNP

Poisoning the carnivores: During the late 1980's, snow leopard population was estimated as 30 animals in KNP (Chaudhry, 1989) whereas, during the present study, based on indirect observations like pug marks, scats, and territory marking signs, 3-5 Snow leopards were estimated in the park. Similar is the case with wolves. According to the park management plan, the local livestock was to be removed from the potential habitats within the KNP boundaries. However, this could not be done most likely because of the non-payment of compensation to the affected communities. As a result, the locals still keep their livestock within the Park and as such, grazing has not been stopped in KNP area. The presence of livestock in the park area attracts carnivore predators towards more easy prey like goats, sheep and yaks. When a snow leopard or wolf kills any grazing animal the owner of the herds poisons the carcass to kill the predator. This leads to the death of not only the attacking predator but also to many other carnivores that dependent on the left-over haunt. This situation has resulted in reduced number of wolves and snow leopards to an alarming level.

Table 6. Vantage Points marked in different valleys in KNP.

S. No.	Area	GPS location	Elevation (m)	Wildlife that can be observed
1.	Dhee nullah near Dhee check post		3,300	Reptiles: Himalayan Rock Agama and Pakistani Rock Agama Birds: Golden eagle, Yellow billed chuff, Mammals: Himalayan Ibex, Snow leopard, Red fox
2.	Dhee nullah about 5 km from Dhee	N: 36° 52' 573" E: 74° 58' 451"	3,615	Reptiles: Himalayan Rock Agama and Pakistani Rock Agama Birds: Golden eagle, Yellow billed chuff, Mammals: Himalayan Ibex, Red fox, Pika,
3.	Qarchenai Nullah	N: 36° 52' 198" E: 75° 02' 127"	3,444	Reptiles: Himalayan Rock Agama Birds: Golden Eagle, Yellow billed chough, Hoopoe, Black Redstart. Mammals: Snow leopard, Brown bear, Indian Wolf, Red Fox and Himalayan Ibex
4.	Qarchenai Nullah	N: 36° 52' 887" E: 75° 02' 126"	3,475	Reptiles: Himalayan Rock Agama Birds: Golden Eagle, Yellow billed chough, Red billed chough. Mammals: Snow leopard, Brown bear, Indian Wolf, Red Fox and Himalayan Ibex
5.	Qarchenai Nullah	N: 36° 53' 452" E: 75° 01' 926"	3,688	Reptiles: Himalayan Rock Agama Birds: Golden Eagle, Chukar, Yellow billed chough, Black Redstart and Eurasian Chiffchaff Mammals: Brown bear, Snow leopard, Tibetan Red Fox, Indian Wolf, Cape hare, Karakoram Pika and Himalayan Ibex
6.	Qarchenai Nullah	N: 36° 53' 723" E: 75° 01' 867"	3,719	Reptiles: Himalayan Rock Agama Birds: Golden Eagle, Chukar, Yellow billed chough Mammals: Brown bear, Snow leopard, Tibetan Red Fox, Indian Wolf, Cape hare, Karakoram Pika and Himalayan Ibex
7.	Qarchenai Nullah	N: 36° 54' 014" E: 75° 01' 666"	3,749	Birds: Golden eagle, Red billed chough, Yellow billed chough, Black Billed Magpie, Black Redstart, Eurasian Chiffchaff. Mammals: Himalayan Ibex, Karakoram Pika, Cape hare, Brown bear and Tibetan Red Fox
8.	Qarchenai Nullah	N: 36° 54' 720" E: 75° 01' 465"	3,780	Birds: Golden eagle, Red billed chough, Yellow billed chough, Black Billed Magpie, Black Redstart, Himalayan Snow-cock. Mammals: Himalayan Ibex, Brown bear, Cape hare and Snow leopard
9.	Qarchenai Nullah	N: 36° 55' 665" E: 75° 00' 990"	3,871	Birds: Golden Eagle, Red billed chough, Yellow billed chough, Himalayan Snow cock, Snow pigeon Mammals: Himalayan Ibex, Brown bear, Snow leopard, Cape hare, Red Fox, Golden Marmot and Indian Wolf
10.	Zoi Saam Nullah	N: 36° 57' 153" E: 74° 59' 705"	4,206	Birds: Golden Eagle, Red billed chough, Yellow billed chough, Himalayan Snow cock, Snow pigeon and Lammergeyer. Mammals: Golden marmot, Brown bear, Himalayan Ibex, Marco polo sheep, Snow leopard, Cape hare, Tibetan Red Fox and Indian Wolf.

Table 6. (Cont'd.).

S. No.	Area	GPS location	Elevation (m)	Wildlife that can be observed
11.	Zoi Saam Nullah	N: 36° 57' 306" E: 74° 59' 448"	4,221	Birds: Snow cock, Golden Eagle, Snow pigeon. Mammals: Himalayan Ibex, Brown bear, Snow leopard, Cape hare, Tibetan Red Fox and Marco polo sheep.
12.	Wologh Dor Nullah	N: 36 58' 847" E: 75 02' 321"	4,359	Best place for observing Marco Polo Sheep. Birds: Snow pigeon, Snow cock, Golden Eagle Mammals: Marco polo sheep, Brown bear, Golden marmot and Snow leopard.
13.	Padekishk Nullah	N:36° 49' 3.03" E:75°16' 8.70"	4,123	Birds: Snow Pigeon, Himalayan Snow cock, Chukar, Golden eagle, Lammergeyer, Red Billed Chough and Yellow Billed Chough. Mammals: Himalayan Ibex, Brown bear, Cape hare, Snow leopard, Golden marmot, Field mouse, Indian Wolf and Tibetan Red Fox.
14.	Padekishk Nullah	N:36°48' 45 8" E:75° 16' 16.5"	4,396	Birds: Common Rose Finch, Masked Wagtail, Himalayan Snow cock, Golden eagle, Lammergeyer, Red Billed Chough, Rock Bunting. Mammals: Himalayan Ibex, Brown bear, Cape hare, Snow leopard, Golden marmot, Indian Wolf and Tibetan Red Fox.
15.	Padekishk Nullah	N: 36°48' 10.56" E:75°16'19.72"	4,645	Birds: Common Rose Finch, Himalayan Snow cock, Golden eagle, Lammergeyer, Red Billed Chough and Snow pigeon. Mammals: Himalayan Ibex, Brown bear, Cape hare, Snow leopard, Golden marmot, Indian Wolf.
16.	Toghroqin Nullah	N:36°51'44.51" E:75°05'13.39"	3,502	Birds: Himalayan Snow cock, Chukor, Golden eagle, Lammergeyer, Red Billed Chough and Yellow Billed Chough. Mammals: Himalayan Ibex, Brown bear, Cape hare, Snow leopard, Golden marmot, Field mouse, Indian Wolf and Tibetan Red Fox.
17.	Toghroqin Nullah	N:36°51'00.41" E:75°05'05.35"	3,781	Birds: Himalayan Snow cock, Northern Raven, Black Redstart, Golden Eagle, Lammergeyer, Red Billed Chough and Yellow Billed Chough. Mammals: Himalayan Ibex, Brown bear, Cape hare, Snow leopard, Golden marmot, Field mouse, Indian Wolf and Tibetan Red Fox.
18.	Toghroqin Nullah	N:36°50'27.42" E:75°04'53.30"	4,049	Birds: Himalayan Snow cock, Snow Pigeon, Chukor partridge, Golden eagle, Lammergeyer, Red Billed Chough and Yellow Billed Chough. Mammals: Himalayan Ibex, Brown bear, Cape hare, Snow leopard, Golden marmot, Field mouse, Indian Wolf and Tibetan Red Fox.

Trophy hunting: During the late 1980's the population of blue sheep was estimated around 2,000 in KNP (Wegge, 1988) which later on showed a declining trend. There are multiple reasons behind this declining trend and trophy hunting being one of such reasons.

The area of KNP has traditionally been used by local communities for grazing of livestock. After the park was established in 1975, a very small part of it was declared protected against all kinds of uses including grazing of livestock. There was a general

understanding between local people and the park administration about the type of compensation to be granted in due course of time. Graziers claimed that they were not compensated in accordance with the agreement. Hence, doubts and mistrust developed and the Shimshalis refused to recognize Khunjerab as a National Park. They established an independent organization parallel to KNP named as “Shimshal Nature Trust” (SNT) in 1993. Shimshalis claim that nature has gifted them with blue sheep and it is their right to make full use of this renewable natural resource. Therefore, they started trophy hunting of blue sheep primarily to generate funds for the economic and social development of Shimshali community.

Many hunting organizations facilitate hunters for blue sheep’s trophy hunting. These organizations also facilitate hunters in trophy export documentation from National Council for Conservation of Wildlife (NCCW) and International Union for Conservation of Nature (IUCN). With the increase in trophy hunting, some locals got involved in illegal blue sheep hunting either by themselves or by organizing such un-authorized hunting expeditions for outside hunters which seems a threat for the population of blue sheep.

Overgrazing: Population of Marco Polo sheep; the key mammalian species in the KNP, was estimated around 500 at the time of establishment of the park which got reduced to about 50 in 1992. Khan & Khan (2003) reported 35 animals in 2002 while 19 animals in 2003 while during the present study, only 25 animals were observed in 03 small herds in Qarchenai valley. Marco Polo sheep normally stays on the Chinese side of the Khunjerab Pass where it is regularly hunted by Chinese Security Guards. Similarly, in KNP it is also facing the lack of food due to presence of grazers in the core habitat area in Qarchenai and Wologh Dor valleys. The pastures and grass land of Qarchenai valley belong to the people of Ghulkin village who use to graze their livestock from May to September every year. The pastures of Wologh Dor valley in Qarchenai are the lambing grounds of Marco Polo sheep. The plant species which are palatable and favorite for Marco Polo sheep, include: *Stipagrostis plumosa*, *Myricaria* spp., *Lonifera* spp., *Cicer microphyllum*, and *Poa* spp. which are shared by thousands of sheep, goats and yaks hence, offering a severe food competition to Marco Polo sheep in its lambing sites in KNP.

Food competitors: There is no serious threat to wild ungulates in their core habitats from predators as the buffer species like Golden marmot and Cape hare are there to share the predatory pressure on wild ungulates. The actual and major threat to wild ungulates is the presence of a huge number of domestic animals including sheep, goat and yaks which consume all available vegetation of the site before moving to another place, thus leaving nothing for wild ungulates.

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Khunjerab National Park (Urdu: $\text{Ø@Ù†Ø-Ø±Ø§Ø} \text{Ù†ÙCEØ} \text{Ù†Ù, Ù°4Ø§Ø±Ú@ã€Ž}$) is a national park in Gilgit Baltistan, Pakistan. Khunjerab National Park is Pakistan's third largest national park, and is adjacent to the Taxkorgan Natural Reserve in China. Khun means "blood" and jerav means "to stream" in Wakhi, the native language of the region. Khunjerab National Park was established primarily as a means to protect the Marco Polo sheep (as well as snow leopards and bharal) living in the area. The borders of the park were mapped

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