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Mammal's diversity of Ladakh (Jammu and Kashmir), India

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Abstract

Ladakh is a part of Trans-Himalayas in the Tibetan Plateau. The area is extremely arid, rugged and mountainous. The harsh environment is dwelling to only highly adaptable fauna. During the present studies, efforts have been made to compile the diversity of the Mammals as per the present studies as well as from the pertinent literature. It represents 35 species belonging to 23 genera, 13 families and 05 orders. 11 mammalian species are endemic to the area. The conservation status as per IUCN Red list of threatened species & cites and Indian Wildlife (Protection) Act, 1972 has been discussed. The various anthropogenic activities *viz.* development, construction of roads, tourism pressure, habitat degradation, hunting, poaching, illegal trade etc. are the main threats in the area.

Keywords: Trans-Himalayas, Tibetan Plateau, habitat degradation

1. Introduction

Ladakh-Trans-Himalayan Ecosystem is the highest altitude plateau region in India, situated in the state Jammu and Kashmir between world's mightiest mountain ranges i.e. Karakoram mountain range in the north and the main Great Himalayas in the south. State Jammu and Kashmir has 17 districts of which Leh and Kargil districts constitute the region of Ladakh. It comprises over 80% of the trans-Himalayan tract in India. It is located between 34°08' to 77°33'N and 34°.14' to 77°.55' E with an area of 96,701 sq. kms. It borders Tibet to the east, the Lahaul and Spiti to the south, the Valley of Kashmir, Jammu and Baltistan regions to the west and the trans-Kunlun territory of East Turkistan in Central Asia on the other side of the Karakoram range across the Karakoram Pass in the far north. The altitude of Ladakh ranges from 2,750m asl (at Kargil) to 7,672m asl (at Saser Kangri) in the Karakoram Range with an average altitude of above 3000m asl. Ladakh is traversed by two parallel chains, the Ladakh Range and the Zaskar Range. Ladakh range and Zansker range running in the east and west side respectively through Ladakh divides it into three main valleys i.e., Zansker valley, Indus valley and Nubra valley. The Zanker valley lies west to Zansker range, the Indus valley sandwiched between Zansker and Ladakh ranges and Nubra valley on the east side of Ladakh range crossing the Khardungla pass. The river Indus is the backbone of Ladakh. The Zanskar river flow northwards through a gorge in the Zanskar range, to join the Indus at Nyemo in Central Ladakh. The Pang-gong range runs parallel to the Ladakh range some 100 km northwest from Chushul, along the southern shore of the Pang-gong Lake. It is divided from the main range by the Tangtse River. Its highest range is 6700 m, and the northern slopes are heavily glaciated.

There are brackish and fresh water lakes. The brackish water lake comprises of Tso Morari, Pangong Tso and Tsokar in the region. Based on the ecological diversity of the Lake and its surroundings, the Tsomorari was notified in November 2002 under the List of Ramsar Wetland site. Other notable brackish water lakes in Ladakh are Tso Khyagar and Mitpal Tso. This region also harbours a few freshwater lakes i.e. Tsigul Tso Wet Land, Hanle Tso and Tso Startsapuk. Hemis National Park is a high altitude National Park in the eastern Ladakh region. It is the largest notified protected area and comprises an area of 4,400 sq. Km. and is the second largest protected area after the Nanda Devi Biosphere Reserve. The Park is home to a number of species of endangered mammals including the snow leopard.

The enormous mass of the Himalayas creates a rain shadow, denying entry to the moisture-laden clouds of the Indian monsoon into Ladakh. Due to the high altitude of Ladakh, the climate is very cold, the air is very thin and makes the heat of the sun very severe.

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The proportion of oxygen is less than in many other places at a comparable altitude because of lack of vegetation. The mountains are naked in Ladakh and the vegetation is extremely sparse. The vegetation is mainly on the streambeds and comprises mainly Seabuckthorn, wild roses and some medicinal grasses.

It is one of the most fragile mountain regions of the world and has a key role for regulating the climate of the country. Thus, the area is of worldwide significance for the conservation of biodiversity. The fauna found here is very unique as they have evolved to withstand the rigors of extreme climatic conditions. Its location, rugged landscapes and inaccessible slopes are the home for the rare/threatened fauna. Keeping in view the efforts have been made to document the mammalian fauna of the area. Though, the review of literature revealed that various works have been undertaken on the status, distribution and sightings of the mammals of the area from time to time. Some of the recent contributions are Mallon 1983 [6, 12], 1991; Osborne *et al.* 1983 [12]; Chundawat 1990 [4]; Joseph 1991 [5]; Sharma 1999 [15]; Pfister 2004 [13]; Jackson, R. and Rinchen, W. A. 2004 [17]; Namgail *et al.* 2005 [8], Shawl *et al.* 2008 [14]; Bhatanagar *et al.* 2006, 2007 [3], 2008, 2009 and Sharma & Dutta 2016. But, during the present studies, attempts have been made to compile the diversity of the Mammals of Ladakh as per the present studies as well as from

the available literature. The studies will be helpful for the conservation and sustainable development of the area.

Results and Discussion

During the present studies 35 species belonging to 23 genera, 13 families and 05 orders have been documented (Table-1). Four species *viz.* House rat- *Rattus rattus* (Linnaeus), Turkistan Rat- *Rattus pyctoris* (Hodgson, 1845), House mouse- *Mus musculus* Linnaeus, 1758 and Himalayan Field Mouse- *Apodemus pallipes* (Barrett-Hamilton, 1900) are found in the Ladakh as per (www.reachladakh.com/floral-and-faunal-diversity-of-ladakh) are not included in the present studies. 11 mammalian species *i.e.* Pallas's Cat- *Octocolobus manul* (Pallas, 1776); Tibetan Sand Fox- *Vulpes ferrilata* Hodgson, 1842; Himalayan Stoat- *Mustela erminea* Linnaeus, 1758; Kiang- *Equus kiang* Moorcraft, 1841; Tibetan Antelope/ Chiru- *Panthlops hodgsonii* (Abel, 1826); Ladakh urial or Shapu- *Ovis orientalis vignei* (Blyth, 1841); Bactrian Camel- *Camelus bactrianus* Linnaeus, 1758; E. Ladakh Mountain Vole- *Alicola stoliczkanus* (Blanford, 1875); E. Ladakh Pika- *Ochotona ladacensis* (Gunther, 1875); E. Large-eared Pika- *Ochotona macrotis* (Gunther, 1875); Plateau Pika - *Ochotona curzoniae* (Hodgson, 1858) are endemic to the area. The distribution in Ladakh has also incorporated of Shawl *et al.*, 2008 [14] and Pfister, 2004 [13].

Table 1: Systematic List of Mammals of Ladakh, Jammu & Kashmir

S.N.	Common Name	Scientific Name	Distribution		Conservation Status		
			India	Elsewhere	IUCN	IW(P)A	Cites (Appendix)
Order: Carnivora Family: Felidae							
1.	Snow leopard	<i>Panthera uncia</i> (Schreber, 1775)	Himachal Pradesh, Sikkim, Arunachal Pradesh, Uttarakhand and Jammu & Kashmir: (Ladakh- Hemis National Park and Zankar Valley)	Afghanistan, Bhutan, China, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russian Federation, Tajikistan and Uzbekistan	EN	I	I
2.	Tibetan Lynx	<i>Lynx lynx isabellina</i> Linnaeus, 1758	Himachal Pradesh and Jammu & Kashmir: (Ladakh- Hunder and Panamik area, Near Gya-Miru area of Leh, Rupchu area)	From Europe to the east of Asia including China, North America, with an exceptional concentration along a strip across Russia from Ural mountains to the Pacific, Tibet, Gilgit	LC	I	II
3	Pallas's Cat	<i>Octocolobus manul</i> (Pallas, 1776)	Jammu & Kashmir: (Ladakh- Rupchu, Changthang area)	Tibet, France and Pakistan	NT	I	II
Family: Canidae							
4.	Tibetan Wolf	<i>Canis lupus chanco</i> Gray, 1863	Himachal Pradesh, Sikkim, Arunachal Pradesh and Jammu & Kashmir: Kashmir, (Ladakh- Rupshu and Changthang plains, to some extent in Markha, Upper Suru Valley and Zankar)	Tibet, China, Mongolia and Afghanistan	Vu	I	I
5.	Red Fox	<i>Vulpes vulpes</i> (Linnaeus, 1758)	Gujarat, Himachal Pradesh, Punjab, Rajasthan, Sikkim, Uttar Pradesh, Jammu & Kashmir:	Europe, Asia and Northern Africa, North America and Australia.	LC	II	II

			(Ladakh- Throughout)				
6.	Tibetan Sand Fox	<i>Vulpes ferrilata</i> Hodgson, 1842	Jammu & Kashmir: (Ladakh- Between Parma Valley & Chushul, Chumur Valley, Hanle)	China and Nepal	LC	I	-
7.	Wild Dog	<i>Cuon alpinus</i> (Pallas, 1811)	Sikkim, Uttarakhand, Himachal Pradesh, Jammu & Kashmir: (Ladakh- Rupshu, Changthang area, eastern part of Hemis National Park and eastern Zanskar)	Bangladesh, Bhutan, Cambodia, China, Indonesia, Kazakhstan, Kyrgyzstan, Laos, Malaysia, Mongolia, Myanmar, Nepal, Russian Federation, Tajikistan, Thailand and Viet Nam	EN	II	II
Family: Ursidae							
8.	Himalayan Brown Bear	<i>Ursus arctos isabellinus</i> Horsfield 1826	Himachal Pradesh, Uttarakhand and Jammu & Kashmir: (Ladakh: Upper Suru, Zanskar, Changchu valley and lower Markha valley)	Nepal, Tibet and North Pakistan	CR	I	I
Family: Mustelidae							
9.	Himalayan Stoat	<i>Mustela erminea</i> Linnaeus, 1758	Jammu & Kashmir- (Ladakh- Suru & Zanskar Valleys and Markha Valley in Hemis National Park)	North America New Zealand, Europe, and Asia, from Greenland and the Canadian and Siberian Arctic islands south to about 35°N	LC	I	
10.	Mountain Weasel	<i>Mustela altaica temon</i> Hodgson, 1857	Himachal Pradesh, Sikkim, Uttarakhand and Jammu & Kashmir: (Ladakh- Hemis National Park, Shey, Thikse, Zanskar valley, Tsokar basin and Hanle)	Bhutan, China, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Russian Federation and Tajikistan	NT	II	III
11.	Siberian/ Himalayan Weasel	<i>Mustela sibirica</i> Pallas, 1773	Himachal Pradesh, Uttarakhand and Jammu & Kashmir: (Ladakh- Shey and Hemis National Park)	Bhutan, China, Japan, Korea, Korea, Republic of, Laos, Mongolia, Myanmar, Nepal, Pakistan, Russian Federation, Taiwan, Thailand and Viet Nam	LC	-	-
12.	Stone/Beech Marten	<i>Martes foina</i> (Erxleben, 1777)	Himachal Pradesh, And Jammu & Kashmir: (Ladakh- Kargil region, lower Indus, Nubra Valleys and lower region of Hemis National Park)	Nepal, Afghanistan and Pakistan	LC	II	III
Family: Mustelidae							
13.	Eurasian otter	<i>Lutra lutra</i> (Linnaeus, 1758)	Himachal Pradesh, Maharashtra, Punjab, Sikkim, Uttarakhand and West Bengal, Jammu & Kashmir: (Ladakh- Indus River and its tributaries including Runtse and lower Zanskar, Kargil area, Suru and Dras valleys)	Europe, Asia and Africa	NT	-	I
Order: Perissodactyla Family: Equidae							
14.	Kiang	<i>Equus kiang</i> Moorcraft, 1841	Jammu & Kashmir: (Ladakh- Resident throughout eastern and Northern Ladakh. Rupshu, Changthang region, Tsomoriri, Hanle, Chumur, Chushul, Tsokar and upper Markha Valley)	China, Nepal, Sikkim and Pakistan	Vu	I	II
Order: Artiodactyla							

Family: Moschidae							
15.	Musk Deer	<i>Moschus chrysogaster</i> (Hodgson, 1839)	Himachal Pradesh, Uttar Pradesh and Jammu & Kashmir: (Ladakh- Western Ladakh in Suru Valley).	Bhutan, China, Sikkim and Nepal	EN	I	I
Family: Bovidae							
16.	Tibetan Antelope/ Chiru	<i>Panthlops hodgsonii</i> (Abel, 1826)	Jammu & Kashmir: (Ladakh-Daulat Beig Oldi (DBO) in the Karakoram range and Changchenmo Valley in Leh).	-	EN	I	I
17.	Tibetan Gazelle	<i>Procorpa picticaudata</i> Hodgson, 1846	Sikkim and Jammu & Kashmir: (Ladakh-Changthang region, Kalak-Tartar plains south of Hanle Valley)	China and Tibet	NT	I	I
18.	Wild Yak	<i>Bos grunniens</i> Linnaeus, 1766	Himachal Pradesh and Jammu & Kashmir: (Ladakh- Changthang region and Chang-Chenmo Valley).	China and Nepal	VU	II	I
19.	Himalayan or Asiatic Ibex	<i>Capra sibirica</i> Pallas, 1776	Himachal Pradesh, Uttarakhand and Jammu & Kashmir: (Ladakh- Hemis National Park or Kanji near Lamayuru, Changla and Nubra Shyok valleys).	Afghanistan, Pakistan, China, Mongolia, Former Russia	LC	I	-
20.	Blue sheep	<i>Pseudois nayaur nayaur</i> (Hodgson, 1833)	Himachal Pradesh, Jammu & Kashmir: (Ladakh- Throughout Ladakh except Western Region, best areas are Hemis National Park, Chumatang-Mahe region, Rupshu, Changthang including Tsokar, Puga, Tsomoriri and Hanle).	China, Sikkim, Mongolia, Nepal, Pakistan and Pamir range in Tajikistan	NT	I	
21.	Tibetan Argali	<i>Ovis ammon hodgsoni</i> (Linnaeus, 1758)	Himachal Pradesh, Sikkim and Jammu & Kashmir: (Ladakh-Khemmer catchment near Gya and Miru, upper Rumbak valley, northern slopes towards Taklang-La and above Tsokar basin)	Afghanistan, China, Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Pakistan, Russian Federation, Tajikistan and Uzbekistan	NT	I	II
22.	Urrial or Shapu or Ladakh urial	<i>Ovis orientalis vignei</i> (Blyth, 1841)	Jammu & Kashmir: (Ladakh- Fotu La, Nindum and between Lamayuru, Rizong and Wanla. In Kargil- Junkar range and between Chiktan and Jukshu).	Armenia, Azerbaijan, Iran, Kazakhstan, Oman, Pakistan, Tajikistan, Turkey, Turkmenistan and Uzbekistan	VU	I	I
Family: Camelidae							
23.	Bactrian Camel	<i>Camelus bactrianus</i> Linnaeus, 1758	Jammu & Kashmir: (Ladakh: Nubra Valley)	Afghanistan, Turkestan			
Order: Rodentia							
Family: Sciuridae							
24.	Long-Tailed Marmot	<i>Marmota caudata</i> (Geoffroy, 1844)	Himachal Pradesh, and Jammu & Kashmir: (Ladakh- Upper Rumbak Valley westwards through the Zaskar and upper Suru region, less common along the Ladakh range eastwards to Khardungla).	Afghanistan, China, Kyrgyzstan, Pakistan and Tajikistan	LC	II	-
25.	Himalayan marmot	<i>Marmota himalayana</i> (Hodgson, 1841)	Himachal Pradesh and Jammu & Kashmir: (Ladakh- Upper Markha valley in Hemis National Park, Changthang plains including Tsokar and Rupshu, Puga, Tsomoriri)	Nepal, Sikkim, China and Pakistan	LC	II	-
Family: Cricetidae							
26.	E. Royle's Mountain Vole	<i>Alticola roylei</i> (Gray, 1842)	Himachal Pradesh, Uttarakhand and Jammu & Kashmir: (Ladakh- In and around Panikar upto Suru Valley, the Zaskar and Changchu Valley).	China and Nepal	NT	-	-
27.	Silver Mountain Vole	<i>Alticola argentatus</i> (Severtzov, 1879)	Himachal Pradesh and Jammu & Kashmir: (Ladakh-Southern slopes of the Tsokar plains).	Afghanistan, China, Kazakhstan, Kyrgyzstan,	LC	-	-

				Pakistan, Tajikistan and Uzbekistan			
28.	E. Ladakh Mountain Vole/ Stoliczkae's Mountain Vole	<i>Alticola stoliczkanus</i> (Blanford,1875)	Jammu & Kashmir: (Ladakh- Rupshu and Changthang regions like Tsokar, Puga, Chumur, Hanle and Chushul plains).	China, Pakistan and Nepal	LC	-	-
Order: Lagomorpha Family: Ochotonidae							
29.	Royle's Pika, Large-eared Pika	<i>Ochotona roylei</i> (Ogelby,1839)	Himachal Pradesh, Uttarakhand and Jammu & Kashmir: (Ladakh- Upper Suru and Zankar Valleys and also in Hanle region).	China, Nepal and Pakistan	LC	-	-
30.	E. Ladakh Pika	<i>Ochotona ladacensis</i> (Gunther,1875)	Jammu & Kashmir: (Ladakh- Tsokar and Hanle Plains)	China, Tibet and Pakistan	LC	-	-
31.	E. Large-eared Pika	<i>Ochotona macrotis</i> (Gunther,1875)	Jammu & Kashmir: (Ladakh- Lower Hunder Valley and towards Khardungla)	Afghanistan, Bhutan, China, Kazakhstan, Kyrgyzstan, Nepal, Pakistan and Tajikistan	LC	-	-
32.	Nubra Pika	<i>Ochotona nubrica</i> Thomas, 1922	Sikkim, Arunachal Pradesh and Jammu & Kashmir: (Ladakh- Among thickly <i>Hippophae</i> -covered valley bottoms along Indus valley and Shyok River, especially the Hunder, Diskit and Panamik region)	China, Sikkim, Arunachal Pradesh	LC	-	-
33.	Plateau Pika/ Black-lipped Pika	<i>Ochotona curzoniae</i> (Hodgson, 1858)	Jammu & Kashmir: (Ladakh- Changthang, Rupshu, Tsokar and Chushul plains)	Sikkim, China and Nepal	LC	-	-
Family: Leporidae							
34.	Cape Hare/ Brown Hare	<i>Lepus capensis</i> Linnaeus, 1758	Jammu & Kashmir: Kashmir, (Ladakh- Nubra and Shyok Valley)	Tibet			
35.	Woolly Hare Hodgson, 1840	<i>Lepus oiostolus</i> Hodgson, 1840	Sikkim, Jammu & Kashmir: (Ladakh: Rupshu and Changthang plains, Tsokar, Hanle, Chushul and also in Markha and Rumbak valley of Hemis National Park)	China, Tibet, Nepal and Pakistan	LC	-	-

Threats

The developmental activities, tourism pressure, human conflicts, habitat degradation etc. are the main threats in the area. The motorable roads are being constructed in the remote areas of the Ladakh. Consequently, the human pressure is increasing in these regions. Naorji & Sangha, 2011^[11] reported that Tibetan refugees settled at Hanle are directly creating new threats and disturbances in the area. The new agricultural lands are being developed in the area. The Hanle River has been diverted to the agricultural fields. During the studies, it has been noticed that in the Changthang area fencing has been fixed around the pasture land and agricultural field to avoid the Kinag away from grazing these areas. Further, it has been recorded that the brackish water lakes viz. Tso Morari, Pangong Tso and Tsokar in the region are under pressure. As, many tents have come up near these wetlands to prompt the tourism. The herds of domestic cattle have been recorded near these wetlands. The local communities as well as the nomads use to graze their cattle on the pastures near these wetlands. Rauf Zargar *pers. comm.* 2003 reported that during religious festivals, people use these wetlands and there is increased diversion of water channels for domestic use. Thus, there is tourism, over grazing pressure in the catchment areas and resulting habitat degradations in the area. Musk deer has been reported by single records from Western Ladakh in Suru valley prior to 1960 only. Few decades the animal was numerous but owing to intense poaching for highly priced musk gland, the population has

decreased drastically (Pfister, 2004)^[13]. The *C. bactrianus* has been recorded from the only Nubra Valley of Ladakh in India. These are used for tourism purpose in the area. Angchok *et al.* 2012^[1] reported that the private land owners and the Forest Department are in conflict with the camel owners because the animals trespass their fences and cause damage to their resources. They suggested that proper institutional norms need to be endorsed so that minor conflicts between the stakeholders could be sorted out locally. Further, the studies should be made to understand the animal and how to conserve it. The conservation can be done with the help of local communities in the area.

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