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SHORT COMMUNICATION

ON THE STATUS OF THE LONG-TAILED MARMOT *MARMOTA CAUDATA* (MAMMALIA: RODENTIA: SCIURIDAE) IN KARGIL, LADAKH (INDIAN TRANS-HIMALAYA)

Tanveer Ahmed, Mohammad Shoeb, Pankaj Chandan & Afifullah Khan

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ON THE STATUS OF THE LONG-TAILED MARMOT *MARMOTA CAUDATA* (MAMMALIA: RODENTIA: SCIURIDAE) IN KARGIL, LADAKH (INDIAN TRANS-HIMALAYA)

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Abstract: Two species of marmots occur in India, the Himalayan Marmot *Marmota himalayana* and the Long-tailed Marmot or Golden Marmot *Marmota caudata*. Marmots constitute part of the diet of some globally endangered carnivores in the Trans-Himalaya, yet studies on marmots in India are scanty. Besides, the status of the Long-tailed Marmot is still unknown in India. Considering this, a survey was carried out in Rangdum Valley, Kargil between May and July 2011 to collect baseline information on the Long-tailed Marmot. Trails and roads were explored through walk and slow moving vehicle, respectively. The Long-tailed Marmot was found to have a density of 14.31 ± 2.10 per sq.km. and an encounter rate of 2.86 ± 0.42 per km. Most of the observations of Long-tailed Marmot were in hilly areas (77.7%), lower slope (48.8%) and herbaceous meadow (38.0%). The current information is expected to bring concern towards this lesser known species in India.

Keywords: Abundance, habitat, Kargil, Ladakh, Marmot, threats.

Marmots are ground dwelling squirrels evolved 9.5 million year ago in North America (Steppen et al. 1999). They radiated in North America in the Miocene and Pliocene and Eurasia in late Pliocene or in early Pleistocene (Steppen et al. 1999; Armitage 2000). However, the retreat of glaciers and forest expansion restricted them to open mountain and landscapes or

the forest steppe or plain steppe zones (Steppen et al. 1999). They occupy habitats ranging from small, widely scattered alpine meadows to the wide-spread steppe environment. Hunting, habitat destruction along with climate change has threatened the survival of marmots across their distribution range. Of the recognized 15 species, one is Vulnerable, two are Endangered and one is Critically Endangered. The population trend of four species is decreasing and five species are still with an unknown population trend (IUCN 2016).

Marmots are restricted to the northern hemisphere (Barash 1989). Six species occur in western North America, two in Europe and the remaining six in Asia (Armitage 2000). In southern Asia, marmots have their distribution range in Afghanistan, Nepal, Pakistan and India (IUCN 2016). India is home to two species of marmots, namely, the Himalayan Marmot *Marmota himalayana* and the Long-tailed Marmot or Golden Marmot *Marmota caudata* (Image 1). Though both the species are found above the tree line at an elevation ranging between 3000m and 5200m, their region of occurrence vary, e.g., Himalayan Marmots are found across the Himalayan mountain ranges in Jammu &

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Kashmir, Uttarakhand, Himachal Pradesh and Sikkim (Satyakumar et al. 2011) while the Long-tailed Marmot is a resident of central and western Ladakh, Jammu & Kashmir (Pfister 2004).

Marmots form an important part of the diet of some globally endangered species in India such as the Snow Leopard *Panthera uncia*, Tibetan Wolf *Canis lupus chanco* and Himalayan Brown Bear *Ursus arctos isabellinus* along with the Red Fox *Vulpes vulpes* (Image 6), Golden Eagle *Aquila chrysaetos*, Bearded Vulture (Lammergeier *Gypaetus barbatus* and other associated carnivores of high altitude (Maheshwari et al. 2010; Ahmed 2015). Some of the predators of marmots are also involved in human wildlife conflict. Hence, the conservation and management of marmots are crucial to the interest of carnivores of high altitude and to mitigating the human wildlife conflict, yet studies on marmots are scarce. For instance, Pfister (2004) delineated the distribution of the Himalayan Marmot and Long-tailed Marmot in Ladakh. Tak & Sharma (2003) and Alfred et al. (2006) highlighted the status of the Himalayan Marmot in Ladakh. Information on the status and distribution of the Long-tailed Marmot is still lacking in India, however.

Considering this, a survey was carried out between May and July 2011 to assess the status and distribution of Long-tailed Marmots in Rangdum Valley, Kargil, Ladakh. The current information is expected to help future researches on this lesser known species.

MATERIAL AND METHOD

Study area

The current study was conducted in Rangdum Valley lying between 34°06'55"–33°56'32"N & 75°57'04"–76°19'02"E south-west of Kargil in the Jammu &



Image 1. Long-tailed Marmot *Marmota caudata*

Kashmir State of India (Fig. 1). The area is dotted with very few sparsely populated villages, viz.: Panikhar, Achambur, Tangole, Parkachik, Zuido and Tashi-tonge. At an elevation ranging between 3,245m and 4,550m, Rangdum Valley encompasses an area of about 200km². The climate of the area is a combination of arctic and desert type with severely cold winter and relatively cool and dry summers. The average annual temperature varies from -2°C (January) to 30°C (July–August). Precipitation is generally in the form of snow, however the average amount of rainfall ranges from 2.5mm in September to 39.6mm in March.

The vegetation consists of herbaceous meadows, grassy meadows and some planted trees that supports an assemblage of Asiatic Ibex *Capra ibex*, Long-tailed Marmot, Royle's Pika *Ochotona roylei*, Plateau Pika *Ochotona curzoniae*, Silvery Mountain Vole *Alticola argentatus* and Stoliczka's Mountain Vole *Alticola stoliczkanus*. The large predator in the area includes the endangered Snow Leopard, Himalayan Brown Bear and Tibetan Wolf. Additionally, medium and small-sized carnivores such as the Red Fox, Mountain Weasel *Mustela altaica* and Stoat *Mustela erminea* also occur in the area (Ahmed et al. 2015).

Methods

A trail and road transect method was used to determine the status of the Long-tailed Marmot in Rangdum Valley, Kargil. Each trail transect (0.5–2 km) and road transect (2–5 km) was traversed on foot and by slow-moving vehicle (10–12 km/hr) respectively. The survey was conducted in the morning between 0800hr and 1100hr following Christophersen (2012). Trails and roads were traversed only once by two observers, and individuals of the Long-tailed Marmot within a perpendicular distance of 100m on either side of the trail/road were recorded using a Nikon binocular (8X10). A fixed 100-m radius distance was used owing to the visibility of the Long-tailed Marmot in the study area. On each sighting, information on habitat variable such as elevation, slope, location and vegetation characteristics (plant community) were also recorded.

Results and Discussion

A total of 163 individuals of the Long-tailed Marmot were sighted in Rangdum Valley with a density 14.31 ± 2.10 per sq.km. and an encounter rate of 2.86 ± 0.42 per km. It was comparatively higher than the Siberian Marmot *Marmota sibirica* (0.123 ± 0.043 /km²) in eastern steppe (Townsend & Zahler 2006; Townsend 2009), Hoary Marmot *Marmota caligata* (5.03 ± 0.09 /

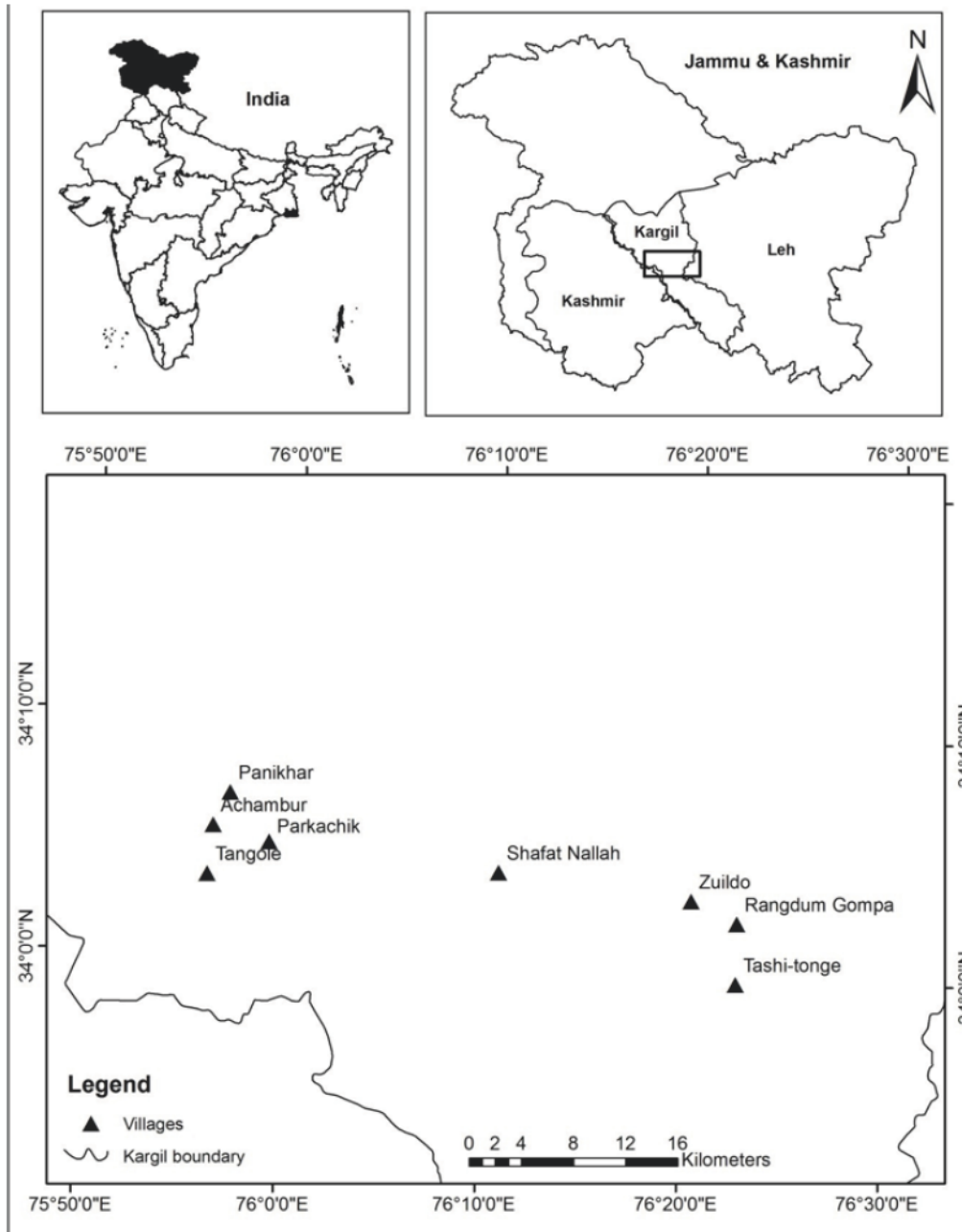


Figure 1. Rangdum Valley, Kargil, Ladakh, Jammu & Kashmir, India

km²) in North Cascades National Park Complex, Washington (Christophersen 2012). Frigerio et al. (1996) and Allaine et al. (1994) highlighted the avoidance of human activities by marmots. Hence our results of high density of Long-tailed Marmot might be due to the sparse and low human population in Rangdum Valley. A large portion of the sightings of the species occur at an elevation more than 4,000m and very few at less than 3,500m (Table 1). Marmots are known to occur at an elevation above or near the timber line (Armitage 2000).

The Long-tailed Marmot was recorded mostly in hilly areas (77.7%) than in valleys (18.9%) or plateaus (4.1%) (Table 1). Sightings of the Long-tailed Marmot in hilly topography might be due to hilly areas in Rangdum Valley containing habitat like herbaceous meadow and grassland. Grassland and meadows are used by marmot for foraging (Armitage 2000). Almost half of the sightings of the Long-tailed Marmot were made in lower slope (48.8%) and remaining in middle slope (30.6%), upper slope (19.8%) and cliffs (4.1%) (Table 1; Images 2–5).

Table 1. Abundance of Long-tailed Marmot recorded at various habitat variables in Rangdum Valley, Ladakh, Jammu & Kashmir, India

Variable	Category	Frequency of sighting	% of sightings	Total individuals encounter	P value (χ^2)
Topography	hilly	94	77.7	128	<0.01
	plateau	5	4.1	7	
	valley	22	18.2	28	
Location	cliff	1	0.82	1	<0.01
	lower slope	59	48.8	79	
	middle slope	37	30.6	54	
	upper slope	24	19.8	29	
Elevation (m)	<3500	9	7.4	9	<0.01
	3501–4000	33	27.3	44	
	<4000	79	65.3	110	
Slope	flat (0–20 %)	31	25.6	41	>0.05
	moderate (21–40 %)	30	24.8	45	
	steep (40–60 %)	35	28.9	48	
	very steep (>60%)	25	20.7	29	
Habitat	scrubland	12	3.3	18	<0.01
	grassland	32	6.6	24	
	herbaceous meadows	46	9.9	65	
	riverine	8	15.7	9	
	rocky	19	26.4	42	
	cultivation	4	38.0	5	

Our high sighting of the Long-tailed Marmot in lower slope is in line with the results of Rodrigue et al. (1992) who highlighted that slope, sun exposure, and plant cover significantly affect habitat choice by *M. marmota* in the French Alps. Among the slope categories, 28.9% of individuals of Long-tailed Marmot were observed at steep slope followed by moderate slope (24.8%) and very steep slope (20.7%) (Table 1). The high sighting of Long-tailed Marmot at steep slope is concurrent with the earlier study (Panseri & Frigerio 1996) who delineated the increased use of steep slope in Orobian Alps between 1985 and 1992. Besides marmots are known to use steep to moderate slope that provide good drainage (Armitage 2013). Regarding habitat, the Long-tailed Marmot was observed at a maximum in herbaceous meadow (38.0%) followed by grassland (26.4%) and rocky area (15.7%) (Table 1). COSEWIC (2008) also reported the preference of these habitats by other congeners. These habitats are used by marmots for foraging and den making. Significant difference was found in the use of various vegetation classes ($\chi^2=63.73$, $df=5$, $p<0.01$), topography ($\chi^2=110.70$, $df=2$, $p<0.01$) and location ($\chi^2=51.45$, $df=3$, $p<0.01$).

The abundance of the Long-tailed Marmot

suggested the species to be fairly common in Rangdum Valley. However, Rangdum Valley is threatened by increasing human and livestock population. Besides, several developmental projects, such as building roads to remote areas and dams for electricity, are underway in Kargil which will further reduce the available habitat to this lesser known species. Furthermore increasing tourism along with tourism related activities like trekking, camping and waste dumping in the remote areas are also a threat to the habitat of the Long-tailed Marmot (Geneletti & Dawa 2009).

Because this was the first baseline survey of Long-tailed Marmots in Kargil, no information is yet available regarding other areas of Kargil. It is still ambiguous whether the population is stable or unstable. Given the considerable concern about the potential impacts of increasing human and livestock population, habitat degradation and increased tourism, proper planning and awareness programmes are recommended in entire Kargil to sustain the species in the area. Surveys should be conducted in entire Kargil to develop baseline information on the status of the Long-tailed Marmot.



Image 2. Long-tailed Marmot in rocky habitat



Image 3. Long-tailed Marmot in grassy meadows



Image 4. Long-tailed Marmot in its den



Image 5. Long-tailed Marmot in alert position

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Image 6. Red Fox - a common predator of Long-tailed Marmot in Rangdum valley, Kargil, Ladakh

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