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Mammalian diversity of Chandertal wild life sanctuary in Lahaul and Spiti district, Himachal Pradesh, India

Ranjit Singh and Desh Raj Thakur

Abstract
The exploration in such a distinct biogeographic zone of Chandertal Wildlife Sanctuary characterized by extreme cold, low precipitation and alpine cold desert, revealed 11 mammalian species belonging to 11 genera under 6 families of 3 orders. Maximum 6 species belong to order Artiodactyla (Bovidae: 5 spp. and Moschidae: 1 sp.) followed by 3 species to Carnivora (Canidae: 2 spp. and Felidae: 1 sp.) and one species belonging to each family Muridae, Sciuridae under order Rodentia. Artiodactyl species contribute more than half of total mammalian species and carnivores only one third.

Keywords: Biogeography, Chandertal, Himachal Pradesh, mammals, wetland, wildlife, sanctuary

1. Introduction
Mammals inhabit the globe and exploit the resources of earth from pole to pole and from mountain top to deep oceans. Like India the biodiversity in Himachal Pradesh is also very rich and diversified due to its varied climatic conditions ranging from tropical in foothills to arctic environment in trans-Himalayan region. The extinction rate results in rapid loss of biodiversity of animals. With the extinction of species we are losing the potential contributors of future food, medicine and valuable links in natural and biological cycles. Although extinction found to be a natural phenomenon as fossil records reveal that on an average one species dies out in every 100 years. But during the last 200 years the rate of extinction has been 40 times greater than this. The major causes of extinction are habitat loss and habitat degradation. Changes in land use patterns have a detrimental effect on habitats which have been fragmented and reduced in extent and diversity (Birdlife International, 2001; Jhunjhunwala *et al*., 2001) [1, 5]. In an estimate human-induced extinction rates are 100-1,000 times the geological background rate and are predicted to increase another 10 times. 107 mammalian species 0f 9 orders, 25 fanilies and 77 genera have been reported from Himachal Pradesh (Chakraborty *et al*. 2005) [3], however, the number recently increased to 111 species (Sharma and Saikia, 2009) [10]. The Chandertal Wildlife Sanctuary (WLS) possesses an internationally known Ramsar site and Wetland of national importance situated near little below the Kunzam Pass (4520 m amsl). It is situated at 32^0 29' N latitude and 77^0 36'E longitude with an altitude upto 4830 m above mean sea level falling in the 1 B Tibetan Plateau Biogeographic zone. It exhibits half-moon shaped rock basin Chandertal Lake (4270m amsl) formed by glacial melt in land locked depression with single outlet which drain down into Chandra river (Fig. 1). Lake with crystal clear water inhabits Shrimps and larvae of Trichoptera etc. A few semi-permanent land locked water reservoirs are also present which help in wetland formation. Since water is basic need of living organisms so it supports the floral and faunal species.
The faunal diversity at higher elevations of Himachal Pradesh is mostly Palaearctic alongwith extensions of Oriental elements. In such a distinct biogeographic zone, characterized by extreme cold, low precipitation and alpine cold desert, 11 mammalian species belonging to 11 genera under 06 families and 03 orders have been observed. The research work was carried out with the following objectives: (i) To catalogue the mammalian diversity found in and around

the Chandertal Wetland and (ii) To document the enumeration and distribution of mammalian species of Sanctuary.

Fig 1: Photographic view of Chandertal Lake with Yaks grazing in the background.

2. Materials and Methods

The mammals in the study area were both diurnal and nocturnal, therefore, their presence was assessed by using direct as well as indirect methods. Sighting and capturing them in high resolution camera was used in direct method. Different groups of shepherds who visit the sanctuary area usually every year were also approached to know the presence of some mammals (Snow Leopard, Ibex, Tahr, Tibetan and Blue Sheep etc.). Indirect methods involved the quantification of indirect evidences such as pug marks, hoof marks and faecal matter of mammalian species. The direct evidences of large and medium sized mammals may be sampled by using line transect method (Burnham *et al*., 1980) [2]. It is based on being able to follow a straight transect line or series of straight line segments. The line transects are held in stratified random design with either vegetation type, or terrain type as stratification criteria. These line transects are regularly monitored and mostly during the high activity period of mammals. For small mammals, camera trap method (for Himalayan Marmot) and Sherman Trap (for *Pitymus* sp.) were used. Wire mesh cage trap were also used to capture the *Pitymus leucurus* by using wheat bread as bait. The traps were deployed near active rodent holes and camouflaged by surrounding as highly visible strange object may frighten the animals. As wild animals are highly susceptible to injury inside a trap, therefore, these were examined at regular intervals. Nikon D-80 Camera with zoom tele-lenses, 10 x 50 super Zenith field binocular and 1000 mm tele-lens of Questar make were used for field photography. The research work was carried out between the years 2008-2014, during which the study area was regularly visited.

3. Results

From Chandertal Wetland and its surrounding area, 11 mammalian species belonging to 10 genera under 6 families of 3 distinct orders have been observed (Table: 1). Maximum 6 species belong to order Artiodactyla (Bovidae: 5 spp. and Moschidae: 1 spp.) followed by 3 species to Carnivora (Canidae: 2 spp. and Felidae: 1 sp.) and one species belong to each family Muridae, Sciuridae under order Rodentia. (Fig. 2). Artiodactyl species contribute more than half of total mammalian species and carnivores only one third. In higher forms pyramid of number also justifies the decrease in number of species as trophic level increases. Snow leopard, Indian wolf and Red fox (Fig. 3) are carnivorous species which predate on wild as well as shepherd herds. Shepherds along with their sheep and goat herds visit the sanctuary area regularly during favourable season i.e., June-September, during which the snow melts and pastures appear. Ten different herdsmen were approached at different times for getting information about wild mammals they faced or observed because they are usually familiar with wild habitats. All the herdsmen confirmed these three carnivorous species in the area and two of the herdsmen narrated the attack of Snow leopard on their sheep and goat during day time. They explained that attack was so quick that within half an hour, leopard killed their 12 sheep and 9 goats.

Only two pairs of *Moschus chrysogaster* were observed only once in a grassy patch along the Chandra river. The Siberian Ibex too found in rare sights. The other bovids (Himalayan Tahr, Blue Sheep (Fig. 4) and Nayan) were observed in small and separate herds, mostly near inaccessible terrains. Yak is a common visitor in this region searching for food in grassy meadows (Fig. 5). For a few times they were found grazing around water sources. Himalayan Marmot may be commonly seen early in the morning up to afternoon hours but due to their shyness and fearness, they abruptly hide in multi-opening ground burrows, when human beings tend to approach them (Fig. 6). Observing them in natural way is very pleasant since their sitting posture and other activities were interesting. Short tailed *Pitymus leucurus* is smallest mammal found in Chandertal WLS, observed in aggregation of 10 to 15 around single nesting burrow (Fig. 7). Four nesting burrows were identified situated mostly near or below boulder with rich grassy carpet.

Table 1: Systematic list of mammals noticed in Chandertal Wildlife Sanctuary

Sr. No.	Order	Family	*Scientific Name*	Common Name
1	Carnivora	Canidae	*Canis lupus* L.	Indian Wolf
2	,,	,,	*Vulpes vulpes* L.	Red Fox
3	,,	Felidae	*Uncia uncia* (Schreber)	Snow Leopard
4	Artiodactyla	Moschidae	*Moschus chrysogaster* (Hodgson)	Musk Deer
5	,,	Bovidae	*Capra sibirica* (Pallas)	Siberian Ibex
6	,,	,,	*Hemitragus jemlahicus* (Smith)	Himalayan Tahr
7	,,	,,	*Pseudois nayaur* (Hadgson)	Blue Sheep
8	,,	,,	*Ovis Ammon* (Blyth)	Nayan
9	,,	,,	*Bos grunniens* L.	Yak
10	Rodentia	Muridae	*Pitymus leucurus* (Blyth)	Vole
11	,,	Sciuridae	*Marmota himalayana* (Hodgson)	Himalayan Marmot

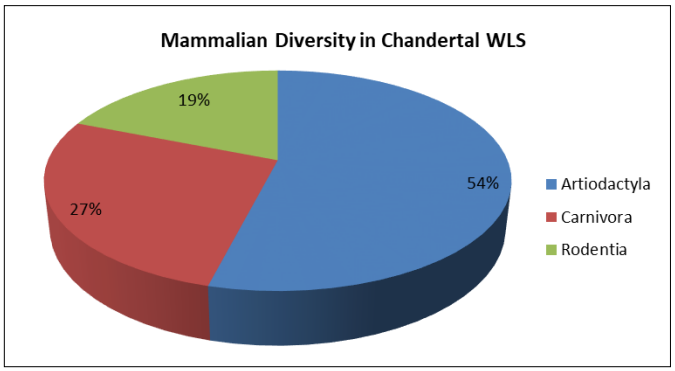

Fig 2: Percentage composition of various mammalian orders reported from Chandertal Lake.

Fig 3: Red Fox

Fig 4: Blue Sheep

Fig 5: Yak

Fig 6: Himalayan Marmot

Fig 7: Vole

4. Discussion

11 mammalian species belonging to 10 genera under 6 families of 3 distinct orders have been observed from Chandertal Wetland and its surrounding area. Maximum 6 species belong to order Artiodactyla followed by 3 species to Carnivora and one species belong to each family Muridae, Sciuridae under order Rodentia. The Pin Valley National Park (with almost similar geography and climatic conditions) has been explored for mammalian diversity by Sharma (2008) [12] which also revealed presence of 9 mammals including 6 carnivore, 3 artiodactyl and 1 logomorph species. Earliar, Chakraborty (2005) [3] has also reported 107 mammalian species (including 7 species common with chordate reported from Chandertal WLS) from different parts of Himachal Pradesh. In almost similar environment, Khangchendzonga Biosphere Reserve in Eastern Himalaya also possess threatened species of mammals (Snow leopard, Musk deer, Himalayan tahr, Tibetan wolf, Nayan etc.) and of birds (Himalayan bearded vulture, Tibetan snow cock, Himalayan golden eagle etc.) (Lepcha, 1988) [6]. Lahaul & Spiti district have been explored for faunal studies by Saini and Ghattor, 2007; Sharma, 2008; Paliwal, 2008; Gupta, 2008. But very less or selected faunal studies have been carried out on Chandertal Wildlife Sanctuary. The small mammalian fauna of Himachal Pradesh have received relatively little attention during recent years compared to other vertebrate groups (Singh *et al*., 2014) [12]. Threatened mammalian species must be treated by modern techniques for their multiplication and breeding. These faunal species of higher elevations are significantly important due to their adaptations and endemism (Mehta, 2005) [12].

5. Conclusion

Habitat loss, habitat fragmentation, change in habitat quality, unsustainable natural resource consumption due to human load and change in climatic conditions are causes of biodiversity loss. The comprehensive and integrated framework is the exigency to the complex target of managing biodiversity for conservation, sustainable use and benefit sharing objectives. This work may be useful in making the old taxonomic work more meaningful and for the enumeration of endemic taxa of Himalayan region.

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