

Dietary composition of Leopard (*Panthera pardus fusca*) in Mukandara Hills National Park, Kota, Rajasthan, India

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ABSTRACT

Food habit of a carnivore animal is a determining factor for its food habit. In the study area, Mukandara Hills National Park, there is very low density of wild ungulates. Among the wild prey species, Hanuman langoor, wild boar, hare, monitor lizard, mongoose, porcupine and birds were occasionally sighted. During the study total 9 transects were laid out. Scats were collected opportunistically as well as systematically from different habitats including den sites all over the study area as and when encountered during the field work or walking on transects. Analysis of all collected 13 scats shows the availability of leopard diet in this National Park. The prey identified through hair analysis with the help of microscopic study in lab. Observation shows that common Hanuman langoor, Jackal, Blue Bull, Fox, Wild Boar and domestic dog are compose part of regular diet of Leopards. Among these prey species highest frequency (76.92%) of hairs of common Hanuman langoor makes it main staple diet of Leopard in Mukandara Hills Tiger Reserve.

Key words: Leopard, opportunistic search, transects, langoor, prey, scats etc.

INTRODUCTION

Leopard as one of the most ferocious and cunning member of the larger cat family can surely be described as the most perfect predator of the big cats and graceful in its movements¹. The leopard show great variation in appearance and behaviour. The Indian leopard (*Panthera pardus fusca*) is a sleek short-haired animal with a fulvous or bright fulvous coat marked with small close-set black rosettes^{2,3,4}. These rosettes are smaller and have no dark spots in the middle but are black circles broken into 2 to 5 parts. The coat colour varies from pale yellow to deep gold. Animals from the desert zone are paler. Leopards from Kashmir have soft deep-furred grey buff coats with small, thick-rimmed rosette. The coat colour and rosettes patterns are broadly associated with surrounding habitat types⁵. Coat patterns differ between individual leopards and from one side of the body to the other in the same individual^{6,7}. Its response on habitat and food varies according to the habitat it occupies and prey availability^{8,3,9}. Leopards can easily survive in human dominated areas by changing its dietary habits to include the livestock and dogs^{1,10,8,11,9,12,13,14}.

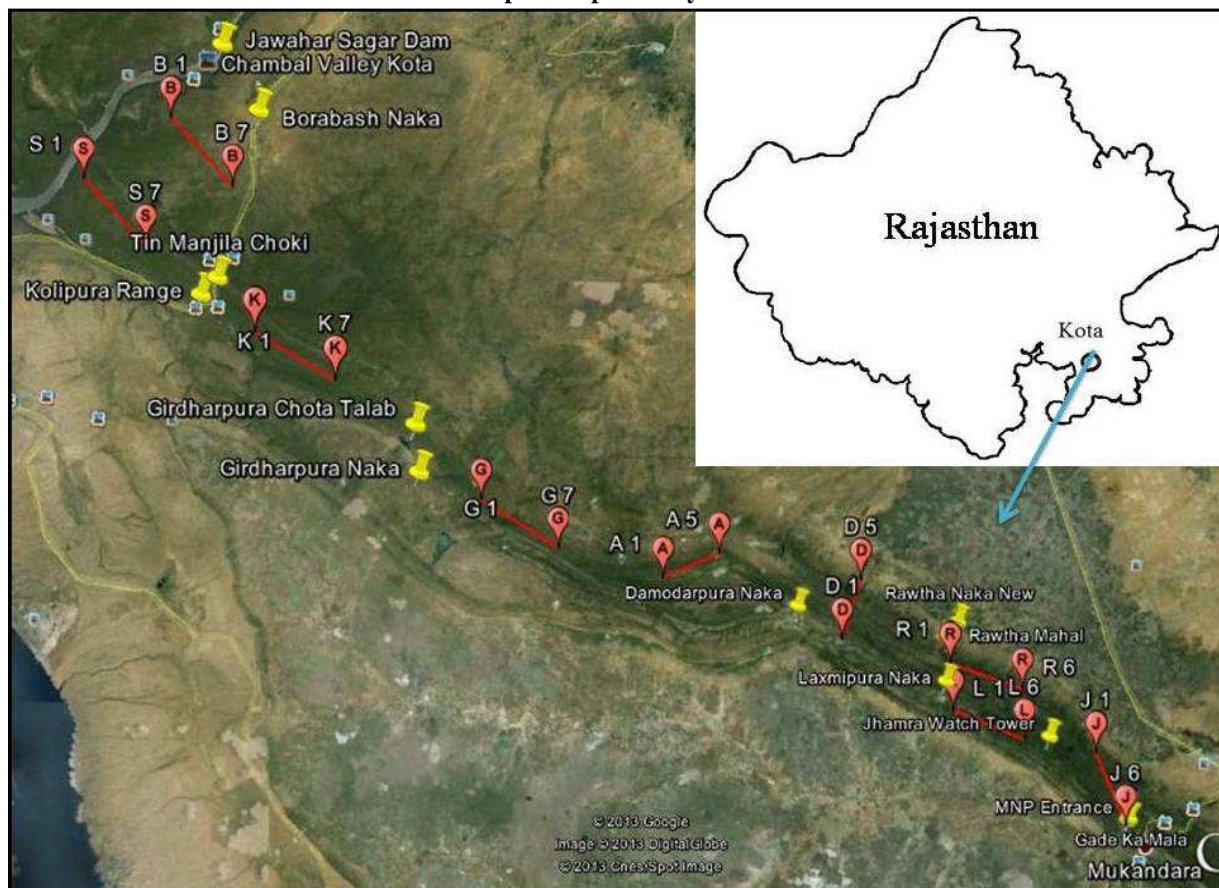
Stabilize the dietary composition of leopard through the examination of scats analysis on the basis of hair examination. Present study provides prey and predator relationship and also the information about favourable factor for survival of leopard in Mukandara Hills National Park.

STUDY AREA:

The whole field studies carried out in Mukundra Hills National Park of Kota district of Rajasthan state during the session of 2013. It is located in the South-West part of Rajasthan of India, at the coordinates of 25°03'-24°48' to 75°43'-75°59', 199.45 sq. km. (Map-1). Recently in the month of April 2013 State

Government declared it as third Tiger reserve of the state. As for boundary information; Chambal River makes western boundary which is upto Geparnath valley in Eastern side. Delhi-Mumbai railway track divides it from Darrah Wildlife Sanctuary. In the Northern border is maintained by fire line; whereas Chittorgarh district is situated at its Southern border.

Map 1: Map of study area



Mukandara Hills National Park is densely wooded and is spread over a hilly terrain. It is thronged with various wild herbivores, carnivores animals. Some of the resident species of this mysterious forest are Sambhar deer, spotted deer, blue bull, chinkara and wild boar. Today, Mukandara boasts of a rich wildlife population consisting of leopards, wolves and sloth bears. The Park is also cradle home of several resident and migratory birds and reptiles. Besides it this National Park is lush with green foliage and many rare medicinal herbs and trees. The tourists seeking adventure and solitude indulge in trekking along the many mountain trails and in undertaking jeep safaris through the forested areas.

METHODOLOGY

To achieve perfect and conclusive result following method was followed during study-

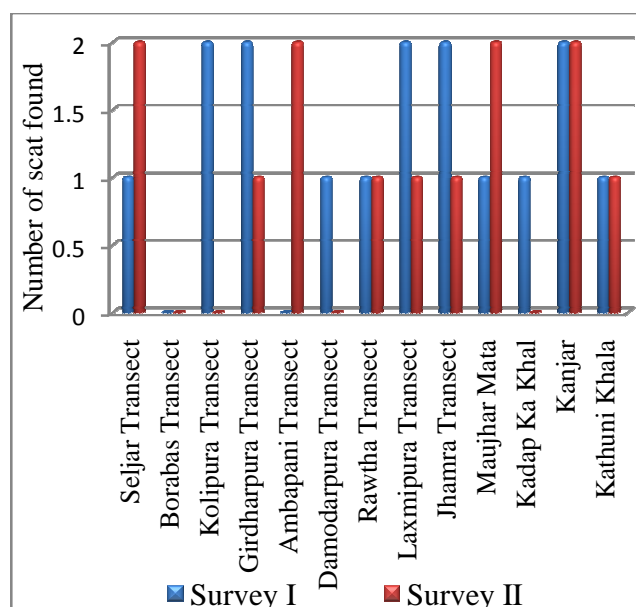
Transect Line Method- : Line transect method^{15,16} was used to estimate the overall density, relative density, encounter rate and group size. Line transect method is practical, efficient and inexpensive. Nine transects were systematic randomly laid varying in length between 2 km to 3 km with time 6:00 am to 10:00 am. In this method a line is put up in a road which was often used by wild animals. In these methods especially researcher they take a rope of 20 meters long (for prepare a quadrate) or make transect in every 500 meters, total number of species were counted which comes under in the transit. In this method the evidences observed in both side of the line (as the length of 2-3 Km in field sampling). Leopard scats were collected whenever encountered in the study area during the study period. Scats are commonly used to determine the food habit, as it is **non-destructive technique**^{3,17}. Binocular, Camera- Digital and SLR, GPS and Zip pouch like equipments were used during the study.

OBSERVATIONS AND RESULT

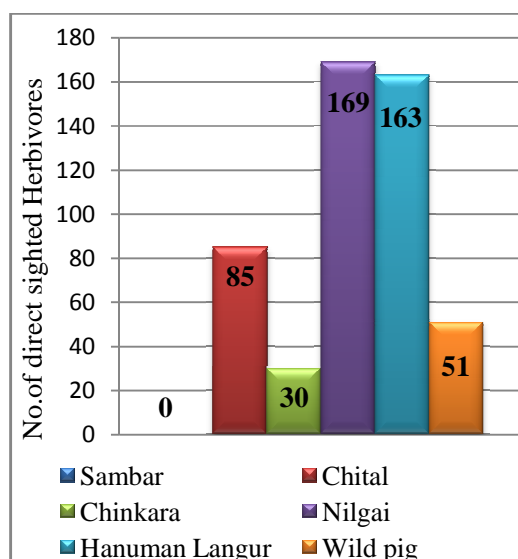
During transects scats were collected opportunistically as well as systematically from different habitats including den sites all over the study area as and when encountered during the field work or walking on transects. These scats were differentiated from other co-existing carnivore species based on their shape, size and associated signs like scraps and tracks^{10,18}. Leopard is the only big cat found in most part the study area so in the absence of Tiger and Lion, it was easy to identify its scat from other small predators without any confusion. There was a possibility of confusing leopard scats with the faeces of dogs in the study area. Scats were considered to be leopard scats if they had pointed ends and many lobes in relation to their size or if they were associated with the pug marks or scraps¹².

The scat samples were collected and brought to the laboratory for food habit analysis by microscopic based analysis of hair using cuticular and medullar characteristic. One of the important aspects in studying the food habits of carnivores is to find the number of scats required to get the accurate picture of the diet of the animal^{17,19}. During the survey 29 scat samples were observed in 13 spots in this National Park. The maximum 4 scats were collected from the Kanjar site. A total of 29 scat samples were collected during study in two surveys. In first survey 16 scats of leopard were collected and 13 scats were collected in second survey. 13 scats samples of second survey analysed in this study (Graph-1).

Graph-1: Number of Scat collected from the transect survey and opportunistic search



Graph-2: Status of direct sighted Herbivores in MHNP at transects



Scat analysis: The scats will be examined in reference to wild and domestic prey species. Prey species identification is based on the microscopic hair analysis, and presence of bone fragments, teeth nails and other hard parts as described by Grobler J.H. *et al*²⁰ and Mukherjee S. *et al*¹⁷ Based on preliminary examination of leopard scats, broadly the occurrence of prey items were determined. Scats were processed for analysis. These scats were subsequently washed in flowing water through a fine (<1mm) sieve^{21,22}. The sieved prey remains, grass and soil were sun dried and oven dried (60°) in thin paper bags for 2-3 days to avoid fungal growth.

Food habit analysis from scat of leopard by morphometric method: A non-contaminated small part of scat sample is placed on tissue paper. At first we need to find out whether there is presence of hairs or not; if present then they are needed to be plucked out using forceps for cuticular and medulla identification (Graph-2). After the scat is pill into small pieces it is then kept into the petri plate and observed under the microscope to find additional food materials which has been missed out by our necked eye. Then the species which are separated are identified and categorized under different headings. After all the species and other food materials are being listed in a sheet then the percentage of different food items are calculated applying the formula as follows:

$$\text{Pre cent Occurance} = \frac{\text{Total No. of occurrences of a species}}{\text{Total No. of the sample}} \times 100$$

The table-1 shows the prey species identification from the different scat sample with the help of microscopic analysis of hairs found in scats. After analysis of the scats, the following prey species observed as common Hanuman langoor, Blue Bull, Fox, Jackal and Domestic dog.

Table 1: Major foods of Common Leopard (Total scat sample n=13) in Mukandara Hills National Park, Rajasthan

Category	Common Name of identified species	No. of samples in which present	Per cent occurrence
Major food (> 40%) of Common Leopard	Common Hanuman languor	10	76.92%
	Blue Bull	2	15.38%
	Jackal	3	23.08%
	Fox	1	7.69%
	Domestic dog	2	15.38%
	Unidentified hair	2	15.38%

In table-1 total of 13 scats sample analysed in lab and their results shows the status of prey presence of leopard diet availability. The maximum prey species found in leopard scats samples 10 Common Hanuman langoor (76.92%) identified with the help of hair analysis presence in samples. The minimum (7.69%) prey observed in scat as fox.

DISCUSSION

Food habits and prey selection of leopard in Mukandara Hills National Park: Availability of prey is an important factor to determine the food habit of a carnivore²³. No such type of scientific study has been done before in Mukandara Hills National Park. There is very low density of wild ungulates. Sighting of wild boar, hare, deers, monitor lizard, mongoose, porcupine and birds is not so frequent. The domestic prey species on which the predators are dependent for their food are goat, cattle, and domestic dog. Mosaic of forest areas, agricultural land and human habitation provided a mix of habitats to leopard.

An analysis of 13 scats shows the availability of leopard diet in this National Park. Microscopic studies of hair of leopard's scats shows common Hanuman langoor, Jackal, Blue Bull, Fox, Wild Boar and Domestic dog acts as regular diet for leopards. The frequency of the percentage occurrence of the prey observed through the scat analysis of leopard as 76.92% of Common Hanuman langoor, 23.08% of Jackal, 15.38% of Blue Bull, 7.69% of Fox, 15.38% of Domestic dog and 15.38% of Unidentified.

CONCLUSION

Anthropogenic activities have been found as the main factors which are affecting populations of main prey of leopard. So proper conservation strategies are strictly required in this area, so future human-animal conflicts can be relaxed.

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