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ORIGINAL ARTICLE

Habitat Preference of Indian Langur (*Presbytis entellus*) at Goverdhan, Mathura

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ABSTRACT

The observations on habitat preference of Indian langur Presbytis entollus were made at different places of Goverdhan, Mathura, India. Both infant and juvenile showed highest preference to vegetable fields (40.00 and 13.33 %) followed by forest and temples (35.48 and 12.90 %) and minimum to village and orchard (30.00 and 10.00 %). However, sub-adult male and female given highest preference to village and orchard (10.00 and 25.00 %) followed by forest and temple (9.47 and 22.58 %) and minimum on vegetable fields (6.66 and 20.00 %). Furthermore, female always showed higher preference to vegetable field (40.00 %) and minimum on village and orchard (15.00 %). The observations on the preference of home range showed that Presbytis entellus visited maximum area of forest and temple (0.31 km) followed by vegetable fields (0.25 km) and minimum village and orchard (0.18 km). Moreover, they also used maximum area of vegetable field occasionally (0.80 km) and minimum village and orchard (0.58 km). Moreover, maximum death (02 individuals) recorded in vegetable field as well as village. In vegetable field the mortality of juvenile was occur due to accident while new born infant died due to severe cold. In village and orchard the mortality of sub adult female was recorded in second year of observation possibly due to hot summer. The overall observation revealed that vegetable field was preferred by young langur, whereas, forest and temple preferred by mature adult.

Key words: *Forest, Infant, Temple, Langur, Vegetable*

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INTRODUCTION

Association of monkey and man is as old as man's own existence on the earth. In India they are worshiped by Hindus and considered to be holy. One kind of langur *i.e.,* the Hanuman is true sacred monkey of India. Hanuman, the powerful monkey god-head, is firmly entrenched in Hindu religion, mythology and art. It is intimately associated with Lord Rama in the ancient Sanskrit classic 'Ramayana of Valmiki' and the more recent Hindu classic 'Ramcharitmanas of Tulsidas'. Hanuman is a Sanskrit word for 'having jaw' while 'Langur' is a Hindi word possibly from Sanskrit for 'tailed'.

Indian langur has several common names as grey, true, common, entellus, native name Hanuman langur, In Hindi Wanur, Makur, Mahratti, Musya, Canarese. Hanuman langur is also known by variety of names *i.e.,* Bajrangbali, Mahavir (The great warrior), Pavansut (son of the wind) etc. Hanuman is here indentified zoologically as the common south Asian langur *Presbytis entellus* (Kumar *et al*., 2008, Groves and Molur, 2008).

The systemic research on this species with thrust on its ecology was initiated by Jay (1962) in Central India. *P. entellus* has also been reported from different part of India *i.e.,* Himachal Pradesh (Bhimtal and Shimla), in Uttar Pradesh (Kaukori), Rajasthan (Bharatpur, Mount Abu, Jodhpur) (Rajpurohit, 1992). It is most adaptable species accuring in a wide

range of habitats like villages, towns, cultivated fields, orchards, gardens and dense forests. Therefore, present study was designed to record the habitat preference of Indian langur *Presbytis entellus* at different places of Goverdhan.

MATERIALS AND METHODS

For the present study a population of *Presbytis entellus* consisting about 55 animals. Among them 10 animals has been selected, which resides in the premises of Goverdhan, Mathura. Considering look of animal, langur is slender agile, tree dwelling. It is pale dirty straw-colour or ashen grey darken on the shoulder and rums, paler on the head and lower parts; hand, feet, and face are black. Langur is a large sleek, graceful, silver grey animal with long limbs and long tail. The average size of males head and body length 51-108 cm, while female has 40-68 cm. The body weight of adult male stands at about 9 to 20.9 kg, while weight of female is about 7.5 to 18 kg (Roonwal and Mohnot, 1977). Tail is about one and half times the length of head and body.

The Infants (newly born) have light colour faces which darken after birth. Upto the age of 5 months coat colour of infant is black but it gradually changes provide after the completion of weaning *i.e.* 5 to 15 months of age. Female juveniles are of 15 months to about 2.5 years of age *i.e.* at the onset of menarche, while juvenile males are of 15 months to about 4 years with abdominal testis in younger and scrotal testis in older juveniles, glans penis is generally not visible in them. Sub-adult female are of 2-3 years of age, as small pink patch at the side of clitoris and the anus above the callosities. Sub adult male are of 4-6 years of age with undeveloped ischial pads, reduced canines usually visible glans penis and capable of copulatory behaviour. Young adult females are not older than 4 years *i.e.* from the onset of sexual cycle to the birth of first infant, while age of young adult/ males arrange between 6-8 years with small tail, ischial pads, visible glans penis and fully erupted canines although they have not attain full size. Adult females are of more than 4 years, while adult males are more than 8 years of age with full size and pink and puffy ischial pads.

The estrous cycle is of about 24 days but due to the infant loss cycle can resume within 8 days. Gestation period of female is approximately 200 days. Female bears young one every 1 or 2 year but twins occurring very rare. The normal interval between births is 15 to 24 (878 days) months, while Infant is weaned after 13 to 20 months and weaned is completed 10 to 12 months. Life span is about 20 years in wild and about 25 years in captivity (Parker, 1990 and Nowak, 1991).

On trees it is remarkably agile. It can make horizontal leap of 3-5 meter or cover upto 13 meter with some loss of height. In areas where trees are scare, the langur has adapted well to live on the ground. When on the ground, it walks or runs on all four feet. The grasping power of their hands and feet allow the langur to travel at great speeds, they have been clocked at 23 mph (Parker, 1990 and Nowak, 1991). Langurs when pursued can effortlessly jump distance upto ten meters when leaping from a tree top to somewhat lower branches of another trees, they land on the branch so that the impact of the body on the branch propels them up again the next jump. Langur is folivorous, vegetarian, semi terrestrial diurnal and lives in a group. The strength of the group tends to vary in different seasons.

CONSERVATION STATUS

Factors which have effect the survival of Indian langurs and depletion in its number are its habitat destruction urbanization, pollution, natural calamities and intra specific competition. This has resulted in its placement the part I of schedule II of the wild life protection act 1971, which prohibits their killing or capture dead or alive. However, enforcement in the field is virtually nonexistent except in the Protected Areas. Most locals are also unaware of such legal status so this species is fully protected throughout the country Tikader (1983). There is no long term guarantee of the species, survival, unless the habitat is safe guarded. The present study has been undertaken for the population of Indian

langur at Goverdhan, because no statistical data is available for its socioecological, behaviour and conservation.

SAMPLING

Sampling techniques used for recording the observations were focal and scan, which have been tested on several langur varieties for obtaining accurate results. These techniques were applied for recording various activities of behaviour of animals by continuously watching the activities of the target animal.

FOCAL SAMPLING

Focal sampling involves the observation of behaviour of a single animal for a specified period of time. All instances of an animal's behaviour and its interaction with other animals in a group are recorded. During observation period the individual may get partially obscured or may go out of sight. In such a case, recording is stopped until it is visible again. Using this technique, the animal is observed from a least of two hours to a maximum of twelve hours a day. Each observation hour is divided into four equal parts of fifteen minutes sample period. Each sample period has a sample time of ten minutes followed by a sample interval of five minutes.

SCAN SAMPLING

Scan sampling means a rapid scanning of a whole group at regular intervals. It involves recording the activities and interactions of each individual at that instant. A single scan may require a time period from a few seconds to several minutes, depending on the size of the group and the information recorded for each individual. Scan sampling can be used in addition to focal sampling during the same observation period (Altmann, 1974).

All observations were taken with the help of 7 x 50 'Nihon' binoculars during field visits. Whenever a troop was sighted the number of individuals was directly counted and composition of sex and age classes (adult male, sub-adult male, adult female, juveniles, infants etc.) was recorded. The age classes in case of males, were distinguished by the size of canines, colour of ischial pads and visibility of testis and glans penis while in case of females body size and coat colour size of mammary glands and menstruation were taken as criteria. The animals were selected from different troop for convenience. The adult dominant male, adult female, sub-adult male, sub-adult female Juvenile and infants were identified from a bisexual troop. These observations also included photography of the animals in a variety of postures using a digital camera (20X, 28-140 zoom, 'Sony').

STUDY SITE

The present study was conducted in Goverdhan, Mathura. This place is situated Mathura Varsana road, 21 km. from West of Mathura city on the Mathura Delhi National highway and is easily approachable. It is a pilgrim spot visited by thousands of pilgrims and tourists daily.

The main study site is a part of forest and adjoining area of greater Goverdhan parikrama path which stretches for about 12km. Shri Giriraj ji Goverdhan Mountain which has a length 11 km. from North to South and height is 30 meter from land (Ground) is surrounded by parikrama route with a variety of species of both flora and fauna.

CLIMATE OF THE STUDY SITE

This is a region where major part of the year is hot and dry. The seasons recognized are-

(a) Summer season - The summer seasons extend from mid March to June

(b) Rainy season - July to early October (with maximum rain fall during late August and September)

(c) Winter seasons - November to February are winter months, with December and January being extremely cold.

Summer is hot and dry with mercury reaching upto 45°C to 46°C in late May and June. The temperature remains high throughout this month. July and September are main months of rainy seasons with maximum precipitation during August and September an annual average rainfall upto 765 mm has been recorded. Humidity also remains very high upto 98% during the monsoon season. Some rainfall is also received in October. December and January are the coldest months with temperature dropping to a minimum of 3°C to 4°C. The maximum wind 7.8 km/hour was recorded in June 2002 and minimum 2.1 km/hour in November while the maximum wind was noted 8.2 km/hour in June 2003 and minimum 2.2 km./hour in November

The main floral species found at Goverdhan are-

S.No.	Botanical name	Common Name	S.No.	Botanical name	Common Name
1	*Acacia Arabica*	Baboon (Native)	28	*Mangifera indica*	Aam
2	*Acacia catechu*	Khaki	29	*Maytenus senegalensis*	Kankero
3	*Acacia Senegal*	Combat	30	*Mimosops sps.*	Morchli
4	*Eagle marvels*	Bell	31	*Morus alba*	Shahtoot
5	*Anogeissus letifolia*	Dhoora	32	*Opuntia dellenii*	Nagphani
6	*Anthocephalus cadamba*	Kadam	33	*Oleodies*	Kharajal
7	*Arachis hypogaea*	Groundnut	34	*Pinus longifolia*	Cheer
8	*Azadirachta india*	Neem	35	*Polyaithia longifolia*	Asoka
9	*Bougainvillea sps.*	Bougainvillea	36	*Proscopis jolifolra*	Babool (Exotic)
10	*Brassica campestris*	Sarson	37	*Prosoois cineraris*	Khejri
11	*Brassica oleracea*	Bandgobi	38	*Psidium guava Linn.*	Amrood
12	*Brassica oleracea*	Phulgobi	39	*Pumia granatum*	Annar
13	*Canavalia ensiformis*	Barasem	40	*Raphannus sativas Linn*	Mooli
14	*Capsicum annum Linn.*	Hari Mirch	41	*Salamolia sp.*	Saimal
15	*Carissa carandus Linn.*	Karonds	42	*Solanum mejongena Linn.*	Brinjal
16	*Chenopodium album Linn.*	Bathua	43	*Solanum tuberosum*	Potato
17	*Citrus medica Linn*	Nimbu	44	*Spinacia oleracea Linn.*	Palak
18	*Coriandrum album Linn.*	Dhania	45	*Syzygium cumini*	Jamun
19	*Dalbergia latifolia*	Shisham	46	*Tamarindus indica*	Imli
20	*Daucus carota*	Carrot	47	*Tectona sps.*	Sagaun
21	*Ficus bengalensis*	Bargad	48	*Terminalia sps.*	Arjun
22	*Ficus benghaiensis*	Banyan	49	*Trigonella foenum graceum*	Methi
23	*Ficus religiosa*	Pipal	50	*Wrightia tinctoria*	Dudhi
24	*Flacourtia ramontchi*	Kanner	51	*Zizyphus mautitiana*	Ber
25	*Lycopersicum esculentum*	Tomato	52	*Zizyphus nummularia*	Bordi
26	*Lantena sp.*	Lantena	53	*Zizyphus oenoplia*	Makoi
27	*Madhuca India*	Mahua			

RESULTS AND DISCUSSION

Three groups of different size *i.e.* 31, 20 and 15 number of langur *Presbytis entollus* were evaluated for the study of habitat preference. There were three habitats *i.e.* Forest and Temple, Village and Orchard and Vegetable fields including 53 plants and trees were observed during the course of study. The group of Indian langur further categorized in groups on the basis of their age and sex in six categories *viz.,* infant of both sex, juvenile of both sex, sub-adult male, sub-adult female, male and female. The observations revealed that both infant and juvenile given highest preference to vegetable fields (40.00 and 13.33 %) followed by forest and temples (35.48 and 12.90 %) and minimum to village and orchard (30.00 and 10.00 %) (Table 1). On the other hand, sub adult male and female given highest preference to village and orchard (10.00 and 25.00 %) followed by forest and temple (9.47 and 22.58 %) and minimum on vegetable fields (6.66 and 20.00 %) (Table 1). It was interestingly noticed that the population of female is always higher at every experimental

site and showed preference to vegetable field (40.00 %) followed by forest and temple (16.12 %) and minimum on village and orchard (15.00 %) (Table 1). The observations on different activity pattern of *P. entellus* also showed preference to forest as reported in previous years by Mathur and Bhatnagar (1993) and Koenig (2000).

As far as percent composition were concerned, the highest composition of infant was observed on all the groups with a sum of 34.84 % followed by sub-adult female 27.27 %, female 23.63 %, juvenile 14.54%, sub-adult male 10.90 and minimum of 1.80 % of male (Table 1). The findings of Newton (1994) on social stability and changes in hanuman langur given further strengthen to present study. The other observations on habitat preference of as well as behaviour of Indian langur are Vogel (1971), (1973), Bhati and Srivastava (1988) and Sterck (1999).

Table 1: Habitat preference and mean composition of *Presbytis entollus* at Govordhan, Mathura

Habitat	Size	Composition											
		Infant (both sex)	% preference	Juvenile (both sex)	% preference	Sub-Adult Male	% preference	Sub-Adult Female	% preference	Adults			
										Male	% preference	Female	% preference
Forest & Temple	31	11	35.48	4	12.90	3	9.67	7	22.58	1	3.22	5	16.12
Village & Orchard	20	6	30.00	2	10.00	2	10.00	5	25.00	0	0	3	15.00
Vegetable fields	15	6	40.00	2	13.33	1	6.66	3	20.00	0	0	6	40.00
Total	66	23	-	8	-	6	-	15	-	1	-	13	-
Mean		7.6	-	2.6	-	2	-	5	-	0.33	-	4.3	-
Percent composition		34.84	-	14.54	-	-	-	-	-	-	-	-	

The observations on the preference of home range showed that *Presbytis entellus* visited maximum area of forest and temple (0.31 km) followed by vegetable fields (0.25 km) and minimum village and orchard (0.18 km) (Table 2). Moreover, they also used maximum area of vegetable field occasionally with the value of 0.80 km followed by forest and temple (0.72 km) and minimum village and orchard (0.58 km) (Table 2). The observations of Newton (1992) on the feeding preference and Sommer *et al,* (1995) reported habitat quality of hanuman langur and given strengthen to present findings with the choice of fondness to forest.

Table 2: Home range of *Presbytis entellus* at different places of Goverdhan

Habitat	Home range (Sq. Km.)		Total
	Preferred areas	Occasionally used areas	
Forest and temple	0.31	0.72	1.03
Village and orchard	0.18	0.58	0.76
vegetable fields	0.28	0.80	1.08
Range	0.18-0.31	0.8 - 0.72	0.76-1.03
Mean	0.245	0.76	0.89

The results on the mortality of Indian langur showed that the maximum death (02 individuals) recorded in vegetable field as well as village. In vegetable field, the mortality of juvenile observed due to accident, while new born infant died possibly due to severe cold. In village and orchard the mortality of sub adult female was recorded in second year of observations possibly due to hot summer. On the other hands, single mortality of infant was recorded in forest and temple area but the reason is unknown. In the other findings, Rajpurohit and Sommer (1991) and Rajpurohit and Goyal (1999) describe the death as well as cause of mortality among the hanuman langur at Jodhpur, Rajasthan.

Table 3: Cases of deaths recorded in group of *Presbytis entellus* at Goverdhan

Habitat	I year mortality	II year mortality	Total	Remarks
Forest & Temple	Infant (August)	-	1	Unknown reasons
Village & Orchard	-	2 Sub-Adult female (May and June)	2	Died due to hot summer
Vegetable fields	Juvenile female (December)	New born infant (January)	2	Juvenile female died in a motor accident while new born infant died due to severe cold
Total Death			5	

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