International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

Selection of Sleeping Sites by Hanuman Langurs in Chitrakoot Forest Range of Madhya Pradesh, India

Manojkumar Mishra[1], Surya Kant Chaturvedi[2], Mahendra Kumar Upadhayay[3]

[1, 2, 3]Department of Bioloigical Sciences, Mahatma Gandhi Chitrakoot Gramodya Viswavidyalaya, Satna M.P.

Abstracts: ***Selection of sleeping sites by Hanuman langurs (Semnopithecus entellus) were studied by in Chitrakoot forest range Madhya Pradesh India, from January 2012 to December 2012. For this study we selected three troops (two bisexual and one all male bands). The entire studied troop used large tree species, with have numerous branches straight trunk and dense canopy, for roosting.Total 16 plant species were used by langurs for sleeping site. During rainy and cold season the Hanuman langurs sleep in cave and old heritage building and temple. During rainy and cold season the Hanuman langurs sleep in cave and old heritage building and temple.***

Key words: Hanuman langurs, altitude, troops.

1. Introduction

Langurs are leaf-eating, tree-residing, forest-dwelling monkeys. They are regarded as among the most arboreal of all Old World monkeys. They are active throughout the tree canopy and can be found in both primary and secondary forests

Langurs are one of the most fascinating non-humanprimates. Besides their importance inthe fields of agriculture and medicine, the study ofthese animals has a close bearing on theunderstanding of human, social and psychologicalproblems. The non-human primates are representedwith 63 genera and about 600 species or subspecies in some 92 countries of the 25 species of theseanimals recorded from the Indian sub-continent,three, namely, the rhesus macaque (*Macacamulatta*), the bonnet macaque (*Macacaradiata*)and the Hanuman langur (*Semnopithecus entellus*)have become urbanized (Rajpurohit, 2005).Theyoccupy geographically vast areas andexploit diverse habitats ranging from thick foreststo human-dominated landscapes and thus areconsidered 'least concern' species in India (IUCN, 2003). Recently, habitat loss and degradation throughhuman encroachment, overgrazing, building roadsthrough forests, lopping, deforestation, agriculture,fire, unavailability of food, predation by carnivoresand attack of several viral and bacterial diseases

The Hanuman langurs are found in a wide range of habitats from desert edge to rainforest and mountain scrub at 4,000m. Because they are considered sacred there they are found even near urban areas in northern India, they usually only move on the ground when trees are scarce. They forage during the morning and late afternoon. The troop returns to the same sleeping tree every night. They sleep at the ends of branches, where it's hard for a large predator to get at them. Sometimes, they sleep in caves.They spend a lot of time foraging on ground, but prefer sleeping in the trees during night to protect themselves from predators. They produce various sounds like grunting, panting, honking, hiccups, rumbling, coughing etc to communicate and alarm other members.

2. Material and Methods

2.1 Study Area

The study site is situated in the border of Chitrakoot District of U.P. in North and East and partially West; while MajhgawanRange of Satna District of M.P. in South; BarondhaRange of Satna District M.P. in West. Chitrakoot is the most historical and religious Hindus place of India,and surrounded by lush green hills of legendary Vindhyachal range. In Chitrakoot have many natural historical caves,streams,lakes and different types of flora& fauna. Therefore the Chitrakoot has been sacred place of worship for sages and hermits since antiquity. The general topography of Chitrakoot is hilly and undulating cut off by numerous reveres and rivulets. Chitrakoot is situated in the close vicinity of the tropic of cancer is land locked, so in this places a typical tropical climate condition occur.In Satna districts there are about 170201.46 hectare forest area.out of them about 34% forest areas in Chitrakoot region. The forest area is Chitrakoot is mainly mixed. In this type of forest most of their trees remain leafless for several weeks in dry season.

2.2 Methods

We used visual focal sampling method to record on sleeping site of hanuman langurs. With the help of direct observation method we identified their sleeping site and trees used by them and made atable in the field.Overall15plants species were utilized by Hanuman langurs during the study period. The focal groupsperiodically from morning till the timethey settled on specific locations andby recording presence of fresh fecalpellets of langurs under such locations.Each focal group of Hanuman langurswas followed for three consecutivedays each month from January 2012 toDecember 2012Of the total 125 days, sleeping sites could be identified only on 28 occasions of monitoring offocal groups from morning till evening.On rest of the days, particularly duringmonsoon season, the observer lost thesight of focal groups and hence dataregarding their sleeping sites could notbe obtained. Whether or not the samesleeping site was used for consecutivenights could be discerned on the basisof the amount of faecal patches andcharacteristics of faecal

distribution.The geographical location of sleepingsite was determined with hand heldGPS and the height of treesused as 'sleeping sites' was measuredwith Hypsometer.

2.3 Study group

Initially, a thorough survey of Chitrakoot forest range was carried out and in all, 14troops of Hanuman langur (13 Bisexual groups, & 1 all male band) were found. Of these,three groups, i.e., Kamtanath hill troop (S1), Hanumandhara Troop (S2) and Semariya turn Band (S3) were selected for the detailed study. The troops S1 and S2 were'multi-male bisexual' troops while S3 was an 'all male' band. These troopsinhabited different habitats withinsame range of climate, rainfall, topography, but different in altitude,plantation and withrespect to human interference and predatorabsence/presence (Table 1).The habitat of S1and S2 troopwas a mountain and forest area with humansettlement and presence of temple but both are differ with respect of vegetation while in the case of S3 (05 individuals) troop, it was a forest areaand no human settlements. In S1 study site abundantly found Kardhai (*Anogeissuspendula*) trees about 11.46% of the total area is covered with Kardhai forest. The composition of the Kardhai forests is the top story and understory are *Anogeissus*pendula, *Mitrgynaparvifolia*, *Acacia catechu etc.* In S2 site Bans (*Dendrocalamusstrictus*), and Tendu(*Diospyrosmelanoxylon)*found abundantly. In S3 site mainly found in Babool(*Acacia nilotica),* Ber (*Ziziphusmauritiana*) and Mahua (*Madhucalongifolia*).

Table 1: Location of types of langur troops, habitats used with / without human interference by them, predominant trees and availability of their possible predators in Chitrakoot Forest Range

Types of troops & its size	*Type of habitat occupied with/without human nterference [Altitude(m) Lattitude, Longitude]*	*Dominant tree*	*Predator presence in the study troop*
Bisexual troop S1 (59)	Forest area having crop land nearby (with Temple and human Interference) 190m 80 o 50'59.3 & 25 o 10'24.1"	*Anogeissuspendula,Mitragynaparvifolia, Anogeisuspendula,Acaciacatechu,Ficusbenghalensis, Ficusracemosa, Ficusreligiosa,Diospyrosmelanoxylon, Tamarindusindica,Bauhiniaracemosa,Anogeisuslatifolia,*Pinusroxburghii, *Madhucalongifolia*	Dhol, Jakal, Dog
Bisexual troop S2 (102)	Forest area having crop land nearby (with temple &human Interference) 206m 80 o 53'0.3" & 25 o 09'24.1"	*Dendrocalamusstrictus,Acaciacatechu,Boswelliaserrata,Madhucalongifolia,Mangiferaindica, Diospyrosmelanoxylon,Azadirachtaindica*	Dhol, Jakal, Dog
Bisexual troop S2 (102)	Forest area having crop land nearby (with no human Interference) 157m 80 o 50'31.7"& 25 o 07'31.7"	*Acacia niloticassp.Indica,Azadirachtaindica,Ficusreligiosa,Mangiferaindica,Aeglemarmelos,Ziziphusmauritiana, Ziziphusnummularia, Ficusbenghalensi.*	Jakal,Dog,Fox

3. Result and Discussion

During the study period, the sleepingsites and plant species used for theroosting by Hanumanlangur(*Semnopithecus entellus*) were recorded. At the evening when sunset, all individuals of each troop would gatheraround theground and at theonset of darkness, they would climbthe trees for sleeping. All the individuals of studied troop used large tree species, with have numerous branches straight trunk and dense canopy, for roosting. Total 16 tree species, namely, Mahua(*Madhucalongifolia*), Neem (*Azadirachtaindica*), Tendu (Diospyrosmelanoxylon), Bargad (*Ficusbenghalensis),* Aam (*Mangiferaindica),* Safeda (*Eucalyptus globulus*), Khair (*Acacia catechu*), Siris (*Albizzialebbeck*), Jamun *(Syzygiumcuminii*), Salai (*Boswelliaserrata*) Imli (*Tamarindusindica*), Kahua (*Terminaliaarjuna*), Vilaytibabool (*Prosopisjulifolia*) Cheed (*Pinusroxburghii)* Peepal (*Ficusreligiosa*) and Umar (*Ficusracemosa)*were used assleeping trees (Table 2).To study the table it was show that the Hanuman langurs of different focal troop used different plant species for roostingbut it was similar to all troop they used tallest plant species for sleeping.Average height ofsleeping tree was 17.3m (range 7 -28m). The individuals of a troopusually used one large tree orcombination of some high trees and 2-3small trees close to each other. This combinationplay animportantrole in protection of the troop duringattack by predator as the langurs can jump from one branch to another branch and thus protect itself from natural predator. During rainy and cold season the Hanuman langurs sleep in cave and old heritage building and temple. It is possible that variation in microclimate affect choice of sleeping sites in langurs. Strong wind also disturbthem. The sleeping trees of Hanuman langurs were well protected from strong wind and that changes in wind direction could influence choice of sleeping site.During summer months, the langur'sused to sleep on high trees to avoid theexcessive heat during the months of May and June. In present investigation it was observed that the Hanuman langur's troop of Kamtanath hills selected the same tree for 5 nights of observation.Many factors influence the selection of sleeping site by Hunuman langurs such as protection from predators, accessibilityto food and water sources, physicalcomfort in terms of shelter from coldwind and rain, avoidance ofbiting insects, parasite avoidance andhuman disturbance. In Kamtanath hill (S1) andHanumandhara (S2) langurs troop during rainy season used tree near temple or inwhich place where permanent shelter constructed.At the time ofcrop harvesting, S3 troop living in the vicinity ofcrop fields, shifted to the trees near the crops fields to raidthem for food. When chased by the farmers and their petdogs, the individuals repeatedly reverted to the roostingsites.During extreme hotweather it was observed that all studytroopsshifted to the trees around

natural or man-made water sources. It was concluded that the Hanuman langurs usually changed our sleeping site due to the disturbance by the predators and human being.

Table 2: Sleeping sites, sleeping trees and their heights for the three focal troops in Chitrakoot forest range

Types of troop	*Sleeping site*	*No. of trees in sleepingsite*	*Plant Species used as sleepingsites*	*Approximate height of trees(m)*
Kamtanath hills (S1) Troop	A	3	*Anogeissuspendula* *Anogeissuslatifolia* *Ficusbenghalensis*	12 13 15
	B	3	*Mitragynaparvifolia,* *Madhucalongifolia,* *Ficusreligiosa*	12 16 17
	C	2	*Ficusracemosa,* *Tamarindusindica,*	13 14
Hanuma--ndhara Troop(S2)	D	3	*Mangiferaindica,* *Azadirachtaindica* *Diospyrosmelanoxylon,*	14 12
	E	3	*Boswelliaserrata,* *Acacia catechu,* *Acacia niloticassp.Indica*	13 11 12
Semariya turn Troop (S3) AMB	F G	2 2	*Azadirachtaindica,* *Ficusbenghalensis,* *Mangiferaindica,* *Ziziphusnummularia*	12 15 14 10

Ramakrishnan and Coss (2001)also observed that Bonnet macaquesand Hanuman langurs preferentiallyselected sleeping trees close to humansettlements to reduce the risk of nighttime attacks from predators that tendto avoid humans but Nilgiri Langurs did not appear to choose sleeping sites close to human settlement.Similar observation found in present study in case of Hanuman langurs.

Chhangani and Mohnot (2006) observedthat temporary shifts in sleeping sites of hanuman langurs nearto crops fields to raid mature crops in Rajasthan.In present study it was also observed that at the time ofcrop harvesting, S3 troop living in the vicinity ofcrop fields, shifted to the trees near the crops fields to raidthem for food.

Bishop1979; Wada &Ichiki 1980; Li *et al*. 2000; Liu & Zhao2004; Cui *et al*. 2006; Liu *et al*. 2010 repotted that in temperate zone primate mostly move to lower altitudes in cold season and during warm season they move higher altitudes. Similar types of observation found in present studyduring summer months, the langursused to sleep on high trees to avoid theexcessive heat during the months of May and June.

Minhas*et al* (2010) observed during study period in MachiaraNaional Park all focal troops used 2-11 large and small trees of various species for the roosting within their home range. The langurs of all-male band used 9 roosting sites, of which 5 were used in summer and during winter 4 sites were selected .While in present study there are 15 plant species used by hanuman langurs for roosting. In all-male band used 2 sleeping sites and 4 plant species for roosting.

Table 3: Selection of different tree species by Hanuman langurs as sleeping sites in Chitraloot Forest Range

Tree species used as sleeping site	*Number of trees used as sleeping site*	*Per cent selection*
Mahua(*Madhucalongifolia*)	5	5.75
Neem (*Azadirachtaindica*)	4	5.00
Tendu(Diospyrosmelanoxylon)	4	5.00
Bargad(*Ficusbenghalensis),*	8	9.20
Aam (*Mangiferaindica),*	6	6.90
Safeda (*Eucalyptus globulus*),	2	2.3
Khair (*Acacia catechu*),	4	5.00
Siris (*Albizzialebbeck*),	5	5.75
Jamun(*Syzygiumcuminii*)	6	6.90
Salai(*Boswelliaserrata*)	5	5.75
Imli(*Tamarindusindica*),	7	8.04
Kahua(*Terminaliaarjuna*)	8	9.20
Vilaytibabool(*Prosopisjulifolia*)	4	5.00
Cheed(*Pinusroxburghii*)	6	6.90
Umat(*Ficusracemosa*)	5	5.75
Peepal(*Ficusreligiosa*)	8	9.20

References

[1] **Ramakrishnan, U. & R. Coss (2001).** Strategies used bybonnet macaques (*Macacaradiata*) to reduce predation riskwhile sleeping. *Folia Primatology* 42: 193–206.

[2] **Chhangani and Mohnot (2006)** also have observedtemporary shifts in sleeping sites of hanuman langurs nearto crops fields to raid mature crops in Rajasthan.

[3] **Bishop, N. (1979).** Himalayan langurs: temperatecolobines. *Journal of Human Evolution* 8: 251–281.

[4] **Wada, K. & Y. Ichiki (1980).** Seasonal home range useby Japanese monkeys in the Shiga Heights.*Primates* 21:468–83.

[5] **Li, B.G., C. Chen, W.H. Ji&B.P.Ren (2000).**Seasonalhome range changes of the Sichuan snub-nosed monkey(*Rhinopithecusroxellana*) in the Qinling Mountains of China.*Folia Primatology* 71: 375–386.

[6] **Liu, Z. & Q. Zhao (2004).** Sleeping sites of *Rhinopithecusbieti*at Mt. Fuhe, Yunnan.*Primates*45: 241–248.

[7] Li, D., C.C. Grueter, B. Ren, Q. Zhou, Z. Peng& F. Wei(2006). Characteristics of night-time sleeping placesselected by golden monkeys (*Rhinopithecusbieti*) in the

[8] Samage forest, Baima snow mountain Nature Reserve,China.*Integrative Zoology* 1: 141–152

[9] **Li,D., B.Ren, C.C.Grueter, B.Li& M. Li (2010).** Nocturnalsleeping habits of the Yunnan Snub-Nosed Monkey inXiangguqing, China.*American Journal of Primatology* 72:1092–1099.

[10] **Chopra,G. Bhoombak,M.A. and Kumar P.(2012).**Selection and Shifting of Sleeping Sites by Hanuman Langurs in MorniHills of Haryana, IndiaZOO's PRINT, Volume XXVII, Number 5, May 2012

[11] **Rajpurohit D.S. 2005**.Study the Dominance Hierarchy and its Role in Social Organization in Hanuman

langurs,*Semnopithecus entellus entellus*(D). Ph.D.thesis, Jai NarainVyas University, Jodhpur(Rajasthan) India.

[12] **IUCN.2003**. IUCN Red List of Threatened Species (EB/OL). http://www.iucnredlist.org/.

[13] **MinhasRiazAziz ,AhmedKhawajaBasharat ,Muhammad SiddiqueAwan,NaeemIftikhar Dar,2010**. Habitat utilization and Feeding Biology of Himalayan Grey Langur (*Semnopithecus entellus ajex)* in Machiara National Park,Azad Jammu and Kashmir,Pakistan,Zoology Research,Apr.31(2);177-188