Lodging site selection by wild group of stump-tailed macaques (Macaca arctoides)

Article · May 2021

CITATIONS
0

READS
57

3 authors:

Dilip Chetry
Aaranyak
38 PUBLICATIONS **338** CITATIONS
SEE PROFILE

Rekha Chetry
Jawaharlal Nehru College,Boko,Kamrup,Assam,India
17 PUBLICATIONS **123** CITATIONS
SEE PROFILE

Parimal Ch Bhattacharjee
Gauhati University
23 PUBLICATIONS **262** CITATIONS
SEE PROFILE

THAR MULTIDISCIPLINE JOURNAL

Thar Multidiscipline Journal is a bi-annual international e-journal of scholarly research articles/papers covering all disciples of studies which can be accessed via electronic transmission. The journal shall be solely published on the web in a digital format. However, as most electronic journals, it may subsequently evolve into print component maintaining the electronic version. The journal may publish special issues over and above the mandatory bi-annual issues.

The journal explicitly clarifies that opinions expressed in the articles are those of the contributors and do not necessarily reflect the views of the editorial board.

Vol. No. 01
Issue No. 02
Summer Edition 2020

Lodging site selection by wild group of stump-tailed macaques (Macaca arctoides)

Dilip Chetry, [1,] Rekha Chetry[2,] Parimal Chandra Bhattacharjee,[3,]

[1]Primate Research and Conservation Division, Aaranyak,13 Toyab Ali Bye Lane,Bishnu Rabha Path, BeltolaTinali, PO: Beltola, Guwahati,Assam,India

[2]Department of Zoology, Jawaharlal Nehru College, Boko,Kamrup,Assam,India.

[3]Department of Zoology, Gauhati University,Assam,India
Corresponding author:E-mail: dilip.aaranyak@gmail.com/dilip@aaranyak.org

ABSTRACT

We monitored a group of 53 stump-tailed macaques from dawn to dusk, during 1998-2000 in the Hollongapar Gibbon Sanctuary, Assam, India to understand socio-ecological behaviour. We focused on identifying the lodging tree species used by stump-tailed macaques. During 1504 hours of observation, we recorded that the stump-tailed macaque group used six tree species for their lodging. Artocarpus chama was the most selected (preferred) species (45%) followed by Ficus bengalensis (35%), Castopnopsis indica (8%), Ficus religiosa (7%), Mangifera sylvatia (3%) and Ficus benjamina (2%). The average diameter at breast height of the lodging trees ranged from 0.68 to 2.4 meters and the height ranged from 20 to 35 meters. We further observed that in 85% cases stump-tailed macaques used one lodging site for one night only while 15% of their sleeping was in the same lodging tree for two consecutive nights. The study also revealed that the strong selectivity for preferred lodging sites is influenced by factors including group foraging strategies, predator avoidance and social accommodation. Above all the preference and selectivity for lodging sites is found to be critical from conservation perspective of the species.

KEY WORDS:

Lodging tree, Macaca arctoides, Seasonal variation, Hollongapar, Assam, India.

INTRODUCTION

Sleeping site is an integral component of primate ecology. Primates use diverse sleeping sites. According to Andersosn (1984) half of the lives of primates are spend on their sleeping sites. Therefore, selection of suitable sleeping sites is very crucial for the survival of individual of any primate species.

The lodging tree selection has been reported in pigtailed macaque (Caldecott,1986; Albert et al 2011), Assamese macaques (Sarkar, 2002) bonnet macaques (Rahaman & Parthasarathy 1969; Ramakrishna and Coss), golden langurs (Biwas, 2004, Chetry et al., 2002; Chetry & Chetry, 2009), hoolock gibbon (Das, 2003; Chetry et al., 2016), black crested gibbon (Fan and Jiang, 2008), pileated gibbons (Phoonjampa et al ., 2010), Skywalker gibbon (Fei et al,…….) golden-handed tamarin (Day & Elwood 1999), Proboscis monkeys (Bernard et al., 2011) and François' langur (Zhou et al., 2009).

Stump-tailed macaque is one of the least studied species in wild. Only few studies have been attempted on stump-tailed macaque in natural habitats (Chetry & Mohnot 2000; Chetry & Bhatacharjee, 2002; Chetry et al., 2003; Chetry, 2004; Chetry et al, 2007). A detailed account of selection of lodging sites by this species is lacking except for a preliminary report by Chetry & Bhattacharjee (2004). The aim of present study is to highlight the diversity of lodging trees of a wild group of stump-tailed macaque in the Gibbon wildlife sanctuary. The study also discusses about the socio-ecological factors influencing the selection of lodging sites by stump-tailed macaque.

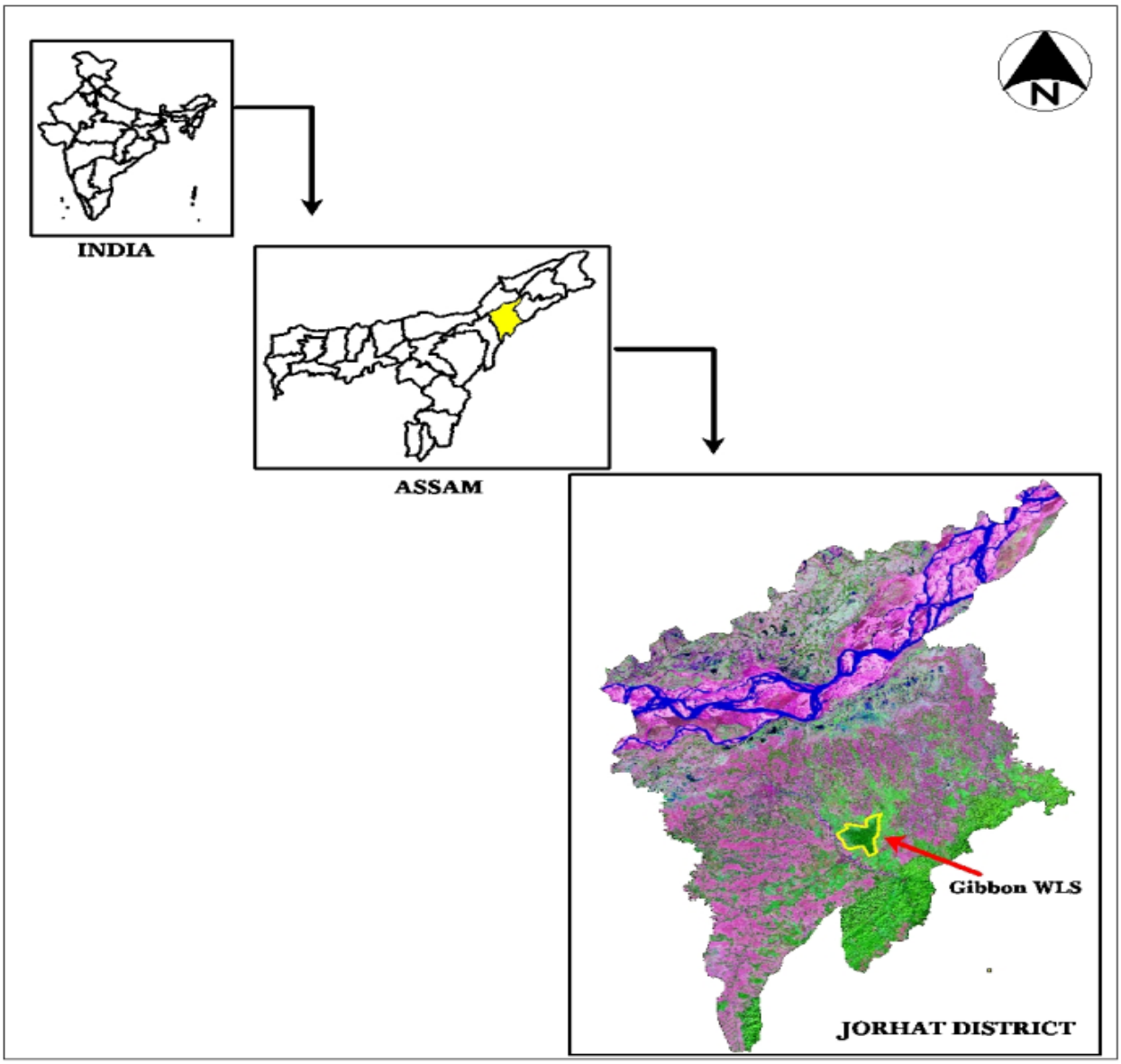
MATERIAL AND METHODS

STUDY SITE

The study site, the Hollongapar Gibbon Sanctuary, Jorhat, Assam, North-east India covers an area of 2,098 hectares. Located at 26º45`N and 94º25`E, its altitude ranges from 100-120 msl. Before the name of this Sanctuary (GWLS), came into existence on 30th July, 1997, it was known as Hollongapar Reserve Forest. The Sanctuary is characterized by a lowland forest with numerous small streams. It is surrounded by human habitations and tea gardens making it a "forest island".

The annual rainfall during the study period was 1870.5 mm and the average minimum and maximum temperatures were 20.15ºC and 28.75ºC respectively.

The major forest type in the sanctuary is tropical moist deciduous dipterocarpus forest. The principal trees, which form the top canopy, are *Dipterocarpus retusus, Sapium baccatum, Arctocarpus chama, Largerstroemia floreginae, Canarium resiniferum, Castopnopsis indica, Anthocephalus cadamba, Amoora wallichi, Duabanga sonneratioides,* and *Mansonia dipikae*. The middle storey is generally composed of *Vatica lancefolia, Mesua ferrea, Dilena indica, Aqualaria agolacha, Biscofia Mangifera javanica, Ficus glomeruta, Elaeocarpus ganitrus*. The lower storey is composed of three bamboo species viz. *Pseudostachym polymorphum*, *Bambusa pallida* and *Calamus* species. The undergrowth consists of species like *Clerodendron*, *Eupatorium*, *Mikenia scandews* and *Commelina*, etc



STUDY GROUP

One group of 53 stump-tailed macaques was selected for the study. The group was composed of ten adult males, one sub-adult male, 15 adult females, eight juvenile females, ten juvenile males and nine infants. Apart from the stump-tailed macaque, 6 other primate species such as Hoolock hoolock, Trachypitheucs pileatus, Macaca leonina, Macaca assamensis, Macaca mulatta and Nyctcebus bengalensis were found in the study area (Chetry et al., 2001).

Adult male: Stumptailed macaque (Photo@ Dilip Chetry)

Adult female & infant: Stump-tailed macaque (Photo@ Dilip Chetry)

RESULTS

After pooling the data from 1504 hours of observation, the following results were obtained.

i. Lodging site:

A total of 75 lodging trees were recorded in the home range of the study group during the study period.

ii. Characteristic of lodging sites:

The stump-tailed macaques selected only large, tall and emergent trees for night sleeping. All the lodging trees were on average 20m in height and 1.5m DBH. The majority of the trees selected for lodging supported vines and lianas.

iii. Preference for lodging sites:

Stump-tailed macaques showed strong selectivity in choosing their lodging sites. From 85 species of trees in their home range, the group selected only 6 tree species for sleeping during night. Out of these 6 species they are found to roost mostly upon 2 species namely Arctocarpus chama (45%) and Ficus bengalensis (35%). Therefore, we state them preferred species.

iv. Seasonal variation in lodging site selection:

Marked seasonal variations were also recorded in the selection of lodging sites (Table 1). The stump-tailed macaques used to lodge in Arctocarpus chama and Ficus bengalensis in all the four seasons. However, during monsoon season they preferred to lodge in Ficus bengalensis (62%), while in retreating monsoon, preference was high for Arctocarpus chama (50%).

TABLE:1 SELECTION OF LODGING TREE IN DIFFERENT SEASON:

Tree species	Family	W S %	PMS %	MS %	RMS %	Height (av)m	DBH (av)m
Ficus religiosa	**Moraceae**	0	29	0	0	25-30	2.4
Ficus bengalensis	**Moraceae**	25	13	62	38	25-30m	2
Ficus benzamine	**Moraceae**	4	4	0	0	25m	1.87
Castonopsis indica	**Fagaceae**	17	8	0	8	15-20m	.67
Arctocarpus chama	**Moraceae**	46	46	38	50	20-25m	1.5
Mangifera sylvatica	**Anacardiaceae**	8	0	0	4	20m	.68

WS= winter Season, PMS= pre-monsoon season, MS= monsoon season, RMS= retreating monsoon season.

DISCUSSION

Lodging tree: Arctocarpus chama: photo @ Mridupaban Phukan

Habitat of Stump-tailed macaque at Hollongapar Gibbon Sanctuary (Photo@ Udayan Borthakur)

The stump-tailed macaque group used 75 trees of 6 different species belonging to 4 families for lodging. Interestingly, all these trees were food trees of the stump-tailed macaques and they procured different food items viz. fruit, seed, leaf, flower etc., from these plants in different seasons. However, they never used these trees during the fruiting stage as lodging sites. This is likely to be a strategy of avoiding disturbances from nocturnal frugivores like bats and slow lorises. Das et al., 2005 reported similar kind of avoidance in using fruiting food plants as sleeping sites by Hoolock gibbon. The use of only six species of trees clearly shows that stump-tailed macaques are very selective in choosing their lodging sites. Species like golden langur, Hoolock gibbon, Proboscis monkey, Skywalker gibbon also show strong selectivity in choosing lodging trees (Biswas, 2004; Das, 2003; Fei et al., 2017). Seasonal variation in using the lodging sites was also observed, as the group preferred different species of trees in different seasons. As far as using pattern of sleeping trees go in 85% of the cases, the macaques were seen not to lodge in the same tree for two consecutive nights. Rather they returned to a lodging tree after an interval of 2-8 days. This cyclic return of the group to a particular lodging tree can be best described through their foraging behaviour.

Each day they start their travel from the previous night's lodging tree. As they do not forage within the same patch every day, they do not return to the previous lodging tree the next day but instead lodge in a different tree every night. In this manner, they change their lodging sites according to their daily foraging habit. However, after a few days (2-8) they return to the same tree. Thus the study clearly shows the influence of foraging behaviour on the frequency of using the sleeping sites in stump-tailed macaque. Several studies have established the effect of foraging on sleeping site selection and other sleeping-related behaviour in primates (Chapman 1989; Von Hippel 1998; Teichroeb et al., 2012). Moreover, changing sleeping tree in every night by the study group of stump-tailed macaque in majority cases also appears as an alternative strategy of reducing predation risk. Fei et al., (2017) observed that the sky walker gibbons rarely reused sleeping trees in consecutive nights. Similar results have been found for a number of primate species including pileated gibbon (Hrdy, 1977; Reichard, 1998; Smith et al., 2007) , black-crested and white-handed gibbons [Fan & Jiang, 2008; Reichard, 1998) and Proboscis monkey (Bernard et al., 2011). In contrast, Ramakantha & Coss (2001) observed a bonnet macaque troop using the same sleeping tree every night. Likewise reuse of sleeping trees for consecutive nights is a norms in some capuchin monkeys (Di Bitetti et al., 2000), and Kloss's gibbons (Tenaza & Tilson, 1985). According to (Caine et al. 1992; Liu and Zhao 2004) predators pose a major threat to primates when they are asleep. Our results have also shown that stump-tailed macaques invariably uses only tall lodging trees for night sleeping. This inherent habit of selecting tall trees as sleeping sites suggests that it is another anti-predation strategy of stump-tailed macaque. By adopting this strategy they actually try to avoid land predators in the habitat as predators cannot access top level of lofty and bulky trees easily. Chetry et al (2003) identified clouded leopard (Neofelis nebulosa), leopard (Panthera pardus) as potential predators of stump-tailed macaque in the study site. Anti-depredation behaviour has already been well identified as a prime determining factor for sleeping related behaviour in primates (Barnett et al., 2012; Di Bitetti et al., 2000; Duarte and Young 2011; Smith et al. 2007; VonHippel 1998; Zhou et al. 2009). Selection of tall trees for sleeping is widespread in different primate species as a primary means of anti-predation (Cui et al., Liu and Zhao 2004; Ramakantha & Coss (2001); Bernard et al., 2011; Phoonjampa et al ., 2010; Fei et al., 2017).

The study also shows that majority of the trees selected by study group of stump-tailed macaque were entangled with vines and lianas. It is likely that they used the tangled vegetation as a hiding cover to avoid detection by predators. However, occurrence of some potential predators like snake in the cover of vines cannot be overruled. In contrast to stump-tailed macaque the preference for tall trees without vines and lianas is exhibited by Pileated gibbons (Phoonjampa et al.,2010) Kloss gibbon (Tenaza & Tilson, 1985) and Skywalker gibbons(Fei et al., 2017).

Our results further reveal that all the 53 members of the study group slept in a single tree rather than scattering in sub groups in different trees at night. This might have been another important reason that stump-tailed macaques always selected tall emergent trees with profuse branching which can provide the necessary accommodation for the entire group. Sleeping tree architecture is also important in some arboreal primate species (Rasoloharijaona et al., 2008). It has been observed that the physical structure of a tree is an important factor in the choice of night sleeping trees in proboscis monkeys (Bernard et al., 2011). By allotting accommodation to all the group members large trees may facilitate social interaction, group cohesion, and communication (Anderson 1998; Di Bitetti et al., 2000).

In a nutshell, it can be said that predator avoidance is one of the most vital factor that influences lodging tree selection in stump-tailed macaque like in many other species of primate. Additionally, group foraging strategy and social accommodation also play key roles in sleeping tree selection of stump-tailed macaque. This high selectivity for lodging sites definitely bears strong conservation implications. Because of this strong selectivity for lodging trees the populations of stump-tailed macaque in fragmented habitats may become more susceptible to predation in absence of suitable lodging trees and which may in the long run affects the population size. Habitat destruction with indiscriminate removal of suitable lodging trees may become a crucial detrimental factor for the species. Therefore, the study emphasizes on systematic identification and conservation of lodging trees of stump-tailed macaque in different habitats as a part of its long term conservation

ACKNOWLEDGEMENTS

Our thanks go to colleagues from the Forest Department of Assam, especially the Jorhat Division for providing us permission to work and logistic support during the fieldwork. We are thankful to **Prof. S. M. Mohnot** and **Dr. Arun Srivastava** of Indo-US Primate Project for helping in designing the project. We are thankful to **Mr. Deban Borah**, late **Noren Bhuyan**, **Jibon Borah** and **Mr. B. B. Gurung** and his family who assisted in the fieldwork, without whose support this work would not have been possible. A special thank goes to late **Dr. Robert Horwich**, for going through the manuscript with valuable suggestions. This research is a part of cooperative programme of the Ministry of Environment and Forests Govt. of India and the US Fish and Wildlife Service (**Grant Agreements No.INT/FWS-22**).

REFERENCES

- Albert, A., Savini, T., Huynen, M. C. 2011. Sleeping site selection and pre sleep behavior in wild pigtailed macaques. American Journal of Primatology. https://doi.org/10.1002/ajp.20993.
- Anderson, J. R. 1998. Sleep, sleeping sites, and sleep-related activities: awakening to their significance. American Journal of Primatology, 46, 63–75.
- Barnett, A. A., Shaw, P., Spironello, W. R., Maclarnon, A., and Ross, C. 2012. Sleeping site selection by golden-backed uacaris, Cacajao melanocephalus ouakary (Pitheciidae), in Amazonian flooded forests. Primates, 53, 273–285.
- Bernard, H., Matsuda,I., Hanya, G and Ahmad, A. Hamid. 2011 Characteristics of Night Sleeping Trees of Proboscis Monkeys (Nasalis larvatus) in Sabah, Malaysia. International Journal Primatolgy, 32:259–267 DOI 10.1007/s10764-010-9465-8
- Biswas, J. 2004. Ecology and Social Behaviour of golden langur (Trachypithecus geei) in Assam. Unpublished Doctoral thesis, Gauhati University, Assam, India.
- Caine, N. G., Potter, M. P., & Mayer, K. E. 1992. Sleeping site selection by captive tamarines (Saguinus labiatus). Ethology, 90, 63–71.
- Caldecott, J.O.1986. An Ecological and behavioural study of the Pigtailed macaque. Constribution to Primatology. Vol.21, Karger, Basel.
- Chapman, C. A. 1989. Spider monkey sleeping sites: use and availability. American Journal of Primatology, 18, 53–60.
- Chetry, D and Mohnot, S.M. 2000. Distribtuion of food resource or group size, What matters ? XVIIIth, Congress of the Interna¬tional Primatological Society. Adelaide, South Australia.
- Chetry, D., Medhi,R. Bujarbarua,P. and Bhattacharjee, P. C 2001. Mammals of Gibbon Wildlife Sanctuary, Assam, India. Tiger paper, XXVIII. 4: 29-32.
- Chetry, D. 2002, Socioecology of Golden langur (Trachypithecus geei) in Chakrashila Wildlife Sanctuary, Assam, India. Project Report Submitted to Primate Conservation Inc. Charlestown, RI. 21pp.
- Chetry, D., Medhi,R., Bhattacharjee,P.C. 2003. Antipredator Behaviour of Stumptailed macaque in Gibbon Wildlife Sanctuary. ASIAN PRIMATES.Vol.8 No.3&4:20-22.
- Chetry,D and Bhattacharjee, P.C.2002. Reproductive Behaviour in a Wild Group of Stump-tailed macaque, Macaca arctoides. XIXth Congress of the Interna¬tional Primatological Society. Bejing, China.
- Chetry, D and Bhattacharjee, P.C.2004. Lodging trees of Stump-tailed macaque (Macaca arctoides). Folia Primatologica Abstract XXth Congress, International Primatological Soceity, 247pp.

- Chetry, D 2002. Socioecology of Stumptailed macaque, Macaca arctoides (I. Geoffroy, 1857). Unpublished Doctoral thesis, Gauhati University, Assam, India.
- Chetry, D., Medhi, R. Bhattacharjee, P.C. and Mohnot,S.M. 2007.Factors influencing the ranging behavior in Stumptailed macaque. Tropical Ecology, 4:1-8.
- Chetry, R., and D. Chetry. 2009. The Golden Langur. Gibbon Conservation Centre, Mariani, Assam, India. 205pp.
- Chetry, D., Gosh.K., and Chetry, R. 2016. Lodging site selection by western hoolock gibbon (Hoolock hoolock). International Primatological Society Congress XXVI, Chicago, USA.
- Cui, L. W., Quan, R. C., & Xiao, W. 2006. Sleeping site of black-and-white snub-nosed monkeys (Rhinopithecus bieti) at Baima Snow Mountain, China. Journal of Zoology, 270, 192–198.
- Das, J. 2003. Socioecology of Hoolock Gibbon: Hylobates hoolock hoolock (Harlan, 1834). Unpublished Doctoral thesis, Gauhati University, Assam, India.
- Das,J., Bhattacharjee, P.C., Biswas, J. and Chetry, D. 2005. Western Hoolock gibbon: Socio-ecology, Threats and Conservation Action Plan. Department of Zoology, Gauhati University, Guwahati, India . 7-11.
- Day, R. T. and Elwood, R. W. 1999. Sleeping site selection by the golden-handed tamarin Saguinus midas midas: the role of predation risks, proximity to feeding sites, and territorial defence. Ethology 105:1035–1051.
- Di Bitetti, M. S., Vidal, E. M. L., Baldovino, M. C., & Benesovsky, V. 2000. Sleeping site Callithric penicillata preferences in tufted capuchin monkeys (Cebus paella nigritus). American Journal of Primatology, 50, 257–274.
- Duarte, M. H. L., & Young, R. J. 2011. Sleeping site selection by urban marmosets under conditions of exceptionally high predator density. International Journal of Primatology, 32(2),329–334.
- Fan P-F, Jiang X-L. 2008. Sleeping sites, sleeping trees, and sleep-related behaviors of black crested gibbons (Nomascus concolor jingdongensis) at Mt. Wuliang, Central Yunnan, China. American Journal of Primatology 70:153–160.
- Fei, H, L., Zhang, D., Yuan, S,D., Zhang,L. and Fan, P.F. 2017. Anti-predation Sleeping Behavior of Skywalker Hoolock Gibbons (Hoolock tianxing) in Mt. Gaoligong, Yunnan, China. International Journal of Primatology. 38:629–641
- Hrdy, S. B. 1977. The langurs of Abu: female and male strategies of reproduction. Cambridge: Harvard University Press, 361p.
- Liu, Z. H., & Zhao, Q. K. 2004. Sleeping sites of Rhinopithecus bieti at Mt. Fuhe, Yunnan. Primates, 45(4), 241–248.
- Phoonjampa, R., Koenig, A., Borries, C, Gale, G. and Savini, T. 2010. Selection of sleeping trees in pileated gibbons (Hylobates pileated). American Journal of Primatology. 72:617-625.

- Reichard, U. (1998). Sleeping sites, sleeping places, and pre-sleep behavior of gibbons (Hylobates lar). American Journal of Primatology, 46, 35–62.
- Sarkar, P. 2002. Ecology and dynamics of social relationship of Assamese macaque: Macaca assamensis (Mc Clelland, 1839). Unpublished Doctoral thesis, Gauhati University, Assam, India.
- Smith, A. C., Knogge, C., Huck, M., Lottker, P., Buchanan-Smith, H. M., & Heymann, E. W. 2007. Long term patterns of sleeping site use in wild saddleback (Saguinus fuscicollis) and mustached tamarins (S. mystax): effects of foraging, thermoregulation, predation, and resource defense constraints. American Journal of Physical Anthropology, 134, 340–353.
- Rahaman, H., and Parthasarathy, M. D.1969. The home range, roosting places, and the day ranges of the Bonnet macaque (Macaca radiata) Journal of Zoology, London, 157: 267-276.
- Ramakantha,U and Coss,R.G.2001. A Comparison of the Sleeping Behavior of Three Sympatric Primates: A Preliminary Report. Folia Primatol 2001;72:51–53.
- Rasoloharijaona, S., Randrianambinina, B., & Zimmermann, E. 2008. Sleeping site ecology in a rainforest dwelling nocturnal Lepilemur mustelinus lemur: implications for sociality and conservation. American Journal of Primatology, 70, 247–253
- Teichroeb, J. A., Holmes, T. D., & Sicotte, P. 2012. Use of sleeping trees by ursine colobus monkeys (Colobus vellerosus) demonstrates the importance of nearby food. Primates, 53, 287–296.
- Tenaza, R., & Tilson, R. L. 1985. Human predation and Kloss's gibbon (Hylobates klossii) sleeping trees in Siberut Island, Indonesia. American Journal of Primatology, 8, 299–308.
- Von Hippel, F. A. 1998. Use of sleeping trees by black and white colobus monkeys (Colobus guereza) in the Kakamega forest, Kenya. American Journal of Primatology, 45, 281–290.
- Zhou, Q. H., Huang, C. M., Li, M., and Wei, F. W. 2009. Sleeping site use by Trachypithecus francoisi at Nonggang nature reserve, China. International Journal of Primatology, 30, 353–365.

THAR MULTIDISCIPLINE JOURNAL

Vol. No. 01 Issue No. 02 | Summer Edition 2020

ISSN 2582-3140