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Cover: *Euphaea pseudodispar* shot at Kalindi River, Thirunelly, Wayanad district, Kerala. © Muneer P.K.

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COMMUNICATION

Attitudes and perceptions of people about the Capped Langur *Trachypithecus pileatus* (Mammalia: Primates: Cercopithecidae): a preliminary study in Barail Wildlife Sanctuary, India

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Abstract: Conservation of any species needs the support and cooperation of local people. In order to understand the attitudes and perceptions of the locals about the Capped Langur, the present study was carried out around Barail Wildlife Sanctuary in Assam. The study was carried out through a questionnaire, semi-structured interviews, and interaction with forest staff & local experts to assess the perception of present threats and conservation problems. A total of 400 respondents were interviewed during the study periods. The results reveal that a majority of respondents supported Capped Langur conservation. Habitat loss and fragmentation was considered a major threat (47%), followed by human exploitation (22%), developmental activities (17%), agricultural extension (8%), and hunting & teasing (6%). Knowledge concerning Capped Langurs and perceptions of threats varied considerably among respondents. Increased awareness among local people is suggested to motivate them towards conservation. Benefit sharing and promotion of value-added services through skill development could also be highly rewarding.

Keywords: Assam, conservation, northeastern India, threats.

Bengali: উদ্ভিদ হোক, কিম্বা প্রাণী, যে কোনো প্রজাতির সংরক্ষণের জন্য স্থানীয় লোকদের সহযোগিতা অত্যন্ত প্রয়োজন। টুপিওয়ালা বানর (কেপড ল্যাঙ্গুর) সম্পর্কে স্থানীয়দের ধারণা এবং মনোভাব বোঝার জন্য এই গবেষণাটি আসামের বড়াইল বন্যপ্রাণী অভয়ারণ্যে করা হয়েছিল। এদের সংরক্ষণের প্রয়োজনীয়তা কি এবং বড়াইল পাহাড় অঞ্চলে বানরগুলোর টিকে থাকতে গিয়ে কি কি সমস্যার মুখোমুখি হচ্ছে, এসব নিরীক্ষণ করার জন্য একটি প্রশ্নমালা তৈরি করে বনকর্মী এবং স্থানীয় লোকদের সাক্ষাৎকারের মধ্য দিয়ে এই গবেষণার ভিত তৈরি করা হয়েছিল। মোট ৪০০ লোকের সাক্ষাৎকার নেওয়া হয়েছিল। দেখা গেলো যে বেশিরভাগ উত্তরদাতাই টুপিওয়ালা বানরের সংরক্ষণকে সমর্থন করছেন। প্রায় ৪৭% উত্তরদাতা মনে করেন বাসস্থানের অবক্ষয় বানর প্রজাতিটির সংরক্ষণের প্রধান অন্তরায়, ২২% এর মতে বানরের প্রতি মানুষের বৈরী আচরন, ১৭% এর মতে তাদের বাসস্থানের আশপাশ অঞ্চলে বিভিন্ন উন্নয়নমূলক কর্মযজ্ঞ, ৪%-র মতে এলাকাতে কৃষি সম্প্রসারণ, এবং ৬%-র মতে নির্বিচার বানর নিধন, এ সবই হচ্ছে প্রজাতিটির সংরক্ষণের অন্তরায়। স্থানীয়দের ভাষ্য মতে, সাধারন জনগণের মধ্যে টুপিওয়ালা তথা অন্যান্য সব বানর প্রজাতির সংরক্ষণের প্রয়োজনীয়তার উপর সচেতনতা বৃদ্ধির যথেষ্ট প্রয়োজন রয়েছে, যাতে করে সবাই বানর সংরক্ষণের প্রতি উদ্বুদ্ধ হন।

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Author contributions: RAB & PC designed the study; RAB, ASC, & NRT collected the data while RAB analyzed the data, RAB wrote the first manuscript and all authors revised the manuscript.

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INTRODUCTION

Primates play an fundamntal role in the forest ecosystem as seed dispersers and predators, and they are dependent on primary forest habitats (Chapman & Onderdonk 1998; Kays & Allison 2001). Habitat fragmentation, quality of habitat, and anthropogenic factors affect primate diversity and abundance across their distribution (Rylands 1987; Chapman & Peres 2001; Pyritz et al. 2010). It has been recorded that some primates respond to these challenges by emigration, crowding, and altered sex ratios, while others continue to thrive in the same area by adjusting to anthropogenic threats (Baranga 2004; Martins 2005; Rode et al. 2006; Schwitzer et al. 2011). In disturbed, degraded or fragmented habitats, animals also face loss of roosting sites, reduced food resources, diminished escape cover, altered and migratory routes (Kumar & Solanki 2004; Malhi et al. 2008). They are likely to become more prone to natural disasters such as hurricanes, floods, and seasonal droughts (Malhi et al. 2008; Alho & Silva 2012).

Capped Langur *Trachypithecus pileatus* (Image 1) is a folivorous primate occurring in the northeastern states of India, Bangladesh, northwestern Myanmar, Bhutan, and southern China (Das et al. 2020). They live in multi-female groups, rarely with more than one male (Stanford 1991; Mukherjee et al. 1995). The species occurs in different habitats including bamboo stands, plantations, and tea gardens (Choudhury 1989, 1996; Raman et al. 1995). Their population is on the decline mainly due to habitat loss and forest degradation (Srivastava et al. 2001; Das et al. 2020). Human population explosion, forest degradation by logging, tea garden extension, fuel wood collection, and other construction activities affect the healthy survival of Capped Langurs in Assam.

The present study was carried out in Barail Wildlife Sanctuary (BWS), which is the only protected area in southern Assam, northeastern India. It is situated in the Barail Hill range on the transitional zone between the Indo-Burmese and Indo-Chinese subregions and surrounded by tea gardens from the southern side. Although some scattered studies have been carried out on wildlife of this sanctuary, to date no study was taken up on Capped Langurs. The wildlife sanctuary is a safe home for many primates, including an 'Endangered' species, the Western Hoolock Gibbon *Hoolock hoolock*; four 'Vulnerable' species including Bengal Slow Loris *Nycticebus bengalensis*, Capped Langur, Stump-tailed Macaque *Macaca arctoides*, and Northern Pig-tailed Macaque *Macaca leonina* (Choudhury 2013; Talukdar et al. 2018). Besides, Assamese Macaque *Macaca assamensis*, a 'Near Threatened' species, and Rhesus Macaque *Macaca mulatta*, a 'Least Concern' species also occur in the sanctuary. The present study was done to develop a clear understanding of conflict of the Capped Langur with the people of the fringe villages and threats that affect the survival of the species. Here, we document the results of a questionnaire survey on the Capped Langur in BWS. This work presents ongoing problems for the species and suggests some effective measures for conservation in the region.

Image 1. Capped Langur *Trachypithecus pileatus* in Barail Wildlife Sanctuary. © Rofik Ahmed Barbhuiya

METHODS

Study area

The Barail Wildlife Sanctuary is located in the Barak Valley area of southern Assam districts. The area comprises of fourteen reserve forests, out of which Barail Reserve forest and North Cachar Reserve forests have been converted into BWS. It is a newly declared sanctuary formed in 2004 through a gazette notification of the Government of Assam (vide no. FRW-12/2001/pt/4, dated 19 June 2004).

It is a major catchment area and watershed zone for Barak valley. It covers a total area of 326.24 km^2 and is located at the 92.766–92.866 °E & 24.966–25.966 °N. The North Cachar part of the sanctuary is located at 92.27–92.78 °E & 25.12– 25.18 °N (Figure 1). The forests occupy the outlying ranges of hills that project out from the main ranges of the Jaintia Hills and North Cachar Hills and undulate at the base. The highest point in the

Figure 1. Map of India highlighting the state Assam and the study area.

BWS is Nemotha Peak with an altitude of 1,105 m. The southern slopes are steeper than the northern slopes. The elevation ranges from 55 to more than 1,800 m and annual rainfall ranges 2,500–4,000 mm. The temperature is a minimum of 9 °C in winter and highest 37 °C in summer, and humidity varies from 62% to 83%. The administrative control of the BWS is under the Southern Assam Forest Circle, Silchar, Assam.

The sanctuary includes several rivulets—Jatinga, Daloo, Kayong, Gumra, and Boleswar—all of which drain into Barak, the main river basin of the valley. Vegetation of the sanctuary is a mix of tropical moist evergreen, semi-evergreen, and deciduous forests which supports a wide diversity of wildlife. The Sanctuary harbors 19 species of mammals including seven species of primates, 250 species of avifauna, 23 species of amphibians, and 43 species of reptiles which are globally threatened (Choudhury 2013; Talukdar et al. 2021). The plant diversity of BWS comprises of 81 tree species, eight species of bamboo, and several species of herbs & shrubs.

Data collection

A preliminary survey was conducted from November 2016 to December 2018. The survey was carried out by a set of close ended questionnaire. The questions were designed as per Mutanga (2015), Mir et al. (2015), Choudhury et al. (2019), and Talukdar & Choudhury (2020) with slight modifications. The samples were taken within the range of two kilometers from the sanctuary, considering that the Capped Langurs do not usually come out to the fringe villages. A pilot survey was carried out on a sample of 50 people, giving special preference to the forest staff, village headman, hunters, and local experts. Before interviewing the respondents, a pre-test was conducted among a few respondents to assess their level of understanding of the questionnaire. A total of 400 respondents were selected from all the villages irrespective of their community. The sample size was realistic as the pilot survey suggested homogeneous responses.

The study was done in two phases. In the first phase, the photograph of the species was shown to the respondents to identify if they have seen it. Only those respondents who knew the species were selected for the next phase, i.e., feedback collection. For obtaining feedback, preference was given to the senior-most family member, who was expected to have an idea about the past as well as the present status of the species, and all their perceptions were recorded based on the questionnaire set for this. After this, the respondents were asked about the threats faced by the Capped Langur in BWS, community responses for them, and the problems caused by the species. The ideal reason for assessing the trends of species over time and threats were noted in the field record book as short forms, for example, Habitat loss and fragmentation 'HF', Developmental activities 'DA', and Hunting & Teasing 'HT'. Collected data were combined as per the objectives of study and perceptions of people were used for population trend analysis. Data were analyzed through SPSS version 20 and the chi-square test was applied to understand the significance level.

RESULTS

Perceptions

Results reveal that the local people are aware of the species. Most respondents think that the population of Capped Langur was decreasing (46.7%), while 30.3% respondents believe that the population was increasing, whereas 23% people did not know whether it was increasing or decreasing, and these varied significantly (Table 1). All the respondents are regular visitors of the sanctuary (as they harvest firewood and practice 'jhum' (slash and burn cultivation). The majority of the respondents (59%) expressed that agricultural crops (like jhum cultivation) in fringe areas and inside the sanctuary are not damaged by the langur, whereas 26.3% of respondents were neutral, and 14.7% said that they do cause damage to the crops There was a significant difference in people's perception. (χ^2 = 126.52, df = 2, P <0.001). Large numbers of respondents (58.2%) feel that the species should be conserved, 36% were neutral, and a small segment (5.8%) did not speak in favor of conservation (χ^2 = 166.65, df = 2, P <0.001). Most respondents (68.3%) are not well aware of the species conservation status. Only 23.5% of respondents knew that it is a legally protected animal and 8.2% thought it is not legally protected and the difference was significant (χ^2 = 233.41, df = 2, P <0.001).

A total of 49.5% respondents reported that the species is good for the sanctuary, whereas 41.2% of respondents were not interested, and only 9.3% clearly expressed it was not good to have the langur (χ^2 = 108.49, df = 2, P <0.001). A good number of respondents (53.8%) shared that they enjoy to watch the species, but 43% respondents were silent and only 3.2% said no (χ^2 = 169.84, df = 2, P <0.001).

When the respondents were interviewed to know the species relation with regards to human health, the maximum response (70.2%) was 'do not know', whereas the remaining 10.3% and 19.5% said 'Yes' and 'No' respectively (χ^2 = 250.45, df = 2, P <0.001). Most of the respondents (57.2%) said that the species is important for balancing the ecosystem whereas 35.8% of respondents did not know about it and only 7% of people said that they had no role (χ^2 = 152.56, df = 2, P <0.001).

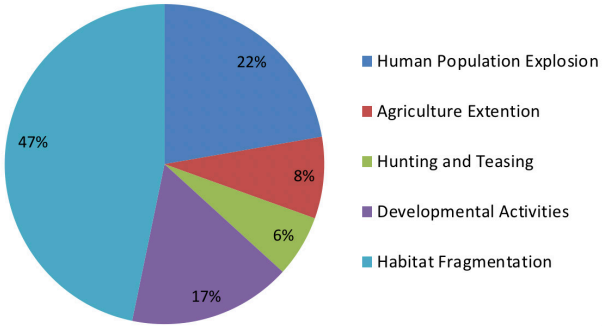

Figure 2. Perceptions of people about threats faced by the species.

Threats to the Capped Langur in Barail Wildlife Sanctuary

It was found that most people were well aware of the threats to the Capped Langur (Figure 2). The majority of respondents (47%) informed that habitat loss and fragmentation are significant threats to the species and its population decline. Another section of the respondents stated that human exploitation (22%) was the second most important factor due to wood collection for fuel and house construction by the people in the fringe villages. Developmental activities (17%) like road constructions and sand & stone collection from the rivers of the sanctuary were affecting their habitats. A few of the respondents thought that agriculture extensions (8%) through the practice of jhum inside the

Table 1. Perception of people about various questions and its calculated value.

	Question	Category			χ^2	p
1	Do you think the number of Capped Langur has been increasing in BWS?	Yes	No	Neutral	35.56	0.001
		121 (30.3%)	187 (46.7)	92 (23%)		
2	Do you think Capped Langurs are harmful for Agricultural crops?	59 (14.7%)	236 (59%)	105 (26.3)	126.52	0.001
3	Is it important to conserve Capped Langur in BWS?	233 (58.2%)	23 (5.8%)	144 (36%)	166.65	0.001
4	Are Capped Langurs legally protected animal?	94 (23.5%)	33 (8.2%)	273 (68.3%)	233.41	0.001
5	Do you think Capped Langur is good for BWS and local people?	198 (49.5%)	37 (9.3%)	165 (41.2%)	108.49	0.001
6	Do you think Capped Langur has the recreational value?	215 (53.8%)	13 (3.2%)	172 (43%)	169.84	0.001
7	Is it good for human health?	41 (10.3%)	78 (19.5%)	281 (70.2%)	250.45	0.001
8	Do you think Capped Langur balance the ecosystem?	229 (57.2%)	28 (7%)	143 (35.8%)	152.56	0.001

Image 2. Threats in the Barail Wildlife Sanctuary: A—Rice cultivation in fringe area | B—Betel Nut plantation by local inhabitants | C—After interaction with the local people | D—Tea plantation in fringe areas of the BWS.

sanctuary was also a reason for habitat destruction. The remaining respondents indicated that hunting & teasing (6%) affected the survival of the species in the sanctuary.

DISCUSSION

Most people believed that the population of the Capped Langur was declining. Many of them opined that these langurs were now not as frequently seen as in the past decades. Villagers regularly roam in the buffer areas of the sanctuary, where they had witnessed a deterioration of forest cover due to increase in timber logging, firewood collection, and jhum practices. Thus, the langurs might have shifted to their traditional forage areas in the core of BWS to good quality forests, and hence their reported perceptions. The Capped Langurs sometimes come to the fringe areas, especially in the morning hours to forage on crops and hence a few of the respondents reported loss of crops to langurs, while the majority of the respondents did not experience similar incidents. Respondents opined that they drove away the animals during the onset of jhum cultivation so as to minimize crop loss and show a strong ability to adapt to living close to human settlements. Large core areas of the sanctuary are sufficient to fulfill the needs of the Capped Langur. From most of the respondents, positive attitudes were documented on the conservation of the langur. A few of the respondents experienced conflict and thus had negative attitude towards conservation of the species thinking that it would cause loss to their shifting cultivation practices. The percentage of respondents (36%) who kept silent on conservation of the species is not negligible and they need to be sensitized to increase cooperation for conservation.

Although most of the respondents have a low educational background, they believe that the species was important for the forest. Only a small fraction of the respondents knew that these langurs were legally protected, but the majority of the respondents had no knowledge about the conservation status of the species. This reflects the need for awareness for the species. None of the respondents reported that the death of langurs happens because of conflict or demand for their meat.

Habitat loss and fragmentation are the main threats for the Capped Langur in the sanctuary (Image 2). Jhum cultivation and large-scale harvesting of forest resources in the form of firewood collection from the sanctuary are also major reasons for the reduction the habitat. Although tea and rubber plantations within reserve forests are the major factors for the destruction of natural habitats in southern Assam (Talukdar et al. 2018), the local people in BWS have destroyed the habitat by jhum and fuelwood collection. Jhum cultivation is one of the biggest threats for wildlife including primates in northeastern states (Johnsingh 1985; Katti 1992; Choudhury 1996). It is done by tribal communities for planting several crops, fruits, and betel nut. Jhum cultivation leads to soil erosion and landslides ultimately damaging large forest covers through the creation of canopy gaps and depletion of food (Choudhury 2013). Increasing land for monoculture activities especially betel nut plantation in human settlement fringe areas of the sanctuary is another major threat. It was found that local people collect timber yielding plants for house and furniture construction and also for selling them to support their livelihood. Commercial mining of stone creates landslide in Jatingah River and other small riverbanks within the sanctuary. These are the major factors that affect survival of wildlife including primates (Fahrig 1997; Srivastava 2006). Habitat loss causes reduction in population size in particular forest areas and ultimately increases the chances for some species to become locally extinct (Burkey 1995).

Road construction and a railway line inside the sanctuary are also threats for the Capped Langur. There is regular railway line repairing due to damages of its track especially in monsoon season after introducing the new broad-gauge line in 2015. Also, National Highway 27 is under construction inside the sanctuary and NH 54 also traverses through the western boundary of the sanctuary. A considerable number of landslide incidences take place in these tracts every year between

April and September. Once the construction of NH 27 is over, it will cause hindrance for the free movement of animals, especially Capped Langurs as they prefer to use tree canopy for travel. This aspect deserves the sincere attention of conservationists.

The increasing human population is another major threat to wild animals in the BWS. A rising population entails increasing consumption of food, water, and fuel (Ehrlich & Anne 1970; Cincotta & Engelman 2000). This leads to reducing the habitat of wildlife inside the sanctuary (Figure 3). Extension of agricultural land, especially monoculture activities, consumes the natural forests in human settlement areas near or fringe villages of the sanctuary. People residing inside the sanctuary especially tribal people have started practicing Betel Nut *Areca catechu* and Pan *Piper betel* plantation (Figure 3). Both have good market value as these are consumed by the locals as a mouth freshener and psycho stimulant i.e., creates a sense of well-being and decreases depression.

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