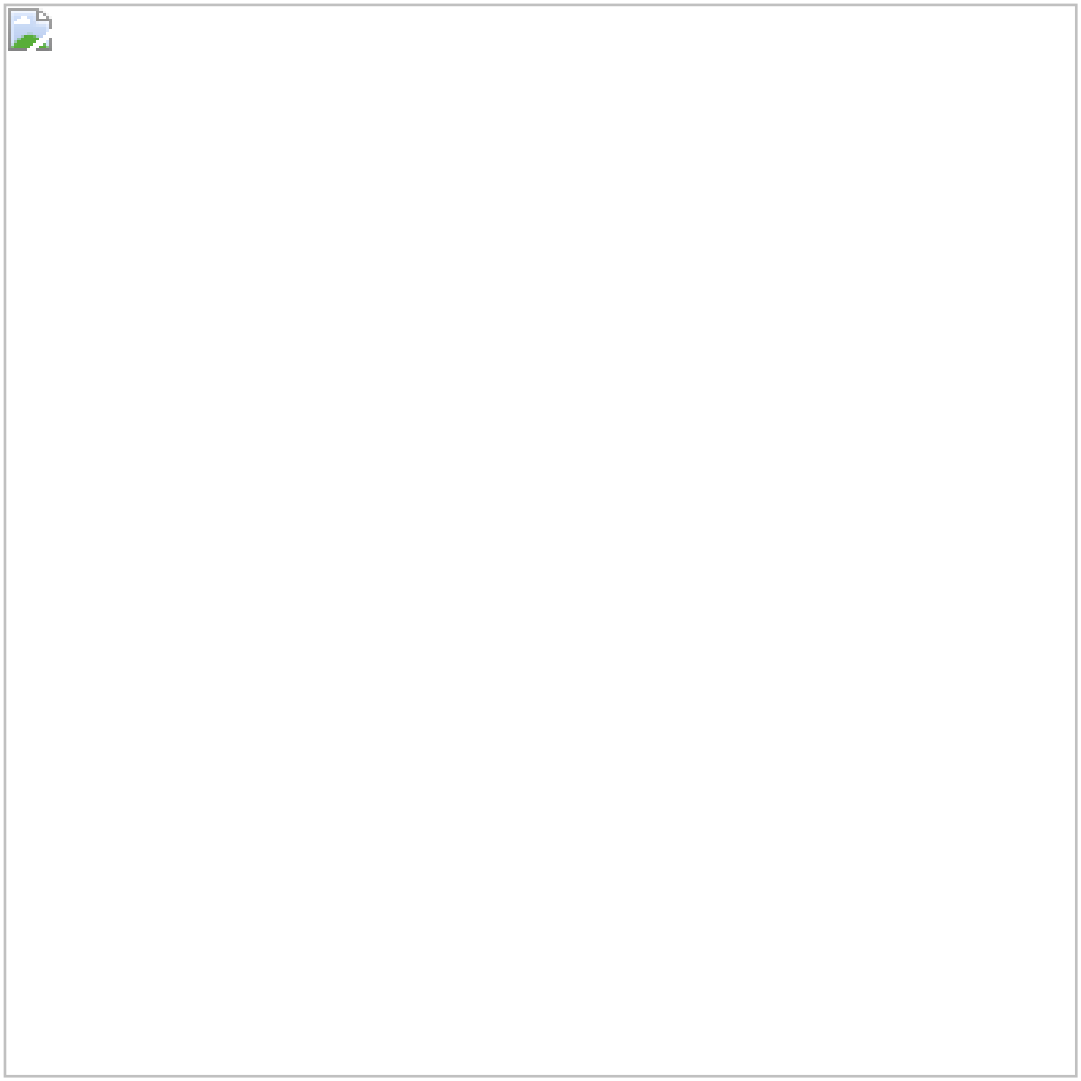

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Status and Conservation of Golden Langur in Chakrashila Wildlife Sanctuary, Assam, India

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Abstract: The golden langur, *Trachypithecus geei*, is an endangered species endemic to India and Bhutan. Its distribution is limited to a small forest belt in western Assam in Northeast India and Bhutan, between the River Manas in the east, River Sankosh in the west and the Brahmaputra in the south. Chakrashila Wildlife Sanctuary straddling Kokrajhar and Dhubri districts of Assam is the only protected habitat for the golden langur in India. From December 2006 to January 2007, we carried out the first survey of the golden langur in the sanctuary. Data were collected using line transects and total counts. We counted 474 individuals in 64 troops in and around the sanctuary through direct sightings. Group size ranged from 3 to 15 individuals, with a mean size of 7.4. The adult sex ratio was 1:1.53, and the ratio of adult females to infants was 1:0.617. The age structure of the population counted comprised 49.8% adults, 33.5% juveniles and 16.7% infants. Domestic dogs (*Canis familiaris*) and illegal felling were found to be the major threats for golden langur in this protected habitat. We hope that this report will help guide future conservation efforts for the golden langur and for the management of the Chakrashila Wildlife Sanctuary.

Key words: Golden langur, endangered species, conservation status, Chakrashila Wildlife Sanctuary, India

Introduction

The golden langur (*Trachypithecus geei*) is endemic to a limited area of western Assam in India and a neighboring part of Bhutan. The distribution of this endangered species lies north of the Brahmaputra River, bounded on the east by Manas River, and on the west by the Sankosh River. The range in south-central Bhutan is between the Sankosh River and a high mountain ridge (running across Pele-la) in the west, and Manas River, Mangde Chu and the high mountain ridge west of Chamkhar Chu in the east (Choudhury 2008). There have been a number of studies that have examined the distributional limits and the population status of the species in India and Bhutan (Gee 1961; Khajuria 1956, 1961; Wayre 1968; Mukherjee and Saha 1974; Mukherjee 1978, 1994, 1995; Mukherjee *et al.* 1992, 1997; Mukherjee and Southwick 1997; Subba 1989; Choudhury 1992, 2008: Wangchuk 1995; Mohnot 1995–2001; Mohnot 2002). Srivastava *et al*. (2001b) estimated a population of 1,500 in India. There are reports on population dynamics of the species from different forest fragments (Srivastava *et al.* 2001a; Choudhury 2002; Medhi *et al.* 2004; Biswas 2004).

The golden langur occurs in three protected areas in Bhutan: the Jigme Singye Wangchuk (Black Mountains) National Park (173,000 ha), Royal Manas National Park (103,300 ha) and the Phibsoo National Wildlife Sanctuary (26,600 ha). In India, the golden langur receives the highest legal protection as a Schedule-I species in the Indian Wildlife Protection Act (1972), yet nearly all of the areas where it is still found lie outside the protected area network. Chakrashila Wildlife Sanctuary in the districts of Kokrajhar and Dhubri is the only protected habitat for golden langur in the country. Datta (1998) it was who first reported the occurrence of golden langur in Chakrashila Wildlife Sanctuary, and a few studies on the ecology and behavior of the species have already been conducted there (Mukherjee 1996; Chetry 2002a; Chetry *et al*. 2002a). Chetry *et al*. (2005) also carried out an education and awareness program for the conservation of the golden langur in the vicinity of the sanctuary. There was no systematic attempt, however, to examine the population status of the species in the sanctuary even after 11 years of its declaration as a protected area specifically for the golden langur.

Rapid loss of habitat and habitat fragmentation are the major threats for the golden langur in India (Srivastava

2001b; Choudhury 2002). Chetry (2002b; Chetry *et al*. 2002b) reported substantial anthropogenic pressure in and around Chakrashila and, with this in mind, we decided to carry out a study to assess the status of the golden langur population in this protected habitat. Here we provide an estimate of the size (number of individuals and groups, and average group size) and composition of the golden langur population in the Chakrashila Wildlife Sanctuary.

Methods

Chakrashila Wildlife Sanctuary

Chakrashila Wildlife Sanctuary (26°15'–26°26'N, 90°15'–90°20'E; 4,500 ha) is in the districts of Kokrajhar and Dhubri in Assam. The sanctuary, in the southernmost part of the range of the species, is the only protected area for the golden langur in India. The hilly terrain is covered with dense forest which is mostly semi-evergreen and moist deciduous, with patches of grassland and scattered bushes (scrubland). The forest type falls in the category 3C/C.1.a(ii) following Champion and Seth (1968). The communities living around the sanctuary belong to various ethnic groups, including Bodo, Rabha, Garo, Rajbanshi, Nepali and Muslims.

Survey

The survey was carried out from December 2006 to January 2007, and data were collected using both direct and indirect methods. A modification of the line transect method (Burnham *et al.* 1980; NRC 1981; Struhsaker 1997) was used, depending upon the habitat and the forest condition. Twelve transects totaling 120 km were set up in a stratified random manner to cover all representative areas of the wildlife sanctuary (Mueller-Dombois *et al*. 1974; Kent *et al*. 1994). Three people walked the existing forest trails (and occasionally off the trails), covering an average of 10 km per day. Transects were initiated at 06:00 and terminated in the evening (16:30). The observers walked slowly through the transect pausing regularly, at least every 500 m. On sighting the golden langur, the global positioning system (GPS) co-ordinates, altitude, group structure and, when possible, age, sex and number of individuals were recorded.

At 500-m intervals and at each location where golden langur were encountered, the observers estimated the tree height, canopy cover, ground cover, dominant tree species, and shrub and herb species in a 10-m radius. Observers also took notes *ad libitum* on any evidence for, and degree of, grazing and logging in the study area.

We recorded indirect evidence for the presence of primates, such as grunts, branch shaking, and sounds associated with locomotion and feeding. All such indications were used to trace the animals and we stopped for about 10 minutes to collect the details. Secondary information was also gathered by talking with the local people in the vicinity of the sanctuary.

Results

Population of golden langurs

In all, direct sightings during the survey resulted in an estimate 474 individuals in 64 groups. The average group size ranged from 3 to 15 individuals, with a mean of 7.40. These 64 troops were recorded from both peripheral and

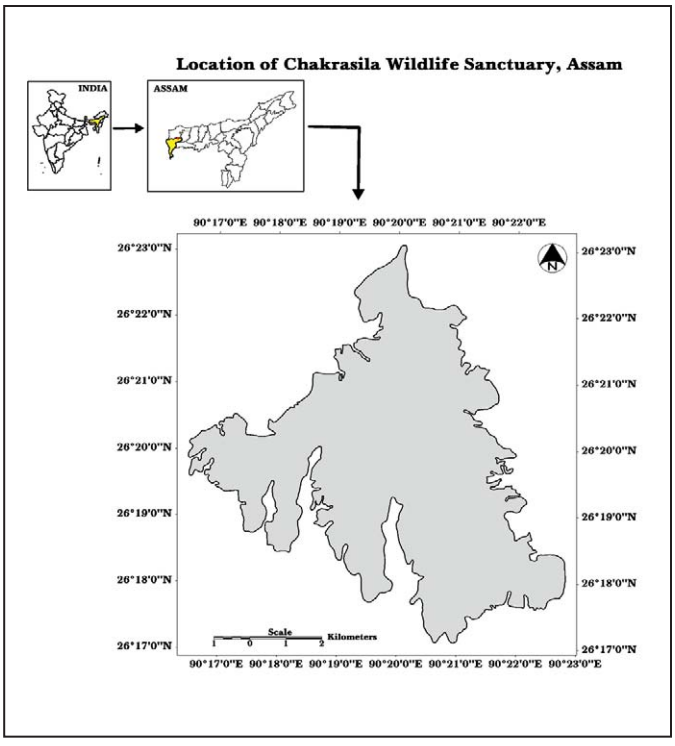

Figure 1. The Chakrashila Wildlife Sanctuary, Assam.

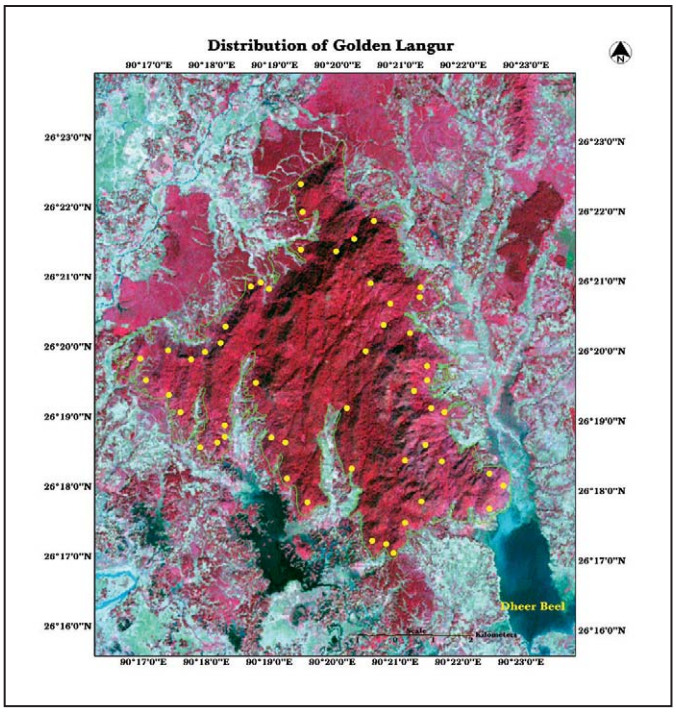

Figure 2. The Chakrashila Wildlife Sanctuary, Assam, showing the locations of the 64 golden langur groups recorded in this survey.

core areas of the sanctuary. Groups were located at altitudes of 34 m to 417 m above sea level. Table 1 gives the locations of the golden langur troops in the Chakrashila Wildlife Sanctuary.

Population structure and group composition

We counted the numbers of all troops and individuals we saw, and also analyzed the age–sex composition of the groups. Of the 474 individuals, 236 were adults, 159 were juveniles and the rest (79) were infants (Table 2). Thus, 49.78% were adults, 33.54% were juveniles and 16.66% were infants. The demographic records further revealed that the adult sex ratio was 1:1.53 (Table 3). Of the 64 groups, most (43) were single male/multi-female, while 19 groups had two-male/multi-female social structures. Only two all male groups were seen during the survey period. The population density in the sanctuary was estimated at 65.83/km².

Sympatric primates and other mammals

Two other primates were recorded in the Chakrashila Wildlife Sanctuary: rhesus macaque (*Macaca mulatta*) and slow loris (*Nycticebus bengalensis*). Other mammal species include tiger (*Panthera tigris*), leopard (*Panthera pardus*), clouded leopard (*Neofelis nebulosa*), wild pig (*Sus scrofa*), barking deer (*Muntiacus muntjak*), sambar (*Cervus unicolor*), and pangolin (*Manis pentadactyla*).

Threats

Dogs kill the langurs particularly in the fringe areas of the sanctuary. We recorded seven incidences during one year (2005–2006) of golden langurs being killed by dogs in the nearby villages; of these, two of the victims were adult females and five were juveniles. General forms of exploitation and disturbance of the forest were also found to be a threat to the langurs in the sanctuary. They included illegal logging, the collection of firewood and non-timber forest products, and grazing. Although not evaluated systematically, interviews and qualitative observations during the study indicated that the golden langurs were not hunted.

Discussion

Our results indicate that the Chakrashila Wildlife Sanctuary is an important stronghold for the endangered golden langur in the western-southernmost part of its range in India. The Chakrashila population is one of the largest in the country, and the current age structure indicates that it is a healthy and growing population. The population density is high when compared to other localities (Srivastava *et al.* 2001b), and the single-male/multi-female group which is predominant in Chakrashila is the most stable social system for golden langur (Biswas 2004). Ghosh (2009) also counted 501 individuals in 66 groups in Chakrashila Wildlife Sanctuary and its adjacent areas.

An important measure for its conservation in the sanctuary will be to stop the ongoing illegal felling of trees and the encroachment. The golden langurs in the forest at Nayakgaon were evidently part of a single population with those in Chakrashila (Srivastava *et al*. 2001a; Medhi *et al.* 2004), but the connection has been lost. The current high density of golden langur in the sanctuary may result from lack of opportunities for dispersal, a threat over the mid-term (Choudhury 2002; Biswas 2004). In this context, we recommend that efforts should be made to restore the lost continuity between the sanctuary and other isolated forest pockets, planting natural corridors using bamboo species along with other preferred food plant species of golden langur. Bamboo is recommended not only because it grows fast, but golden langurs also eat the stem cortex of growing bamboo shoots and it provides the thick canopy which the langur uses to hide from predators. There are a number of native bamboos which are intricately associated with the traditional life styles of local people, so local communities can benefit not only from being involved in planting the corridor, but also in promoting the availability of non-timber products of interest to them.

The absence of hunting pressure is positive and probably one of the reasons that the area still has a high density of the species, despite habitat degradation and other human pressures. The concentration of langurs mostly in the periphery of the sanctuary however, may be an indication of potentially high predator pressure in the core area. All the incidences of killing of golden langur by domestic dogs recorded during the study need special attention. Chetry *et al*. (2005) also identified dogs as a threat to the golden langur. Illegal felling still continues in the area, with a significant ongoing loss of canopy cover as a result. Overall the conservation of the golden langur in and around the Chakrashila Wildlife Sanctuary requires a landscape approach. An integrated management program of forest fragments taking golden langur as a flagship species will also ensure the conservation of other wildlife in this part of Assam.

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Table 1. Sightings of golden langur, *Trachypithecus geei*, in the Chakrashila Wildlife Sanctuary, Assam, India.

	GPS locations	Locality	Alt. m	No. Indiv.
1	26º16'975"N 90º20'820"E	Jornagra L.P.School	44	10
2	26º17'927"N 90º21'820"E	Bada Manush kata	169	8
3	26º18'153"N 90º21'267"E	Bada Manush kata	273	7
4	26º18'208'N 90º21'106"E	Bada Manush kata	262	3
5	26º18'327"N 90º20'905"E	Bada Manush kata	172	6
6	26º17'429"N 90º20'622"E	Bada Manush kata	105	5
7	26º17'377"N 90º20'510"E	Bada Manush kata	99	5
8	26º17'511"N 90º20'506"E	Bada Manush kata	95	5
9	26º17'779"N 90º20'491"E	Bada Manush kata	102	6
10	26º17'761"N 90º20'451"E	Bada Manush kata	84	3
11	26º18'039"N 90º20'435"E	Bada Manush kata	34	7
12	26º18'137"N 90º20'482"E	Bada Manush kata	37	15
13	26º17'883"N 90º20'851"E	Bada Manush kata	173	3
14	26º17'741"N 90º20'836"E	Bada Manush kata	176	8
15	26º17'330"N 90º20'842"E	Bada Manush kata	72	9
16	26º16'921"N 90º20'693"E	Bada Manush kata	46	7
17	26º18'397"N 90º21'857"E	Chakrashila village	144	9
18	26º18'053"N 90º21'340"E	Chakrashila village	290	5
19	26º17'869"N 90º21'298"E	Chakrashila village	200	10
20	26º17'645"N 90º21'381"E	Chakrashila village	88	7
21	26º18'267"N 90º20'416"E	Salbari Naribhuri	116	9
22	26º18'482"N 90º20'453"E	Salbari Naribhuri	105	11
23	26º18'770"N 90º20'483"E	Salbari Naribhuri	98	4
24	26º18'596"N 90º20'319"E	Salbari Naribhuri	203	11
25	26º18'300"N 90º20'352"E	Salbari Naribhuri	114	8
26	26º18'319"N 90º20'149"E	Abhaykuti PHE	62	6
27	26º18'809"N 90º20'092"E	Abhaykuti PHE	114	7
28	26º19'299"N 90º20'216"E	Abhaykuti PHE	75	9
29	26º19'293"N 90º20'137"E	Abhaykuti PHE	93	9
30	26º18'935"N 90º19'949"E	Abhaykuti PHE	53	12
31	26º18'976"N 90º19'627"E	Jainpur	129	12
32	26º19'258"N 90º19'671"E	Jainpur	143	9
33	26º19'567"N 90º19'752"E	Jainpur	162	8
34	26º19'682"N 90º19'870"E	Jainpur	218	10
35	26º19'440"N 90º19'923"E	Jainpur	206	3
36	26º18'061"N 90º19'586"E	Bor Bamuni	93	11
37	26º18'431"N 90º19'532"E	Bor Bamuni	51	7
38	26º18'811"N 90º19'492"E	Bor Bamuni	80	3
39	26º18'623"N 90º19'394"E	Bor Bamuni	128	5
40	26º18'412"N 90º19'229"E	Bor Bamuni	129	13
41	26º20'883"N 90º18'680"E	Korwari	105	7
42	26º21'742"N 90º18'935"E	Nalbari	50	7
43	26º21'493"N 90º19'543"E	Goyjora	100	6
44	26º21'373"N 90º19'717"E	Goyjora	211	4
45	26º21'188"N 90º19'784"E	Goyjora	254	11º
46	26º20'913"N 90º19'764"E	Goyjora	417	7
47	26º20'857"N 90º19'606"E	Goyjora	356	6
48	26º20'834"N 90º19'468"E	Goyjora	324	9
49	26º20'792"N 90º19'332"E	Kumertol	299	9
50	26º20'420"N 90º19'274"E	Rajapahar	316	5
51	26º20'515"N 90º19'225"E	Rajapahar	320	15
52	26º21'920"N 90º19'640"E	Nalbari	56	4
53	26º22'109"N 90º19'812"E	Nalbari	90	7
54	26º23'131"N 90º19'602"E	Kowari	98	12
55	26º20'414"N 90º18'659"E	Kowari	90	6
56	26º20'204"N 90º18'585"E	Kowari	89	6
57	26º20'140"N 90º18'450"E	Kowari	105	5
58	26º20'100"N 90º18'235"E	Kowari	187	7
59	26º20'020"N 90º18'117"E	Kowari	191	7
60	26º21'859"N 90º18'211"E	Belguri	49	7
61	26º21'805"N 90º18'208"E	Belguri	57	3
62	26º21'877"N 90º18'273"E	Belguri	53	5
63	26º22'526"N 90º20'039"E	Kakrikhola	61	5
64	26º22'808"N 90º19'974"E	Kakrikhola	51	9

Table 2. Age and sex composition of 64 golden langur groups, *Trachypithecus geei*, in the Chakrashila Wildlife Sanctuary, Assam, India.

Adult male	Adult female	Adult unidentified	Total adults	Juvenile male	Juvenile female	Juvenile unidentified	Total juveniles	Infant male	Infant female	Infant unidentified	Total infants	Total
85	127	24	**236**	7	25	127	**159**	0	1	78	**79**	**474**

Table 3. Age category and sex ratios in golden langur, *Trachypithecus geei*, in the Chakrashila Wildlife Sanctuary, Assam, India.

No. of groups	Adult Male:Adult Female	Adult Female: Immature	Adult: Immature	Adult Female: Infant
64	85:127(1:1.53)	127: 159(1:1.86)	236:238(1:1.017)	127:79(1:0.617)

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