Status and Distribution of the Eastern Hoolock Gibbon (Hoolock leuconedys) in Mehao Wildlife Sanctuary, Arunachal Pradesh, India

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Status and Distribution of the Eastern Hoolock Gibbon (*Hoolock leuconedys*) in Mehao Wildlife Sanctuary, Arunachal Pradesh, India

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Abstract: A field survey was conducted in 2008–2009 in the Mehao Wildlife Sanctuary in Arunachal Pradesh, India, to investigate the status and distribution of the eastern hoolock gibbon there. The data were collected using line transects (trails covering all representative areas of the sanctuary) and by registering calling groups. We recorded 157 groups of gibbon in the sanctuary, of which 28 were directly sighted and 129 groups were registered by their calling. Of the 88 individuals seen, 61.4% were adults, 22.7% juveniles and 15.9% infants. Average group size was 3.14, with an adult sex ratio of 1:1. The survey also confirmed the presence of capped langur (*Trachypithecus pileatus*), Assamese macaque (*Macaca assamensis*), rhesus macaque (*Macaca mulatta*) and slow loris (*Nycticebus bengalensis*) in the sanctuary. We identified encroachment, *jhum* cultivation, horticulture, selective logging and inadequate infrastructure as being the major threats for the hoolock gibbon and other wildlife in the sanctuary. Although the gibbons were not hunted, hunting was evidently a threat to other wildlife in the sanctuary.

Key words: Eastern hoolock gibbon, status, Mehao Wildlife Sanctuary, threats, conservation, Arunachal Pradesh, India.

Introduction

In India, gibbons are restricted to tropical and subtropical forests of the southern bank of the Dibang-Brahmaputra river system in the seven states of the Northeast. Western hoolock gibbons (*Hoolock hoolock*) occur in all of the states: Assam, Arunachal Pradesh, Meghalaya, Mizoram, Tripura, Nagaland and Manipur. The eastern hoolock gibbon (*Hoolock leuconedys*) occurs in two: Arunachal Pradesh and a small part of Assam (Chetry and Chetry 2010).

Seven other primates occur in Arunachal Pradesh besides the two hoolock gibbons (Borang *et al*. 1993; Singh 2001). Chetry (2002) and Chetry *et al.* (2003) reported on the primates in Namdapha National Park and Pakke National Park, respectively, and Chetry (2004) described the diversity and status of the primates in the Eagle Nest and Sessa Orchid wildlife sanctuaries. Sinha *et al*. (2005) described a new macaque from the Tawang district in the eastern part of the state, the Arunachal macaque (*Macaca munzala*), and Kumar *et al.* (2005) indicated the presence of the Tibetan macaque (*Macaca thibetana*), although this has yet to be confirmed. There are also reports on the status of primates in Dibang Valley Wildlife Sanctuary (Chetry and Medhi 2006; Chetry and Chetry 2009). There have been studies on the distribution of the western Hoolock gibbon in the districts of Tirap, Changlang and Lohit (Mukherjee *et al.* 1988, 1991, 1992; Choudhury 1991; Biswas *et al*. 2007). Das (2002) studied the behavior of *H. hoolock* in Namdapha, and Das *et al.* (2006) it was who reported finding the eastern hoolock (*H. leuconedys*) in Arunachal Pradesh, the first record for India (see also Chetry *et al*. 2007, 2008). Here we present our findings on the status and distribution of the eastern hoolock gibbon in the Mehao Wildlife Sanctuary in the Lower Dibang Valley district of Arunachal Pradesh. We also report on the anthropogenic pressures that the hoolock gibbon and its habitats in the sanctuary are facing.

Study Area

The Mehao Wildlife Sanctuary (281.5 km²) is in the Lower Dibang Valley district of Arunachal Pradesh (93º30'–95º45'E, 28º05'–8º15'N) (Fig. 1). The topography is undulating and hilly, and altitude ranges from 400 to 3,568 m above sea level. The forest types change with altitude: tropical

evergreen forest, tropical semi-evergreen forest, subtropical evergreen forest, temperate broad leaf forest and temperate conifer forest. The human population living around the sanctuary is primarily of the local Idu and Padam tribes of Arunachal Pradesh. Mehao is a sanctuary for numerous threatened species of the Indian flora and fauna, and much has yet to be explored and properly documented.

Methods

Line transect survey

A population survey was carried out in the Mehao Wildlife Sanctuary from October, 2008 to April, 2009. The trails were set up to cover all representative areas of the park (Mueller-Dombois *et al.* 1974; Kent *et al*. 1994). The total length of the trails was 800 km. Three observers walked the trails, covering 10–12 km per day from 06:00 to 15:00 h, during 80 days of field surveys. Observers walked slowly along the transects, pausing at intervals of 500 m. When gibbons were seen, the observers recorded the location using a Global Positioning System (GPS), and noted the group size and composition. At 500-m intervals, and at every location where gibbons were encountered, the observers estimated the tree height and canopy cover in a circle of radius 10 m, and also took note of the evidence and degree of grazing and logging in the study area.

Recording calls

Whenever we heard the gibbons calling but did not see them, we noted the time, direction, duration and GPS co-ordinates. All the transects were more than 1 km apart. As a rule of thumb, calls heard from locations 500 m to 1,000 m apart were considered to be different groups. We also co-related the time of calling and direction of the call. Accordingly, during the survey we recorded 210 calls, from which we identified 129 groups.

We also recorded secondary information relevant to the study, such as on hunting and traditional beliefs, through our informal interaction with forest field staff, local guides, hunters and elderly people.

Results

Population size

We saw 88 individuals in 28 groups in the sanctuary at altitudes of 300 m to 1,713 m above sea level (Table 1). Locating calling gibbons, we estimated a further 129 groups at altitudes ranging from 142 m to 1,865 m above sea level (Table 2, Fig. 2).

Seventy-five percent of the 28 groups seen were at altitudes below 1,000 m; 25% above 1000 m. Of the 21 groups seen below 1,000 m, most (16 groups) were at or below 500 m. For the call counts, 69% of the calls were recorded at

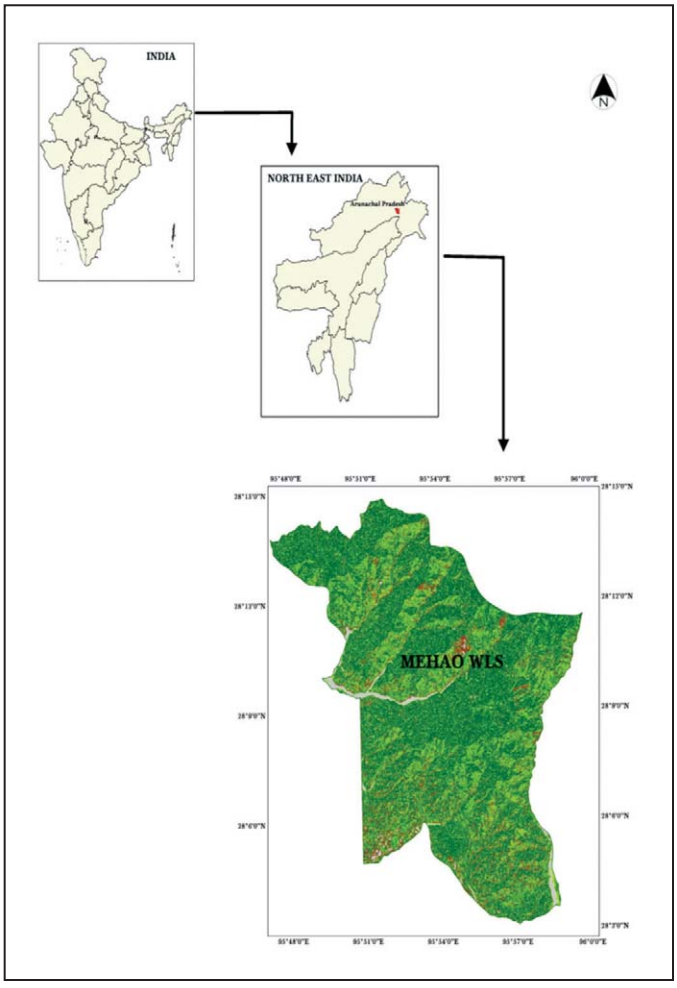

Figure 1. Location of the Mehao Wildlife Sanctuary, Arunachal Pradesh, Northeast India.

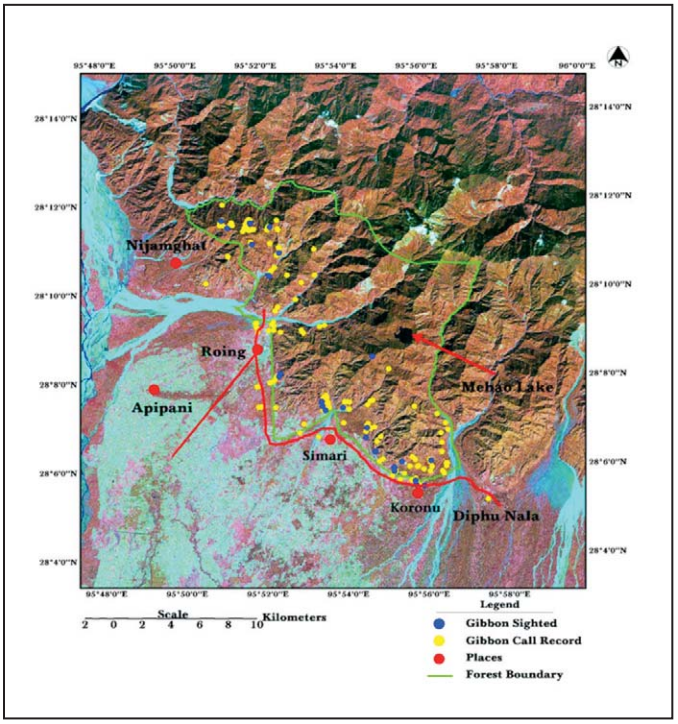

Figure 2. Location of eastern hoolock gibbon (*Hoolock leuconedys*) groups seen and recorded by their calls in the Mehao Wildlife Sanctuary, Arunachal Pradesh, October, 2008 to April, 2009.

altitudes below 1,000 m, while 31% were above 1,000 m. Of the calls recorded from below 1,000m, 60% were at altitudes of 500 m or lower, and 40% were at altitudes of 500 m to 1,000 m (Tables 1 and 2).

Group size and composition

The structure and composition of the 28 groups we were able to watch are shown in Table 1. The average group size was 3.14, ranging from 1 to 5. Most of the groups were observed with either four (10 groups) or three (11 groups) individuals. The adult sex ratio is 1:1. Age classification showed that, of the population seen, adults constituted 61.4%, juveniles 22.7%, and infants 15.9% of the population.

Sighting time and calling times

We saw 25 of the 28 groups before 12:00, and only three groups after mid-day. Sightings were evenly distributed through the morning—52% of them between 06:00 and 09:00 and 48% between from 09:00 and 12:00.

Of the 129 groups registered from calling bouts during the survey, 92.2% called before 12:00, and only 7.8% of the calls were heard after 12:00. Of the morning calls, 42.4% were between 07:00 and 09:00, and 57.6% between 09:00 and 12:00. The average duration of the calls was 18.26 minutes, with a range of 5 to 35 minutes.

Threats

During the survey, we also tried to identify the threats to the hoolock gibbon population and other wildlife of the sanctuary. The conversion of forest for the commercial cultivation of orange, ginger and cardamom is increasingly widespread in the area and is undoubtedly a serious threat to the gibbons, reducing habitat and fragmenting the remaining forest. All the primates there are hunted for their meat and skins and as agricultural pests, except for the hoolock gibbons (the Idu people of the area do not hunt gibbons although, elsewhere, other communities do). The local communities at Mesao have a long tradition of hunting, which is a major threat to wildlife in the sanctuary. The survey team recorded several incidences of hunting of such as takin, serow, musk deer, sambar and barking deer, and bears by the different local communities.

Table 1. Sightings of eastern hoolock gibbons (*Hoolock leuconedys*) in the Mehao Wildlife Sanctuary, Arunachal Pradesh, October, 2008 to April, 2009.

No.	Location		Altitude	Locality	Time	AM	AF	J	I	Total
1	N28°03.319	E95°56.482	309 m	Koronu	07:20	1	1	1	1	4
2	N28°03.25.9	E95°57.07.9	382 m	Koronu	08:00	1	1	1	1	4
3	N28°03.46.4	E95°56.14.2	332 m	Koronu	12:05	1	1	1	1	4
4	N28°04.00.6	E95°56.51.8	990 m	Korunu	09:45	1	1	1	1	4
5	N28°04.408	E95°55.445	378 m	Injunu	06:45	1	1		1	3
6	N28°04.037	E95°57.802	418 m	Injunu	08:10	1				1
7	N28°04.981	E95°55.049	367 m	Injunu	10:32	1	1	1	1	4
8	N28°08.07.3	E95°55.40.2	1,713 m	Mehao Lake	10:00	1	1	2	1	5
9	N28°03.12.2	E95°57.15.5	300 m	Dipu nala	07:00	1	1	1		3
10	N28°03.12.2	E95°57.15.5	300 m	Dipu nala	06:30	1	1	1	1	4
11	N28°06.13.2	E95°57.16.5	310 m	Dipu nala	06:00	1	1		1	3
12	N28°03.611	E95°56.254	335 m	Balani	09:30	1	1	1	1	4
13	N28°03.07	E95°57.4.6	298 m	Balani	07:45	1	1	1	1	4
14	N28°05.32.5	E95°55.11.0	491 m	Balani	08:00	1	1	1		3
15	N28°06.38.9	E95°53.20.7	474 m	Balani	09:38	1	1			2
16	N28°06.15.6	E95°53.26.1	430 m	Balani	07:15	1	1		1	3
17	N28°06.20.8	E95°53.21.2	484 m	Chimari	06:30	1	1	1	1	4
18	N28°06.12.7	E95°54.11.7	489 m	Chimari	07:56	1	1	1		3
19	N28°07.40.7	E95°51.41.0	716 m	Roing	09:25	1	1	1		3
20	N28°07.40.8	E95°51.41.1	716 m	Roing	09:30		1			1
21	N28°07.46.8	E95°51.45.0	760 m	Roing	10:40	1	1			2
22	N28°13.14.4	E95°49.33.9	1,575 m	Tiwarigaon	13:22	1	1	1		3
23	N28°11.27.8	E95°53.02.9	1,110 m	Tiwarigaon	11:30	1	1			2
24	N28°13.34.8	E95°50.18.0	1,260 m	Tiwarigaon	08:25	1	1			2
25	N28°13.19.3	E95°51.10.9	1,537 m	Tiwarigaon	09:25	1	1	1	1	4
26	N28°13.43.3	E95°49.11.5	1,128 m	Tiwarigaon	10:16	1	1	1		3
27	N28°11.29.0	E95°51.08.6	1,865 m	Epipani	09:05	1	1	1		3
28	N28°12.12.6	E95°51.51.3	759 m	Epipani	01:05	1	1	1		3
Total						**27**	**27**	**20**	**14**	**88**

AM = Adult male; AF= Adult female; J = Juvenile; I = infant

Table 2. Eastern hoolock gibbon groups located by their calls in the Mehao Wildlife Sanctuary, Arunachal Pradesh, October, 2008 to April, 2009.

No	Location		Altitude	Locality	Time and duration
1	N28°03.117	E 95°57.140	306 m	Koronu	08:10 to 08:24 = 14 min
2	N28°03.615	E95°57.768	370 m	Koronu	09:22 to 09:38 = 16 min
3	N28°03.789	E95°58.462	350 m	Koronu	09:50 to 10:15 = 25 min
4	N28°03.891	E95°58.447	315 m	Koronu	10:37 to 10:51 =14 min
5	28°03.894	E95°58.452	318 m	Koronu	10:47 to11:05 = 18 min
6	N28°04.021	E95°55.609	290 m	Koronu	07:40 to 08:00 = 20 min
7	N28°04.117	E95°55.764	381 m	Koronu	08:55 to 09:13 = 18 min
8	N28°03.537	E95°56.66.8	347 m	Koronu	09:05 to 09:33 = 28 min
9	N28°03.626	E95°56.301	329 m	Koronu	11:27 to 11:36 = 9 min
10	N28°03.599	E95°56.189	335 m	Koronu	09:52 to 10:12 = 20 min
11	N28°03.21.7	E95°57.16.9	361 m	Balani	07:42 to 07:52 = 10 min
12	N28°03.34.7	E95°57.12.5	371 m	Balani	09:46 to 09:54 = 8 min
13	N28°05.34.9	E95°55.11.5	513 m	Balani	08:32 to 08:50 = 18 min
14	N28°05.40.9	E95°55.09.6	533 m	Balani	09:03 to 09:32 = 29 min
15	N28°06.36.6	E95°55.28.4	533 m	Balani	12:18 to 12:39 = 21 min
17	N28°04.070	E95°57.130	366 m	19kilo	07:37 to 07:48 = 11 min
18	N28°04.352	E95°58.280	384 m	19kilo	08:07 to 08:12 = 5 min
19	N28°05.469	E95°58.463	423 m	19kilo	09:07 to 09:17 = 10 min
20	N28°05.817	E95°58.104	441 m	19kilo	09:40 to 09:49 = 9 min
21	N28°03.59.9	E95°58.28.9	350 m	Dipu nala	07:15 to 07:22 = 7 min
22	N28°05.07.6	E95°58.26.8	397 m	Dipu nala	08:35 to 08:52 = 13 min
23	N28°04.979	E95°55.697	500 m	Dipu nala	10:52 to 11:20 = 28 min
24	N28°03.51.5	E95°58.34.1	335 m	Dipu nala	10:00 to 10:20 = 20 min
25	N28°05.550	E95°54.121	142 m	Dipu nala	08:00 to 08:15 = 15 min
26	N28°06.062	E95°54.380	166 m	Dipu nala	08:30 to 08:40 = 10 min
27	N28°06.232	E95°55.156	219 m	Dipu nala	09:30 to 09:40 = 10 min
28	N28°06.389	E95°55.381	249 m	Dipu nala	10:15 to 10:30 = 15 min
29	N28°02.48.5	E96°00.19.2	347 m	Dipu nala	12:45 to 13:00 = 15 min
30	N28°03.800	E95°57.852	375 m	Sakole	08:20 to 08:34 = 14 min
31	N28°04.050	E95°57.749	437 m	Sakole	10:25 to 10:50 = 25 min
32	N28°05.030	E95°53.040	376 m	Injunu	10:20 to 10:37 = 17 min
33	N28°05.193	E95°55.073	388 m	Injunu	11:20 to 11:40 = 20 min
34	N28°03.820	E95°56.897	346 m	Purana basti	08:23 to 08:45 = 22 min
35	N28°04.159	E95°57.008	463 m	Purana basti	09:50 to 10:02 = 12 min
36	N28°03.805	E95°57.212	449 m	Purana basti	08:40 to 08:53 = 13 min
37	N28°03.684	E95°57.490	329 m	Purana basti	10:35 to 10:42 = 7 min
38	N28°05.50.2	E95°55.16.0	592 m	Abango	08:18 to 08:47 = 29 min
39	N28°05.30.6	E95°55.27.1	515 m	Abango	10:20 to 10:49 = 29 min
40	N28°05.35.7	E95°55.43.5	551 m	Abango	11:17 to 11:56 = 39 min
41	N28°06.13.9	E95°53.51.3	583 m	Abaily nala	09:42 to 09:59 = 17 min
42	N28°06.32.0	E95°53.49.5	586 m	Abaily nala	10:15 to 10:30 = 15 min
43	N28°06.33.2	E95°53.48.6	624 m	Abaily nala	10:30 to 10:46 = 16 min
44	N28°06.35.6	E95°53.45.8	671 m	Abaily nala	11:37 to 11:50 = 13 min
45	N28°06.04.3	E95°53.34.5	260 m	Chimari	12:30 to 12:45 = 15 min
46	N28°06.13.0	E95°53.33.4	407 m	Chimari	08:00 to 08:20 = 20 min
47	N28°06.52.7	E95°53.27.8.4	580 m	Chimari	09:30 to 09:45 = 15 min
48	N28°06.52.3	E95°53.32.1	612m	Chimari	09:50 to 10:02 = 12 min
49	N28°06.52.1	E95°53.33.8	640 m	Chimari	10:19 to 10:32 = 13 min
50	N28°06.53.2	E95°53.35.4	630 m	Chimari	10:47 to 10:54 = 7 min
51	N28°07.577	E95°56.093	1,519 m	Chimari	10:48 to 11:00 = 12 min
52	N28°06.06.4	E95°53.25.9	398 m	Chimari	07:26 to 07:37 = 11 min
53	N28°06.06.4	E95°53.25.9	405 m	Chimari	10:00 to 10:35 = 35 min
54	N28°06.36.0	E95°53.21.8	466 m	Chimari	09:02 to 09:27 = 25 min

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Table 2. *continued*

No	Location		Altitude	Locality	Time and duration
55	N28°05.53.1	E95°52.42.8	466 m	Chimari	08:42 to 08:59 = 17 min
56	N28°05.19.7	E95°52.24.5	298 m	Chimari	11:15 to 11:40 = 25 min
57	N28°06.34.8	E95°54.40.2	623 m	Chimari	09:19 to 09:46 = 27 min
58	N28°06.15.9	E95°54.13.7	564 m	Chimari	08:47 to 09:17 = 30 min
59	N28°06.36.4	E95°54.18.5	191 m	Chimari	12:06 to 12:19 = 13 min
60	N28°06.20.9	E95°50.52.6	323 m	Chimari	09:47 to 10:13 = 26 min
61	N28°09.17.8	E95°51.23.7	529 m	Roing	08:15 to 08:20 = 5 min
62	N28°09.09.8	E95°51.52.4	631 m	Roing	09:15 to 09:33 = 18 min
63	N28°07.14.0	E95°51.02.7	330 m	Roing	07:02 to 07:09 = 7 min
64	N28°07.19.8	E95°51.18.1	488 m	Roing	07:41 to 07:52 = 11 min
65	N28°07.28.7	E95°51.26.4	510 m	Roing	08:15 to 08:30 = 15 min
66	N28°07.35.8	E95°51.31.7	529 m	Roing	08:51 to 09:10 = 19 min
67	N28°09.09.5	E95°50.54.9	399 m	Roing	08:00 to 08:30 = 30 min
68	N28°09.16.7	E95°51.03.3	462 m	Roing	08:10 to 08:35 = 25 min
69	N28°06.19.1	E95°51.24.9	372 m	Roing	11:30 to 12:06 = 36 min
70	N28°09.40.3	E95°51.16.3	452 m	Roing	07:45 to 08:20 = 35 min
71	N28°09.50.1	E95°51.22.5	477 m	Roing	08:32 to 08:52 = 20 min
72	N28°10.07.7	E95°51.42.3	507 m	Roing	09:26 to 09:57 = 31 min
73	N28°10.34.4	E95°52.19.4	574 m	Roing	10:47 to 11:10 = 23 min
74	N28°11.00.1	E95°52.46.6	658 m	Roing	12:02 to 12:31 = 29 min
75	N28°09.9.28.8	E95°51.31.3	491 m	Deopani	07:55 to 07:58 = 3 min
76	N28°09.15.7	E95°52.40.6	555 m	Deopani	09:01 to 09:21 = 20 min
77	N28°09.03.8	E95°52.50.3	711 m	Deopani	10:12 to 10:38 = 2 6min
78	N28°09.44.4	E95°50.45.5	475 m	Deopani	08:00 to 08:20 = 20 min
79	N28°09.29.0	E95°50.50.3	454 m	Deopani	09:02 to 09:19 = 17 min
80	N28°09.33.8	E95°51.25.5	482 m	Deopani	09:52 to 10:06 = 14 min
81	N28°11.03.2	E95°48.39.7	587 m	Epipani	08:36 to 08:42 = 6 min
82	N28°09.28.2	E95°53.18.8	626 m	Tewari gaon	10:05 to 10:41 = 36 min
83	N28°09.32.2	E95°53.41.0	657 m	Tewari gaon	11:28 to 11:59 = 31 min
84	N28°13.26.8	E95°49.57.6	1,420 m	Tewari gaon	07:30 to 07:45 = 15 min
85	N28°13.16.4	E95°51.08.5	1,564m	Tewari gaon	08:30 to 08:50 = 20 min
86	N28°13.08.4	E95°51.04.1	1,586 m	Tewari gaon	09:40 to 09:55 = 15 min
87	N28°12.52.6	E95°51.15.3	1,285 m	Tewari gaon	10:50 to 11:07 = 17 min
88	N28°13.11.2	E95°50.15.6	1,495 m	Tewari gaon	08:47 to 09:05 = 18 min
89	N28°13.11.3	E95°50.15.6	1,495 m	Tewari gaon	09:04 to 09:12 = 8 min
90	N28°13.10.0	E95°50.19.2	1,477 m	Tewari gaon	09:20 to 09:48 = 28 min
91	N28°13.17.7	E95°50.12.7	1,520 m	Tewari gaon	10:17 to 10:46 = 29 min
92	N28°13.15.9	E95°50.09.5	1,527 m	Tewari gaon	10:57 to 11:11 = 15 min
93	N28°13.10.3	E95°50.19.5	1,569 m	Tewari gaon	11:51 to 11:57 = 6 min
94	N28°13.02.6	E95°50.02.0	1,578 m	Tewari gaon	12:17 to 12:33 = 16 min
95	N28°13.28.2	E95°49.47.7	1,374 m	Tewari gaon	07:50 to 08:00 = 10 min
96	N28°13.10.7	E95°50.19.9	1,465 m	Tewari gaon	08:01 to 08:19 = 18 min
97	N28°12.38.3	E95°51.52.4	1,235 m	Tewari gaon	08:49 to 09:09 = 20 min
98	N28°12.32.9	E95°51.55.8	1,186 m	Tewari gaon	09:18 to 09:30 = 12 min
99	N28°13.15.3	E95°51.21.91	1,592 m	Tewari gaon	09:50 to10:03 = 13 min
100	N28°13.42.8	E95°51.46.9	1,708 m	Tewari gaon	10:45 to 11:00 = 15 min
101	N28°12.06.5	E95°49.36.6	1,535 m	Tewari gaon	08:38 to 08:49 =11 min
102	N28°13.05.4	E95°50.27.6	1,508 m	Tewari gaon	08:20 to 08:34 = 14 min
103	N28°13.06.4	E95°50.28.7	1,285 m	Tewari gaon	08:00 to 08:15 = 15 min
104	N28°13.31.6	E95°49.53.8	1,353 m	Tewari gaon	08:01 to 08:20 = 19 min
105	N28°13.32.9	E95°49.53.7	1,301 m	Tewari gaon	08:31 to 08:39 = 8 min
106	N28°13.26	E95°49.17.1	1,317 m	Tewari gaon	12:23 to 12:35 = 12 min
107	N28°13.29.2	E95°50.14.7	1,360 m	Tewari gaon	07:56 to 08:10 = 14 min

table continued on next page

Table 2. *continued*

No	Location		Altitude	Locality	Time and duration
108	N28°13.45.66	E95°50.23.66	1,186 m	Tewari gaon	09:11 to 09:36 = 15 min
109	N28°13.44.3	E95°50.28.20	1,080 m	Tewari gaon	10:03 to 10:34 = 31 min
110	N28°13.47.8	E95°50.28.7	955 m	Tewari gaon	11:33 to 11:45 = 12 min
111	N28°13.08.9	E95°50.41.4	1,513 m	Tewari gaon	07:46 to 07:58 = 12 min
112	N28°13.09.8	E95°50.48.4	1,541 m	Tewari gaon	08:50 to 09:10 = 20 min
113	N28°13.09.4	E95°51.50.0	1,555 m	Tewari gaon	10:33 to 10:56 = 23 min
114	N28°13.05.8	E95°51.51.2	1,530 m	Tewari gaon	11:10 to 11:21 = 11 min
115	N28°12.33.9	E95°51.54.4	1,204 m	Tewari gaon	13:09 to 13:39 = 30 min
116	N28°13.25.7	E95°49.05.1	1,325 m	Tewari gaon	07:33 to 07:59 = 26 min
117	N28°13.34.7	E95°49.05.5	1,296 m	Tewari gaon	08:17 to 08:39 = 22 min
118	N28°13.39.4	E95°49.08.1	1,191 m	Tewari gaon	09:40 to 09:59 = 19 min
119	N28°13.47.6	E95°49.12.3	1,080 m	Tewari gaon	10:50 to 11:13 = 23 min
120	N28°14.06.3	E95°49.16.8	954 m	Tewari gaon	12:10 to 12:23 = 13 min
121	N28°11.43.00	E95°51.15.4	624 m	Tewari gaon	08:47 to 09:14 = 27 min
122	N28°11.49.9	E95°51.19.4	649 m	Tewari gaon	09:32 to 09:59 = 27 min
123	N28°11.59.5	E95°51.32.5	707 m	Tewari gaon	10:48 to 11:19 = 31 min
124	N28°12.07.0	E95°51.43.10	738 m	Tewari gaon	11:52 to 12:05 = 13 min
125	N28°12.13.3	E95°51.57.6	789 m	Tewari gaon	13:35 to 13:52 = 17 min
126	N28°12.59.4	E95°50.34.0	1,555 m	Tewari gaon	08:10 to 08:36 = 26 min
127	N28°12.59.	E95°50.34.0	1,555 m	Tewari gaon	08:26 to 08:59 = 33 min
128	N28°12.55.4	E95°50.36.2	1,544 m	Tewari gaon	09:17 to 09:42 = 25 min
129	N28°12.48.3	E95°50.36.0	1,495 m	Tewari gaon	10:20 to 10:48 = 28 min

A newly constructed, high-tension, electric power line along the southern boundary of the sanctuary, running parallel to the Roing-Koronu-Bhisma Nagar road**,** is emerging as a potential threat to the wildlife of the sanctuary, especially the arboreal species. A male gibbon was killed due to electrocution during the survey.

There is widespread encroachment of the forest for human settlements and for small-scale agriculture (horticulture, tea plantations, ginger cultivation, *jhum* cultivation), along with illegal felling of select trees, and the extraction of non-timber products such cane, bamboo, and medicinal plants. Cane and bamboo are also extracted commercially from the sanctuary.

In practice, the sanctuary does not have a well-marked boundary. Other than declaring the sanctuary, the forest department seems to have not taken any initiatives to convey the message to the local people. Most of the local people have no clear understanding of the existence of the sanctuary or its boundaries, and still think that the land belongs to their forefathers and they have the right as such to hunt and to carry out their day-to-day activities as they always have.

Discussion

This is the first assessment of the eastern hoolock gibbon population in the Mehao Wildlife Sanctuary. Das *et al.* (2006) had first reported the species from the district of Lohit, Arunachal Pradesh, and Chetry *et al.* (2008), discovered it also in the district of the lower Dibang Valley. With an estimated 157 groups, the Mehao Wildlife Sanctuary is clearly an important stronghold for this species.

Das *et al.* (2006) estimated an average group size of 3.37 for the eastern hoolock gibbon. The average size of the 28 groups we observed was slightly smaller at 3.14. Groves (1971) reported that eastern hoolock gibbons can be found between 1,067 m and 1,219 m above sea level in Myanmar and China. The Indian populations, however, also occupy the lowlands. Das *et al.,* (2006) found them occurring at altitudes of 122 m to 1,075 m, and in the Mehao Wildlife Sanctuary they range from 142 m to 1,865 m; higher and lower elevations than had been recorded previously, although in Mehao the majority of the groups we saw were below 500 m. The gibbons were found to occupy primarily the subtropical evergreen and semi-evergreen forests that are predominant in the lower elevations of the sanctuary.

During the surveys, we recorded four other primates besides the eastern hoolock gibbon. We saw rhesus macaque (*Macaca mulatta*), Assamese macaque (*Macaca assamensis*), and the capped langur (*Trachypithecus pileatus*), and the slow loris (*Nycticebus bengalensis*) was reported to occur there by the local people and rangers. It is possible that stump-tailed macaques (*Macaca arctoides*) and pigtail macaques (*Macaca leonina*) may also occur the sanctuary, but they may have been extirpated or reduced to extremely low numbers by hunting. This assemblage of five, possibly seven, species of non-human primate establishes the sanctuary as one of the most primate-rich areas in Arunachal Pradesh (and the entire

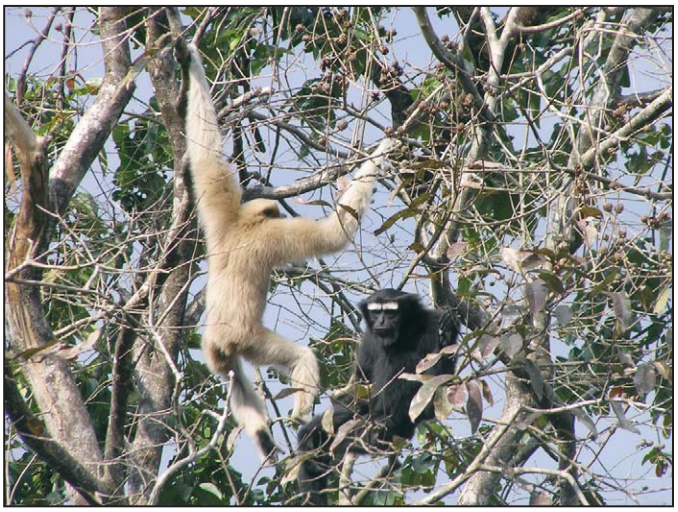

Figure 3. Adult female (left) and male (right) eastern hoolock gibbons (*Hoolock leuconedys*). Photo by Dilip Chetry.

country), but only the hoolock gibbons can be seen and heard regularly. The other primates were very scarce. Biswas *et al.* (2007) also found stump-tailed and pigtailed macaques to be very rare in the Lohit and Changlang districts of Arunachal Pradesh. The low numbers of primates other than Hoolock gibbon in the Mehao sanctuary indicates regular hunting. Only the centuries-old traditional belief of the local "Idu Mishimi" tribe is protecting the hoolock gibbons there. Elsewhere in Northeast India, the gibbon populations are declining severely due to hunting (Das *et al.* 2005), habitat loss and habitat fragmentation (Chetry *et al*. 2007). Habitat loss and fragmentation resulting from encroachment, *jhum* cultivation (traditional slash and burn cultivation) and other horticultural and agricultural practices (especially ginger, cardamom, orange and tea cultivation) are major threats to the eastern hoolock gibbons and to other wildlife of the sanctuary.

Effective conservation measures involving the local community and with a long-term vision are needed, along with regular population monitoring and ecological studies, if the eastern hoolock gibbon is to continue to thrive in this sanctuary. Infrastructure and facilities, and strict vigilance on the part of forest department is also vital for protecting and conserving all the rich wildlife there.

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