

Report on a Snub-nosed Monkey and Biodiversity Survey, Maw River Catchment, Northeast Kachin State 24 April – 8 May 2010

Frank Momberg, Ngwe Lwin and Thomas Geissmann



Myanmar Primate Conservation Program

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24 April – 8 May 2010

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Cover: Snub-nosed monkey skull. Photo: Ngwe Lwin, May 2010.

i. Abstract

This is the fourteenth report of the Hoolock Gibbon Status Review project (of the Myanmar Conservation Program) on the results of a survey for snub-nosed monkey (*Rhinopithecus sp.*) in the watershed area of the Maw river, a tributary of the Mae Hka river. No snub-nosed monkeys were previously known from Myanmar. Following up on information gained from villagers earlier in 2010, this survey has now confirmed their presence at the site. Furthermore, we believe the species may be a previously unknown taxon. Other objectives included conducting a threat assessment to snub-nosed monkeys, and a presence-absence survey of mammals and birds.

ii. Report conventions

All geographical references are given as decimal degrees (lat/long, hddd.ddddd°) on the WGS84 datum.

All altitudes are in meters above sea level.

Where non-English words or names are provided, they are indicated by the use of *italics*.

Scientific and common names for mammals come from Francis (2008). Those for birds are from Robson (2007).

All maps were produced by the Hoolock Gibbon Status Review team unless otherwise stated.

Species threat status is taken from the IUCN Red List of endangered species, available at www.iucnredlist.org/

At the time of the survey, one USD was roughly equivalent to 1,000 kyat

iii. Acronyms and abbreviations

BANCA	Biodiversity and Nature Conservation Association (Myanmar organisation, project partner)
FFI	Fauna and Flora International (international organisation, project partner)
FS	Field Site. Sites are coded by year (two digits) and consecutive number (three), eg, FS09014
IUCN	International Union for Conservation of Nature and Natural Resources
LP	Listening Post. LPs are numbered (FS).1 to (FS).4 for each Field Site, eg, LP0901.1
PRCF	People Resources and Conservation Foundation (international organisation, project partner)
USD	United States Dollar

iv. Acknowledgements

This field survey was conducted under the Hoolock Gibbon Status Review project (of the Myanmar Primate Conservation Program), which is jointly implemented by the Biodiversity and Nature Association (BANCA), Fauna & Flora International (FFI), and People Resources and Conservation Foundation (PRCF). Financial support came from the Arcus Foundation Great Apes Program, and the Halcyon Fund.

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1. Itinerary and methods

An itinerary for the survey is provided in Table 1.

Table 1. Survey itinerary.

Date	Activity
24April	Travel from Myitkyina to Chibwe (N 25.88614°, E 98.12851°; elevation 257 meters) by 4x4 car
25 April	Travel from Chibwe to Saw Law (N 26.15396°, E 98.27053°; elevation 1,541 meters, 11.5 hours)
26 April	Travel from Saw Law to Chaung Mo village; 7 hours by car and 2 hours walking due to landslides blocking the road
27 April	Walking from Chaung Mo village (N 26.33101°, E 98.33195°; elevation 912 m) to San Buk village (N 26.39701°, E 98.34699°; elevation 1,541 meters); 10 hours, first on logging roads to Chinese logging camp, then on trail to village
28April	Walking from San Buk village to Camp 1 (N 26.41898°, E 98.35752°; elevation 2,374 meters), 7 hours
29 April	Walking from Camp 1 to Camp 2 (N 26.42835°, E98.38884°; elevation 2,764 meters), 8.5 hours through habitat of snub-nosed monkeys, according to hunter Le Me A Si from San Buk, who shot two snub-nosed monkeys here in May 2009
30 April	Walking from Camp 2 to Camp 3 (N 26.42596°, E 98.40383°; 2,661 meters), 3.5 hours through habitat of snub-nosed monkeys
1 May	Survey (2 teams, 10 hours each, east and southeast of camp 3). Our guides Le Me A Si and Dai Laum encountered six adult snub-nosed monkeys and one infant during this survey (N 26.43200°, E98.41393°; elevation 2,503 meters)
2 May	Survey (2 teams, 12 hours each) of the wider area where snub-nosed monkeys were encountered on the previous day
3 May	Survey (3 teams, 11 hours each: Team 1 surveyed area northeast to south of Camp 3, Team 2 surveyed the same sighting area where snub-nosed monkeys were encountered on 1 May, and Team 3 went to the conifer zone up to an elevation of 3,187 meters (N 26.43457°, E 98.43764°)
4 May	Walking from Camp 3 to Camp 2, 3 hours, then one team surveyed around Camp 2, 3 hours
5 May	Walking from Camp 2 to Maw Ban village (N 26.40207°, E 98.36563°; elevation 1,750 meters)
6 May	Walking from Maw Ban to Chaung Mo, 10 hours
7 May	Travel from Chaung Mo to Chibwe, 16 hours by car
8 May	Travel from Chibwe to Myitkyina, 6 hours by car

Survey participants included Frank Momberg, Ngwe Lwin, Saw Soe Aung, Thet Naing Aung. In addition, one translator from Saw Law (Ra Chaung Laum De), two hunters from San Buk (La Me R Si, Maw Bang Dam Laum), and 11 porters from Saw Law (Kaung Daung, De Laung, De Haung, De Naing, Laum Naw, Laum Saing, Saung Kaung, Saing Laum, Kun Taung, R Tar, Kun Zay) were hired for the whole survey or for parts of it.

Scientific and common names for mammals come from Francis (2008); those for birds are from Robson (2008). Species threat status is taken from the IUCN Red List of endangered species (IUCN, 2009).

2. Mammal records

2.1 Snub-nosed Monkey (*Rhinopithecus* sp.)

On 1 May, Le Me A Si and Dai Laum, two of our local survey team members from San Buk village, encountered a group of snub-nosed monkeys counting at least six adult individuals and one infant at 1.3 km northeast of Camp 3 (N 26.43300°, E 98.41393°, elevation 2,503 m). Le Me A Si believed that this group was a temporary splinter group of the large band of 60-80 individuals usually encountered in this area.

Unfortunately, the duration of the encounter was too short to take a photo. They described the monkeys as “black with long black tails”. The infant was all black, but only the dorsal aspect was visible as the infant was clinging to the belly of its mother. The hunters we interviewed described the snub-nosed monkeys they hunted before as follows: adults all black, except for white chin, ears, and perineal area, and somewhat paler colour on the inner sides of upper arms and on the chest.

The habitat at this site was mountain forest with moss-covered rhododendron and maple trees in the upper forest storey and bamboo and ferns in the under storey.

We visited two additional sites where Le Me A Si had previously encountered snub-nosed monkeys. He shot two adults between our Camp 1 and Camp 2 (N 26.42814°, E 98.37643°, elevation 2,488 m) in May 2009, and he shot four snub-nosed monkeys (including one infant) in the lower conifer zone (N 26.43457°, E 98.43764°, elevation 3,187 m) in December 2009. No snub-nosed monkeys were encountered during this survey in the two areas.

Near the site where snub-nosed monkeys were encountered on 1 May, we met the hunter Bo Sar Ye from Ngwapaka village near Kangfang (= *Gangfang*) town. This hunter has been hunting and trapping wildlife in this area for the past three years. He last saw a group of approximately 80 snub-nosed monkeys at the beginning of April 2010. He met this group both in mountain forest and conifer forest and reported that their home range was very large, but encounters were rare. This hunter was using iron traps baited with meat to catch for bears. In 2009, he caught three adult snub-nosed monkeys in his iron traps. Chinese-made iron traps are readily available in shops in Kangfang.

In Maw Ban village we saw one skull of a snub-nosed monkey in the headman’s house (Fig. 1). The hunter was not present; therefore we were not able to confirm when the monkey was shot. In San Buk village we interviewed a second hunter named Maw Ban Laum Daung, who had shot four snub-nosed monkeys in the last ten years. All three hunters from San Buk village confirmed the presence of one large group (about 80 individuals) in the area between Camp 1 and the conifer zone. They also heard from villages located north of San Buk that there was a second group of snub-nosed monkeys in the area north of the Maw river, but have not been in that forest themselves.



Fig. 1. Skull of a snub-nosed monkey in a hunter’s house in Maw Ban village. Photo: Ngwe Lwin, May 2010.

2.2 Shortridge's Langur (*Trachypithecus shortridgei*)

According to local hunters, Shortridge's langurs occur in forest around the villages (up to elevations of 2,000 m). They are absent from the higher mountain forests. We recorded one skull in San Buk village and two skulls and two tails in Maw Ban village (Fig. 2). Langurs are rarely hunted, as their meat is considered less tasty.



Fig. 2. Tails of Shortridge's langur in a hunter's house in Maw Ban village. Photo: Frank Momberg, May 2010.

2.3 Rhesus Macaque (*Macaca mulatta*)

According to local hunters, Rhesus macaques occur around the villages or at elevations below the villages. Four skulls were displayed in a hunter's house in Man Baw village (Fig. 3).

2.4 Assamese Macaque (*Macaca assamensis*)

This macaque species is frequently observed in the forests around the villages but reportedly occurs at higher elevations than the rhesus macaque (*M. mulatta*). In San Buk village ten skulls were displayed in Laum Daung's house.

2.5 Northern Pig-tailed Macaque (*Macaca leonina*)

According to local hunters, pig-tailed macaques are common around villages located in the mountain forests. On 1 May, the survey team encountered a group of at least six adult pig-tailed macaques near Camp 3 (N 26.42831°, E 98.41069°, elevation 2,625 meters).

2.6 Stump-tailed Macaque (*Macaca arctoides*)

According to local hunters, stump-tailed macaques are still common around villages and in the mountain forests of the survey area. The survey team observed three groups of stump-tailed macaques between Camps 2 and 3 (group 1: at least three individuals, N 26.42452°, E 98.39655°, elevation 2,787 meters; group 2: at least ten individuals, N 26.42594°, E 98.39451°, elevation 2,791 meters; group 3: six individuals, N 26.42597°, E 98.39026°, elevation 2,874 meters).



Fig. 3. A hunter's collection of primate skulls in Maw Ban village (including macaques, langurs, snub-nosed monkey). Photo: Frank Momberg.

2.7 Dhole (*Cuon alpinus*)

According to hunters, the dhole is rare. One individual was caught in an iron trap in 2008 near our Camp 3.

2.8 Red Panda (*Ailurus fulgens*)

On 1 May, Dai Laum encountered a red panda south of Camp 3. In the area surveyed during this study, red pandas are not a target species for hunting, because their meat is not considered tasty. However, sometimes red pandas get caught in the iron traps. Red pandas are mainly encountered in the conifer zone. Only in December and January, when snowfall is heavy, red panda's are encountered more often in the mountain forests between Camps 2 and 3.

2.9 Asian Black Bear (*Ursus thibetanus*) and Sun Bear (*Helarctos malayanus*)

The presence of both Asian black bear and sun bear were confirmed. On 4 May, the tracks of an adult sun bear with infant were recorded near Camp 2 (N 26.43104°, E 98.39275°, elevation 2,776 m). Two skulls of Asian black bears and one skull of a sun bear were displayed at the house of Luan Taung in San Buk village. At the house of Maw Ban Luan Taung in Maw Ban village, we recorded skulls of five sun bears and four black bears (Fig. 4). Bears are the main target species for trapping. Before ten years ago, bears were only hunted with guns and occasionally snared. Since the start of Chinese logging in 2001, both the demand for wildlife products and availability of Chinese iron traps increased, which led to a drastic increase in the hunting pressure on bears. The use of meat-baited iron traps is now the main hunting method for bears. Some Lisu hunters are now specialised in bear hunting, such as Bo Sar Ye, the hunter from Ngwapaka village whom we encountered in the forest. His main livelihood is hunting and trapping for the Chinese wildlife market. Bo Sar Ye has set about 100 iron traps and is checking his traps every five days. He spends at least 20 days per month in the forest.



Fig. 4. Skulls of bears, deer, serow, and wild pig in Maw Ban village. Photo: Frank Momberg.

2.10 Leopard Cat (*Prionailurus bengalensis*)

A leopard cat was trapped near Maw Ban village one week before our arrival. According to local hunters, leopard cats are relatively common. In Maw Ban we recorded four leopard skins in total.

2.11 Other carnivores

Members of each household have trapped civets, and civet skulls are displayed at hunters' houses. However, we were not able to identify the species. Local hunters reported that yellow-throated martens (*Martes flavigula*) were common and represented the main predator for small deer species like muntjaks.

2.12 Eurasian Wild Pig (*Sus scrofa*)

Tracks and resting places of wild pigs were encountered frequently during the field survey. All households have numerous skulls of wild pig displayed in their houses.

2.13 Gongshan Muntjak (*Muntiacus gongshanensis*)

The Gongshan Muntjak was the most common deer species in the mountain forests. We found one Gongshan Muntjak carcass between Camp 1 and 2 (N 26.42725°, E 98.37157°, elevation 2,436 m). The animal had apparently been killed by a predator (a yellow-throated marten according the hunters). Another dead Gongshan muntjak was seen in a snare trap between Camp 1 and Camp 2 (N 26.42821°, E 98.38210°, elevation 2,519 m), and another one in an iron trap near Maw Ban village. We saw one skin and two skulls in San Buk village and four skins and ten skulls in Maw Ban village. This muntjak is the main bushmeat target species of this area besides the Chinese serow. Hunting methods are snares, iron traps and hunting with shotguns.

2.14 Red Muntjak (*Muntiacus muntjak*)

We recorded one skull of a red muntjak skull in San Buk village and one skull in Maw Ban village. According to the hunters, the red muntjak only occurs around the villages and at lower elevations.



Fig. 5. Gongshan Muntjaks snared between Camp 1 and 2 (left) and caught in an iron trap above Maw Ban village (right). Photos: Frank Momberg.

2.15 Tufted Deer (*Elaphodus cephalophus*)

We observed one tufted deer at N 26.43160°, E 98.41587° at an elevation of 2,580 m (Fig. 6). No skulls or skins were recorded in the villages. Local hunters consider the deer rare. The species is distributed in north-eastern Myanmar and south-eastern China. It is considered very rare in Myanmar (Francis, 2008), while it is wide-spread in south-eastern China. Its conservation status is Near Threatened (IUCN, 2010), but it is considered vulnerable to snaring because it lives in a well-defined home territory where it travels along on well-established paths (Smith and Yan Xie, 2008, p. 462).



Fig. 6. Tufted deer. Photo: Ngwe Lwin.

2.16 Takin (*Budorcas taxicolor*)

Takin tracks and feeding signs were recorded on 9 April 150 meters east of Camp 2 (N 26.42846°, E 98.39023, elevation 2,772 m). Takin feeding signs were also recorded between Camps 2 and 3 (N 26.42449°, E 98.39623°, elevation 2,810 m). Hunters from San Buk village reported recent sightings and hunting of takins in the conifer zones, especially at a salt lick (N 26.43457°, E 98.43764°, elevation 3187 m). Three to four Takin skulls both adult and juvenile were displayed in all houses of the San Buk and Maw Ban villages (Fig. 7).



Fig. 7. Female and male Takin skulls in Maw Ban village. Photo: Frank Momberg.

2.17 Chinese Serow (*Capricornis milneedwardsi*)

In San Buk village, we recorded 14 skulls on display in hunters' houses. During 2009, Le Me A Si caught ten Chinese serow with iron traps near San Buk village (Fig. 8). In Maw Ban village, we recorded three skins and 17 skulls. Chinese serow is still considered common in the survey area. Besides snaring and trapping, Chinese serow is hunted with shotguns.



Fig. 8. Serow and Muntjak skulls in San Buk village. Photo: Frank Momberg.

2.18 Red Serow (*Capricornis rubidus*)

In San Buk village, we recorded one skull of the red serow (Fig. 8, centre of photograph), and in Maw Ban village two skulls.

2.19 Malayan Porcupine (*Hystrix brachyura*)

Two skulls of Malayan porcupine were displayed in a hunter's house in Maw Ban village.

2.20 Brush-tailed Porcupine (*Atherurus macrourus*)

Local hunters report brush-tailed porcupine as present, but no evidence was collected during this survey.

3. Bird records

Bird records are summarized in Appendix I. Due to the focus on confirming the presence of snub-nosed monkeys, the survey team covered large tracks of forest in a short time on arduous treks across steep mountain slopes with 10-12 hours of walking per day. This compromised the recording of birds. Bird records from this survey are very similar to those recorded on previous ornithological surveys further south in Mount Imawbun and Saw Law.

On 5 May, Dai Laum saw a male Blyth's tragopan (*Tragopan blythii*) (N 26.42557°, E 98.38922°, elevation 2,806 m) near Camp 2. This species is recorded as Vulnerable in the IUCN Red List (IUCN, 2010).

4. Habitat of the snub-nosed monkey

Based on our field observations and additional information provided by hunters, the habitat of the snub-nosed monkeys at the lower end of the range (2,000-2,150 m, e.g. between near Maw Ban village on the way to Camp 2) consists of **Temperate rain forest (monsoon forest)** with distinct spring and winter seasons, but with little snow in winter. Typical trees are *Alnus nepalensis*, *Betula cylindrostachya*, and *Bucklandia populnea*. We also recorded single-stem rattan in this forest zone. However, the main forest types in the range of this snub-nosed monkey are **Cool temperate rain forest** (Fig. 9) and **Mixed temperate forest** (Fig. 10). Cool temperate forest (elevation range 1,830-2,440 m) is indicated by the appearance of the main belt of large shrub rhododendrons.

Mixed temperate forest (elevation range 2,135-2,745 m) is transitional between broadleaf Temperate rain forest below and Silver fir (*Abies fargesii*) forest above. The dominant genera are *Quercus*, *Magnolia*, *Acer*, *Prunus*, *Ilex*, and *Rhododendron*. There is often thick bamboo undergrowth. **Silver fir forest** (Fig. 11) occurs at elevations of 2,745-3,660 m (conifer zone). At this altitude, deep snow lies for at least one month per year. The forest is dominated by *Abies fargesii*, and also with species of *Acer*, *Betula*, *Rhododendron*, and *Magnolia*. At higher altitudes, the forest is more open and bamboo (*Arundinaria*) thickets occur. These forest ecosystems and their botanical composition have first been studied by Frank Kingdon-Ward, who traversed the snub-nosed monkey forests at the end of August 1914 (Kingdon-Ward, 1921).

According to local hunters, snub-nosed monkeys occupy mostly mixed temperate forests and the silver fir forests in the snow-free times between May and October. They move to lower elevations when snowfall restricts the availability of food.



Fig. 9. Cool temperate forest. Photo: Frank Momberg.



Fig. 10. Mixed temperate forest. Photo: Frank Momberg.



Fig. 11. Silver fir forest. Photo: Frank Momberg.

5. Threats to biodiversity

5.1 Wildlife trade for medicinal purposes

Ever since 2001, when Chinese road construction for logging has provided improved access to this area, snub-nosed monkeys, macaques and langurs are hunted and trapped for their heads (skull and brain) and bones to be sold to nearby Chinese logging and road construction camps, as well as to wildlife traders in Kangfang, which is the nearest border town on the Chinese border. However, more often snub-nosed monkeys are trapped un-intentionally in iron traps that were set-up for bears.

Monkey heads can be sold for 100-150 Yuan. Monkey bones are sold for 150 Yuan per *vis* (1 *vis* = 1.7 kg). The main target species for wildlife trade are sun bear and Asian black bear. Bears are trapped with iron traps set-up with meat bait or hunted with shotguns when encountered in the forest. Depending on the weight of valuable bear parts (gold bladder, paws/legs) local hunters can sell bears for 4,000 to 10,000 Yuan per animal. Hunters in San Buk village earned 10,000 Yuan per year from hunting and trapping wildlife (including bushmeat).

Based on the interviews with hunters (Table 2), at least 13 snub-nosed monkeys are hunted during one year alone (2009), and at least 78-79 snub-nosed monkeys were hunted during the last 20-30 years. These numbers are very conservative, as not all hunters could be consulted. In addition, hunters who caught monkeys 20-30 years ago may not remember all specimens they caught, and some hunters who were active during this time period may not be alive anymore.

Table 2. Number of snub-nosed monkeys hunted based on interviews conducted during the present survey (April/May 2010) and the previous survey (Feb./March 2010) in the distribution range of the snub-nosed monkeys.

Interviewees' village	Hunter name	Interview date	No. of animals	Rhinopith. group area	Hunting date [years ago]	
					2009-2010	Before 2009
Chichitago	Kyar Hpu Ye	02-2010	3	3	3 (all juv.) in 2009	
		02-2010	c.50	3	c.50 since 20-30 years ago	
Kaugkung	Hpa Lar Hpi Kaw	02-2010	1	1 (north-east part)	1 c.3 years ago	
Htantan	Nyi Mar Htaw Kyun	02-2010	2 ad. (1 male and 1 female)	1 (north part)	2 ad. c.3-4 years ago (skulls)	
	Name not recorded	02-2010	1 juv.	1 (north part)	1 in Jan 2010 (got a bag made of part of skin)	
Pashe	La Kin Kaung Daung	02-2010	1	1	1 c.10 years ago	
	La Kin Kaung Laun	02-2010	1	1	1 c.10 years ago	
	Name not recorded	02-2010	1	1	1 in late 2009	
Wayawbuk	Sar Har	03-2010	2	1	1 2-3 years ago, and 1 c.10 years ago	
		03-2010	1	1	1 c.10 years ago	
Pade	Name not recorded	03-2010	1	2	1 in Jan 2010	
	La Kan Kaung Kyun + La Gaung Sai Dai	03-2010	1 ad.	2	1 in Mar 2010	
San Buk	Le Me A Si	03 + 04/05-2010	7 (incl.1 inf.)	2	6 (incl. 1 inf.) in 2009	
	Maw Ban Luan Taung	03 + 04-2010	2-3	2	2-3 >3 years ago	
Maw Ban	Name not recorded	05-2010	1	2	1 undated skull	
Ngaw Phar Kar	Bo Sa Ye	05-2010	3	2	3 in 2009	
Total					16	62-63

5.2 Bushmeat trade

The presence of Chinese logging and road construction camps has increased the demand for bushmeat. While Lisu and Law Waw hunters previously only hunted for subsistence use, they now set-up iron traps and snares near their villages targeting for muntjak, serow and wild pigs to supply the Chinese camps with fresh meat. This bushmeat sells for 500 Yuan on average per animal.

5.3 Non-timber forest product extraction

Access to Chinese markets has also increased the extraction of non-timber forest products (NTFP). Medicinal plants (bark, roots and whole plants), ornamental plants (orchids), and wild mushrooms are sold to Chinese camps. As shotguns are carried during NTFP collection trips, the demand for NTFPs also results in a further increase of opportunistic hunting. Medicinal bark (Lisu name: *shikutgi*) was collected in large quantities in 2009 and 2010. More than ten people collected this bark to fill up a truckload for 50,000 Yuan. Another important medicinal plant is *shishe* (Lisu language); its root is used for Malaria treatment. *Deban daing* roots are collected and sold for 100 Yuan per *vis* (1 *vis* = 1.7 kg) in the nearest Chinese road construction camp. *Kwabuoimutschi* mushrooms (Lisu name: *gyipu*) sell for 1,500 Yuan per *vis*.

5.4 Logging

Chinese commercial logging

Chinese company roads for logging from Kangfang have opened up the entire area. The Yin Toak company has a five-year-contract (2008-2012) to develop roads for logging in the upper Mae Hka watershed. This company has started the development of two logging roads towards the habitat of the snub-nosed monkeys to access precious woods in the upper mountain forest and conifer zone. One road goes south of the Maw river via San Buk village, the other one north of the Maw river via Wayaw Buk village. However, the road construction team will need at least two more years to reach the upper mountain zone. These logging roads must go through steep slopes with 30-70° slope inclination, and their construction so far has led to large scale landslides impacting Taungya (shifting cultivation areas), secondary and primary forests. Timber has been logged along the roads, although the main target species are limited to higher elevation in the area that is currently still primary forest.

Forest destruction by road construction and logging will have a tremendous impact on the integrity on the habitat of the snub-nosed monkeys. Noise of explosives used in road construction could impact the behaviour of the species, including their reproduction and group dynamics. Improved access to, and demand by Chinese workers for, wildlife product will drastically increase hunting pressure.

The improved access since 2001 due to logging has already introduced profound changes that impact biodiversity: During the last nine years the hunting pattern has changed from subsistence hunting to hunting for wildlife and bushmeat trade. Hunting techniques have shifted from the use of cross bows, home made black powder guns and snares, to Chinese shotguns with bullets and iron traps, both available in Kangfang. Primary forests have been logged and degraded up to the highest mountaintops, with irreparable impacts on ecosystems.

Local timber extraction

Main target species are conifer trees with scented wood that are also called coffin wood trees (*Taiwania cryptomerioides*) for their use in China, and Maple trees (*Acer* spp.). The scale and impact on the bio-integrity of the forest is limited. However, local timber extraction also increases the chance for opportunistic hunting.

5.5 Dam construction

In December 2006, China Power Investment Corporation (CPI) and the Myanmar Ministry of Electrical Power (1) signed a Letter of Intent for the Hydropower Development in Ayeyarwaddy river basin above Myitkyina, Kachin State. Seven cascade hydropower stations are to be built in the hydropower development scheme of the Ayeyarwaddy river basin upstream from Myitkyina. Five of these cascade power stations are built on the May Hka river, one power station is built on the Mali Hka river, and one is built 5 km downstream from the confluence of the latter two rivers on the Ayeyarwaddy river. The total installed capacity of basin cascade development of the Ayeyarwaddy river above Myitkyina is 16,500 MW. The dams of the hydropower development scheme for the Ayeyarwaddy river basin above Myitkyina are listed in Table 3.

Table 3. Dams of the hydropower development scheme for the Ayeyarwaddy river basin above Myitkyina.

Dam location	River	Capacity (MW)	Reservoir area (km ²)	Watershed area (km ²)
Myitson	Ayeyarwaddy	4,100	262.38	11,680
Lasa	Mali Hka	1,900	245.54	15,390
Khaunglanghpu	May Hka	2,700	24.09	3,455
Yenam	May Hka	1,200	9.17	5,255
Pisa	May Hka	2,000	6.90	1,950
Wusuk	May Hka	1,800	4.98	1,203
Chibwe	May Hka	2,800	32.14	3,796
Total		16,500	585.02	42,729

The distribution range of the sub-nosed monkeys is largely located in the watershed of the planned Wusuk dam and partly in the watershed of the Chibwe dam.

Indirect impacts on biodiversity, such as logging, hunting and wildlife trade, are expected to be severe. The construction of access roads for the dams will allow all-year-round and all-weather access to the mountain forests, including the whole distribution area of the snub-nosed monkeys of Kachin, and this will lead to increased logging and unsustainable NTFP extraction in these areas. This will also open cheap opportunities for logging companies to build secondary logging roads. The new dam construction road from Yi Tan via Chaung Mo to Wusuk built in 2009/2010 has already improved access to that area and prompted the Yin Toak company to build secondary logging roads towards the range of the snub-nosed monkeys. Construction of the Chibwe dam (Fig. 12) has started in 2009 and dam construction in Wusuk will start in 2010. This will also lead to an increasing influx of Chinese construction workers as well as shop and restaurant owners, further accelerating demand for bushmeat and wildlife products.



Fig. 12. Dam construction on the Chibwe river by China Power Investment. Photo: Frank Momberg, April 2010.

6. Conclusions and conservation recommendations

The populations of sub-nosed monkeys in the area surveyed during this study appear to be limited to one large band of approximately 80-100 individuals. A small splinter group with consisting of at least six adults and one infant were observed during this survey. Colouration of adult individuals was confirmed to correspond to the coloration of the specimen collected during the previous survey. Taking into account interview surveys in other villages during the hoolock gibbon and biodiversity survey conducted in March 2010, the overall population of the snub-nosed monkeys probably consists of three bands with a total population of 260-330 individuals. The species range encompasses the mountain forests in the watershed area of the Maw river, a

tributary to the May Hka river, and forests across the range to the east above the village of Chichitago. In the forests above Chichitago, snub-nosed monkeys are only sighted seasonally during the month of July.

For a more comprehensive and accurate assessment of the populations of this snub-nosed monkey, we recommend (1) a survey of the Chichitago forest during July and (2) at least two months of field surveys between November 2010 and January 2011 both north and south of the Maw river. These surveys should be using camera traps in areas where hunters have previously successfully trapped snub-nosed monkeys.

Hunters from at least six villages (San Buk, Maw Ban, Pade, Pashe, Tam Tan, Chichitago) surrounding the snub-nosed monkey range and from Ngwapaka village near Kangfang are hunting and trapping in the habitat of the snub-nosed monkeys.

As snub-nosed monkeys are not the primary target species of these hunters, targeted conservation awareness campaigns and village conservation agreements could reduce hunting of snub-nosed monkeys with shotguns. Lisu and Law Waw hunters are trained early in hunting skills. Most of their children are sent to schools in Saw Law, which provides the opportunity for the development and implementation of an intensive school-based conservation awareness and education campaign using awareness materials in Lisu, Law Waw, and Burmese language.

Reducing indiscriminate trapping with iron traps will be more difficult as trapping bears is still very lucrative. The following interventions have the potential to reduce trapping:

- Employ the approximately ten hunters engaged in trapping in the habitat of the snub-nosed monkeys as guides and porters for population surveys and subsequently as community rangers to monitor and patrol in the snub-nosed monkey range. However, this requires strict supervision to ensure compliance with no-hunting agreements with the community wardens
- Approach the forestry department, authorities of state, district and township, and the NDAK/Kachin Special Region 1 administration to ban iron traps from the snub-nosed monkey range and prohibit the sale of iron traps, especially in Kangfang.

Increased demand for bushmeat and wildlife products due to the influx of Chinese dam and road construction workers, shop and restaurant owners, and loggers can be contained by the following interventions:

- Develop and implement a conservation awareness campaign targeting bushmeat consumption and wildlife trade in Chinese language targeting Chinese workers, shop and restaurant owners.
- Approach CPI (China Power Investment Corporation) to adopt regulations for its construction workers to ban bushmeat consumption and wildlife trade and provide punitive actions in employment contracts; encourage CPI to provide meat imports from China for employees.
- Include snub-nosed monkeys in the Myanmar Wildlife protection law and facilitate IUCN and CITES listing; provide training to Myanmar and Chinese border police and CITES authorities at Pima, Kangfang and Panwar border posts.

Logging is posing a serious threat to the habitat integrity of the snub-nosed monkey range, as well as providing access for increased hunting and trapping. Logging in the watershed of the dam development project also reduces the lifespan of Wusuk and Chibwe dams. The following actions are required:

- Lobby CPI, Northern Military Commander, Myanmar Forestry Department, Yunnan Forestry Bureau and NDAK to exclude the Maw river watershed immediately from any further logging operation and phase out logging in the entire May Hka watershed as soon as possible.
- Lobby CPI, Northern Military Commander, Myanmar Forestry Department, Yunnan Forestry Bureau and NDAK to establish the May Hka National Park, which includes the entire eastern watershed of the May Hka dams (including Mount Imawbon and the snub-nosed monkey range).
- Provide technical and financial assistance for the establishment of May Hka National Park with an emphasis on multi-stakeholder management and collaborative law enforcement.

7. References

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Appendix 1. Birds recorded during this survey.

Family	Species		Sites ^(a)								
			1	2	3	4	5	6	7	8	9
Phasianidae	Rufous-throated Partridge	<i>Arborophila rufogularis</i>		C	C	C	C	C			
	Blyth's Tragopan	<i>Tragopan blythii</i>									+
Falconidae	Oriental Honey-Buzzard	<i>Pernis ptilorhynchus</i>					+				
	Long-legged Buzzard	<i>Buteo rufinus</i>					+				
	Black Eagle	<i>Ictinaetus malayensis</i>									+
Columbidae	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	+								
	Pin-tailed Green Pigeon	<i>Treron apicauda</i>									+
	Mountain Imperial Pigeon	<i>Ducula badia</i>									+
Cuculidae	Eurasian Cuckoo	<i>Cuculus canorus</i>								C	C
	Indian Cuckoo	<i>Cuculus micropterus</i>			C	C					
	Dark Hawk Cuckoo	<i>Hierococyx bocki</i>	C	C	C	C	C	C	C	C	C
Strigidae	Collared Owlet	<i>Glaucidium brodiei</i>		C	C						
Ramphastidae	Blue-throated Barbet	<i>Megalaima asiatica</i>									+
	Great Barbet	<i>Megalaima virens</i>	C	C	C						+
Picidae	White-browed Piculet	<i>Sasia ochracea</i>	+								
	Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>						+	+		
	Bay Woodpecker	<i>Blythipicus pyrrhotis</i>				C					
Eurylaimidae	Long-tailed Broadbill	<i>Psarisomus dalhousiae</i>									+
Vireonidae	Black-eared Shrike-Babbler	<i>Pteruthius melanotis</i>					+				
Campephagidae	Large Cuckooshrike	<i>Coracina macei</i>						C			
	Black-winged Cuckooshrike	<i>Coracina melaschistos</i>									+
	Short-billed Minivet	<i>Pericrocotus brevirostris</i>	+	+	+						
	Long-tailed Minivet	<i>Pericrocotus ethologus</i>	+								
Oriolidae	Slender-billed Oriole	<i>Oriolus tenuirostris</i>				C	C	C			
	Maroon Oriole	<i>Oriolus trailii</i>	+								
Incertae sedis	Common Woodshrike	<i>Tephrodornis pondicerianus</i>		+							
Rhipiduridae	Yellow-bellied Fantail	<i>Chelidorhynch hypoxantha</i>	+				+		+		
Dicruridae	Bronzed Drongo	<i>Dicrurus aeneus</i>	+	+							+
	Ashy Drongo	<i>Dicrurus leucophaeus</i>	+								
	Black Drongo	<i>Dicrurus macrocercus</i>	+								
	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	+								
	Lesser Racket-tailed Drongo	<i>Dicrurus remifer</i>		+							
Corvidae	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>						+			
	Grey Treepie	<i>Dendrocitta formosae</i>									+
	Eastern Jungle Crow	<i>Corvus levaillantii</i>	+								
Laniidae	Grey-backed Shrike	<i>Lanius tephronotus</i>	+	+							+
Nectariniidae	Black-throated Sunbird	<i>Aethopyga saturata</i>					+			+	+
	Streaked Spiderhunter	<i>Arachnothera magna</i>	+	+							+
Chloropseidae	Orange-bellied Leafbird	<i>Chloropsis hardwickii</i>	+								
Motacillidae	Grey Wagtail	<i>Motacilla cinerea</i>	+	+							
Emberizidae	Little Bunting	<i>Emberiza pusilla</i>	+	+							
Certhiidae	Hodgson's Treecreeper	<i>Certhia hodgsoni</i>									+
Sittidae	Chestnut-bellied Nuthatch	<i>Sitta cinnamoventris</i>					+				
	Beautiful Nuthatch	<i>Sitta formosa</i>			+						
	White-tailed Nuthatch	<i>Sitta himalayensis</i>						+	+		
	Yunnan Nuthatch	<i>Sitta yunnanensis</i>								+	

Appendix 1 (ctd.)

Family	Species		Sites ^(a)								
			1	2	3	4	5	6	7	8	9
Muscicapidae	Ferruginous Flycatcher	<i>Muscicapa ferruginea</i>								+	
	Rufous-gorgeted Flycatcher	<i>Muscicapa strophciata</i>								+	
	Taiga Flycatcher	<i>Ficedula albicilla</i>		+							
	Little Pied Flycatcher	<i>Ficedula westermanni</i>				+					
	Pale Blue Flycatcher	<i>Cyornis unicolor</i>		+							
	Rufous-gorgeted Flycatcher	<i>Muscicapa strophciata</i>									+
	White-browed Bush-Robin	<i>Tarsiger indicus</i>								+	
	Black-backed Forktail	<i>Enicurus immaculatus</i>									+
Paridae	Green-backed Tit	<i>Parus monticolus</i>						+			
	Yellow-cheeked Tit	<i>Parus spilonotus</i>					+				
	Yellow-browed Tit	<i>Sylviparus modestus</i>					+				
Stenostiridae	Grey-headed Canary-Flycatcher	<i>Culicicapa ceylonensis</i>					+	+	+		
Pycnonotidae	Flavescent Bulbul	<i>Pycnonotus flavesceus</i>		+							
	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>		++							
	White-throated bulbul	<i>Alophoixus flaveolus</i>		+							
	Mountain Bulbul	<i>Ixos mccllellandii</i>		+							
	Himalayan Black Bulbul	<i>Hypsipetes leucocephalus</i>		+							+
Hirundinidae	Red-rumped Swallow	<i>Cecropis daurica</i>		+							
Aegithalidae	Black-throated Tit	<i>Aegithalos concinnus</i>				+					
Cettiidae	Black-faced Warbler	<i>Abroscopus schisticeps</i>					+				
	Chesnut-crowned Bush-Warbler	<i>Cettia major</i>								+	
	Chestnut-headed Tesia	<i>Tesia castaneocoronata</i>						+	+		
Timaliidae	Black-eared Parrotbill	<i>Suthora beaulieui</i>								+	
	Golden Breasted Fulvetta	<i>Lioparus chrysotis</i>								+	
	Striated Yuhina	<i>Staphida castaniceps</i>		+							+
	White-naped Yuhina	<i>Yuhina bakeri</i>								+	+
	White-collared Yuhina	<i>Yuhina diademata</i>							+	+	
	Whiskered Yuhina	<i>Yuhina flavicollis</i>		+	+						
	Stripe-throated Yuhina	<i>Yuhina gularis</i>								+	+
	Nepal Fulvetta	<i>Alcippe nipalensis</i>					+		+		
	Orange-billed Scimitar-Babbler	<i>Pomatorhinus ochraceiceps</i>									+
	White-hooded Babbler	<i>Gampsorhynchus rufulus</i>		+							
	Rufous-winged Fulvetta	<i>Pseudominla castaneiceps</i>					+		+		
	White-crested Laughingthrush	<i>Garrulax leucolophus</i>									C
	Assam Laughingthrush	<i>Trochalopteron chrysopterum</i>								+	
	Bar-throated Minla	<i>Chrysominla strigula</i>					+	+			
	Long-tailed Sibia	<i>Heterophasia picaoides</i>						+			
	Grey Sibia	<i>Malacias gracilis</i>		+					+		
	Beautiful Sibia	<i>Malacias pulchellus</i>									+
Rusty-fronted Barwing	<i>Actinodura egertoni</i>								+		
Streak-throated Barwing	<i>Actinodura waldeni</i>							+			
Cisticolidae	Hill Prinia	<i>Prinia superciliaris</i>									+

^(a) Abbreviations for survey sites: 1: Saw Law – Gyi Tan (600-1,000 m), 2: Chaung Mo – San Buk (900-1,540 m), 3: San Buk – Camp 1 (1,540-2,374 m), 4: Camp 1 – Camp 2 (2,374-2,764 m), 5: Camp 2 – Camp 3 (2,764-2,661 m), 6: Camp 3 and around (2,500-2,700 m), 7: Around Camp 2 (2,764-2,890 m), 8: Camp 2 – Maw Ban village, 9: Maw Ban – Chaung Mo. Abbreviations for bird records: + sighting, C = calls heard only.