

SEARCH FOR A SPECTACLE



A Conservation Survey of the Phayre's Leaf Monkey (*Trachypithecus phayrei*) in Assam and Mizoram

Joydeep Bose



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Back cover: Project investigator with evidence of primate meat trade.

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Phayre's Leaf Monkey (*Trachypithecus phayrei*)
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May 2003

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PREFACE

North-East India is home to ten of the fifteen primate species found in India. The Phayre's leaf monkey is perhaps the most enigmatic and least known of these ten species. The fact that a short conservation survey like this one conducted by Joydeep Bose can reveal three or four new sites in which the primate was previously un-recorded shows that some areas of the North-East are still completely unexplored.

While research is not the primary mandate of a conservation-action oriented organization like the Wildlife Trust of India (WTI), it is recognized that for many species, even baseline data is not available to decide on conservation priorities. It is with this in mind that the Board of Trustees mandated a division to conduct conservation surveys. This one on the Phayre's leaf monkey is the second in this series of such surveys.

December 27, 2004
New Delhi

Vivek Menon
Executive Director
Wildlife Trust of India

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Joydeep Bose

EXECUTIVE SUMMARY

Systematic surveys were carried out in March and April 2003 for Phayre's leaf monkey (*Trachypithecus phayrei*) in the north-eastern states of Assam and Mizoram. The PAs surveyed in Mizoram were Lengteng Wildlife Sanctuary, Murlen National Park, Tawi Wildlife Sanctuary, Khawnglung Wildlife Sanctuary, Phawngpui National Park, Dampa Tiger Reserve and Ngengpui Wildlife Sanctuary. In Assam, the survey was basically concentrated in reserve forests and tea estates. Expertise of the locals, tribes and hunters were made use of in locating the groups of monkeys. This short-term effort produced fascinating results:

1. One new distribution site was recorded from Assam.

The Phayre's leaf monkey (*Trachypithecus phayrei*) was recorded from the Silcoorie, Borojalenga and Irongmara tea estates. Among these, Irongmara was a new distribution record. A "trapped population" was found in the Borojalenga tea estate forest patch, where the area available to the troop was just 22 ha, which is surrounded by paddy fields and tea gardens.

2. A total of 129 monkeys were sighted from survey locations in Assam.

Four troops comprising 46 individuals were seen in the four tea estates; ten troops comprising 83 individuals were seen from the reserve forests of Assam.

3. Phayre's leaf monkey was sighted in four out of six PAs surveyed in Mizoram out of which two were new locations.

Of the seven PA's surveyed in Mizoram, the Phayre's leaf monkey was sighted in Lengteng WLS, Murlen NP, Khawnglung WLS

and Ngengpui WLS while no evidence was recorded from Tawi Wildlife Sanctuary, Phawngpui National Park and Dampa Tiger Reserve.

4. Fourteen troops having a total of 174 individuals were recorded from Mizoram.

A total number of seven troops having 87 individuals were recorded from Dampa Tiger Reserve alone during the survey. Average group size was 12.4 (range 2 to 25). Six of the seven troops were found in localities having extensive bamboos, with two localities being bamboo dominated.

5. Slash and burn or shifting cultivation, locally called "jhum" and hunting are the two major threats to primates in the surveyed areas.

We recommend the following measures for the long term protection of this elusive primate species:

- 1. A thorough survey of Phayre's leaf monkey areas needs to be carried out to arrive at a complete distribution range.**
- 2. It is necessary to find out the demography of groups to determine the viability of the isolated populations.**
- 3. Attempts should be made to save the isolated population of Borojalenga Tea Estate.**

1. INTRODUCTION

The Phayre's leaf monkey (*Trachypithecus phayrei*), a colobine, has been reported from India, Bangladesh, Myanmar, China, Laos, Thailand and Vietnam (Srivastava, 1999; Roonwal and Mohnot, 1977; Gupta and Kumar, 1994; Stanford, 1988; Ruggeri and Timmins, 1995 and 1996). The species is reported in India from the north-eastern states of Tripura, southern Assam and Mizoram (Choudhury, 1987 and 1994; Mukherjee, 1982; Srivastava, 1999) of which the largest population is reported from Tripura. The population status of the Phayre's leaf monkey in India is available only for the state of Tripura (Mukherjee 1982; Gupta 1994).

Choudhury (1987) first reported this species in the state of Assam, from the Inner line Reserve Forest. Subsequent surveys by the Indo-US Primate project in 1997 described a few new locations in the southern Assam districts of Cachar, Hailakandi and Karimganj. There are no Protected Areas (National Parks and Wildlife Sanctuaries) in southern Assam and all the sightings are from Reserve Forests and forested lands within tea gardens.

In Mizoram, which has eight protected areas, the Phayre's leaf monkey was reported from Dampa Wildlife Sanctuary (Raman *et. al.*, 1995) and Ngengpui WLS (Anon., 1999). The state of Mizoram shares its western boundary with Bangladesh and eastern boundary with Myanmar and the Phayre's leaf monkey has been reported from both the countries. Thus the species was thought to have a wider distribution in Mizoram than described so far and hence it was felt that a systematic survey would reveal the true status and distribution of the species in Mizoram. The Wildlife Trust of India planned a project to survey the Protected Areas of Mizoram and Assam with this objective.

1.1 Local Names

Hindi: *Chasma-wala Bandar*; Bengali: *Chasma-bandar*; Assamese: *Chasma-chakuwa Bandar*; Mizo: *Dawr*; *Rukni*, *Lekan*; Khasi: *Pret*; Burmese: *Kekaw*; Bilaspuri: *Lukkur Bandar*; Tripuri: *Dodhi Bandor* or *Kala bandor* (Srivastava, 1999).

1.2 Identification in the Field

The species is easily identified in the field by a distinct white patch seen around the eyes and on upper and lower lips. This is also why they are often referred to as the spectacled langur (Figure 1). They are greyish to black in colour. Their brow, hands and feet are jet black, and their upper arms, legs and tail are silvery grey (Rowe, 1996).

1.3 Present Conservation Status

Trachypithecus phayrei is listed under Schedule I of the Indian Wildlife (Protection) Act, 1972 and in Appendix II of CITES. The IUCN Red list lists this species as Data Deficient.



Figure 1 a & b: Phayre's leaf monkey (*Trachypithecus phayrei*)

2. OBJECTIVES

1. To record the distribution of *Trachypithecus phayrei* in Protected Areas (PAs) of Mizoram and Assam.
2. To collect information on their demographic profile (wherever possible) and habitat conditions in their range of distribution.

3. SURVEY SITES

North-East India is one of India's richest biodiversity zones and is unique in its genetic resources. It comprises the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim (21°57'-29°30'N, 89°46'-97°30'E) and has the highest primate diversity in India. Ten of the fifteen species of primates found in India are reported from the North-East, eight being endemic to it. Except for the Golden langur (*Trachypithecus geei*), Hanuman langur (*Semnopithecus entellus*) and the Phayre's leaf monkey (*Trachypithecus phayrei*), all other species have a large extent of occurrence in the region. The diverse fauna of this region is threatened by logging, shifting cultivation (locally called "jhum"), and hunting by local people (Johnsingh, 1985; Choudhury, 1987; Rodgers and Panwar, 1988; Katti, 1992). However, ecological information that can lead to comprehensive conservation measures is severely lacking for most of the hilly regions of North-East region (Raman *et al.*, 1995).

3.1 Mizoram

The state of Mizoram is an extremely rugged mountainous area along the northeastern border of India (Figure 2). It lies within the geographical limit of 20°20' to 24°21' N latitude and 92°20' to 93°29'E longitude and covers an area of 21,087 km². It is bounded on the north by Cachar district of Assam state and Manipur, on the east and south by the Chin hills of

Myanmar, on the south by the Arakan hills of Myanmar and on the west by Tripura state and the Chittagong hills of Bangladesh. As per the 2001 census, Mizoram has a population of 8,91,058 with a literacy rate of 88.49%, which is the second highest in India. The local vernacular is Mizo, which is written in the Roman script. The entire state consists of hill ranges running in the north-south direction with little or no valleys in between. The average height of the hills is in the range of 1000m. The river system in Mizoram is rather peculiar as rivers in North Mizoram flow towards the north, and those in South Mizoram flow towards the south. Though the Tropic of Cancer passes through Mizoram, due to variation in altitude, Mizoram has tropical, sub-tropical and sub-temperate climates. The summer temperature varies from 20° to 32°C and winter temperature from 10° to 20°C. The average annual rainfall varies from 2000 to 3900 mm.

The forests of Mizoram can be broadly divided into three types: tropical wet evergreen, tropical moist deciduous and montane sub-tropical (Champion and Seth, 1968). The total forest cover of Mizoram is 15,935 km² (FSI, 2002), which comprises 75.59 % of the total geographical area of the state. Mizoram ranks only behind the Andaman and Nicobar islands in terms of percentage forest cover.

Some of the main tree species are *Dipterocarpus turbinatus*, *Artocarpus chaplasha*, *Terminalia myriocarpa*, *Amoora wallichii*, *Schima wallichii*, *Pinus khasya*, *Quercus serrata*, *Rhododendron sp.*, etc. Seventeen species of bamboo have been identified so far in Mizoram, of which the most common are *Melocanna bambusoides*, *Teinostachum dulloa*, *Bambusa tulda*, *Dendrocalamus strictus* and *Bambusa pallida* (Srivastava, 1999). About 150 species of orchids have been identified of which some common ones are *Acridies odoratum*, *Acridies vandarum*,

Arundina graminifolia, *Anoechtochilus sikkimensis*, and *Dendrobium fimbriatum* (Srivastava, 1999).

Within the administrative boundaries of Mizoram, the survey was carried out in Lengteng Wildlife Sanctuary (32°47' N and 93°15' E), Murlen National Park (23°32'-23°42'N and 92°13'-92°27'E), Tawi Wildlife Sanctuary (23°30'-23°34'N and 92°55'-92°59'E), Khawnglung Wildlife Sanctuary (23°04'-23°10'N and 92°55'-92°59'E), Phawngpui National Park (22°39'N and 93°02'E), Dampa Tiger Reserve and Ngengpui Wildlife Sanctuary (92°45'-92°50'E and 22°21'-23°30'N). Thorangtlang WLS, which has been newly constituted, was not covered, as it did not exist at the time of planning the project and subsequently could not be fitted into the schedule and work plan.

3.2 Assam

The state of Assam is a mixture of flood plains and some mountainous areas surrounded by hilly states like Meghalaya, Arunachal Pradesh, Mizoram, Nagaland, Manipur and Tripura and the Kingdom of Bhutan (Figure 2). Assam, comprising an area of 78,438 km², had more than 33% of its geographical areas covered by forests till the 1980s. But this has decreased drastically due to indiscriminate 'jhuming' and diversion to other uses. Presently 23,824 km², which is ca. 30% of the geographical area, is under forest cover in Assam. Wildlife in Assam is given protection through a network of five National Parks and 15 Wildlife Sanctuaries.

Assam is home to a number of charismatic mammalian fauna including the greater one-horned rhinoceros (*Rhinoceros unicornis*), pygmy hog (*Sus salvanius*), Royal Bengal tiger (*Panthera tigris*), Asian elephant (*Elephas maximus*), swamp deer (*Cervus duvaucellii*), Gangetic dolphin (*Platanista gangetica*), wild buffalo (*Bubalus arnee*), golden langur

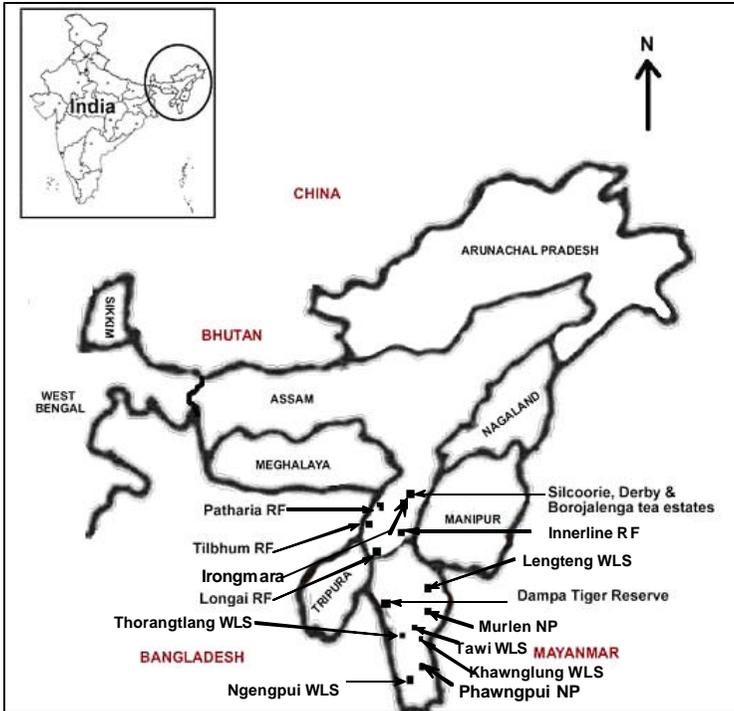


Figure 2: Map of North-East India showing survey locations. (Map not to scale)

(*Semnopithecus geei*), hoolock gibbon (*Bunopithecus hoolock*), stump-tailed macaque (*Macaca arctoides*), pig-tailed macaque (*Macaca leonine*), hispid hare (*Caprolagus hispidus*), etc.. Important bird species found in Assam include the endangered greater adjutant stork (*Leptoptilos dubius*), white winged wood duck (*Cairina scutulata*), Bengal florican (*Eupodotis bengalensis*), spot-billed pelican (*Pelecanus philippensis*), lesser adjutant stork (*Leptoptilos javanicus*), king vulture (*Sarcogyps calvus*), etc.

The areas covered in Assam for this survey are:

3.1.1 Outside Reserve Forests (Figure 3)

- a) Silcoorie tea estate
- b) Borojalenga tea estate
- c) Derby tea estate in Cachar district.
- d) Irongmara tea estate

The total continuous forested patch in Silcoorie and Derby tea estate was estimated as 669 ha and in Borojalenga as 22 ha.

3.1.2 Inside Reserve Forests (Figure 3.)

- a) Inner line RF (107997 ha) on Assam-Mizoram border: Cachar and Hailakandi Forest Divisions
- b) Longai RF (15151ha): Karimganj Forest Division
- c) Tilbhum RF (1795 ha): Karimganj Forest Division
- d) Patharia RF (7647 ha): Karimganj Forest division.



Figure 3: Hills under 'jhum'

4. METHODS

Systematic surveys were carried out between March and April 2003. Groups of field personnel were formed for each Protected Area (Appendix I) and these groups surveyed the forests on foot and in one case, on boat. Each group had at least one experienced person (usually a former hunter) and other members were trained on various aspects of Phayre's leaf monkey by using photographs and descriptions. Each group was allotted a specific area in a PA and based on terrain and visibility; the number of days spent by them ranged from three to six. The number of survey groups, number of individuals in each group, number of days required for survey, etc. were decided after consultations with Forest Department personnel. The transects were plotted on existing forest maps taking care to avoid the teams from overlapping, thereby preventing multiple counts of animals. In the forests, the procedure adopted was to move slowly with the least noise and to stop at regular intervals and at suitable places to scan the areas for the presence of animals. The disturbance of vegetation caused by the movement of animals and calls were also used to locate them. Observations were recorded on pre-formatted datasheets (Appendix II), which were both in English and Mizo. The survey teams camped within the forest during the survey. The survey was usually carried out between 5:30 and 16:30 hrs. Wherever possible, a total count was attempted and age-sex composition of troops was noted. A visual estimation of the closeness of canopy (canopy cover) in a 10 meter circle around the troop's position was also carried out. A GPS was used to record geographical coordinates of the sites where troops were first sighted. Dense canopy cover prevented GPS positions from being taken in a few areas.

5. RESULTS

5.1 Population Details

5.1.1 Assam

The Phayre's leaf monkey was sighted in three tea estate areas, viz. Silcoorie and Borojalenga and Irongmara but it was not sighted in Derby tea estate area. Of these, Irongmara was a new description record for Assam. Four troops comprising 46 individuals were seen in total (Table 1). The species was sighted in all the four Reserve Forests, viz. Inner line, Longai, Tilbhum and Patharia (Table 2). Ten troops comprising a minimum of 83 individuals were sighted.

#	Tea estate	Locality	Troop size	Troop structure	Altitude	Canopy cover
1	Silcoorie	Section 49	11	3 AM +3 AF+2 SAF+1 JuM+2 In	145 ft.	>50%<75%
		Bilani	14	2 AM +2 SAM + 5 AF+1 SAF + 2JuF	136 ft.	>50%<75%
2	Boroja- lenga *	Allenpur	6	2AM+1SAM+1AF+2JuF	116 ft.	>25%<50%
3	Irong- mara *	Parikona Bagbahar	15	4 AM+4 SAM+6 AF+1 In	127 ft.	>25%<50%

* New record during this survey

AM = Adult Male AF= Adult Female SAM = Sub-adult Male SAF = Sub-adult Female
 JuM = Juvenile Male JuF = Juvenile Female In = Infant u? = Unknown

Table 1: Details of Phayre's leaf monkey sightings in tea estates of Assam

#	RF	Locality	Troop size	Troop structure	Alt.	Canopy cover
1	Longai	Bandorgonai	25+	--	324 ft.	>50%<75%
		Kalamati Kuwari	5	2SA+3AF	353 ft.	>50%<75%
		Churaibari-Khasiya mandir	10+	--	-----	>75%
2	Tilbhum	Sarjul	13	3AM+5AF+	100 ft.	>50%<75%
3	Patharia	Mokamilla	10	--	390 ft.	>50%<75%
		Lakhicherra	3+	--	----	>75%
4	Inner line	Gaucherra	9	3AM+2AF+2SAF+A	370 ft.	>50%<75%
		Gaucherra palai	3	1AM+1AF+1 In	370 ft.	>50%<75%
		Jhálnacharra	5	4A (?) + 1Ju (?)	---	>50%<75%

AM = Adult Male AF = Adult Female SAM = Sub-adult Male S A F = S u b - a d u l t
 Female JuM = Juvenile Male JuF = Juvenile Female In = Infant u? = Unknown

Table 2: Details of Phayre's leaf monkey sightings in Reserve Forests in Assam

5.1.2 Mizoram

In Dampa TR, 9 troops were sighted, comprising 82 individuals of which the age-sex composition could be determined for only three. In other cases, due to the very thick vegetation and shy nature of the animal, the age and sex could not be determined and the GPS coordinates could also not be obtained for any of the localities. The sighting details are given in Table 3.

Of the six PAs of Mizoram surveyed, the Phayre's leaf monkey was sighted in four, viz. Lengteng WLS, Murlen NP, Khawnglung WLS and Ngengpui WLS. (Table 3). The known occurrence record of the Phayre's leaf monkey from Mizoram was thus extended with the discovery of the species from three new sites in Mizoram. The number of PAs that the species is today recorded from, has therefore gone up to five (from two) in Mizoram and eight for the whole of India.

#	Range	Locality	Troop size	Troop structure	Canopy cover
1	Teirei	Tuichar puk ral	7	2AM+3AF	>75%
2	Teirei	Tuichar puk	9	2AM+2AF+3 A (?) + 2Ju (?)	>75%
3	Teirei	Damparengpui	8	--	>75%
4	Teirei	Verrengtlang	5	2AM+3AF	>75%
5	Phuldungsei	Keisalam	8	--	>75%
6	Phuldungsei	Sarpuilui	8	--	>50%<75%
7	Phudungsei	Saipui	10	--	>75%
8	Phuldungsei	Fangfarlui	16	--	---
9	Phuldungsei	Fangfarlui	11	--	---

-- Could not be determined

AM= Adult Male AF= Adult Female SAM = Sub-adult Male SAF=Sub-adult Female
 JuM= Juvenile Male JuF = Juvenile Female In = Infant u? = Unknown

Table 3: Details of Phayre's leaf monkey sightings in Dampa Tiger Reserve, Mizoram

A total of seven troops comprising 87 individuals were recorded during the survey. The average group size was 12.4 (range 2 to 25). However, due to difficult terrain, reduced visibility and extreme shyness of the animals to human presence, demographic structure could not be conclusively worked out in the field. Though the Phayre's leaf monkey was not found in Tawi WLS, they were seen outside the sanctuary. A total count could not be done in this area.

Locality	Troop size	Sighting distance	Nearness to habitation	Type of vegetation
Lengteng WLS : New record during this survey				
		20m	8km	Bamboo dominated
Rerhgau river	20	50m	0.45Km	Woodland
Murlen NP : New record during this survey				
Sereplui	02	60m	8km	Woodland
Khawnglung WLS : New record during this survey				
Khawkhochhuah	25	80m	2km	Mixed
Ngengpui WLS : Confirmed the earlier records of presence				
Khangpui mual	3	30m	5km	Mixed
Tuiphal chhuah	5	50m	10km	Mixed
Tuiphal kam	7	50m	10km	Bamboo dominated

Table 4: Record of the Phayre's leaf monkey sightings in the four PAs of Mizoram

5.2 Habitat Description

5.2.1 Assam

Of all the survey sites (Reserve Forest and tea gardens), a "trapped population" was found only in the Borojalenga tea estate forest patch. The area available to the troop was just 22 ha, which is surrounded by paddy fields and tea gardens. Elsewhere, the langur populations had forest continuity for ranging, though considerable part of some RFs like Longai were not available to langurs due to human settlements and agricultural fields inside. Movement is facilitated by the presence of various species of bamboos, which the langurs use not just for moving on, but also for

feeding. If the bamboo is removed, as are the trees, the troops will be in danger of losing this habitat contiguity. Eighty-one species of trees were recorded from the surveyed sites. *Ficus tomentosa*, *Artocarpus chaplasha* and *Ficus glomerata* were widely seen in the survey sites.

5.2.2 Mizoram

In Dampa Tiger Reserve, contiguous forest was available for the Phayre's langur troops and there were no cases of 'trapped populations'. The tree species observed in locations of Phayre's leaf monkey sightings were *Terminalia myriocarpa*, *Ficus benghalensis*, *Bischofia javanica*, *Gmelina arborea*, *Michelia champaca*, *Polygala jefensis*, etc. In almost all the locations, the canopy cover was above 75%.

6. DISCUSSION

Bigger trees are decreasing over years due to illegal felling according to local villagers. The troops are becoming more and more dependent on bamboo, the removal of which endangers their survival.

Only the Borojalenga tea estate that has a "forested patch" of 22 ha, had a "cut off" troop of Phayre's leaf monkey, while in the others, the troops have continuous habitat (due to presence of various species of bamboos) despite low tree abundance. In Borojalenga, the Phayre's leaf monkey troop has been surviving for the past several years in a habitat surrounded by tea gardens and paddy fields. The langur populations in the tea garden areas live in close proximity to human settlements, where the number of trees is higher. The local people always wander for some distance from their settlements for logging, sparing the important trees near their houses. Due to lack of roosting trees, the home range for the langur populations is shrinking and becoming concentrated near human settle-

ments. There was no report of human-Phayre's leaf monkey conflict.

There were reports of poaching from Inner line RF, which is on the boundary of Assam and Mizoram states. The Mizos, who are the largest tribe of Mizoram, are traditional hunters and Phayre's leaf monkey was reported to be hunted from the Inner line RF by Mizos. However, no report of poaching of Phayre's leaf monkey was available from the Dampa Tiger Reserve in Mizoram.

Slash and burn or shifting cultivation (Figure 3), locally called 'jhum' and hunting (Figure 4) are the two principle threats to primates in Mizoram. Mizoram is a land of traditional hunters and 'jhum' cultivation and because of this, the forests are always under threat. During the surveys the rough boundaries of Protected Areas, etched as forest extents on otherwise bare and 'jhumed' hills could be identified. Wildlife is thus somewhat confined to PAs in Mizoram inside which 'jhum' and hunting are prohibited and these areas are probably one of the only places in which wildlife can be conserved in this state. However, 'jhum' cycles of 15-20 years create successional forests, which may be able to support species such as Phayre's leaf monkey (Gupta and Kumar, 1993).



Figure 4: Skulls of hunted animals on display

Six of the seven troops were found in localities having extensive bamboos, with two localities being bamboo-dominated. Phayre's leaf monkey is reported to be found in bamboo-dominated areas elsewhere (Bose and Bhattacharjee, 2002; Choudhury, 1987, 1994 and 1996; Raman *et al.*, 1996; Roonwal and Mohnot, 1977; Wolfheim, 1983).

Mizos hunt and eat practically all animals, including primates and they keep skulls of animals as trophies. Such exhibits were seen in various fringe villages of the PAs, especially in Vapar village, adjacent to Murlen National Park (Figure 4).

The Mizoram Forest Department is facing a severe problem due to the lack of adequate forest staff. The total staff strength in six PAs, which have a total area of 400 km² is only 136 of which more than 56% are casual staff. Basic infrastructure is also not in place. Joint Forest Management (JFM) and rural development through VEDC (Village Eco-Development Committee) are being promoted in the state by the Forest Department.

7. INITIATIVES BY THE WILDLIFE TRUST OF INDIA

The Wildlife Trust of India (WTI) is a non-profit conservation organization committed to urgent action that prevents destruction of India's wildlife. Listed below are some initiatives taken by WTI in Phayre's leaf monkey areas:

1. WTI has insured all wildlife staff (Forest Range officers and below including casual workers) throughout India against accidental death or permanent, total or partial disability while on wildlife duties. The premium for this is being paid by WTI and this supple

mentary insurance scheme is hoped to increase the morale of forest staff.

2. All the wildlife staff of the rank of Forest Range Officers and below (135 in all) in the state of Mizoram have been provided with uniforms at the behest of the forest department.
3. WTI conducted a training workshop (inaugurated by the state Forest Minister) for Range Officers and senior ranks on the Wildlife (Protection) Act, 1972 and legal issues concerning wildlife conservation. WTI runs training and equipping programmes for the forest officials and so far 34 staff have been trained and 39 have been equipped with basic anti-poaching kits in the Dampa Tiger Reserve of Mizoram.
4. In Dampa Tiger Reserve, 18 bicycles were distributed to aid faster and effective patrolling.

8. RECOMMENDATIONS

These recommendations are specific conservation action points that can be carried out for the conservation of the species. These do not take into account lifestyle changes and other social parameters such as 'jhumming' and traditional hunting that greatly influence the wildlife in this region that are outside the scope of conservation action. The following measures are recommended:

1. **A thorough survey of Phayre's leaf monkey areas needs to be carried out to arrive at a complete distribution range.**
Many of the forest areas of North-East India remain un-explored

even today. Newer species are described each year by scientists. Even in the case of the Phayre's leaf monkey, many new locations of occurrence were described from this short-term survey. This points to the fact that isolated populations of this lesser-known primate may exist in the adjoining areas. It is recommended that the survey should be extended to all forested regions having canopy continuity with the identified locations of Phayre's leaf monkey.

2. It is necessary to find out the demography of groups to determine the viability of the isolated populations.

In the present survey, the population structure of many of the groups could not be found out because of the difficult terrain and dense canopy. By spending more time with the identified troops, it is possible to bring to light various characteristics of the population.

3. Attempts should be made to save the isolated population of Borojalenga Tea Estate.

The trapped population in Borojalenga Tea Estate is totally cut off from the other populations. The well-known problems of isolated populations will soon affect these too unless urgent intervention to create continuity of this population with others in the nearby areas is carried out. If canopy bridges are too nonviable an option, translocation of this group can be considered to prevent inbreeding and to maintain genetic variability.

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Appendix I

Survey Groups in Lengteng Wildlife Sanctuary

- GROUP I :
1. Lalrawna
F/G (Leader)
 2. Biakkunga, W/G
 3. Ram Thansanga
 4. La lthuama

Kawlbam atangin Lengteng Wildlife Sanctuary *Hmar 1am* 20 km².
(approx.) *an cover ang. Hei hian Nauzuar lui thleng a huam ang.*

- GROUP II :
1. C. Vansanga
F/G (Leader)
 2. Thanzuala, W/G
 3. Thangliana
 4. Chullova

Ngopa atangin Lengteng Wildlife Sanctuary *Nauzuar lui atanga tannin*
Sialkal tiang thlengin 20 km². (approx.) *an cover ang.*

- GROUP III :
1. Laltluanga
W/G (Leader)
 2. Thangzika
 3. Vanlalhuma
 4. Lalkungpula

Lanzawl atangin Lengteng Wildlife Sanctuary *Sialkal tiang atanga tannin*
Sanctuary chhim 1 am zawng 20 km². (approx.) *an cover ang.*

Appendix II

Sheet no.

Animal Survey Sheet

NAME OF PA:

(*Ramsa hmuhna* plot center *atanga* 10 mts radius *chhung* measurement *lak tur*).

DATE:

OBSERVERS:

1. ANIMAL OBSERVATION

#	Species (<i>Eng chi nge</i>)	Distance (<i>Hlatawng</i>)	Time (<i>Hun</i>)	Adult male (<i>Apapuitling</i>)	Adult female (<i>Anupuitling</i>)	Other	Total
1.							
2.							
3.							
4.							

2. PHYSICAL FEATURES

2.1 Locality (*Hmun*):

2.2 Weather (*Nisa / chum / ruahsur*):

2.3 Aspect (*A ram hawi zawng*):

3. HABITAT DESCRIPTION

3.1 Visibility (*khawhmuh plat thein dan*):

3.2 Nearest waterhole (*Tui awmna hnai ber*):

3.3 Nearest habitation (*Mihring chennus hnai ber*) (Forest):

3.4 Roosting tree (*An awmna thing*):

3.5 Type of vegetation (*A ram hmul awm dan*):

3.6 Bamboo (*Mau awm te*):

4. ANIMAL'S ACTIVITY (*Ramsa thiltih*)

4.1 Sighting (*Hmuh lai a awm dan*):

4.2 Troop activity (*A huhova awm thiltih*):

4.3 Vocalization (*an hram ri*):

5. OTHERS (*A dangte*)

5.1 Pug mark (*Hnu*):

5.2 Scat (*Ek*):

5.3 Bones(*Ruh*):

5.4 Kill (*Tihhlum/Thi*):

5.5 Hunt (*Pei*):

6. REMARKS

Appendix III

Mammals sighted In Mizoram during the survey

Species		Protected Areas					
Scientific name	Common name	Leng-teng	Murlen NP	Tawi	Khawn-glung	Phaw-ngpui	Nge-ngpui
<i>Bunopithecus</i>	Hoolock Gibbon	X	X	X	X	----	X
<i>Trachypithecus</i>	Capped langur	X	---	X	X	---	---
<i>Macaca arctoides</i>	Stump-tailed macaque	---	X	---	---	---	---
<i>Macaca assamensis</i>	Assamese macaque	---	X	---	---	---	---
<i>Macaca mulatta</i>	Rhesus macaque	X	X	X	X	X	X
<i>Selenarctos thibetanus</i>	Himalayan black bear	----	----	X	X	----	X
<i>Martes flavigula</i>	Yellow-throated marten	----	----	----	X	----	----
<i>Neofelis nebulosa</i>	Clouded leopard	----	X	----	----	----	----
<i>Felis chaus</i>	Jungle cat	----	----	----	X	----	----
<i>Naemorhedus goral</i>	Goral	X	X	X	X	X	----
<i>Capricornis sumatraensis</i>	Serow	X	X	X	X		X
<i>Cervus unicorn</i>	Sambar	X	X	----	X	----	X
<i>Muntiacus muntjac</i>	Barking deer	X	X	X	X	X	X
<i>Sus scrofa</i>	Wild boar	X	X	X	X	----	X
<i>Hystrix indica</i>	Porcupine	----	X	----	----	----	----
<i>Ratufa bicolor</i>	Malayan giant squirrel	----	X	----	X	----	----
<i>Arctictis binturong</i>	Binturong	----	----	----	----	----	X
<i>Arctonyx collaris</i>	Hog badger	----	----	----	----	----	X

X: Sighted, ----: Not sighted

Advisors

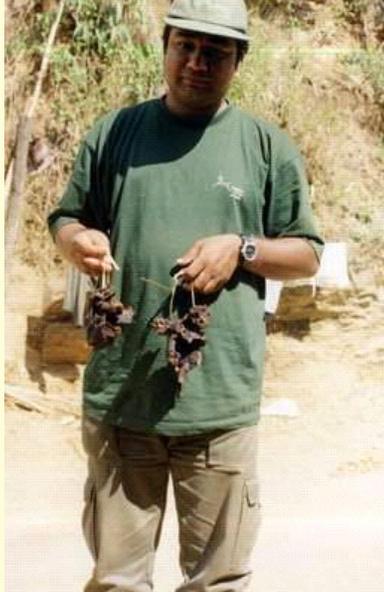
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A conservation survey of the Phayre's leaf monkey (*Trachypithecus phayrei*), one of the least known Indian primates, by the Wildlife Trust of India, discovered the species from four new locations in the states of Assam and Mizoram. A total of 303 animals were counted during this survey. Slash and burn or shifting cultivation, locally called 'jhum' and hunting are the two major threats to primates in the surveyed areas.



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