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Contents

NPS feeding *Gmelina arborea* in Bangladesh (Image: Tahsinur Rahman)

First report of *Saccolaimus saccolaimus* Temminck, 1838 (Chiroptera: Emballonuridae) from Assam, northeast India

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The bat fauna of the north-eastern states of India is very diverse with about 65 reported species from the region (Sinha, 1999; Bates and Harrison, 1997; Thabah and Bates, 2002; Ruedi *et al* 2012). This constitutes over 50 percent of the 117 species known from India (Talmale and Pradhan, 2009). This impressive species diversity can be attributed to habitat heterogeneity and partly to the past faunal interchange with the western Himalayan region of India from where a number of Palearctic mammalian species invaded the region thus, enhancing the species composition. However, compared to the northeastern region as a whole, the bat fauna of the state of Assam is not very remarkable comprising about 28 reported species (Sinha, 1999; Bates and Harrison, 1997). This apparently lower species diversity is partially because of fact that bat fauna of the state has not been explored satisfactorily till date. This is evident from very little published information on the group from the state during the post independence period except for Kurup (1968) and Sinha (1999), the former dealing with the mammalian fauna as a whole and the latter providing a consolidated account of the bats of northeast India. During the course of field work in Baksa district of central Assam, the authors could collect a number of bat specimens, one of which was identified as *Saccolaimus saccolaimus* (Temminck, 1838). A perusal of published information revealed that, thus far, the species has not been recorded from Assam (Bates and Harrison, 1997; Molur *et al*. 2002; Csorba *et al.* 2008). In the present communication, this species is being reported from Assam on the basis of a freshly collected specimen from western Assam. The specimen is deposited in the Department of Zoology, Gauhati University for future reference.

Fig1: Dorsal view of *Saccolaimus saccolaimus* showing the typical pelage colouration

Fig2: Dorsolateral view of *Saccolaimus saccolaimus*

Saccolailmus saccolaimus (Temminck, 1838), commonly known as Bare-rumped Sheathtail Bat is one of the biggest emballonurid bats of India with an average forearm length of 63-68mm (Srinivasulu *et al*. 2010). In India, this species is known to be distributed in Andaman and Nicobar Islands, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Uttar Pradesh and West Bengal (Bates and Harrison, 1997; Molur *et al*. 2002). During field surveys in Balahati Village (*c.*

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$26^0$32'08"N, $91^0$43'07"E, 64m asl) under Tamulpur Division in Baksa district of Assam, a female specimen of this species was collected on 16th January, 2013. A colony of eleven individuals was observed roosting under dried leaves of a palm tree near a pond surrounded by rice fields at about forty feet from the ground. The single animal was collected by scooping a butterfly net by an expert climber. The dorsal pelage is dark brown with many hairs having white tips and giving an overall grizzled appearance. There are many irregular white patches especially around the rump region (Fig 1). Venter is lighter in comparison. The lower lip has a characteristic deep 'V' shaped groove in the middle. The external and cranial measurements of the preserved specimen are given below.

External (in mm): Hb-84, Tl-27, FA-70.75, E-15.5, Tb-28, Hf-16.2

Cranial (in mm): GTL-26.75, CCL-24.36, ZB-17, PC-5, CM^3-10.7, C^1-C^1-5.21, M^3-M^3-11.35, M-19.75, CM_3-11.88

Saccolaimus saccolaimus is listed as Least Concern in the IUCN Red List of Threatened Species 2012 and Conservation Assessment and Management Plan workshop 2002 (for South Asia) apparently because of widespread distribution. However, our field observation in the study area suggests that it is probably uncommon locally. We randomly looked at around 20 palm trees in the vicinity of the tree from which this bat was collected, but none was found to harbour this species and a few knowledgeable local people also noted that they have not encountered this bat earlier. From other parts of northeast India, this species is known from a single locality (Phulbari, *c.* $25^0$53'N, $90^0$01'E) in West Garo Hills district of Meghalaya (Specimen Catalogue No. 76058; FMNH, 2008) although it is reported widely distributed in other parts of India. Intensive surveys are required to ascertain the status of this species in the northeast India

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Investigating the least known small mammals of Jahangirnagar University campus, Bangladesh

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We investigated the local status and some ecological aspects of small mammals, particularly the rodents and bats of Jahangirnagar University Campus during the years 2011 and 2012. Live rodent traps with baits and mist net were used in capturing rodents and bats respectively in different habitat types in the campus. Jahangirnagar University campus, located in the central part of the country, has been an important biodiversity hotspot despite of increased urbanization over decades. A total of 233 species of plants belonging to 168 genera and 62 families were reported from the study area (Hossain *et al*. 1995). The university campus has diverse ecosystems such as open grasslands, bushes, cultivated fields, scattered woodlands, permanent and temporary bodies. These habitats provide shelter to many kinds of mammals, birds, reptiles, amphibians, fishes and insects (Hossain *et al*. 1995; Begum 2003; Aziz *et al.* 2007). The campus is known to support 180 species of birds including 61 migrants, which accounts 29% of the national avian fauna (Mohsanin and Khan 2009).

We captured 36 individuals under five species of rodents, which included the Lesser Bandicoot Rat (*Bandicota bengalensis*) (5 individuals), Large Bandicoot Rat (*Bandicota indica*) (3 individuals), Common House Rat (*Rattus rattus*) (16 individuals), Soft-furred Rat (*Millardia meltada*) (3 individuals) and House Mouse (*Mus musculus*) (5 individuals). We also included here the Asian House Shrew that was trapped frequently during this study (Table 1). Of the recorded species, Common House Rat was very common while others were common. Of the five species, the Common House Rat was commonly distributed throughout the study area while the Large Bandicoot Rat preferred bushy areas and Lesser Bandicoot Rat, Soft-furred Rat and House Mouse both bushy and around of human-dwellings.

Of the bats, a total of 19 individuals were captured from the 11 trap nights. Captured bats represented 2 families, 4 genera and 4 species of

Asian House Shrew (Female)

Asiatic Greater Yellow House Bat

Asiatic Lesser Yellow House Bat

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Table 1. Rodents and bats recorded in Jahangirnagar University campus of Bangladesh

Common Name	Scientific Name	Species status		
		JU	IUCNB	IUCN
Family: Muridae				
Lesser Bandicoot Rat	*Bandicota bengalensis* Gray, 1835	C	NO	LC
Large Bandicoot Rat	*Bandicota indica* Bechstein, 1800	C	NO	LC
Soft-furred Rat	*Millardia meltada* Gray, 1837	C	DD	LC
House Mouse	*Mus musculus* Linnaeus, 1758	C	NO	LC
Common House Rat	*Rattus rattus* Linnaeus, 1758	VC	NO	LC
Family: Soricidae				
Asian House Shrew*	*Suncus murinus* Linnaeus, 1766	C	DD	LC
Family: Pteropopidae				
Greater Short-nosed Fruit Bat	*Cynopterus sphinx* Vahl, 1797	VC	DD	LC
Indian Flying Fox	*Pteropus giganteus* Brunnich, 1782	VC	NO	LC
Family: Vespertilionidae				
Asiatic Greater Yellow House Bat	*Scotophilus heathii* Hosrsfield, 1831	C	DD	LC
Asiatic Lesser Yellow House Bat	*Scotophilus kuhlii* Leach, 1821	R	NO	LC
Indian Pipistrelle	*Pipistrellus coromandra* Gray, 1838	C	NO	LC

JU (Jahangirnagar University) code: R= Rare; UC= Uncommon; C= Common, VC= Very Common
IUCNB (International Union for Conservation of Nature, Bangladesh) Code: NO= Not Threatened; DD= Data Deficient; EN= Endangered; VU= Vulnerable
IUCN: LC= Least Concern; NT= Not Threatened
*Considered as invasive and not protected by Law in Bangladesh

Lesser Bandicoot Rat

Soft-furred Rat

bat. In addition, direct observation was made on the Indian Flying Fox, which regularly comes to forage in the campus area. The bat species were the Greater Short-nosed Fruit Bat (*Cynopterus sphinx*), Indian Flying Fox (*Pteropus giganteus*), Indian Pipistrelle (*Pipistrellus coromandra*), Asiatic Greater Yellow House Bat (*Scotophilus heathii*) and Asiatic Lesser Yellow House Bat (*Scotophilus kuhlii*) (Table 1). The latter two species were the first locality record for this university campus. Among them the *Cynopterus sphinx* was very common species while *Scotophilus kuhlii* rare in the campus. The *Pteropus giganteus* and *Cynopterus sphinx* foraged in different fruit-yielding trees in the campus. The remaining three insectivorous bats usually reside in ceilings, walls, crevices and hollows in old buildings, roof of houses, behind switch board, etc. during the day and come out after sunset for foraging. They foraged over open lands, paddy fields and water bodies found in the campus.

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Large Bandicoot Rat

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Taking measurements in the field

An aberrant specimen of *Pipistrellus* species from Hyderabad, Andhra Pradesh

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A dead bat, found in the garden of a house in R. N. Reddy Nagar near Karmanghat in Greater Hyderabad, was brought to us on 15.04.2013. We assume that it might have died due to heat stress. The specimen was examined and morphometric measurements (in mm) (namely, HB 38.52; FA 28.62; E 9.41; Hf 5.25; Tl 32.54) were taken. The specimen was found to be an adult female. Its morphological characters and measurements showed overlap between *Pipistrellus tenuis* and *Pipistrellus coromandra*. Species identity could not be ascertained as the extraction of the skull could not be carried out, and these two species of genus *Pipistrellus* show overlapping characters. On closer examination, it was found that the specimen had some anomalies to it. Its muzzle was distinct in lacking right nostril. The right upper canine was projecting at an angle of 90^{O} to the plane of its muzzle and though presumed broken was observed to be developed attached to the maxilla in that angle (Fig. 1). The right side portion of its maxilla was completely loose and it showed no broken teeth or external injuries to be attributable to such a condition. On the right side both pm^2 and pm^4 were present, while on the left side only pm^4 was present. The lower incisors were ill developed, devoid of cusps and were plate-like (Fig. 1).

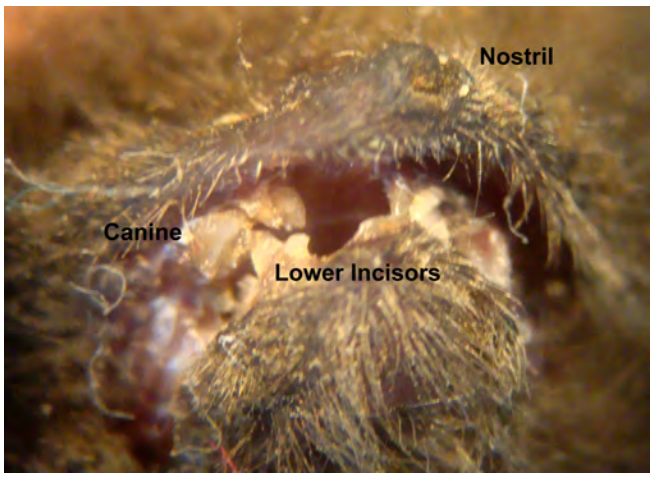

Fig. 1. Close up of the frontal view of the muzzle of the *Pipistrellus* species showing abnormalities

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Bat Survey in Eastern Terai of Nepal

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Abstract

A survey on bats of plains of Eastern Nepal (three districts namely Sunsari, Morang and Jhapa) was conducted on October-November, 2008 and March-April, 2009 with an objective of recording the species status for the first time. Two individuals of single species (*Pipistrellus* sp.) were netted while 13 bats of two species (*Scotophilus heathii* and *Pipistrellus* sp.) were captured by hands during roost survey, all from the houses. *Megaderma lyra* and *Cynopterus sphinx* colonies were only observed, a dead specimen of *Taphozous* sp. was collected and measured, and two preserved specimens of *Scotophilus heathii* were measured. Time of emergence of their flight was recorded. In total five species of bats was recorded during the survey and in conclusion the population of these species except *Taphozous* sp. is rich. There might be chance of recording new species to Nepal or even to World from this area.

***Pipistrellus* sp. (whole body) at Kusaha, KTWR**

Introduction

Diversified and populated distribution may be found in plains (Terai) of Nepal. However, more studies and more species have been recorded from hills and mountains. Thirty six species have been recorded from hills and mountains while that of from plains is only four, and three species from both (Bates and Harrison, 1997). Among 34 species with confirmed locality, 21 species are recorded from protected areas of Nepal. Among 21, only four species viz. *Kerivoula picta* from CNP and BNP; *Scotophilus heathii* from CNP; *Scotophilus kuhlii* from South-west Nepal (Corbet and Hill, 1992); *Rhinolophus luctus* from CNP have been recorded from Tarai. However, *Pipistrellus coromandra* occurs in both plains (CNP, and BNP) and hills (ACAP, MBNP) and even in Ilam (Suwal *et al*., 1995).

In eastern Nepal, bat researches have been focused to Sankhuwasabha and Ilam districts. Among eleven species from Eastern Nepal, ten species are recorded from Sankhuwasabha: 7 from Num (FMNH and Koopman, 1983); two from Tumlingtar (FMNH), one from Ilam district (Mitchell, 1980). *Scotomanes ornatus* has unconfirmed locality in Sankhuwasabha district (Bates and Harrison, 1997). According to BPP, 8 species are found in MBNP only while *Pipistrellus coromandra* from MBNP and Ilam (Suwal et al., 1995). Twenty two species can be found from eastern Nepal (Baral and Shah, 2008).

Rhinolophus ferrumequinum, *R. rouxi*, *R. luctus*, *R. pearsonii*, *Hipposideros armiger*, *Pipistrellus circumdatus*, *Philetor brachypterus*, *Eptesicus serotinus* are reported from Num (FMNH). However, the specimen of *Pipistrellus circumdatus* and *Eptesicus serotinus* has been reported only from Num. Specimen of *Myotis blythii* was collected only from Tumlingtar, Sankhuwasabha district, whereas specimen of *Scotomanes ornatus* had been reported from Sankhuwasabha district. The specimens are deposited at FMNH. *Rhinolophus lepidus* was recorded from Ilam district (Mitchell, 1980). *R. ferrumequinum* was collected from an altitude of 2738m (8900 ft.) in Num. *R. pearsonii* was collected from elevations ranging from 11123m (3650 ft.) at Dima near Num to 2031m (6601 ft.) in the Suki Patyl forest near Num (FMNH). *Hipposideros armiger* was collected from 2031m (6600 ft.) in the Suki Patyl forest near Num (FMNH).

Pipistrellus circumdatus was also collected from 2031m (6600 ft.) in the Suki Patyl forest near Num on 31st May, 1973 (FMNH), A specimen from Num Bridge at 862m (2800 ft.) was also collected (FMNH; Koopman, 1983). Nine species namely *Hipposideros armiger*, *Myotis mystacinus*, *M. siligorensis*, *Plecotus auritus*, *Barbastella leucomelas*, *Pipistrellus javanicus*, *P. coromandra*, *Eptesicus nilssoni*, and *E. serotinus* can be found from MBNP. *P. coromandra* can also be found from Ilam (Suwal et al., 1995).

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Figure 1: Study area with pointed study sites (Source: Google Earth)

Among the 22 species three species namely *Harpiocephalus harpia*, *Scotophilus kuhlii* and *Taphozous longimanus* can be found from plains of eastern Nepal. There is no exact location of *Taphozous longimanus* (Worth and Shah, 1969), However *Taphozous longimanus* can only be found from plains and Churia hills of Eastern Nepal (Baral and Shah, 2008).

Specimens of six species were collected from eastern Nepal that had been deposited at Hungarian Natural History Museum, HNHM and Zoological Museum of Moscow State University, ZMMU: An adult male of *Rhinolophus affinis* was collected on 1 April, 1996 from Tawa, Taplejung at 1200m; Two adult males and an adult male of *R. sinicus* were collected on 5 April and 7 April, 1996 from above of Yamphudin at 2650m and Mamankhe at 1700m respectively; An adult female of *R. pusillus* was collected on 1 April, 1996 from Tawa, Taplejung at 1200m; Two adult females of *R. pearsonii* were collected on 7 April, 1996 from Mamankhe at 1700m; An adult female and an adult male of *Myotis muricola* were collected on 12 and 13 April, 1996 from Lam Pokhari and Tinjure Phedi, Terhathum district at 3000m and 2900m respectively; five adult males and seven adult females of *Kerivoula hardwickii* on 7 April, 1996 from Mamankhe at 1700m (Csorba et. al, 1999). Twenty two species can be found from eastern Nepal (Baral and Shah, 2008).

This is the first survey in this area. The aim of the study is to record the species diversity, population and their habitats in plains of eastern Nepal and update the information. The rapid transformation of the land use pattern due to haphazard urbanization and industrialization and economic increment has encroached the major roosting habitats of bats, may have influence to the species loss. This survey of bats in plains of eastern Nepal is the preliminary and primary. This study is expected to update the facts of the species and population prevailing and their roosting and hibernating habitats in the study area.

Materials and Methods

Study area: Three districts namely Sunsari, Morang and Jhapa, were chosen as study area for the present study. It is flat bottomed plain at the foothills of Churia extending south bordering Bihar in South and West Bengal in North of India. Climate in plains of eastern Nepal is characterized by subtropical and influenced by the tropical monsoon. Saptakoshi (the biggest river of Nepal), Mechi and Mai (Kankai) are major rivers of this area. Lower tropical forest of *Shorea robusta* (Sal) dominates the vegetation of Tropical tarai (the remaining Char-Kose Jhadi). *Acacia catechu* and *Dalbergia sissoo* forests grows in narrow strips on alluvium along streams and rivers, tropical humid evergreen forest (multi species) grows in narrow belts in the sal forest. Pseudo steppes with tall elephant grasses (*Saccharum spontaneum*) and Shrubs (*Phragmites kharka*) especially in KTWR. Sub-tropical forest is dominated by *Schima/Castanopsis* forests. *Pinus roxburghii* (Chir pine) forest on dry south facing slopes. *Alnus nepalensis* is mixed within along the streams and ravines. The evergreen forest is represented by *Eugonia tetragona* with an under storey of *Ostodes paniculata* (surrounding hilly area) (Dodman, 1990). While the fauna like leopard (*Panthera pardus*), wild boar (*Sus scrofa*), deers, Asian elephant (*Elephas maximus*), wild water buffalo (*Bubalis arnee*) Common langur (*Semnipethacus entellus*), Rhesus monkey (*Macaca mulata*), Gangetic dolphin (*Platinista gangetica*) etc, numerous herpeto-fauna, avian fauna (birds), and fishes are present. Areas aside the busy city, such as Kusaha, KTWR in Sunsari district, Keroun V.D.C in Morang district and busy towns and city such as Inaruwa in Sunsari district, Taaghandubba-5; Bahundangi-2 in Jhapa district, and Biratnagar sub-metropolitan city in Morang district were chosen as study sites.

Climate of the Kusaha, KTWR is tropical, dominated by the southeast monsoon. The average daily maximum temperature ranges from 23.5ºC to 33.4ºC, with minimum of 7.8ºC -25.3ºC (Sah, 1997). Mean monthly temperature ranges from 15.7ºC -29.2ºC (Singh, 2001). The annual precipitation recorded at Fathepur, Saptari district is about 1300mm. This rainfall occurs from mid June to mid September (Sah, 1997). Morang district receive annual precipitation of 1812mm with maximum and minimum temperatures of 42ºC and 3ºC respectively. Climate in Biratnagar is characterized by sub-tropical and influenced by the tropical monsoon. The annual average high temperature is 31ºC and the annual average low temperature is 18ºC. The annual

Table 1: Bats captured in different sites and their characters

S. No	Locality	Date of Netting/ Roost Survey	Species netted	Species observed during roost survey	No. of species netted	No. of species captured from the roosts	Sex	Age	Repro-status
1	Kusaha	24-29 Oct, 08	*Pipistrellus* sp.	*Pipistrellus* sp.	2	2	M	A	NR
		29 Mar-2 Apr, 09	-	*Pipistrellus* sp. *Megaderma lyra* *Cynopterus sphinx*	- - -	6 - -	4M, 2F - -	4A,2Y - -	3R, 3NR - -
2	Inaruwa	3 Apr, 09	-	*Scotophilus heathii*	-	1	F	A	R
3	Samrat Chowk	30 Oct-2 Nov, 08	-	*Megaderma lyra* *Cynopterus sphinx*	- -	- -	- -	- -	- -
		4, Apr 09	-	*Cynopterus sphinx*	-	-	-	-	-
4	Sissoghari	5, Apr 09	-	*Pipistrellus* sp.	-	1	M	Y	NR
5	Pushpalalchowk	6, Apr 09	-	*Pipistrellus* sp.	-	1	M	Y	NR
6	Keroun	6, Nov 08	-	*Scotophilus heathii*	-	1	M	Y	NR
7	Bahundangi-2	4, Nov 08	-	*Megaderma lyra*	-	-	-	-	-
		9, Apr 09	-	-	-	-	-	-	-
8	Taaghandubba-5	10, Nov 08	-	*Megaderma lyra*	-	-	-	-	-
		11, Apr 09	-	*Scotophilus heathii*	-	1	M	A	NR

Note: M=Male; F=Female; A=Adult; Y=Young; NR=Non-Reproducing; R= Reproducing.

***Pipistrellus* sp. (inside hollow bamboo) at Sissoghari, Biratnagar**

rainfall in Biratnagar is about 157 mm. Jhapa district receives 2500 to 3000 mm of rainfall a year, and mostly during the monsoon season in the summer and its hilly northern area receives more rainfall than the south. The annual average maximum temperature is 29.9ºC, annual average minimum temperature is 18.5ºC, and receives annual rainfall of 1264mm in Sunsari district (DHM, 2006).

Field Survey: Mist netting was done randomly in each study site. Mist nets were deployed near wetlands, bushes and lakes, ponds, houses from evening to 22:00hr.

The following external measurements was taken with the help of millimeter graded steel scale to the nearest 1 mm. T- Tail length (from the anus to last vertebra); FA – Forearm Length, E – Ear length from the lower border of the external auditory meatus (Posterior to tragus to the tip of pinna), TIB - Tibia length, HF- hind foot length (excluding claws). HB- Head body, 5mt-Fifth metacarpal, 4mt-Fourth metacarpal, 3mt-Third metacarpal, 1ph5mt-First Phalange Fifth metacarpal, 1ph4mt- First Phalange Fourth metacarpal, 1ph3mt- First Phalange Third metacarpal, 2ph5mt- Second Phalange Fifth metacarpal, 2ph4mt- Second Phalange Fourth metacarpal, 2ph3mt- Second Phalange Third metacarpal. The body weight was measured with the help of simple spring balance graded with gram. After capturing the bats spot identification was made with the help of the standard taxonomic keys obtained from the IUCN/SSC experts and other reference books: Bates and Harrison, 1997. On the basis of these measurements, we made taxonomic confirmation on the field. The key success was to give us confirmation then we released without giving any more stress to these bats. Population in the colony was estimated. All bats were photographed digitally. Additionally, the reproductive stage of them was noted by observing their genitalia and nipples (in case of female).

Tree barks and hollows, old houses and temples, and other diurnal roosts were searched at the day time. The population in the colony was estimated. Their colony was photographed. Bats were captured by hands, while for Pipistrelle the cloth bag was hanged covering the bamboo holes during late afternoon in which they were captured during evening. The captured bats were measured and photographed and released.

Result

Bats captured/ netted

Two individual bats of single species were captured over 23 nights of mist-netting while 13 bats of two species were captured by hands during roosts survey (Table 1). Bats were captured at one of the 8 mist-netting locations. At sites except Kusaha, no bats were captured in the net. At Kusaha, two individuals of *Pipistrellus* sp. were netted. Each individual of *Scotophilus heathii* were captured by hand from sites 6, 2, and 8. One, eight, and one individuals of *Pipistrellus* sp. were captured by hand from sites 4, 1, and 5. In the site 1, two and six individuals were captured during October and March-April.

Bats observed/ Specimen Collected

At site 1, two individuals of *Pipistrellus* sp. were netted and bats were observed emerging at 6:00 and 6:30pm during October and March. Two specimens of *Scotophilus heathii* were observed from Site 1. A single dead specimen of *Taphozous longimanus* was collected at sites 3 on February 25, 2009. Twelve, 300, ten, and eight individuals of *Megaderma lyra* colony were observed from sites 1, 7, 3, and 8 respectively. Small colonies of six and four individuals of *Cynopterus sphinx* were observed from sites 1 and 3 respectively. None of the species was measured. At sites 2, 4 and 5, bats were observed emerging at 6: 35 PM where as at sites 3, 7, and 8 bats were observed emerging at 6:02, 6: 05, 6:10 PM during October and 6: 35, 6: 37, and 6:37 PM during April. At site 6 bats were observed emerging at 6:08 PM.

Species recorded

Altogether five species of bats were recorded.

Pipistrellus sp. (*Pipistrellus coromandra* or *Pipistrellus tenuis*)*

***Megaderma lyra* colony at Samrat Chowk, Biratnagar-1**

Common Name: Pipistrelle bat (Indian Pipistrelle or Least Pipistrelle) (Bates and Harrison, 1997)

Conservation Status in Nepal: LC (Walker and Molur, 2003)

Conservation Status Global: LC (IUCN, 2008)

Status: Among twelve, seven was male (Ps1, Ps3, Ps4, Ps5, Ps6, Ps7, Ps9) and one female (Ps10) adults, other was three young males (Ps2, Ps11, Ps12) and one young female (Ps8).

Reproductive Status: Two males were reproducing with swollen testes (Ps4, Ps8), and a single female was reproducing (Ps10), while others were non-reproducing.

Population: Kusaha**,** KTWR is the hotspot for the population of hundreds of these bats, about a hundred in Sissoghari; a few in Tanka Prasad Acharya's house, Pushpalalchowk, Biratnagar.

External Characters:

The color of the dorsal pelage was ranging from uniform mid-brown to deep clove brown. Ventral pelage were paler buffy brown and with cinnamon brown tips. The external measurements are given in table 2. Ectoparasites were absent.

Habit: These were found roosting at the bamboo hollows and holes of the thatched roofs of the houses at Samsul tole; Goithi tole; Near Hattisar, Kusaha village (N 26º 25' 54", E 87º 19' 31.4" and at an elevation of 70m from the sea level), Koshi Tappu Wildlife Reserve (KTWR); Srinagar tole, Sissoghari (at the bank of Singia khola), Pokharia, Biratnagar-1, (N 26º 17' 35.2", E 87º 34' 52.4" and at an elevation of 62m from the sea level) and Pusphalalchowk (N 26º 18' 54.5.2", E 87º 34' 55.4" and at an elevation of 76m from the sea level), Biratnagar sub-metropolitan city. Sometimes when disturbed they roosts even in banana trees. They were even found in the roosts of smoky areas like kitchen and shed.

Table 2: Measurements of bats captured in the study area.

Bat Species	*Pipistrellus* sp.(Ps)											
External Measurements (mm)	**Ps 1**	**Ps 2**	**Ps 3**	**Ps 4**	**Ps 5**	**Ps 6**	**Ps 7**	**Ps 8**	**Ps 9**	**Ps 10**	**Ps 11**	**Ps 12**
HB	40	38	41	44	42	48	44	40	44	45	34	33
T	25	22	25	26	22	25	21	20	20	20.1	21	22
TIB	13	12	14	15	14	12	15	10	12	10	10	15.2
HF					6	6	6	7		7	6	
FA	30	27	31	33	33	28	35	28	29	35.2	29	29
WSP						220				210		
3mt	25	23	25	26	30	29	31	27	28	30	27	27.3
4mt	25	22	24	24	30	28	31	27	28	30	28	28
5mt	26	20	24	25	29	28	30	25	27	29	26	26
1ph3mt	11	10	12	13	12	10	12	10	11	10	10	10
1ph4mt	10	9	11	11	11	12	11	10	10	10	9	10
1ph5mt	6	8	9	11	10	6	10	9	9	8	6	7
2ph3mt	9	8	10	12	10	16	10	9	9	9	6	10
2ph4mt	8	6	8	11	9	8	9	9	8	8	5	5
2ph5mt	5	5	7	9	8		8	7	7			
E	10	10	11	12	12	8	12	9	12	12	7	7
Wt. (gm)	10	8	11	12	12	13	8	14	8	9		12

Table 3: Measurements of bats captured in the study area.

Bat Species	*Scotophilus heathii* (Sh)					*Taphozous* sp.
External Measurements (mm)	**Sh 1**	**Sh 2**	**Sh 3**	**Sh 4**	**Sh 5**	
HB	65	72	72	75	80	65
T	54	55	50	60	60	25
TIB			20	24.5	20	25
HF			12	11.5	16	12
FA	60	64	62	63	60	60
WSP				390	440	
3mt	61.2	60	58	58	60	60
4mt	61	57	56	58	58	48
5mt	56	57	52	56	58	38
1ph3mt	20	20	20	20	18	22
1ph4mt	16	16	14	16	16	13
1ph5mt	10	10	11	10	12	10
2ph3mt		17	15	19	16	25
2ph4mt		14	12	13	14	7
2ph5mt		10	7	8	10	10
E	10	20	16	19	17	18
Wt. (gm)	35			50	65	

Threats: Children play with these bats and kill for fun. According to locals at KTWR, Kusaha after the flooding of Koshi the population of the species has decreased. Their habitat is disturbed when the house is re-thatched or maintained.

Status from the present study: Common
* Externally, it is often difficult to distinguish these species; also both may occur within the same locality (Bates and Harrison, 1997).

Scotophilus heathii **Horsfield, 1831**

Common Name: Asiatic Greater Yellow House bat (Bates and Harrison, 1997)

Conservation Status in Nepal: LC (Walker and Molur, 2003)

Conservation Status Global: LC (IUCN, 2008)

Status: Among five, three were male (Sh2, Sh3, Sh5) and one female (Sh4) adults, other one was young male (Sh1).

Population: About 200 individuals were seen roosting at Pankaj Kumar Mahato's house, Inaruwa municipality, a few of 25 at Kamal Nepal's house, Sundarbasti, Keroun-5, 35 at Ganga Bahadur Pudasaini's house, Taaghandubba-2, unknown population at office, guest house and museum of KTWR.

Reproductive Status: Four males were non-reproducing and a single female was reproducing with parous nipples.

External Characters: The crescent shaped tragus is half the height of pinna. The tail is long. The color of the dorsal pelage and head was ranging from buffy brown to orange brown with hair roots darker and tips paler. Ventral pelage was characteristic yellow. The external measurements are given in table 2. Ectoparasites were present in the body Sh1 from Keroun with maximum in Sh5 from Taaghandubba.

Habit: These were found roosting at space between roofs covered with galvanized plate and ceiling and house made up of timber at Keroun (N 26º

Captured *Scotophilus heathii* at Taaghandubba-5, Jhapa district

35' 34.2", E 87º 30' 12.4" at an altitude of 87m), Inaruwa (N 26º 24' 56.1", E 87º 26' 27.9" at an altitude of 67m), and Taaghandubba (N 26º 17' 33.1", E 88º 09' 5.7" and at an elevation of 64m from the sea level). Two specimens (Sh2, Sh3) were preserved at museum of Headquarter of KTWR, Kusaha, Sunsari. According to the staffs, these bats are a lot in number inside the space between roofs covered with galvanized plate and ceiling made up of timber in the warden office, guest rooms, and museum too. The faeces is quite broad and cylindrical. They twitter sharply and quarrel when disturbed. They were found roosting at spaces between walls and pillar of the house too in Taaghandubba and Inaruwa. When the wings were stretched it implied great force to escape or bite.

Status from the present study: Common

Megaderma lyra **E. Geoffroy, 1810**

Common Name: Greater False Vampire (Bates and Harrison, 1997)

Conservation Status in Nepal: LC (Walker and Molur, 2003)

Conservation Status Global: LC (IUCN, 2008)

Population: About 300 individuals were seen roosting in an old house of Chandi Poudel at Bahundangi-2 (N 26º 32' 33.3", E 88º 27' 58.7" at an altitude of 176m), five individuals were seen at Jhapa Smriti Library, Taaghandubba-5, eight at Samrat Chowk, Biratnagar, a dozen at Utimlal Mandal's thatched house, Kusaha-4 (N 26º 25' 48.7", E 87º 19' 46.5" at an altitude of 71m).

External Characters: This has the characteristic large, oval ear, flesh colored skin, large-erected nose-leaf and large wingspan. The dorsal pelage is uniform pale grey and ventral pelage is white.

Habit: Colonial, feeds on frogs generally, hovers during flight, flies at exact evening. It was seen flying low. On hanging it shakes its mouth and mouthparts.

Status from the present study: Common

Cynopterus sphinx **Vahl, 1797**

Common Name: Greater Short-nosed Fruit Bat (Bates and Harrison, 1997)

Conservation Status in Nepal: LC (Walker and Molur, 2003)

Conservation Status Global: LC (IUCN, 2008)

Population: A small colony of about 6 individuals were seen roosting under the palm leaf at Kusaha-4 (N 26º 25' 48.7", E 87º 19' 46.5" at an altitude of 71m). Also another small colony of four individuals was seen roosting in Samrat Chowk, Biratnagar.

Habit: During November it was seen roosting in Teak trees (*Tectona* sp.) while in April it was seen roosting in Ashoka trees (*Saraca asoca*). A single individual was seen temporarily at its night roost occasionally under Betel nut tree (*Areca catechu*) leaf.

Status from the present study: Common

Taphozous sp.* **E. Geoffroy, 1818**

Conservation Status in South Asia: LC (Walker and Molur, 2003)

Conservation Status in Global: LC (IUCN, 2008)

Status: Adult Male

Reproductive status: Non-Reproducing

External Characters: Tail arises dorsally from the sheath (interfemoral membrane). The tip of the tail is haired, black hair bearded in its chin, The wings are attached to tibiae, the radio-metacarpal pouch of each wing is well developed, fur extends to one-third of the length of humerus and femur. There is no gular sac and the throat is hairy.

Habit: On February 25, 2009 the dead voucher specimen on the road in Samrat Chowk, Pokharia, Biratnagar-1 (N 26º 17' 35.2", E 87º 35' 2.4" and

at an elevation of 72m from the sea level) was collected.

* The morphology and measurements reveal this as the *T. melanopogon*. But, as the Forearm and third metacarpal lengths are equal, it shows the characteristic of *T. longimanus*.

Note: HB=Head Body; T=Tail; TIB=Length of Tibia; HF=Hind Foot; FA=Forearm; WSP=Wingspan; 3mt=Third Metacarpal; 4mt=Fourth Metacarpal; 5mt=Fifth Metacarpal; 1ph3mt=First Phalange Third Metacarpal; 1ph4mt= First Phalange Fourth Metacarpal; 1ph5mt= First Phalange Fifth Metacarpal; 2ph3mt=Second Phalange Third Metacarpal; 2ph4mt= Second Phalange Fourth Metacarpal; 2ph5mt= Second Phalange Fifth Metacarpal; E=Ear (Pinna from base to tip); Wt. =Weight.

Discussion and Conclusion

The population and distribution of bats seems to be higher in plains of eastern Nepal as a single or more species were recorded from all sites of the survey. However, Only *Pipistrellus* sp. was netted and the number of the species netted was only two. Most of the bats escaped from the net. Whereas three species were captured and each additional species was observed and collected respectively. The average number of bats recorded was 1.80, with maximum of 10 at Kusaha, KTWR and minimum of each from all sites. Netting in most of the sites was unsuccessful. Among the 22 species of bats compiled from the eastern Nepal only two species *Scotophilus kuhlii* and *Taphozous longimanus* can be found from the study area (Baral and Shah, 2008). This study added *Scotophilus heathii*, *Pipistrellus* sp., and *Megaderma lyra* and *Cynopterus sphinx* to the species list of this area (Bates and Harrison, 1997), *Scotophilus kuhlii* was not encountered. However, the sites were not clearly defined before for most of the species. *Taphozous longimanus*, is the only species of Sheath-tailed bats in Nepal (Bates and Harrison, 1997; Baral and Shah, 2008), whose exact locality is unknown (Worth and Shah, 1969) whereas can be found from eastern Nepal Churia hills and Tarai (Baral and Shah, 2008), This first survey resulted the specific sites and locations for the species.

Seasonal fluctuation of population and diversity was found during the survey with greater population during summer. Roost survey was more effective methodology than mist-netting in the study area. *Megaderma lyra* was most populated, *Scotophilus heathii* and *Pipistrellus* sp. flanked second and third. Even the sequence appeared for distribution with equal spots for the *Scotophilus heathii* and *Pipistrellus* sp. Roosting habitat of *Taphozous* sp. was still left to reveal. Even there might be chance of recording new species to Nepal and even to the world from this area. More species and even estimated new species to Nepal and even to the world can be found from this region. Hence, detailed survey of microchiroptera in this region should be conducted. The habitats, habits and other ecology of the species should be explored.

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Food Habits of Northern Palm Squirrel *Funambulus pennantii* Wroughton, 1905 in Chuadanga District, Bangladesh

Tahsinur Rahman Shihan*

Abstract

Northern palm squirrel is using both trees and ground for their feeding. The study reveals the squirrels of Chuadanga shows varieties in their food choice and feeding behaviour. The major items for feeding of their diet was grass leaf and stem that it spent 27.9% of feeding time and they prefer part of grass leaf most 32.35% took as their diet. During feeding the animal tend to be concentrated in the ground 55.88% and the rest time in the tree.

Introduction

Information on the food habits of this species is scanty, and there is no work in Chuadanga, Bangladesh. Several studies have been conducted on this species as Chaudrey & Beg (1977) studied the reproductive cycle and population structure of the Northern Palm Squirrel in Pakistan. Prakash, Kametkar & Purohit (1968) studied the home range and territoriality in India. Prasad, Dhaliwal, Seth, Reddi, Sivashankar & Uberoi (1966) studied the biology of reproduction in India. Purohit, Kametkar & Prakash (1966) studied the reproduction biology and post-natal development in India. Wright (1972) studied the biology in Western Australia.

The district is situated in western part of Bangladesh. It lies between 23.39^0 N latitude and 88.49^0 E longitudes. This area is covered with cultivated land, wetland and homestead vegetation which support this species for their food and breeding. This is one of the driest and temperate area of Bangladesh.

Materials and methods

The feeding habits were observed each day by scan sampling method on from June 2011 to May 2012. A total of 40 days were spent in field day at 6.00am-6.00pm to determine food habits of Northern Palm Squirrel. Data were collected with 5 minutes interval for possible time of a day from every month.

Result and discussion

Northern palm squirrel feeds on variety of food like fruits, vegetables, seeds, nuts, barks and insects (Khan, 2008). Their food is the usual food of all squirrels. When the silk cotton trees are in bloom these squirrels visit the flowers to drink the nectar and so probably help pollination. They are partial to 'prickly pears' and eaten the eggs of birds (Prater, 2005).

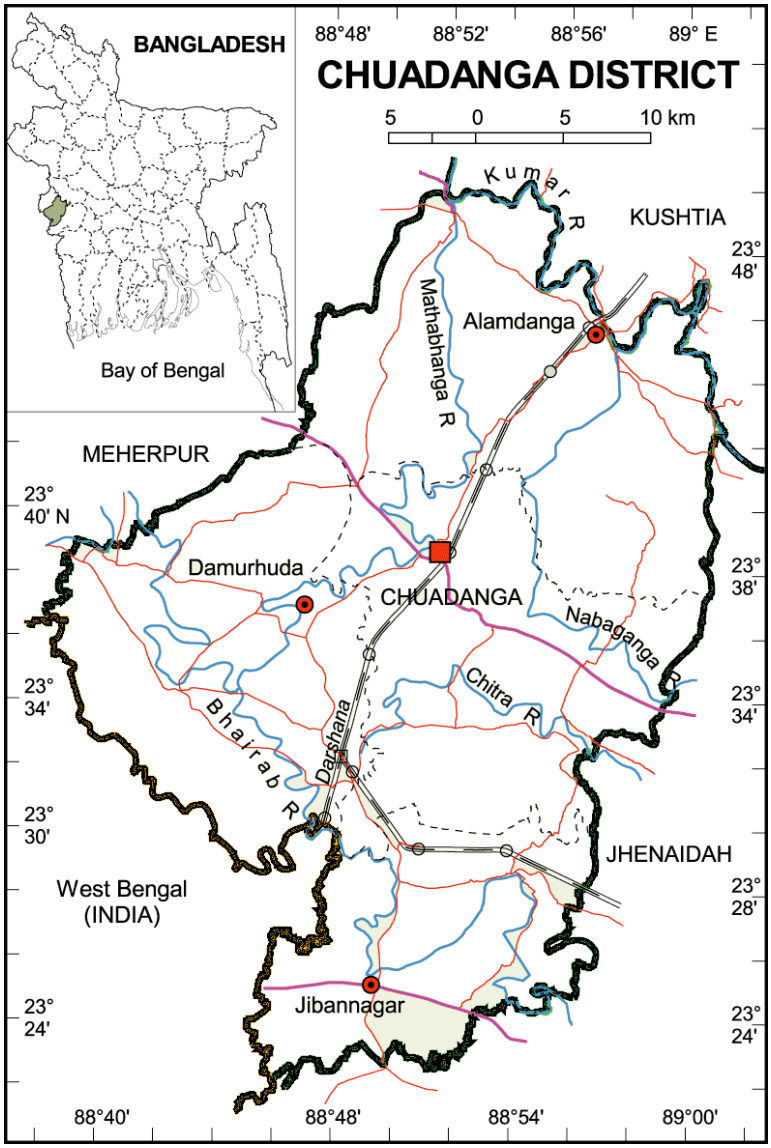

Figure 1: Map of the study area

A total of 411 observations with direct sighting and 192 scans of feeding were recorded during study period. They feed grass leaves (*Cyperus rotundus, Cynodon dactylon*) most which was 27.9% of their diurnal time of total food consumed, fruits (*Mangifera indica, Litchi chinensis, Ziziphus mauritiana, Psidium guajava*) 27.9%, seed (*Tectona grandis, Gmelina arborea*) 18.6%, flower (*Cocos nucifera*) and bark (*Litchi chinensis*) 2.3%, Palm juice (*Phoenix dactylifera*) 2.3% and insect termite (*Microtermes obesi*) 6.9% time used for their feeding.

Northern Palm Squirrel is selective about their diet. A total of 11 plant species and one insect species could be identified as the food of the northern palm squirrel during study period (Table 1). Of the 11 plants species 4 species provided seeds, leaves 2 species, and fruits 5 species.

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Figure 2: NPS feeding *Gmelina arborea* (Photo: Tahsinur Rahman)

Figure 3: NPS feeding *Oryza sativa* (Photo: Tahsinur Rahman)

Figure 4: NPS feeding *Cynodon dactylon* Grass (Photo: Tahsinur Rahman)

Table 1: Food Plants/Insect eaten by the Northern Palm Squirrel

Common name Plant/Insect	Scientific name	Part Eaten	Habitat
Paddy	*Oryza sativa*	se	Ground
Am	*Mangifera indica*	fr	Ground & Tree
Mutha Grass	*Cyperus rotundus*	le, st	Ground
Durba Grass	*Cynodon dactylon*	le, st	Ground
Litchu	*Litchi chinensis*	fr	Tree
Narkel	*Cocos nucifera*	fl	Tree
Shegun	*Tectona grandis*	se	Tree & Ground
Boroi	*Ziziphus mauritiana*	fr	Tree & Ground
Gamari	*Gmelina arborea*	fr	Tree & Ground
Payara	*Psidium guajava*	fr	Tree
Termite	*Microtermes obesi*	bo	Ground
se=seed, fr-fruit, le=leaves, st=stem, fl=flower, bo=body			

Among all the food items squirrel prefer grass leaf most which is 32.4% and next the seed 29.4% of their total food eaten. They also feed fruits, bark, flower, termite and palm juice.

Feeding pattern related with the daily temperature. Squirrel feed more food before and after mid day rest. They started their feeding activity at the beginning of their active period and continued until the day temperature increased. When the day temperature was increasing at that time simultaneously their feeding activity was decreasing. After the midday rest, when the day temperature was low they started their feeding. Rainfall halted their feeding.

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Occurrence of Indian Painted Bat (*Kerivuola picta*) in dry deciduous forests of Mudumalai Tiger Reserve, Southern India

Nachiketha S.R. and Sreepada K.S.

Bats belong to the order Chiroptera which is the second largest mammalian group after the order Rodentia (Carbet and Hill, 1991). In India there are 117 species of bats have been identified so far (Bates and Harrison 1997, ZSI report 2009). For some of the species, very little information is available on their distribution, habitat, feeding habits, reproduction, population size, biometry these information is in turn very essential because bats play a major role in keeping ecosystem healthy they are considered as keystone species (Cox *et.al* 1992). The main reason behind people disliking bats could be because of they are considered as omen of bad signs and as a mysterious species due to their morphological features and for the habitat in which they live in. But not all bats are cryptic there is one species of bat which is very attractive but yet hardly visible, the Indian Painted bat or Painted Wooly Bat (*Kerivoula picta* Pallas 1767). (See Fig.1).

Kerivoula picta belongs to the family Vespertilionidae and order Microchiroptera. This species is confined only to the South East Asia (Bates and Harrison 1997, Molur *et al.* 2002), but information about their distribution, roosting, reproduction and other important information is scanty (Phillips.1980, Ramachandran, *et al*. 1994; Bates and Harrison, 1997). The genus *Kerivoula* has other two species, they are *Kerivoula hardwickii* (Horsfield,1824) distributed in Indian sub continent, *Kerivoula papillosa* (Temminck,1840). distributed in India, Vietnam, Malaysia and Indonesia. Even though, there are few reports about the existence of Painted bat in protected areas of North East and Central India from Western Ghats (Bhat and Sreenivasan, 1990; Molur *et al.* 2002) it is very difficult to track them down and recording their roosting habit.

We accidentally encountered a painted bat, which was roosting in a resort which is located in Masinagudi village, eastern part of Mudumalai Tiger Reserve. The forest is close by, less than a kilometer. There is a small banana plantation in village, which makes good habitat for the bat (Yapa and Ratnasooriya 1995; Phillips 1980). This is the first report of Painted bat from Mudumalai Tiger Reserve (MTR).

Map showing forest boundary, roost site of the bat and potential habitat of painted bat that is banana plantation.

Fig 1: Indian painted bat *Kerivoula picta*

MTR is the part of Nilgiri Biosphere Reserve; it is as unique as of its own. It lies on the north eastern and north western part of Nilgiris, rightly placed at the center of tri-junction of Bandipur Tiger Reserve (Karnataka) in the north, Wayanad Wildlife Sanctuary (Kerala) in the west and Nilgiris North Division in the south and east part of park. All together forms pristine un-fragmented habitat and jointly creates a part of countries one of the largest biosphere reserve. Mudumalai Tiger Reserve is located between 110 30' and 110 39' N. latitude and between 760 27' and 760 43' E. longitude. Mudumalai has exceptional habitat diversity, with combination and interspersion of a variety of habitats

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ranging from semi evergreen, moist deciduous, dry-deciduous and open thorn scrub jungles. Because of these unique features, Mudumalai is residence for different kinds of unique flora and fauna. But appropriate scientific studies are lacking on many rare plants and animals.

Painted bats known to live either singly or occasionally in small groups of two individuals (Khan, 2001), they roosts in dried leaves of tree ferns and very often found in banana plantations (Bhat and Sreenivasan, 1990) and are known to leave in the inflorescence of banana plant (Yapa and Ratnasooriya 1995). It is also collected in tall grass, flowers, among the dry leaves of vines (Lekagul and McNeely, 1977) and in sugar cane. It has been observed that Painted bats use Baya weaver bird's nests for shelter and or littering (Sharma *et al.,* 2002). It is observed that during the day, it is in semi-comatose state, making very little effort to escape. If shaken into flight, it flutters around rather like a huge moth and quickly seeks cover (Philips, 1980).

Painted bats are relatively small sized and brightly colored. The entire body is bright orange or sometimes tawny red in color apart from parts of the wings which is conspicuously colored in black. Body is completely covered

Table 1: Biometry of Indian painted bat

Total length of the body (Head to tail, in mm)	75 mm
Head	14 mm
Body	26 mm
Tail	33 mm
Right wing	111mm
Left wing	110mm
Right ear	12 mm
Left ear	12 mm
Ear pinnae (Right)	07 mm
Ear pinnae (Left)	08 mm
Total wing span	223 mm

by the thick hairs which is orange in color. The total wing span is about 22-23 cm. Table 1 explains the measurement of different body parts of the bat. Very little is known about their feeding habits. They are known to prey on small insects around bushes and from small patches of forests (Phillips, 1980).

This short report gives some valuable information on new records of distribution and morphometric details of the Painted bat, which is enigmatic and often go unnoticed to the human eye. The new information about their distribution is useful for the bats enthusiasts and hence it's a high time to conduct proper scientific studies on these cryptic bats, the 'dark jewels' in this part of the world.

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Unwillingness to Bat Open Art Exhibition 2013, Nepal

Sabina Koirala, Rama Karki, Narayan Lamichhane, Sanjan Thapa*

During the Sagarmatha (Everest) zone project, bat open art drawing competition was conducted altogether in 16 schools. The art competition was conducted in two phases in eight schools at each phase, pre-awareness and post awareness open art competition. Students of class VI to IX participated in the event. In each school 44 such arts were drawn in both phase. Altogether, 352 arts were drawn.

Among those arts, 30 arts were selected. Fifteen arts were selected from the first phase and next 15 from the second phase. These arts from the pre-awareness phase include a picture of a single flying bat (insectivorous or frugivorous), their habitats such as tree branches, caves, houses, their feeding habit of eating fruits and insects. Few of the arts show the misconception such as bats drink blood of human and eat coconut. Few arts also show that they fly in the night. Therefore, the change in their conception about bats and their importance was reflected from the post-awareness arts. These arts clearly showed that they aids in pollination, seed dispersal, control the pests and disease vectors such as mosquitoes, sand flies etc.

Small Mammals Conservation and Research Foundation organized Bat open art exhibition on March 11, 2013 at Nepal Art Council, Babarmahal, Kathmandu with the financial support from Rufford Small Grants, UK. Those arts were framed each with simple black rectangular frame. Mr. Kamal Raj Kunwar, Conservation Officer, Department of National Parks and Wildlife Conservation, Babarmahal, Kathmandu, Nepal inaugurated the program. The exhibition was targeted for the schoolchildren of schools from Kathmandu Valley but they could not participate in the program due to their final exams schedule. Truly speaking only 25 enthusiasts visited the first ever bat art exhibition program. The one reason for the excuse may be the partial strike during the afternoon on that day. So, SMRF will conduct similar kind of bat exhibition in the future.

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Bat Conservation Practices in Nepal

Sanjan Thapa*

Bat conservation practices started from the early 2000 in Nepal. Hitherto, different individuals and organizations in the country have undertaken about nine bat conservation projects. All projects implemented for bat conservation in Nepal is integrated with understanding peoples' perception towards bats and/ or awareness creation and/or conservation actions. However, the project area covers only nine districts of Nepal; therefore, the project area needs to be extended.

Bat conservation practices Nepal is recent compared to its neighboring countries. In the beginning, bat conservation activities were carried out by individuals. Then, it was continued by students or group of university students. Sally R Walker and Zoo Outreach Organization triggered the Nepalese to carry on bat conservation in Nepal. Nepal Action Trust for Utility Resources and Education (NATURE) started the first conservation step for bat fauna in Kathmandu Valley. This was the first ever bat conservation activity in Nepal (Shrestha, 2005 and 2006). Since then there was a gap in conservation activities within Kathmandu Valley until 2009. However, conservation activities were continued in Pokhara Valley (Phuyal and Dhoubhadel 2008, Adhikari 2008 and Adhikari et al 2008). Thapa (2012) further continued bat conservation project in Pokhara. Such activity was also extended to Palpa (Adhikari 2009, 2010, Adhikari and Karki 2010) and Tanahun (Karki 2011). Small Mammals Conservation and Research Foundation have been leading bat conservation activities throughout Nepal since 2009. It targeted the initial conservation awareness and actions in Kathmandu Valley (Thapa et al. 2010a, Thapa et al. 2010b, Thapa et al. 2010c, Thapa 2011); Biratnagar (Thapa 2011); Solukhumbu, Okhaldhunga, Khotang and Udaypur (Thapa et al. 2012). Acharya (2010) initiated bat conservation and awareness in Sankhuwasabha, Taplejung and Ilam districts under the support from Critical Ecosystem Partnership Fund/ Eastern Himalayas.

Altogether nine projects and few conservation attempts have been undertaken by different individuals and organizations hitherto. These projects can be categorized as

a. Understanding local peoples' perception towards bats

Structured questionnaire/survey for locals' conception and knowledge on bats among students, youth clubs and community members were conducted in Palpa (Adhikari and Karki 2010). Schedule survey and interviews has been deployed to collect the local peoples' perception towards bats in Kathmandu Valley (Thapa et al. 2010a, Thapa et al. 2010c, Thapa 2011) and Solukhumbu, Okhaldhunga, Khotang and Udaypur (Thapa et al. 2012). Interviews have been carried out in Makalu-Barun National Park, Ilam and Kangchenjunga Conservation Area (Acharya 2010). Focus group discussions on bats have been organized among community members, social worker, local conservationist, journalist, and teachers, where suggestions for bat conservation were exchanged in Palpa (Adhikari and Karki 2010).

b. Awareness creation

1. Publication and dissemination

Brochures in Nepali language about the information on bats and their importance has been published during different bat conservation projects in Pokhara and Tanahun (Phuyal and Dhoubhadel 2006, Karki 2011). Small Mammals Conservation and Research Foundation too published such brochures in Nepali language. A leaflet in English language was published in Palpa (Adhikari and Karki 2010). Educational kit "Bat Conservation in Nepal: An Educational Kit" in Nepali language was also published Adhikari et al. 2008). Similarly, Posters were published (Acharya 2010, Thapa 2011). SMCRF published a book "Bats of Nepal, A field guide" and also greeting card with photos of bats in 2011. Thapa, P. S. (2012) published pamphlets and cards. These publications were disseminated to different parts of Nepal.

2. School programme

Lectures to school children in different parts of Nepal have been carried on; Pokhara Valley (Phuyal and Dhoubhadel 2006, Thapa 2012); Palpa (Adhikari and Karki 2010); Kathmandu Valley [Thapa et al 2010a, 2010b); Tanahun (Karki 2011); Solukhumbu, Okhaldhunga, Khotang and Udaypur (Thapa et al 2012).

Nepal Action Trust for Utility Resources and Education, NATURE started the conservation of bat fauna of Nepal through bat club formation programs in schools of Kathmandu Valley. It established three school bat clubs, namely, CCINSA NATURE Boudha School Bat Club, NATURE NMSA (National Model Science Academy) CCINSA Bat Club and NATURE SDBS (Shahid Dharma Bhakta School) CCINSA Bat Club. It organized discussions, field visits and other extra activities within these clubs (Shrestha 2005, 2006). The bat club formation was continued in Pokhara (Phuyal and Dhoubhadel 2005). SMCRF in joint venture with NATURE established Arniko School Bat Club, Satdobato, Lalitpur.

Essay competition, drawing competition and informal quiz were also conducted among students. Students were assisted in making wall magazines on different aspects of bats. Lectures to assembly of guardians, was conducted in Shree Damkada Higher Secondary Schools. Meetings with school headmasters of three schools were also conducted. All these activities were conducted in Palpa (Athikari and Karki 2012). Inter-school essay competition and quiz contest was alo conducted in Pokhara (Thapa 2012). Thapa *et al*. (2012) conducted pre-awareness open art competition to know the perception of local people towards bats in schools of Solukhumbu, Okhaldhunga, Khotang and Udaypur.

3. Radio programme

National radio awareness programme was broadcast from Radio Kantipur, a leading FM of Nepal [11]. Radio awareness program to western areas of Nepal had been conducted from Radio Annapurna [3, 17]. District level radio awareness programs were also continued in Palpa District (Adhikari and Karki 2010) and Tanahun District [9].

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4. Boards display

A flex board had been displayed at the entrance of Nagarjuna Cave, Shivapuri-Nagarjuna National Park, Kathmandu by SMCRF. A board had been placed at Chamere Gupha, Pokhara (Phuyal, S.P., S.P. Dhoubhadel 2006) and other places of Pokhara [17].

c. Conservation actions

1. Honouring the conservationists

A local of Bahundangi V.D.C. ward No. 2 was honoured with small cash prize for abandoning his old house for the conservation of a colony of Greater false vampire bat *Megaderma lyra* by SMCRF. Similarly, Mrs. Geeta Shrestha was also felicitated with first SMCRF Conservationist Award 2011.

2. Trainings

Trainings and workshops have been carried out to university students from time to time [21, 22, 20, 18, (Adhikari and Karki 2010), 9, 19]. The most important are: Training in Field Techniques for Research and Conservation of Volant and Non-Volant Small Mammals organized by ZOO & WILD, India in collaboration with CBSG South Asia, RSG South Asia, CCINSA and RILSCINSA, Sponsored by BCI USA, Chester Zoo UK, Knowsley Safari Park UK [23] and Bat Conservation Educator Skills Training, Organized by ZOO/CCINSA, Sponsored by BCI, USA, in 2008.

3. Bat house installation

A bat house was installed at the Central Zoo for the awareness to the visitor as well as to develop habitat for the bats by SMCRF. Similarly, twelve bat houses have been installed in Kathmandu valley and each at Sauraha, Chitwan National Park; Itahari, Sunsari District and Thakurdwara, Bardia National Park Headquarters [11].

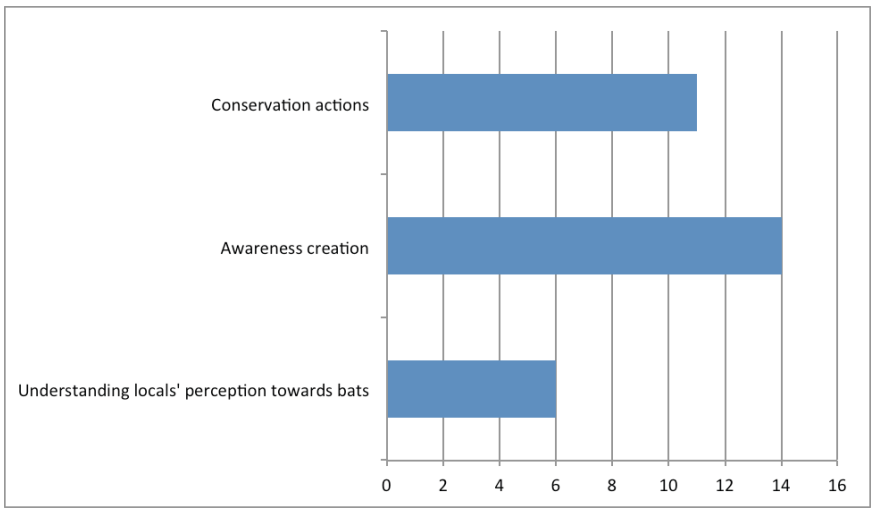

Figure 1. Types of bat conservation practices implemented projects.

4. Cave Conservation

Formation of Cave Conservation and Development Committee and working with Local Women's Group in Pokhara although initiated (Phuyal, S.P., S.P. Dhoubhadel 2006) remained inconsistent.

5. Plantation

A small Plantation Programme was organized at Biratnagar (Thapa 2011).

6. Policy making

National Red List of 53 bat species occurring in Nepal were assessed (National Red List of Nepal Mammals 2010). Nine bat species were recommended for legal protection on the government of Nepal's Department of National Parks and Wildlife protected species list: *Ia io, Myotis csorbai, M. sicarius, Scotomanes ornatus*, *Hipposideros Pomona, Sphaerias blanfordi, Miniopterus pusillus, Murina aurata, Philetor brachypterus* (Himalayan Nature 2010).

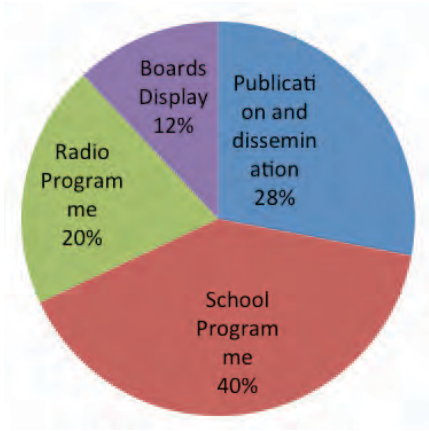

Figure 2. Types of awareness creation projects.

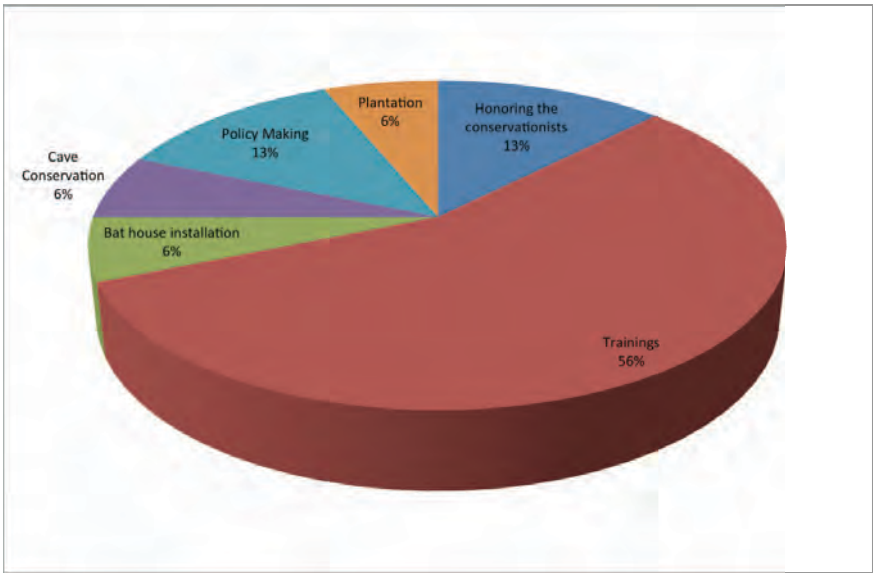

Figure 3. Types of Conservation actions projects.

Discussion and Conclusions

All projects implemented for bat conservation in Nepal is integrated with understanding peoples' perception towards bats and/or awareness creation and/or conservation actions. Majority of projects are focused to awareness creation, in which the maximum projects are targeted for school programme. Minimum project is approved for the bat house installation and for cave conservation.

All of the projects launched in a small area (nine districts of Nepal).

Publication and dissemination as well as radio programme covered the larger area and greater mass of people. Some of the conservation steps such as cave conservation remained inconsistent. In conclusion, the conservation practice for bat conservation is new and has not been satisfactory. Conservation practices needs to be undertaken regularly, upgraded and in larger scale too.

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Bats, Birds, Biodiversity! Gliding guests of Kittampalayam, Coimbatore, Tamil Nadu

Brawin Kumar

Villagers of Kittampalayam celebrated the Diwali festival on Tuesday 13 November 2012 without bursting firecrackers to keep their area pollution free and spread awareness of bat and bird conservation.

The bats sighted in the village belong to the Indian flying fox *Pteropus giganteus* species, a fruit-eating flying mammal. Over 350 families in the village had decided to abstain from using crackers during Diwali, two years ago, in an initiative taken by Noiyal Green Foundation, a local eco group led by R Palanisamy.

"Bats and Birds inhabit our village in large numbers and we feel very happy about it. We want these bats and birds to stay in the village. So, we celebrate Diwali in a quiet and peaceful manner and do not burst crackers," said Kuppamma, a local in Kittampalayam.

"We have always stopped the hunters from hunting the bats. The bats do not disturb us and we do not disturb them,'' says village panchayat president, Jothimani Ramasamy.

"The village has over 2,000 bats and this particular area is protected from poachers. Border Security Force and the local community coming together would enhance protection measures in future," said L. Joseph Reginald, a research scholar at Salim Ali Centre for Ornithology and Natural History (SACON).

Locals beat drums and urging villagers to not burst firecrackers to avoid disturbing the birds and the environment.

NOIYAL GREEN FOUNDATION – an **NGO** for "Nature Conservation and Social Development", based in Karumathampatti, Coimbatore conducted "**Bats and Birds Conservation Programme"** at Government Middle School, Kittampalayam Village on 02 November 2012.

The program started with an awareness rally which included students of Park College of Technology, ARC Matric School, Kongu Vellalar Matric School, BSF jawans and members of Noiyal Green Foundation (NGF) and villagers, around the streets of Kittampalayam Village to circulate pamphlets and stick posters in public places highlighting the need to protect the bats, inaugurated by "Second in Command" of '149BN BSF' Mr. S.N.Yadav. In his inaugural speech Mr. Yadav highlighted the need to protect biodiversity by protecting the bats and birds in the Kittampalayam Village.

Mr. Sethu Ramasamy, Trustee NGF presided the program. Mr. R. Palanisamy, President, NGF, explained the role of NGF members took the

***Pteropus giganteus* emerging from roosts**

***Pteropus giganteus* colonies in the tree**

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Village Panchayat president receiving 'Pasumai Award' from Mr. S. Ganesh, Commandant 149BN BSF

initiative to protect the bats in this village from 2008 onwards and thanked the people of the village for not bursting the crackers, in his welcome address. He also said that, apart from 2000 odd bats, there are many birds such as **Cattle Egret, Common Myna, House Crow, babbler and bulbuls** sharing the same trees. He also explained how those bats and birds share the same habitat (trees) during day and night without any conflict.

"Though the villagers do not burst crackers after the initiative by NGF, during Diwali festival they do wear new clothes and share sweets. If anybody is found interested in bursting crackers, they are dissuaded,'' Jothimani Ramasamy added. The village chief received the NGF's "Pasumai Award 2012" from the special guest **Mr. S. Ganesh**, "Commandant"- 149BN BSF.

"How the villagers think is extraordinary. This time, BSF decided to get involved with them as we are in favor of protecting the bats, environment and roosting trees. All the BSF personnel have taken this decision collectively,'' says Mr. S. Ganesh, Commandant 149BN BSF.

Mr. Joseph Reginald, the research scholar from SACON gave a detailed slideshow presentation about the facts and myths about bats. Villagers asked various questions about the bats' characteristic features, bat behaviors and migration patterns. The school children keenly participated in the presentation and answering questions asked by Joseph.

Zoo Outreach Organization bat education pamphlets and stickers were distributed to chief guests, young students and people.

The function attended by Mr. Sakthivel, Mr. Parameswaran, Mr. Natarajan, Mr. Premier Selvam, Trustee of NGF, Mr. Mukuntan 'Dy-Commandant', 149BN BSF, Miss. Balamani, Suzlon Foundation and Mr. Brawin Kumar from Zoo Outreach Organization.

Vote of thanks was given by Mr. A. Shanmugasundaram, Joint Secretary, NGF.

My views on this event:

Pteropus roost in Kittampalayam

The big banyan tree in the center of the village near Karumathampatti, which holds over one thousand bats. People in that village treat the bats as honorable guests and allow them to behave naturally without any disturbance in their village. People of this village honor the bats as some good omen and treat them with all respect. They know that cracker noise will chase them away and hence they are very careful in protecting them.

People's perception on bats

Generally, Indian villages always have entertainments with bursting noise of crackers; not only at religious temple festivals, but also during social functions such as weddings, puberty ceremonies and even funerals. But these people have sacrificed such enjoyment for more than five years. They treat these bats as one among them and do not allow outsiders to disturb these bats in anyway. Kittampalayam and nearby school students try to understand the behaviour of the bat roost and monitor through counting.

Noiseless Diwali

Diwali was celebrated all over the world with full of fun. The eco-friendly people of this Kittampalaym village celebrated this year's Diwali also without crackers. They sacrificed crackers for the well-being of their beloved bats and birds of the village. It is extremely good to find such eco-loving people nowadays.

We need to encourage more such initiatives and make people a part of conservation and wildlife studies. One way of creating more awareness on the roles played by bats we can conduct education programmes and outreach for the students of the school located near the bat roost in Kittampalayam Village. Also, such interested villagers can help in gathering data through Pterocount – a South Asian Bat Monitoring Programme for citizens.

Acknowledgements

I thank the Noiyal Green Foundation for providing the photos.

Occurrence of Edward's Rat *Leopoldamys edwardsi* (Thomas, 1882) (Rodentia: Muridae) in Mizoram, northeast India

Uttam Saikia* and Dimos Khynriam

The Indo-Malayan genus *Leopoldamys* Ellerman includes some very large rats with long tails exceeding the combined length of head and body (Musser, 1981). Four species are recognized within the genus of which *L. edwardsi* occurs within India (Agrawal, 2000; Musser and Carleton, 2005). Commonly known as Edward's Rat, *L. edwardsi* is characterized by a very large tail and large ears exceeding one tenth of the head and body length (Agrawal, 2000). Dorsal pelage is brown and venter white with sharp demarcation. Tail is dark brown above and either white or grayish brown below (Musser, 1981) and sometimes indistinctly bicoloured (Agrawal, 2000). This is a widespread species ranging from northeastern South Asia, into central and southern China, and parts of Southeast Asia. In South Asia, it is occurring in Arunachal Pradesh, Meghalaya, Nagaland and West Bengal in India (Agrawal, 2000; Molur *et al*. 2005). While studying a collection of unidentified rodents from Mizoram state, northeast India, the authors could find a specimen of a very large rat that turned out to be *L. edwardsi*. Perusal of literature revealed that the species has not been recorded from the state thus far and in this communication, it is being reported for the first time from Mizoram.

During December, 2006, Zoological Survey of India, Shillong undertook a field survey to Mizoram in connection with bamboo flowering and the consequent outbreak of rodent population which is considered a prelude to the impending famine in the region. During the survey, about 90 specimens of Rodent were collected from a few localities in Mammit and Champhai districts of the state. The unidentified collection was recently examined and found to contain at least five species of rodents namely *Rattus rattus/R.tanezumi* (most abundant), *Berylmys mackenziei*, *Niviventer cf. niviventer*, *Niviventer* sp. and *Leopldamys edwardsi*. The lone female specimen of *L. edwardsi* at Zoological Survey of India, Shillong (Regn. No. V/M/ERS/276) was collected from Dulte village in Khawzawl Tehsil in Champhai district of Mizoram in December, 2006. The village is located at 23^{0}39'32.5"N and 93^{0}04'20.3"E at an average altitude of 715m but the specimen was caught in a Jhum field (a form of shifting cultivation) by a farmer in a locally made trap at a height of 925m. The pelage is short and spiny and preserved animal has a light sandy brown dorsum and white venter with sharp demarcation between the two. The tail is bicoloured, dark brown above and whitish below for nearly half of the length and becoming unicoloured (light) towards the end.

Fig 1: The specimen of *Leopoldamys edwardsi* (Thomas) in NERC, ZSI, Shillong (Regn. no. V/M/ERS/276)

Fig 2: Dorsal view of the skull of *Leopoldamys edwasdsi* (Thomas) (ZSI Regn No. V/M/ERS/276)

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Fig3: Ventral view of the cranium and maxilla of *Leopoldamys edwardsi* (Thomas)

The tail possesses short spiny fur. Hind feet appear white with a few vertical brown streaks on the dorsal side. It has two pairs of inguinal teats. The external measurements of the animal (as noted in the field, in mm) are given below

Head and body length-261.4, *Tail length*-295, *Ear length*- 26.16, *Hind feet length*-58. The skull was taken out for taxonomic confirmation and the cranial measurements are as follows (after Agrawal, 2000, in mm) *Occipitonasal length*-54.88, *Condylobasal length*-52.73, *Greatest zygomatic width*-24.78, *Cranial width*-20.4, *Length of tympanic bulla*-5.38, *Nasal length*-22.7, *Length of anterior apical foramina*-8.07, *Length of maxillary toothrow*-9.22, *Length of diastema*-14.12, *Nasal width*-6.75. The cranium is long and narrow with long nasals (Fig2) and when viewed from sides, the braincase is low. The apical foramina (covered by some sort of calcification but the outline is clearly visible) are short, wide and oblong in outline and their posterior margins end well before the beginning of the upper molars. Compared to the size of the cranium, the tympanic bullae are minute (9.8% of onl). Maxillary tooth row is comparatively long at 9.22mm.

Recent genetic data indicate that *Leopoldamys edwardsi* throughout its range may represent a species complex requiring taxonomic revision (Musser and Carleton 2005). However, following these authors, the present specimen from Northeast India is recognized as *L. edwardsi*. IUCN Red List categorize this species as Least Concern because of wide distribution and apparently large population size (Aplin *et al.* 2008). However, its population size in the collection area remains unclear and one villager noted that a white bellied large rat (possibly *B. mackenziei* as evident from multiple collected specimens and not *L. edwardsi*) is common around that time of bamboo flowering. The local people are apparently familiar with *L. edwardsi* and have their own vernacular name for this large rat called "Zu-tam".

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The authors are grateful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkota and the officer-in-Charge, NERC, Zoological Survey of Shillong for institutional support and also to Mrs. Rosamma Mathew, retired scientist, ZSI, Shillong for conducting the field survey and collecting the specimen.

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First record of Lesser False Vampire bat (*Megaderma spasma*, Linnaeus, 1758) from Sundergarh, Odisha, India

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Lesser false vampire bat (*Megaderma spasma*, Linnaeus, 1758) is a widely distributed species and has been reported from Bangladesh, Brunei Darussalam, Cambodia, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Sri Lanka, Thailand and Viet Nam (Csorba *et al*. 2011). In India its distribution has been reported earlier from Andaman & Nicobar Islands, Andhra Pradesh, Assam, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Mizoram, Tamil Nadu and West Bengal (Molur *et al*. 2002).

In South Asia, it is found in humid and dense tropical moist forests. It roosts in small colonies in caves, old and disused buildings, temples, lofts of thatched huts, tiled roofs, hollows in large trees and disused mines (Molur *et al*. 2002) where as in the Philippines, it was found to roost in caves, tree-hollows, and hollow logs (Taylor 1934; Lawrence 1939; Rabor 1986; Ingle 1992; Rickart *et al*. 1993; Lepiten 1995). On Palawan, the species occurs in bamboo thickets, secondary forest, and primary forest (Esselstyn *et al*. 2004). This species has not been earlier reported from Odisha. On 09.06.2011 we located a roosting site of a single male individual of Lesser false vampire bat in a cave of Sundergarh district of Odisha, India with geographic location of N $21^0$42'47.4" and E $086^0$01'55.6". The bat was captured using an entomological net and morphological measurements (Table 1) were taken using Srinivasulu's identification keys (Srinivasulu *et al*. 2010).

Description of the species

Megaderma spasma belongs to the family Megadermatidae and it is easily distinguished from other families of microchiroperans with their appearance. Its fur is deeper grey. Ears are large and oval shaped jointed at the base with no white inner margin. The nose leaf is short compared to *M. lyra* and has broad convex flaps on the sides with longitudinal ridge present and base of the nose leaf is heart shaped. Tail is absent in the species (Fig. 1).

Fig 1. First record of *Megaderma spasma* from Odisha

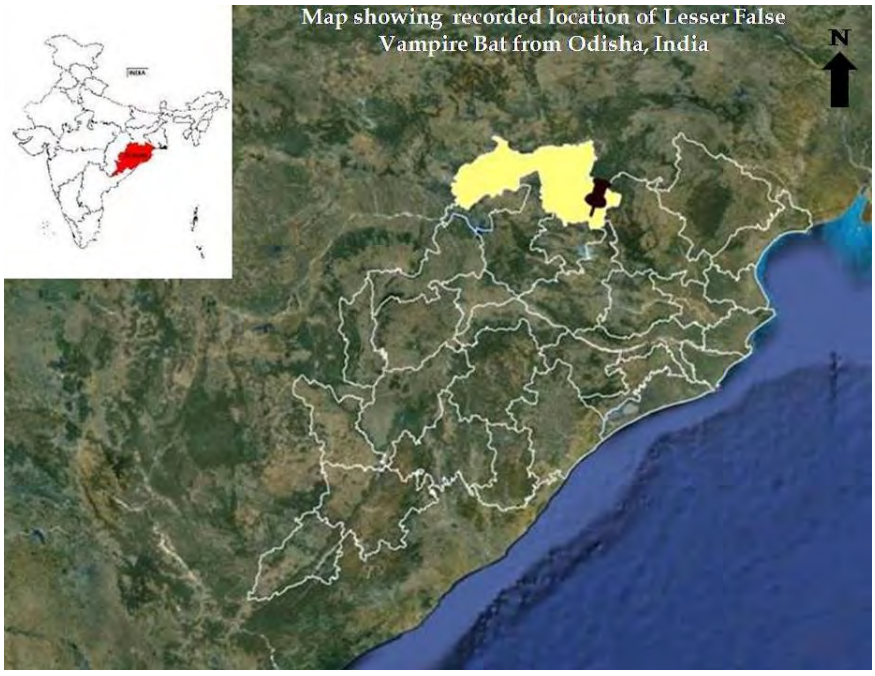

Fig 2. Recorded location of *Megaderma spasma* from Odisha

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Table 1- Externa and cranical characters of *Megaderma spasma*

EXTERNAL CHARACTERS		**mm**
1	Forearm length	55.1
2	Head Body length	55.0
3	Hind Foot length	14.2
4	Ear length	34.0
5	Tail length	Absent
6	Tragus	Bifid with narrower and taller posterior process
7	Nose leaf	6.5
CRANIAL CHARACTERS		
1	Condylocanine length	22.1
2	Maxillary toothrow (CM^3)	9.5
3	Mandibular toothrow (CM_3)	10.4
4	Zygomatic breadth	13.8
5	Mandible length	17.0

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Present scenario and possible threats to the Microchiropteran Bats near Jambughoda Wildlife Sanctuary, Gujarat

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Abstract

We describe two important microchiropteran sites at Jambughoda Wildlife Sanctuary (JWLS) and Pavagadh located near Vadodara, Central Gujarat. Site near JWLS had deserted mines varying in sizes and shapes that transverse through the hills forming an interconnecting network of tunnels with varying temperature zones. Results envisaged here are based upon year-long survey conducted in Sipa, Tera and GMDC mines and, nearby areas of Champaner and Pavagadh. The study area was visited twice a month for monitoring bat colonies and to collect specimens for morphometric analysis. We had recorded about 1500 Greater or Indian false vampire Bats (*Megaderma lyra lyra*) in Tera mine and a major roost of Black bearded tomb bats (*Taphozous melanopogon*) in GMDC mine. This roost is assumed to be one of the biggest congregation of Black bearded tomb bats in western India. The same species also sighted in a mixed colony of Naked bellied tomb bats (~5000; *Taphozous nudiventris*) and *Pipistrelle* sp. at Pavagadh fort. Sipa mine housed a mixed congregation of *Rhinopoma microphyllum* and *Rhinopoma hardwikii* (~50000) wherein; their numbers were reported to double during their breeding season. The bat habitats consisting of mines and caves located at the boundary of JWLS are not under any major threat but, bat populations in Champaner and Pavagadh are facing anthropogenic pressures such as tourism; consequences of the same are awaited in years to come.

Bats are one of the most neglected species of land mammals that lack priority and importance in terms of wildlife conservation in India. Insectivorous bats take a major toll of nocturnal insects not only in agricultural ecosystem but also within the towns and cities. But their importance as natural pest controlling agent has never been highlighted (Mistry, 1997). The dry deciduous forests of Gujarat, India interspersed with patches of scrub land or semi-arid patches and irrigated/non-irrigated agricultural fields sustain a wide variety of insects, avian and mammalian diversity (Senacha, 2009). Since, bats are one of the least studied species, most of the habitats or protected areas in India

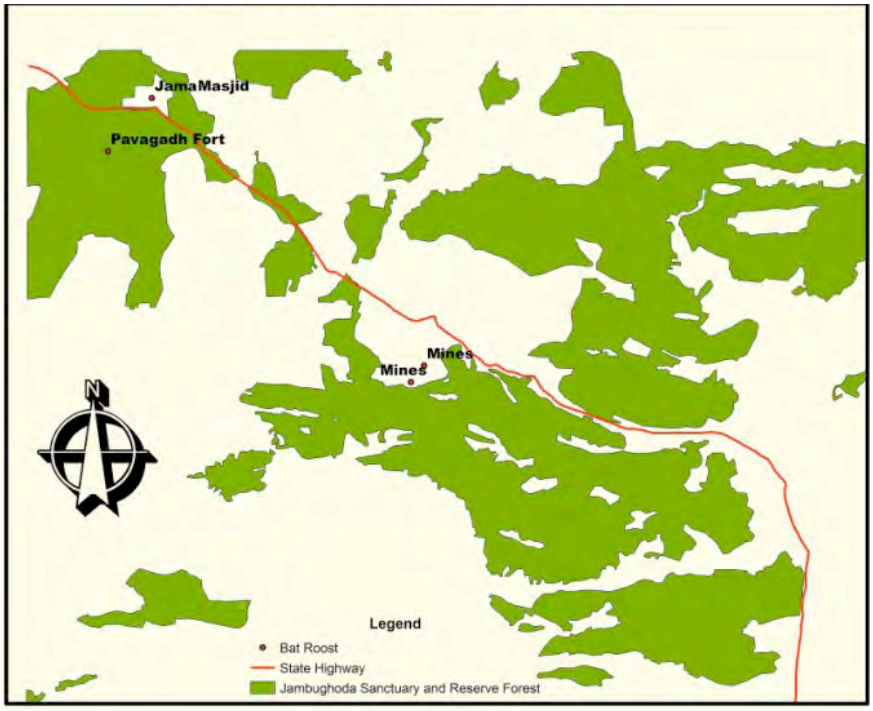

Fig 1. Map showing the location of bat roosts in study areas

Fig 2. Tera mine and Indian False Vampire colony, JWLS.

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Fig 3. GMDC mine with multiple entrances, JWLS

Fig 4 *Megaderma lyra lyra* with its young one, Tera mine, JWLS.

either lack a systematic record or the species list is not updated. Tomb bats (*Taphozous* sp.), lesser and greater mouse-tailed bats (*Rhinopoma* sp.) have been commonly reported from the states of Gujarat and Rajasthan (Senacha, 2009; Devkar *et al*., 2011). Though, their preferred habitats are caves and rock crevices in a forest ecosystem, they are also seen inhabiting old buildings and monuments (Senacha, 2009; Devkar *et al*., 2011). Their seasonal life cycle includes rearing young ones in the summer, winter hibernation, gathering for social activities (such as courtship and mating) and night roosting wherein, bats temporarily rest to digest their prey between foraging bouts (Bates and Harrison, 1997). Caves, old buildings or monuments located on transit routes serve as crucial resting spots between changing seasons and during their migration. These habitats are crucial for bats but, places where natural caves no longer exist, closed/open mines serve as an alternative habitat that witness huge congregations of bat populations that were formerly distributed in smaller numbers across the landscape (Altenbach, 1995; Devkar *et al*., 2011). Larger mines with single or multiple entrances are preferred by bats because they have varying temperature zones that are similar to their natural habitats (Altenbach, 1995; Devkar *et al*., 2011).

In this report, we have complied observations recorded at two major microchiropteran sites (Jambughoda Wildlife Sanctuary and Pavagadh; photo 1). Jambughoda Wildlife Sanctuary (130.38 km² and 230 to 354 m above msl) occupies parts of Vadodara and Panchmahal districts, Gujarat and has a tropical dry deciduous forest cover (Vyas and Upadhyay, 2011). Pavagadh hill is a tourist destination located near Halol town of Panchmahal district and has forts, mosques and numerous other monuments of historical importance. The study area near Jambughoda Wildlife Sanctuary consisted of deserted mines. Historically, these mines were dug in the pre-independence era for collection of manganese ore. But after a legal ban on mining in the post independence era, these mines have now transformed into a prime bat habitat with wild animals such as leopard (pugmarks seen), sloth bear (scat collected), jungle cat, rusty spotted cat, porcupine, palm civet and python using these shelters either for transit or as a hideout (Devkar *et al*., 2011). These mines are tunnels of varying shapes and dimensions that transverse through the hills. Some of them form an interconnecting network of tunnels with varying temperature zones. Such niches are ideal for bats to hibernate or use them for maternity purposes. Results envisaged here are based upon year-long survey conducted in Sipa, Tera and GMDC mines and, nearby areas of Champaner and Pavagadh. These mines are located about 5-58 m above the ground level and have single or multiple openings. Tera mine is straight tunnel but other mines ramify into branches (~2.65 m diameter) and then tapers into inaccessible horizontal and vertical tunnels (photo 2). The GMDC mines were the most spectacular consisting of caves (dead ends) and tunnels of varying sizes (2-12 m diameter) with multiple entry/exits (photo 3). In surrounding areas, teak (*Tectona grandis*), Neem (*Azadirachta indica*) and Mahuda (*Madhuca indica*) were the dominant vegetation interspersed with patches of *Acacia* sp., agricultural fields and tribal villages.

The study site was approached on foot and diurnal and nocturnal surveys were conducted (once in 15 days) from August 2009 to July 2010. Bat specimens (*n* = 25; alive/dead) were randomly collected with a hoop net (during September–October) from various locations of the study area and morphometic details of fore arm, tail length, ear, condyle canine length, upper tooth row length, body weight, sex (male/female) and pelage colour were recorded and the genus and species were identified based on the keys provided by Bates and Harrison (1997). Live specimens were released after morphometric analysis whereas; no specimens were collected during the breeding and post-breeding seasons.

We recorded about 1500 Greater or Indian false vampire Bats (*Megaderma lyra lyra*) in tera mine. Their numbers showed considerable variations with winters witnessing their migration to other niches (unidentified). Indian false vampire belongs to family-Megadermatidae and have been reported to inhabits caves, forests, old buildings and monuments in various parts of India (Menon, 2003). They are predacious primarily on insects but also feed on amphibians, geckos, rodents, small bats, etc (Baqri, 2000, Vyas and Upadhyay, 2011). In Gujarat, false vampire has been reported from Ahmedabad, Kodinar, Banaskantha, Dangs, Kheda, Surat and Junagadh districts (Ryley, 1914; Sinha, 1981; Brosset 1962; Muthuandavan et al. 2009). Though, sighting of Greater False Vampire is discreetly reported from Gujarat, reports on their roosts are few. In this regard, this report is the first from Panchmahal district, Gujarat. An undisturbed habitat in form of a pristine forest in vicinity that supports its dietary requirement is the major contributing factor for their survival and breeding success (data not shown) in this area. A major roost (~100000) of Black bearded tomb bats (*Taphozous melanopogon*) was also located at GMDC mine in our study area. This roost is assumed to be one of the biggest congregation of Black bearded tomb bats in western India (photo 5). This species could also be observed in a mixed population of Naked bellied tomb bats (~5000; *Taphozous nudiventris*) and *Pipistrelle* sp. at Pavagadh fort. This species is predominantly an occupant of southeast Asia and the populations in Rajasthan and Gujarat are its western geographical limits (India biodiversity portal). Sipa mine recorded a mixed congregation of *Rhinopoma microphyllum* and

Fig 5. *Taphozous melanopogon* inside GMDC mine, JWLS.

Fig 6. *Rhinopoma* sp. in sipa mine, JWLS.

Rhinopoma hardwikii (~50000) wherein; their numbers were reported to double during their breeding season (photo 6; Devkar *et al* 2011). Mouse tailed bats (Rhinopoma sp.) inhabit western and northwestern parts of India and are commonly seen in forts, monuments, old buildings and forested areas (Devkar *et al*., 2011). These species were also recorded from Jama masjid and GMDC mines. A solitary Fulvus or round leaf bat (*Hipposideros fulvus*) was also regularly sighted in an isolated 'Isthmus' mine. This mine was relatively shorter in length (about 30

	Name of the place	Lat-Long	Known landmark	Type of Bat Sighted	Type of Habitat	Vegetation pattern around Habitat	Approx no.	Remarks
1	Pavagadh Jail	22°27'42.88"N 73°31'36.73"E	Near Bhadrakali temple, Pavagadh. Dist. Panchmahal.	*Pipistrellus* sp.	Underground cells that served as Jail. (heritage structure)	Mix vegetation	>100	Tourist destination
2	Pavagadh fort and nearby areas	22°28'12.08"N 73°31'26.16"E	Fort near origin of river Vishwamitri. Pavagadh, Dist. Panchmahal.	*Taphozous melanopogon, Taphozous nudiventris* & *Pipistrellus* sp.	Fort (Heritage structure)	Moderately dense Shrubs and herbs	~5000	Tourist destination
3	Jama masjid	22°29'8.95"N 73°32'13.14"E	Champaner, Dist. Panchmahal.	*Rhinopoma microphyllum, Rhinopoma hardwickii, Taphozous melanopogon*	Mosque- A world heritage site.	Sparse distribution of big trees. Shrubs and herbs occur.	>200	UNESCO world heritage site
4	Sipa Mines	22°24'35.35"N 73°37'24.03"E	Near Village Bhat, Shivrajpur, Dist. Panchmahal	*Rhinopoma microphyllum, Rhinopoma hardwickii*	Abandoned manganese mines.	Dry deciduous forest interspersed with tribal villages.	~ 50000	Jambughoda Wildlife Sanctuary
5	Tera Mines	22° 24' 05.29 "N 73° 36' 51.24" E	Bhat village, mines, Shivrajpur, Halol, Dist. Panchmahal	*Megaderma lyra lyra*	Abandoned manganese mines.	-	~150	Jambughoda Wildlife Sanctuary
6	Isthmus mine	22° 24' 05.29 "N 73° 36' 51.24" E	Bhat village, mines, Shivrajpur, Halol, Dist. Panchmahal	*Hipposideros fulvus*	Abandoned manganese mines.		>5	Jambughoda Wildlife Sanctuary
7	GMDC Mines	22°24'10"N, 73°36'23"E	Bhat village, mines, Shivrajpur, Halol, Dist. Panchmahal	*Taphozous melanopogon, Rhinopoma microphyllum, R.hardwickii*	Abandoned manganese mines.	Acacia and Eucalyptus plantations in surroundings.	~ 100000	Near Jambughoda Wildlife Sanctuary

mts) and served as a walkway through a hill.

Jambughoda Wildlife Sanctuary had recently witnessed development of eco-tourism under the watchful eyes of the Forest Department, Government of Gujarat. Hence, the bat habitats consisting of mines and caves located at the boundary of the sanctuary are not under any major anthropogenic threat. However, Pavagadh fort is a tourist place and hence, bat roosts are constantly under threat due to human disturbances. Also, Jama masjid in Champaner has been declared as UNESCO world heritage site and has witnessed major overhaul and renovation work to promote tourism. (Goud, 2012) This can possibly threaten the bat population in this area and may force them to migrate in search of alternative sites such as the adjacent Jambughoda Wildlife Sanctuary. The same may exert pressure on the existing population of microchiropterans in Jambughoda, thus leading to a competition for food and space; consequences of the same are awaited in years to come.

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Occurrence of Indian Tree Shrew *Anathana ellioti ellioti* (Waterhouse, 1850) in Khandesh, Maharashtra

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Abstract
First sighting record of Indian tree shrew *Anathana ellioti ellioti* (Waterhouse, 1850) was made at Manudevi forest, 35 km North of Jalgaon, Maharashtra along the boundaries of Yawal Wildlife Sanctuary (21°18'32.2" N, 75°33'38.2" E). Sighting of *Anathana ellioti ellioti* (Waterhouse, 1850), points towards presence of other unrecorded species thriving within the dense forests of the Satpura range.

Introduction
The Manudevi forest area (21°18'32.2" N , 75°33'38.2" E) is located 35 km north of Jalgaon, along the boundaries of Yawal Wildlife Sanctuary in the Satpura range of Maharashtra (Fig.1). Before independence this area came under the East Khandesh of Bombay Presidency. The forest type is mainly of tropical dry deciduous with teak (*Tectona grandis*), anjan (*Hardwickia binata*), salai (*Boswellia serrata*) being the predominant tree species (Champion and Seth, 1968). The vegetation varies with the changes in altitude, aspect and rainfall. Other trees generally observed are dhawra (*Anogeissus latifolia*), safed khair (*Acacia ferruginea*), dhobin (*Dalbergia paniculata*), mahua (*Madhuca longifolia*), kekad (*Garuga pinnata*), kulu (*Sterculia urens*) etc.

Indian tree shrew (Scandentia: Tupaiidae) is an endemic species of mammal occurring in southern peninsular India. It externally looks like a combination of shrew, squirrel and a mongoose. Its long snout is shrew-like, the rounded ears, body, limbs and bushy tail suggests like a squirrel and while in motion with long body and the extended bushy tail, its behavior is like that of a mongoose (Alfred *et al.,* 2006). The feet are like that of squirrel well adapted for climbing. Dorsum reddish brown to grayish brown speckled with black colour. There is an oblique pale shoulder stripe (Fig.2). The ventrum is whitish in colour. Feet buff in colour (Alfred *et al.,* 2006).

It is diurnal and omnivorous in habit and a resident of scrub, dry and moist deciduous forest. It prefers to live mostly in forested areas (Theodore, 1986; Alfred *et al.*, 2006). The Indian tree shrew has reported from Andhra Pradesh (Molur *et al.,* 2005; Srinivasulu and Srinivasulu, 2011; Giridhar and Srinivasulu, 2011), Chhattisgarh (Chakraborty, 2008), Gujarat (Chakraborty and Agrawal, 2000), Jharkhand (Gupta,1996), Karnataka (Srinivasan *et al.,* 2009), Kerala (George, 1989), Madhya Pradesh (Shrivastava, 1995), Orissa (Chakraborty, 2005), Tamil Nadu (Karthikeyan, 2003) and West Bengal (Agrawal *et al.,* 1992). Particularly from Maharashtra it is reported from Khandala, Bhimashankar, Matheran, (Suter, 1922; Chakraborty, 2005), Allapalli, Gadchiroli (Wroughton & Ryley, 1913), Nagpur City (D'Abreu, 1927), Pench National Park, Nagpur (Pradhan, 2004), Melghat Tiger Reserve, Amravati (Pradhan, 2005), Tadoba-Andhari Tiger Reserve

Fig.1: Showing distribution of tree shrew (*Anathana ellioti ellioti* (Waterhouse) in Maharashtra with new sight location at Manudevi forest, Jalgaon district (Map Courtesy : Google earth)

Fig.2 : *Anathana ellioti ellioti* (Waterhouse, 1850) in Manudevi Forest.

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Fig. 3 : *Anathana ellioti ellioti* (Waterhouse, 1850) feeding on Apple in Manudevi forest.

(Pradhan, 2006), Nawegaon National Park, Gondia (Alfred *et al*, 2006) (Fig. 1). Perusal of literature shows that there were no any authentic sighting records of this species from Khandesh, Maharashtra especially from the Manudevi forest area.

Materials and Methods

During a field survey for locating orchid species in Manudevi forest of Jalgaon district on 2rd February 2011, on the trails towards deep forest area above Manudevi temple the authors (JJS & UKP) sighted a squirrel like mammal that had no stripes on its body. It quickly passed through and we were unable to take any photographs. It was later identified as Indian tree shrew following Prater (1980). On 3rd Feb 2011 at Manudevi waterfall area we placed a fresh apple (*Malus domestica* Borkh.,1803) on a flat rock near the area where the species was initially sighted, and after hiding for 1.5 hrs a striped palm squirrel (*Funambulus palmarum* Linnaeus) was seen near the apple. After 15 minutes a tree shrew approached the rock in search of food where the apple was placed and started feeding on it (Fig.3). Photographs and videos were taken using Sony DSC HX1 camera when the animal was busy feeding on the apple. Surveys were conducted over a period of one year and sighting records of the tree shrew collected from Manudevi forest area are as given in Table 1.

Observations and Discussion

Waterhouse (1850) described Indian Tree Shrew as *Tupaia ellioti* from Eastern Ghats, Andhra Pradesh. Further, Lyon (1913) studied the specimens from Indian region and placed the species under new genus *Anathana.* In addition on the basis of dorsal colouration and distribution Lyon in 1913 gave two species namely

Table 1: Field visits to Manudevi Forest

Date of field visit	Number of Individual sighted
2-Feb-11	01
3-Feb-11	01
15-Mar-11	0
26-Mar-11	01
30-Jul-11	0
29-Jul-11	0
29-Oct-11	0
7-Mar-12	02

Anathana wroughtoni and *Anathana pallida*. *Anathana ellioti* Waterhouse (Range : Eastern India, Upper parts and tail reddish brown, feet and hind legs buff or ochraceous; *Anathana pallida* Lyon (Type from Munbhum, Purulia, West Bengal; Range : Northeastern India, upper parts a less conspicuous reddish brown, different in colour from tail, feet and hind legs grizzled buffy; *Anathana wroughtoni* Lyon (Type from Mandvi, Surat, Gujarat; Western India, Upper parts dull grizzled, brownish, tail slightly dissimilar, feet and hind legs grizzled grayish. Corbet and Hill (1992) have mentioned about the various forms earlier recognized (by Ellerman and Morrison-Scott (1951)) under this taxon with a rider that species boundaries are indistinct and hence they considered these as synonyms of the nominate taxon. However, Helgen (2005) synonymized *pallida* and *wroughtoni* under *Anathana ellioti*. Talmale (2007) studied the museum specimens (Bombay Natural History Society, Mumbai; National Institute of Virology, Pune and Zoological Survey of India, Pune) available from Maharashtra and also followed Helgen (2005). Perusal of literature including results of Mammal survey of India by Bombay Natural History Society, Mumbai of this region (East Khandesh: Dhule, Jalgaon and Aurangabad districts) have no collection or sighting records of the tree shrew (Wroughton, 1912). Therefore, this is a first authentic sighting record from Khandesh, Maharashtra.

Further on, field visits were done from 3.02.2011 to 07.03.2012 (Table 1) and in our study it was revealed that the tree shrews were sighted in Manudevi forest area only during the months of February and March. There were no sightings of this species during monsoon and winter months. Our preliminary observations show

that the site where this species was sighted was at a distance of 30m from the Manudevi temple and it was observed that the animals frequent the temple environs in search of food. More surveys are needed to understand its habitat requirements and population trends.

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Bats Hero in Bangladesh!

Kaji Fakhrul Islam*

Bats are most neglected and mysterious mammals in the world. Fruit bats play a vital role in preserving the biodiversity through pollination, seed dispersal and forest degeneration, while insectivorous bat control the harmful pest of crops and disease career. In Bangladesh bats are neglected without proper understanding of its role in the ecosystem. Here, bats are considered as evil sign. It is not a matter of concern of the people of Bangladesh whether the number of bat is increasing or decreasing. Rather people think that they are causing unanimous harms on economy by wasting various kinds of valuable fruits such as mango, nut, palm, litchi and guava etc. So, decline of bat population is a good news for the farmers.

Realizing the significance of bats on environment, we formed a Group for Conservation and Research of Bat (GCRB) in 2009. We are working to raise awareness among the community people and farmers about the role of bat. We also work to eliminate the myths and misconception about bats. However, we are the first group in Bangladesh dedicated to bat conservation and research.

We started our journey by the support of Bat conservation International through Global Grassroots Conservation Fund. For successful completion of project and extreme dedication of the volunteer, BCI awarded Conservation impact award 2012 to Nurul Islam. Bat conservation International honoured two bat champions from many who had a major impact on Bat conservation. One is Nurul Islam in the field of education and advocacy and another is Al Hicks, Wildlife Biologist, USA.

Nurul Islam is an Intern student of Chittagong Veterinary and Animal Sciences University who initiated the first bat conservation education in Bangladesh. He volunteered to GCRB since 2010. He debunked the myths and educated students about the benefits of bats at 15 schools, plus adults in five villages. The team conducted outreach activities at two zoos and Bangladesh Agricultural Fair. He worked with farmers and fruit growers on bat protection and trained 20 volunteers in bat biology and conservation. Later the authority of Chittagong Veterinary and Animal Sciences University also recognized his award for excellent performance in bat conservation in Bangladesh.

***Faculty of Veterinary Medicine, Chittagong Veterinary & Animal Sciences University, Bangladesh and Volunteer, Group for Conservation and Research of Bat, Bangladesh**

SMALL MAMMAL NETWORKS

Chiroptera Conservation and Information Network of South Asia (CCINSA)

CCINSA is a network of South Asian Chiroptera specialists, educators and enthusiasts. The network aims to enhance communication, cooperation and collaboration among chiroptera specialists of this region and thereby create a chiroptera conservation "community" for better biodiversity conservation.

Chair: Sripathi Kandula
Convenor and Administrator: Sally Walker
Red List and Technical Advisor: Sanjay Molur

Rodentia, Insectivora, and Scandentia Conservation & Information Network of South Asia (RISCINSA)

RISCINSA network of South Asia was suggested by interested biodiversity conservation specialists and the purpose of this network, then is to link together rodent field researchers and their field knowledge throughout South Asia (Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan and Sri Lanka) so the pooling of information can lead to conservation action.

Scientific Chair: Sujit Chakraborty
Convenor and Administrator: Sally Walker
Red List and Technical Advisor: Sanjay Molur

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Bat Conservation International BCI is one of the most active, innovative and respected bat conservation organisations in the world. See BCI's wonderful website: **www.batcon.org**

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IUCN SSC Bat Specialist Group
CCINSA represents the IUCN SSC Bat Specialist Group in South Asia. BSG utilises the CCINSA Network to locate specialists in different subject areas, to organise training as well as conservation assessment workshops and other activities to assist the CSG in their mission. Contact : Chair Paul Racey: **p.racey@abdn.ac.uk**
See Website:
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Small Mammal Mail

SMM is a web-based bi-annual Newsletter celebrating the most useful yet most neglected Mammals for both CCINSA & RISCINSA -- Chiroptera, Rodent, Insectivore, & Scandens Conservation and Information Networks of South Asia.

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