

Monitoring and conservation of bats in the Kathmandu valley, Nepal

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ABSTRACT

The Kathmandu Valley has been a centre for bat study since the 19th century. Twenty five species of bats have been documented from Kathmandu Valley including two species of fruit bats until 1997. Opportunistic and sporadic survey was continued then after. There was a gap of more than a decade for monitoring. A recent preliminary survey in 2008 re-recorded only three species which revealed the need for detailed monitoring. Bats conservation is a rare practice in Nepal which lags behind neighboring countries. The negative perception of the bats and lack of awareness is the primary factor for the lack of conservation. This project is designed to redress this at twenty sites within the Kathmandu Valley where mist and scoop nettings together with roost survey were carried out. Lectures to schoolchildren were the primary conservation action along with radio-awareness programmes. Twelve species was re-recorded excluding fruit bats and two unidentified species (*Pipistrellus* sp. and *Myotis* sp.). Specific roost sites and foraging habitats were discovered and documented in the study area. A new site of occurrence of vulnerable species Mandelli's Mouse-eared *Myotis* *Myotis sicarius* was identified. A special trend of seasonal variation in species at few study sites was observed while in few the species were found resident. Thirteen half hour radio programmes about bats were successfully broadcast throughout Nepal from Radio Kantipur. Lectures of 45 minutes were delivered to in an average 75 schoolchildren per school at twenty schools in fifteen project sites. Post project effectiveness evaluation should be carried out.

Key words: Bat fauna, Nepal, detailed monitoring, radio-awareness programme

INTRODUCTION

The Kathmandu Valley has been centre of bat studies since 1835 (Bates & Harrison, 1997). Since Csorba *et al.* (1997), Myers *et al.* (2000) and Malla (2000) there has been no bat studies excluding flying fox observations. Twenty five species of bats had been documented from Kathmandu Valley including two species of fruit bats until 1997 (Bates and Harrison, 1997). There was a gap of monitoring and surveys of bat fauna existing in Kathmandu Valley. Thapa *et al.* (2009) re-recorded only three species excluding the Indian Flying Fox *Pteropus giganteus* from eight sites in Kathmandu district. History of bat conservation in Kathmandu dates back just few years ago. The Nepal Action Trust for Utility Resources and Education (NATURE) initiated the conservation of bat fauna in Nepal through the formation of bat clubs in schools of Kathmandu (Shrestha, 2005 & 2006). The conservation actions were not continued. The locals residing in Kathmandu Valley had a negative attitude towards bats and little knowledge of their ecological importance regarding healthy forest maintenance and pest control in agriculture and that nullified attempts at their conservation.

Haphazard urbanization, infrastructure development, industrialization has caused the rapid transformation of the land use pattern in the valley which resulted in encroachment of the major roosting habitats of bats, which may have resulted in the species loss. This created the background for the need of detailed monitoring of the bats in the present study, one of the objectives of which was to monitor bat roosting locations

and bat species as well as estimating their population size. The next objective of this study was to establish a radio awareness programme and lectures to schoolchildren about the conservation of bats.

MATERIALS AND METHODS

Monitoring

Monitoring was conducted within twenty sites of Kathmandu Valley (27°35'00"N 85°15'00"E to 27°50'00"N 85°37'30"E). The study area occupies 395 square kilometers and is situated at an altitude of 1372 m to 2732 m. The climate in the Kathmandu Valley is characteristic temperate, influenced by the tropical monsoon. The average air temperature is 19° C but the mean annual temperature at summer season is 28° C while that in winter is 13° C. The annual rainfall in Kathmandu is about 140 mm (DHM, 2006).

Bats were captured using mist nets which were deployed near crevices/caves/ bushes/lakes randomly from evening to 2200h. Tree bark, hollows, old houses, temples and caves were searched during the day time. The population in the colony was estimated and photographed. Bats were also captured from the wall of their roost by scoop net. Flight emergence and behavior was noted. Echolocation frequency was obtained using the heterodyne bat detector Magenta Mk11b.

Morphometrics and identification

Seventeen external measurements from captured bats were taken with the help of millimeter graded steel scale

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to the nearest 1 mm. The body weight was measured with a 100g Pesola spring balance. On the basis of these measurements, we made spot identifications with the help of taxonomic keys Bates & Harrison (1997) and Srinivasulu *et al.* (2010). Additionally, the reproductive stage of the bats was noted by observing their genitalia and photographs were taken using NIKON D40X camera.

Radio-awareness programme

Thirteen half an hour programme airing the importance of bats in providing ecosystem services, their conservation threats was broadcast in the Nepalese language through the country’s leading FM station, Radio Kantipur 96.1 MHz and 101.8 MHz (www.radiokantipur.com). The general format of each radio programme included; starting with one liners related to the conservation of wildlife, introduction to the Small Mammals Conservation and Research Foundation (SMCRF) and Rufford Small Grants (RSG), a short report on a specific small mammal, an interaction with an expert, quiz and ending with the one liners.

Outreach Programme to school children

Lecture classes to make schoolchildren aware about bats and their importance was delivered in one or two schools of each of the study sites by using 5’ by 4’ flex and distribution of brochures. Question and answer sessions about bats were held at the end of the session.

RESULTS

Monitoring

Bats were found occurring in ten sites amongst twenty monitored sites. Altogether twelve species were identified together with two species identified only to genus (*Pipistrellus* sp. and *Myotis* sp.). The distribution of bats in the Kathmandu valley ranged from 1267m a.s.l. (Pharping) to 1992m a.s.l (Panimuhan). The bat assemblage was found to be rich in the sites at average altitudinal range of 1300-1500 m asl eg. Nagarjun, Chobhar, Godawari, and Bajrabarahi (Chapagaun). *Rhinolophus affinis* was the most widely distributed species. It was reported from five sites namely: Godawari, Nagarjun, Nagarkot, Pharping, Sankhu-Bajrayogini. However the species’ distribution was found varying seasonally at Pharping and Nagarkot where it was found before and after the monsoon respectively, while it was resident in both phases at Godawari and Nagarjun. *Hipposideros armiger* was the second most widely distributed species. It was reported from three sites: Godawari, Nagarkot and Sundarijal. Its distribution is seasonally affected at all sites, occurring at Godawari before the monsoon while arriving at Nagarkot and Sundarijal during the monsoon. *R. ferrumequinum* and *M. nipalensis* had the smallest distribution ranges respectively (Figure 1 & 2).

Godawari still harbors the greatest bat diversity (five species excluding the *Myotis* sp.), followed by Nagarjun (three species), then Chobhar (two species). Bajrabarahi emerges as a new good habitat for diversity

and distribution of bats with two species excluding *Pipistrellus* sp. This is a new site for the occurrence of a vulnerable species Mandelli’s Mouse-eared *Myotis Myotis sicarius*. Bat species were also recorded from four new sites: Muhanpokhari (Panimuhan, Shivapuri Nagarjun National Park), Pharping, Sankhu-Bajrayogini and Swoyambhu. Additional species were recorded from previously recorded sites of bat distribution such as: *H. armiger*, *M. muricola*, *M. nipalensis*, *R. affinis*, and *R. macrotis* from Godawari; *H. armiger* and *R. affinis* from Nagarkot; *R. ferrumequinum* and *R. macrotis* from Nagarjun. Bats were captured in five different habitat types: cave, stream in the forest, tunnel, old abandoned house and trees (Figure 3).

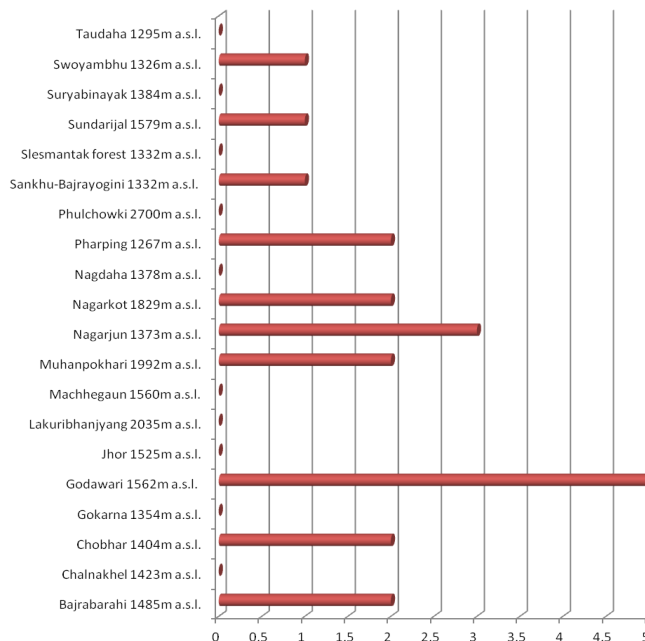


Figure 1. Total no. of species recorded atlocalities (excluding *Pipistrellus* sp. and *Myotis* sp.).

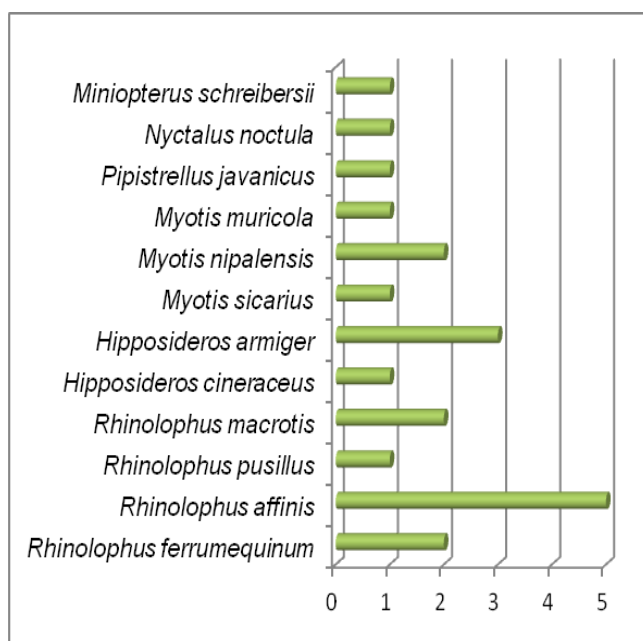


Figure 2. Species recorded at total no. of localities (excluding *Pipistrellus* sp. and *Myotis* sp.).

Conservation awareness radio programme

Altogether 10 (eight live and two telephone interviews) of experts on small mammals research and conservation (bat, red panda, pangolin, otter, hispid hare) as well as experts from other conservation partners and stakeholders (Himalayan Nature, National Trust for Nature Conservation, Department of National Parks and Wildlife Conservation, Bardia National Park, Ministry of Forest and Soil Conservation) were aired. Eight reports on different small mammals (Three full reports on bats, two short reports on red panda, each short report on pangolin, otter and hispid hare) were broadcasted during the programme. Few national and international news regarding research and conservation activities on small mammals as well as some activities of SMCRF were delivered. Six winners in the quiz selected by lucky draw were presented a gift from SMCRF.

School Lecture Programme

Lectures of 45 minutes were delivered to in an average 75 schoolchildren per school at twenty schools in fifteen project sites. Schoolchildren of class 6, 7 and 8 were targeted except classes 4 and 5 at two schools of Muanpokhari (Panimuhan) and Sipadol, Suryabinayak (Figure 4). Brochures on “awareness for bat conservation” published by SMCRF was distributed among the schoolchildren. Two 5’ by 2’ flex of the brochure was also displayed in the lecture class. At last, a photograph of participating schoolchildren was taken with the banner.

DISCUSSION

Double number of bats was rerecorded in summer than in winter which clues that summer is preferable for bat studies. Previously, most of the localities where bats were captured had been mentioned as Kathmandu Valley and Kathmandu. Further details or specific sites had not been reported, for such bat species as *R. ferrumequinum*; *R. pusillus*; *R. subbadius*, *R. luctus*, *H. fulvus*, *M. formosus* (Scully, 1887); *M. muricola* (Hinton & Fry, 1923) and *Hipposideros armiger*; *H. cineraceus* from the Kathmandu valley (Bates and Harrison, 1997). According to Scully, 1887 (In Hinton & Fry, 1923), *M. siligorensis* is one of the commonest bats in the Kathmandu Valley. Bates & Harrison (1997) reported *M. nipalensis* (*M. mystacinus*) from Kathmandu. However, it was considered uncommon in the Kathmandu valley (Scully, 1887). Similarly, Shivapuri was also mentioned as a locality for such species as *R. affinis* (Fry, 1925) and *Pipistrellus javanicus* (Bates & Harrison, 1997), but this does not signify an actual place rather than the whole Shivapuri National Park (Now Shivapuri Nagarjun National Park). Few species were reported from other localities in the Kathmandu Valley. Those sites such as Thankot and Bansbahari were not included as study sites in this project. Also the present study could not cover the bats flying within the busy city of Kathmandu where they could not be captured but were observed flying. Maximum number of species was captured from cave, whereas, minimum from old abandoned house and tree. Stream in the forest harbors second maximum number of species. This, indicate that

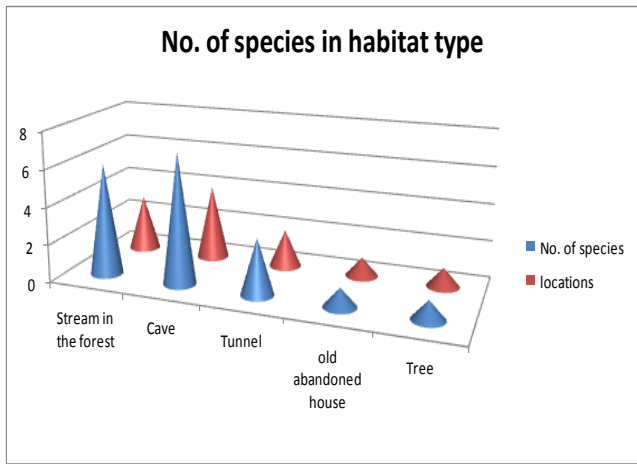


Figure 3. Habitat types harboring number of Species recorded and number of localities (excluding *Pipistrellus* sp. and *Myotis* sp.).

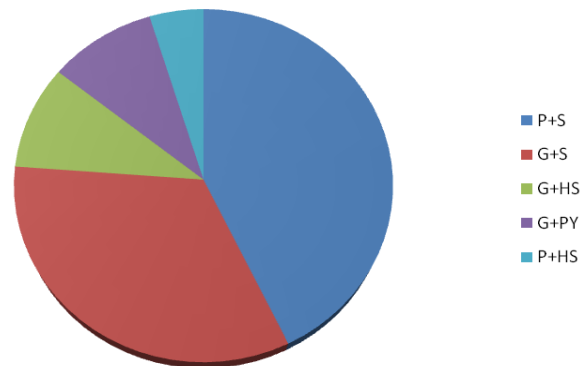


Figure 4. Categories of schools where outreach programme for school children was launched.

Note: P+S=Private Secondary School; G+S=Government Secondary School; G+HS=Government Higher Secondary School; G+PY=Government Primary School; P+HS=Private Higher Secondary School.

caves and stream in the forest are the favourable habitat for bats. The absence of species from the specific sites during one season and presence in another predicts seasonal short distance migration. Long distance migration and species loss may account for the absence of species for a long time. It can be interpreted that thirteen or less number of species is missing. Disappearance of species from the Kathmandu Valley can be interpreted as the consequences of habitat encroachment and rapid transformation of land use patterns due to haphazard urbanization, infrastructure development and industrialization. Another may be climate change.

This detailed monitoring also expanded the action-oriented conservation in the wide landscape of the Kathmandu valley and throughout Nepal, and used radio programmes and lectures in schools to make local people, students and schoolchildren aware about bats and their importance and is expected to encourage a positive attitude towards their conservation. In the past such awareness programmes were restricted to some schools of busy cities of Kathmandu, Lalitpur and Kaski districts The present project is the first to start the radio awareness programme for bat conservation throughout Nepal and this is the first wildlife programme to be broadcast through

Radio Kantipur the leading FM station in the country. Priority should be given to bat surveys at new sites as well as monitoring the previously recorded sites. Also acoustic surveys of bats within busy cities should also be included. Long term migration studies through banding as well as research on the effect of the climate change on the population of bats and their distribution should also be initiated. A survey should also be carried out to measure the development of knowledge about bats among local people in the project area. Similarly, other conservation actions such as bat house installment and the safeguarding of habitats important to bats, especially their cave roosts should be implemented.

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