



BAT NET NEWSLETTER

Newsletter of the Chiroptera Conservation and Information Network of South Asia
CCINSA and the IUCN SSC Chiroptera Specialist Group of South Asia (CSGSA)

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Contents

Greetings to Readers

ZOO and CCINSA Bat Conservation International BCI Liaison for South Asia, P. 2

Report on the training in Field techniques for the study of Volant and Non-volant small mammals Randenigala, Sri Lanka by Wipula B. Yapa, Sampath Goonathilage, P.O. Nameer, R. Marimuthu and B.A. Daniel, Pp. 3-8

Project Pterocount - South Asian Bat Monitoring Programme, *Pteropus giganteus* Population Monitoring Project, Pp. 9-13

Bat Data put up on new ZOO/WILD South Asian Taxa Website — Threatened Taxa Monitoring System for South Asian Fauna, Flora and Fungi (www.southasiantaxa.org), P. 14

Bat Festival 2006, P. 15

Report of Bat Club of Megamix activities, P. 15-16

Nature Club Surat study bats, P. 16

Zoo Education Programme on Bats Conservation at Maitri Baug Zoo, P. 17

A Report on the Bats 'N Rats Activity Session in the TCS Childrens Summer Camp, May 16-20, 2005, P. 18

Distribution of Roosting and Survival Threats of Bat in Pokhara Valley with reference to Species and Population Survey at Chamere Gupha by Pushpa Raj Acharya, P. 18

Current Members of Chiroptera Conservation and Information Network of South Asia, Pp. 19-22

Profile of one of our own -- Sanjay Molur R.V., Pp. 23-24

CCINSA/NATURE Bat Clubs, Kathmandu, Nepal, Geeta Shrestha, P. 25-26

Opportunistic Survey of Indian Flying Fox *Pteropus giganteus* (Brunnich, 1982) by K. R. Senacha, Pp. 27-29

Solitary or non-territorial adult males in bats: Are "Making the best of a bad job"? by T. Karuppudurai, N. Gopukumar and K. Sripathi, Pp. 30-33

Practical Science to enable fruit bats to survive, P. 33

Status and Threats of Bats in Pokhara Valley, Nepal by Sujas Prasad Phuyal and Shree Prasad Dhoubhadel, Pp. 34-36

An Overview of the Bats in Sallaghari, Bhaktapur by Rajesh Rajchal, P. 37

Report on CCINSA Sarah Tucker Branch Activities 2005-2006, Sarah Tucker College, Tirunelveli, Tamil Nadu, Pp. 38-40

Announcing the First International South East Asian Bat Conference, P. 39

Conservation status of bats of Andhra Pradesh: Their niche, habitat requirements and threats by Bhargavi Srinivasulu, C. Srinivasulu* and V. Nagulu, Pp. 41-42

Editorial and text from a wall magazine 'Mero Chamero' (My Bat) from one of CCINSA's newest members from Nepal, P. 42

Foraging *Rousettus leschenaulti* (Fulvous Fruit Bat) Is A Bioagent Controlling Black Sooty Mold on Plants, J. Vanitharani, A. Arulsundari and M. Vijaya, P. 43

This issue of BAT Net — CCINSA's newsletter — is late but long, with many articles and reports, news items and announcements for making your batting better. A lot is going on in South Asia for bats these days. Nepal is simmering with *bactivity* ... there are several new researchers conducting studies, starting bat clubs, organising training, etc. and creating a community of *bacademics*. There are also reasons to think that Pakistan is on the verge of a wave of activity. Sri Lanka conducted a field techniques training which is reported in this issue. Bangladesh had one last year. India has produced a range of new bat projects, such as Pterocount, the first attempt to monitor the Giant Fruit Bat throughout the region with a great deal of enthusiastic volunteer help, new education activities such as a colour poster featuring fruit bats, and a website with all our bat information included. Now, all the countries of South Asia seems to have its bat community with the exception of Nepal. We have to work harder there.

One of the important events of the year for CCINSA has been that Bat Conservation International asked us to represent them in South Asia. BCI, along with Chester Zoo, has been very generous over the years to provide us with funds for education, field techniques training, and conservation assessment workshops. We are happy to be more closely allied with them.

Finally, we were pleased to learn that the Chiroptera Specialist Group of IUCN SSC was continued when many of the specialist groups were dropped.

We look forward to an active and productive year with our old and new members of CCINSA.





ZOO and CCINSA Bat Conservation International BCI Liaison for South Asia

Bat Conservation International, BCI, is the foremost and most active Chiroptera conservation organisation in the world. Its founder and President, Merlin Tuttle is one of the most active and respected bat experts and probably the most dynamic activist for bat conservation today.



BCI has awarded Zoo Outreach Organisation and CCINSA a number of grants for conservation assessment workshops, public education and field techniques training over the last few years and, along with Chester Zoological Gardens have enabled CCINSA to be constantly busy doing something or other for bats. BCI has acknowledged our efforts in its excellent BATS Newsletter and in personal communications. Now, Bat Conservation International has given perhaps the ultimate honour to ZOO and CCINSA as well as Chester Zoo, by requesting us to represent BCI in South Asia as "Bat Conservation International South Asia Liaison". This is a singular honour and one which we take very seriously.

As our members and readers know ZOO and CCINSA represent the IUCN SSC Chiroptera Specialist Group in South Asia and like to think that Chester Zoo would also permit us to make the same claim with respect to them. This is a winning combination for all, we believe, ZOO CCINSA working to help IUCN SSC CSG, BCI and Chester work more effectively in all countries of South Asia.

With this year's grants from BCI and Chester, ZOO/CCINSA will do the following activities :

Chester will sponsor CCINSA Network

- coordination, data collection and Training
- Communication, newsletter,
- maintenance of directory and website, organisation of lobbying, communication,
- Pterocount correspondence and some web work
- Field Techniques training (shared with BCI and possibly other sponsors)

BCI will sponsor Public Education and Training

- a modified series of bat packets and "drama kits" for more meaningful education and also educating rural people and local communities,
- provide colour scientific illustrations for our bat CAMP / TTMS data base on our website www.southasiantaxa.org and for Project Pterocount www.pterocount.org.
- produce a colour poster of S. Asian fruit bats for assisting with Pterocount, a regional volunteer count of *Pteroptus giganteus*

Training (shared with Chester Zoo) - continue field techniques training for countries and areas not covered (shared with Chester Zoo).

Our responsibilities to BCI include also mid-term and final progress reports, provision of high quality photos of sponsored activities for their use, provision of popular article (on request) for BATS.

Needless to say, such support encourages us to think ahead and another Chiroptera CAMP or Red Listing exercise to incorporate work done since 2002 CAMP is very much in our thoughts. Thanks to our major collaborators : Chester Zoo, BCI, Chester, and IUCN SSC CSG



Bat Photographs Urgently needed

Zoo Outreach Organisation and CCINSA have been awarded a grant to represent Bat Conservation International in South Asia for a three year period. Part of the proposal is a project to illustrate the Threatened Taxa Monitoring Systems TTMS website, Chiroptera CAMP data section with drawings and/or photographs of all bats. This is a formidable task as bats are not easy to photograph and perhaps there are many bats which have never been photographed, or drawn from life.

We have a few black and white illustrations of bats which we have contracted with Arnab Roy, our official ZOO artist, but now we have to systematically attempt to contract colour illustrations of all the bats of South Asia. These will be put up on our TTMS website as and when each drawing is completed so that bat biologists can comment on its accuracy and watch the progress of this challenging project.

Those of you who have photographs of bats which show sufficient detail to use as a model for a colour scientific quality drawing, are urged to kindly donate these photographs for our use. Our budget covers the artists' fees but will not cover purchase of photos. You will, of course, receive full credit for your photograph any time it is used by us and on the website.

Read more about TTMS on page 14 of this newsletter and send us your photographs as soon as you can. We will start this project immediately.





Report on the training in Field techniques for the study of Volant and Non-volant small mammals Randenigala, Sri Lanka.

Wipula B. Yapa, Sampath Goonathilage, P.O. Nameer, R. Marimuthu and B.A. Daniel

Background

From 29th October to 3rd November, 2005 a training exercise was conducted in Sri Lanka by CCINSA in collaboration with RILSCINSA, networks for small mammals based in India assisted ably by local organisations. In continuation of the capacity building exercises to ensure that there will be sufficient scientifically trained manpower in the South Asian region to carry out the uphill task of documentation, monitoring and conservation of small mammals of the region, the Chiroptera Conservation Information Network of South Asia (CCINSA) and Rodent, Insectivore, Lagomorph and Scandent Conservation Information Network of South Asia (RILSCINSA) organised a training workshop in the "Field techniques for the study of Volant and Non-volant small mammals" at Randenigala, Sri Lanka. This one was the 8th in the series. Before this we have had three in India, three in Pakistan and one in Bangladesh.

The programme was held at Training, Research, Education and Extension (TREE) Centre, Randenigala, Sri Lanka and was jointly organised by the Zoo Outreach Organisation, India, CBSG, South Asia and the Department of Zoology, University of Colombo, Sri Lanka, in collaboration with CCINSA, RILSCINSA and WILD (Wildlife Information Liaison Development Society). The venue of the workshop was an excellent setting at the TREE Centre in Randenigala, which in turn is located in one of the protected areas of Sri Lanka, viz. 'Victoria-Randenigala-Rantambe wildlife sanctuary, which incidentally is the largest protected area in Sri Lanka. The habitat of the area is predominantly scrub jungle to dry deciduous forests. The programme was sponsored by Chester Zoo, U.K., Bat Conservation International, U.S.A., Knowsley Safari Park, U.K. Dr. Mike Jordan, Curator of Higher Vertebrates, Chester Zoo and Dr. Paul Racey, Regius Professor, University of Aberdeen, U.K. were the main resource persons of the workshop.

All the participants and resource persons arrived at the venue on 29th October 2005 evening by 7 and straight away we commenced the session with a brief inaugural. Dr. Wipula Yapa, Senior Lecturer of University of Colombo, welcomed the participants and the resource persons, Dr. B.A. Daniel, introduced the resource persons and then had the 'ice- breaker', with a small activity called "sound off".

Day 1: The technical session began with the lecture by Mike Jordan, who introduced the biodiversity of the non-volant small mammals of the orders Rodentia, Insectivora,

Lagomorpha and Scandentia. He stressed upon the disparity and the neglect that is being received by small mammals, in spite of the fact that they account for about 55% of the mammals of the world. The rodents are generally considered as pests, this is in spite of the fact that only 10 to 15 species (< 1%) are major pests. However, many of them are threatened with extinction. The diversity among the rodent group was well explained through slides by giving examples from Muridae, Sciuridae, Acomidae, Heteromyidae, Dipodidae, Geomyidae, Castomyidae and Hystricidae; the insectivore families such as Soricidae, Erinaceidae, Talpidae, Tenrecidae and Chrysocholidae.

This was followed by Mike's second presentation on different types of traps used for the study of the rodents. He explained about the live and single capture traps such as Sherman traps of varying dimensions, big wire mesh traps (also known as FAWS Trap– Forest And Wildlife Service Trap) etc. He also explained about the multi-capture traps such as UGLAN trap. The small mammals, being nocturnal, small and cryptic can only be studied by trapping. While setting the traps "One has to think like a small mammals", says Mike. He explained in detail with suitable examples, the number of traps required for the study of small mammals, place to set up traps and also minor details of successful trapping experiments such as space requirements and time of setting up the traps. Later Mike explained about the handling and welfare issues while studying both volant and non-volant small mammals. While handling the animals the primary aim should be "safety to



Dr. Mike Jordan gives an introduction in the field before setting traps



Paul Racey loops the mist net to the side pole.

the animals as well as to the person who is handling". Mike told that the advantages of handling volant and non-volant small mammals include species identification, sexing, marking, weighing, determination of the age, breeding condition etc. He also explained how these are done. Different types of marking the volant and non-volant small mammals were told by Mike and Paul.

Field session: Mike demonstrated the preparation of bait for setting the traps. Afterwards all the participants were taken to a nearby scrub jungle patch for the demonstration of setting traps. 30 traps were set and another 15 were set near the kitchen/canteen at the base camp.

Day 2: The day started with checking

the traps set the previous day. It was a disappointment since most of the traps set were disturbed by the wild Macaques. However, one specimen of *Rattus rattus* was caught in one of the traps set on the tree. Mike explained in detail on the problems that the group encountered for a successful trapping. Alternative methods were discussed. He also demonstrated the handling techniques, identification and marking of the species using the trapped specimen before releasing it back in to the wild.

The technical session on the second day started with the presentation of Paul Racey, who gave a vivid introduction of bats, their general features, evolution, taxonomy, distribution, feeding ecology, echolocation and conservation.

He then discussed about the survey techniques and study of bats. He stressed the need for the survey of the bats of the tropics, particularly South Asia, as there is very little information available on the bats of the region. Different types of nets to survey bats such as mist nets, harp nets, canopy nets, bat detectors, flick net etc were explained. To collect the bats at roosts large butterfly nets can be used. Paul also explained about the foraging strategy of different species/families of bats.

Paul explained about the use of dichotomous key and character matrix for the identification of bats in the field. He explained about sexing, breeding condition of the bats such as lactating or not and pregnant or not etc, and estimating the age of the bats.

Field session: Three mist nets were set in and around the different buildings of the TREE centre. However, no bats were caught. Bats were however, seen flying all over there. In many instances they came very close to the mist net, but managed to avoid the nets.

Day 3: Field session: The day started with checking the traps. One *Rattus rattus* was caught from the natural forest patch and a *Mus booduga* was caught near the auditorium of TREE centre. The latter was caught in multiple capture trap, which actually is quite good for small body sized animals. Mike demonstrated handling, weighing, sexing, measuring, photographing releasing the animals. In the afternoon session of trap checking a *Funambulus palmarum* was caught, processed and released.

Paul Racey started the technical session on the third day by explaining the different methods of marking the bats, such as temporary marking (marker pen, nail varnish), permanent marking (forearm bands/rings, necklace, tattooing, bleaching the fur etc). Study of the foraging behaviour



of the bats, radio tracking studies, use of bat detectors etc were explained by Paul.

Nameer Ommer demonstrated the dry skin preservation techniques (carding) and preparation of the skull for storage in the museum. Voucher specimens are of extreme importance in the study of small mammals. It helps us to sort out taxonomical issues such as the identity of the species. Some of the advantages of carding, when compared to that of wet preservation are: a) it helps to retain the original colour and the shape of the animal for a longer period of time, to a great extent; and b) it helps us save considerable space in the lab or museum. Moreover, it is also a very simple technique that can be done right in the middle of the forest/field station. All that is required is a pair of scissors and borax powder.

Participant's presentations:

Maththegama Ralalage Manori Prasanthika Nandasena Goonathilake detailed about the findings of her Ph.D. dissertation on "Activity budget in diurnal roost of the False Vampire bat, *Megaderma lyra*". She studied a colony of 120 bats, and recorded various behavioural aspects.

Pradana Mudiyansele Chandrasekara Bandara Digana explained about the results of his Ph.D. dissertation on "Survey of bats of Sri Lanka". He surveyed 18 districts of Sri Lanka, located > 500 roosts, and identified 20 species.

Field session: During the mist netting session in the evening two bats were caught out of the three mist nets kept. Paul Racey explained the method of processing the collected bats, including handling, removing the bats from the mist nets, recording the measurements, sexing, estimating the age, the reproductive condition of the bats etc. He also explained how to identify the bats. The bats caught were



Nameer demonstrates the dry skin preservation techniques

identified as *Pipistrellus coromandra* and *Hipposideros speoris*.

Day 4: Field session: The day started with checking the Sherman traps. One *Rattus rattus* and *Mus booduga* were caught. The handling and processing of the animals were demonstrated by Mike.

The technical session of the day was started by the presentation by Paul Racey on the dietary studies of the bats, wherein he explained about different techniques to study the dietary preferences of both fruit bats and insect bats.

This was followed by a panel discussion on survey protocols of volant and non-volant small mammals. The discussion was led by Paul Racey and Mike Jordan, during the course of which they answered different field related questions of the participants.

Mike Jordan illustrated about the importance of small mammal conservation with several examples. He explained about the threats to the small mammals such as habitat loss, introduction of alien and invasive species, predation, disease, habitat destruction, habitat degradation, all of which lead to habitat fragmentation. Defragmenting the population using recolonisation and reintroduction is a way out for the conservation of small mammals under severe threat. Mike also told that out of the 83 species of mammals that were extinct over the past 500 years, 75% are small mammals.

Wipula Bandara Yapa made presentation on an "Introduction to Sri Lankan Mammals" with particular emphasis on small mammals. This was followed by a presentation by Nameer Ommer on the CAMP process and the results of the CAMP on small mammals conducted by ZOO/CBSG



South Asia on small mammals during 2002 and 2004 on volant and non-volant small mammals respectively.

Field session: The evening mist netting was done on the bank of the Mahaveli River, which incidentally is the largest river in Sri Lanka. The river was dammed at Randenigala. Mist nets were set across the Minipe canal, just underneath one of the bridges across the Minipe canal. There was a roost below the bridge and within about 30 minutes of setting the net we caught six bats. These bats were processed in the field itself by Paul Racey. He explained the use of identification keys, and also the key prepared by Sampath de Alwis Goonatilake was used. With the help of the different keys, we reached up to the genus of the species caught, as *Myotis*. It was identified either as *Myotis hasseltii* or *Myotis horsfieldii*. Sampath and Yapa are studying the cranial and dental characters of the bats to confirm the

identity. If it *Myotis hasseltii* then it is a rediscovery of the species after Phillips who located it in 1930s and if it is *Myotis horsfieldii* it will be a new record for the country.

One of the net was kept across a trail passing through the forest patch. One *Cynopterus sphinx* was caught in that net.

Day 5: B.A. Daniel explained about the various education activities of Zoo Outreach Organisation, particularly those related to small mammals.

Mike, Paul and Nameer then led a discussion on conservation recommendation of small mammals drawing examples from the IUCN Red list categories of small mammals of Sri Lanka. They pointed out the lack of our knowledge about the known species of small mammals of Sri Lanka and warrant more studies on them. One of the



Paul explains the technique of setting up mist nets to participants



main reasons for the conduct of this training workshop here in Sri Lanka is to equip young researchers to take up this challenge.

This was followed by a discussion on sources of funding for studies on small mammals, which was led by Paul and Mike. They have given the details including the web site address of various funding agencies that would be interested in funding studies on small mammals.

During the valedictory function all the participants were asked to give commitment to take up some activities towards conservation of bats and rodents. All participants received a certificate of appreciation and a CD containing all presentations of the resource persons and related literature. Dr. Wipula Yapa thanked all the participants for their interest shown in attending the workshop. He also thanked the Zoo Outreach Organisation, particularly Sally Walker for the visionary zeal of organising this kind of training workshop in different regions of South Asia, which would

definitely have a long standing impact on the conservation of small mammals of the region in the years to come. Yapa also thanked the resource persons for their time and effort to go over to Sri Lanka to train the young biologists of the country.



Workshop Participants



Paul and Mike in the filed concluding remarks of the day

The ongoing small mammal training in South Asia conducted collaboratively by CCINSA and RILSCINSA is sponsored by

Chester Zoological Gardens, U.K. (Bats)



Bat Conservation International, U.S.A. (Bats)



Knowsley Safari Park, U. K. (Rodents)





Field Techniques Hands on Training workshop on Survey of Small Mammals *List of Participants -- Network Contact Information: CCINSA and RILSCINSA*

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Project PteroCount

South Asian Bat Monitoring Programme *Pteropus giganteus* Population Monitoring Project

Overview

The South Asian Bat Monitoring Programme aims to create awareness about bat conservation issues, involve and educate biologists and nature-lovers in studies about the biology of bats, and establish a conservation action plan. The Programme will initially focus on one species, the Indian flying fox (*Pteropus giganteus*) as it is the most known and recognizable bat species in South Asia.

The programme is based on a collection of volunteers from a broad range of backgrounds who have identified *Pteropus* roosts in their area and have committed to studying the roost and obtaining population information on a regular basis. It consists entirely of volunteers and is the first such network to monitor the population of a species in South Asia. The information from all these sites will be compiled and analyzed for trends in the population of *Pteropus giganteus*, identify key threats to roosts and provide recommendations for their conservation.

Background

Little is known about the population status of *Pteropus* or any other bat species in any country of South Asia. While we have a good idea of the number of species, and limited information about their distribution, the actual numbers of individuals of each species remain an unknown.

It is difficult to assess whether a species requires any conservation measures without reliable population estimates. That is, unless one cannot show that a population is declining or under threat of decline, one cannot create a plan to conserve it.

Although there are anecdotal accounts which indicate that populations and roosts of many bat species are decreasing, there is no hard evidence. There is thus an urgent need to assess the populations of bats and to monitor them on a regular basis to determine population trends.

Bat populations face some of the same threats that other species do, including direct disturbance by humans, habitat loss, and limited roosting sites.

Pteropus giganteus, the Indian flying fox, is an ideal first candidate to study population trends because it:

- is the only large pteropodid on the subcontinent and is easily identified
- is visible during day

- is large and easy to count
- often roosts near humans
- is often easy to acquire historical information about roost from locals (like age of roost, behaviour of the animals and population trends)

Objectives

- To establish an organised group of individuals that monitors *Pteropus* roosts and provides information on population size as well as threats.
- To have a significant number of participants throughout South Asia
- To establish long term data on roost size, fidelity, etc.
- To collate this information and analyze the data for trends in populations
- To make this information readily available for dissemination to all interested parties
- To create a conservation plan for *Pteropus* based upon the information collected

Methodology

The methodology requires three simple steps

- Locate and describe the roost site
- Count the number of bats at this roost
- Provide the information via the printed or online form

Information Required

(Minimum) - The following items are essential and necessary.

- Species
- Date
- Location (State, District, Taluk, Village)
- Roost Size
- Protocol used to count bats: Exact or Estimate (below)
- Observer's Name
- Observer's Address

(Additional) - The following are very useful, but not absolutely necessary. Participants are encouraged to provide as much as possible, without making the task of monitoring too difficult.

- GPS Location of roost site (Degrees-Minutes-Seconds or UTM)
- Number of roost trees
- Roost tree species (common or scientific name)
- Height of roost (range)



- Photographs of the roost (showing details as well as surrounding area)
- If roost is remote, directions from nearest village
- Distance to nearest forest and directions
- Threat information (e.g., disturbance, killings, habitat loss)
- Protection information (e.g., temple, sacred groves, sanctuary)
- Notes and comments (include any anecdotal information about history of roost)
- Observer's Email and Phone number

Protocol

Measuring the population

Each roost should be measured by means of one of two methods, an exact count or an estimated count. The choice of methodology should be noted on the data sheet.

Bats tend to be more active during dusk and dawn hours, often flying around the roost and changing their location. It is therefore best to conduct the count during the day (not dusk or dawn) as this minimizes the chance of missing a bat in the count or multiple counts of the same individual.

1. Exact Method: This method should be used for small roosts (300 or less) where individuals can be easily distinguished and counted. Counts should be conducted by enumerating the number of bats on individual branches to create a tree total and then summing bats across all trees.

2. Estimation Method: If there are too many bats to count each and every bat, one can use an estimation method. It is important to note that no one method is suitable for all situations. Here we present a few methods that are commonly used to estimate populations. If you use your own estimation method, or a variation of one of these, please describe in detail on the form.

a. Branch Estimates: Identify all the major branches on the tree that have bats on them. Pick a branch that has an average number of bats on it (i.e., don't pick one that has just a few, or the branch that has the most). Count the number of bats on this branch and multiply that number by the total number of branches that are occupied by bats. You can make this estimate more precise by counting a few branches and taking the average, and also by ensuring that the branches are of roughly equal length. Additionally you could count the actual number of bats on branches where they are sparse, and then use the estimation methods for the heavily populated branches.

b. Tree Estimates: In situations where the roost is spread out across many trees, one can count the number of bats

on a tree and then multiply by the number of trees. You can increase the accuracy by following the same suggestions above.

c. Flight Estimates: If it is not possible to count the bats while they are on the trees, one can count the number flying from the roost. This is suitable for small roosts where visibility is not a problem. This method is not recommended as many factors can affect this count (bats flying in different directions, darkness affecting visibility, inaccuracy of counting many flying bats concurrently, etc.)

Other Considerations

Sampling Periods

Ideally, censuses should be done once a month. At a minimum a census should be done annually. However, annual censuses will not provide useful information on seasonal patterns of movement, changes in roost size or reproductive cycles.

Roost ID numbers

Each roost will be assigned a unique roost ID - preferably based on a GPS location but if not possible then by using the detail directions to and description of the roost. Once your roost site has been given a number, you may use this reference number in subsequent surveys and not have to fill in the location information every time.

Disturbance at Roosts

It is important that the monitoring activity of the researcher not disturb the bats at their roost. One should avoid any activity, such as getting too close to the trees or talking too loud, which may disturb the bats.

Additional Information

There are many other studies that can be done at the roost site, and much depends on the time and inclination of the participant. Some of the possible topics worth studying include monitoring roosts for sex ratios, age structure, reproductive status, threats, social behaviour, sleeping activity, social structure, foraging activity, movement between trees/roosts, direction that bats fly at sunset, etc. Those interested in studying such aspects of the roost may wish to contact the group organizers for details.

Products

The data collected will be analyzed for patterns and changes in populations. Annual reports will be sent to each participant in the network as well as published online. The summary information, but not the details of each site, will also be available at any time via the internet. The network will periodically publish summaries of the information collected so as to distribute the information to the scientific community and also inform policy.



Ownership of Data/Copyright Issues Ownership of Data

The data collected belong to the researcher and the group. Thus, the individual volunteer may use their site data to publish in any way they wish and the programme may use the data from multiple sites for "Programme scale" publications.

Thus, by participating in this group, the volunteer agrees to help the Programme to

- Add their data to the Programme database
- Present summaries of the data on the website as well as in annual printed summaries (Note: at no point will the Programme release actual location information or details of a study to others without the participant's permission)
- Publish papers based on the information collected by the Programme. These papers would be at the scale of the entire Programme and not the individual sites. Thus there should be no overlap between these publications of those of individual researchers. If anything, they will compliment each other. Since we anticipate that there will be many individuals taking part in this collaborative project, it would be difficult to list all as authors.

Contact: Ptero Count Sanjay Molur and Shahroukh Mistry, Coordinators Sally Walker, Convenor/Administrative Chair, CCINSA Sripathi Kandula, Scientific Chair, CCINSA Zoo Outreach Organisation, 29-1 Bharathi Colony, Peelamedu, Coimbatore, Tamil Nadu 641004, India
Email: pterocount@pterocount.org, sanjaymolur@rediffmail.com, zooreach@zooreach.org

Volunteers needed

The Chiroptera Conservation and Information Network of South Asia (CCINSA) along with Dr. Shahroukh Mistry, USA, have embarked on a project that involves identification and monitoring of fruit bat (*Pteropus giganteus*) colonies/roosts all over South Asia. The project will be an ongoing one with regular monitoring of colonies to understand the dynamics, population trends and various other aspects of the region's largest bats.

If you or any one of your colleagues or friends are interested in joining this exciting project, please write with your name, address, occupation, interest in this subject, and the geographical area you would like to participate in monitoring fruit bats.

We already have a few volunteers who have started work in different parts of South Asia. South Asia is a large region and we need many more people.

Write to us at the earliest to be part of this long-term, first of its kind project.

Enrol

If you wish to join Project PteroCount as a Volunteer, please fill in your details below and also write about your interest, experience and why you wish to volunteer. You can find this form on the website < www.pterocount.org > under Volunteers Needed or you can type or write it up using the format below and send it by e or snail mail or fax to our office. Email : sanjaymolur@rediffmail.com; Fax : +91 422 2563269 or POB 1683, Peelamedu, Coimbatore 4.

Name
 Organisation
 Address
 City
 State
 Pincode
 Country

Phone
 Fax
 E-mail
 Comments (if any)





**South Asian Bat Monitoring Programme
Project PteroCount**



Observer code:	Data form	Site code:
Observer's Name:	Date of observation:	
Observer's Address:		

Email:	Phone/Mobile:
--------	---------------

Location of roost:					
Country	State	District	Taluk	City/Town/Village	Location name

Is the roost situated in/by

The roadside	Agricultural field	Forest	Temple	Village	Plantation	Home garden
--------------	--------------------	--------	--------	---------	------------	-------------

Other (Describe)

Elevation	GPS location of roost site					
m	Degree	Minutes	Seconds	U	T	M
ft						

Roost size (number of bats - accurate, approximate or range):							
Accurate	Approximate	Range					
Protocol used to count bats: 1 Exact 2 Estimate							
If Estimate choose method (see background information)				2 a (i)	2 a (ii)	2 b	2 c

Number of roost trees:	Height of roost trees (range):
------------------------	--------------------------------

Roost tree species (common and/or scientific name):

If roost is remote, directions from nearest village:
--

Distance to nearest forest and directions:

Threat information (e.g., disturbance, killings, habitat loss):

Protection information (e.g., temple, sacred groves, sanctuary):

Notes and comments (include any anecdotal information about history of roost):
--

Photographs of the roost (showing details as well as surrounding area)	Yes	No
--	-----	----

Send this form to Project PteroCount, c/o CCINSA/ZOO/WILD, 29-1 Bharathi Colony, Peelamedu, Coimbatore, Tamil Nadu 641004, India; Or Email the information to: pterocount@pterocount.org, sanjaymolar@rediffmail.com, zooreach@zooreach.org, Or Fax to +91 422 2563269



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Bat Data put up on new ZOO/WILD South Asian Taxa Website -- Threatened Taxa Monitoring System for South Asian Fauna, Flora and Fungi (www.southasiantaxa.org)

In order to provide an easily accessible and retrievable data set, ZOO and WILD have developed a website with the following characters :

1. standard, taxonomically correct, current, systematic regional checklists of all taxa of fauna, flora and fungi of South Asia
2. national checklists for the eight South Asian countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka
3. global assessment of taxa (species and subspecies) for all endemics of South Asia
4. regional assessment of taxa for all non-endemics in South Asia
5. national assessment of taxa for all non-endemics in every country of occurrence in South Asia
6. compilation of information from experts in the region and apply IUCN Red List Criteria for in-house assessment status of taxa
7. development of distribution maps
8. analysis of information for the region and for every country
9. compilation of drawings and photographs for every taxon
10. compilation of information for global assessments for IUCN Red List
11. creation of a mechanism for local and regional experts to update distribution information and maps
12. concise and accurate assessments of South Asian taxa made available on the web
13. provision of most up-to-date distribution information and maps for all taxa
14. a system for monitoring the status of selected taxon groups in the coming years
15. a web site dedicated to achieving all of the above
16. a single database for effective summaries and analyses
17. a system to compliment global assessment efforts by IUCN
18. a source of reliable taxonomic and conservation information for faunal, floral and fungal taxa of South Asia in one place

The system will be available for all experts to contribute and update regularly under specific guidelines. An in-house team of database managers and outside experts will be involved in compiling the information to constantly review information and update. Information will be provided in the required format to the central IUCN SSC Red List office for inclusion in the global red list. The system is intended to be aid in monitoring the status of taxa in the wild in South Asia. It has been initiated after successfully assessing status of South Asian taxa over the last 10 years. The TTMS will be evaluated as often as possible by various outside experts and agencies. The usefulness of the system will be measured by the comments received and by the number of hits on the website over the long term.





Bat Festival 2006

This is the 6th festival celebrated by a formal committee in organized way. The place of the traditional “Bat Festival” is Kondoli Hills of Nagaon dist.in Assam. The 3 days event began on 28th Feb by hoisting the flag of the committee at 8 a.m. The entrance towards the bat caves was opened at 9am. Then there was religious events among the crowd. On next day, 1st March at 9am it was like a zoo visit. Tourists and the devotees were there inside the bat caves to watch the bats roosting inside. The last day on 2nd March there was a open meeting of the festival where Mr. Prafulla Kr. Mahanta , ex CM of Assam was a guest speaker.

The bat festival, actually a bat worshipping, has been taking place from a long time in the place. Among the local people, a belief prevails that the bats are female creature having some heavenly powers to bless and favour people.



The event is not a scientific or environmental thing. But somehow the event is helping in protecting the bats there. However, the activities during the event, like-large crowd, noises, lighting inside caves and smoking are much harmful and disturbing for the cave bats. The bats several hundreds in number comprise of approx.

8(eight) species. I feel a detailed and scientific study is essential indeed.

Submitted by: Debojit Phukan,
Secretary, Bat Club of Megamix,
Dhakuakhana, 787 055 Lakhimpur,
Assam

Report of Bat Club of Megamix activities

It was a daylong event of World Environment Day 2005. During the deliberation Session, Mr. Debojit Phukan of Bat Club of Megamix was the first resource person to talk about the various rules of wildlife in keeping the environment okay. He described how the flowers are pollinated by the insects and other animals, how the pests are naturally controlled by the insectivorous bats, how the seeds are dispersed by the birds and mammals to widen forest and how the plants attracts creatures and creatures in responds protects and regenerate plants

Date: 19.06.05, Place:
Ghilamar Public High School
In this day long programme, Debojit Phukan of Bat club of Megamix for





“Capacity Building of Eco-Club in school”. For bat introduction, students and teachers are taught what is environment, what are the objectives of a eco-club and what to do as an eco-club member.

The rest of the day was a programme related to bats and other wildlife. Students, teachers and some local people were the participants. Habits of wildlife including bats as the prime element of eco-systems were demonstrated by displaying the packets of “ZOO” and “WILD”.

A game identifying an animal (marked stone) with the eyes blind folded and what am I (Species name card) was played among the eco-club members

In another programme, Date: 24-07-05, at Bhalukaguri (Assam), Mr. Narin Chutia and Mr. Debojit Phukan of “Bat club of Megamix” were the two resource persons to train the students and youths of this wildlife-prominent locality. The Programme was started by using black-board, ZOO-packets, wildlife posters and wildlife cards and ended with field activities. The objectives of these programs was to demonstrate about the rules of species in biodiversity and how foods, medicines, shelters and cultural resources come from biodiversity. Bats were highlighted as prominent wildlife in protecting biodiversity

Submitted by Debojit Phukan, Date: 05-06-05, Place: Ghilmara (Assam) Megamix Nature Club Dhakuakhana, Lakhimpur, Assam- 787 005. Email: debojit.p@rediffmail.com



Nature Club Surat studies bats

An exciting activity was undertaken on bats. All participants who had come to our farm for a day camp were provided with the kit on bats and were also given other information on bats. They were informed of their habitat, food, their look and habits. Many of us feel that bats are only destructive and they are of no use to us. But after going through the information given in the kit the children really enjoyed and learnt a lot. Regarding the blind belief that bats suck blood and spread rabies it was made clear that this was just a rumor and without basis. The participants were taken on a visit around the farm and showed them how bats live during the day hanging on the trees and only become active at night, as they are nocturnal. They are more active during the night and they come out at dusk looking for food. They mainly rely on fruits so normally we find them residing on or near fruit trees. Children had a great fun seeing all this and gathered more information and learnt more new things of which they were unaware.

Submitted by Snehal Patel, President, Nature Club Surat, Environment Education & Research Centre



Zoo Education Programme on Bats Conservation at Maitri Baag Zoo

The Maitri Baag Zoo, Bhilai Steel Plant conducted an educational programme on Bat Conservation to the students of Kendriya Vidyalaya (Central School) Raipur in Chhatisgarh.

Over 300 students of Kendriya Vidyalaya along with staff of the school visited the zoo for zoo education. The students and teachers have taken round along with zoo education unit Dr. G. K. Dubey, Dr. T. Kalaichelvan and C. Balkottaiya. The students were divided into 3 groups led by the staff of the Maitri Baag Zoo education unit.

The students were given information about the role of bat in the environment by controlling rodents and mosquitoes. The bats are also having role in seed dispersal. They were given information about the decreasing number of bats in the field due to habitat destruction, pesticides, and human activities in a different ways. They were also given messages on myths about bats. In Maitri Baag Zoo, the bats used to roost in the natural habitat and enjoy themselves. The management of Maitri Baag Zoo has given protection to the bats.



The students were taken to the natural site and given information and they enjoyed themselves.

During educational visit the members of Maitri Baag Zoo explained the purpose of the zoo, i.e. conservation, zoo education, research and recreation.

To fulfill one of the aims of the zoo, zoo educations the students were given much information about habit, habitats of wild animals, feeding habits, status of wildlife etc. The students also interacted with staff of the Maitri Baag Zoo.

During this educational visit, the students were given educational packets containing masks, placards, stickers, information booklet etc on bat conservation provided by Zoo Outreach Organisation. At the end of the programme, the participants took an oath on the conservation of bat and also wildlife in their lifetime by tying the traditional rakhi (wrist bracelet with bat theme) on one of their partners' wrist.

During the visit they were also given certificates provided by Z.O.O. Coimbatore. School teachers also took active part in this programme and the school principal appreciated the programme material provided to them.

Submitted by Dr. G.K. Dubey, Chief Veterinary Officer & Dr. T. Kalaichelvan, Zoo Supervisor, Maitri Baag Zoo, Bhilai Steel Plant, Bhilai-490 006, Chhatisgarh.





A Report on the Bats 'N Rats Activity Session in the TCS Childrens Summer Camp, May 16-20, 2005

As part of the TCS Maitree Sanctuary Conservation Initiative, a children's camp was organised at the TCS office at Banyan Park, Andheri. Sanctuary conducted nature related activities for the children every day of the camp, held from 16th May 2005 to 20th May 2005. Fifty-four children ranging from the age group four to thirteen years attended. Registration began at 9:30 a.m. with nature diaries, nametags and wildlife stickers were distributed to the children. After introductions, the children played "The Moo Game" - an icebreaker to help them get familiar with everyone.

There were varied activities organized ranging from nature trails to arts and crafts. The camp commenced everyday with a yoga session where the children concentrated on breathing exercises and also learnt some basic yoga exercises. The children were asked to pot saplings of various plants provided like hibiscus and byrophyllum. Each child was responsible for watering their plant everyday. They also learnt to make pug-marks using plaster of Paris. The children were taught to make these casts by the same method used by forest guards while doing wildlife census in the jungle. The children were taken to CEC (Conservation Education Centre) at Goregaon and taken into the forest for a nature trail. The trail lasted for half an hour, during which the children not only learnt about the flora and fauna inside the park, but also learnt about the importance of Sanjay Gandhi NP to a city like Mumbai.

The children were shown a short documentary film by David Attenborough, which was not only interesting, but also educative. There was a wildlife quiz based on all they had learnt at the camp and also a fancy dress competition; the themes being animals, fruits and vegetables. The camp also included a one-day theatre workshop at the end of which the children performed short skits with a wildlife theme.

Bats 'N Rats Activity Session May 17, 2005

A bat workshop was also conducted at the camp. The session commenced with a 30 minute interactive power-point presentation on bats where the children learnt about their physical characteristics, habitat, food and importance.

Interesting facts were told to the children about bats for e.g., the little Brown can eat up to 1,200 insects in one hour and how bats live on all continents except Antarctica! Myths and tales about bats were discussed and many mis-conceptions that the children had about bats were cleared. The presentation ended with a short question-answer session.

Distribution of Bat Kits

The presentation was followed by distribution of the Bats n Rats kits. The children read through the information with wildlife biologist Ms. Supriya Jhunjunwala which led to a detailed interactive discussion about the information contained within. They wore the bat and rat masks. There was an activity session during which the game at the back of the A3 poster of a cave bat was used and the children eagerly wore the bat and rat masks provided in the kit. The children were instructed to tie the rachis provided in the kits to their parents at home.

Visit to Bat Colony

This was followed by a short visit to the bat colony at the Banyan Park where they viewed the habitat and mannerisms of the bats from close proximity.

T-shirt Painting Competition

The session concluded with a poster painting competition where the children were given T-shirts with a bat outline to paint. This was a competition where there were six winners-three in the junior category (ages 4 to 7) and three in the senior category (ages 7 to 13). The winners were felicitated on the last day of the camp during the prize distribution ceremony.

Later there were other activities ending with prize distribution. The camp went very well with the children enjoying all the activities their favourite being the T-shirt painting competition.

Submitted by Karen Menezes Sanctuary Asia, Email: <mail@sanctuaryasia.com>

Distribution of Roosting and Survival Threats of Bat in Pokhara Valley with reference to Species and Population Survey at Chamere Gupha

A Dissertation Submitted by Pushpa Raj Acharya to the Central Department of Zoology Tribhuvan University, Kathmandu

Abstract

The study of roost distribution, threat analysis of bat at Pokhara Valley with reference to population and species survey at Chamere Gupha was carried out from September 2004 to October 2005. Roost findings and threats study was primarily done through questionnaire survey and direct observation. Population counted by thorough counting with many trials and species survey by capturing the specimen and identification at lab.

Altogether 11 permanent roosts (9 cave roosts and 2 tree roosts) were explored during study period. Habitat loss, habitat destruction, excessive tourist flow, changing cave environment and some natural threats were found major survival threats to bats. Chamere Gupha is the renowned cave for tourist visiting Nepal, which was found providing restplace to more than 3,000 bats





Current Members of Chiroptera Conservation and Information Network of South Asia

Members directory is up on the website at www.zooreach.org. Many members never got back with updated information, so if your entry has mistakes please write to us and correct them. Also, since it has been a year, update your work -- your field surveys, projects, research, lectures given, awards received, education events organised, etc. Everybody is responsible for their own entry. If you don't correct us then it will remain wrong and incomplete.

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Profile of one of our own -- Sanjay Molur R.V. Sally Walker*

Sanjay Molur, Deputy Director of ZOO and Founder/ Secretary of WILD and Red List Technical Expert for IUCN SSC CBSG as well as all our ZOO and WILD networks is in the process of obtaining a long-overdue Ph.D. He has an exciting topic, e.g. "Habitat and status assessment of mammals in southern Karnataka, with special reference to bats and rodents." The reason this is an exciting topic will be explained in the profile, taken from Sanjay's synopsis.

Sanjay has worked for ZOO for 13 years and about 4 years ago founded an organisation to help ZOO maintain its *ex situ* mandate by taking on much of the *in situ* work which ZOO had fallen into. Dr. Mewa Singh, Chairman, Dept. of Psychology, Manasagangotri, Mysore is his guide and he has registered with Mysore University.

One of the reasons Sanjay's Ph.D. is exciting for us is because it deals with two groups of our major network taxa, bats and rodents. Sanjay took up the ZOO and WILD ran about the neglect of non-charismatic invertebrates by focusing on these two most speciose and least studied groups, bats and rodents.

Although large mammals in India are relatively well documented, smaller or lesser-known mammals such as rodents, insectivores, scandents, lagomorphs and bats are primarily known from old taxonomic work in the fauna volumes. Very little information on their distribution is available from various local and regional publications. For many smaller mammal species, the information is just from type descriptions. An impressive compilation of the knowledge on bats of South Asia has been brought out recently (Bates and Harrison, 1997). A compilation of mammals of Western Ghats is listed in Nameer and Molur (2001).

The Bombay Natural History Society conducted a series of mammal surveys all over India, the earliest work in southern India published by Wroughton and others. BNHS followed up the surveys periodically in selected areas of the country, including southern India by Katherine Ryley, Shortridge and J.C. Daniel. The mammal surveys included all mammals and information on rodents and bats are available in certain areas of southern India for more over 50 years (1910 to 1960). This information forms an excellent basis for comparative work in species assessments if similar surveys are conducted presently.

Since the mid 1800, human impact on wildlife and wild habitats has had repercussions on their status. A number

of studies on larger forms such as primates, tigers, elephants and other 'visible' mammals have shown the negative effects of such human interference on habitats. Much of the conservation measures in the recent past has also focused on these studies, which have led to the present day management plan in developing protected areas, sustainable use initiatives and joint forest management involving local communities.

However, such conservation efforts rarely include the status and needs of lower forms such as amphibians, reptiles, invertebrates, fishes, bryophytes, pteridophytes, gymnosperms, fungi, lower angiosperms and lower mammals. These groups being important components have not been assigned an important status in conservation plans. Of these, the group of smaller mammals is chosen in this proposal as focus groups in assessing the impact of habitat change to their status, presence and abundance.

It is not well established whether loss of habitat or changes in habitat quality can have a negative effect on small mammal densities and composition, although several recent small mammal workers abroad are of this opinion (Mike Jordan, pers. comm.). A comparative account of presence/absence data on smaller mammals presently *vis-vis* older data (BNHS mammal survey) can help understand the effects of changing habitat on these forms.

Only some areas in southern India have been inventoried for smaller mammals recently (Shankar, 1999; ongoing work by P.O. Nameer, C. Srinivasulu and Kranti & Yardi, Molur *et al.*, 2002), but most have been within protected areas, e.g. Nagarahole by Ullas Karanth and Upper Bhavani by Karthik Shankar. These studies, however, have not looked at trends in small populations or the effects of habitat change.

In recent efforts to understand the status of many taxonomic groups in India, the process of Conservation Assessment and Management Plan (C.A.M.P.) workshop methodology has been employed. In the status assessments of mammals of India done using the C.A.M.P. method in 1997, it was found that more than 30% of the bats and rodents in India are threatened with extinction (Molur *et al.*, 1998) as tested against the IUCN Red List Criteria, version 2.3 (IUCN, 1994). Fifty-nine species of rodents, bats, insectivores and scandents were categorized

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Asia by the same method indicated very little information for many species in the region (Molur *et al.*, 2002), a big lacuna in wildlife studies.

This study is with the intention of understanding the role of habitat change in species and population composition of smaller mammals in southern India by comparing old data with that to be conducted in the course of the project. While the BNHS teams surveyed many localities in the 1900s, a few locations in Coorg in Karnataka have been selected for the present study. The reason for selecting Coorg are for the reasons that the localities fall within both the Western Ghats and adjoining plateau which are home to unique fauna and flora, the areas have had a tremendous impact of human populations in the last 150 years, and the areas have been worked by the forest departments for timber in the past.



Sanjay Molur helps put up mist net in the forested areas near the Pakistan Museum of Natural History in Islamabad, the site of one of our three small mammal training workshops in Pakistan with resource persons Paul Racey for bat and Mike Jordan for rodents. Photo by Sally Walker.

This is a unique situation in which data is available so far back and Sanjay is fortunate to have been well advised about this by Mr. J.C. Daniels of BNHS. Despite not having an advanced degree, Sanjay has been imminently useful to the Chiroptera and Rodentia students in assisting with the network sponsored training courses and other activities. The network trainings have been useful to Sanjay as well and we are happy to have had such a mutually beneficial association within our organisations.

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CCINSA/NATURE Bat Clubs, Kathmandu, Nepal

Geeta Shrestha*

Nature and its resources are wonderful -- living beings, environment, ecosystem are so closely related, similar to a spider web. If one small part of the web is destroyed the whole weave of the structure or entire ecosystems and the lives thereof are affected. After various global decrees and conventions and the attendant publicity, gradually people are becoming more aware of the value of nature and its ecosystems for their survival. Since last two decades so many conservation works including education and research have been and are being done to save nature and its resources. However, because of the tendency of educators, public relation persons and even scientists themselves to focus on charismatic megavertebrates, the common man thinks about nature conservation and balance of ecosystem in terms of large, powerful and attractive animals.

Even people who really care and work for environment protection don't give much attention to some animals, such as bats, despite its essential role in balancing ecosystems and the long term effect on the stability of our environment. Even I worked in the field of conservation education for last 10 years and never thought of educating children about bats. I always focused my lesson in attractive, large and endangered species. But one day Ms. Sally Walker, Founder/Director of Zoo Outreach Organization of India advised me to start bat education in schools and provided the educational materials. The materials were very interesting, informative and, best of all, interactive -- you could help your audience learn by doing activities with them. I came to know lots of interesting thing about bats and their significant role in balancing ecosystem. I was inspired to learn more about bats. With the support of Zoo Outreach Organization and



Group photo of Nepal's first Bat Club

CCINSA and their sponsor Chester Zoological Gardens, my organisation NATURE started Bat clubs in schools and began conducting bat education activities in those schools. The first club was so rewarding, we thought of starting other.

Now, NATURE runs a total of three CCINSA bat clubs. I should mention that CCINSA stands for Chiroptera Conservation and Information Network of South Asia and NATURE stands for Nature, Awareness Trust Utility Resource for Environment.

First club -- Boudha School

The first club was called "NATURE Boudha School Nepal CCINSA Bat Club" This school is situated in Baudha, Kathmandu. Here we have 22 club members from class 6 and 7. In this bat club all the meetings, field trips and bat educational activities requested by CCINSA have been completed but we are still in touch with the club members and encouraging them to learn more about bats and share it with their friends. The club members are engaged in

activities on their own and collecting information about bats and sharing with us as well. The coordinator of this club is very active and comes to NATURE office to get advice and information which he shares it with other club members.

I had requested teachers of this school to spread bat education through different ways and they took the initiative to put a two-page lesson about bats in a primary school book. Now this book has been published in Nepali language and there are two pages about bats with a photograph. The pictures were taken from the material provided by Zoo Outreach and CCINSA. Thousand of children will be reading at least some general information about bats which will help to develop a positive attitude towards bat from their early age.

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Second Club

The second Club; "NATURE NMSA CCINSA Bat Club"; (National Model Science Academy). This school is situated at Gongabu, Kathmandu. Here we have 32 members all from class 7. In this club we have finished two meetings, named the club, registered club members formally and did a pre-evaluation of their knowledge about bats. We have scheduled three more meetings and a field trip with this club members.



Wildlife Conservation Society at Bronx Zoo New York presented me a Book all about American Bats in recognition of our work with bat education In Nepal.

Third Club

The third club; "NATURE SDBS CCINSA Bat Club" (SDBS is Shahid Dharma Bhakta School) and is situated at Nakkhu, Lalitpur. Here we have already met the principal and got approval to start bat club and selected the name for club. We will be starting club meeting and its activities by the first week of May.

There is no special course or programs in Nepal to acquire detailed knowledge about bats. The NATURE Bat Club activities are going well and helping to create awareness about bats among school children. We have found tremendous changes in students' attitudes towards bats when we matched pre- and post- evaluation forms. Thus we are satisfied with the outcome of this programme. I had presented NATURE Bat club program as a successful program while I was attending an Environmental Education Fellowship program in Bronx Zoo New York in 2005 organized by Wildlife Conservation Society WCS. During the training the staff of WCS helped me to get more information about bats and at the last day of training WCS provided all the participants with a personal gift and my gift



Briefing about bat club in NATURE
Bauddha School Bat club

was a book which was all about bats. This was really more valuable for me than any other gift. So I am really thankful to ZOO, CCINSA and WCS for providing such valuable educational materials and guidance about bat clubs, through which I am being able to raise awareness among the students about bats which is the key for its conservation.

Two more CCINSA Bat Clubs in Nepal

Sujas Phuyal and Rajesh Rajchal, students of Institute of Forestry, Pokhara Campus, Nepal are forming bat clubs in Pokhara for a range of age groups. Rajesh came to us via Geetha Shreshta who has given bats quite a bit of coverage with her bat clubs for kids and her search for experts to speak to the kids. Rajesh formed his club some time ago and Suhas is starting now.

Although our grant for Bat Clubs from Chester Zoo is exhausted we have materials left which we are providing to Suhas and Rajesh. These consist of a variety of bat education material to use as guidelines and also camera ready copy of the printed material so we can all put our money directly into printing instead of in postage or customs duty.

These bat clubs will create a population of youngsters who might be interested in become bat scientists one day and who, at the very least, will know the value of bats and how to honour their tremendous role in making our lives better.

Zoo Outreach Organisation and CCINSA provided a set of bat club educational materials and a CD which consists of more bat education stuff and the camera ready copy of all the printed materials to print more copies by themselves.





Opportunistic Survey of Indian Flying Fox *Pteropus giganteus* (Brunnich, 1982)

K. R. Senacha*

Indian flying fox, *Pteropus giganteus* is a megachiropteran species of bats distributed widely from Pakistan, Nepal, India, China and Maldives through to Myanmar. It is well distributed across India (Bates and Harrison, 1997).

During the period of May 2004 to July 2005 we travelled across various destinations in Northern, Western, Central and Eastern India by car for the field work aimed to investigate the prevalence of diclofenac in livestock carcasses. It has availed me an opportunity to explore various roosts of Indian flying fox, *Pteropus giganteus* (Fig.1). I could locate twelve roosts of this species varying with population range of 13 to 2500 individuals (Map.1) Table 1 posses the brief account of all these roosts.



Fig.1: An individual of Indian flying fox: *Pteropus giganteus*. Photo: K. R. Senacha

The most thrilling experience for me was to saw a huge colony, comprising of 2000 - 2500 individuals, of this species roosted on twelve trees of five species. It was the late afternoon of rainy days when we were traveling from Udaipur to Sirohi in Rajasthan by road on 27 June, 2004. Being a hilly route we were making fun in the start of the Journey with slow classical music running in our car, but our driver Mr. Anant got stunned upon hearing a sentence "Aarre rooko" which I uttered curiously in response of sound heard thereon of Indian flying foxes. He stopped the vehicle and we got down to look for the flying fox colony. I turned thrilled to



Fig. 2: A colony of Indian flying fox: *Pteropus giganteus* roosting on a tree of *Albezia* sp., located at roadside of village Jaswantgarh (Tehsil- Gogunda, Distt. – Udaipur), Rajasthan. Photo: K. R. Senacha

saw a tree full with flying foxes, which was looking entirely black on the top due to presence of bats (Fig.2 & 3)



Fig. 3: A close-up view of Indian flying fox colony roosting on a tree of *Albezia* sp., located at roadside of village Jaswantgarh

It was located just aside with the right side of the road running out from the village Jaswantgarh (Tehsil- Gogunda, Distt. – Udaipur) towards Sirohi (Rajasthan), but then dazed upon another glance at some more trees fully occupied with this species of bats (Fig.4). We spent almost two hours to examine the entire roost in detail. There were total twelve trees belonging to five different species of plants, of which

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Table 1: detailed account of different roosting sites of Indian flying fox,
Pteropus giganteus observed through May 2004 to July 2005

Sl. No.	Location of the roosting site with GPS reading	Date of observation	State	Roosting trees	Estimated population
1	Kankariya Lake, about 2 km from Main Railway station, Ahemadabad (23.04561 N & 72.57598 E)	26.06.04	Gujarat	<i>Ficus</i> sp.	100 - 110
2	Tree on the four lane divider, Ahemadabad – Udaipur national highway, near village- Padhuna, Tehsil- Girava, Distt.- Udaipur (24.35550 N & 73.65237 E)	26.06.04	Rajasthan	<i>Ficus</i> sp.	140 - 160
3	Roadside trees, road running out from village- Jaswantgarh, Tehsil- Gogunda, Distt.- Udaipur- Sirohi Road (24.74871 N & 73.51075 E)	27.06.04	Rajasthan	<i>Ficus</i> sp. <i>Albezia</i> sp. Three unidentified	2000 - 2500
4	Roadside trees, near Bus stand of village- Dewala, Tehsil- Bekariya, Distt.- Udaipur (24.74727 N & 73.45822 E)	27.06.04	Rajasthan	<i>Albezia</i> sp.	13 -15
5	Pinjore garden, Pinjore, Hariyana (30.79193 N & 76.91528 E)	21.07.04	Hariyana	<i>Mangifera indica</i> <i>Eucalyptus</i> sp.	300 - 325
6	Roadside trees near a river bridge on Pawata Shahib – Dehradun highway, near village- New Chorkhala, Tehsil- Vikas Nagar, about 25 km prior to Dehradun (30.35217 N & 77.85743 E)	23.07.04	Uttaranchal	<i>Eucalyptus</i> sp.	250 - 300
7	Trees in a private campus, near Sabaji Mandi, left side of new Roadways bus stand - Railway station road, Dehradun (30.31825 N & 78.04809 E)	27.07.04	Uttaranchal	<i>Mangifera indica</i> Some unidentified	900-1000
8	Roadside trees, about 6 km prior to village Nanota on Saharanpur - Nanota – Muzzafarnagar highway, About 15 -20 km from Saharanpur (29.75263 N & 77.65376 E)	27.07.04	Uttar Pradesh	<i>Eucalyptus</i> sp.	450 - 500
9	Trees at right side of the Nasik – Indore national highway, near bus stand, village- Ojhar Mig, Tehsil- Niphad, Distt.- Nasik (20.09464 N & 73.92567 E)	04.12.04	Maharashtra	<i>Ficus</i> sp.	70 - 80
10	Trees in a private farmhouse, left side of the Nasik - Indore national highway, near Bus stand, village – Peepaldhar, Tehsil- Sendhawa, Distt.- Barwani (21.66314 N & 75.08103 E)	04.12.04	Madhya Pradesh	<i>Ficus</i> sp. <i>Mangifera indica</i>	100 - 120
11	Trees near Hemilton Road Bridge, Kishanpura, Indore (22.72857 N & 75.85996 E)	18.02.05	Madhya Pradesh	<i>Ficus</i> sp.	90-100
12	Trees in the Campus of Govt. Bus Stand, Sinnar, Distt.- Nasik	08.03.05	Maharashtra	Gulmohar (Local name)	50 - 55





Fig.- 4: A view of Indian flying fox colony roosting on a tree of *Ficus* sp., located at roadside of village Jaswantgarh (Tehsil- Gogunda, Distt. – Udaipur), Rajasthan. Photo: K. R. Senacha

three were of *Albezia* sp., four were of *Ficus* sp., but remaining five couldn't be identified properly.

Although sex ratio could not be assessed properly but males were found dominated in that vary population. A few of them were making noise interacting with each other whereas many of them were roosted calmly with keeping their wings folded one over the other on their ventral body parts and keeping their eyes open, whereas some of them were looking very lethargic with hiding head inside their wing cover. There may be more but I could count at least 50 sub adults in that vary colony of bats. Notably, parturition in this species have been reported in the months of March and April in Western India (Senacha, 2003), but varies over different months as in January and February in Central India (Moghe, 1951) whereas May and June in Sri Lanka (Phillips, 1980).

Generally, they give birth to a single infant but twin have also been observed rarely (Senacha and Purohit, 2004). Electrocutation in this species has already been reported in western parts of India (Purohit and Senacha, 2003). Beside these roosts we also came across roughly hundred electrocuted specimens of *P. giganteus* at different places during

this time span. Although we could not sight any roosts of this species in North – Eastern parts of India but I recollect the comments of local people in Bihar, Assam and Meghalaya saying “Indian flying fox is frequently been hunted for the sake of its medicinal value”. They strongly believe its meat has got potential to cure disease like Asthma and Paralysis.

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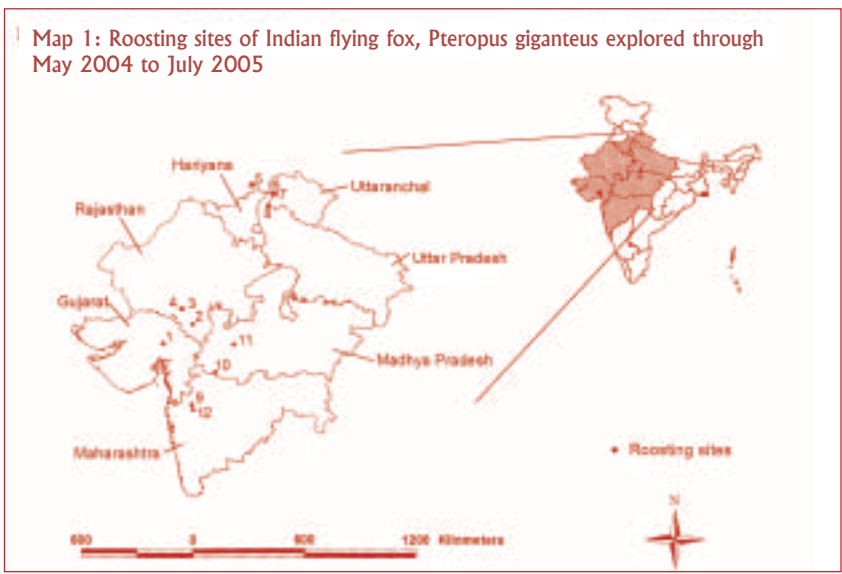
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Solitary or non-territorial adult males in bats: Are “Making the best of a bad job”?

T. Karuppudurai*, N. Gopukumar# and K. Sripathi*

As our understanding of mating systems increases, it becomes obvious that apparently species specific mating behaviours often vary both between and within population (Emlen & Oring, 1977). Since individuals should respond to their environment in ways which maximize their inclusive fitness, the former variations may result from ecological differences between populations. Within population variance, the co-occurrence of territorial and solitary or non-territorial male mating tactics in many populations is less transparent. It indicates that two or more segments of the population may respond to essentially the same environment with different tactics. One aspect of behaviour that shows such extensive variation is mating behaviour. Broad intraspecific variation in mating behaviour is seen in diverse animal taxa including arthropods, fish, amphibians, reptiles, birds and mammals (Brockmann, 2001). Reproductive strategies are shaped by natural selection favouring individual with the greatest lifetime reproductive success. However, not all mature individuals adopt the same reproductive strategies (Gross, 1996). When competition for access to mates is severe, young reproductive individuals sometimes opt for alternative mating behaviours (Caro & Bateson, 1986). Environmental or demographic factors may constrain the number of males able to employ the most successful strategy, and force other mature males into “Making the best of a bad job” (Dawkins, 1980). Variation in individual characteristics that lead to competitive asymmetries also may affect the age at which males switch from a less successful reproductive strategy to a more successful or optimal one (Clutton-Brock *et al.*, 1979). Alternative tactics in reproductive behavior enable individuals to maximize their fitness in relation to competitors in the same population. Among polygynous mammals, territorial behaviour is almost exclusively a male trait believed to function primarily as a reproductive strategy to secure mates. Because mammals are committed to their progeny through gestation and lactation, female reproductive success usually is more readily quantified than male reproductive success. Male reproductive success in polygynous mammals is largely attributed to the spatial and temporal patterns of female aggregation (Bradbury & Vehrencamp, 1977; Emlen & Oring, 1977; Clutton-Brock, 1989). Aggregations of receptive females are dependent on variation in resource distribution, predation pressure, costs of social living and activities of males (Clutton-Brock 1989). Hence, resource distribution is one of the major factors affecting mating success of resource-based polygynous mating animals when males control access to resources that females require for reproduction (resource defense mating systems, Bradbury & Vehrencamp, 1977; Emlen & Oring, 1977). Under elevated levels of intrasexual competition, cost of territory maintenance may be so great that alternative mating strategies are favoured, even among mature males. However, most bat species are polygynous with a highly varied male mating success. Different mating strategies adopted by males within the same species are often considered as a plausible reason for

this variation in male mating success. Why should males from the same species adopt different strategies? Changing environment, genetic polymorphism and selecting the less common strategy within a population are thought to be some of the factors influencing an individual to follow a particular mating strategy. The most common pattern in a variety of taxa is for the tactics to reflect opportunistic, facultative responses to the local social and ecological environment experienced by individual males. The plasticity of mammalian behaviour is well known; however, the alternative reproductive tactics of males have received little attention, and most studies are limited to large mammalian species (LeBoeuf, 1974). Although we hardly know the history of alternative tactics in any population, the prevalence of alternative types in so many species makes it unlikely that they are all transient phenomena. In this story, we attempt to explain the apparently stable co-existence of alternative mating tactics and attempt to determine the mating success of the strategies.

Bats are quintessential refuging animals, belonging to the Order Chiroptera, with 1,001 species divided into two suborders, the Megachiroptera (often known as Old World fruit bats) with 167 species and the Microchiroptera with 834 species. Bats are recorded from all areas of the world except Arctic and Antarctic and a few isolated oceanic islands. More than 20% of all mammalian species are bats (Mickleburgh *et al.*, 2002). Bats exhibit various forms of mating behaviour ranging from simple monogamy to resource and female defence polygyny, as well as leks (Bradbury & Vehrencamp, 1977; McCracken & Wilkinson, 2000). Among these, resource defence polygyny is the most commonly observed mating pattern. Bats establish a harem by defending critical resources such as food, shelter, or mates (McCracken & Wilkinson, 2000). Modification of foliage into the form of a tent is but one form of resource. Tent making behaviour has been observed in at least 15 species of bats including *Uroderma bilobatum* (Timm & Clauson, 1990), *Ectophylla alba* (Brooke, 1990), *Vampyressa nymphaea* (Brooke, 1987), *Artibeus jamaicensis* (Kunz & McCracken, 1996), and *Cynopterus sphinx* (Balasingh *et al.*, 1995). In most species of bats, the adult males are categorized into two groups, harem or territorial males and solitary or non-territorial males. The harem males construct defend tents against other males and thereby enabling copulation with a large number of females. The evolution of resource defence polygyny requires critical resource be in limited supply and economically defensible (Emlen & Oring, 1977). Under such conditions, all eligible males are not

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expected to form a harem of their own, instead some adult males roost alone (Heckel *et al.*, 1999; Ortega & Arita, 1999; Storz *et al.*, 2000b; Gopukumar *et al.*, 2005). These observations suggest an interesting question, why do some males roost alone? Are solitary or non-territorial males less competitive and so remain isolated from breeding activities? Can a solitary male, which roosts unobtrusively near a harem, succeed in mating with harem females? If so, the question that arises is how and when a solitary male would gain access to females. Are solitary males “making the best of a bad job”? This was a major question we sought to answer from our study species *Cynopterus sphinx* and other bat species.

The Indian short-nosed fruit bat, *Cynopterus sphinx*, is one among the Old World fruit bats (Megachiroptera: Pteropodidae). It is a common plant-visiting bat that occurs throughout the Indo-Malayan region (Storz & Kunz, 1999). Roosts solitarily or in small groups in the foliage. It weighs about 45-70g. It lives in clusters of small colonies of about 2-30 individuals (Balasingh *et al.*, 1995). *C. sphinx* is a polygynous mating bat and also has a polyestrous reproductive cycle with two well-defined and highly synchronous parturition periods per year (Krishna & Dominic, 1983; Sandhu, 1984). These bats occupy a wide diversity of diurnal roosts and are known to alter different types of foliages to create tents in trees like *Borassus flabellifer*, *Washingtonia filifera*, *Caryota urens*, *Areca catechu*, *Polyalthia longifolia*, and *Vernonia scandens* (Balasingh *et al.*, 1993; 1995; Bhat & Kunz, 1995; Storz *et al.*, 2000b; Gopukumar *et al.* 2005). In *C. sphinx*, adult males are categorized into two groups, harem male and non-harem male. The harem males construct and defend tents (resource). Only those males who are in possession of a tent recruit females and gain mating access with them. This organization of bats is called harem. During breeding seasons these harem males defend critical resources to attract females, thereby facilitating a harem-polygynous mating system. However, recent studies have shown that breeding population also consists of non-harem males and most of the time they occupied roosts adjacent to the harems (Storz *et al.*, 2000a). Moreover, Gopukumar *et al.*, (2005) reported that the frequency of non-harem males was high between August and October and further suggested that this is due to the sexually mature first time breeding young males and thereby high competition amongst them to establish a day roost to recruit females before securing mating in October-November. What should they do? This was a major question we attempt to elucidate the impetus behind solitary roosting by using radio-telemetry, mark-recapture and direct observation in and around Madurai (lat 9° 58' N, long 78° 10' E) and Palayamkottai (lat 8° 44' N, long 77° 42' E), Tamil Nadu, South India. Our results suggest that the males roosting near to a harem started recruiting females by occupying a tent abandoned by the harem. Morphological variables did not differ between harem and non-harem males, suggesting that some trait other than size may be instrumental in deciding the reproductive status (harem or non-harem) of adult males. Interestingly enough, when we analysed the roosting pattern of non-harem males, we found that more than 90% of the non-

harem males preferred to stay nearer to a harem. Furthermore, mark-recapture and radio-telemetry studies showed that in some cases transition of males from non-harem to harem male status was so fast it indicates that solitary males are reproductively active, gain access to females and presumably obtain some reproductive success (Karupudurai *et al.*, in prep.). It may not be possible for a male to succeed in mating in such a short time, if it follows the primary strategy involving construction, maintenance and defence of tent leading to female recruitment. Moreover Balasingh *et al.*, (1995) observed a male *C. sphinx* in the act of tent making in curtain creeper, *Vernonia scandens* and suggested that the process took nearly 50 days for a male to construct a tent by chewing and severing more than 300 stems and leaf petioles. Since tent construction by a male represents such a heavy investment of time and energy, it seems highly unwarranted to abandon it for other males. We believe that in *C. sphinx* the solitary adult males are “making the best of a bad job”. Further investigations are needed to fully understand the mating system of *C. sphinx* and to ascertain whether the roosting pattern of non-harem males is to avoid the cost of tent construction and defense? However, whether it is a strategy to usurp mating opportunities from harem males deserves further investigation.

In several species of polygynous mating bats, the territory and resource holders typically have a higher reproductive success than those males without territories. Many females are monopolized and probably fertilized by territory holders (McCracken & Bradbury, 1977; Wilkinson, 1985; Heckel *et al.*, 1999; Ortega *et al.*, 2003). However, both genetic and behavioural studies so far from various taxa have shown that non-territorial males are not totally isolated from mating. They were found to be employing a “low cost, low benefit” alternative mating strategy either as satellites (Emlen, 1976) or as sneakers (Clutton-Brock *et al.*, 1979). Solitary or non-territorial males execute the alternative strategies in a variety of ways. The mode of attaining harem male status differs from species to species. A size-based hierarchy for males in the social system was observed in *A. jamaicensis* (Ortega & Arita, 1999), with some larger harems being occupied by a small sized subordinate male apart from a dominant male. In *Saccopteryx bilineata*, some individuals are associated with harems over several years and the non-territorial males build up site-specific dominant hierarchies (Voigt, 2002), and young males of *Phyllostomus hastatus* are known to gain access with harem females if the harem male dies or is displaced (Kunz *et al.*, 1998). In some cases, males try to mate with females while wandering through different territories. These males are wanderers (Alcock *et al.*, 1977). Some males stay near a dominant male and obtain mating by sneaking, while the dominant male is away (Clutton-Brock *et al.*, 1979). In some cases, male maintain a long term association with a territory and obtain mating by intercepting females when they approach a dominant male, importantly presence of this satellite male is tolerated by the dominant male (Howard, 1978).

The most commonly described mating system in bat species is polygyny, in which males defend a resource to recruit and





have exclusive mating access with a large number of females. The resource may be a foraging area or a roosting site or the females themselves. However, several genetic analyses have shown that paternity is biased in polygynous mating systems. For e.g. a paternity study in *Saccopteryx bilineata* demonstrated that 71% of offspring born into a harem are not sired by the resident harem male, but are instead fathered by non-territorial males (Heckel *et al.*, 1999; Heckel & von Helversen, 2002). Similarly, in *Phyllostomus hastatus*, harem male fathered 60-90% offspring (McCracken & Bradbury, 1977), while the harem male in *Desmodus rotundus* fathers approximately 45% of young (Wilkinson, 1985) and the estimated paternity for dominant males of *Artibeus jamaicensis* ranged from 33-83% (Ortega *et al.*, 2003). The monopolization of paternity by the dominant males is incomplete due to alternative strategies used by satellite males to gain access and copulate. These alternative strategies include coalitions, forced copulations or sperm competition (Clutton-Brock *et al.*, 1989). It is common for alternatives to exist in the way males gain access to mates or resources. In many species, large males defend territories, while other males adopt non-territorial behaviours. Variation exists even within this basic pattern. In the bluegill sunfish, individual males do not appear to switch between alternative behaviours (Gross, 1996). In the bluehead wrasse, each male is non-territorial when small and switches to territorial defence when large. In some frog species, males even switch on a daily basis between alternative behaviours (Howard, 1978). However, the *modus operandi* of nonharem or satellite males gaining access with harem females was inadequately investigated to equate with “alternative strategy”.

Apart from the mating success of nonharem males, low paternity for harem males can also occur as a result of female choice. Heckel *et al.* (1999) reported the importance of female choice especially in highly mobile animals with harem system. It appears that female of *S. bilineata* actively select their roosting location and are highly mobile; some females shift roosting territories during the course of a day and some disperse to other colonies. Thus the roosting preferences of females seem likely to increase the chances for non-territorial males to sire offspring. We observed three postpartum estrus females (*C. sphinx*) belonging to a harem visit a nonharem male exclusively during the night hours and engaged in mating. A similar observation was also made by Balasingh *et al.* (1995) who reported fluctuations in the harem size on a day-to-day basis, indicating that females periodically shifted their tents. Incomplete monopolization of females by harem males has been observed. The incomplete control of harem males over harem females increases the chances for non-harem males to fertilize some of the females. In addition a recent study by Storz *et al.* (2001) indicated that in southern India, during the dry season the spatial dispersion of female *C. sphinx* is highly clumped due to limited roosting sites and the harem male sires 96% of offspring conceived during this period. In total contrast in the wet season more roost sites are available and females are dispersed more widely and in this case, the harem male sires only 40% of offspring, while the other 60% offsprings were sired by other (solitary) males. The possible movement of females between harems was

suggested as one of the reasons for this observation. Similarly, among the polygynous bats *A. jamaicensis* (Ortega & Arita, 1999; Ortega *et al.*, 2003), *Phyllostomus hastatus* (McCracken & Bradbury, 1977), *Desmodus rotundus* (Wilkinson, 1985) and *S. bilineata* (Heckel *et al.*, 1999; Heckel & von Helversen 2002), incomplete monopolization of females by harem males has been observed. Finally, most work on mating behaviour in bats has been focused on male behaviour. Much less is known about female behaviour and how it affects male mating tactics; and that there is still much to learn about how females choose males and why different females make different choices. Behavioural variation in bat populations is an exciting area of research, which is likely to provide insights not only into the evolution of bat behaviour but also, more generally, into the evolution of individual decision-making. There are exciting research opportunities ahead for those so inclined.

The evidence discussed here provides support for the solitary or non-territorial adult male employing a “low cost, low benefit” alternative mating strategy or individuals are “Making the best of a bad job”. The growing interest in alternative tactics should encourage future investigators to discuss the lack of solitary roosting (other species) behaviour making their finding easier to interpret and we suggest a number of possible lines for future research.

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Practical Science to enable fruit bats to survive

Editors note :

The School of Biological Sciences of Madurai Kamraj University has always been a leader in bat studies and its Chair, G. Marimuthu right at the forefront. Recently Dr. Marimuthu began giving much more focus to scientific studies which have a practical application, particularly in regard to the vexed problem of orchard-growers and fruit bats. Below is a brief of a paper of that type. Congratulations to the authors and to MKU. Eds.

A paper entitled “*Muntingia calabura* – an attractive food plant of *Cynopterus sphinx* deserves planting as an alternative food plant to lessen orchard damage” has been published in the recent issue (Volume 8 (1), 2006, page 239-245) of ‘**Acta Chiropterologica**’ (a journal that contains research papers exclusively on bats, being published by the Museum and Institute of Zoology and Polish Academy of Sciences, Warszawa, Poland). N. Singaravelan and G. Marimuthu (Madurai Kamaraj University, Madurai) author the paper. For the benefit of the readers of the ‘Bat Net’ the abstract of the paper is reproduced here.

Among the fourteen species of pteropodids that are found in India, *Cynopterus sphinx* (body mass ~ 45 g) receives most of the blame for causing damage to commercial fruit crops. We observed the number of visits made by *C. sphinx* to four species of commercial fruits in orchards (*Mangifera indica*, *Achras sapota*, *Psidium guajava* and *Vitis vinifera*), and four species of wild/non-commercial fruits (*Muntingia calabura*, *Ficus bengalensis*, *F. religiosa* and *Bassia latifolia*) in trees located in suburban areas. The total number of bat visits to *M. calabura* was significantly greater than to all other fruit species. The total nightly bat visits ranged from as low as 5.0 % (*V. vinifera*) to 47.0 % (*F. religiosa*), in comparison to the total nightly visits made to *M. calabura*. In addition, the number of mist-netted individuals of *C. sphinx* per hour near *M. calabura* was also significantly higher than near other fruit species. We suggest that if *M. calabura* is grown in and around orchards, damage caused by *C. sphinx* to commercial fruit crops may be decreased and therefore would serve as a non-destructive method for managing removal of commercial fruits by bats.





roosts are documented for the first time in this survey. The confirmed bat colonies in this study are layered upon the Pokhara Valley map using a Geographical Information System (GIS). This map showing distribution of bat roosts in the valley is presented in the figure 2 (above).

Species richness of Bats

Total of eleven species of bats were recorded from the Pokhara Valley during the course of study. These bats belong to four families, four sub-families, and nine genera. Of the bats identified, three species are fruit bats from the family Pteropodidae. The

remaining eight species are insectivorous bats, belonging to the following families: Megadermatidae (1), Rhinolophidae (2), and Vespertilionidae (5). These finding suggest that Pokhara valley represents 22% of the total bat species found in Nepal.

Threats to bats

With the increased interest in exploring caves within Pokhara Valley, managers are modifying cave environments with artificial lighting at a detrimental expense to the cave fauna. Bat cave, Mahendra cave and Gupteshwor cave have been used as a tourism resource. Two years ago, one tourist guide

noticed two dead bats inside Bat cave, which may have been killed as a result of stone throwing by tourists. In addition, the increased traffic within the cave systems inevitably brings the increase in foreign objects into the cave. The current state of cave management in Pokhara Valley focuses on tourist attraction, not preservation of sensitive cave life. Mahendra cave is found to be illuminated with 12-hour run electric bulbs, Gupteshwor cave partially lit with electric bulbs, and Bat cave only be observed with torches.

During the course of this study different types of natural tragedies were observed. High rainfall in Pokhara Valley has been directly disturbing tree roosting bats. Heavy storm and hailstorms has sometimes caused branches to break on large trees, injure bats and kill them. Local people have observed the killing of 47 *Pteropus giganteus* in Dhital Phant area during a single night, eight years ago. Local people have also reported seeing starving bats during heavy and long duration rainfall. In Gupteshwor cave, the water level sometimes rises up to the cave entrance trapping and drowning unaware bat colonies. A similar situation is assumed to occur in the inaccessible Radhe-radhe cave, when the water level rises in Seti River.

Heavy declines in banana production within Hemja VDC have occurred during the last ten years. Now, only a few clusters of banana groves remain. Local people once observed numerous flying foxes roosting and foraging around Hemja area, but now their numbers are low and their visits are infrequent. In addition, guava and papaya plantations have decreased as well. Logging in the forest deprives the bat of both feeding and roosting options, as does the cutting and trimming of trees in urban areas. Local people, who live near Bat cave, once observed bats using *Ficus religiosa* trees as maternity roosts during the summer months. Now, these trees have been removed and the bats have not been observed near Bat cave.

Local residents also report that young adults occasionally use caves for social gatherings. Bundles of billets are often

Sn	Colony's Name and address	Characteristic feature
1	Sita Cave (Lekhnath - 14)	Accessible cave roost. Situated by farm land near a motor road. Belongs to individual farmer. Previously unexplored. Simple and easy for caving.
2	Pandit Chowk (Pokhara - 18)	Accessible tree roost. Situated by the black topped road. Trees belong to different farmers. Previously unexplored.
3	Radhakrishna tole (Pokhara - 18)	Accessible tree roost. Situated by the black topped road. Trees belong to different farmers. Only 23 bats are found in this roost. Previously unexplored.
4	Radhe radhe Cave (Pokhara - 15)	Inaccessible cave roost situated by the Seti River about 100m vertically below a gravel road. Only religious people, believed to have obtained extra power from God, have entered this cave. Not a well known cave, but lies on public land.
5	Buddha Cave (Pokhara - 9)	Generally inaccessible cave roost situated by the Seti River in Shanti Ban area. Smallest cave recorded in this study. Can be visited in winter season with some difficulty. Previously unexplored. Belongs to Institute of Forestry.
6	Gupteshwor Cave (Pokhara - 17)	Accessible cave roost situated by the motor road, famous for caving. Presence of bats was ever recorded in this study. Very interesting cave for caving purpose. The biggest cave recorded during the study.
7	Peace Cave (Hemja - 2)	Accessible cave roost situated by the Yamdi River. 15 minute walk from motor road. Previously unexplored. Interesting cave for both cave and bat study.
8	Bat Cave (Pokhara - 16)	Accessible cave roost, situated by the motor road, Well known cave for cave adventure and bat study. Cave supporting largest number of bats in comparison with other caves recorded in this study. Interesting and important for bat study.
9	Mahendra Cave (Pokhara - 16)	Accessible cave roost, situated by the motor road, world-famous for cave adventure. The oldest recorded and the most visited cave by tourists in comparison with the other caves recorded in this study. Simple and easy for caving.
10	Crazy Cave (Armala - 6)	Accessible cave roost, situated in 30 minute distance from motor road. Previously unexplored. Interesting for both, caving and bat study. Belongs to individual farmer.
11	Putli Cave (Bhalam - 2)	Accessible cave roost. 10 minute walk from motor road. Lies in public land. Previously unexplored. Interesting for cave, bat and studying snakes as well.
12	Birendra Cave (Bhalam - 2)	Accessible cave roost situated in front of Putli Cave. Lies in public land. Easy and interesting for cave and bat study.





Table 2: Checklist of Bats of Pokhara Valley, Nepal (2005)

Sn	Common Name	Family	Species	SA Status	Nepal Status
1	Greater False-vampire bat	Megadermatidae	<i>Megaderma lyra</i> (E. Geoffroy, 1810)	LC	LC
2	Short-nosed Fruit Bat	Pteropodidae	<i>Cynopterus sphinx</i> (Vahl, 1797)	LC	LC
3	Indian flying fox	Pteropodidae	<i>Pteropus giganteus</i> (Brunnich, 1782)	LC	LC
4	Fulvous Fruit Bat	Pteropodidae	<i>Rousettus leschenaulti</i> (Desmarest, 1820)	LC	NT
5	Andersen's Leaf-nosed Bat	Rhinolophidae	<i>Hipposideros pomona</i> (Andersen, 1918)	LC	NT
6	Least Horseshoe Bat	Rhinolophidae	<i>Rhinolophus pusillus</i> (Temminck, 1834)	LC	LC
7	Hodgson's Bat	Vespertilionidae	<i>Myotis formosus</i> (Hodgson, 1835)	LC	NT
8	Nepalese Whiskered Bat	Vespertilionidae	<i>Myotis muricola</i> (Gray, 1846)	LC	LC
9	Himalayan Whiskered Bat	Vespertilionidae	<i>Myotis siligorensis</i> (Horsfield, 1855)	NT	NT
10	Javan Pipistrelle	Vespertilionidae	<i>Pipistrellus javanicus</i> (Gray, 1838)	LC	LC
11	Asiatic Greater Yellow House Bat	Vespertilionidae	<i>Scotophilus heathii</i> (Horsfield, 1831)	LC	LC

Note: IUCN Red list categories used
 LC = Least concern (Taxa which don't qualify for Near Threatened)
 NT = Near Threatened (It has been evaluated, doesn't satisfy the criteria for any of the threatened criteria)

lit in Sita cave during these occasions. Bats are being killed by electrocution also. A dead body of *Pteropus giganteus* killed by electric shock was found from Tutunga area during study visit. Local people from Hemja, Lekhnath, Lakeside, Chindanda and Malepatan area have reported killing of number of bats in the past due to electrocution. The direct killing of bats for medicine and food has also been recorded but only one report of killing bats for meat was recorded.

Conclusion

Pokhara is a good habitat for bats, a total of 12 bat colonies were found in the valley. Ten of them were cave roosts and two were tree roosts. Eleven species of bats were identified in Pokhara Valley accounting for 22% of Nepal's bat biodiversity. These bats belong to four families, four sub-families, and nine genera. Of the bats identified, three species are fruit bats and the remaining eight species are insectivorous bats. The main threats exist to bats in Pokhara Valley are artificial lightening in the cave, disturbance by the visitors, lack of

policies, natural tragedies, decline in fruit production, shrinkage of roosting sites, electrocution and direct killing of bats.

Education programs aiming at increasing conservation awareness, especially among students and those living near large bat colonies is considered necessary to build the positive attitudes towards bats. Caves need protection to prevent disturbance of colonies and excessive lighting must be reduced. Formation of a bat club is promising in the Batulechaur area and habitat focused conservation actions are immediately required for Sita cave and Chindanda bat colonies. Managers of tour caves should consider promoting their bat colonies and, should help educate the public about bats and other cave dwelling animals. Urban tree planting should be encouraged throughout the valley to provide needed food and roosts while beautifying the city.

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Suhas Phuyal examines a live bat captured from Sita Cave of Lekhnath Municipality.



An Overview of the Bats in Sallaghari, Bhaktapur

Rajesh Rajchal*

Although bats are one of the largest groups of mammals in overall abundance and known to be playing a crucial role in the ecosystem, very little information is available on them. In Nepal, 50 species of bats have been recorded, which forms 40.6% of the South Asian and 4.48% of the global bat species. This study aimed to identify the trends of and threats to bats population in Sallaghari which is located in Bhaktapur district, 13 km east from the capital city – Kathmandu. The major species of Sallaghari is Chir pine (*Pinus roxburghii*) (Nepali name: salla). Other associated species are Silky oak (*Grevilla robusta*), European nettle wood (*Celtis australis*), Champ (*Michalea champaca*), Nepoleon's willow (*Salix* sp.), Himalayan poplar (*Populus* sp.), Camphor (*Cinnamomum camphora*), Himalayan cypress (*Cupresus torulosa*), Jacaranda (*Jacaranda ovalifolia*), Bottlebrush (*Calistamon citrinus*), Mulberry (*Morus alba*) and herbs, shrubs and grasses. There are agricultural lands, ponds, school, hospital and temples in and around the bat habitat.

Map Showing Location of Study Area

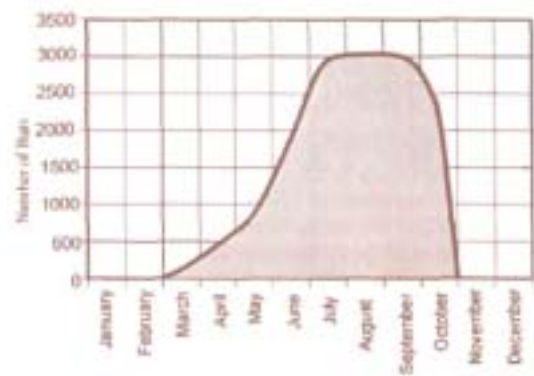
This study was conducted at different times during March 2005 to March 2006. The bat present in the area was identified as Indian flying fox (*Pteropus giganteus*), which is confirmed by colours of different parts and measurements of body length, weight and wingspan. It has been inhabiting the area since the time immemorial. The bats begin to emerge from hibernation in March and immigrate to Sallaghari. Their number continues to increase until July and remains constant with 3000 in number over a period from July to September. Then it starts decreasing and



comes to zero at the end of October. Interview with the local people revealed that the bats emigrate to Kavre district for hibernation from October to February. The trend of bats population over a year is shown in figure below.

Figure showing Trend of Bats Population over a Year in Sallaghari

Though the area has been protected by the royal Nepalese army, it is facing a number of threats. When asked about trend of bats population in Sallaghari, nearly every



respondent indicated that the number of bats was about double just five years back. Similar to the findings of other studies, destruction of habitat, misunderstanding, fear and increasing human population were found to be the major causes of population decline. Moreover more than ten bats annually die of electric shock and is being the highest threat to the bats in the locality. Only one household was found to capture the fallen bats for food and medicine. Other respondents answered unanimously that they had never seen or heard of anyone in the area who was in any way participated with bat killing.

In conclusion, Sallaghari is the only habitat popular for bats in Bhaktapur. There are also some other forest areas and caves potential for bat habitats but studies have not been started yet. Sallaghari area is relatively rich in biodiversity and has peaceful environment, so it seems possible to recover the bats population as in the past through appropriate habitat management and public awareness program. Appropriate management of electric wires is the immediate need to solve the problem of bat kills by electric shock. It is also necessary to be carried out studies on the impact of pesticides on the population, habitat, breeding biology and diet analysis.

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Report on CCINSA Sarah Tucker Branch Activities 2005-2006, Sarah Tucker College, Tirunelveli, Tamil Nadu

Dr. Juliet Vanitharani, Director, CCINSA - Sarah Tucker branch became one of the editors for the International Journal of Basic and Applied Biology titled *Journal of Theoretical and Experimental Biology*. Published by *Elias Academic Publishers*, under the Chief Editor Dr. G. Kulandaivelu, Department of Plant Sciences, School of Biological Sciences, Madurai Kamaraj University, Madurai and Executive editor Dr. E. John Jothi Prakash, Department of Plant Biology and Plant Biotechnology, TDMNS College, T.Kallikulam, Tirunelveli.

The Bat Research team consisting of Juliet Vanitharani, Ph.D scholars and colleagues of the faculty of Zoology, 3 Junior Research Fellows, 2 field assistants, and one technical assistant who are working in the bat research laboratory and the student Bat Club Members of Sarah Tucker College, Tirunelveli -627 007, Southern India, has an excellent record in terms of Bat Conservation in India. They are working for the conservation of 34 bat species in southern India.

May 26 -28, 2005

MEPCO SCHLENK Engineering College Bat Club Members helped the CCINSA Sarah Tucker Bat Research team at Sengaltheri. This event created an awareness on fruit bat conservation among the forest officials (the forest range officers, watchers and guards), including witnessing radiotelemetry work at Sengaltheri and examining a bat roosting cave.

July 9-16, 2005

Dr. J. Vanitharani participated as a resource person in the 4th International Symposium/Workshop on frugivores and seed dispersal and presented a paper on "*Latidens salimalii* a reliable seed disperser of southern Western Ghats, India"

August 10-11, 2005

The bat research team headed by Dr. J. Vanitharani participated and presented research papers based on bat conservation in HESTECH - 2005 National Seminar on the "Human Values and the Emerging Problems of Science and Technological Developments" organised by Sarah Tucker College Tirunelveli. Papers were presented on the following topics:

J. Vanitharani, 2005. Impact of anthropogenic perturbation through science and technology on a group of bio- agents in the tropical ecosystem

L.Jeyapraba and Vanitharani. J. 2005, Advancement of science and technology an emerging problem for the existence of bio agents (Fruit Bats) of forest ecosystem.

M. Vijaya, J. Vanitharani and D.A.E. Pushparani, 2005. Temple Bats – A case study to assess the health hazards and human values.

A. Arulsundari and J. Vanitharani, 2005. Effect of recent developments in sciences and human impact on the complex networks of seed dispersers.

August 26-28, 2005

The bat research team launched an 'awareness programme on bat conservation' among the non-teaching staff members of Sarah Tucker college at Sengaltheri. The team members did mist netting and collected *C. brachyotis* and explaining about the role of fruit bats in

the forest ecosystem to the participants. The participants joined as a member in the CCINSA, Sarah Tucker Branch and have taken an oath to protect bats the 'key stone species' of the ecosystem.

September 9-10, 2005

Dr. J. Vanitharani was asked by the Tamilnadu forest department to give training on bat conservation and discuss about the bat research in KMTR to the Indian Forest Service (IFS) probationers batch 2004-2007. The training was entitled "Training on the biodiversity conservation and management of keystone species- bats Venue: Mundanthurai, Kalakad-Mundanthurai Tiger Reserve. Indian Forest Service probationers taken oath to protect and conserve keystone species (bats) in their jurisdiction all over India

September 26, 2005

A pathetic site of a wounded flying fox *Pteropus giganteus* provoked the Sarah Tucker CCINSA team members to make an arrangement for a bat conservation awareness programme through publication of research papers with documents to prove the bats are the key stone species in the ecosystem.

September 30 - October 1, 2005

The bat research team has participated and presented research paper based on bat conservation in the State level conference on the changing environment at Dakshina Mara Nadar Sangam College, T. Kallikulam, Tirunelveli. Papers Presented on the following topics:

J. Vanitharani. 2005. Can the Indian constitutional provisions protect our environment? are they all constructed with the basic knowledge of each environmental Components?

L. Jeyapraba and J. Vanitharani. 2005. Environment Impact Assessment through bat species.

E. Sophia and J. Vanitharani. 2005. A probe into bat conservation in Indian government legislation.

J. Vanitharani, A. Arulsundari and M. Vijaya. 2005. Bat diversity a boon to the forests of Kalakad- Mundanthurai tiger reserve.

J. Vanitharani, M. Vijaya and A. Arulsundari. 2005. Role of fruit bats in forest management of Agasthiya-malai biosphere reserve.

October 8, 2005

The Bat Research Team has participated in the Wildlife Week Celebrations convened by the Tamil Nadu Forest Department and spoke about Wildlife Conservation, Conservation of Biodiversity and Environment Protection in the public meeting.

November 18, 2005

The bat research team created bat conservation awareness among YWCA members

January 23, 2006

The bat research team made a membership campaign for the expansion of CCINSA bat club at St.Xavier's College, Palayamkottai. Outcome of the campaign :

- Bat awareness programme to the Staff and the students (U.G and



P.G) of Department of Zoology

• 83 members belonging to the faculty of zoology St. Xavier's became members of CCINSA

February 4-5, 2006

The CCINSA team Sarah Tucker presented 8 research papers insisting on bat conservation and management at the national conference held at Sri Pudmavathy Mahila Visvavidyalayam at Thirupathi.

March 4-5, 2006

The CCINSA team created bat awareness among Kani tribals at Karayar, Mundanthurai. The research team attempted to catch available bat species to show the tribals from a bat roost located in the midst of the Kani village, thus confirming bats are friendly animals contributing only good to mankind. The ecodevelopment officer Mr. Malaseppa IFS and his team also visited the Kani village and joined in promoting the protection of bats and biodiversity conservation

March 9, 2006

The bat research team convened a workshop for 40 members, PG students and staff, ending the programmes of the year 2005-2006 by publishing research papers and articles in journals.

Papers Published

D. Lily and J. Vanitharani. 2005. Olfactory Communication through scent marking behaviour during breeding in *Hipposideros speoris* (Schneider's leaf nosed bat 1800). *J. of Theoretical and Expt. Biol.* 1 (3) : 121 – 128. Pub: Elias Academic Publishers.

D. Lily and J. Vanitharani. 2005. Chemical Signaling In *Hipposideros speoris* (Schneider's leaf nosed bat 1800). *J. of Theoretical and Expt. Biol.* 1(4): 183-192. Pub: Elias Academic Publishers.

J. Vanitharani. 2005. A general review of Indian Bats. In. Souvenir, Silver Jubilee, 25 years of Academic Excellence. Pub: Post Graduate studies and research centre, Scott Christian College (Autonomous), Nagercoil. Ed. Dr. Prasannakumar, 125-130.

In Press: J. Vanitharani, U.M. Norberg, M. J. Pearch and V. Chelladurai. 2005. Wing form, flight mode and dietary selection in *Latidens salimalii* (Salim Ali's Fruit Bat) of Agasthiyamalai biosphere reserve, India. *J. of Mammalogy*.

Pub: J. Vanitharani. 2005. Can the Indian constitutional provisions protect our environment? proceedings of state level conference on the changing environment. T. Kallikulam, Tirunelveli District.

L. Jeyapraba and J. Vanitharani. 2005. The impact of changing environment on bat species. *Zoo's Print Journal*. Pub: Zoo's Outreach Organisation. On line www.zoosprint.org.

J. Vanitharani, M. Vijaya and A. Arulsundari (In press). Role of fruit bats in forest management of Agasthiyamalai biosphere reserve. Proceedings of State level conference on the changing environment. T. Kallikulam, Tirunelveli District

D.A.E. Pushparani, J. Vanitharani, S. Rajkumar, S. and T. Sundararaj. 2005. A report on the Bacteria flora of the intestinal track of Indian false vampire bat *Megaderma lyra*. *Journal of Theoretical and Experimental Biology*. Pub: Elias Academic Publishers.

Submitted by Dr. Juliet Vanitharani, Reader, Sarah Tucker College

ANNOUNCING THE First International

South-East Asian Bat Conference

7-10 May 2007

Club Andaman Resort Beach Hotel,
Patong, Phuket, Thailand

Jointly hosted by Faculty of Science, Prince of Songkla University, Hat-Yai, Thailand, Darwin Initiative, Texas Tech University, USA and Harrison Institute, U.K.

Objective: The conference will provide a forum for the exchange of ideas and information on the research and conservation of South-East Asia's bats. Will include a wide variety of oral presentations, posters and demos. It is open to all (from throughout the world) with an interest in South-East Asian bat fauna, including university, institute and NGO staff and students, amateur and professional researchers and enthusiasts and conservationists.

Themes: Biodiversity; Conservation; Ecology; and Outreach.

Date and Venue: 7-10 May, 2007, Club Andaman Resort Beach Hotel, Patong, Phuket, Thailand
www.clubandaman.com

Field Excursion (Optional, details to be fixed): 11-13, May 2007.

Provisional Registration Form: To help us plan the best possible conference, it would be most valuable if you would complete the attached registration form (see page below) and e-mail (or post it) to Associate Professor Chutamas Satasook (at chutamas.p@psu.ac.th : see below for full address). This will ensure that you receive the second and subsequent circulars. It is anticipated that the Second Announcement will be circulated by 1 October, 2006. Updated information regarding the conference and registration form can be found at

<http://www.sc.psu.ac.th/bats>

Organising Committee: For further information please refer website: <http://www.sc.psu.ac.th/bats> and contact

Conference Secretariat: Associate Professor Chutamas Satasook, Faculty of Science, Prince of Songkla University, Hat-Yai, 90112, Thailand, e-mail: chutamas.p@psu.ac.th or:

International advisor: Dr. Paul Bates, Harrison Institute, Bowerwood House, St Botolphs Road, Sevenoaks, Kent, TN13 3AQ, England, hzm@btinternet.com



The CCINSA Sarah Tucker team created bat awareness among Kani Tribals at Karayar, Mundanthurai



Research team presents papers at TDMMS College at State level conference on the changing environment



Ecodevelopment officer Mr. Malaseppa IFS also visited the Kani village to speak of protection of bats and biodiversity conservation



Awareness programme on bat conservation among the non-teaching staff of Sarah Tucker College at Sengaltheri.



A wounded bat provoked the Sarah Tucker CCINSA team members to make an arrangement for a bat conservation awareness programme through publication of research papers with documents to prove the bats are the key stone species in the ecosystem



Team members did mist netting and collected *C. brachyotis* and explained the role of fruit bats in the forest ecosystem to non-teaching staff of STC.



Conservation status of bats of Andhra Pradesh: Their niche, habitat requirements and threats

Bhargavi Srinivasulu, C. Srinivasulu* and V. Nagulu

The order Chiroptera, including 1280+ species of bats, is unique in being the only mammals capable of sustained flight. Bats are sub categorized in two major groups, megachiroptera and microchiroptera, basing on their specialization of their feeding habits and morphological adaptations. While the former group is predominately fruit eaters, the later predominately feed on insects. They represent about one-fifth of the known mammal diversity of the world.

In India, there are 114 species of bats of which only 14 are fruit eaters. As with many other small mammal groups the bats have also been poorly studied and documented resulting in apathetic attitude and widespread ignorance about them. Unlike, birds and large wild animals, these are neglected totally while drafting management plans of both protected area networks and other urban-development or tourism-related projects. To bridge this chasm bat biologists of South Asia in a conjoint effort assessed the current trends of distribution and population of known species of bats in the region to get enlisted in national and international legislation according to the guidelines of IUCN (See Molur *et al.*, 2002). In this effort, we realized that the lack of proper database is the major hindrance in any such effort.

Due to the lack of scientifically analysed biological information and concern among general public, bats face threat in India as well as in the neighbouring countries in South Asia. Large colonies of bats have disappeared due to a number of threats. It was also felt that the ecological studies are critical for better understanding the status of the species as well as the very much-needed documentation of the ecological value of bats. In Andhra Pradesh, an initiative had been taken up by us to document bat diversity and study ecology of selected fruit and insectivorous bats. Through this paper we attempt to present our analysis of the diversity, status, niche and habitat preferences of bats and threats in existence on them. This information will go a long way in determining the future of these unique mammals

We derived information on status, niche use, habitat requirements and threats on bats in Andhra Pradesh from our personal observations and also Molur *et al.* (2002). We analyzed the number of bat species using a particular niche and habitat, and also being under a particular threat (see Box).

Status: As on January 1 2003, a total of 26 species of bats are recorded from Andhra Pradesh (Table 1), of which as many as 24 were of Least Concern, two of Near Threatened and one of Vulnerable status. These status are those applicable to India. From regional point of view, among the Least Concern bats, three species are such whose distribution range is wide and population stable in other parts of India, but in Andhra Pradesh they are known from less than five different localities. For example, the Dawn Bat *Eonycteris spelaea* that is very common in northeastern India and through Indo-China is known only from Vishakapatnam district and Lesser Woolly Horseshoe Bat *Rhinolophus beddomei* a widely distributed species in Western Ghats and Sri Lanka is known only from three different localities in Andhra Pradesh.

Niche	Threats	Habitat
Caves	Habitat loss	Forests
Subterranean habitats	Deforestation	Scrub
Tree holes	Control	Agricultural lands
Ruins	Exploitation	Synanthropic habitats
Cracks & Crevices		
Trees		
Wells		

Niche preference: Among various niches categorized, it was found that caves are most important followed by subterranean habitats, tree holes, ruins and temples. Three species of bats used only one kind of niche, which make them 'specialists'. Eight species each used 2 niches, three species used 3 niches, ten species used 4 niches, two species used 5 niches and one species used all the six niches making it a 'generalist'. This indicates that about 44% of the bat species are under threat due to their restricted niche preference and are subject to high pressure due to anthropogenic activities threatening their survival.

Habitat requirements: Forest habitat was the most preferred one followed by agricultural lands. Scrub and synanthropic habitats were equally preferred. More than 60% of the bats were encountered in all the four different habitats categorized, while a quarter is restricted to one habitat (especially forest).

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Table 1.
Bat species diversity known
from Andhra Pradesh
(as on January 1, 2003)

Suborder Megachiroptera

1. *Pteropus giganteus*
2. *Cynopterus sphinx*
3. *Cynopterus brachyotis*
4. *Rousettus leschenaultii*
5. *Eonycteris spelaea*

Suborder Microchiroptera

6. *Rhinopoma hardwickii*
7. *Rhinopoma microphyllum*
8. *Megaderma lyra*
9. *Taphozous longimanus*
10. *Taphozous melanopogon*
11. *Rhinolophus beddomei*
12. *Rhinolophus lepidus*
13. *Rhinolophus pusillus*
14. *Rhinolophus rouxii*
15. *Hipposideros lankadiva*
16. *Hipposideros pomona*
17. *Hipposideros speoris*
18. *Tadarida aegyptiaca*
19. *Scotophilus heathii*
20. *Scotophilus kuhli*
21. *Pipistrellus ceylonicus*
22. *Pipistrellus coromandra*
23. *Pipistrellus tenuis*
24. *Scotozous dormeri*
25. *Murina cyclotis*
26. *Myotis montivagus*

Threats: Habitat loss and deforestation are the major threats to bats. These threats take away the foraging grounds and roosting places. Control of bats in temples and ruins open to public visitation is another threat. In many such structures where bats were roosting since many generations upkeep activity of the premises drive them away. With favourable roosts gone the bats normal social behaviour is disturbed which leads in poor population performance on the whole. Exploitation and hunting for local consumption and also for medicinal values too are causing damage to bat populations in selected parts of the State. Of the total diversity of bats in Andhra Pradesh, 10 species (37%) are under five threat categories, 3 (12%) species each are under 4 and 3 threat categories, and 11 species (41%) are under 2 threat categories.

Conclusion: Bats require specific niches and uses almost any kind of habitat (excepting some truly

'specialists' species). Their future is under pressure due to various anthropogenic developmental activities. Although, most neglected bats are very important in ecosystems as they help in pollination of night blooming plants and seed dispersal, and also control insect pests in agricultural and synanthropic habitats.

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Molur, S., G. Marimuthu, C. Srinivasulu, S. Mistry, A. M. Hutson, P.J.J. Bates, S. Walker, K. Padma Priya and A.R. Binu Priya (eds.) (2002). Status of South Asian Chiroptera – Conservation Assessment and Management Plan (C. A. M. P.) Workshop Report 2002. Zoo Outreach Organisation, CBSG – South Asia and WILD, Coimbatore, India. viii + 141pp + CD-Rom.

Editorial and text from a wall magazine 'Mero Chamero'
(My Bat) from one of CCINSA's newest members from Nepal

We are glad to be able to continue our third edition of wall magazine '**Mero Chamero**' (**My Bat**). We hope that this edition will be helpful for initiating research projects about Chiroptera in Nepal and we will try to provide as much information about Chiroptera as we could. It is obvious to say that information regarding bats in Nepal is limited. This bat club is working as per need of the students' interest and in this section we have highlighted the bats of Pokhara valley especially focusing in their distribution, taxa and ecological status. Little information about their communication process has also been included. We expect that this information will provide some ideas about bats in Pokhara to all the students of IOF. This research was conducted by Mr. Sujas Phuyal, graduated student of IOF, Pokhara. We are very grateful to him for providing this information to publish in this magazine (This article is published in this issue see Pp. 34-36).

Recently, we have published a website www.groups.yahoo.com/group/batsnepal. Please join this group. This online network group has been built to gather and consolidate all bat lovers at common forum for discussion, draw their attention and encourage them to provide fascinating insights into bat conservation. We are looking forward to your kind information, progressive comments, valuable suggestions and helpful guidelines to carry on this work and turn out better consequences. If you have any queries, we would be happy to answer them. Presently, the membership card has not been prepared, but we would like to request the bio-data of all the interested students who like to be member of this club.

How to be a Member: All the interested students are requested to submit a letter of interest, a biodata and a passport sized photograph. The membership card will be distributed later. This is a volunteer, non-governmental and non-political club and an authorized club will be established soon. No fee is necessary for membership. For More information contact: Mr. Rajesh Rajchal, Institute of Forestry, Office of Dean, Pokhara, P.O. Box 203, Nepal.





Foraging *Rousettus leschenaulti* (Fulvous Fruit Bat) Is A Bioagent Controlling Black Sooty Mold On Plants

J. Vanitharani*, A. Arulsundari and M. Vijaya

Sooty mold is an indication of insect pest problem in some of the plant species. This common name 'Sooty mold' is applied to several species of fungi grow on 'honey dew' secretions on plant parts (Laemmlen, 2003). Honeydew is a sweet sticky liquid that excreted by various plant sap-sucking insects such as mealy bugs, aphids, white flies, leafhopper and scale insects (Smith, 2006).

In southern part of India, leaf hoppers *Idioscopus* species (Family: Cicadellidae (= Jassidae); Order: Homoptera) are one of the major sap-sucking pest which feed on tender leaves, flower panicles of Mango tree (Kabir, 1997; Anon, 2005b). This infestation reduces the fruit set in this plant species. In addition to this direct damage these leafhopper causes indirect damage through their excreta much of the water and sugar content of the plant sap as 'honey dew' (Laemmlen, 2003; Martin 2005; Anon, 2005b). In humid condition the black sooty mould fungus grow on these honey dew and blackens the leaves, fruits, twigs and tender branches of mango trees (Figure:1). The mycelial growth of this fungus on the honeydew medium seriously damages the chlorophyll and prevents the proper functioning (Anon, 2005a). These damage symptoms were popularly known as 'Hopper burn' (Kabir, 1997).

R. leschenaulti (fulvous fruit bat) one of the common fruit bats distributed in the plains, foot hills, dry deciduous and semi evergreen forest (up to the elevation of 1000m) of southern Western Ghats (Bates & Harrison, 1997). These bats roost in mass more than 1500 in a colony (Bates & Harrison, 1997) in the caves as well as some of the abandoned Hindu temples (Vanitharani, 2006). These bats forage in groups and commonly blamed as a 'Vermin' for orchards.

During our bat survey work near the Karaiyar kani tribal hamlet at Kalakad - Mundanthurai Tiger Reserve, we saw hundreds of *R. leschenaulti* came in group and seriously engaged in cleaning the tender leaves of both wild and planted mango trees of the karaiyar hill slopes. Series of video taping was done to cover the peculiar behaviour of *R. leschenaulti* and we found the bats cleared off honey dews present on the dorsal and ventral side of the tender mango leaves in a very quick manner (Figure: 2). Within two hours these bats cleaned up the whole patch of the mango trees with honeydew infection.

This incidence is a thumb proof evidence to say fruit bats are not vermin. In addition to faraway seed dispersal and pollination, they prevent the economically important plant

species of forest as well as of the mainland from infection through sooty mold on honey dew secretions.



Figure 1. Black sooty Mould Fungus grown and blackening



Figure 2. A single *Rousettus leschenaulti* clearing off honeydews from the mango leaves

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IUCN SSC Chiroptera Specialist Group

Professor Paul Racey has been re-appointed as co-chair of IUCN Species Survival Commission Chiroptera Specialist Group. His co-chair is Professor Rodrigo Medellin of the Institute of Ecology, UNAM (Universidad Nacional Autonoma de Mexico).

Professors Racey and Medellin are currently formulating a plan of action for the group and selecting members.

They plan a web site and a regular electronic newsletter and will provide further information to Batnet when they have made more progress.

BAT NET & CCINSA Chiroptera Conservation and Information Network of South Asia (CCINSA)

CCINSA is a network of South Asian Chiroptera specialists 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.

Sripathi Kandula: Scientific Chair

Sally Walker: Convenor and Administrative Chair

Sanjay Molur : Red List Technical Expert

BAT NET is a bi-annual Newsletter of the Chiroptera Conservation and Information Network of South Asia (CCINSA) and the CSG in South Asia. BAT NET is published for private circulation only.

Sally Walker: **Editor BAT NET**

Sanjay Molur, B.A. Daniel, R. Marimuthu, Latha Ravikumar,

Pravin Kumar: Technical Advisors and Publication Assistants

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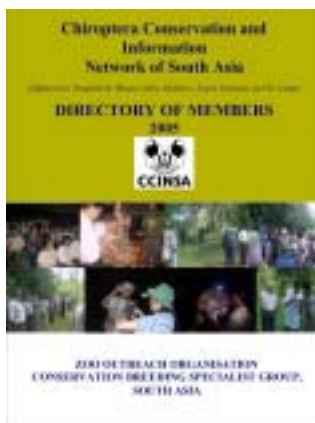
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www.pterocount.org, www.southasiantaxa.org



Be sure to send your biographical and biological information to our outstanding CCINSA Directory of Members. It is up on the website at www.zooreach.org

Designed by B.A. Daniel and "Directory" Deepa, and R. Marimuthu this web-based volume will knock you out with its detail. Many members never got back with updated information, so if your entry has mistakes please write to us and correct them. Also, since it has been a year, update your work -- your field surveys, projects, research, lectures given, awards received, education events organised, etc.

Everybody is responsible for their own entry. If you don't correct us then it will remain wrong and incomplete. No printed versions available except at great cost. Network sponsored by Chester Zoo.

International Partners of CCINSA

Bat Conservation International BCI

BCI has awarded CCINSA / ZOO a special three-year award to conduct public education, field training and conservation workshops and network batters both potential and actual for BCI in this region. BCI is one of the most active, innovative and respected bat conservation organisations in the world.

IUCN SSC Chiroptera Specialist Group

CCINSA represents the IUCN SSC Chiroptera Specialist Group in the region of South Asia. CSG utilises the CCINSA Network to locate specialists in different subject areas, to organise technical as well as conservation assessment workshops and other activities to assist the CSG in their mission.

Chester Zoo Conservation Fund

fund CCINSA and BATNET. Chester Zoo, which has an excellent facility for exhibition & breeding of bats and an active conservation interest in chiroptera is located in Upton on Chester in England and administered by the North of England Zoological Society.

CCINSA is an activity of Zoo Outreach Organisation (ZOO) and Wildlife Information Liaison Development (WILD) in association with CBSG, South Asia and RSG, South Asia.

Note: ZOOS' PRINT Magazine, Journal, Newsletters and a variety of reports can be found on our websites

<www.zooreach.org>, <www.zoosprint.org>