

Rescue of micro-bats in Bikaner, Rajasthan, India

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Bats are warm-blooded true flying mammals. They are also long-lived, intelligent and have a complex social life. According to Mistry (1997) insectivorous bats prey on nocturnal insects not only in agricultural ecosystem but also within the towns and cities. But their importance as natural pest controlling agent has never been highlighted. Larger mines with single or multiple entrances are preferred by bats because they have varying temperature zones that are similar to their natural habitats (Altenbach, 1995; Devkar *et al.*, 2011). Insectivore bats eat insects and other invertebrates such as spiders, which they catch in flight or pick off water, the ground or foliage. Some bats special in catching large insects such as beetles or moths but others eat large numbers of very small insects, midges and mosquitoes during night. Bats gather to feed wherever there are lots of insects, so the best places for them include traditional pasture, woodland, marshes, ponds and slow moving rivers (Kunz, 1988).

Bats have evolved a number of unusual features, mainly connected with their ability to fly. Their wings are formed from a web of highly elastic skin stretched over greatly elongated finger bones, the legs and tail, though their thumbs remain free to help them cling on when roosting (Kunz, 1988). Bats have also developed a highly sophisticated echo-location system that allows them to avoid obstacles and catch tiny insects, even in complete darkness. When they're flying, bats produce a stream of high-pitched calls and listen to the echoes to produce a sound picture of their surroundings. Most of these echo-location calls are too high pitched for us to hear, but electronic bat-detectors that pick up these calls and turn them into sounds that we can hear are now widely used by specialists.

During the winter, there are relatively few insects available, so bats hibernate. In September and October they put on weight and then, as the weather gets colder, they seek out appropriate sheltered roosts, let their body temperature drop to close to that of their surroundings and slow their



Bat collection



Bat capture during rescue programme

heart rate to only a few beats per minute. This greatly reduces their energy requirements so that their food reserves last as long as possible. Bats have a unique way of fitting their breeding cycle in with hibernation (Barnard, 1989 and Briggs, 2002). They mate during the autumn and winter, but the female stores the sperm alive in her body and only become

pregnant the following spring. Pregnancy lasts for six to nine weeks and can vary in length depending on the weather. Usually only one baby is born each year. This is looked after carefully and suckled for between four and five weeks until it is old enough to fly out and hunt for it. Bats do not build nests and bring food back to the roost to feed their young, so the baby

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Release of bats in near by safe caves by volunteers



Caves damaged due to developmental activities

lives only on its mother's milk until it is old enough to fly (Entwistle, 2001). During this spring and summer period female bats gather together into maternity colonies for a few weeks to give birth and rear their babies. Once the baby is independent, the colony breaks up and the bats generally move to other roosts (Freer, 1998). Bats may gather together from over a large area to form these colonies, so any disaster at this summer breeding site can affect all the females from this area (Appleton, 2003). Many of these maternity sites are used every summer and bats have a strong tradition of returning to the same site year after year.

Importance of study

Bats are one of the most neglected species that lack priority and importance in terms of wildlife conservation in India. Population trends in bats are particularly difficult

to measure on bases any assessment. The fragmentary evidence available supports the view that bat populations have declined over the last century or so.

Due to urbanization bats have lost countless traditional roosts such as caves, rock carvings, old buildings and old tree hollows (Cowan, 2003). Mines are being recognized as key to the life history of bats and are critical for many purposes such as rearing young hibernation, social activities (courtship and mating), and roosting. The complexity and associated airflow of these mines provides a range of internal temperatures suitable for bats (Altenbach, 1995). In Rajasthan, multiphase development work like infrastructure developments and unutilized land conversion are happening. In winter, most of new born babies hibernate with mother and take a long time for maturation. Thar

Desert (a part of North-West Rajasthan) is an unique habitat in India, that experience extreme low temperature in winter and in summer hot and dry atmosphere occur, and has an average annual rainfall of 100-400 mm and temperatures range from a minimum of -2°C in winter to a maximum of 51°C in summer (Sharma, 2009). In India, a total of 110 species of bats belonging to 36 genera and 6 families have been recorded (Agrawal, 1998). This was raised to 112 species belonging to 33 genera and eight families within Indian limits (Srinivasulu and Srinivasulu, 2001). Simmons (2005) revised the checklist which now includes 117 species and 100 subspecies under 39 genera belonging to 8 families. Sinha (1980) and Bates *et al.*, (1994) have reported the occurrence of 22 species of bats in Rajasthan. In Bikaner, the presence of four species of Microchiropterans *Rhinopoma microphyllum*, *Rhinopoma hardwickii*, *Pipistrellus tenuis* and *Rhinolophus lepidus* and one Megachiropteran *Pteropus giganteus* has been recorded (Bohra, 2010). The term threatened according to the IUCN categories means Critically Endangered (CR), Endangered or vulnerable.

Study area

The study area is located within the Thar Desert, The vegetation is mainly composed of dry open grassland or grassland interspersed with trees and thorny drought resistant bushes growing in sandy soils (Gupta, 1975). Bats are flying or crawling in the living area of the old *havalis*. The most common source of bats in the inhabited parts of a building is through some connection habitually used by bats. In modern houses, such connections are common where pipes, such as sink waste pipes, pass through a cavity wall (Mitchell-Jones, 1999). In older houses particularly, there is a wide range of possible entry points such as between floor joists, around window frames where there is a gap between the wood and brick or stone, through gaps. Caves, mines and structures such as ice-houses, tunnels provide the protected and stable conditions that many bats seek during hibernation. Within such sites, there is relatively little variation in temperature and humidity throughout the year, although each site will provide a range of conditions. Bats use such sites both as mating and gathering areas in early and late summer, as night roosts and as hibernation sites. Many species

prefer to roost in cracks or crevices. Some sorts of artificial tunnels or natural caves are lacking in these, and the provision of additional places can sometimes increase the attractiveness of the site to bats.

Urbanization, mining and industrialization have made major inroads in this desert. The low temperatures and humid conditions of bat caves create ideal breeding and residence. Our programme, considers how to protect bats natural safe zone. Thar Desert Ecological society of India (TDESI) is working on Bat conservation aspects including habitat restoration (protect natural caves and bats translocation) in Thar Desert of India.

Bats Rescue in Bikaner, Rajasthan Programme I

Between October and December 2011, 20 caves (sites rich in bat roosting), near old city (Near Temple of *Harolai Hanuman Ji*) were damaged by urban improvement trust of Bikaner (UIT, Bikaner). During our routine bats survey we observed, about 3000 bats (*Rhinopoma hardwickii* and *Rhinopoma microphyllum kinneri*) were found dead. rescue of bats were carried out in five caves: **Cave A.** (Latitude 28.009088 and Longitude 73.289065), **Cave B.** (Latitude 28.009301 and Longitude 73.289334), **Cave C.** (Latitude 28.009021 and Longitude 73.288910), **Cave D.** (Latitude 28.009334 and Longitude 73.289613) and **Cave E.** (Latitude 28.008818 and Longitude 73.289175) with the help of local volunteers, 500 cave bats were protect by relocating them in nearest safe cave (Latitude 28.006695 and Longitude 73.284720). All operation was done in day times with permission from the local forest department. For rescue we used insect net and standard protocols used for collection of bats. No single bat was injured in this operation.

The Department of Local Bodies (D.L.B. Dept.) Rajasthan has to be informed about the existing protection laws and species of Rajasthan. According to list of wildlife animals, bats are treated as a very common as house rats and other rodents. According to IUCN reports habitat loss is one of the major threats for many Critically Endangered species listed. The bats of this region is also experiencing the same threat. So need more attention to protect local



Bats were safely removed from the cotton bags.



Rescued bats released in new habitat

and available wild species in this Desert area.

Programme II

In Bikaner old city, traditional *havillaies* (*Rhinopoma hardwickii* roosting sites) were reducing due to modernization and reforms of house structure. At present the Bikaner city has about 50+ sites available in central Bikaner. In a Damani Chok, old city (Latitude 28.01426 and Longitude 73.29897) we conducted bats rescue programmes in 2012 with help of local volunteer and house owner Vyas Ji in our *havali* underground. According to house

owner, they do not want to kill bats by fire (for Hindu mythological reason), so they contact us to protect them and to remove the bats from our house. In preliminary stages of rescue, we collected all supportive information regarding depth of *havillaies* underground, humidity and temperature so as to find a similar natural caves at a distance away from the city.

- Following steps used for bats rescue:
1. Procure all supportive apparatus like insect net, loop net, globes, Thermo-hygrometer, Point lesser

- beam temperature recorder, light weight metal tag, and cotton bag for collection of specimens.
2. Records all ecological parameters of *havillies* underground
 3. Find similar climatically natural caves in out side of city (<20km) of same species of bats for release
 4. Daily monitoring

On observation we found that no no single bats returned to the previous site and also we are monitoring nearest roosting site.

Some reasons to avoid bats in house by house owners:

Noise: Noise from bat colonies can be temporary but annoying problem during the summer. Noise is usually noticeable at dusk and on hot sunny days. The problem can be particularly acute in house with hanging tiles pinned directly onto block work walls.

with local community person, and also develop prominent community leaders who in turn help to impart the message of conservation to their community fellows. Both programmes of bats rescue was very helpful for local people as compared to kill them. Thar Desert is having a good bat population and hence very important place regarding bat conservation.

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Damaged bat caves of the region

Smell: Smell from droppings is relatively uncommon but can sometimes be well found. Problems usually arise either where a building defect allows droppings to get wet or where large quantities of droppings are accumulating rapidly in a poorly ventilated area.

Transmission of disease: Fears about the possibility of disease being spread by bat droppings or urine. Such fears are quite understandable in view of the number of diseases that can be spread by the excreta of other species, including domestic pets.

Recommendation

Our aim is to minimize problems due bats and promote bat conservation

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