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**Dr. Rekha Salvi**

Assistant Professor, Department of Zoology Seth Mathuradas Binani Government P.G. College, Nathdwara, Rajasthan, India

**Dr. Isha Sharma**

Assistant Professor, Zoology Department Pacific College of basic and applied sciences Pacific University, Udaipur, Rajasthan, India

**Dr. Shashi Parmar**

Department of Zoology, Shree Bhogilal Pandya Govt. College, Dungarpur, Rajasthan, India

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### Diversity and status of chiropterans in Girwa tehsil of Udaipur district (Rajasthan), India

**Dr. Rekha Salvi, Dr. Isha Sharma and Dr. Shashi Parmar**

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#### Abstract

Among many species of the world, bats contribute a significant role in pollination and seed dispersal. They prefer to roost on tall trees. This paper highlights the diversity and the conservation status of bats in Girwa tehsil of Udaipur district, Rajasthan (India). For the present study road surveys were performed for identification of the roosting sites. For the study, Roosting sites of the bats were identified and species of bats were analysed qualitatively and quantitatively. A good number of the bat species are reported in the study area due to availability of ample water bodies and the presence of high tree densities. The threats affecting the conservation of bats of Girwa tehsil are also accentuated. The results of the study suggest the need for further research in this direction and also there is an essential need for an immediate conservation strategy for approaching national conservation goals.

**Keywords:** Chiroptera, diversity, bat, threats, Girwa, Rajasthan

#### Introduction

Girwa town is located in the Aravalli hills of Udaipur division in Girwa tehsil in Rajasthan state, India. It is the administrative headquarter of Udaipur district. The annual average rainfall in Girwa tehsil is 608 mm, with an average of 32 rainy days per year. (Salvi and Parmar, 2022) Bats constitute over 20% of all mammalian species and are considered second to the Rodentia in species richness (Simmons, 2005a). Except in the Arctic and Antarctic regions and a few isolated oceanic islands, bats are found all over the world. (Mickleburgh *et al.*, 2002). In classification, the bats are belonged to the order “Chiroptera” (From the Greek Chier- “hand” and pteron-“winged”) because of modification of forelimbs into leathery wings. Bats are nocturnal in habit so in the day time they usually roosted in caves, rock crevices, foliage and various man-made structures. The order Chiroptera is divided into two suborders, “Megachiroptera” (or the Old-World fruit bats) and Microchiroptera. Megachiroptera includes 167 species and Microchiroptera with 834 species in which all the insectivorous and carnivorous bats are added according to the feeding habits and structural adaptations (Chandrasekharan, 2003). Megachiroptera are also considered as flower pollinators and also help in seed dispersal. Being insectivorous, the microchiropterans play major role in controlling population of some of the insect pest.

In India, 110 species of bats belonging to 33 genera and 8 families are recorded (Agrawal, 1998; Sinha, 1980, 1983; Bates and Harrison, 1997 <sup>[1, 14-15, 2]</sup>. In Rajasthan, 22 species are recorded (Bates *et al.*, 1994) <sup>[2]</sup> among which 03 are identified as fruit bats and 19 are insectivorous bats. Sharma (1986) <sup>[12]</sup> discovered one more bat in Tatarpur (Alwar district) from nest of weaver bird, taking the tally to 23 species.

#### Study Area

Among the 50 districts of Rajasthan state, Udaipur district is located in Mewar region, the south-central part of the state. The administrative division of Udaipur district includes 15 tehsils namely Badgaon, Bhindar, Girwa, Gogunda, Jhadol, Kanor, Kherwara, Kotra, Lasadiya, Mavali, Rishabhdeo, Salumbar, Semari, Sarada, and Vallabh Nagar. The study area ‘Girwa’ is located in the Aravalli hills where annual average rainfall is recorded 608 mm, with 32 rainy days. The bats reside in trees, caves, crevices, ruins, old building, abounded house, temple etc. in the study area.

**Corresponding Author:****Dr. Rekha Salvi**

Assistant Professor, Department of Zoology Seth Mathuradas Binani Government P.G. College, Nathdwara, Rajasthan, India

## Materials and Methods

The duration of the study consisted of 15 months, i.e., from November, 2007 to February, 2009. For identification of the roosting sites, road surveys were performed. For further observation, same sites were visited per week of the study period. After keen observation, with the help of binocular, number of bats were counted. On every visit, observation was made between 5.30 PM to 8.00 PM.

## Results

In the study area, 08 species of bats were recorded which belonged to 02 sub-orders and 06 families. Out of these only 02 species of fruit eating bats and remaining 06 species belonged insect eating bats. Chiropteran diversity of Girva tehsil is shown in table: 1. According to this table *Pteropus giganteus* (Indian Flying Fox) recorded in Girva tehsil (Gulab bagh, Samor bagh, Cremation ground at Chetak, Hospital, Paduna village, Tidi medi village, Ubheshwer, Patia village).

*Cynopterus sphinx* (Short-nosed Bat) occurrence is noted in Girva (Gulab bagh only) *Rhinopoma microphyllum* (Greater Mouse-tailed Bat) is found to occupy many roost sites in Girva tehsil (Gupteshwar Mahadev, Sajjangarh, Delhi Gate, Old Shrinathji temple, Ghasiyar)

*Taphozous nudiventris* (or Naked-rumped tomb bat) and

*Taphozous melanopogon* (Black-Beard Tomb Bat) were observed in the two places viz, the Monsoon Palace in Sajjangarh Wildlife Sanctuary.

*Tadarida aegyptiaca* (or The Egyptian Free-tailed bat) was observed at Sajjangarh Wildlife Sanctuary in the basement of the Monsoon Palace. During the study period only 02 individuals of *T. aegyptiaca* were recorded.

*Pipistrellus tenuis* (or The Indian Pygmy Pipistrelle) was observed roosting behind the broken wall of the Monsoon Palace, Sajjangarh Wildlife Sanctuary.)

*Megaderma lyra* (or Indian False Vampire Bat) is a large carnivorous social bat, observed visiting the lake Bari for drinking water at the time of sunset. *M. lyra* was also witnessed in old buildings near the area of Lake Bari. Among all the species observed in this area, the 02 species of bat have been put under schedule V of the Indian Wildlife Protection Act (1972). According to the IUCN list of threatened species, each species of bat reported during this study period have been categorised in 'least concern species' and according local conservation status 03 bat species are listed as rare, 02 species are abundant and 03 bat species are listed as common.

Diversity and Conservation status of Bats of Girva tehsil is show in table: 1 and 2.

**Table 1:** Bat Diversity in Girva tehsil of Udaipur District

S.	Sub-order	Family	Latin name	English name	Occurrence (tehsil wise)
1.	Megachiroptera	Pteropidae	<i>Pteropus giganteus</i> Brunnich, 1782	Indian Flying Fox	Gulab bagh, Samor bagh, Cremation ground at Chetak, Hospital
2.			<i>Cynopterus sphinx</i> Vahl, 1797	Short-nosed Bat	Gulab bagh
3.	Microchiroptera	Rhinopomatidae	<i>Rhinopoma microphyllum</i> Brunnich, 1782	Large Rat-tailed Bat	Gupteshwar Mahadev, Sajjangarh, Delhi Gate
4.		Emballonuridae	<i>Taphozous nudiventris</i> Cretzschmar, 1830	Naked-rumped Tomb Bat	The Monsoon Palace, Sajjangarh Wildlife Sanctuary
5.			<i>Taphozous melanopogon</i> Temminck, 1841	Black-Beard Tomb Bat	The Monsoon Palace, Sajjangarh Wildlife Sanctuary
6.		Mollossidae	<i>Tadarida aegyptiaca</i> Geoffroy, 1818	Egyptian Free-tailed Bat	Basement of the Monsoon Palace in Sajjangarh Wildlife Sanctuary
7.		Vespertilionidae	<i>Pipistrellus tenuis</i> Temminck, 1840	Pigmy Pipistrelle	Behind the broken wall of the Monsoon Palace in Sajjangarh Wildlife Sanctuary
8.		Megadermatidae	<i>Megaderma lyra</i> Geoffroy, 1810	Indian False Vampire Bat	Lake Bari and observed in old buildings near Bari lake

**Table 2:** Conservation Status of Bats Species of Girva tehsil of Udaipur District

S. No.	Scientific Name	Conservation Status		
		IUCN	WPA, 1972	Local status
1.	<i>Pteropus giganteus</i>	Lr-lc	Schedule V	A
2.	<i>Cynopterus sphinx</i>	Lr-lc	Schedule V	C
3.	<i>Rhinopoma microphyllum</i>	Lr-lc	Vermin	A
4.	<i>Taphozous nudiventris</i>	Lr-lc	Vermin	R
5.	<i>Taphozous melanopogon</i>	Lr-lc	Vermin	R
6.	<i>Tadarida aegyptiaca</i>	Lr-lc	Vermin	R
7.	<i>Pipistrellus minus</i>	Lr-lc	Vermin	C
8.	<i>Megaderma lyra</i>	Lr-lc	Vermin	C

## Acronyms

Lr-lc= Lower risk - least concern, A=Abundant, LC=Less common, C=Common, R=Rare.

It was observed that the roosting sites of bats of the study area were facing many threats such as disturbance of roosting sites by local people, use of pesticides by farmers in nearby farms and habitat destruction. During the study period it was also observed that global warming and other environmental factors are also responsible for loss of roosting site.

## Discussion

1. A generous number of bats are localised in Udaipur district because of availability of a good deal of surface water, remote buildings, palaces and forts, crevices and caves. Since bats like to roost on caves, dark rooms, crevices, temples, behind banners, and in tree holes, an ample number of favourable sites are available in the district.
2. Fruit bats are considered as forest pollinators and seed dispersers, so these bats have received international

conservation attention, but from the last two decades it is reported that their populations are continuously declining throughout their range in tropical, rainy and cloudy forests. (Fujita, 1988, 1991; Power *et al.*, 1996; Wiles *et al.*, 1997) <sup>[6-7, 10]</sup>. Only two species of fruit eating bats are recorded (*Pteropus giganteus*, *Cynopterus sphinx*) in the present study.

3. The International Union for the Conservation of Nature (IUCN) has declared that approximately nearly 240 species within Chiroptera (25% of all species) are considered as threatened category. In the recent times least twelve species have gone extinct and furthermore Megachiropterans are reported at more risk than microchiropterans (34% and 22% of species, respectively), nevertheless both the groups are facing considerable threats due to habitat loss and fragmentation. It is reported that species with comparatively small geographic ranges and/or that are ecologically specialized have a tendency at the greatest risk. (Jones, Purvis, and Gittleman, 2003) <sup>[8]</sup>.
4. Bat Conservation International organisation ([www.batcon.org](http://www.batcon.org)) is running many successful bat conservation projects, along with the projects in the developing world outlined to expand awareness and appreciation among people. (Bats conservation international, 2004; Fenton, 1997) <sup>[5]</sup>.

#### **On the basic of the study authors recommend to conserve the bat species diversity by**

1. Use of chemical pesticides should be minimised as they are not only harmful to bats but for the human health as well.
2. Cutting of trees that are roosting sites for bats should be avoided. If there is such need then new trees should be planted prior to cutting of the old trees.
3. Feeding habits of endangered species and interspecific competition of associated species should be thoroughly studied in order to provide them with sufficient food by planting required trees.
4. Thoroughly identification of the impacts of all the man-made changes that are posing threats to the existing bat population.
5. Identification and mapping of the roosting sites is required in order to protect the bat species undisturbed.
6. There is negative attitude and several myths about bad nature of bats deeply rooted among people. Efforts should be made to break these myths and increase awareness to the maximum number of people and their future generations. To ensure this, it is necessary to educate people by spreading awareness by government and non-government organisations. Electronic media, articles in local newspapers and organising lectures in schools, colleges and gatherings at settlements in towns and small villages by specialist/resource person may help to increase awareness.
7. Local wildlife department should take initiative to include the bats in their conservation priority. Since bats possess the status of low profile on current times and also not in the list of conservation priority.

#### **Conclusion**

The study conducted in Girwa tehsil, Rajasthan, India, showcases the diverse bat population and emphasizes the importance of conservation efforts to protect their habitats and

mitigate threats like habitat loss and pesticide use. Recommendations include minimizing pesticide use, avoiding tree cutting in bat roosting areas, and raising awareness among the local community. Efforts like these are crucial for preserving the biodiversity of bats and their ecological role in the ecosystem.

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