



# THE EMERGING TRENDS IN THE BIO-DIVERSITY OF BATS IN TAMIL NADU

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## Introduction

Of all known species of mammals one in five is bat. Yet remain creatures of mystery, subject of more prejudice and lots of misinformation than any other group of animals. The news media, legends, folk lore, television, movies and storybooks perpetuate myths. 'Fears about bats' that a surprising number of people believe.

Bats are instantly recognised yet poorly known. The hours of twilight followed by darkness is the best feeding time for these animals. The night is really alive with such nocturnal creatures. They inhabit almost every corner of the globe. They are not known from Antarctica, Arctic tundra and few remote oceanic islands. Bats are unique elegant and fascinating. They are the only mammals who mastered true, sustained flight much before man's own lineage began. More than 21% of all mammal species are bats. They 'See' with their ears, hang upside down to sleep by day and can catch insects while flying even in the darkest of nights.

'Hand wing' forms a basis for classifying bats as separate order of Mammals. The order Chiroptera (Greek Cheiros-hand, Pteros-wing), which includes 1242 species.

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Their dietary variation classified them into two sub orders the Megachiroptera (Fruit bats) and Microchiroptera (insectivores). The sub order Megachiroptera consists of only one family (*Pteropodidae*) with 167 species of bats found in the old world tropics and subtropics feed on fruits nectar and Pollen. They roost mainly on trees.

The second sub order Microchiroptera includes 17 families consisting 1075 species. These bats have small eyes and can echolocate. Wide variety of species-specific food specialization is a remarkable character. Which includes insects and flesh (fish, frog, lizards, birds other mammals).

Their physiological and behavioural modifications, their skills of flight and echolocation are rivaled by a few other animals and surpassed by none. Their role in the ecology of certain habitats and in the affairs of man is often a paramount importance.

Bats play a tremendous role in bringing sustainable, balanced ecosystem and also in the Indian economy. The Megachiropteran bats are viable plant pollinators and seed dispersers while the Microchiropterans are the only predators of the night swarming insects, efficient pest control agents and keep the insect population under check. The dietary composition of each species is selectively species specific. Carnivorous bats as a rodent controller act as a good friend of farmers.

## Status of Bats in India

In India bats have a bad reputation. Which is largely undeserved. According to IUCN Criteria Version 3.1 we have 114 bat species. Out of which 13 species are Megachiropterans and the rest are Microchiropterans.

## Status of Bats in Tamil Nadu

Tamil Nadu has a report of 37 bat species representing 8 families out of total 18 families under order Chiroptera (Table 1). Four Microchiropteran bats (*Rhinolophus beddomei*, *Hipposideros cineraceus*, *Harpiocephalus harpia* and *Kerivoula papillosa*) reached the NT (Near Threatened) state. The four endemic bat species of South Asia (a Macrochiropteran *Latidens salimalii* (Endangered) and the 3 Microchiropterans *Rhinolophus beddomei* (Near Threatened), *Hipposideros speoris* (Least Concerned) and *Pipistrellus dormeri* (Least Concerned) are the note worthy representatives. According to IUCN 2001. Version 3.1 *Latidens salimalii* is endemic to Tamil Nadu that too reached the endangered state of survival.

## **Emerging Trend in Bio Diversity of Bats**

At this moment the emerging trend in the bio diversity of bats is 'Conservation'. The report on 'Bat Biodiversity and Management Action Plan' submitted to the Ministry of Environment by the Tamil Nadu Forest Department (Vanitharani 2003) has suggested a list of measures for the Action Plan on 'Bats Biodiversity Conservation'. It has requested the Indian Government to implement the 'Conservation Management Plans' through legislations and policies. Very recently on 30<sup>th</sup> September 2002 our Indian Government legislation stand recognises the bat's biodiversity conservation. Two endemic bat species *Latidens salimalii* and *Otomops wroughtoni* has been listed under schedule I of Indian Wildlife Protects Act.

## **Bat Conservation**

Bats play a critical role in many ecological systems in nature. Unfortunately, these mammals are viewed negatively because of various misconceptions. According to IUCN 2001 Version 3.1 there is a continuous decline and fluctuation in bat population. Many species shows restricted distribution and some of them are facing extinction. The real cause for this menace in the ecosystem is due to many threats faced by this group of poorly recognised mammals.

## **Reason for the Decline in Bat Population**

The major reason for the decline in bat population is due to the problems and threats caused to the habit and habitats of various bat species (Figure 1) (South Asian Chiroptera CAMP (Conservation Assessment and Management Plan) Report 2002). Disturbances to roosts and intensive agricultural practices are the main human interferences. The habitat loss is the major threat to almost all the bat species in India. The Conservation of their feeding habitats and food sources is also of paramount importance to conserve these unrecognized beneficiaries of the ecosystem.

## **Problems and Threats to the Habit and Habitats of Bats**

Bats are vulnerable, sensitive, nocturnal mammals. They prefer to roost during day time in diversified roosting patterns (caves, trees and anthropogenic structures)

depends upon the population size, risks of predation, food resource availability, body size and physical environment. Threats to roosting sites cause server effect on the population size of these vulnerable creatures. Because the roosts serve as a spot for mating, venue for rearing young ones, a community hall for social promotion and a refuge from adverse weather and predators (Kunz, 1982). For the forest bats the caves constitute a calm, cozy roosting place with large spacious chambers. They are typically more stable when compared to other roosting sites. But still the bats face the problems of human interferences (Jeyapraba and Vanitharani, 2003). Plants form the basic raw material for roost construction for many of the fruit bats. Even the cavity of tree trunks offer favored shelter for some of the Microchiropterans. Bat being sensitive creatures they prefer to stay away from human disturbances. Abandoned buildings, crevices of the domes of the old archeological monuments are the favorite roosting sites. The incidental or deliberate disturbances to their roosting sites causes the animals to abandon their roosts. Legislations are needed to protect the roosting sites due to the bat's diverse ecological and economic role in the ecosystem (South Asian Chiroptera CAMP (Conservation Assessment and Management Plan ) Report 2002)

## **Bats have No Protection Under Indian Wildlife Protection Act.**

Schedule V of the Indian Wildlife Protection Act 1972 treats fruit bats as VERMIN. They can be hunted, captured, killed and even exported.

## **Bats Get A Bad Reputation – Myths, Legends and Folklore**

Myths about bats are found in many human cultures. India is not an exception to this. Human misunderstanding made the following persecutions on bats as they attack people, drink blood, agents evil, portrayed symbol of bad luck, inauspicious bad omen, indicator of death, carriers of Rabies etc. This problem is due to the lack of information about the ecology of bats (their role in ecosystem as pest controllers, pollinators and seed dispersers), reproductive behaviour (like gestation, parental care, infant mortality, sex ratio, segregation during reproduction etc), migration, hibernation, roosting behaviour and species availability and population size.

The only way to bring conservation of bats is to list out the measures and action plans (short and long term) needed to implement in terms of importance and

immediacy. Strategies and Action Plan can be brought through legislations, policies, awareness, publications, researches and projects.

## **Conservation Through Legislation and Policy**

Revision in the Indian Wildlife Protection Act should be made to remove fruit bats from Schedule V (vermin category). Legislations should be formulated to protect the key roosting sites of endemic species, trees and caves in which large number of bats are roosting. Law should be extended to prevent trading and hunting of bats for food, medicine and sports. Engineers should consult the bat conservation specialists before venture into the renovation of old buildings and temples to prevent the indiscriminate mass killing of bats. NGOs involved in Wildlife conservation activities should coordinate with the Chiroptera specialists to discuss and formulate various broad conservation issues. Strict legislation should be implemented to control the indiscriminate use of pesticides. This harm the food animals (insects) of bats and affects human through biological magnification. Educational materials should be made and prescribed in school curriculum to remove misconceptions about bats. This will ensure the youngsters to grow up with appreciation of bats. The National Wildlife Action Plan, Forest Management Plans, National Biodiversity Strategy, Environmental Impact Assessment (EIA) and other similar policies, plans and strategies should be incorporated on the interests of Chiroptera.

## **Action Plans for Awareness**

Public awareness is a crucial component action that must be implemented as a holistic conservation action plan for bats in India. This can be achieved by making education materials for schools and graduate students, writing articles in newspapers, erecting posters in temple localities and near the major bat roosting sites, formation of bat clubs in schools, colleges, villages and cities involving locals. Make special reading materials about bat's beneficial role in the ecosystem for policy makers (Ministry both Central and State, Forest and Environment Officials, Village and Panchayat Officials), temple authorities and zoo directors.

## **Recommendation Through Researches and Projects**

Bats are one of the least studied mammalian groups in India. The results of the researches and projects are crucial information to promote bat conservation.

Ecological studies will be of immense help for better understanding the status of bat species. Documentation of the ecological value of bats is very much needed. Even bat biologists admit that they know very little about South Asian bats especially Indian bats. Every species considered a status assessment. Unknown and un-surveyed localities should be surveyed on priority basis. The effect of pesticides and their impacts on bats should be studied in detail. Migratory bat species should be identified and there is a need for drafting of appropriate international agreements. The current information from active field workers should provide a compass by which the direction of a viable conservation action plan has to be practiced

## Conclusion

The fate of man's quality of life depends to a great extent on his capacity to reverse some current trends in management, legislation and even science, which are based on subjective impressions and unpractical policies. It also is the case with Indian bats. Knowledge about bats in India is staggering. Legislation in India is still based on false economic principles and political salvation without sufficient attention to genuine scientific information from active field biologists. It is also clear that there is a crying need for more active, full time field biologists working on bats, to deal with 114 species of this large, neglected and complex group of mammals.

Table -1 : Status of Bats in Tamil Nadu

Order : Chiroptera

Sub order : Megachiroptera

Family : 1. Pteropodidae (Old World Fruit Bat)

Sl. No	Name of species	IUCN status	Locality
1.	<i>Rousettus leschenaulti</i> Fulvous fruit bat	Least Concern (LC)	Vannathiparai (USNM), Zakampatti (Sinha, 1980), Madras (Rookmaaker and Bergmans, 1981), Temple of Tirunelveli, Cheranmahadevi, Nanguneri, Srivaikundam, Vitillapuram (Vanitharani, 1998)
2.	<i>Pteropus giganteus</i> Indian flying fox	Least Concern (LC)	Point Calimere (BNHS), Salem (Sinha, 1980), Madras (BMHN), Keelarajakularaman, Srivaikundam, Ramanathapuram (Marimuth, 1988), <i>Terminalia arjuna</i> Trees of the river line area Srivaikundam, Tirunelveli ( Kurukkuthurai ), Thirupadaimaruthur, Karaikal, (Vanitharani, 2003), Sathiyamangalam Timber Depot, Thanjavore (Annamalai Pers. Comm.)
3.	<i>Cynopterus sphinx</i> Short nosed fruit bat	Least Concern (LC)	Cubum (Wroughton, 1921), Karapar, Cotengady (Lindsay, 1927), Madurai (Sinha, 1980, Marimuthu <i>et.al.</i> 1998), Point Calimere (Balasubramanian, 1988), Upper Manalaar, Vannathiparai, Coimbatore (USNM), Dharmapuri (FMNH), Tirunelveli (Balasingh <i>et.al.</i> 1993), Located in almost all the villages in around Tirunelveli. Forms tent in palm trees and creepers (Vanitharani, 2003)
4.	<i>Cynopterus brachyotis</i> Lesser dog faced fruit bat	Least Concern (LC)	Centre Camp (near Chinnamanur) (H2M), Common fruit bat of forest area above 700 m altitude, Courtallam, Kalakad, Kothiyar hill ranges (Vanitharani, 2003)
5.	<i>Latidens salimalii</i> Salim Ali's fruit bat  <i>Endemic to South India</i>	Endangered (EN)	Kardana Coffee Estate (Bates <i>et.al.</i> 1994), High Wavy mountains Theni district (Singaravelan <i>et.al.</i> ), Fruit bat of rain forest area above 1000 m altitude Kalakad Mundanthurai Tiger Reserve in Nagapothigai, Senkaltheri, Servalar hill range, Courtallam hills (Vanitharani <i>et.al.</i> 2003).
6	<i>Eonycteris spelaea</i> Dawn bat	Least Concern (LC)	Kalakad Mundanthurai Tiger Reserve -(Balasing - Pers.Comm0.

Order : Chiroptera

Sub order : Microchiroptera

Family : 1. Rhinopomatidae (Mouse-tailed bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Rhinopoma microphyllum</i> Greater mouse tailed bat	Least Concern (LC)	Near Madras (Cakenberghe and Vree, 1994)
2.	<i>Rhinopoma hardwickii</i> Lesser mouse tailed bat	Least Concern (LC)	Madras (BNHS), Madurai (Kock and Felten, 1980), Dharmapuri (BNHS), Palani hills (Lindsay, 1927i), Pannian (HNHM), Sivanthipatti hillock (Vanitharani, 2003)

Order : Chiroptera

Sub order : Microchiroptera

Family : 2. Emballonuridae (Sheath-tailed bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Taphozous longimanus</i> Long-winged tomb bat	Least Concern (LC)	Madras (Dobson, 1878), Cumbum (Wroughton, 1921), Murrappanadu (Vanitharani, 2003)
2.	<i>Taphozous melanopogon</i> Black-bearded tomb bat	Least Concern (LC)	Nagarcoil (Wroughton, 1921), Keela Kuyil Kudu (Usman, 1988), Temples of Tirunelveli, Krishnapuram, Nanguneri, Srivaikundam (Vanitharani, 1998, 2003, Lilly <i>et al.</i> , 2003, Addline <i>et al.</i> , 2003)
3.	<i>Taphozous nudiventris</i> Naked-rumped Tomb bat	Least Concern (LC)	Madurai (Marimuthu and Chandrashekarani, 1983)
4.	<i>Taphozous saccolaimus</i> Pouch bearing bat	Least Concern (LC)	Madras (Blyth, 1844)



Order : Chiroptera  
 Sub order : Microchiroptera  
 Family : 3. Megadermatidae (False Vampire bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Megaderma lyra</i> Indian false vampire	Least Concern (LC)	Vannathiparai (USNM), Palani (Lindsay, 1927), Salem, Coimbatore (Sinha, 1980), Tirunelveli, Madurai (Chandrashekar <i>et al.</i> 1988), Keela Kuyil Kudi, Pannian Malai, Seelayampatti (Usman, 1988), Madras, Tirthamalai (BMNH), Idachivillai (Thoothukudi District) 1998, Murrappanadu, Krishnapuram, Tirunelveli, Cheranmahadevi, Thirupadaimaruthur, Nanguneri (Vanitharani, 2003, Addline, 2003)
2.	<i>Megaderma spasma</i> Lesser false vampire	Least Concern (LC)	Vannathiparai (USNM), Chettiri Range, near Cumbum (Wroughton, 1921), High Wavy Mountains (BMNH), Courtallam, Servalar hill range (Vanitharani, 2003)

Order : Chiroptera  
 Sub order : Microchiroptera  
 Family : 4. Rhinolophidae (Horseshoe bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Rhinolophus affinis</i> Intermediate Horseshoe bat	Least Concern (LC)	Das <i>et al.</i> 1995.
2.	<i>Rhinolophus rouxii</i> Rufous Horseshoe bat	Least Concern (LC)	Pondicherry, Coonoor (Blanford, 1888-91), Palani Hills (Lindsay 1927), Shevaroy Hills (Sinha, 1973), Kalakad hill range (Vanitharani, 2003)
3.	<i>Rhinolophus lepidus</i> Blyth's Horseshoe bat	Least Concern (LC)	Salem (Das, 1986), Agasthiyer and Kalakad hill range (Vanitharani, 2003)
4.	<i>Rhinolophus beddomei</i> Lesser Woolly Horseshoe bat  <i>Endemic to South India</i>	Near Threatened (NT)	Kalakad and Kothiyar hill range (Vanitharani, 2003)

Order : Chiroptera  
 Sub order : Microchiroptera  
 Family : 5. Hipposideridae (Leaf-nosed bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Hipposideros ater</i> Dusky Leaf-nosed bat	Least Concern (LC)	Cumbum (Wroughton, 1921), Kurumbapatti, Tirthamalai (BMNH), near Madras (H2M), near Madurai (Jones <i>et.al.</i> 1994), Abandoned buildings in and around Tirunelveli (Vanitharani, 1998, Ezhilmathi, and Vanitharani, 2003)
2.	<i>Hipposideros cineraceus</i> Least Leaf-nosed bat	<b>Near Threatened (NT)</b>	Kurumbapatti, Tirthamalai (BMNH)
3.	<i>Hipposideros fulvus</i> Fulvous Leaf-nosed bat	Least Concern (LC)	Keela Kuyil Kudi (Usman, 1988), Sivanthipatti hillock (Vanitharani, 2003)
4.	<i>Hipposideros Pomona</i> Andersen's Leaf-nosed bat	Least Concern (LC)	Madhavoram (FMNH)
5.	<i>Hipposideros speoris</i> Schneider's Leaf-nosed bat  <i>Endemic to South Asia</i>	Least Concern (LC)	Nagarcoil, Arambol (Wroughton, 1927), Kurumbapatti, Tirthamalai (BMNH), Salem, Madras (Jerdon, 1874), Trichinopoly, Travancore (Blanford, 1888-91), Keela Kuyil Kudi, Kanavai Katha Bootham, Pannian Malai (Usman, 1988), Madurai (Marimuthu and Selvanayagam, 1981), Madras (HNHM), Temples and abandoned buildings in and around Tirunelveli (Vanitharani, 1998, Lilly and Vanitharani, 2003, Adline <i>et.al.</i> , 2003, Rajkumar <i>et.al.</i> , 2003)

Order: Chiroptera  
 Sub order: Microchiroptera  
 Family: 6. Molossidae (Free-tailed bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Tadarida aegyptiaca</i> Egyptian free failed bat	Least Concern (LC)	Madurai (Marimuth pers. comm.), Krishnapuram (Vanitharani, 2003)
2.	<i>Tadarida plicata</i> Wrinkle - lipped Free-tailed bat	Least Concern (LC)	Near Madras (Jerdon, 1874)

Order : Chiroptera  
 Sub order : Microchiroptera  
 Family : 7. Vespertilionidae (Evening bats)

Sl. No	Name of bat species	IUCN status	Locality
1.	<i>Myotis horsfieldii</i> Horsfield's mouse eared bat	Least Concern (LC)	Venniar Estate (HZM)
2.	<i>Scotophilus heathii</i> Asiatic greater yellow House bat	Least Concern (LC)	Madras, near Pondicherry, Nilgiri Hills, Shevaroy Hills, Trichinopoly (BMNH), Salem (HZM), Coimbatore (HNHM), Murappanadu (Vanitharani, 2003)
3.	<i>Scotophilus kuhlii</i> Asiatic lesser yellow house bat	Least Concern (LC)	Kotagiri (Wroughton and Davidson, 1920), High Wavy Mountain (Hutton, 1949), Murappanadu (Vanitharani, 2003)
4.	<i>Pipistrellus coromandra</i> Indian pipistrella	Least Concern (LC)	Pondicherry, Samaya Malai (HZM), Upper Manalaar (USNM)
5.	<i>Pipistrellus tenuis</i> Least pipistrella Indian pigmy bat	Least Concern (LC)	Samaya Malai (HZM), Tirthamalai Chettiri Range, Tirthamalai (BMNH), Madurai (pers. obser), Crevices of buildings in around Tirunelveli, Courtallam hills (Vanitharani, 2003)
6.	<i>Pipistrellus ceylonicus</i> Kelaart's pipistrelle	Least Concern (LC)	Nilgiri Hills (BMNH), Makkudat (Vanitharani, 2003)
7.	<i>Pipistrellus dormeri</i> Dormer's bat <i>Endemic to South Asia</i>	Least Concern (LC)	Salem (HZM), Murappanadu (Vanitharani, 2003)
8.	<i>Hesperotenus tickelli</i> Tickell's bat	Least Concern (LC)	Madras (Wroughton, 1918)
9.	<i>Miniopterus schreibersii</i> Schreiber's long fingered bat	Least Concern (LC)	St. Thome Island (USNM)
10.	<i>Miniopterus pusillus</i> Nicobar Long-fingered bat	Vulnerable VU	Madras (BMNH)
11.	<i>Harpiocephalus harpia</i> Hairy winged bat	<b>Near Threatened (NT)</b>	Perumal (Thomas, 1923)
12.	<i>Kerivoula picta</i> Painted bat	Least Concern (LC)	Madras (Bianford, 1888-91), High Wavy Mountain (Hutton, 1949), Nagercoil (Vanitharani, 2003)
13.	<i>Kerivoula papillosa</i>	<b>Near</b>	Courtallam hills (Vanitharani <i>et.al.</i> 2003)

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37. Wroughton, R.C. and Davidson, W.M. 1920. Dekhan, Poona District. Bombay Natural History Society's Mammal Survey of India, Burma and Ceylon. *Journal Bombay nat. Hist. Soc.* 25: 1025-1030, Figure I : Problems And Threats Caused To The Habit And Habitats Of Various Bat Species (South Asian Chiroptera CAMP (Conservation Assessment and Management Plan )Report 2002)