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Digital copy of this report can be obtained from addresses below:

Dr. K. R. Senacha

41, Surya Colony, Near Polytechnic College, Residency Road, Jodhpur, Rajasthan, India – 342001

A - 401, Ram Rahim Accord, Madhuvan Township, Gokhivare, Vasai (E), Mumbai, India - 401208

Email: <u>senacha@yahoo.com</u> / <u>senacha@gmail.com</u>, Webpage: <u>www.sites.google.com/site/senacha</u> Phone / Fax: + 91 9420299241 / + 91 9414295811 (M), + 91 0250 2339578 (O)

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SUMMARY

Bats play vital role in an ecosystem as pollinators, seed dispersers and insect eaters. The Thar, an important ecosystem of western India have seen remarkable depletion in populations and species diversity of bats over the last two decades. Apparent among cited reasons for deterioration in diversity of bats in the Thar are prevailing myths about nature of bats and lack of awareness among locals about their ecological role and importance. Districts of Jodhpur, Jaisalmer and Bikaner represent more than 80% of the core desert area in Rajasthan part of the Thar. However Jodhpur was recently been thoroughly surveyed to explore diversity of bats and addressed to create bat conservation awareness among locals through the years 2007-2009 in RSG 1st Project, Bikaner and Jaisalmer remained unstudied. In RSG 2nd Project we intended to review the impact of RSG 1st bat conservation initiatives in Jodhpur and undertake a comprehensive survey to assess current status of bats and launch a similar bat conservation and awareness campaign in Jaisalmer and Bikaner districts.

The RSG 2nd Project was executed through the period of August 2010 to December 2011. A total of 245 roosts belonging to 11 species of bats (3 megachiropteran and 8 microchiropteran) were studied during this phase of project, of which 96 belongs to Jodhpur, 82 from Jaisalmer and 67 from Bikaner districts (Tables 1 - 6).

All, 96 bat roosts reported till the completion of RSG 1st from Jodhpur district, along with 11 and 9 explored previously from districts of Jaisalmer and Bikaner of the Thar Desert respectively were revisited and studied from species composition, population status and threats point of view. Moreover, 71 bat roosts in Jaisalmer and 58 in Bikaner districts were newly discovered, studied and being reported for the first time. Geoffroy's Trident bat, *Asellia tridens* (Fig. 12) reported here during survey in Jaisalmer district is not only a new species of bat for the Great Indian Desert but also first record from India.

Beside this, collectively 172 settlements (town/villages/*dhanis*) were visited from Jaisalmer and Bikaner districts for bat conservation education campaign. Lectures themed of ecological significance, nature and diversity of bats in the Thar Desert were delivered in 4 colleges, 116 schools

(112 co-ed. and 4 girl's school), 35 village *Panchayat Bhavans* and about 70 small gathering at different destinations. A sum of 10,000 pieces of informative educational material on scientific facts about bats of this region (500 big size, 1500 medium size posters/ 5000 postcards/ 3000 pamphlets) were prepared and distributed among target groups during this campaign (Photo gallery I, II) in attempt to create conservation awareness and to educate locals about ecological significance of bats dwelling in their locality.

Co-ordinators of the Bat Clubs, initiated in selected schools of Jodhpur district while implementation of RSG 1st Project, were approached, interacted to have updates on their annual activities and suggestions of improvement for better achievement were received. Enthusiastic teachers and students at selected schools in districts of Jaisalmer and Bikaner were encouraged to start similar Bat Clubs, such that their participating members be educated and trained to play vital role in protection of bat roosts and disseminating the scientific information about bats and their environmental importance to locals and their upcoming generations. 18 schools and 2 colleges were shortlisted near prominent bat roosts in the study area and motivated to formulate bat clubs (Table 7).

Response of locals and students participated in Bat Conservation and Awareness Campaign commenced at districts of Jaisalmer and Bikaner too was quite remarkable and comparative, if not more, to that received in Jodhpur district while implementation of this campaign in RSG 1st Project. Alike Jodhpur more than 98% of targeted audiences were unaware of ecological significance of bats and 70-80% of them had strong belief in popular myths like bats attack furiously on human nose and consider them as sign of sin. They explained that because of inadequate knowledge about nature and ecological significance, as well in influence of prevailing myths people here in the study area had never ever admired the presence of bats in their surroundings, which in turn pose serious threat of intentional damage to the existing bat roosts.

But, because of our sincere efforts of disseminating the concrete scientific information about nature and ecological significance of bats, through launching and execution of the bat conservation and awareness campaign under this project, people in the study area have updated their knowledge and realized that bats are indeed quite useful creatures and play imperative role to insure good health of an ecosystem. Upon learning the importance and natural facts about bats they appeared quite excited and confident of discarding their fear of bats attacking human nose and got rid of prevailing myths of considering bats as sign of sin.

Moreover, they started believing that bats are environmental friendly creatures and deeply appreciated the objective of bat conservation and awareness campaign in this project. They were also quite impressed upon learning the fact that such useful project is launched and financially supported by a foreign organization based in U.K. and truly admired the novel effort of the Rufford Small Grants Foundation to fund this project.

INTRODUCTION

Bats play significant role in the betterment of an ecosystem. Insectivorous species of bats are crucial in controlling insect populations while frugivorous helps immensely in pollination and seed dispersal activities of various plant species. Recent studies revealed that diversity of bats in Rajasthan parts of the Thar desert in India have declined radically over the last two decades. Four (*Megaderma lyra, Pipistrellus dormeri, Hipposideros fulvus* and *Tadarida aegyptiaca*) of the twelve species of chiropterans reported earlier, between 1960's to 1980's, from Jodhpur and one (*Taphozous perforatus*) of the three from Jaisalmer have vanished over the two successive decades (Prakash, 1963; Sinha, 1979; Gaur, 1981 and Senacha, 2003). Roost occupancies and species composition in roosts also varied from earlier reports. Replacements of few species were observed in shared roosts while one microchiropteran species in Jaisalmer and two in Bikaner were reported for the first time by Senacha (2003).

Prevailing myths, like some believe bats attack on nose and suck our blood and others consider them as sign of sin, destruction and poverty, and renovation and developmental activities in Rajasthan parts of the Thar are the apparent among cited reasons responsible behind short of decline in diversity of bats (Purohit and Senacha, 2003, 2004; Senacha, 2003). In the dearth of adequate knowledge about nature and ecological significance of bats, traditionally, people in this part do not appreciate presence bats in their surroundings and practices intentional damage to their roosts to get rid of them (Senacha, 2009). To achieve wider objectives of conservation of bats in the Thar Desert people in this area needs to be educated and sensitised about the significance and nature of bats.

A logical approach of educating the people, through conservation campaign, in Jodhpur district about the nature and ecological significance of bats, during the RSG 1st, was much appreciated and the response received from participants was overwhelming. The bat conservation campaign drive was quite successful here in eliminating the existing myths and inculcating a sense of appreciation among locals about bats (Senacha, 2009).

Jodhpur, Jaisalmer and Bikaner districts represents more than 80% of the core desert area of the Thar Desert in Rajasthan (Fig. 1). However, Jodhpur has already been addressed in RSG 1st (Senacha, 2009), to achieve wider objective of conservation of bats entirely in Rajasthan parts of 'the Thar' it is required that similar type of initiatives of bat conservation campaign be undertaken in Jaisalmer and Bikaner districts.

In RSG 2nd we intended to review bat conservation initiatives of RSG 1st in Jodhpur and to explore current status of diversity of bats and to launch a bat conservation campaign in Jaisalmer and Bikaner districts of the Thar Desert. We believed that this exercise would impart bat conservation awareness message among locals and would help to eradicate existing myths from their mind. Once they realise that bats are not evil but are significant contributors towards betterment of an ecosystem and important economically and ecologically, they will start appreciating presence of bats in their surroundings; and would provide them adequate protection rather than intentional damage.

PROJECT OBJECTIVES

The objectives of this project were as under:

- 1. Review of RSG 1st bat conservation initiatives in Jodhpur of the Thar Desert.
- 2. Status survey of chiropterans in Jaisalmer and Bikaner districts of the Thar Desert.
- 3. Assessment of potential threats to chiropteran roosts in study area and recommend suitable measures to concern authority.
- 4. To launch and lead bat conservation campaign in Jaisalmer and Bikaner districts of the Thar Desert.
- 5. Preparation of final report and circulation among wildlife conservation concern organisations.



All above objectives have been achieved fully through the execution of this project.

Fig. 1: Map representing study area in Rajasthan parts of the Thar Desert, India

MATERIALS AND METHODS

To accomplish the objectives of this project following material and methods were used:

1. Survey of bat roosts:

Study area was travelled intensively and surveyed to locate bat roosts. Primary approach of survey was to interact with locals and inquire about the presence of bat roosts in their area. Upon getting information, those locations were approached, explored and assessed for presence of bat species.

2. Identification of bat species:

Project Investigator has ten years experience of working on bats of the Thar Desert and attained proficiency in identifying species bats of this region based on their morphological features and appearance. Doubtful individuals were caught in hoop net from roosts and identified based on morphological measurements and cranial characters.

3. Bat Conservation and Awareness Campaign:

Majority of bat in the study area roosts either in historical monuments (forts and *havalies*) or dilapidated buildings and unused wells that are in direct approach of people. They therefore are prone to face anthropological disturbances incurred by the virtue of existing bat myths and consequences of renovation activities. People in the study area do hate bats and do not want to see them in their surroundings. This leads intentional damage to bats on their roosting sites. To overcome with this problem, as a part of this project, we have launched Bat Conservation and Awareness Campaign in this region. The prime objective of this conservation campaign was to change negative attitude and inculcate the sense of appreciation about bats among locals.

To achieve this, we approached children and youngster, at schools and colleges; and elders, at their settlements, living in vicinity of existing roosts and tried to educate them through personal discussions and imparting lectures on nature and ecological significance of bats.

The project has been executed in following three phases:

(1) Preparatory and Assessment phase (August – October 2010):

- *a. Survey and Assessment of threat to bat roosts:* All existing bat roosts in Jaisalmer and Bikaner were surveyed for assessment of current population status and their potential threats.
- **b.** Volunteer training: After interaction with people in vicinity of bat roosts potential candidate were selected to work as volunteers in this programme. They were exposed to the species of bats at existing roosts in their surroundings and trained to assist in the Bat Conservation and Awareness Campaign.
- *c. Production of publicity material:* Posters and leaflets, illustrating the local bat species and their significance were developed for distribution during the implementation phase of campaign.

d. Assessment of RSG 1st bat conservation initiatives in Jodhpur: We did a rapid survey of the bat roosts located in Jodhpur and met all key persons and coordinators of the instituted bat clubs in this area to get update on success of RSG 1st bat conservation initiatives. We tried to resolve apparent problems of ongoing Bat Clubs, if any and encouraged them to expand their activities in adjoining areas. Feedback received through this assessment was advantageous for successful implementation bat conservation initiatives in remaining parts of the Thar Desert.

(2) Implementation phase (November to December 2011):

- *a. Education Campaign:* Series of lectures were delivered and workshops organized at schools, colleges, village and community gatherings, on nature of bats and their role in betterment of environment, to create awareness in Jaisalmer and Bikaner districts of the Thar Desert. LCD projector was used at required places during lectures for better understanding and learning.
- *b. Field trips:* were organised for onsite exposure of bats to bat lovers at nearby roosts in both the districts.
- *c. Bat clubs:* were formed at educational institutes with representation from staff members, students and local people for effective and constant monitoring, and to ensure safety of bat roosts. Volunteers were encouraged to act as bat club coordinator and to disseminate valuable information on bats to their generations ahead, such that they protect their roosts forever.
- *d. Local media:* were approached to obtain publicity support to this campaign through newspapers and local TV channels.

(3) Report preparation phase (January - March 2012):

Final report was prepared and activities of instituted Bat Clubs were followed up during this phase of the Project.

OBSERVATIONS AND RESULTS

(A) Survey and assessment of bat roosts:

Altogether eleven species of bats, 8 microchiropterans and 3 megachiropterans (Table 1, Photo gallery I and II) were reported from the study area i.e. Jodhpur, Jaisalmer and Bikaner districts of the Thar Desert, during this investigation from their 228 active roosts of the total 245 reported so far (Table 2 to 6, Fig 2 & 3).

All the seven microchiropterans, *Rhinopoma microphyllum*, *Rhinopoma hardwickii*, *Taphozous nudiventris*, *Taphozous perforatus*, *Scotophilus heathii*, *Rhinolophus lepidus* and *Pipistrellus tenuis* reported from Jodhpur district, during the investigation of RSG 1st Project through the years 2007 – 2009, were found dwelling there during this investigation. However, *Cynopterus sphinx* among the only two megachiropterans (*Pteropus giganteus* and *Cynopterus sphinx*) reported during investigation of RSG 1st Project was found missing from its only reported site of this species from Jodhpur district, i.e. Badi Haveli at Tinwari village in Osia Tehsil. Of the total 96 bat roosts reported so far from Jodhpur 11 were found deserted completely while 7 of the remaining 85 are found partially deserted, from species composition point of view, than what was observed during the investigation of RSG 1st Project (Table 2, Fig. 2 & 3).

Survey of RSG 2nd Project in Jaisalmer district revealed that five species of microchiropterans are thriving here currently of which three, *Rhinopoma microphyllum, Rhinopoma hardwickii* and *Taphozous nudiventris* have already been reported from this region in recent past (Prakash, 1963; Senacha, 2003) and Blyth's horseshoe bat, *Rhinolophus lepidus* has been reported for the first time from this district, while Geoffroy's Trident bat, *Asellia tridens* found here from Gajroop Sagar tunnel bat roost is significantly the first record of this species not only from the Great Indian Desert (The Thar) but from India (Table 3 & 4). However, alike the findings of Senacha (2003) we have not seen any roost of Egyptian Tomb bat, *Taphozous perforatus* which has been reported here in early 1960's by Prakash (1963).

However *Cynopterus sphinx*, the only reported species of megachiropterans from district of Jaisalmer (Senacha *et al.*, 2006) has been found missing during this investigation at its reported roost of Fort of Lathi village, an another megachiropteran species Fulvous Fruit bat, *Rousettus leschenaulti* has been reported for the first time here and found co-inhabiting with microchiropterans at Gajroop Sagar roost.

Analysis revealed that of the total eleven chiropteran roosts reported earlier from Jaisalmer district one has been deserted completely while species composition found altered at another four of these roosts (addition of species at one and depletion at three roosts); beside this change, 71 new chiropteran roosts have been explored and reported here during this investigation (Table 3 & 4, Fig. 2).

All four species of microchiropterans, *Rhinopoma microphyllum, Rhinopoma hardwickii, Rhinolophus lepidus* and *Pipistrellus tenuis* reported earlier from Bikaner district (Prakash, 1963; Senacha, 2003) have been observed there during this investigation, whereas megachiropteran species *Pteropus giganteus* has been observed here for the first time (Table 5 & 6).

Of the nine bat roosts reported earlier from Bikaner district, from 1960 to 2009, five were found deserted completely (Table 5) and 58 new bat roosts (1 megachiropteran and 57 microchiropteran) have been explored here during this investigation (Table 6, Fig. 2).



Fig. 2: Map representing distribution of chiropteran roosts in the study area located in Rajasthan parts of the Thar Desert, India.



Fig. 3: Map representing degradation in chiropteran roosts in the study area located in Rajasthan parts of the Thar Desert, India

Species composition at microchiropterans roosts varied significantly from prevailing congregation of Greater Mouse-tailed bat, *Rhinopoma microphyllum* and Lesser Mouse-tailed bat, *Rhinopoma hardwickii* to solitary roosts of each species except Geoffroy's Trident bat, *Asellia tridens* and Fulvous Fruit bat, *Rousettus leschenaulti*. We have observed the co-existence of *Rhinopoma microphyllum*, *Rhinopoma hardwickii*, *Taphozous perforators* and *Rhinolophus lepidus* at some of the roosts. However, at one roost in Jaisalmer four microchiropteran species, *Rhinopoma hardwickii*, *Rhinolophus lepidus*, *Asellia tridens* and a megachiropteran species, *Rousettus leschenaulti* were found to roost altogether (Table 2 & 6).

Occupancy estimates revealed that *Rhinopoma microphyllum* is the most common among microchiropterans in Jodhpur where as *Rhinopoma hardwickii* dominates in Jaisalmer and Bikaner districts, whereas *Pteropus giganteus* dominates all over the study area among megachiropterans.

Based on regular monitoring of some selected sites, temporal fluctuations in population size were observed in six of the eight microchiropterans but none of the three megachiropterans. Population of *Rhinopoma microphyllum* declined significantly in late summer whereas *Rhinopoma hardwickii* population showed a spike during the same time. *Rhinolophus lepidus* and *Taphozous perforatus* populations declined gradually from winter to summer and remained stable thereafter, but no significant fluctuations were observed in *Taphozous nudiventris* and *Scotophilus heathii* populations. It shows that some of the microchiropteran species performs local migration either to overcome the effect of seasonal changes in microclimatic parameters of their roosts or to accommodate with food abundance, while others do not. Due to difficulty in accessibility and field logistics we could not study trend on population fluctuation in *Pipistrellus tenuis* and *Asellia tridens*.

As far as breeding of bats in the study area is concern, mating in *Pteropus giganteus* was observed in months of October and November, whereas parturition was observed in March and April. They found to deliver one pup and just after parturition the newborn hold position in mother's ventral body part by gripping her in head to head direction. Mating in Rhinopoma microphyllum and Rhinopoma hardwickii occurs in March and April, whereas parturition takes place in July and August. These too deliver single pup and remain attached to the ventral body parts of mother in head to tail direction. Parturition in was Taphozous perforatus observed in May and June, but we could not conclude their mating time. Most delivered females of this species were seen with single pups but few others were sighted to carry two pups, possibly the twins. The direction of attachment of pups to their mother was head to head. Mating in Taphozous nudiventris was usually observed in March and April, but some pairs seen to be mounting in July and August. Parturition in this species was observed in July and August and pups found attached to mother in head to head direction. Parturition in Scotophilus heathii was observed in June and July, but their mating time could not be studied. Most delivered females seen with single pups, but remaining carried twins attached to mother's ventral body parts in head to head direction. However, parturition in Rhinolophus lepidus was observed in May and June, period of mating could not be defined. Delivered females were found to carry single pup attached to their ventral body part in head to tail direction. We could not observe breeding activities in species of Cynopterus sphinx, Rousettus leschenaulti, Asellia tridens, and Pipistrellus tenuis.

Megachiropteran species, *Pteropus giganteus* found roosted on the seven species of trees viz., Ficus bengalensis (Banyan), Ficus religiosa (Peepal), Azadirachta indica (Neem), Syzygium cumini (Jamun), Albizia lebeck (Sares), Saraca asoca (Ashoka) and Pithecellobium dulce (Vilaiti Imaly), but Cynopterus sphinx and Rousettus leschenaulti were found roosted in deserted historical buildings like fort, haveilies and manmade tunnels. The microchiropteran species viz, Rhinopoma microphyllum, Rhinopoma hardwickii, Taphozous perforatus, Taphozous nudiventris, Asellia tridens and Rhinolophus Lepidus are found roosted in the segregated locations of deserted public wells (Pisaca's), stepwells (Bhavadi's), unattended ruined building structures, under roofs of mud houses, manmade tunnels, temples and natural caves, whereas Pipistrellus tenuis was found roosted in deep dark crevices in concrete and mud walls of building's or rocks. In contrast to all these, the Scotophilus heathii found to roosts in the hollow spaces under dry foliage of palm trees.

Comparative analysis of data from investigation through RSG Projects (RSG 1st and RSG 2nd) to that with data from studies conducted historically from 1960 to 2007 revealed that seventeen bat roosts reported earlier from districts of Jodhpur, Bikaner and Jaisalmer have been either deserted or destroyed completely in due course of time, while ten have been deserted partially with significant depletion in species composition observed there earlier (Table 2 to 6, Fig. 3).

During this investigation, as observed earlier by Purohit *et al.* (2002) and Senacha (2003, 2009), we observed dead and decayed individuals of *Rhinopoma microphyllum* which got entangled in thorns of the trees of *Prosopis juliflora*, grown wildly at openings of certain microchiropteran roosts in the study area (Fig. 47). Scientifically, individuals of *Rhinopoma microphyllum* posses good power of echolocation and rely on it for navigation while performing their flying and foraging activities. They therefore are expected to detect the presence of every obstacle coming up in their way while flying and should not become the victims of such type of causality. The occurrence such unpredicted trapping of only *Rhinopoma microphyllum* individuals in thorns of *Prosopis juliflora* at entrance of multispecies roosts of microchiropteran has raised a questions mark on potential of echolocation ability of at least victimised individuals of this species, if not all. It further reveals, either echolocation power become weak in some unhealthy or old individuals or it temporarily deteriorate drastically even in healthy individuals under the influence of certain physiological or atmospheric conditions, which leads to such unique causalities. To unearth the exact fact behind this phenomenon detailed investigation is required on echolocation capabilities of individuals of this species.

Electrocution in individuals of megachiropteran species, *Pteropus giganteus*, as reported earlier by Purohit and Senacha (2003) and Senacha (2003, 2009) is common phenomenon and similar incidents were observed here during this investigation (Fig.48). Thirty five individuals of this species were found dead due to electrocution at various feeding locations in this study area. Analysis of data revealed that majority of these incidents took place over and due to existence of un-insulated three phase electricity wires installed alongside the roads but specifically near the occurrence of *Ficus religiosa*, a resource tree for feeding activities of this species.

Bat roosts located in premises of ancient Forts and Havelies are prone to face threat of renovation. Most of these buildings are quite old and ruined therefore their authorities have started renovation activities at many of these sites and are in process to initiate it at others. We therefore approached the concern authorities and tried to convince them to not to disturb roosts of bats. However some of them were quite positive other seemed bit reluctant in lieu of losing the benefits out of renovation.

Majority of bats dwelling in countryside of the study area roosts in traditional public wells (Pisaca) which were potentially used to source ground water by villagers recently till village authorities have provided them required purified drinking water through modern supply system. Ground water level receded significantly and most of these wells are running out of drinkable water and are not in use nowadays. These wells, therefore, are facing threats of either sealing them completely or refilling them with soil to avoid possibilities of animals and children falling into them accidentally. We therefore have approached concerned authorities and requested them to not to refill them with soil, but seal partially in such a way that a comfortable opening be left for bats to make in and out moment while performing foraging activities.

As described in final report of RSG 1st Project (Senacha, 2009) establishment of wind energy farms, comprising of large number of wind mills, at various locations in study area could potentially be fatal to the life of bats foraging in their vicinity. Around 1000 plus wind mills have already been installed in different locations of the study area and many more are underway of installation (Fig.46). Worldwide, wind mills have proven hazardous and deadly to many species of bat flying in their close proximity (Arnett, 2005). A zone of low atmospheric pressure is created around the working wind energy farms. When, bats enter this low pressure zone, while foraging, their blood pressure falls significantly and leads to the failure of blood circulatory system resulting in death. It is therefore required that a scientific study be carried here and intensity of probable damage caused of wind

energy farms to the diversity of bats be investigated; and proper damage control measures be suggested to the concern authorities.

(B) Bat conservation education campaign:

As mentioned earlier people in this area have been misunderstanding bats over last many generations and consider them as evil and sign of sin. They also believe in myth of bat attacking human nose. While campaigning we have delivered lectures and demonstrations about nature and ecological significance of bats to children, students, youths and elders living in many of the urban and rural settlements of the study area (Figs. in Photo Gallery II) This exercise of bat campaign has helped many locals to sweep out existing myths on bats from their minds and turned them a lifelong admirer of bats. It is hence believed that these people will play key role in imparting right message to remaining public about nature and prevailing benefits of species of bats thriving in this area. Bat Clubs initiated during implementation of both the RSG projects will be the key source to teach the future generations about nature and ecological importance of bats. By this way existing myths about bats would sweep out completely from public mind over the period of time and with their changed attitude people will start appreciating existence of bats in this area. I, therefore, strongly believe that initiative of launching Bat Conservation and Awareness Campaign through both of the RSG projects will propagate adequately and would be considered as a milestone achievement in the field of wildlife conservation in this area.

RECOMMENDATIONS

Based upon the observations and analysis of data obtained through the study under RSG 1st and 2nd Projects I formulate following recommendations to conserve the roosts and species diversity of bats in Jodhpur, Jaisalmer and Bikaner districts of the Thar Desert.

1. As mentioned earlier, myths about nature of bats are deep rooted among locals in this study area of Rajasthan parts of the Thar Desert. However, execution of two consecutive Bat Conservation and Awareness Campaigns under RSG first and RSG second projects have played significant role to deracinate existing bat myths and update their knowledge about significance of bats among locals, constant efforts are further required to ensure that this message persuade thoroughly to maximum number of people inhabiting in this area and their future generations. So as to achieve it, one has to make sure that article themed of types, nature and ecological significance of bats be

published in local newspapers and advertised through local television channels over the period of reasonable time span; relevant lectures are delivered at least yearly, if not more, in schools, colleges and gatherings at settlements (towns/villages/dhanies) in due course of time.

- 2. Majority of bats dwelling in rural areas of Jodhpur, Jaisalmer and Bikaner districts of the Thar Desert roosts in traditional public wells (Pisaca) which were potentially used to source ground water by villagers recently till village authorities (Gram Panchayat's) provided them required purified drinking water through modern supply system. Ground water level receded significantly and most of these wells are running out of drinkable water and are not in use nowadays. These wells, therefore, are facing threats of either sealing them completely or refilling them with soil to avoid possibilities of animals and children falling into them accidentally. It is therefore of vital importance that concern authorities of these wells be approached and convinced to not to refill them with soil, but be allowed to seal partially in such a way that a comfortable opening be left for bats to make in and out moment while performing foraging activities.
- 3. Chiropteran roosts located in ancient monuments like Forts and Havelies are prone to face threat of renovation. However, during the implementation of RSG 2nd Project we approached authorities of potential monuments, conveyed them about significance of bats, discussed probability of damage to existing bat roosts by renovation activities and requested them to avoid renovation of sites of bat roosts located in their premises, constant monitoring and efforts of communication with such authorities are required ahead to assure safety these bat roosts. If comfortable, at selected sites authorities of these monuments can be further better educated about ecological importance and species diversity of bats inhabited in roosts located in their premises, and be encouraged to declare it as wildlife spot and earn from visiting tourists, but, in consultation and prior permission from competitive wildlife authorities.
- 4. We approached and arranged meetings with local wildlife department to discuss status of bats in the study area. Although they are reasonably aware of ecological importance and diversity of bats in their jurisdiction we need to chase them in due course of time, convince and pressurise to include bats in their conservation priorities, as currently bats are least concerned from conservation point of view.
- 5. Study area should regularly be reinvestigated in due course of time to assess diversity status of bats and to evaluate the impact of conservation measures initiated in this study.

- 6. Similar approach of studying bats and efforts to create bat conservation awareness is well required in other parts of the Thar Desert, such that a wider objective of conservation of bats in this unique ecosystem be achieved.
- 7. We need to monitor the activities of Bat Clubs instituted during implementation of both the RSG projects and help them out with providing required raw material, guidance and technical support in due course of time such that they work well and achieve the objectives of educating the targeted groups about nature and ecological significance of bats, and conservation of diversity of bats in their area.

FUTURE PLAN

Following are the key objectives of my future plan to conserve diversity of bat in the Thar Desert.

- 1. I am committed and would try to promote and ensure fruitful functioning of the bat clubs instituted in the study area, such that they achieve their objectives of imparting bat conservation awareness education and inculcating sense of appreciation about bats among younger and future generations.
- To achieve wider objectives of conservation of bats in the Thar Desert I would write some more project proposals and try that similar types of studies are undertaken and bat conservation awareness programme be launched in remaining parts of the Thar Desert.
- 3. I would also try to produce a documentary film on bats of the Thar Desert, which would be instrumental in imparting bat conservation education and strengthen the future initiatives of bat conservation awareness programme in this region.
- 4. Initiatives of community conservation have been quite successful and a proven tool to protect various wildlife species in this region. I therefore have communicated many prominent community leaders and would approach others to educate them about nature and ecological significance of bats, and would try to convince them that bats are the symbol of prosper and healthy ecosystem. Then would request them to find a way to provide bats as religious consideration and persuade this message among their community followers such that they start protecting them on their own.

- 5. I have been and would further write popular articles and try to ensure that information on bats be frequently published in local newspapers, such that readers are updated about status of bats in their region.
- 6. I would appreciate to assist local forest department in providing scientific information on bats and in future bat conservation initiatives taken on their behalf, if required.
- 7. I approached foreign organisations like Wild Venture based in UK to get foreign volunteers to participate in this project and they agreed to collaborate with our initiative of Bat Conservation and Awareness Programme. I would also try to secure funding from other potential institutions such that efforts of bat conservation and awareness are further strengthened in this region.

PROJECT TEAM

However, a lot many people and volunteers have contributed for the successful accomplishment of this project following are the key person who acted as project team.

Designation	Name of the person
Principal Investigator and Scientist-in-Charge	Dr. K. R. Senacha
Coordinators	Dr. Sumit Dookia
	Dr. Amit Kotia
Area Coordinator, Jaisalmer	Mr. Gajendra Singh
Area Coordinator, Bikaner	Mr. Vigil Wilson
Area Coordinator, Jodhpur	Mr. Mahendra Singh
Manager Field Activities	Ms. Suman Seervi

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PHOTO GALLERY - I

Design and format of the posters developed for demonstration and distribution while execution of RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 4: Design of postcard size cards developed of frugivorous bat, Indian flying fox, *Pteropus giganteus*, to distribute and create awareness among target groups during RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 5: Design of postcard size cards developed of frugivorous bat, Short-nosed fruit bat, *Rousettus leschenaulti*, to distribute and create awareness among target groups during RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 6: Design of postcard size cards developed of insectivorous bat, Greater mouse - tailed bat, *Rhinopoma microphyllum*, to distribute and create awareness among target groups during RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 7: Design of postcard size cards developed of insectivorous bat, Lesser mouse-tailed bat, *Rhinopoma hardwickii*, to distribute and create awareness among target groups during RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 8: Design of postcard size cards developed of insectivorous bat, Egyptian tomb bat, *Taphozous perforatus*, to distribute and create awareness among target groups during RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 9: Design of postcard size cards developed of insectivorous bat, Nacked-rumped tomb bat, *Taphozous nudiventris*, to distribute and create awareness among target groups during RSG 2nd Bat Conservation and Awareness Campaign.



Fig. 10: Design of banner developed on 2 x 6 feet of flex, to display around vehicle hired for field work and to use as teaching aid while delivering lectures in RSG Bat Conservation and Awareness Campaign.



Fig. 11: Design of informative poster developed in A3 size for distribution among target groups and 3 x 5 feet of flex, to display around vehicle hired for field work, as well to use as teaching aid while delivering lectures in RSG Bat Conservation and Awareness Campaign.

PHOTO GALLERY - II

Photographic representation of work done under RSG 2nd Bat Conservation and Awareness

Project.



Photograph by: Dr. K. R. Senacha

Fig. 12: Geoffroy's Trident bat, *Asellia tridens* reported from Gajroop Sagar tunnel roost in Jaisalmer district of the Thar Desert.



Photograph by: Dr. K. R. Senacha

Fig. 13: Colony of Greater Mouse-tailed bat, *Rhinopoma microphyllum*, and Lesser Mouse-tailed bat, *Rhinopoma hardwickii* rooting at Jalmahal roost of chiropterans located near Sagar village in Bikaner district of the Great Indian Desert.



Photograph by: Dr. K. R. Senacha

Fig. 14: Volunteers and Area Coordinator Mr. Vigil Wilson and Mr. Gajendra Singh while trying to catch a bat for identification purpose at Gajroop Sagar Tunnel roost at Jaisalmer district of the Thar Desert.



Photograph by: Dr. K. R. Senacha

Fig. 15: School going children and locals of village Dau in Sum Tahseel of Jaisalmer district in the Thar Desert, while grasping the information written on banner displayed around the conservation education van.



Photograph by: Dr. K. R. Senacha

Fig. 16: Glimpse of sandy habitat where our conservation education van got trapped in the range of Desert National Park.



Photograph by: Dr. Sumit Dookia

Fig. 17: Principal Investigator and Scientist In-charge of RSG 2nd Bat Conservation and Awareness Project Dr. K. R. Senacha while walking across the typical grassland habitat of Desert National Park located in the study area.



Photograph by: Dr. K. R. Senacha

Fig. 48: An electrocuted individual of Indian Flying Fox, *Pteropus giganteus* Jodhpur district of the Thar Desert.



Photograph by: Dr. Sumit Dookia (auto mode)

Fig. 49: Project team posing at sand dune near Miyazlar in Sum Tahseel of the Jaisalmer district in the Thar Desert.



Photograph by: Mr. Vigil Wilson

Fig. 50: Project team posing at sand dune near RD 928 of IGNP in Bikaner district of the Thar Desert.



Fig. 51: Glimpse of an article on project activities published in leading news paper, Rajasthan Patrika, Dated: 01/10/2010.

Table 1

Taxonomic status of the chiropteran species reported from Jodhpur, Jaisalmer and Bikaner districts of the Thar Desert during this study

Name of the species	Common name	Family	Superfamily		
Sub-order: Megachiroptera	Sub-order: Megachiroptera				
Pteropus giganteus (Brunnich, 1782)	Indian flying fox	Pteropodidae	-		
Cynopterus sphinx (Vahl, 1797)	Shot-nosed fruit bat	Pteropodidae	-		
Rousettus leschenaulti (Desmarest, 1820)	Fulvous fruit bat	Pteropodidae	-		
Sub-order: Microchiroptera					
Rhinopoma microphyllum (Brunnich, 1782)	Greater mouse-tailed bat	Rhinopomatidae	Emballonuriodea		
Rhinopoma hardwickii (Gray, 1831)	Lesser mouse-tailed bat	Rhinopomatidae	Emballonuriodea		
Taphozous perforatus (E. Geoffroy, 1818)	Egyptian tomb bat	Emballonuridae	Emballonuriodea		
Taphozous (Liponycteris) nudiventris (Cretzschmar, 1830-31)	Naked-rumped tomb bat	Emballonuridae	Emballonuriodea		
Scotophilus heathii (Horsfield, 1831)	Asiatic greater yellow house bat	Vespertilionidae	Vespertilionoidea		
Pipistrellus tenuis (Temminck, 1840)	Indian pygmy bat	Vespertilionidae	Vespertilionoidea		
Rhinolophus lepidus (Blyth, 1844)	Blyth's horseshoe bat	Rhinolophidae	Rhinolophoidea		
Asellia tridens (Geoffroy, E., 1813)	Trident bat	Hipposideridae	Rhinolophoidea		

Table 2

Distribution of chiropterans reported earlier in and around Jodhpur of the Thar Desert and their current status

Roosting sites	Profile of bat species			
	Reported earlier (1961 to 2009)	Reported during the RSG 2 nd study (2010-2011)	Missing	Addition
(I) Megachiropterans status				
Balsamand Garden, Jodhpur (26.33361° N, 73.02361° E)	(i) Pteropus giganteus	(i) Pteropus giganteus	Nil	Nil
Rail Sadan, Jodhpur (26.27111° N, 73.01611° E)	(i) Pteropus giganteus	(i) Pteropus giganteus	Nil	Nil
Jeevati Samadhi, Keru (26.33960° N, 72.87443° E)	(i) Pteropus giganteus	Nil	(i) Pteropus giganteus	Nil

Khinyaniya well, Ramdwara,	(i) Pteropus giganteus	(i) Pteropus giganteus	Nil	Nil
(26.34848° N, 72.82760° E)				
Chowk in Meghwal colony, Balesar Durgawata	(i) Pteropus giganteus	Nil	(i) Pteropus giganteus	Nil
(26.35302° N, 72.83818° E)				
Badi Haveli, Tinwari, Osia	(i) Cynopterus sphinx	Nil	(i) Cynopterus sphinx	Nil
(26.46195° N, 72.92123° E)				
(II) Microchiropterans status				
Meharangarh fort, Jodhpur	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	(i) Megaderma lyra	Nil
(26.29333° N, 73.02028° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
	(iii) Megaderma lyra			
Mandore tunnel, Jodhpur	(i) Rhinopoma microphyllum,	(i) Rhinopoma microphyllum	(i) Hipposideros fulvus	Nil
(26.35250° N, 73.03306° E)	(ii) Taphozous perforatus	(ii) Rhinopoma hardwickii	(ii) Megaderma lyra	
	(iii) Hipposideros fulvus	(iii) Taphozous perforatus	(iii) Rhinolophus lepidus	

	(iv) Megaderma lyra			
	(v) Rhinopoma hardwickii			
	(vi) Rhinolophus lepidus			
Bheembhadak, Jodhpur	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	(i) Taphozous nudiventris	
(26.29611° N, 72.95750° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
	(iii) Taphozous nudiventris			
Lal Sagar, Jodhpur	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
(26.32129° N, 73.05534° E)	(ii) Taphozous perforatus		(ii) Taphozous perforatus	
Kaga, Jodhpur	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	
(26.29531° N, 73.05713° E)	(ii) Rhinopoma hardwickii		(ii) Rhinopoma hardwickii	
	(iii) Taphozous perforatus		(iii) Taphozous perforatus	
Balsamand garden, Jodhpur	(i) Rhinopoma hardwickii	Nil	(i) Rhinopoma hardwickii	Nil
(26.333946° N, 73.024156° E)				
Udai Mandir, Jodhpur	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
(26.29462° N, 73.03655° E)	(ii) Rhinopoma hardwickii		(ii) Rhinopoma hardwickii	
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	(iii) Taphozous perforatus		(iii) Taphozous perforatus	
Shrinathji kee haveli, Mahamandir, Jodhpur	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
(26.30667° N, 73.04361° E)	(ii) Rhinopoma hardwickii (iii) Taphozous perforatus		(ii) Rhinopoma hardwickii (iii) Taphozous perforatus	
Open Convocation Center, JNV	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
University New Campus, Jodhpur	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.24639° N, 73.02417° E)				
Mehalado, Soor Sagar, Jodhpur	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
(26.32972° N, 72.98806° E)				
Krishna Nagar, Jodhpur	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
(26.22861° N, 73.02806° E)				
Sagee kee Bhakari, Jhalamand	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	(i) Taphozous nudiventris	Nil
(26.21361° N, 73.11972° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		

	(iii) Taphozous nudiventris			
Daijar Mata Mandir, Jodhpur	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.39694° N, 73.05278° E)	(ii) Rhinolophus lepidus	(ii) Rhinolophus lepidus		
Palm tree plantation of Mandore garden, Jodhpur	(i) Scotophilus heathii	(i) Scotophilus heathii	Nil	Nil
(26.35222° N, 73.02806° E)				
Deval of Maharaja Shri Ajit	(i) Taphozous nudiventris	(i) Taphozous perforatus	(i) Taphozous nudiventris	Nil
Singh, Mandore Garden, Jodhpur	(ii) Taphozous perforatus			
(26.35222° N, 73.03583° E)				
Deval of Maharaja Shri Gaj	(i) Taphozous nudiventris	(i) Taphozous nudiventris	Nil	Nil
Singh, Mandore Garden Jodhpur				
(26.35250° N, 73.03583° E)				
Badi Haveli, Tinwari, Osia	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.46195° N, 72.92123° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
	(iii) Taphozous nudiventris	(iii) Taphozous nudiventris		

	(iv) Taphozous perforatus	(iv) Taphozous perforatus		
Ram Ka Kua, Doli	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.17812° N, 72.88430° E)				
House of Mr. Jagmal Ram Anjana, Doli	(i) Pipistrellus tenuis	(i) Pipistrellus tenuis	Nil	Nil
(26.17375 N, 72.88617 E)				
Farm Well Kago ki Dhani, Doli	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.20189° N, 72.90572° E)				
Jain Bhavan (Gram Panchayat Bhavan), Dhava	(i) Rhinolophus lepidus	Nil	(i) Rhinolophus lepidus	Nil
(26.05989° N, 72.74289° E)				
House of Sh. Ganga Singh Ji,	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
Aagolai (26.53922°N, 72.38058° E)	(ii) Rhinopoma hardwickii		(ii) Rhinopoma hardwickii	
Public Well (Deserted), Alidas	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil

Nagar, near Shetarana				
(26.59675° N, 72.34292° E)				
Farm Well at Saro ki Dhani,	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Madasar – Deda				
(26.59589° N, 72.34473° E)				
Fort premise, Setarawa	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.59594° N, 72.34469° E)				
Public Well (Pisaca), Solankia	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Tala				
(26.53650° N, 72.26992° E)				
Public Well (Pisaca), Bhungra	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.43903° N, 72.28225° E)				
Goga Dev Temple, Bhungra	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.43597° N, 72.28350° E)				
Door Singh ka Kua, Gada	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil

(26.49128° N, 72.36672° E)	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum		
Public well (Pisaca), Ketu	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.52461° N, 72.45486° E)				
Public Well (Pisaca) – Kharia	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bera, Bhalu Kalla	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.55569° N, 72.50319° E)				
Public Well (Pisaca) – Naya	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bera, Bhalu Kalla	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.55621° N, 72.50311° E)				
Public Well (Pisaca) – Kharia	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bera, Bhalu Ratangarh	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.58036° N, 72.51781° E)				
Public Well (Pisaca) - Naya	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bera, Bhalu Ratangarh	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.58345° N, 72.51721° E)				

Public Well (Pisaca), Chamu	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.65550° N, 72.57789° E)				
House of Mr. Dhana Ram Paliwal, Barnau (26.73476° N, 72.47704° E)	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii (iii) Taphozous nudiventris	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii (iii) Taphozous nudiventris	Nil	Nil
Public Well (Pisaca), Dechu (26.77328° N, 72.32633° E)	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
Public Well (Pisaca), Dhadhu (26.92078° N, 72.13650° E)	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
Public Well (Pisaca), Khara (27.02286° N, 72.12550° E)	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
Public Well (Pisaca), Sihara (27.19047° N, 72.05647° E)	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	Nil	Nil
Ground Water Tank, Sihara	(i) Taphozous nudiventris	(i) Taphozous nudiventris	Nil	Nil

(27.19050° N, 72.05650° E)				
Public Well (Pisaca), Tepu	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(27.27392° N, 72.02082° E)	(ii) Taphozous nudiventris	(ii) Taphozous nudiventris		
Public Well (Pisaca), Kanasar	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(27.44772° N, 72.11086° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Public well (Pisaca), Nava	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(27.48548° N, 72.11346° E)				
Public Well (Pisaca), Bhadala	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(27.48114° N, 72.13132° E)				
Dilapidated mud building, near	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
Main Market, Bap				
(27.37350° N, 72.35517° E)				
Dilapidated building (deserted)	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
near village pond, Bap				
(27.37339° N, 72.35508° E)				

Salt Pan well of Mr. Pachu Lal	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Sanda, Bap	(ii) Rhinonoma hardwickii	(ii) Rhinopoma hardwickii		
(27.33796° N, 72.38717° E)				
Dilapidated Mud House	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(Deserted), Jambu				
(27.31083° N, 72.51636° E)				
Public Well (Pisaca), Bhinyasar	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(27.22983° N, 72.77325° E)				
Public Well (Pisaca), Bhojasar	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(27.22983° N, 72.80217° E)				
Public Well (Pisaca), Aau	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(27.20075° N, 72.26564° E)				
Public Well (Pisaca), Sewap	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(27.09203° N, 72.88236° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Thakurji Temple, Esharu	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil

(27.08361° N, 72.95292° E)				
Public Well (Pisaca), Matoda	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.96231° N, 72.87756° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Public Well (Pisaca), Padsala	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.88436° N, 72.88939° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Village Fort, Danwara	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.71269° N, 73.09492° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Public Well (Pisaca), Chandrak	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.80350° N, 73.13497° E)				
New Public Well (Pisaca), Hania	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.82680° N, 73.17284° E)				
Jagdamba Temple, Bhari Nagar	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.80600° N, 73.27694° E)				
Thakurji Temple, Paladi	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil

(26.76478° N, 73.42125° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Baba Raghuram Temple,	(i) Scotophilus heathii	(i) Scotophilus heathii	Nil	Nil
Surpura Khurd	(ii) Pipistrellus tenuis	(ii) Pipistrellus tenuis		
(26.70839° N, 73.47614° E)				
Fort, Surpura Khurd	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.70132° N, 73.47112° E)				
Fort, Bhopalgarh	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.65489° N, 73.49178° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Shimbhasheva Ashram,	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bhopalgarh	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.65423° N, 73.49214° E)				
Temple Bavadi (Step Well),	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bagoria				
(26.59822° N, 73.49769° E)				
Tukon ka Bhakar (Near	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil

Sujannath Temple), Sopado				
(26.60531° N, 73.44600° E)				
Shyam Manohar Prabhu Temple, Choupasani (26.26962° N, 72.94765° E)	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	Nil	Nil
Old building near Arana Jharna Bath Kund, Arana Jharna (26.30156° N, 72.93604° E)	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	Nil	Nil
Dilapidated building in Maheshawari Mohalla, Keru (26.34497° N, 72.87322° E)	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii (iii) Rhinolophus lepidus	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii (iii) Rhinolophus lepidus	Nil	Nil
A building of Mr. Meethalal Jain, Aagolai (26.53910° N, 72.38154° E)	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii	Nil	Nil
A building Ramdwara, Balesar Satta	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil

(26.34845° N, 72.82785° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
House of Mr. Nema Ram in Meghwal colony, Balesar Durgawata	(i) Rhinolophus lepidus	(i) Rhinolophus lepidus	Nil	Nil
(26.35383° N, 72.83785° E)				
Ban Mata temple, Bhavad	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.46174° N, 73.10627° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
	(iii) Rhinolophus lepidus	(iii) Rhinolophus lepidus		
	(iv) Taphozous nudiventris	(iv) Taphozous nudiventris		
An unattended house in	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Brahmapuri Mohalla, Bavadi	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.61976° N, 73.17754° E)				
Meethia Bera public well	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(Pisaca), Bada Kelava				
(26.62954° N, 73.13572° E)				
Jeevati Samadhi premise,	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil

Mevasa	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.64421° N, 73.13695° E)				
Public Well (Pisaca), Santoda	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Khurd				
(26.64705° N, 73.15146° E)				
Public Well (Pisaca), Basani	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Bhatian	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.65322° N, 73.17062° E)				
Kot of Maharaja Ummed Singh,	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Ummed Nagar				
(26.66512° N, 73.19035° E)				
Unattended haveli of Kotecha	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Thakur, Bada Kotecha				
(26.69202° N, 73.22457° E)				
Aasop Fort, Aasop	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.79310° N, 73.58240° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		

Haveli of Mr. Vijaya Raj Tailor,	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Aasop	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.79588° N, 73.58105° E)				
Gadi ka Bera Public Well	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(Pisaca), Aasop	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.79153° N, 73.58008° E)	(,			
Unoccupied rooms in premise of	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Aai Mata Temple, Bilara	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
(26.18093° N, 73.70536° E)				
Deserted mud house, Bhavi	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.21443° N, 73.61541° E)				
House of Shri Ratan Bishnoi,	(i) Pipistrellus tenuis	(i) Pipistrellus tenuis	Nil	Nil
Banar				
(26.33421° N, 73.14269° E)				
Public Well, Dangiyawas	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.26252° N, 73.28660° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		

Unoccupied house of Shri Khem	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
Chand Jain, Pipar				
(26.37850° N, 73.54428° E)				
Public Well, Kakani	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.06669° N, 73.07265° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Unoccupied house of Shri Nena	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
Ram Bishnoi, Luni				
(26.03350° N, 73.07770° E)				

Distribution of chiropterans reported earlier in and around Jaisalmer of the Thar Desert and their current status

Roosting sites	Profile of bat species				
	Reported earlier (1961 to 2009)	Reported during the RSG 2 nd study (2010-2011)	Missing	Addition	
(I) Megachiropterans status – No reports till the year 2009					
Fort, Lathi	(i) Cynopterus sphinx	Nil	(i) Cynonterus snhiny	Nil	
(27.03661° N, 71.51699° E)					
Gajroop Sagar Tunnel, Gajroop Sagar	Nil	(i) Rousettus leschenaulti	Nil	(i) Rousettus leschenaulti	
(26.94722° N, 70.92889° E)					
(II) Microchiropterans status					
Annapurana Bhandar, Sonar Fort, Jaisalmer	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil	
(26.91250° N, 70.91611° E)	(ii) Taphozous nudiventris	(ii) Taphozous nudiventris			

Raj Mahal, Sonar Fort, Jaisalmer	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	(i) Taphozous nudiventris	Nil
(26.91417° N, 70.91333° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
	(iii) Taphozous nudiventris			
Rani Mahal, Sonar Fort, Jaisalmer	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(26.91167° N, 70.91389° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Patawa Haveli, Jaisalmer	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil
(26.91611° N, 70.91500° E)				
Amar Sagar Garden, Amar Sagar	(i) Taphozous nudiventris	Nil	(i) Taphozous nudiventris	Nil
(26.93194° N, 70.87139° E)				
Shri Adinath Jain temple	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	(i) Taphozous nudiventris	Nil
(26.92917° N, 70.87167° E)	(ii) Taphozous nudiventris			
Gajroop Sagar Tunnel, Gajroop Sagar	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	(i) Rhinolophus Lepidus
(26.94722° N, 70.92889° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		(ii) Asellia tridens
		(iii) Rhinolophus Lepidus		

		(iv) Asellia tridens		
Public Well, Gajroop Sagar	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	
(26.94722° N, 70.92889° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Fort, Lathi	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(27.03661° N, 71.51699° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
	(iii) Taphozous perforates	(iii) Taphozous perforates		
	(iv) Taphozous nudiventris	(iv) Taphozous nudiventris		

Species profile of the newly reported chiropteran roosts from Jaisalmer district of the Thar Desert during this study through the years 2010 – 2011

Name of the roost site	Type of Roost	Geographical Position	Name of the	Species Composition
			city/village/settlement	
Public Well	Inside peripheral wall of the well	26.6068° N, 72.0736° E	Jhalara	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii

Rawasoniya Bera	Inside peripheral wall of the well	26.6300° N, 72.0172° E	Jhalara	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Dilapidated Gram Panchayat Water Tank	Inside peripheral wall of the Tank	26.6384° N, 71.9562° E	Doongara Ki Dhani	(i) Rhinopoma hardwickii
Pond water over flow tunnel, Karani Mata Temple	At peripheral walls and ceiling of the tunnel	26.6272° N, 71.8655° E	Bhaniyana	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.6232° N, 71.8656° E	Bhaniyana	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.4876° N, 71.8172° E	Bhikhodai	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5180° N, 71.7468° E	Rajmathai	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5675° N, 71.5629° E	Minaj Pura	(ii) Rhinopoma microphyllum
Public Well	Inside peripheral wall of the well	26.6130° N, 71.4881° E	Bhensada	(ii) Rhinopoma narawicku (ii) Rhinopoma microphyllum (ii) Rhinopoma hardwickii
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Public Well	Inside peripheral wall of the well	26.4904° N, 71.2072° E	Fatehgarh	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Fort premises	Ceilings and forewalls of	26.6943° N, 71.2015° E	Devikot	(i) Rhinopoma microphyllum
	dilapidated rooms			(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.6943° N, 71.2015° E	Devikot	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.8130° N, 70.9070° E	Polaji Ki Dairy	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
House of shri Mana Ram	Wall crevices near main door	26.7693° N, 70.9485° E	Bhu Gaon	(i) Pipistrellus tenuis
Public Well	Inside peripheral wall of the well	26.7350° N, 70.9413° E	Pitholai	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.7041° N, 70.9237° E	Bhopa	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5122° N, 70.9245° E	Chelak	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.3622° N, 70.9224° E	Devada	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.2702° N, 70.9176° E	Jogidas ka Gaon	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.2076° N, 70.6471° E	Jhinjhiyali	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.2251° N, 70.3904° E	Myazlar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Dilapidated house structure	Ceilings and forewalls of this	26.3667° N, 70.4780° E	DNP Chowki Phulia	(i) Rhinopoma microphyllum
	house			(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.4263° N, 70.4441° E	Dau	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5180° N, 70.4923° E	Hattar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5679° N, 70.5183° E	Chohani	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5730° N, 70.4823° E	Koriya	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.6210° N, 70.4855° E	Faledi	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.7419° N, 70.5585° E	Bida	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.7758° N, 70.5418° E	Sudasari	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.8667° N, 70.4990° E	Sum	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Ruined unattended house	Ceilings and forewalls	26.8385° N, 70.5023° E	Luno ki Basti	(i) Rhinolophus lepidus
silucture				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.9922° N, 70.4620° E	Mangliawas	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.0471° N, 70.4318° E	Siyambar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.1435° N, 70.4116° E	Khuiwala	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.1814° N, 70.3526° E	Banda	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.2472° N, 70.4890° E	Murdai Dhani	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.2983° N, 70.4941° E	Ekaipura	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.3317° N, 70.5498° E	Ramgarh	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.2463° N, 70.6524° E	Sonu	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.1326° N, 70.7645° E	Mokal	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.2731° N, 70.8689° E	Khinwsar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.3335° N, 70.9084° E	Mada	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.3515° N, 70.9785° E	Nehdai	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Fort Premises	Unattended rooms at periphery of	27.2836° N, 71.2380° E	Mohangarh	(i) Rhinopoma microphyllum
	the fort permises			(ii) Rhinopoma hardwickii
				(iii) Taphozous nudiventris
Public Well	Inside peripheral wall of the well	27.2836° N, 71.2371° E	Mohangarh	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.4424° N, 71.6934° E	Nachana	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.3304° N, 71.7037° E	Didhu	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.0058° N, 71.9058° E	Ramdevara	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Rajgharana Samadhi tombs	Basement rooms and underside of	26.9357° N, 71.9125° E	Pokharan	(i) Rhinopoma hardwickii
	tombs			(ii) Taphozous nudiventris

Public Well	Inside peripheral wall of the well	26.3951° N, 71.9232° E	Phalsund	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.4674° N, 71.5441° E	Arang	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.6830° N, 71.5808° E	Luna	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.7324° N, 71.5848° E	Sankra	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.9665° N, 71.7193° E	Odhania	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.0198° N, 71.7156° E	Khavolai	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.2604° N, 71.7052° E	Ajasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.3311° N, 71.7091° E	Didhu	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
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Public Well	Inside peripheral wall of the well	26.9985° N, 71.0763° E	Hamira	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.0732° N, 70.5612° E	Kutchchari	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.3167° N, 70.0498° E	Ghotaru	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.6630° N, 70.8043° E	Bhuttewala	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.7964° N, 70.3540° E	Tanot	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.6538° N, 70.4592° E	Ranao	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Fort Premises	Cielings and forewalls of	27.8707° N, 70.5635° E	Kishangarh	(i) Rhinopoma microphyllum
	unattended ruined rooms in the premises			(ii) Rhinopoma hardwickii
				(iii) Taphozous nudiventris
Public Well	Inside peripheral wall of the well	27.4832° N, 70.6928° E	Sadhan	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.9437° N, 70.1425° E	Monnar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.7764° N, 70.3720° E	Chhilaro	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.6122° N, 70.7161° E	Khoordi	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.4644° N, 70.7839° E	Satanagar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.4685° N, 70.8951° E	Nagraj	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	26.5520° N, 71.0416° E	Rama	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii

Distribution of chiropterans reported earlier in and around Bikaner of the Thar Desert and their current status

Roosting sites	Profile of bat species					
	Reported earlier	Reported during the RSG 2 nd study	Missing	Addition		
	(1961 to 2009)	(2010-2011)				
(I) Megachiropterans status – No reports till the year 2009						
(II) Microchiropterans status						
Junagarh fort, Bikaner	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil		
(28.02278° N, 73.32028° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii				
		(iii) Pipistrellus tenuis				
Jalmahal, Sagar village	(i) Rhinopoma microphyllum,	(i) Rhinopoma microphyllum,	Nil	Nil		
(28.02056° N, 73.39306° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii				
	(iii) Rhinolophus lepidus	(iii) Rhinolophus lepidus				
Overflow tunnel, Devikund	(i) Rhinopoma hardwickii	(i) Rhinopoma hardwickii	Nil	Nil		

Sagar, Sagar village				
(28.01972° N, 73.39278° E)				
Public Well, Sagar village	(i) Rhinopoma microphyllum	(i) Rhinopoma microphyllum	Nil	Nil
(28.01944° N, 73.39306° E)	(ii) Rhinopoma hardwickii	(ii) Rhinopoma hardwickii		
Laleshwar Mahadev Mandir, Shiv	(i) Pipistrellus tenuis	Nil	(i) Pipistrellus tenuis	Nil
Badi, Bikaner				
(28.00028° N, 73.35361° E)				
Annapurana Mata Mandir,	(i) Rhinopoma hardwickii	Nil	(i) Rhinopoma hardwickii	Nil
Pawan Puri, Bikaner				
(27.99250° N, 73.33861° E)				
Dauji Ka Mandir, Court Gate,	(i) Rhinopoma microphyllum	Nil	(i) Rhinopoma microphyllum	Nil
Bikaner	(ii) Rhinopoma hardwickii		(ii) Rhinopoma hardwickii	
(28.01556° N, 73.30583° E)				
Girdhari Lal Ji Ka Bada, Court	(i) Rhinopoma hardwickii	Nil	(i) Rhinopoma hardwickii	Nil
Gate, Bikaner				

(28.07722° N, 73.32250° E)				
Session Court Building, Bikaner	(i) Rhinopoma hardwickii	Nil	(i) Rhinopoma hardwickii	Nil
(28.00500° N, 73.32250° E)				

Species profile of the newly reported chiropteran roosts from Bikaner district of the Thar Desert during this study through the years 2010 – 2011

Name of the roost site	Type of Roost	Geographical Position	Name of the	Species Composition
			city/village/settlement	
IGNP Guest House Campus	Mango and Neem trees	27.7936° N, 72.5175° E	Bajju	(i) Pteropus giganteus
Public Well	Inside peripheral wall of the well	27.4591° N, 72.9402° E	Bhelu	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii
Thakurji Temple	Temple ceiling and walls	27.4598° N, 72.9511° E	Bhelu	(i) Rhinopoma microphyllum (ii) Rhinopoma hardwickii

Public Well	Inside peripheral wall of the well	27.4904° N, 72.9320° E	Khajola	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.5526° N, 72.9287° E	Khindasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.5917° N, 72.9383° E	Lamana Bhatiyan	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.6424° N, 72.8724° E	Hadda	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.6368° N, 72.8028° E	Khariya Malinath	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.5627° N, 72.7183° E	Udat	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.6316° N, 72.6499° E	Nokhada	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.7561° N, 72.6986° E	Mandal Charanan	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well Public Well Public Well Public Well Public Well	Inside peripheral wall of the well	27.6424° N, 72.8724° E 27.6368° N, 72.8028° E 27.5627° N, 72.7183° E 27.6316° N, 72.6499° E 27.7561° N, 72.6986° E	Hadda Khariya Malinath Udat Nokhada Mandal Charanan	 (i) Rhinopoma microphyl (ii) Rhinopoma hardwick (ii) Rhinopoma microphyl (ii) Rhinopoma hardwick (ii) Rhinopoma microphyl (ii) Rhinopoma hardwick (ii) Rhinopoma microphyl (ii) Rhinopoma microphyl (ii) Rhinopoma hardwick

Old unattended Hostel	Ceiling and walls	27.7579° N, 72.5893° E	Gadiyala	(i) Rhinopoma microphyllum
Building				
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.7935° N, 72.5180° E	Girandhi	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Door Crevices at Government Upper Primary School Building , IGNP Campus	Inside peripheral wall of the well	27.7823° N, 72.5178° E	Bajju	(i) Pipistrellus tenuis
Public Well	Inside peripheral wall of the well	28.2841° N, 72.8309° E	Amarpura	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.4357° N, 72.9319° E	IGNP RD 682	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.5923° N, 73.0791° E	Sattasar Phanta	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.4512° N, 73.1122° E	Motigarh	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.3864° N, 73.1834° E	Kela Phanta	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii

Public Well	Inside peripheral wall of the well	28.3337° N, 73.1929° E	Lakhasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.1804° N, 73.1900° E	Badarasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well, Shobhasar	Inside peripheral wall of the well	28.1556° N, 73.2010° E	Shobhasar	(i) Rhinopoma microphyllum
Linestone Factories				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.1253° N, 73.2259° E	Shobhasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2002° N, 73.3848° E	Khara	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2501° N, 73.4031° E	Jamsar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.4093° N, 73.5954° E	Dheerera	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.4255° N, 73.6180° E	Dularo Gaon	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.4411° N, 73.6441° E	Hansera	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.4872° N, 73.7326° E	Lunkaransar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.3866° N, 73.8886° E	Kalu	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.3454° N, 73.7608° E	Shejarasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.3464° N, 73.6413° E	Khari	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.3603° N, 73.5941° E	Dheerera	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.3532° N, 73.5978° E	Uttamdesar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2768° N, 73.5879° E	Bandha	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2768° N, 73.5879° E	Karanisar Beeka	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2604° N, 73.5717° E	Molania	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2319° N, 73.5073° E	Malasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.2354° N, 73.4706° E	Dandusar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.6681° N, 73.3680° E	Bhamathsar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.5880° N, 73.3416°E	Nokha Gaon	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.5717° N, 73.4581° E	Bikasar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.1247 ° N, 73.0346 ° E	Jaimalsar village	(i) Rhinopoma microphyllum

				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.9838° N, 72.4843° E	Panwarwala	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.7279° N, 72.5335° E	Girajsar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.5609° N, 72.2510° E	Naukh	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.9968° N, 72.2706° E	Goda	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.1854° N, 72.2436° E	Barsalpur	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.5910° N, 72.3271° E	Chulam Aliwala	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.6690° N, 73.1205° E	Chhatar Garh	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.5151° N, 72.8135° E	Pugal	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
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Public Well	Inside peripheral wall of the well	28.8642° N, 73.2970° E	Raner	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.9422° N, 73.5731° E	Hathusar	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.7211° N, 73.5978° E	Kumana	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	28.7688° N, 73.8566° E	Mahalan	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.8406° N, 72.9581° E	Kolayat	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	27.4893° N, 73.2272° E	Panchur	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii
Public Well	Inside peripheral wall of the well	29.0127° N, 72.1382° E	Molgarh village	(i) Rhinopoma microphyllum
				(ii) Rhinopoma hardwickii

Table 7

Name of the Institute	Name of the city/village/settlement	District
Schools	1	
Government Senior Secondary School, Jhinjihinyali	Jhinjhiyali	Jaisalmer
Government Primary School, Doongara Ki Dhani	Doongara Ki Dhani	Jaisalmer
Government Senior Scondary School, Jaisalmer	Jaisalmer	Jaisalmer
Government Secondary School, Pitholai	Pitholai	Jaisalmer
Government Senior Secondary School, Sonu	Sonu	Jaisalmer
Government Senior Secondary School, Myazlar	Myazlar	Jaisalmer
Jawahar Navodaya Vidhyalaya, Mohangarh	Mohangarh	Jaisalmer
Government Senior Secondary School, Ramgarh	Ramgarh	Jaisalmer
Government Primary School, Kohriya	Kohriya	Jaisalmer
Adarsh Vidhya Mandir, Mohangarh	Mohangarh	Jaisalmer
Government Primary School, Chohani	Chohani	Jaisalmer
Government Upper Primary School, Hasuva	Hasuva	Jaisalmer
Government Upper Primary School, Khinwsar	Khinwsar	Jaisalmer
Saraswati Vidhya Mandir Senior Secondary School, RD 931 of IGNP	Bajju	Bikaner
Government Upper Primary School, IGNP Colony	Bajju	Bikaner
Government Upper Primary School, Bhelu	Bhelu	Bikaner
Government Senior Secondary School, Kolayat	Kolayat	Bikaner
Government Upper Primary School, Khindasar	Khindasar	Bikaner
Colleges	1	1
Government College, Jaisalmer	Jaisalmer	Jaisalmer
Government Veterinary College, Bikaner	Bikaner	Bikaner

BREAKDOWN OF BUDGETED VERSUS ACTUAL EXPENDITURE AND THE REASONS FOR THE DIFFERENCES

	Budgeted	Actual	Difference	Comments
	amount	amount used		
Budget heads				
	£ (GBP)	£ (GBP)	£ (GBP)	
	(Exchang	e rate 1 GBP = 7	73.15 INR)	-
Foriementer				Designation history and was reported
Equipments:				therefore we could save some money
One LCD Projector (To be hired for	400	350	50	which intern used for the purchase of nets.
lectures in villages and schools)				as price quoted for it rose by then; and
				buying three piece head torches instead
Hoop net, Mist Net and accessories	225	250	-25	two, such that volunteers can also utilise it
	50	75	25	on demand.
Head Torches (Two)	50	15	-23	
Perdiem for principal investigator @ £	750	750	Nil	N/A
5/- day for 150 days of field work				
During Angistanta True magnite				
Project Assistants – Two people				
full time basis				
Salary @ £3/- day (3 x 2 x 270)	1620	1620	Nil	N/A
Perdiem @ £1.5/- day for 150 days of				NY/A
field work (1.5 x 2 x 160)	450	450	Nil	N/A
				Fuel prices hiked remarkably therefore we
Travel (Field vehicle hiring and local	900	1045	-145	paid more than quoted towards hiring the
transport) and accommodation				field vehicle and local transport.
Campaign material and field activity	1140	1100	40	we designed campaigning material on
(survey, workshops, bat clubs) cost	1140	1100	40	save money.
Contingency (communication, health	240	200	40	There were no issue of health for project
care and other field born expenses)	-		-	staff and resulted into this saving.
				We typed and designed this report on own
Report Writing	225	125	100	and raised savings.
Total	6000	5965	35	This amount had been charged by
				concern dank against remittance.

Final Report of RSG 2nd Project (Ref: 8400-2)





Principal Investigator and Scientist In-charge of this project Dr. K. R. Senacha is a wildlife biologist and one of the renowned bat experts from India. A doctoral from J N V University Jodhpur in India, Dr. Senacha works primarily on ecology and conservation biology of species of bats dwelling in Rajasthan and Gujarat parts of the Thar Desert. After completion of his Ph.D. degree he joined BNHS (Bombay Natural History Society), India's oldest and one of the premier wildlife and conservation research organizations, in 2004 as a Scientist and worked there till 2008, and has been a member of international team of scientists working there towards cause and recovery of catastrophically declined global populations of three species of *Gyps* vultures *G. indicus, G. bengalensis* and *G. tenutrostris*).

Thereafter till now he is working independently as Principal Investigator and Scientist In-charge of the RSG first and second project which have been sanctioned to him consequently by The Rufford Small Grant Foundation based in London, UK to work on ecology and address the conservation relevant issues of bats of the Thar Desert, India (http://www.ruffordsmallgrants.org/rsg/projects/k._r._senacha). He has published around 40 research papers, conservation notes and articles in journals and magazines of national and international repute (http://www.sites.google.com/site/senacha). He is also associated with other wildlife and conservation research organizations viz., IBCF (Indian Bat Conservation Foundation), Mumbai and ERDS (Ecology and Rural Development Society), Jodhpur in India, and is actively participating in some of their ongoing conservation, rural development and health related programs. He further intends to work on ecology and conservation biology of bats in other parts of northern and central India.

