

Project Update: January 2023

The third phase field work was carried out in December 2022. Bat and acoustic surveys were carried out along with conservation outreach programmes for an 18-day period. December is late autumn in Nepal and the onset of winter with much colder northern areas close to the Himalayas.

Objectives and relevant activities

Objective 1: Document baseline data on assemblage and abundance of bat species; contribute to reference call library for Nepalese bats

Activity 1.1: Identify potential sites for bat survey and important bat roost sites.

During the third phase (06-23 December 2022), we conducted mist-netting and roost search at 23 sites of which 18 sites were new. This makes our total number of sampling sites 35 till date. GPS coordinates, habitat type, temperature and relative humidity were recorded at all sites. We installed a two banks of harp traps near the entrance of a hydropower testing tunnel. Acoustic surveys were also carried out simultaneously in those sites. Jagat Youth Bat Club members were actively involved during bat survey at Jagat.



Figure 1: Deploying mist net over Siprin river flowing into the Tamakoshi River

It was noticeable that the water level in the Tamakoshi River increased a lot during the evening every day. As per the local people and Gaurishankar Conservation Area Project (GCAP) officials, the Upper Tamakoshi Hydropower Project released water in the river during the evening. Due to this, we were not able to conduct mist netting along the Tamakoshi river even during the winter months when the water level in the rivers is supposed to be low. Despite the information we administered a mist net on a bank of the river at Singati and at about 7:20 PM the water level rose and we dismantled the mist net. The sampling sites included rivers, caves, hydropower testing tunnel, farmlands, man-made structures and ponds. Most of our bats were caught in mist nets near water sources, while all caves that were searched had no bats but bat guano on the floor.



Figure 2: A two-bank harp trap installed near the entrance of a hydropower testing tunnel.

Activity 1.2: Bat survey and acoustic survey in identified sites

More than eight species have been recorded during December 2022 along the Tamakoshi river corridor, namely *Cynopterus sphinx*, *Eptesicus serotinus*, *Hipposideros armiger*, *Lyroderma lyra*, *Pipistrellus javanicus*, *Rhinolophus lepidus*, including a few unidentified bat species; *Pipistrellus* spp. and *Vespertilio* sp. Among them *C. sphinx* is a frugivore and *L. lyra* is a carnivore while others are insectivores. Wing tissue (3mm) of the unidentified individuals have been sampled for genetic analysis to confirm the species later.



Figure 3: Bat species captured during the third phase in the Tamakoshi River Corridor; 1- *Cynopterus sphinx*, 2-*Eptesicus serotinus*, 3-*Hipposideros armiger*, 4-*Lyroderma lyra*, 5-*Pipistrellus coromandra*, 6-*P. javanicus*, 7-*Pipistrellus* sp., 8-*Rhinolophus lepidus*, 9-*Vespertilio* sp.

Echolocation calls of all of them have been recorded during hand-held release condition, except *C. sphinx*, using Song Meter Mini Bats or Echo Meter Touch 2 Pro or both.

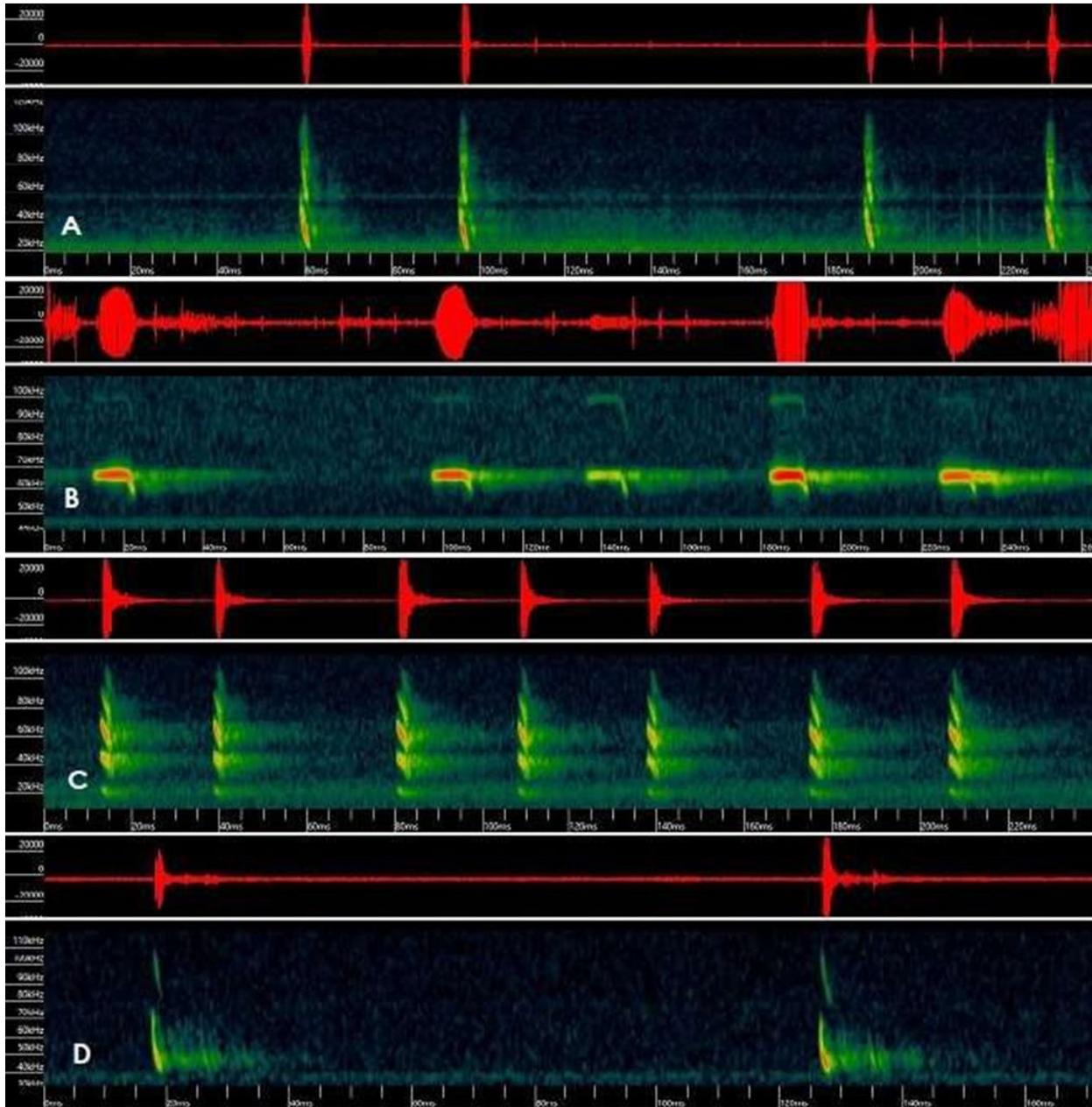


Figure 4: Spectrograms of echolocation calls plate 1: A: *Eptesicus serotinus*, B: *H. armiger*, C: *L. lyra*. D:

Pipistrellus coromandra

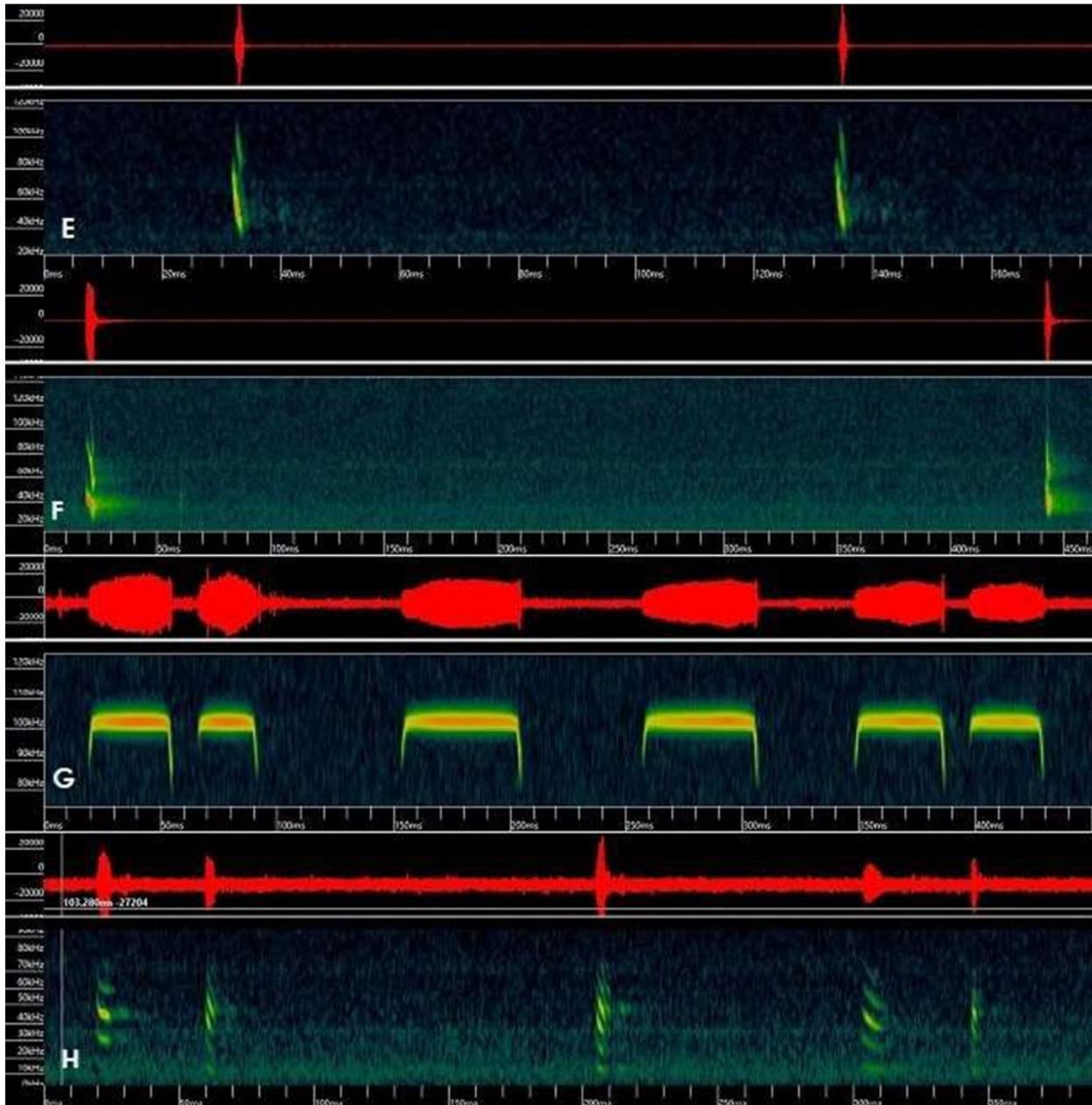


Figure 5: Spectrograms of echolocation calls plate 2: E: *P. javanicus*, F: *Pipistrellus* sp., G: *Rhinolophus lepidus*. H: *Vespertilio* sp.

Additionally, the Song Meter Mini Bats were deployed at the sampling sites throughout most of the nights to assess the level of bat activities during three study periods. The recordings will be analysed further for this purpose. However, through the operation of Echo Meter and direct observation in December 2022, we found that the activity of bats generally started from around 5:00 PM which peaked for about half an hour and then almost stopped with only a few bat calls thereafter. The

The ambient temperature was usually less than 15°C in the evening, which dropped well below 10°C at the northern sites such as Lamabagar.

We have not been able to locate our focus species *M. formosus*, yet. Not much is known about its ecology, however, few studies have found this species roosting in foliage of broad-leaved trees and in buildings during breeding season and hibernating in caves and abandoned tunnels in mountains above 1800 m in South Asia. Along the Tamakoshi river corridor, almost no caves were present and thus, no cave roosts of bats. As per the locals and our experience, such caves harbouring bats were generally located far up in the mountains away from the Tamakoshi River corridor. Thus, it suggests that the next study should extend the search area looking for potential cave roosts for *M. formosus* and other bat species higher uphill.

Objective 2: Carry out community outreach for bat conservation

As a part of our community outreach programmes, we had formed five schools and three youth bat clubs during the previous phase that we revisited this time for a club meeting. We also conducted conservation awareness and outreach sessions in our remaining three schools (with one additional school) and communities and formed additional bat clubs.

Activity 2.1: Bat Club meetings

We conducted the first bat club meetings in our previously formed five school bat clubs and three youth bat clubs. Stationeries such as an attendance register, diaries, pen, pencil, etc., and conservation materials that included several conservation posters and booklets were also distributed to the school bat clubs.

Agenda of the meeting was to discuss the following:

1. How did the perception of the club members change towards bats?
2. How should we handle and rescue bats, if necessary?
3. Whom did they share their learnings with?
4. Any roosts or bats observed?
5. How can the club members contribute to bat conservation?



Figure 6: Kaling Secondary School Bat Club Meeting

Almost all the schools and club members were present at the meeting. Everyone was given an opportunity to speak. The members shared that they were no longer afraid of bats and realised the importance of bats in nature and that they should be protected. We were glad that they remembered that bats help in pollination, seed dispersal and controlling harmful insects and agricultural pests. We reminded them that bats, if sick or found lying on the ground, should not be touched with bare hands, and should be picked up with gloved hands and left on a tree higher from the ground. In the case of dead bats, they should be buried immediately as there is always a high risk of the spread of zoonotic diseases if eaten by pets or feral animals. They informed us that they shared the importance of bats with their parents, grandparents, visiting relatives, friends and even in their neighborhood. During the session, we also asked each member if they had seen bats or any roosts recently. Many had seen them in their homes flying in the evening, roosting under banana leaves while some had seen a bat hanging on a branch of a walnut tree in the evening, two bats hanging on a wire in front of the house, in caves and flying around school premises in the evening. The school club members suggested that they can help to conserve bats by conducting small outreach programmes and sharing what they knew personally with others. During the meeting, one of the members from the Basnet English Academy School Bat Club asked, "Are bats really the culprit for the spread of the coronavirus as people say?" We replied, "It is not yet proved that bats were responsible for the coronavirus outbreak. However, there is always a high risk of the spread of zoonotic diseases from wildlife to humans and vice versa, in case of unnecessary contact or mishandling. The same is true with our pets and domestic animals, too. We still do not know how exactly COVID-19 happened, but

we can definitely say that such outbreak of diseases will lessen if humans learn to live in harmony with nature and be appreciative of what it has to offer. We, as researchers, have been working with bats for many years following strict protocols such that no animal is harmed and have not contracted any such disease till now. Thus, we should not fear bats, but learn and teach others to appreciate what bats do for us and let them be".



Figure 7: Bhorle Youth Bat Club Meeting

In Youth Bat Club meetings, the President and few of the members were present. Through the similar discussion with the Youth clubs, it was clear that our outreach sessions had a positive impact on the perception of the people towards bat conservation. The club members were happy and eager to help raise awareness in the smallest possible ways. The club members are responsible for locating bat roosts in the area and also report us along with any bat related incidences during the project and afterwards. Sajana Thami from Bhorle Youth Bat Club mentioned that she had seen 5-6 bats emerge and fly from the young, curled leaves of banana, while cutting the sick banana plant recently. The club members said that in the past they did not care if bats flew around or where they roosted, however, now they have started noticing bats.

Activity 2.2: Awareness and outreach activities

Following is the list of schools where awareness programme was carried out during the third phase (Table 1). Among them, Karkaladevi English Boarding Secondary School (KEBS) had invited our team to conduct the programme in their premises. It was amazing to see them interested in our work when they heard about us conducting outreach activities in a school in Manthali.

Table 1: List of schools where outreach programme was conducted during the third phase

SN	Name of the School	Type	Number of classes by the school run
1	Vidyashram Basic School, Manthali	Govt.	Up to grade 8
2	Shree Bhimeshwor Rudra Secondary School, Manthali	Govt.	Up to grade 12
3	Karkaladevi English Boarding Secondary School, Manthali	Private	Up to grade 10
4	Shree Tamakoshi Janajagriti Secondary School, Khimti	Govt.	Up to grade 12



Figure 8: School outreach session in Shree Bhimeshwor Rudra Secondary School, Manthali

School children of grade six to eight were targeted for our outreach activities. The programme included an interactive 30-minute lecture followed by a 30-minute documentary "Secret world of Bats" about bats, their importance, threats and ways to protect them. A short interaction session and fun bat quiz was conducted at the end of this 1-hour session.



Figure 9: Community outreach session in Khimti

We conducted two remaining community outreach sessions in Khimti and Manthali in Ramechhap district, which included a short lecture, documentary show, open group discussion and distribution of bat conservation materials such as posters and stickers. The response of locals has been encouraging as they were happy and amazed to learn about bats and their importance and actively participated in the programs. The most important question in most of these sessions was about the relationship between bats and COVID-19. The participants were curious if bats were actually responsible for the spread of this disease. Through the discussion, we found that some people still believed that bat meat could be used to cure the blood urine problem “*Laumutta*” in cattle. Also, participants mentioned that some had seen bats living in bamboo of the bamboo thatched houses and one had seen a couple of bats roosting inside old shoes hung on the entrance of houses (to ward off the evil eye) a very long time ago.

Activity 2.3: Formation of school and youth bat clubs School Bat Clubs

In coordination with the school management, we formed additional four school bat clubs this time, each including school children from grade six to eight/seven as per their interest in four schools (Table 2).

Table 2: School Bat Clubs formed during the third phase

SN	School Bat Club	School children of grade involved	Number of members
1	Vidyashram Basic School Bat Club, Manthali	6-8	10
2	Shree Bhimeshwor Rudra Secondary School Bat Club, Manthali	6-8	10
3	Karkaladevi English Boarding Secondary School Bat Club, Manthali	6-7	10
4	Shree Tamakoshi Janajagriti Secondary School Bat Club, Khimti	6-8	10



Figure 10: Activities during school bat club formation during the third phase

Soon after bat clubs were formed, the members were delivered information on bat club management and activities the club needed to do. An open art competition was conducted between the members of each bat club where they drew bats or anything relating to them. Necessary materials such as art paper, pencil, crayon colours, etc., was provided to them. The session was followed by bat origami making where Varsha Rai and Prahesh Chalise demonstrated and the club members followed. Towards the end, a winner was announced for the Open Art Competition who was awarded with a gift hamper that included educational materials such as a notebook, pen, pencil, posters, stickers, etc. At the end of the 2-hour programme, we conducted a fun quiz

about bats. A teacher from the respective school was assigned to each school bat club to mentor the bat club members to conduct club activities. The bat clubs were presented with some stationery and booklets on conservation of different animals by Small Mammals Conservation and Research Foundation (SMCRF) along with 20 bat conservation posters and 20 stickers each. We also discussed and made consensus about organizing a conservation programme/activity by the club members in the following months.

Youth Bat Clubs

An additional youth bat club was formed this time (Table 3) as per the interest of the locals after the community outreach sessions. We briefed the club members on their roles and activities that need to be done. Manthali Youth Bat Club consists of enthusiastic youths who have been involved in environmental and social causes from time to time engaged in professions like teaching, business, civil service, etc. However, we could not conduct bat walks in the evening to demonstrate bat survey in the field environment due to their other work commitments then.

Table 3: Youth Bat Clubs formed during third phase

SN	Youth bat Club	Number of members
1	Manthali Youth Bat Club	6



Figure 11: Manthali Youth Bat Club members

Plans for the next phase.

The next or last phase of the project will be carried out from March-April 2023. It will focus on conducting at least three sharing workshops along the Tamakoshi River Corridor and installing one information board enlisting the findings of the project and importance of bat conservation in the area. Along with that, we have also planned to conduct a bat survey at that time at some important sites as we missed the March 2022 season due to the late permit granted by the Social Welfare Council. The search for our focus species, *Myotis formosus*, will also continue. A post-project scheduled survey will be conducted at last to assess the change in level of awareness and attitudes towards bats among the concerned stakeholders and the locals.