Project Update: October 2022

The second phase survey of this project was carried out during September 2022. We conducted field surveys, acoustic surveys, conservation outreach programs in schools and communities and formed school and youth bat clubs along the Tamakoshi River Corridor. For the 15-day period, the weather did not favour us this time again and was hugely affected by frequent rainfall. In addition to that, Nepal observes one of the biggest festivals of Dashain or Bijaya Dashami as per the Nepalese Lunar Calendar which is generally around September soon followed by Dipawali or Tihar, another big religious festival. Most of the schools during this time are closed for almost a month-long holiday. Thus, by the time we reached the southern part of our study area, schools were closed, and we could not conduct our outreach activities in the remaining three schools and communities. We have planned to cover them during our next phase in November-December 2022.

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 first phase, we were able to identify seven sites for mist-netting and roost survey. This time we located altogether 12 sites with the help of locals and Gaurishankar Conservation Area Project (GCAP) officials that includes additional new nine potential sampling sites with the evidence of presence of bats and the previous three of seven sites. In total, the number of sampling sites reached 16 in both phases. We could not revisit the previous four sites due to continuous rainfall and geographic challenges caused by it. GPS coordinates, habitat type, temperature and relative humidity were recorded of all those sites. However, we could not find any appropriate site to use harp traps again. Acoustic surveys were also carried out simultaneously in those sites.

Among the 12 sites visited this time, there were two caves, two hydropower tunnels, two streams, three banana plants and three man-made structures. We conducted mist-netting and acoustic survey at two streams, and used different methods appropriate at each of the other sites such as scoop net, direct observation, photography, direct capture, acoustic survey and searched for indirect evidence of bat presence at potential roosts i.e., sighting by the locals, chewed midrib of banana leaves and guano pile. We have located some more bat roosts that will be visited along with previous sampling sites during the next field visit post-monsoon. We found that potential bat roosts such as caves or crevices are mostly situated at high cliffs and hilly slopes that are mostly unreachable due to the treacherous terrain while some due to unfavourable weather. Due to continuous rainfall, the roads reaching several sites were wrecked and landslide-prone and water level in river and streams was unsafe for deploying mist nets.

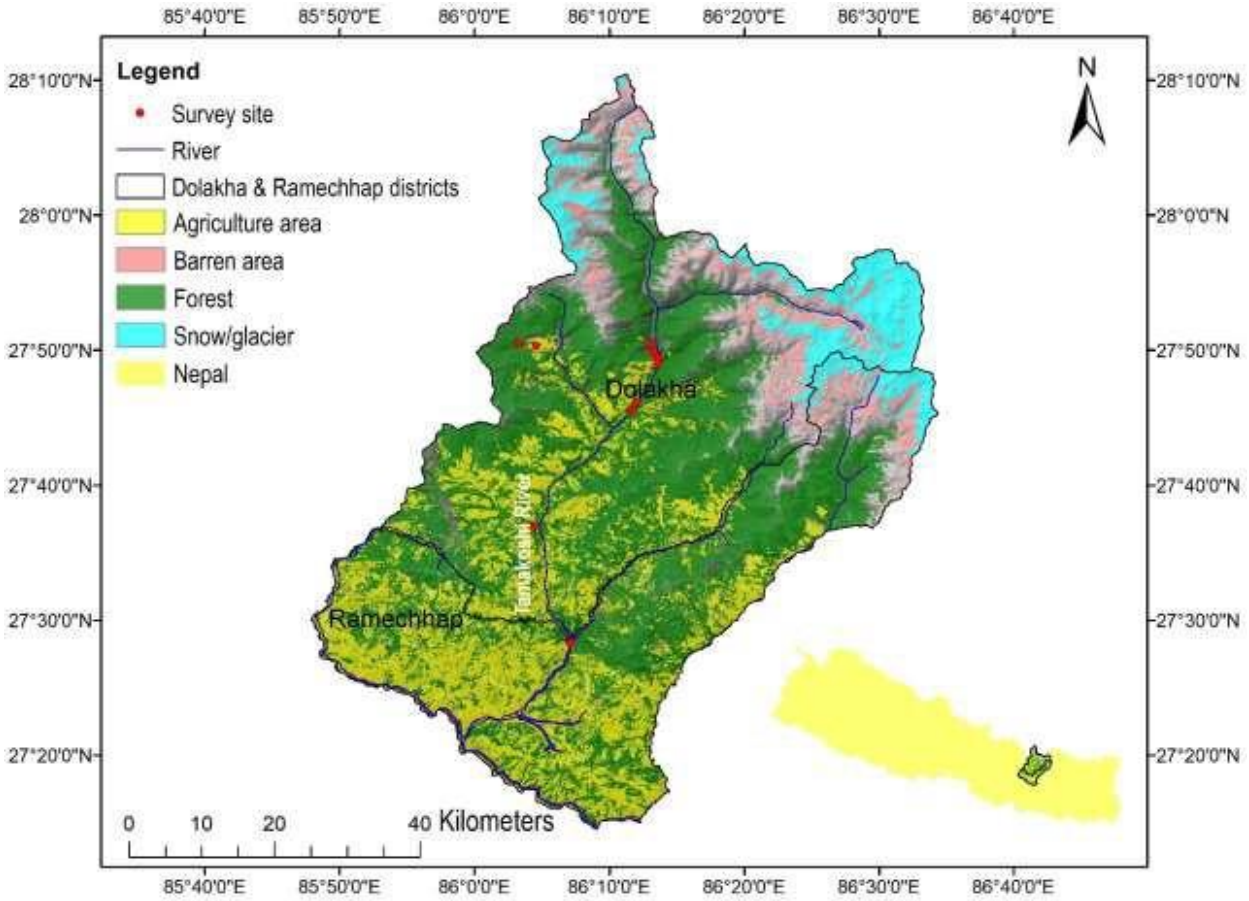

Figure 1: Study area map showing the potential sampling sites along the Tamakoshi River Corridor during the second phase of the project

Figure 2: Talking with a local about bats and their roosts in the area

Figure 3: Mist nets deployed at Sano Kaseri Dobhan (stream), Jamune, Gaurishankar Conservation Area (GCA), Dolakha

Figure 4: Chewed midrib of banana leaves as evidence of bats using it as a roost

Activity 1.2: Bat survey and acoustic survey in identified sites

The bat survey was done using mist nets and roost search in the identified potential sampling sites. Harp trap was not used due to unavailability of proper sites in rain. We captured and identified six bat species this time namely *Cynopterus sphinx, Hipposideror armiger, H. gentilis, Lyroderma lyra, Rhinolophus ferrumequinum* and *R. luctus* of which *C. sphinx* is a fruit bat, *L. lyra* is a carnivore while others are insectivores (Figure 5). One other vespertillionid bat was observed roosting on a very tall banana plant in its distant leaves which was photographed and identified to be *Murina* sp. It was so high; we could not even reach and capture the individual using a 4m long scoop net.

Figure 5: Bat species captured during the second phase in the Tamakoshi River Corridor; 1-*Cynopterus sphinx*, 2-*Hipposideros armiger*, 3-*H. gentilis*, 4-*Lyroderma lyra*, 5-*Rhinolophus ferrumequinum*, 6-*R. luctus*

Echolocation calls of five captured species were recorded except *C. sphinx* as fruit bats do not echolocate, using Song Meter Mini Bats or Echo Meter Touch 2 Pro or both. Additionally, echolocation calls of several bat species have also been recorded at mist-netting and roost sites during free flying condition, potentially *Myotis* sp., *Pipistrellus* sp., *Eptesicus* sp., *Nyctalus* sp., *Rhinolophus* sp., etc. Interestingly, this time we have also been able to record social calls of potentially few bat species that also need to be manually analysed for identification.

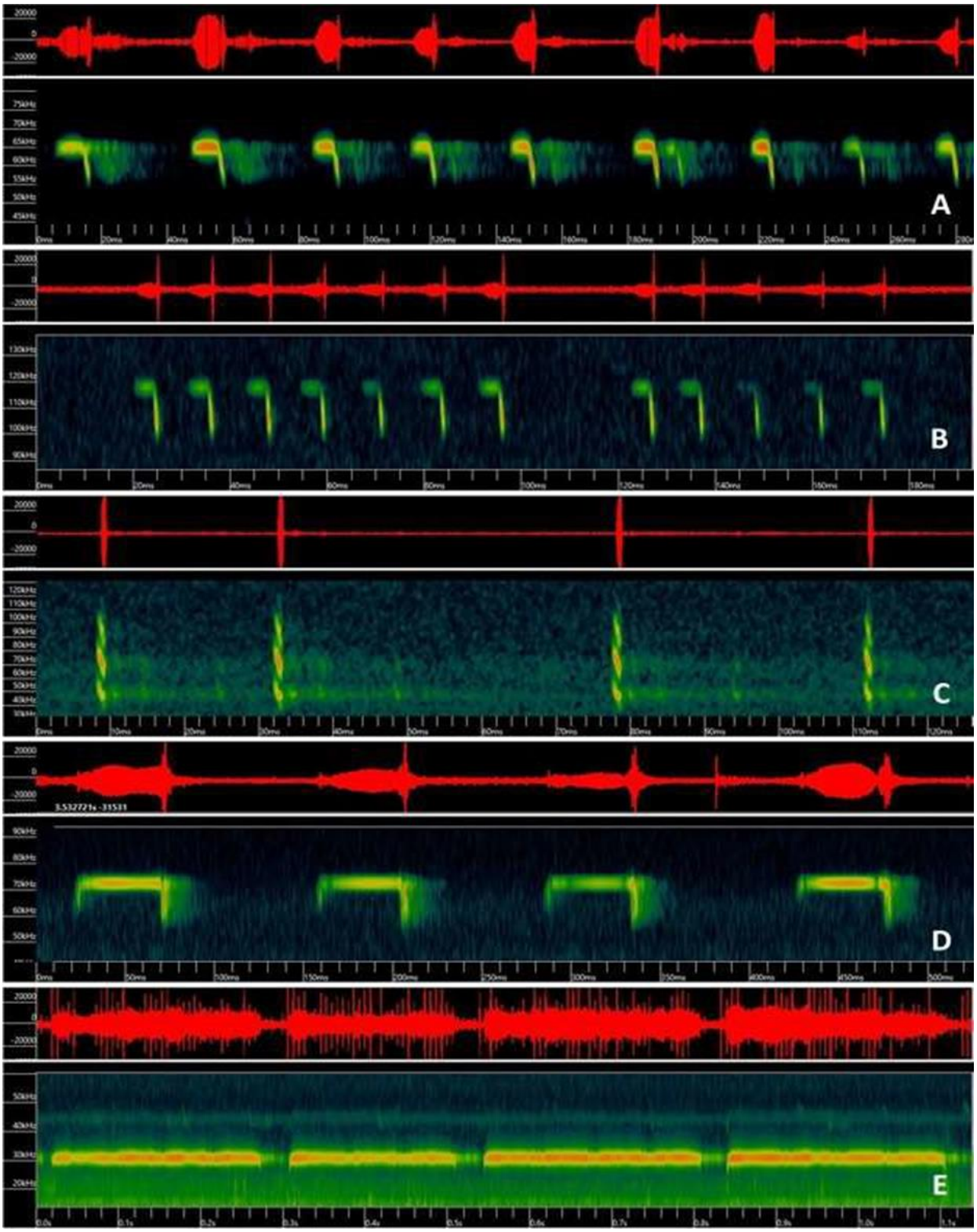

Figure 6: Spectrograms of echolocation calls of five captured bat species (A: *H. armiger*, B: *H. gentilis*, c: *L. lyra*. D: *R. ferrumequinum*, E: *R. luctus*)

Objective 2: Carry out community outreach for bat conservation

Through the pre-project scheduled survey, we found that the majority of people had seen bats but knew nothing about them and their importance. People also pointed out the fact that bat sightings have become rare, and perhaps the bat population has decreased. Based on these findings, we conducted various outreach activities in schools and communities to increase the level of awareness about the role of bats in maintaining the ecosystems, benefit to humans while trying to mitigate the negative attitude towards bats among youth and school children. We also formed youth and school bat clubs in our study area.

Activity 2.1: Awareness and outreach activities

Following is the list of schools where awareness programme was carried out.

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

SN	Name of the School	Type	Number of classes run by the school
1	Kalinag Higher Secondary School, Singati	Govt.	Up to grade 12
2	Shree Gaurishankar Secondary School, Jagat	Govt.	Up to grade 10
3	Gaurishankar International Academy, Singati	Private	Up to grade 7
4	Basnet Academy English Boarding School, Singati	Private	Up to grade 8
5	Shree Tashi Chhime Gastal Basic School, Bigu	Run by	Up to grade 7
6	Shree Gaurishankar Secondary School, Bigu	monastery Govt.	Up to grade 10
7	Shree Himalayan Region Welfare English School, Bigu	Private	Up to grade 5

School children of grade six to eight were targeted for our outreach activities, however, only grades six and seven were included for the lower-secondary schools that taught till grade seven. The programme included an interactive 30-minutes lecture followed by a 30-minutes documentary "Secret world of Bats" about bats, their importance, threats and ways to protect them. We shortly verbally disseminated the message from the documentary in Nepali language as the documentary was in English. A short discussion session and fun bat quiz was conducted at the end. One student from Basnet Academy English Boarding School asked "How can we convince our parents, elders and others to not harm bats when they see bats feeding on their banana and other fruits?" It was indeed wonderful to see young children fascinated by bats and willing to protect them.

Figure 7: Lecture and documentary session in Kalinag Higher Secondary School, Singati

Questions asked during Bat Quiz

1. Bats belong to what family or group - Mammals, Birds, Insects, Reptiles?
2. The largest bat in the world is the size of a?
3. The world's smallest bat is the size of a?
4. Give two advantages of bats.
5. What is the process by which bats disperse seeds of plants called?
6. What is the process by which bats aid plants to produce fruits called?
7. How many mosquitoes can one bat eat per night?
8. What do bats eat? Any three.
9. How many species of bats are found in the world?
10. How many species of bats are found in Nepal?
11. How many species of vampire bats are found in the world?
12. Vampire bats are found in?
13. How long do bats generally live for?
14. How many pups does a bat give birth to at a time?
15. A group of bats is called: a bat group, a winged troop, a colony
16. What is the name of the process that bats use to find their prey in the dark?
17. The world's smallest bat is from Thailand. What is it called?
18. What is the world's largest bat called?
19. What places do bats live? Any three.

The total number of school children in grade six-eight varied from 20 to 150 individuals (male and female 50-50 approx.) in each school. We found that government schools had the largest number of students than private schools probably due to the nominal fee and better equipped infrastructure such as buildings, classrooms and playground in government managed schools. We were also informed that the quality of education in government schools has improved since the past.

Seven out of ten schools were visited as the other remaining three schools closed due to Dashain festival. Those schools will be covered in our next phase. There were not many schools in the northern part of our study area due to its remoteness.

Figure 8: School children of Shree Gaurishankar Secondary School, Jagat after the awareness program

We were able to conduct three community outreach sessions in Jagat, Bhorle and Bigu villages. It involved a short lecture, open group discussion, documentary show and distribution of bat conservation materials such as posters and stickers. The people who gathered enthusiastically took part in the programme and interacted about bats and their importance. The participants expressed their happiness about getting to learn so much about bats and were so amazed by the fact that these small species played a huge role in nature.

Figure 9: Community outreach session in Bhorle village

Questions asked by the participants in the discussion session:

1. How many kinds of bats are found in the world?
2. How do bats look like from up closely?
3. What kind of places does a bat like to live?
4. What kind of nest does a bat make?
5. How does a bat hang upside down?
6. Are bats birds or rodents?
7. How many babies does a bat give birth to at a time?
8. Is it true that bat meat can be used as medicine for treating urinary problem in cattle '*Laumutta'* (blood in urine)?
9. Is it true that bats spread COVID 19 in humans?
10. Do bats drink blood?
11. What animals hunt bats?
12. How can we help to protect bats?

Our team tried its best to tackle the questions/misconceptions/misinformation of the participants.

Activity 2.2: Formation of school and youth bat clubs School Bat Clubs

In coordination with the school management, we formed altogether five school bat clubs each including school children from grade six to eight/seven as per their interest

in five schools (Table 2).

Table 2: School Bat Clubs formed

SN	School Bat Club	School children grade involved	Number of members
1	Kalinag Higher Secondary School Bat Club, Singati	6-8	13
2	Shree Gaurishankar Secondary School Bat Club,	6-8	10
3	Jagat Gaurishankar International Academy Bat Club,	6-7	9
4	Singati Basnet Academy English Boarding School Bat	6-8	10
5	Club, Singati Shree Gaurishankar Secondary School Bat Club, Bigu	6-7	10

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 among the members of the bat club where they drew bats or anything relating to them. Necessary materials such as art paper, pencil, crayon colours, etc. were provided to them. The session was followed by bat origami making where our team members Varsha Rai and Prakriti Pant 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. It was a 2-hour programme. We ended the session with some fun quizzes about bats. A teacher was assigned to each school bat club to mentor the activities of the club. The bat clubs were presented with some booklets on conservation of different animals by Small Mammals Conservation and Research Foundation (SMCRF) along with 20 bat conservation posters and 20 stickers each.

However, we did not continue bat club formation in two schools namely Shree Tashi Chhime Gastal Basic School (monastery managed) and Shree Himalayan Region Welfare English School because one had very few students in grade 6-7 while the other was a primary level school, respectively. Even though we did not form bat clubs, we still conducted open art competitions and fun bat quizzes in the above two schools and distributed prizes in those schools (Figure 11).

Figure 10: Outreach activities in different school bat clubs

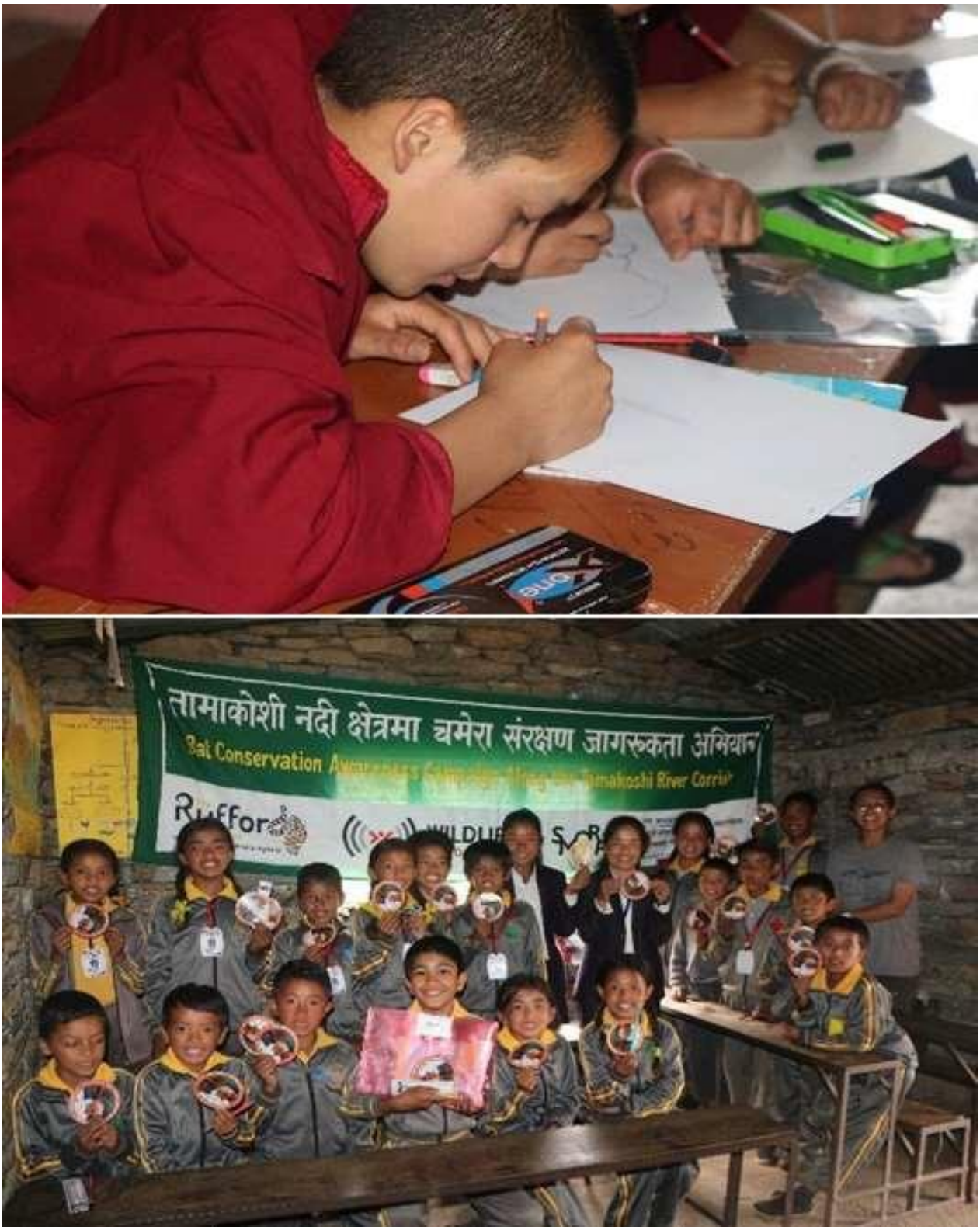

Figure 11: School children drawing during Open Art Competition in Shree Tashi Chhime Gastal Basic School (top) and Art Competition winner posing with other participants in Shree Himalayan Region Welfare English School (bottom), Bigu

Youth Bat Clubs

Three youth clubs could be formed during the second phase of our project 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. However, we could not conduct bat walks in the evening to demonstrate bat survey in the field environment due to rain. Thus, we have planned to involve them in our bat surveys during the next phase.

Table 3: Youth Bat Clubs formed

SN	Youth Bat Club	Number of members
1	Jagat Youth Bat Club	4
2	Bhorle Youth Bat Club	10
3	Bigu Youth Bat Club	9

Figure 12: Youth Bat Club formation program in Jagat

Plans for the next phase

The next phase of this project will be carried out in November-December 2022. Field survey and acoustic survey will be continued through the next phase using mist-nets, harp trap and Song Meter Minibats and Echo Meter Touch 2 Pro. More potential sampling sites will be searched and surveyed including caves, tunnels, forest edges, water sources such as small rivers, streams, ponds, etc. Since this project is also focusing on finding *Myotis formosus* and its roosts in the Tamakoshi River Corridor and we have not been able to find this species yet, we will explore more localities in the area. Locals have suggested that post-monsoon, November-December is feasible to find bats and conduct roost search in the area.

Conservation outreach programmes will be carried out in remaining schools and communities and school and youth bat clubs will be formed. A post-project scheduled survey will be conducted in the next or later phase. Important bat roosts will be identified to install information boards about bats.