

Project Update: October 2019

Seasonal Monitoring Phase I – Autumn Season

The first seasonal monitoring in major cave system of Kaligandaki canyon was started in mid-September 2019 and terminated at the end of the month. Two students studying BSc Forestry at Tribhuvan University, Institute of Forestry, Pokhara and member of Bat Friends Pokhara were hired as research assistants to perform a survey. During a survey we recorded cave's physical properties, micro-climatic properties and bats community assemblages inside the cave. We used an acoustic device – "Echo Meter Touch 2 Pro", a handheld bat detector, to record the ultrasound emitted by bats and for their identification. We also interacted with the members of cave management committees for further aid in conservation works in future study.

Caves Description

1. Gupteshore Cave

Gupteshore cave is horizontal halfway accessible cave of length 150 m with multiple chambers of height up to approximately 50 m. It is located in slope pastureland and has only one cave entrance. Initial chamber was occupied by colony of *Hipposideros armiger*, middle portion by *Rhinolophus affinis* and *Rhinolophus pusillus*, terminal chamber up to where cave is accessible for humans was occupied by colony of *Hipposideros cineraceus*. In addition to previous bat species richness *Myotis* sp. was detected inside the cave. Small spring was observed to flow. CO₂ concentration at cave entrance and inside the cave chambers were very high, at entrance remained 8000 to 9000 ppm throughout the day and inside the cave was more than 9000 ppm (it was the maximum CO₂ concentration level that our device could measure). Temperature was high inside the cave than at the entrance. At entrance humidity was high in the morning which decreased by day while inside the cave humidity increased and reached maximum in evening. Cave receives largest number of tourist (domestic as well as foreign) among all other cave from Kaligandaki canyon.

2. Alpeshore Cave

Alpeshore cave is longest cave of Kaligandaki region of length 750m. It is extended both horizontally and vertically. Cave was inaccessible this season due to the spring which flows from one end of the cave to another. According to the people, cave is accessible during March and April when spring becomes small. Microclimatic conditions were measured up to where cave was accessible. All day CO₂ concentration remained below 800 ppm and observed high inside the cave than at entrance. Temperature at entrance increased by daytime whereas, inside the cave remained constant. In the morning, temperature was high inside the cave than at the entrance while low in the evening. Humidity level both at entrance and inside the cave increased by day but observed high inside the cave than at entrance. In addition to previous bat species richness, *Rhinolophus luctus* was observed to roost in the cave. No visitors were allowed to visit the cave this season however, open when spring is small.

3. Laleshore cave

It is halfway accessible cave formed by joining multiple big rocks. Cave is initially vertical of length 30 m and extended horizontally 100 m up to where humans can visit. Small spring was observed to flow from the cave however, outlet was undermined. Cave was observed to occupy largely by *Hipposideros armiger* of colony size up to 350 individuals. At cave entrance CO₂ concentration range from 500 to 2000 ppm from morning to evening whereas, inside the cave range from 2500 to 5000 ppm. Temperature during morning and evening remained constant both at entrance and inside the cave however, in afternoon temperature was high at entrance than inside the cave. Humidity was higher inside the cave than at entrance for morning and afternoon while constant in the evening. No ticket charge was in practice however, cave receives domestic as well as foreign visitors and occasionally receives tour groups for cave visit. Recently, for the promotion of tourism, cave management committee has constructed 80 m long and 2 m wide pavement road from nearest road to the cave entrance.

4. Parbati Cave

Parbati cave is extended into two flanks; upper portion is single chambered cave of length 83 m and height 25 m whereas, lower portion is halfway accessible from both ends and estimated to be 250 m apart. The upper portion hosts habitat for colonies of *Cynopterus sphinx* where most of the insectivorous bats are roosting in lower portion which is inaccessible for humans. Small spring was observed to flow from one end of the cave to another. Temperature at main entrance increased with increase in daytime whereas, decreased inside the cave i.e. cave remained cooler in daytime. CO₂ concentration remained 400 to 600 ppm from morning to evening. Cave was more humid inside the cave than at entrance and humidity level increased with deeper the cave. This cave is in verge of promoting tourism and receives rare domestic visitors occasionally. No entry fee was in practice.

5. Pauwa's Caves

Ranipauwa is a small village located in Myagdi district. This village consists of three caves: Pauwa cave, Malluwa oodar and Tara cave. Pauwa is located in an agricultural land and covered by bamboo vegetation above the cave structure, malluwa and Tara are in the forest. Pauwa cave is halfway accessible while Tara and Malluwa are accessible to humans. Malluwa oodar and Tara cave are formed by joining two massive rocks while Pauwa cave consists of narrow tunnel deep inside. Malluwa hosts habitat for only *Hipposideros armiger*, Tara for only *Rousettus leschenaultii* and Pauwa for *Megaderma lyra*, *Hipposideros cineraceus* and *Hipposideros* sp. CO₂ concentration in all caves remained below 1000 ppm both at entrance and inside the cave. Temperature and humidity remained constant for Tara and Malluwa however, in pauwa temperature and humidity inside the cave was slightly higher than at entrance. All caves are pristine and undisturbed from cave tourism practice.



Fig1. Researcher with "Echometer Touch 2 Pro" surveying Gupteshore cave. Fig 2. Upper chamber of Parbati cave.



Fig 3. Inside view of Alpeshore cave. Fig4. *Rousettus leschenaultii* roosting in Tara cave.



Fig 5. Measuring cave's microclimatic conditions. Fig 6. Apart from bats other species are also using cave: cave roosting crab.

Some Spectrograms of cave bats recorded during the field visit.

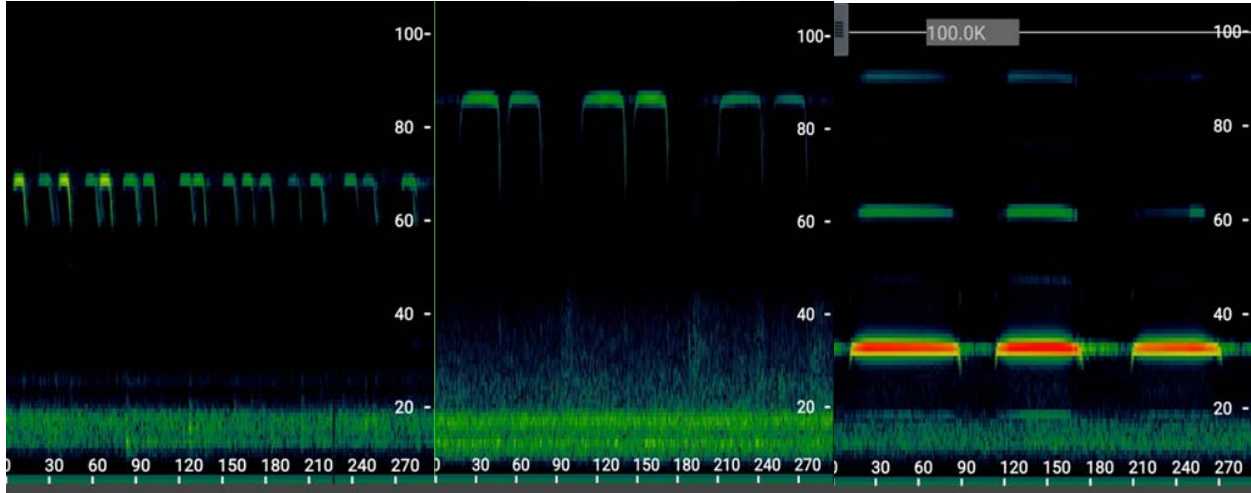


Fig 7. *Hipposideros armiger*. Fig 8. *Rhinolophus affinis*. Fig 9. *Rhinolophus luctus*.

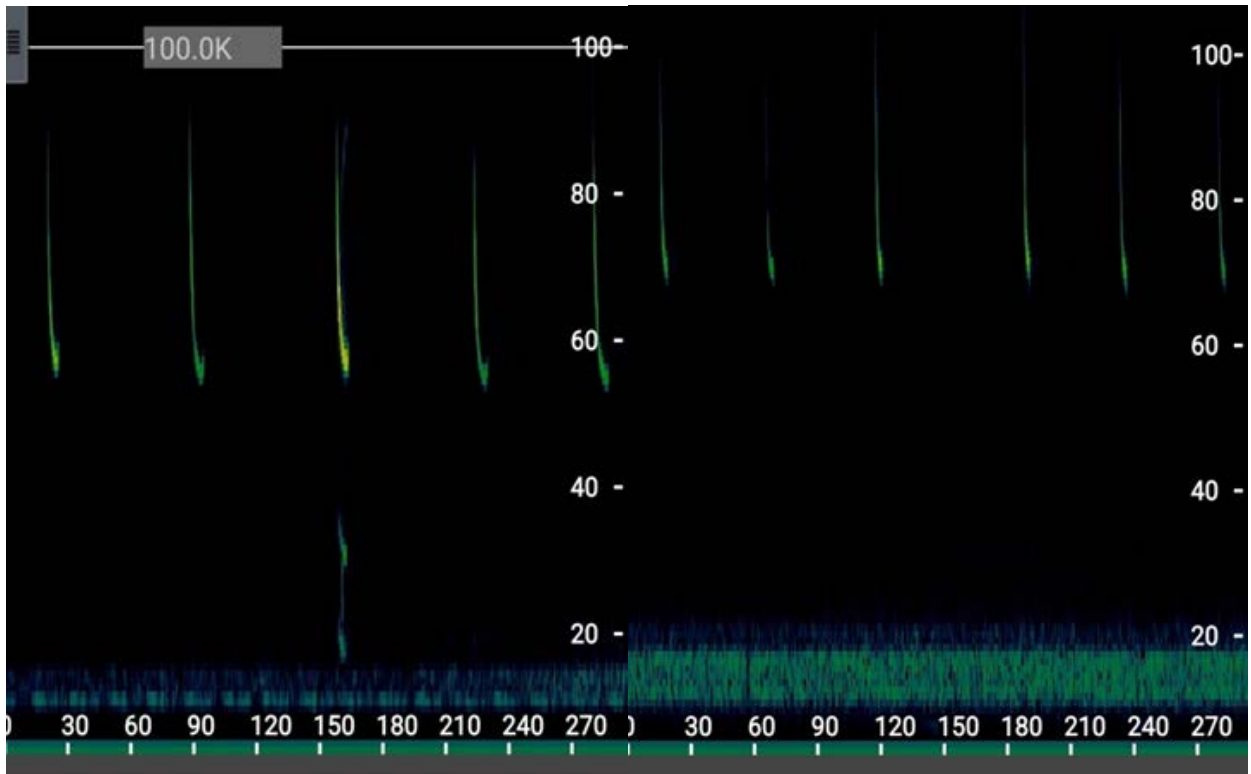


Fig10. *Miniopterus schreibersii*. Fig11. *Myotis* sp.