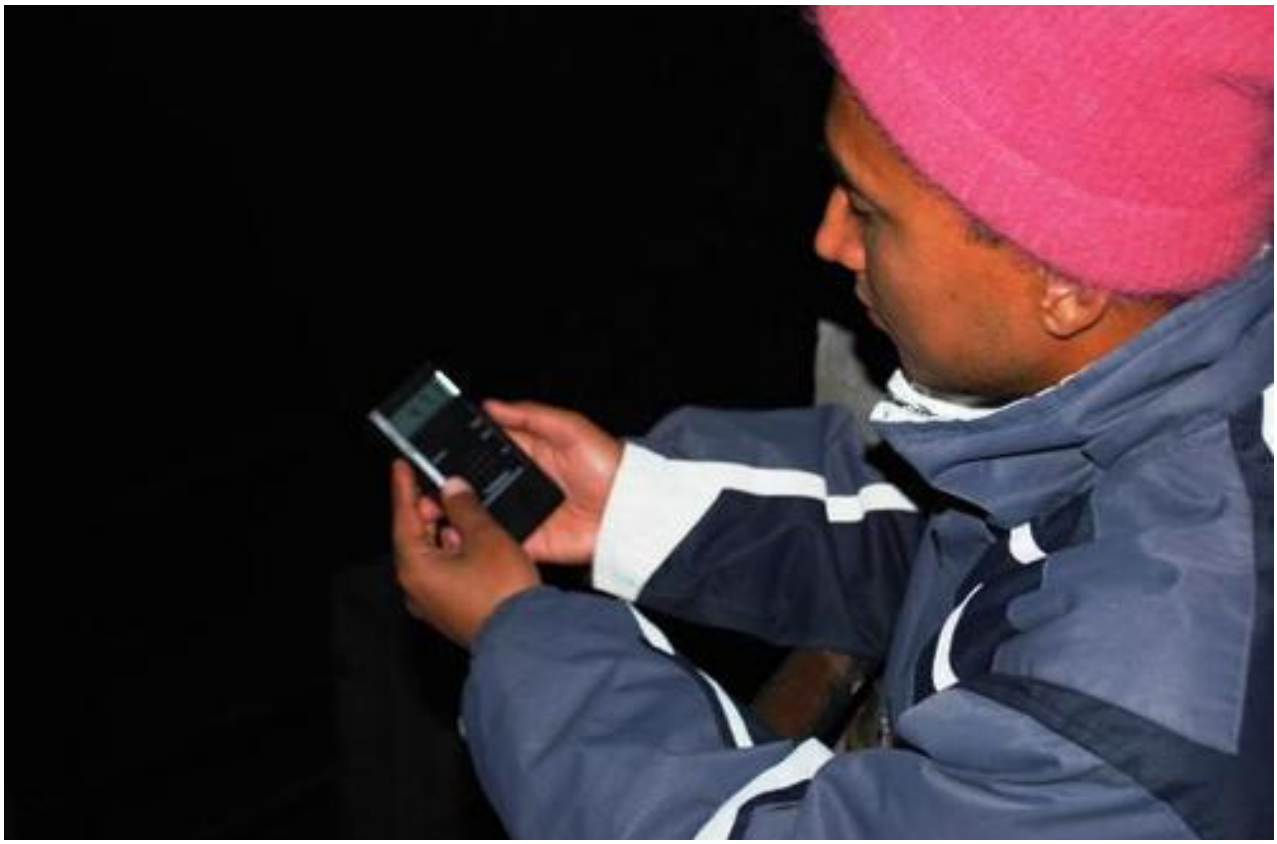
Altitudinal variation in bats, understanding people's perception to bats and creating bat conservation awareness in Sagarmatha (Everest) Zone, Eastern Nepal

December, 2012



Mr. Sanjan Thapa opeerating Pettersson D200 bat detector at Haleshi cave, Khotang District

Second Phase Report submitted to Rufford Small Grants Foundation, UK

Citation: Thapa, S. 2012. Altitudinal variation in bats, Understanding people's perception to bats and creating bat conservation awareness in Sagarmatha (Everest) Zone, Eastern Nepal. Second Phase Report. Rufford Small Grants Foundation, UK. 41pp.

Cover Photo:

Front Cover: View from inside of the Paame Odar (Cave) at Arkhaule-9, Khotang

Back Cover: Participants of Open Art competition at Mt. Everest English Boarding School, Salleri-5

All Photos by: Sanjan Thapa

Acknowledgements

I would like to honor esteem acknowledgements to The Rufford Small Grants Foundation for the financial support to the project; Prof. Paul A. Racey, Co-Chair, IUCN SSC Chiroptera Specialist Group for continuous guidance, advice, and support. I would like to express sincere thanks to Dr. Stephen Rossiter, Queen Mary University of London, UK; Dr. B.A. Daniel, Scientist, Zoo Outreach Organization, Coimbatore, India; and Mrs. Geeta Shrestha, Business Service Center, Kathmandu, Nepal for the strong recommendations to the project. I am especially thankful to Dr. Nikky Thomas for the continuous help in bat sound analysis and Malcolm Pearch, Harrison Institute, Centre for Systematics and Biodiversity Research, UK; and Dr. Gabor Csorba, Deputy Director and Curator of Mammals, Department of Zoology, Hungarian Natural History Museum, Budapest, Hungary for their precious advice. I express sincere gratitude to Dr. Maheshwor Dhakal, Ecologist, Department of National parks and Wildlife Conservation, Babrmahal, Kathmandu, Dr. Shant Raj Jnawali, WWF Nepal; Prof. Karan B. Shah, Natural History Museum (T.U.), Swoyambhu, Kathmandu, Dr. Hem Sagar Baral; Sally Walker, Dr. Sanjay Molur and Rengasamy Marimuthu, Zoo Outreach Organization, Coimbatore, India; Dr. Sarala Khaling, ATREE, Gangtok, India; for encouragements. Last but not the least; I would also thank the School administration and local people of the project sites for co-operation and information.

Sanjan Thapa

December 10, 2012

Sankhuwasabha, Nepal

List of Tables

List of Maps

List of Figures

Contents

Summary

During January-February 2012 first phase of the project was launched. Six species were recorded. Pre-Awareness schedule survey was conducted amongst 168 participants. Open-Art Competition and Awareness Programme were conducted amongst 101 and 418 schoolchildren in seven and eight schools, respectively. Schedule survey was carried out amongst local people of the area. The level of knowledge regarding bats and their importance of ecosystem services was found to be very low amongst local people including schoolchildren. The second phase survey and post-awareness questionnaire survey and post-awareness open art competition was targeted at eight sites of four districts in Sagarmatha zone. In the second phase, Post-awareness questionnaire survey was conducted amongst 180 respondents. Six species were recorded (four up to genera). Some species could not be identified. Post-awareness open art competition was conducted amongst 144 schoolchildren at six schools. The level of knowledge regarding bats and their importance of ecosystem services was found to be upgraded amongst local people including schoolchildren.

1. Introduction

1.1. Background

Sagarmatha (Everest) Zone is the virgin area for bat survey and conservation attempts amongst the three zones of Eastern Development Region of Nepal. Mechi and Koshi Zones have been frequently visited for bat surveys.

During January-February 2012 first phase of the project was launched. Six species were recorded. Pre-Awareness schedule survey was conducted amongst 168 participants. Open-Art Competition and Awareness Programme were conducted amongst 101 and 418 schoolchildren in seven and eight schools, respectively. Schedule survey was carried out amongst local people of the area. The level of knowledge regarding bats and their importance of ecosystem services was found to be very low amongst local people including schoolchildren (Thapa et al. 2012).

1.2. Objectives

- Find the change in level of knowledge about bats importance in the local people residing the area,

- Document records of the bat species diversity, population and their habitats in Sagarmatha (Everest) Zone in other season (second phase).

1.3. Rationale

Species diversity, population and their habitats of bats were recorded in first phase. So, the bat assemblage in another season has to be recorded. Similarly, conception regarding bats of public including school children has been documented in the first phase their perception after a long gap (8 months) has to be documented again to find the change in their perception.

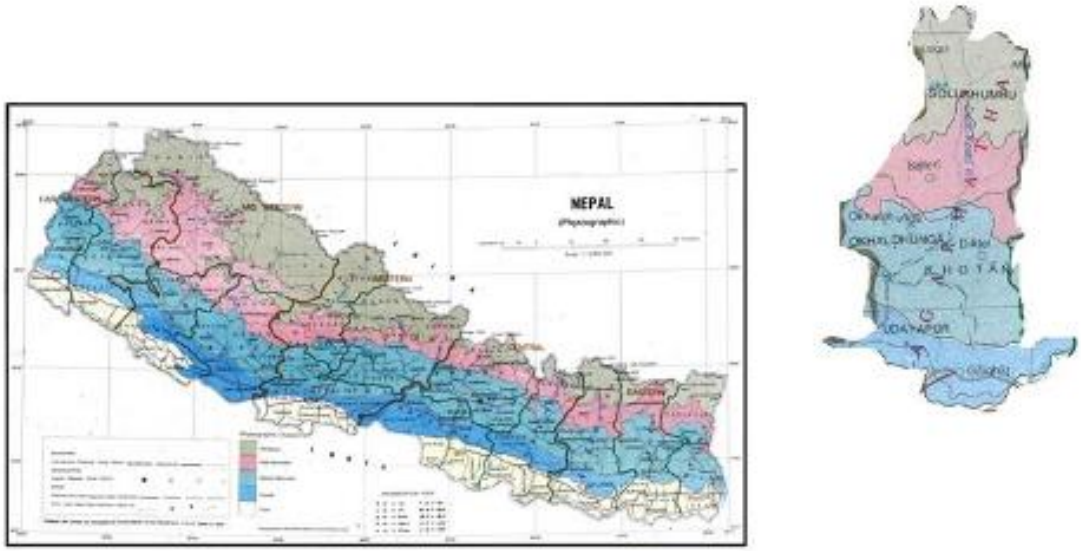
1.4. Limitations of the study

The second phase was targeted after the six months from completion of the first phase, which should have conducted during July-August. But, then it was monsoon and there was no means of transport functioning in the area due to rain. After the monsoon, there was a long holiday for a month for Dashain-Tihar festival in schools. Therefore, the second phase could only start in late Novemeber.

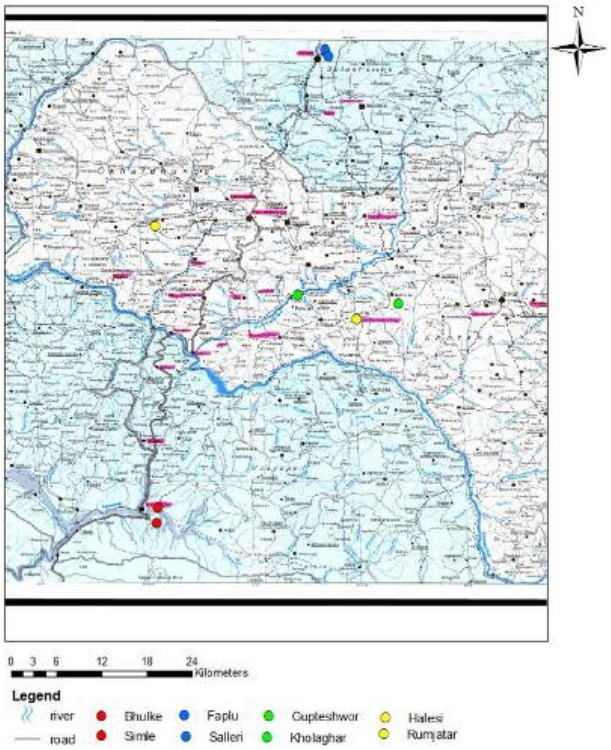
The school lecture programme was conducted again in the same schools where the programme was conducted in the first phase, but this time the programme could only be conducted at six schools due to exam running on at Tribeni Higher Secondary School, Katari, Udaypur.

2. Project area and sites

Same project area and sites is covered for the second phase. Ghurchu in Mangaltar-2 and Paame in Arkhaule-9 were additionally surveyed which are very near to the sites Halesi and Arkhaule. Simle, Katari-5 and Bhulke, Katari-8 were not visited in this second phase.



Map 1. Physiographic Map of Nepal and Sagarmatha zone.



Map 2. Map showing eight project sites in four districts of Sagarmatha zone.
(Note: similar color mark denotes similar elevations).

Okhaldhunga from Ghurmi, Udayapur

Sunkoshi River

Crossing the Sunkoshi River on Pheri in between Udaypur and Okhaldhunga districts

Haleshi Bazaar

Arkhaule Bazaar

A view of mountain near Haleshi

Trekking around Arkhaule

On the way to Paame

View of mountain from Kaavre, Khotang

Kettuke Bazaar, Okhaldhunga

Okhaldhunga Bazaar during sunset from Hotel Solukhumbu

Millet field at Rumjatar

Street at Rumjatar

On the way to Kholaghar from Rumjatar

Chitre, Solukhumbu

Faplu Bazaar

View of Salleri Bazaar

Katari Bazaar from Hotel Makalu

Fragile landscape on the way to Harkapur from Hilepani

3. Materials and Methods

Following activities were conducted within November 2012.

3.1. **Questionnaire Survey:** A Post-awareness questionnaire survey was conducted among locals at each site.

3.2. **Echolocation study:** Echolocation calls were recorded using bat detector Pettersson D200 and Bat Box Duet and analyzed using bat sound analysis software Bat Sound 4 to identify flying bats in the evening.

3.3. **Roost Search**: Houses and caves were searched at the daytime during roost survey. Bats were captured by hands from roosts in some sites.

3.4. **Identification**: Spot identification was made on the basis of morpho-metrics and other characteristics tallying from taxonomic references and keys Srinivasulu et al. (2010) and Acharya et al. (2010).

3.5. **Post Awareness Open Art Competition:** Post-awareness Open Art Competition was conducted at the schools where Pre-Awareness Open Art competition had been conducted during the first phase of the project.

4. Results

Public perception on bats:
Twenty-three questionnaire forms were filled up at eight sites of the project area. Altogether 180 questionnaire forms (see format in Appendix II) were well filled (four partially filled and unclear forms were rejected) amongst local people of different community in the study area. During the post- awareness questionnaire survey a variety of people in occupation, age, sex and education was involved (see Annex I).

Q.1.What is bat?
In this question most of the informants know bats as flying rats.

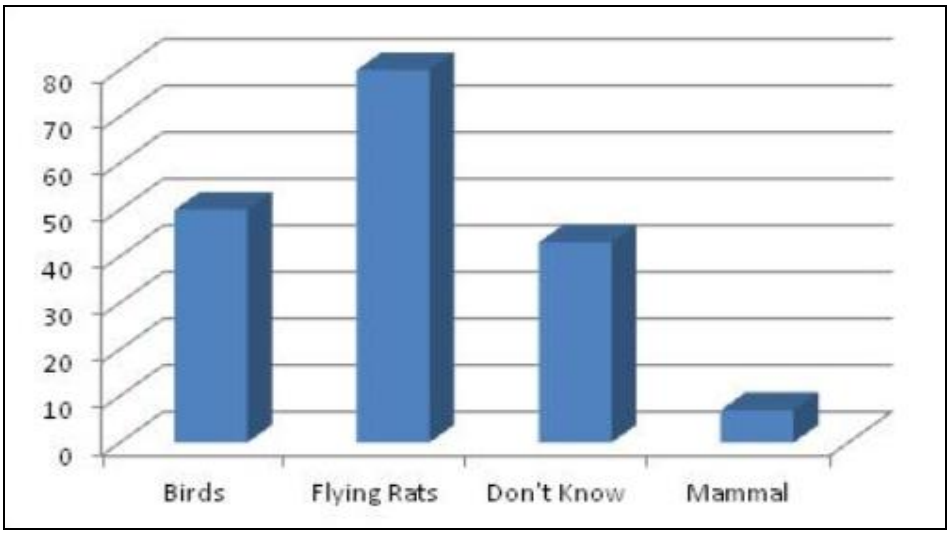


Figure 1. Column-diagram showing public perception about bats.

Q.2. Which Season bats are seen the most?
Most of the people have noticed bats when they come inside their house in raining season (monsoon).

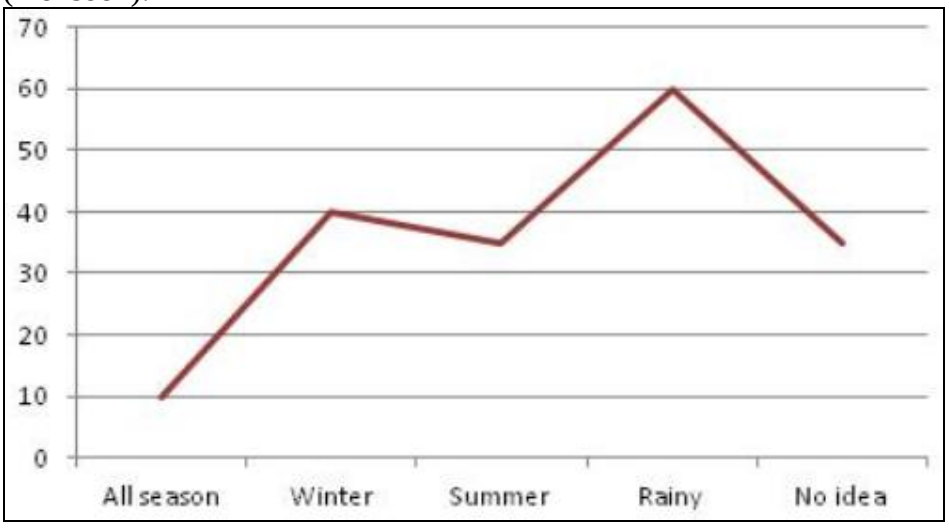


Figure 2. Line--chart showing public perception on season of bats abundance.

Q.3.Where do bats live?

Most of the informant answered bats live in the caves, under banana leaves, hollows of bamboo trees and inside the hut.

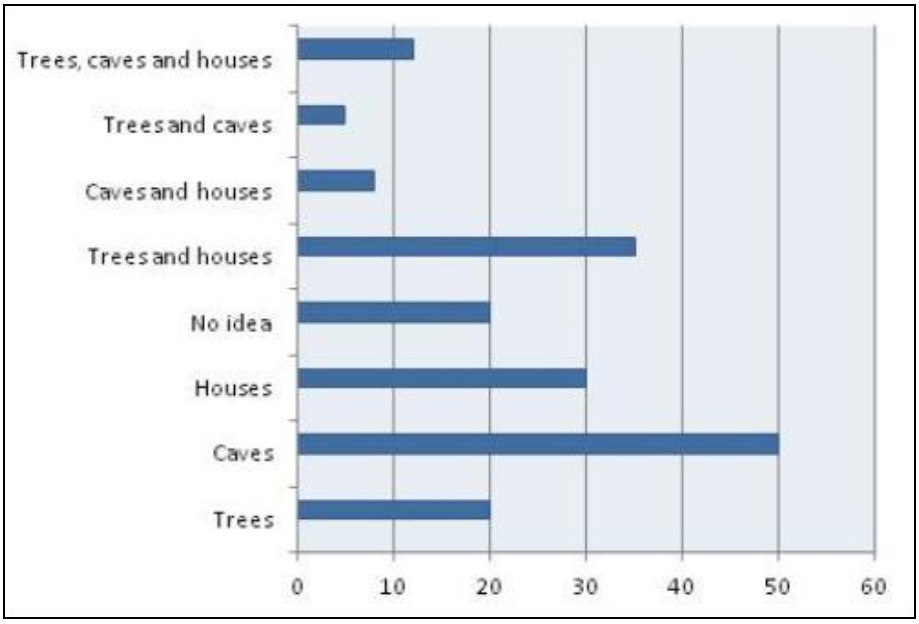


Figure 3. Bar-diagram showing public perception on habitat of bats.

Q.4.Which colours of bats have you seen?

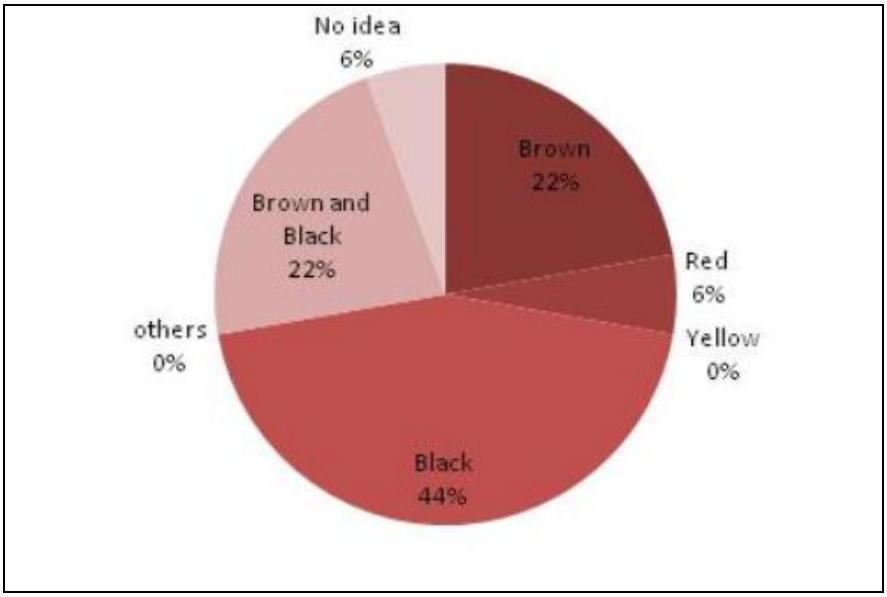


Figure 4 Pie-chart showing public perception on bats' colour.

Q.5. What do they feed upon?

Many informants said bats feeds on insects. From all the forms we concluded that people know bats favorably eats ripen fruits like Citrus fruits, Guava, Banana, Chiuri and they also feed on insects such as sandfly (Bhusuna in Nepali), moths, grasshoppers, mosquitoes and leafhoppers.

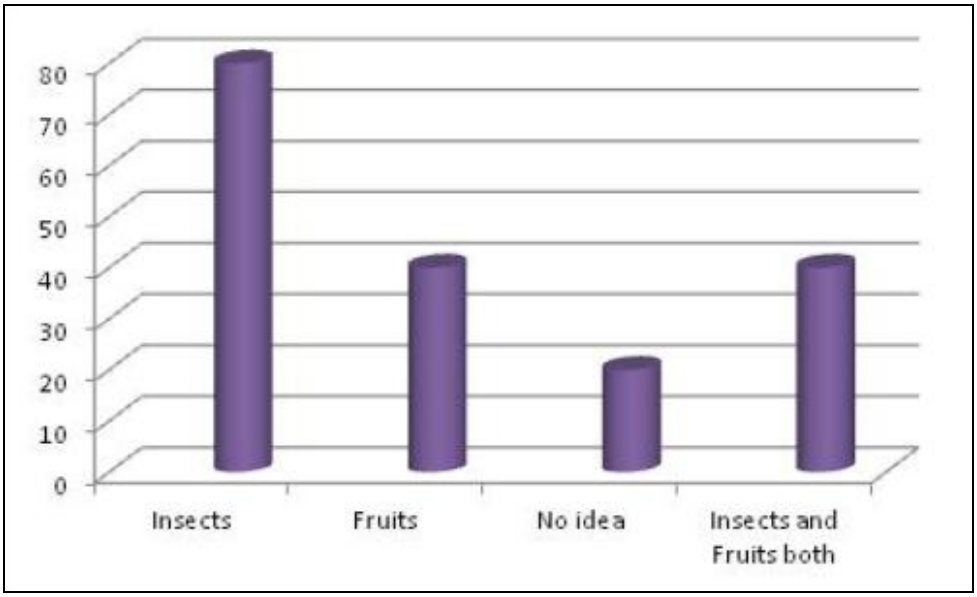


Figure 5. Column-diagram showing public perception on bats' diet.

Q.6. Do you know advantages of bats?

People consider that bats are advantageous for them and nature, but they do not know specific reasons of importance of bats except their guano can be used as fertilizers.

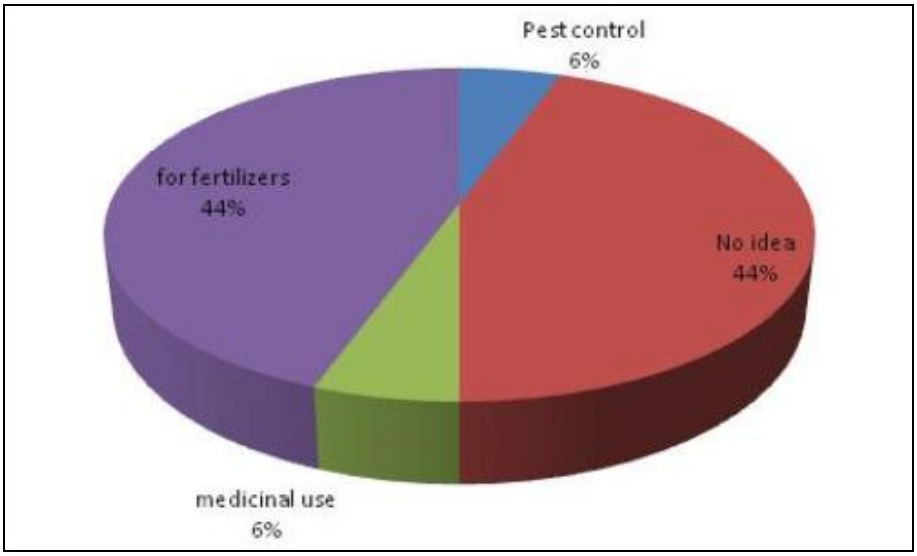


Figure 6. Pie-chart showing public perception on bats' advantages.

Q.7. What are harms of bats?

Informants do not have serious idea of bat harms except fruit raiding and they make the house dirty with stinky guano.

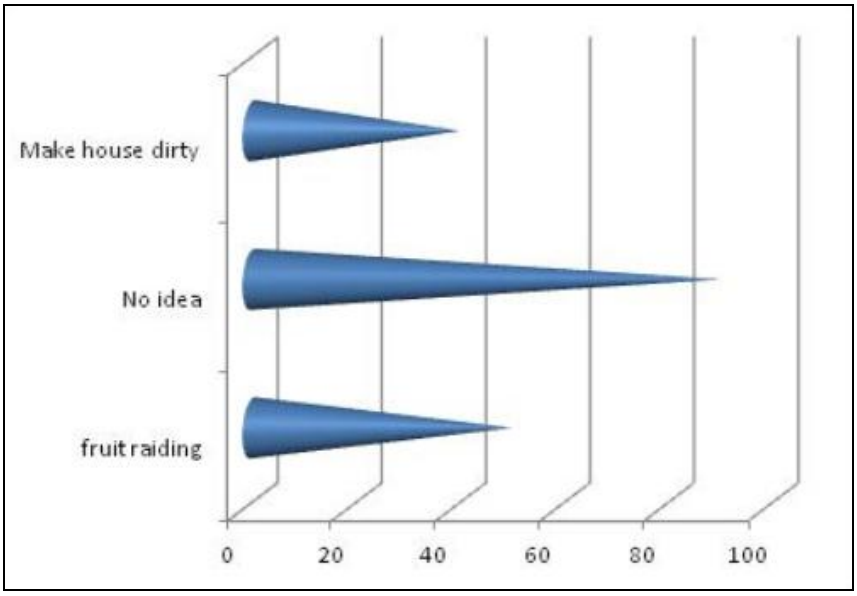


Figure 7. Bar-diagram showing public perception on disadvantages of bats.

Q.8. Do people kill bats?

People have neither killed bats by themselves nor known bat killings.

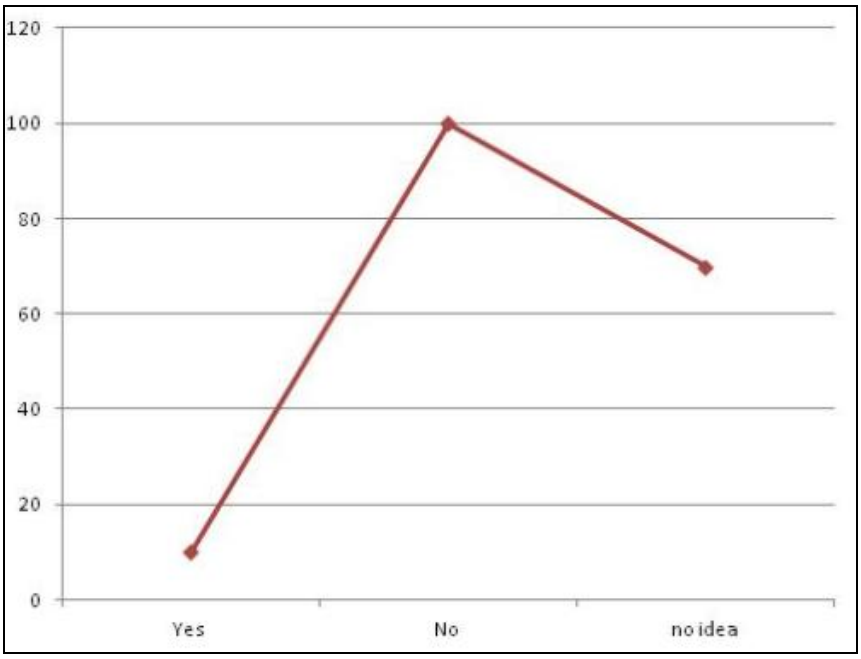


Figure 8. Line-chart showing public perception on bat killings.

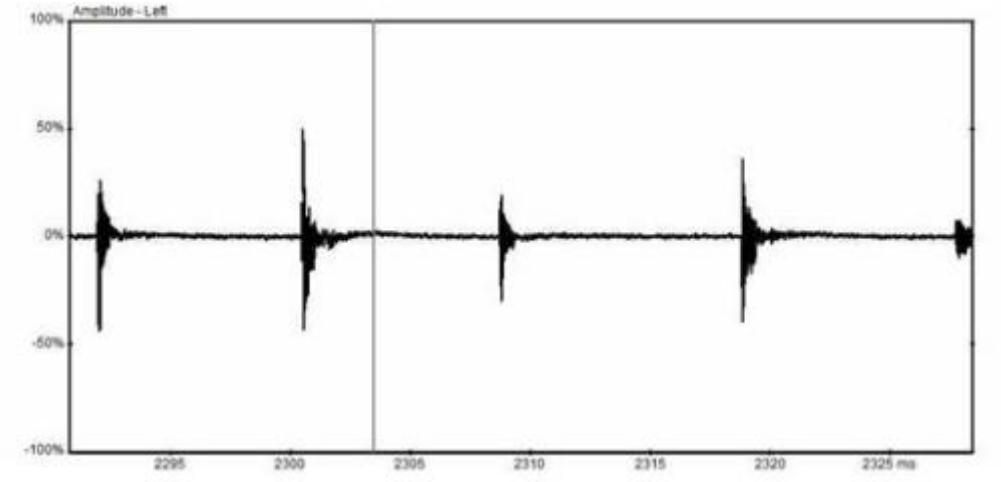
Q.9. Why they kill bats?
They do not have any reason for bat killings.

Altitudinal variation and habitat of bats occurrence

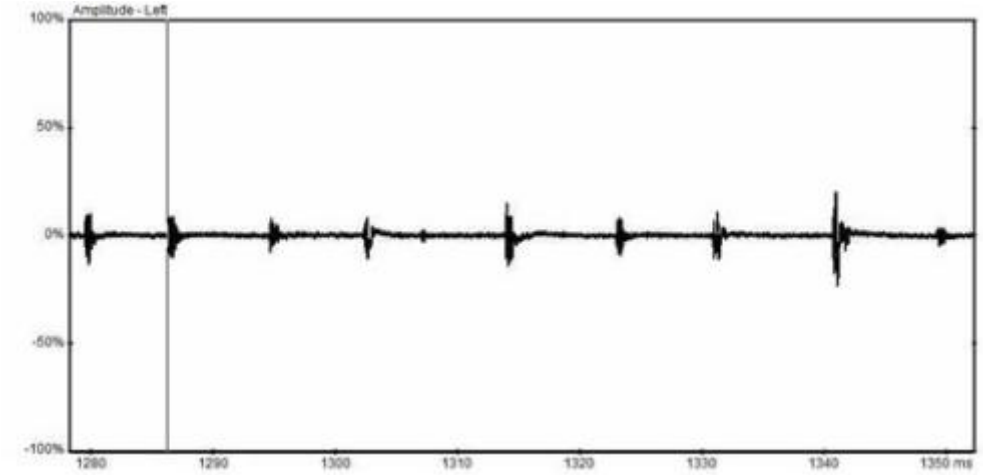
Table 1. Elevation, place and habitat of bat species recorded.

Elevation	**Place**	**Bat species observed/captured**	**Habitat**
2493m a.s.l.	Phaplu, Solukhumbu	-	-
2410m a.s.l.	Salleri, Solukhumbu	-	-
1373m a.s.l.	Halesi Cave, Khotang	*Eonycteris spelaea*, *Hipposideros armiger*	Cave
934m a.s.l.	Mangaltar, Khotang (27°11'35.78"N; 86°36'12.48"E)	*Pipistrellus sp.*	Tree hollow
1360m a.s.l.	Rumjatar, Okhaldhunga	-	-
1246m a.s.l.	Kholaghar, Barnalu-1, Okhaldhunga	-	-
846m a.s.l.	Paame Cave, Paame, Arkhaule-9, Khotang (27°11'44.50"N 86°39'45.08"E)	*Rousettus leschenaulti*, *Eptesicus sp.*	Cave Hut bamboo
206m a.s.l.	Katari	-	-

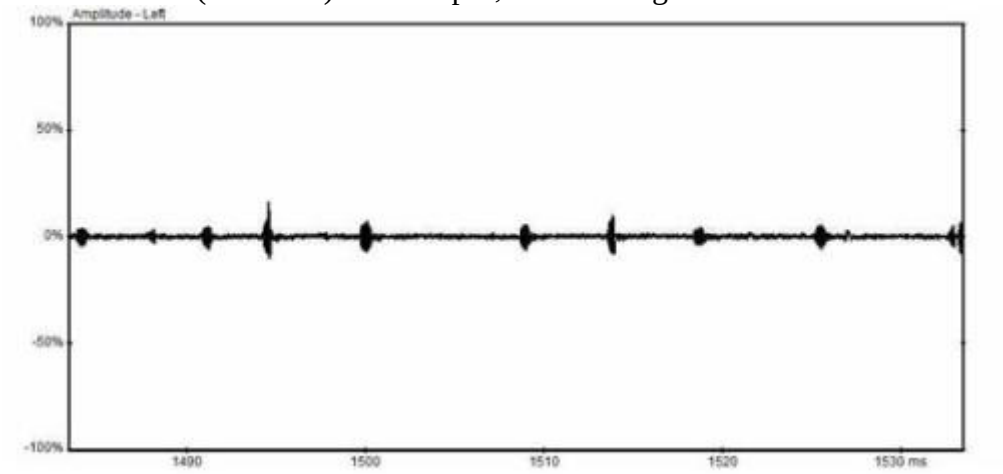
Spectrogram of bat calls recorded



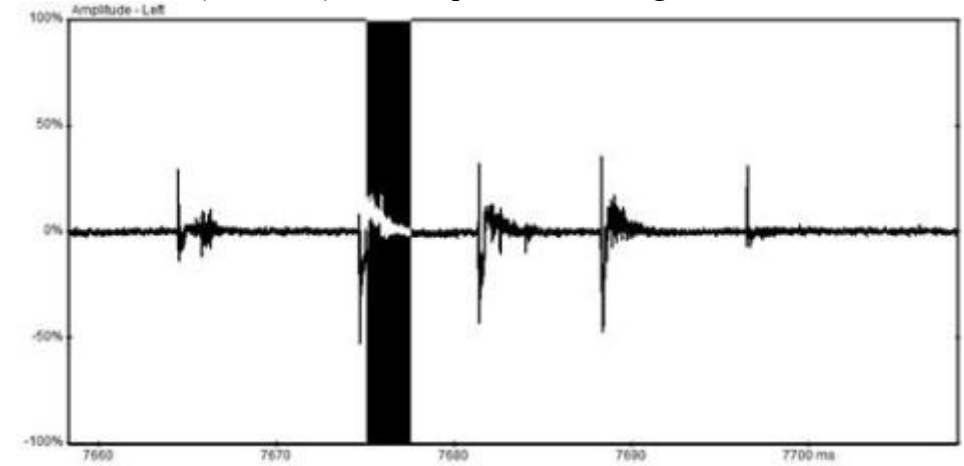
Unknown bats (63.0 kHz) at Harkapur, Okhaldhunga



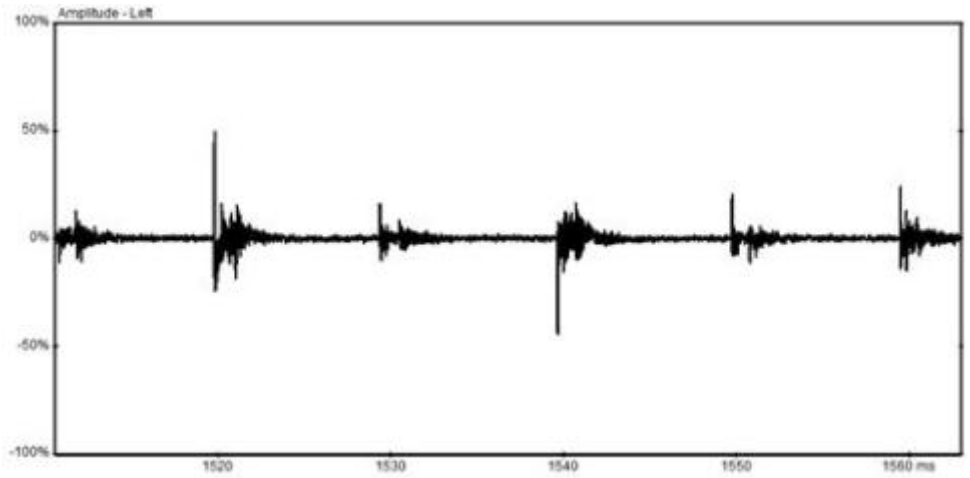
Unknown bats (22.3 kHz) at Harkapur, Okhaldhunga



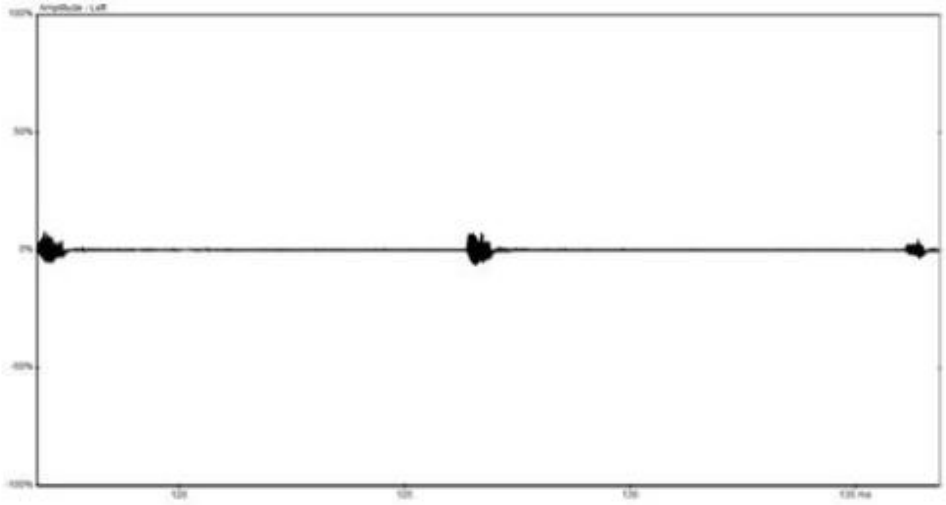
Unknown bats (22.8 kHz) at Harkapur, Okhaldhunga



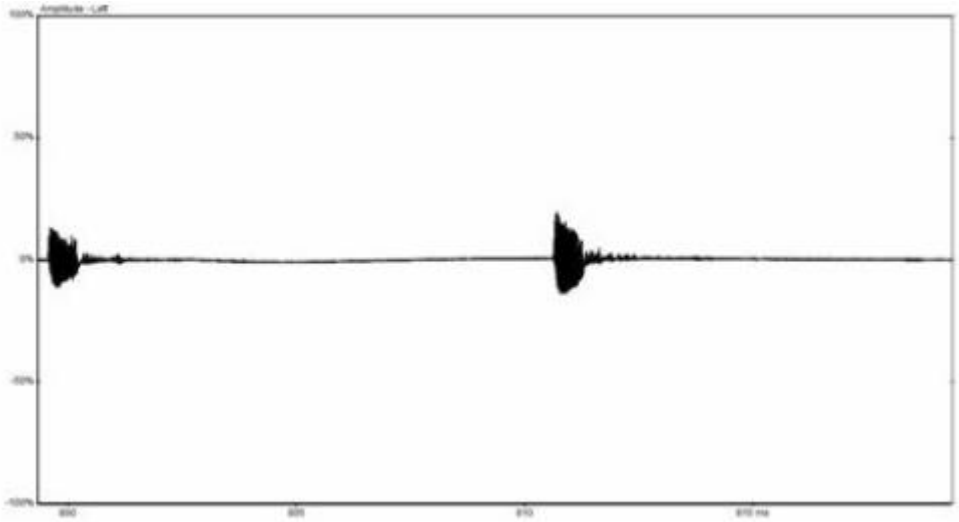
Unknown bat (140.1 kHz) at Arkhaule, Khotang



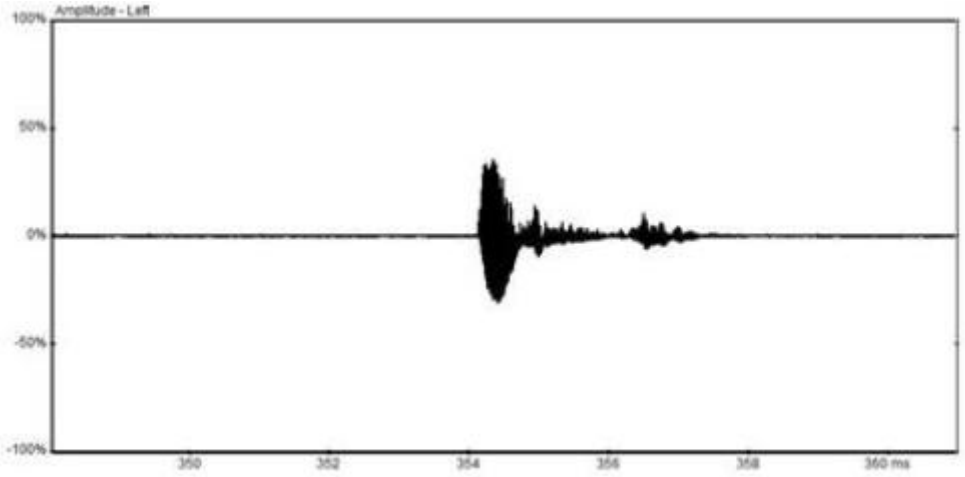
Unknown bat (88.2 kHz) at Arkhaule, Khotang.



(1)

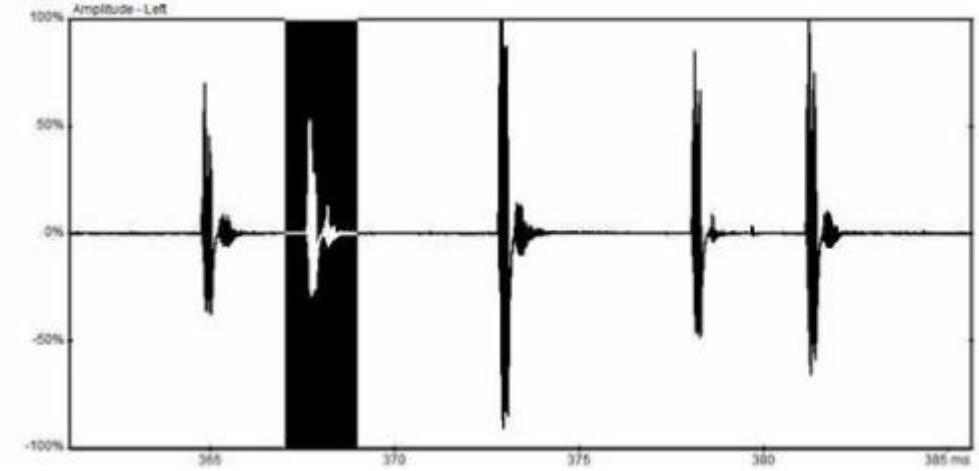


(2)

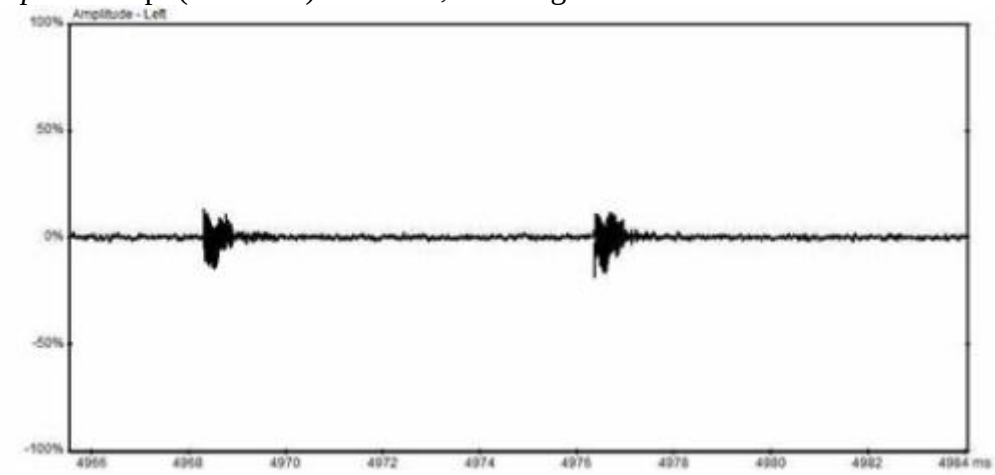


(3)

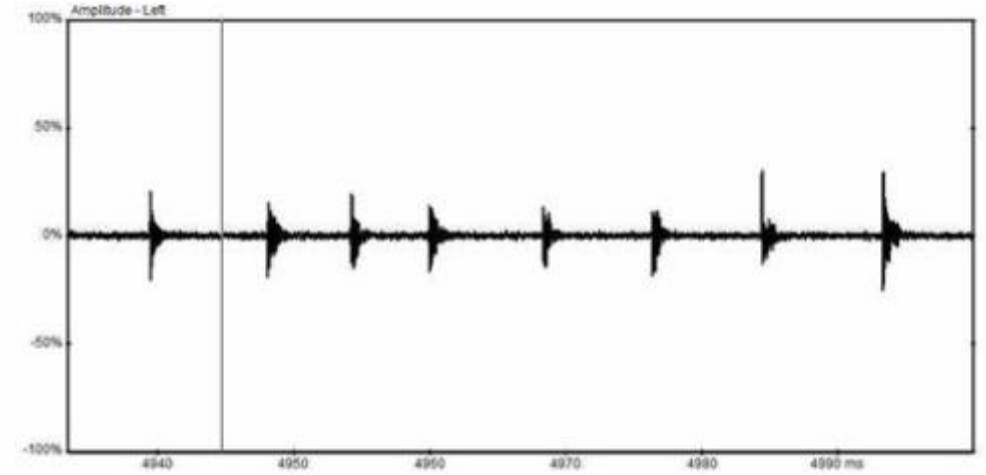
(1, 2, 3) pipistrelle (45.1-47.4 kHz) at Arkhaule, Khotang.



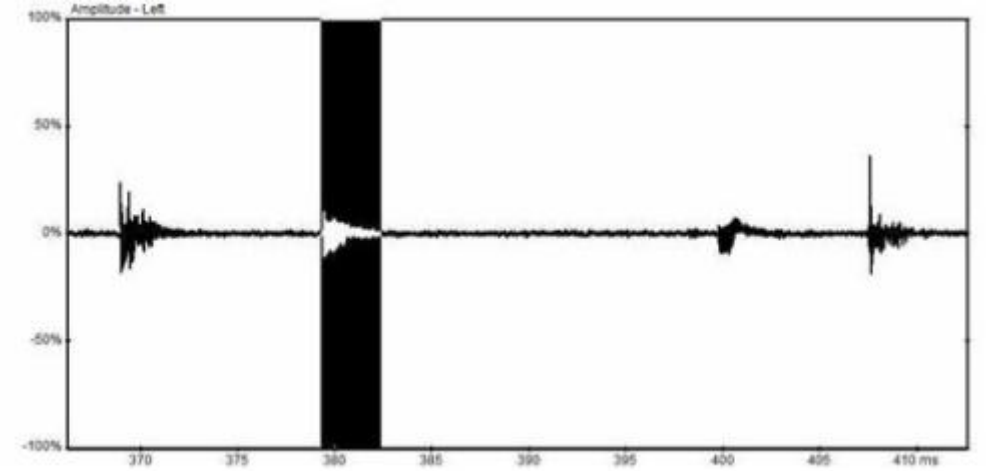
Eptesicus sp. (60.6 kHz) at Paame, Khotang



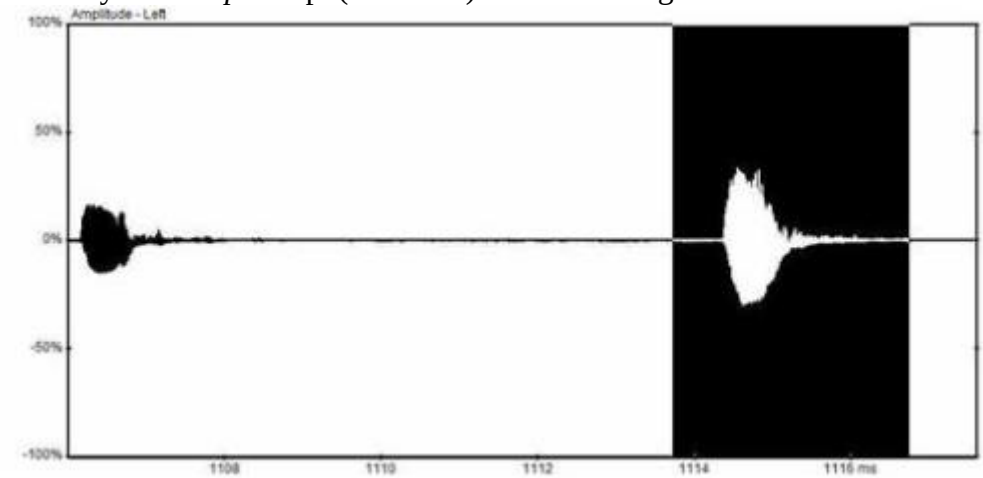
Unknown bat (58.2 kHz) at Jayaramghat, Okhaldhunga



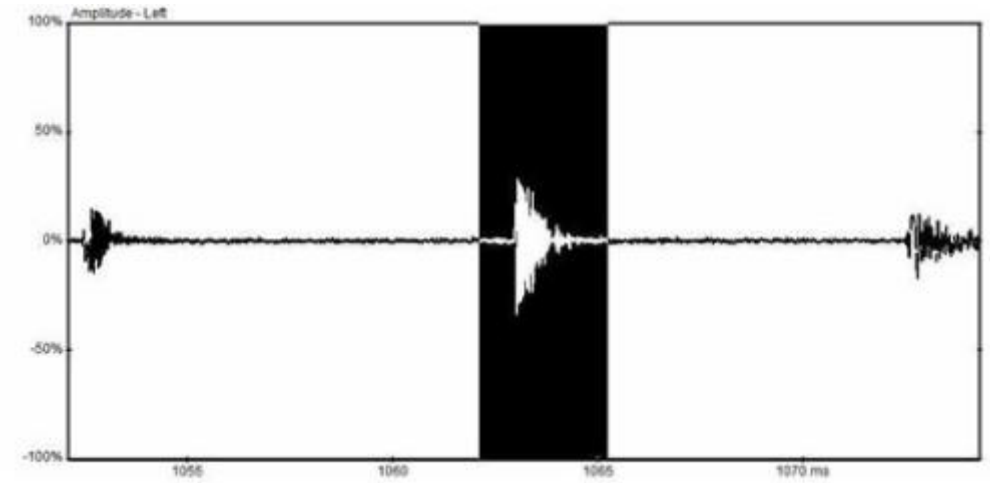
Unknown bat (41.2 kHz) at Jayaramghat, Okhaldhunga



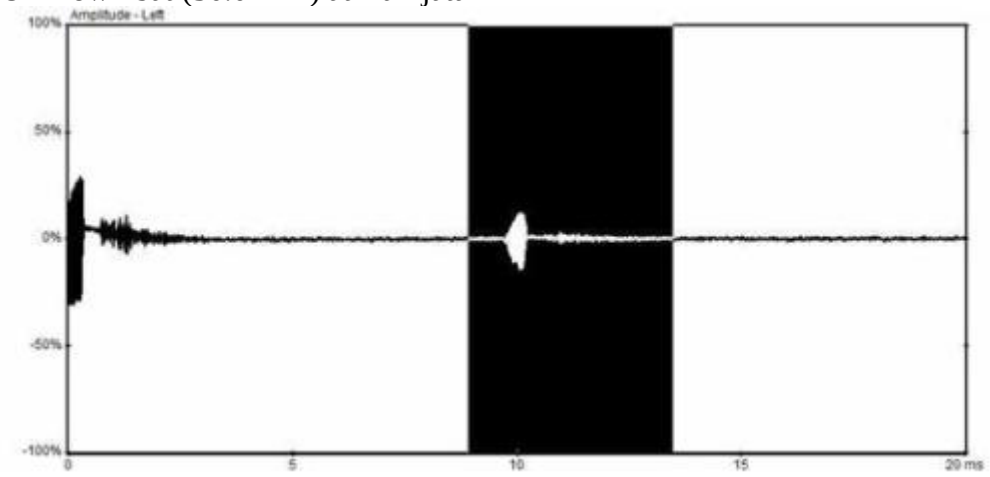
Probably *Rhinolophus* sp. (90.6 kHz) at Okhaldhunga Bazaar



Pipistrelle (46.5 kHz) at Rumjatar



Unknown bat (30.0 kHz) at Rumjatar



Probably pipistrelle (43.0 kHz) at Katari

Note: Sound like water running in the stream was detected at 52-58 kHz during the flight of *Hipposideros* sp. at Haleshi Cave on November 17, 2012 but during the analysis the call spectrogram could not be located.

Table 2. Bat species detected by bat detectors at different sites.

Date	**Elevation**	**Place**	**Bat species detected**	**Frequency (kHz)**
Nov. 26, 2012	2493m a.s.l.	Phaplu, Solukhumbu	-	-
Nov. 16, 2012		Harkapur, Okhaldhunga	Unknown	63.0, 22.3, 22.8
Nov.	2410m a.s.l.	Salleri, Solukhumbu	-	-
Nov. 21, 2012	1373m a.s.l.	Halesi Cave, Khotang	-	-
Nov. 21, 2012		Jayaramghat, Okhaldhunga	Unknown	41.2, 58.2
Nov. 20, 2012		Paame	*Eptesicus* sp.	60.6
Nov. 22, 2012	1767m a.s.l.	Okhaldhunga Bazaar	*Rhinolophus* sp.	90.6
Nov. 23-24, 2012	1360m a.s.l.	Rumjatar, Okhaldhunga	*Pipistrellus* sp.	46.5
			Unknown	30.0
Nov. 21, 2012	1195m a.s.l.	Arkhoule-5, Khotang	Unknown	140.1, 88.2
			Pipistrellus sp.	45.1-47.4
Nov. 29, 2012	206m a.s.l.	Katari	-	43.0

Species Profile

Family: Pteropodidae

Rousettus leschenaultii (Desmarest, 1820)
Common Name: Leschenault's Rousette (IUCN 2010)
Nepali Name: Sano Badura (Baral and Shah 2008); Jibro Padkaune Falahari chamero (Acharya et al. 2010)
Conservation status:
World-wide: LC (IUCN 2010)
South Asia: LC (Molur et. al 2002)
Nepal: LC (Jnawali et al. 2011)
Description: A colony of about 4000 individuals of this species was found roosting in the Paame Ghicin Odar (Paame Bat Cave) at Paame, Arkhould V.D.C.-9, Khotang district.
The roost was too noisy and its fresh guano was seen as a small conical paste.

Eonycteris spelaea (Dobson, 1891)
Common Name: Dawn Bat
Nepali Name: Mirmire chamero (Acharya et al. 2010)
Conservation status:
World-wide: LC (IUCN 2010)
South Asia: LC (Molur et. al 2002)
Nepal: DD (Jnawali et al. 2011)
Description: Altogether three-four thousands individuals were estimated to roosting at Bhairav cave and main cave at Haleshi,Mahadevsthan V.D.C.-4, Khotang. This species is the earliest flier. The first flight of the species was noted 17:35 hr at Bhairav cave and 17:55hr at main cave. The flight was continued until 21:00hr. Chattering sound from the roost was conspicuously heard. In the main cave they were found divided in four colonies in the main cave.

Family: Hipposideridae

Hipposideros armiger (Hodgson, 1835)
Common Name: Great Himalayan Leaf-Nosed Bat
Nepali Name: Thulo Golopatre Chamero (Baral and Shah 2008)
Conservation status:
World-wide: LC (IUCN 2010)
South Asia: LC (Molur et. al 2002)
Nepal: LC (Jnawali et al. 2011)
Description: a small colony 13 individuals was observed roosting and flying inside the main cave at 17:12 in the evening. The first flight out of the cave entrance was noted during 17:25. The sound by the bat detectors were like water running in the stream detected at 52-58 kHz, but during the analysis the calls could not be detected.
Family: Vespertilionidae

Pipistrellus sp.

Description: An adult male individual was found roosting in the hollow of *Bauhinia purpurea* (Tanki) at Ghurchu, Mangaltar V.D.C, Khotang on November 17, 2012.

External characters: Forearm length measured is 35mm (n=1); HB=41mm; T=33mm; TIB=14mm; HF=7mm; 3mt=36mm; 4mt=35mm; 5mt=33mm; 1ph3mt=13mm; 2ph3mt=19.5mm; 1ph4mt=12mm; 2ph4mt=9mm; 1ph5mt=8mm; 2ph5mt=5.5mm; E=10mm; Tragus length=4.5mm. Dorsal pelage has dark hair base with reddish brown tint on the hair tips. Ventral pelage with long, thick, non silky hairs with most of the part reddish but hair bases is dark. Ear and the tragus are short. Post calcaral lobe is well developed.

Eptesicus sp.

Description: A male individual was captured from the roost (inside the hollow bamboo of thatched shed of Padam Bahadur Magar) at Paame, Arkhoule-9, Khotang on November 19, 2012.

External characters: Forearm length measured is 32mm. 3mt=29mm; 1ph3mt= 11mm; 2ph3mt=17mm; 4mt=29mm; 1ph4mt=11mm; 2ph4mt=9mm; 5mt=29mm; 1ph5mt=7mm; 2ph5mt=6mm; TIB=13mm; HF=3mm; Dorsal pelage is pale slaty with dark hair bases while tips pale brown. The ventral pelage is pale. Post calcaral lobe is less developed.

Post-Awareness Open Art Competition

Post-Awareness Open Art Competition was conducted at six schools of the project area. Twenty-four selected students eight each from classes VI to VIII participated in the Post-awareness Art Competition at each school. They were provided all stationary items for the drawing and were asked to draw whatever they know about bats. Most of the students who have participated during the Pre-Awareness Open Art Competition were included except those from class VII who have upgraded to grade IX. New faces from class VI were included this time.

Table 3. Schools and number of participants of Open Art Competition

Name of school	**Address**	**No. of participants**
Mahendrodaya Higher Secondary School	Halesi, Mahadevsthan-4, Khotang	24
Saraswati Higher Secondary School	Arkhaule, Khotang	24
Laliguransh English Boarding School	Okhaldhunga	24
Sagarmatha Janata Higher Secondary School	Okhaldhunga	-
White-Hills English Boarding School	Salleri-5, Solukhumbu	24
Mount Everest English Secondary School	Salleri-5, Solukhumbu	24
Shree Tribeni Higher Secondary School	Katari-3, Udayapur	-
Prabhat English Boarding School	Katari-4, Udaypur	24

Note: In Shree Tribeni Higher Secondary School, there was internal exam (First term) of classes VI-X, so, open-art competition could not be organized. The program was also not re-organized at Sagarmatha Janata Higher Secondary School as the program was not conducted there during the pre-awareness open art competition.

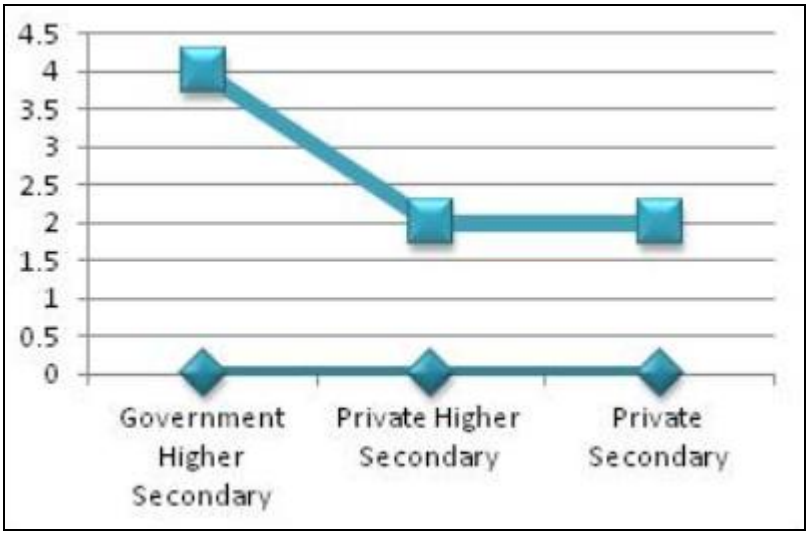


Figure 9. Line-chart showing number and types of schools.

At saraswati H.S.S., Arkhaule

At Mahendrodaya H.S.S., Haleshi

At Mahendrodaya H.S.S., Haleshi

At Laliguransh E.B.S., Okhaldhunga

At Laliguransh E.B.S., Okhaldhunga

At White-Hills E.B.S., Faplu


At Mt. Everest E.B.S., Salleri


At Prabhat E.B.S., Katari

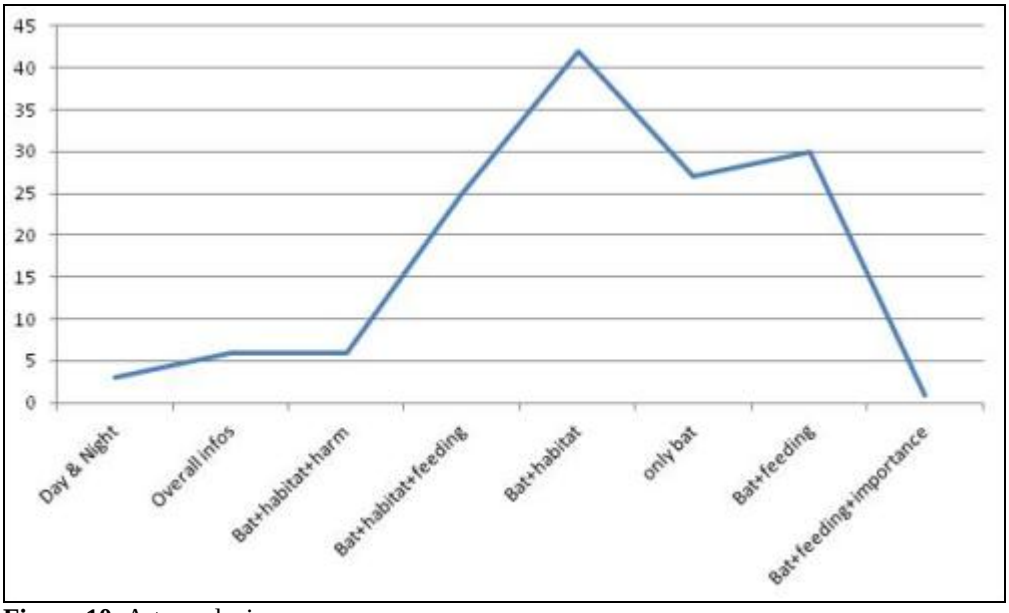
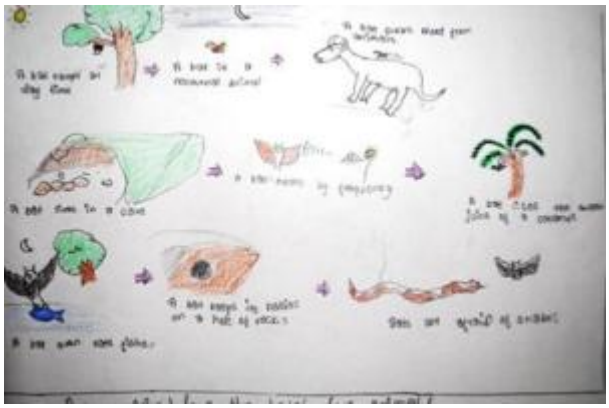


Figure 10. Arts analysis

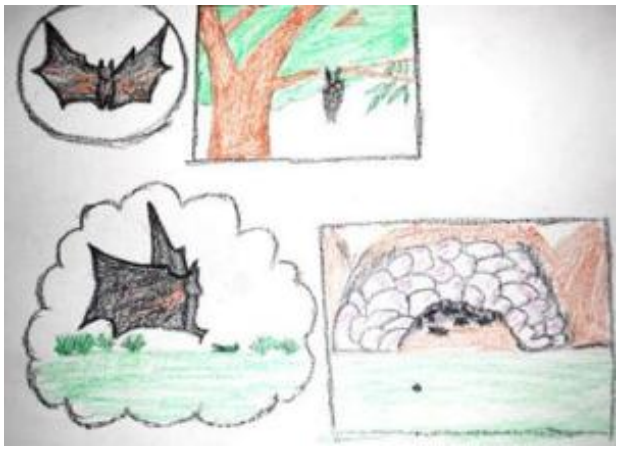



Save
The
Bat
4
ever


Save the Bat


Fig Bats


Day
Night



5. Discussion and Conclusions

People have overall good information regarding bats. People of the study area perceive bats as the flying rats. Most of the people have seen bats flying during the rainy season. Most of the people know habitats of bats. They have good idea on colour of the bats. Feeding habits of bats are well known as insects and fruits. People know bats are advantageous, but do not have specific reason except their guano can be used as fertilizers. Still, a good number of respondents have no idea. Fifty percent informants do not have specific cause of bat harms except fruit raiding and they make the house dirty with stinky guano answered by another 50% of the respondents. Bats killing are unknown to almost all of the people. Ten respondents reporting the bat killing are unaware of the cause for bat killings.

Bat sounds were recorded for three (genera) and additionally unknown species with different frequencies. In the second field too, bats occurrence with elevation gradient is exhibited. Bats were recorded from 206m a.s.l. to 1373m a.s.l. Bats diversity and population were found greater at mid-hills rather than in the Tarai and higher elevations. *Eonycteris spelaea* was found at Haleshi as in the first field but the roost sharing of *Rousettus leschenaultii* was not observed. This time, *Hipposideros* sp. was additionally recorded from the main cave at the Haleshi. Also, the colony of 4000 individuals at Paame is the first record of the largest colony of *Rousettus leschenaultii* in Nepal. Species variation with altitude has been interestingly exhibited. *Eptesicus sp.* occurs in the higher elevation, whereas, *Pipistrellus sp.* is distributed in lowlands as well as highland both. However, both species inhabit bamboo hollows and additionally the later inhabits the tree.

Altogether six schools were approached for the post-awareness open-art competition. Maximum programs (4) were conducted in Government Higher Secondary School, minimum (2) in Private Higher Secondary School and Private Secondary School each. Equal number of students (24) participated at each school. Some schoolchildren are confused bats with birds. Few participants draw bats face like that of bird and rats. Some schoolchildren perceive bats as funny and amazing creature. Most of they know very well about their habitat such as bats live in caves and in trees and their diet comprises of insects and variety of fruits. Still, few have misconception that bats suck blood of cattle and even human.

The level of knowledge regarding bats and their importance of ecosystem services was found to be upgraded amongst local people including schoolchildren.

6. Next Steps

Exhibition and Calendar printing will be conducted within May 2013.

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Baral, H.S. and Shah, K.B. 2008. Wild Mammals of Nepal. Himalayan Nature, Kathmandu, 128-157pp.

Jnawali, S.R., Baral, H.S., Lee, S., Acharya, K.P., Upadhyay, G.P., Pandey, M., Shrestha, R., Joshi, D., Laminchhane, B.R., Griffiths, J., Khatiwada, A. P., Subedi, N., and Amin, R. (compilers) 2011. The Status of Nepal Mammals: The National Red List Series, Department of National Parks and Wildlife Conservation Kathmandu, Nepal. viii+266pp.

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ANNEX I

Informants according to Occupation

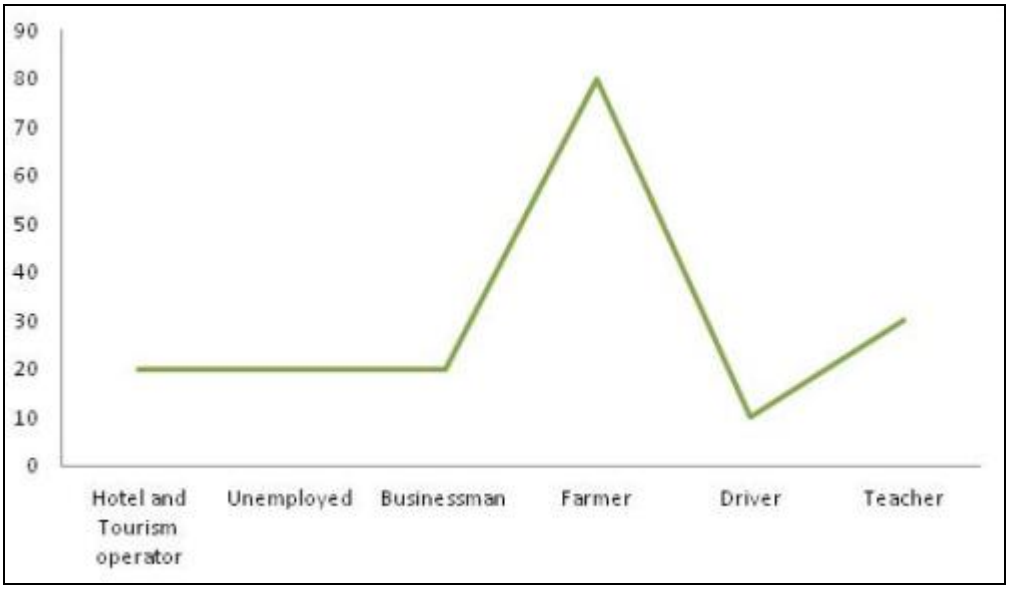


Figure 11. Line-chart showing informants on the basis of occupation.

Informants according to Age group

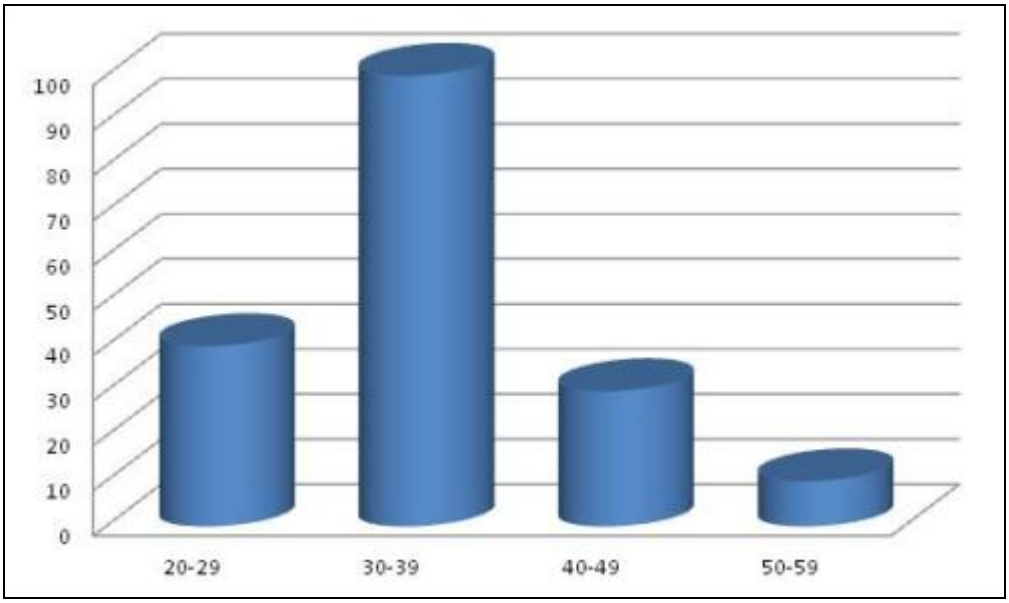


Figure 12. Column-diagram showing informants on the basis of age.

Informants according to sex

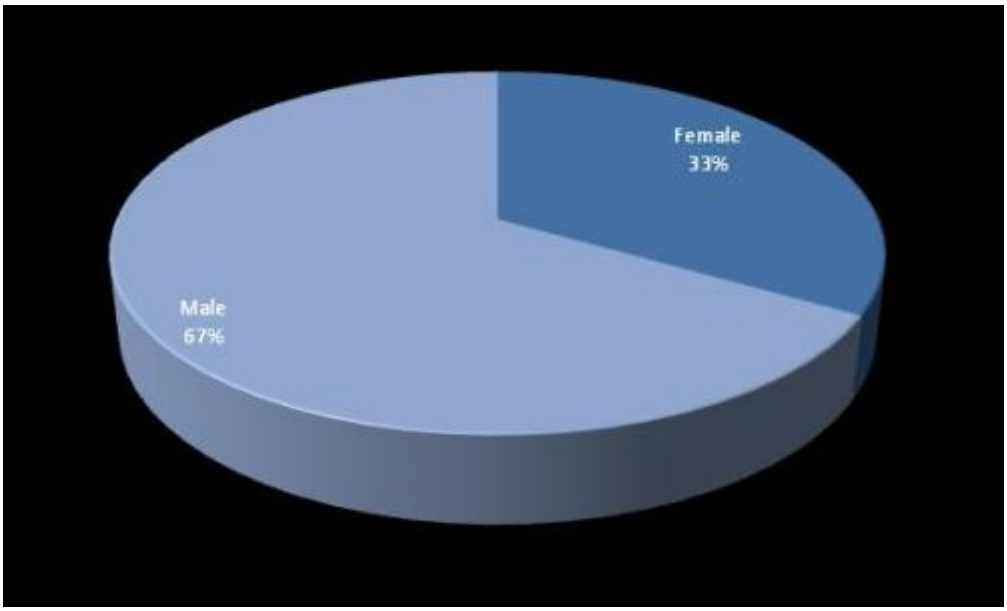


Figure 13. Pie-chart showing informants on the basis of sex.

Informants according to Education

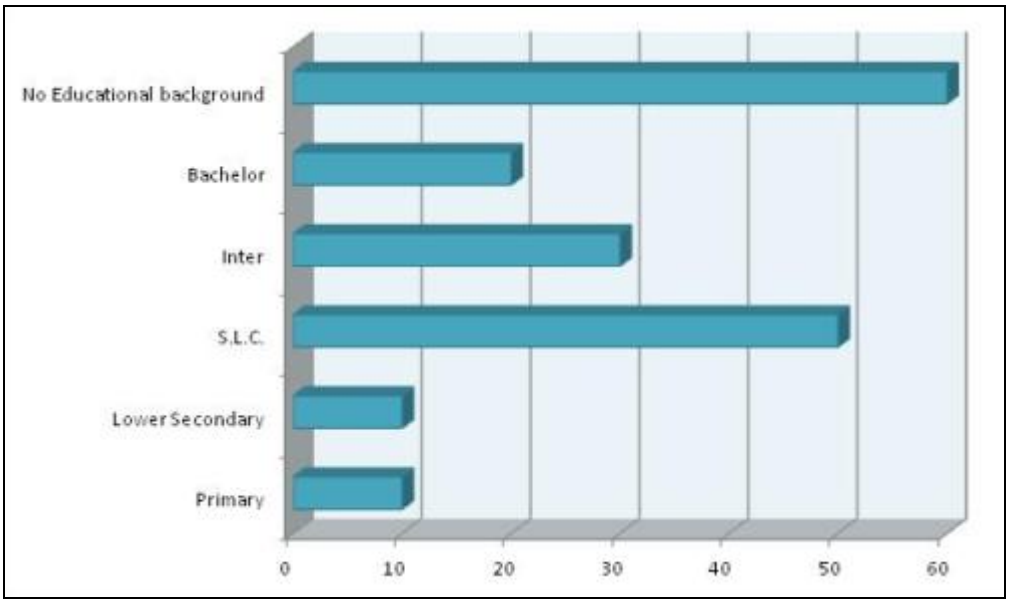


Figure 14. Bar-diagram showing informants on the basis of Education.

Informants according to community

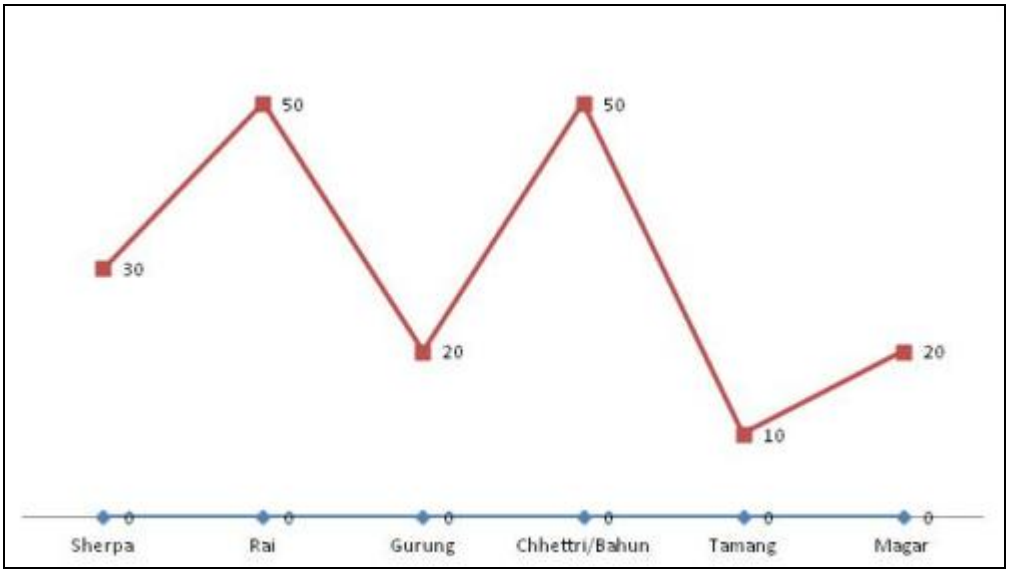


Figure 15. Line-Chart showing informants on the basis of community type.

ANNEX II

Table 4. Bats in dialect (additional to the first phase).

Casts	What they say for Bats
Sampang Rai*	Papiwa
Tamang (Blone)#	Hatipa

*of Patheka V.D.C-8, Khotang district
#of Kettuke, Okhaldhunga district

Questionnaire Survey format of Knowledge and Conception on bats in Nepal

Name: ……

Address: ……

Occupation: …… Date: ……

Institution: …….

Address: ……

Age: …… Sex: …… Educational Background: ……..

---

1. Do you know about Bats? Yes ☐ No ☐

2. What do you know about bats?

……

……

……

……

3. When do you see bats? Morning ☐ Evening ☐ Afternoon ☐ Night ☐

4. Which season and month do you see bats the most?

……

5. Where have you seen the bats nearby? Trees ☐ Caves ☐ Houses ☐

6. What is the place where you have seen the bats nearby? Please describe.

……

……

7. What type of colors of bats have you seen? Brown ☐ Red ☐

Yellow ☐ Black ☐. Others ……..

8. What do they feed upon?

……

……

9. What can be the advantages of bats?

……

……

10. What can be the harms of bats?

……

……

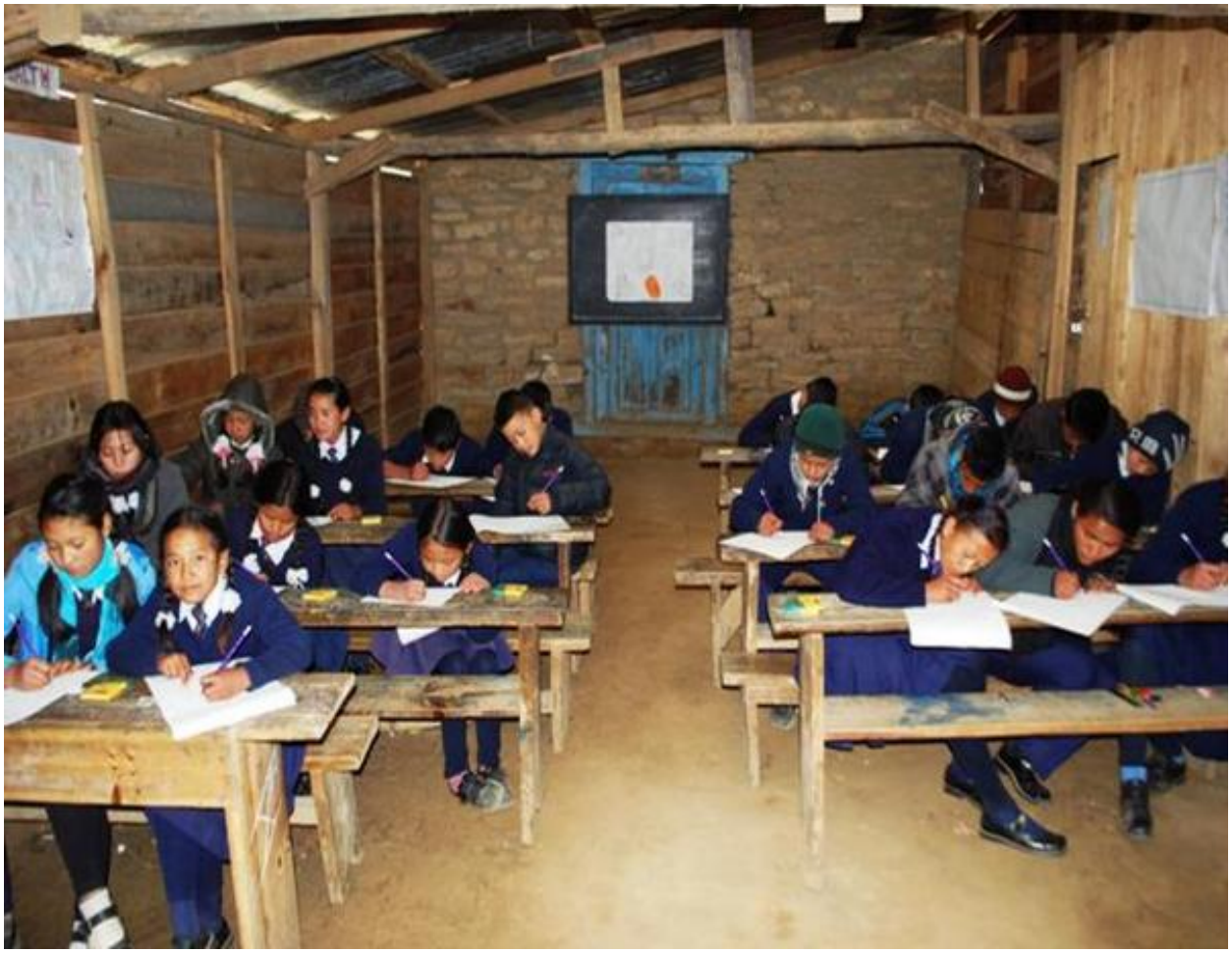
11. Do people kill bats? Yes ☐ No ☐

12. Why do they kill?

……

……

Thank you very much



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