

Final Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF format**. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work - remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please DO NOT fill in and submit this form until the project has been completed.

Complete the form in English. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

Your Details	
Full Name	Shreya Ray
Project Title	Foster conservation of threatened mammals through community engagement in the hills of Northern West Bengal, India
Application ID	42406-1
Date of this Report	16-09-2025

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
1) Determine mammal diversity and distribution across different land-use types of Darjeeling Himalayas of Northern Bengal, India.				<ul style="list-style-type: none"> • I started camera trapping from November 2024 in thirty 16 km² grids across the region. • We started with a month-long pilot survey to understand locations and initial pattern of mammal capture. Following this, we omitted some initial grids because of inaccessibility and risk from theft. • After this we started our sessions from January 2025 placing a total of 100 camera in traps in 3 blocks, for between 20 to 30 days. Of these, 89 will be used for further analysis (five cameras were stolen, one was damaged and four cameras malfunctioned, providing no data). • Our team managed the data, and I conducted preliminary analysis to understand diversity and distribution based on data collect. • Currently I am working on occupancy analysis to predict diversity and distribution.
2) Assess the myriad interactions between these mammals and the local people in shared spaces.				<ul style="list-style-type: none"> • We conducted 238 semi-structured interviews across the landscape covering an area of 528 sq. km across tea gardens, community lands and forest villages. • Our team worked together to

				<p>process this data generating 1,809 observations of 22 species of mammals. Generating qualitative and quantitative data.</p> <ul style="list-style-type: none"> Finally, I analysed and found interaction factors affecting them through generalized linear mixed effects model.
3) Assess local communities' responses to negative interactions with mammals.				<ul style="list-style-type: none"> This data was collected during the previous objective. The recordings were translated and transcribed. Coding of the qualitative data in ongoing. I am currently exploring the qualitative data to analyse through content analysis, but have noted that 25% of responses reported tangible negative experiences from wildlife, such as crop or livestock loss, and 40% reported a negative perception of mammals, indicating the importance of past experiences and socio-cultural factors.
4) Promote human-wildlife coexistence through outreach activities and workshops with multiple stakeholders.				<ul style="list-style-type: none"> We designed a mammal atlas poster and used that as poster during our mammal workshops conducted in schools. We were at the end of field season by the time we conducted workshops and did not get time to facilitate placing of these posters at the target villages, but plan to do so during a subsequent stage. We could not conduct participatory mapping because of a small team and

			<p>logistical challenges (the project site is vast and it would not be possible to conduct this session within all the villages). It also did not seem like a method which would produce the data we wanted to gather.</p>
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2. Describe the three most important outcomes of your project.

a) This is first study from region to generate distribution of 15 species of mammals recorded in camera traps from the Darjeeling hills, across the multiple kinds of landscapes (Figure 1) shedding light about the occurrence of lesser-known mammals along with threatened mammals such as leopard, Himalayan serow, Himalayan black bear (Figure 2).

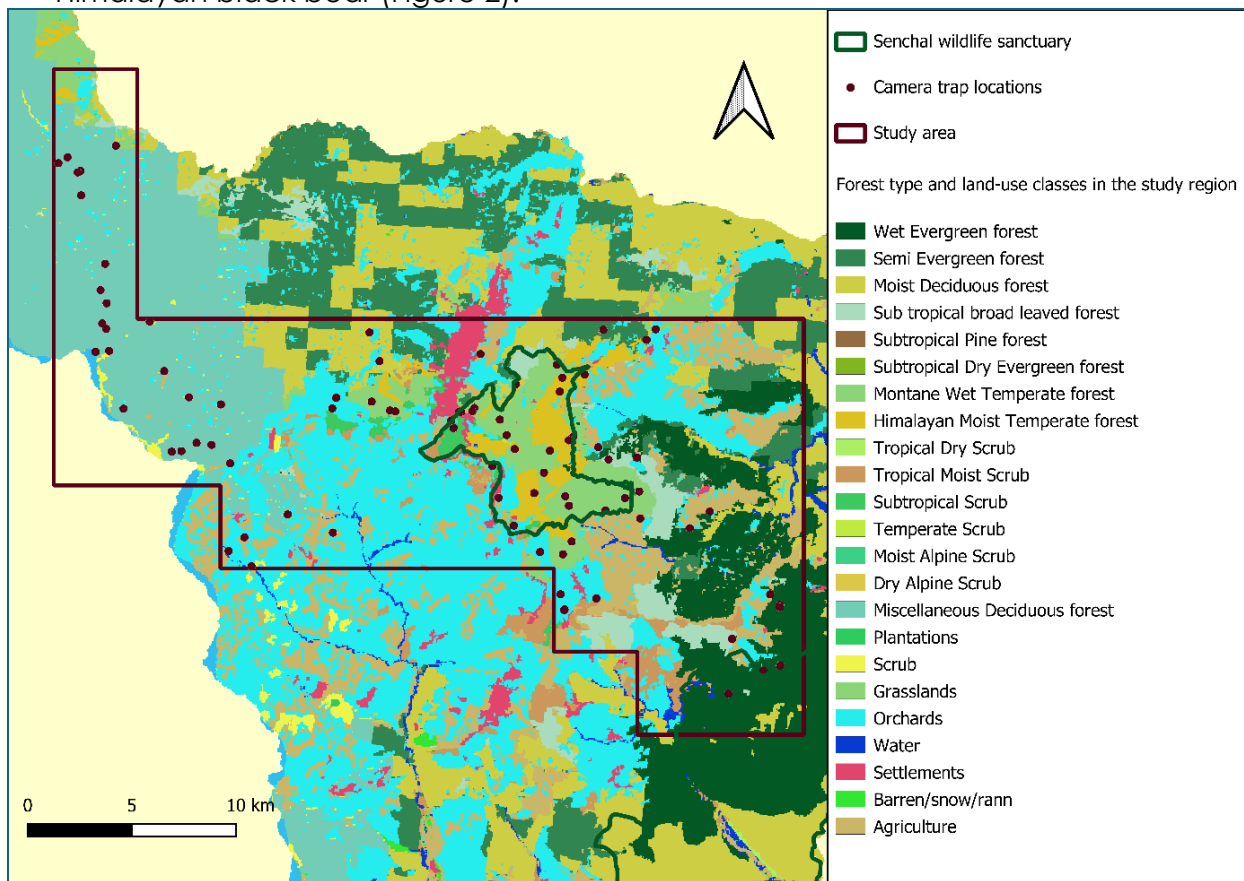
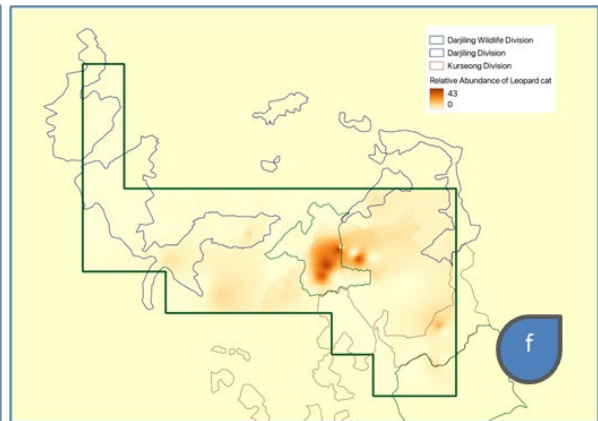
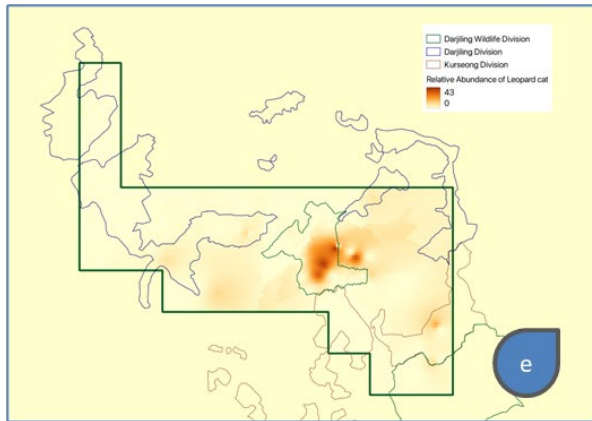
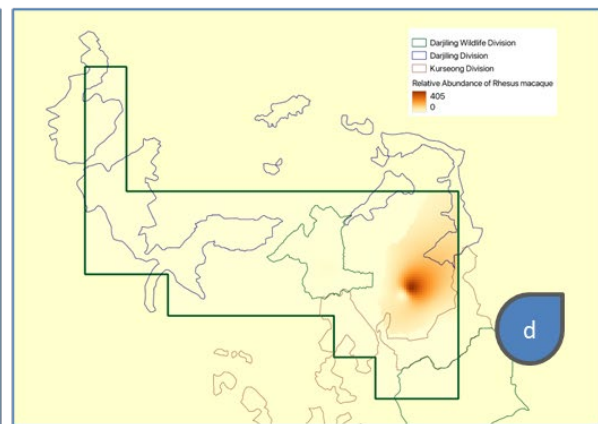
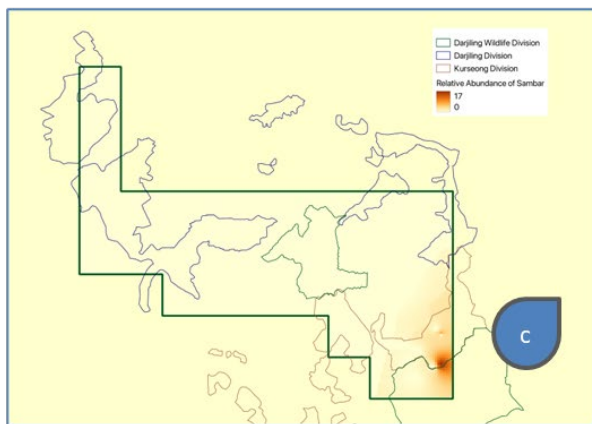
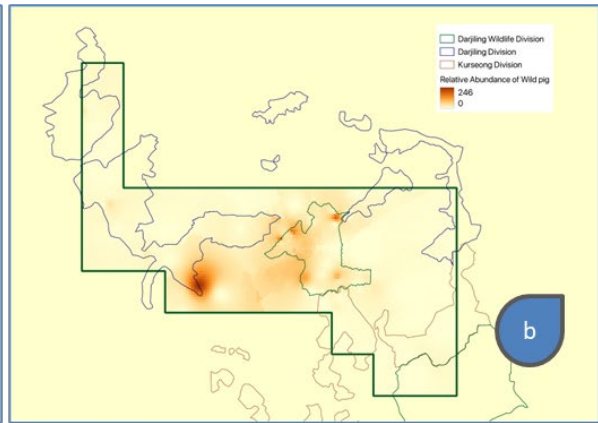
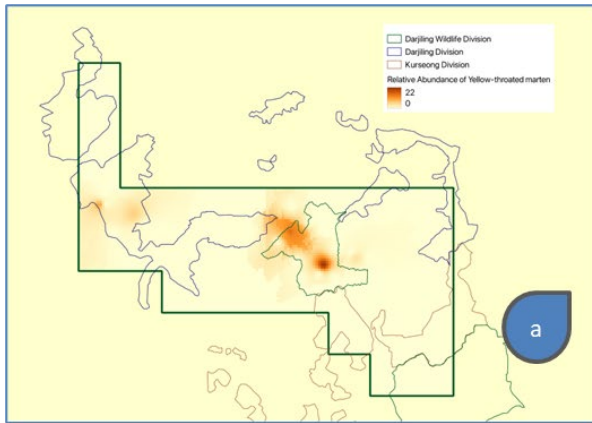
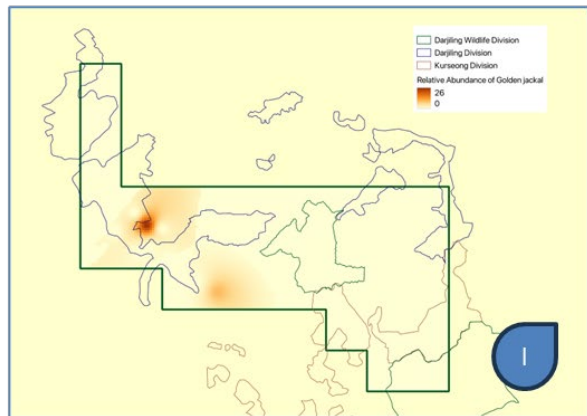
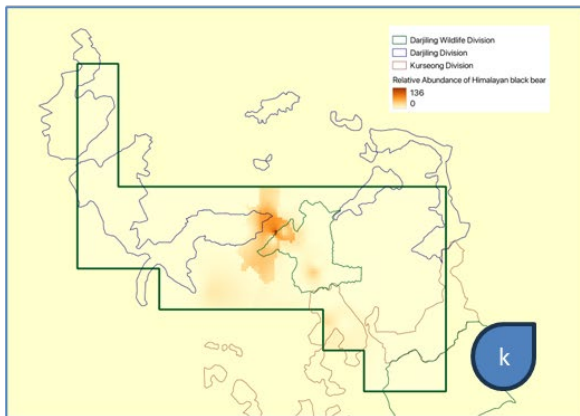
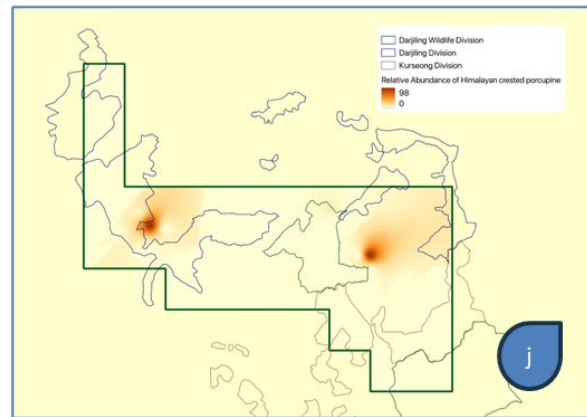
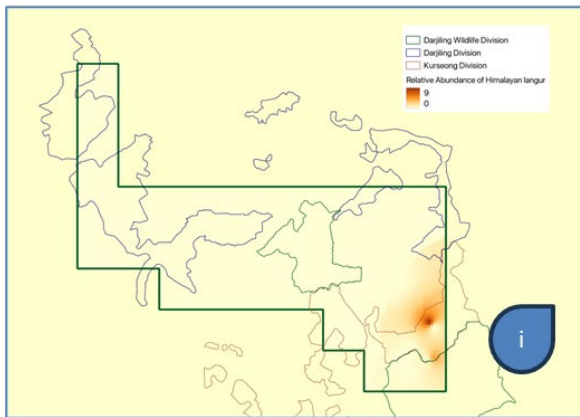
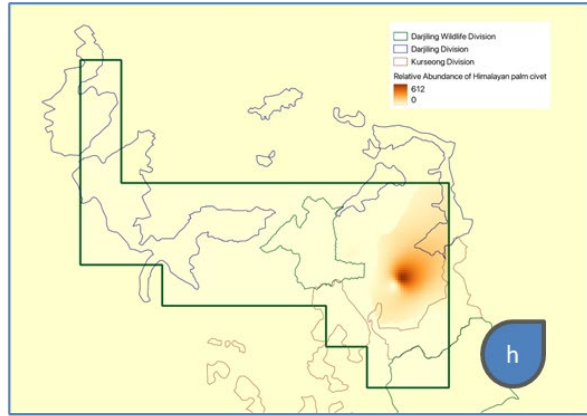
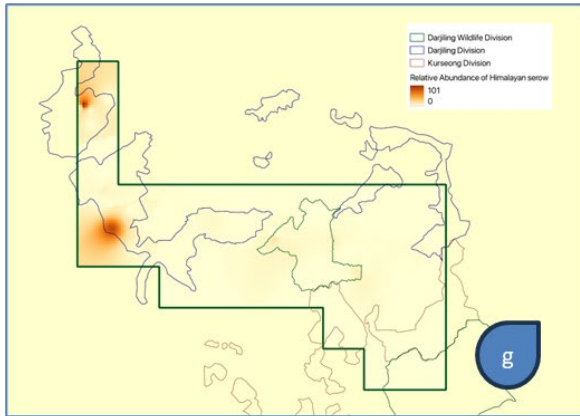


Figure 1: Location of camera traps across land-uses and protected area





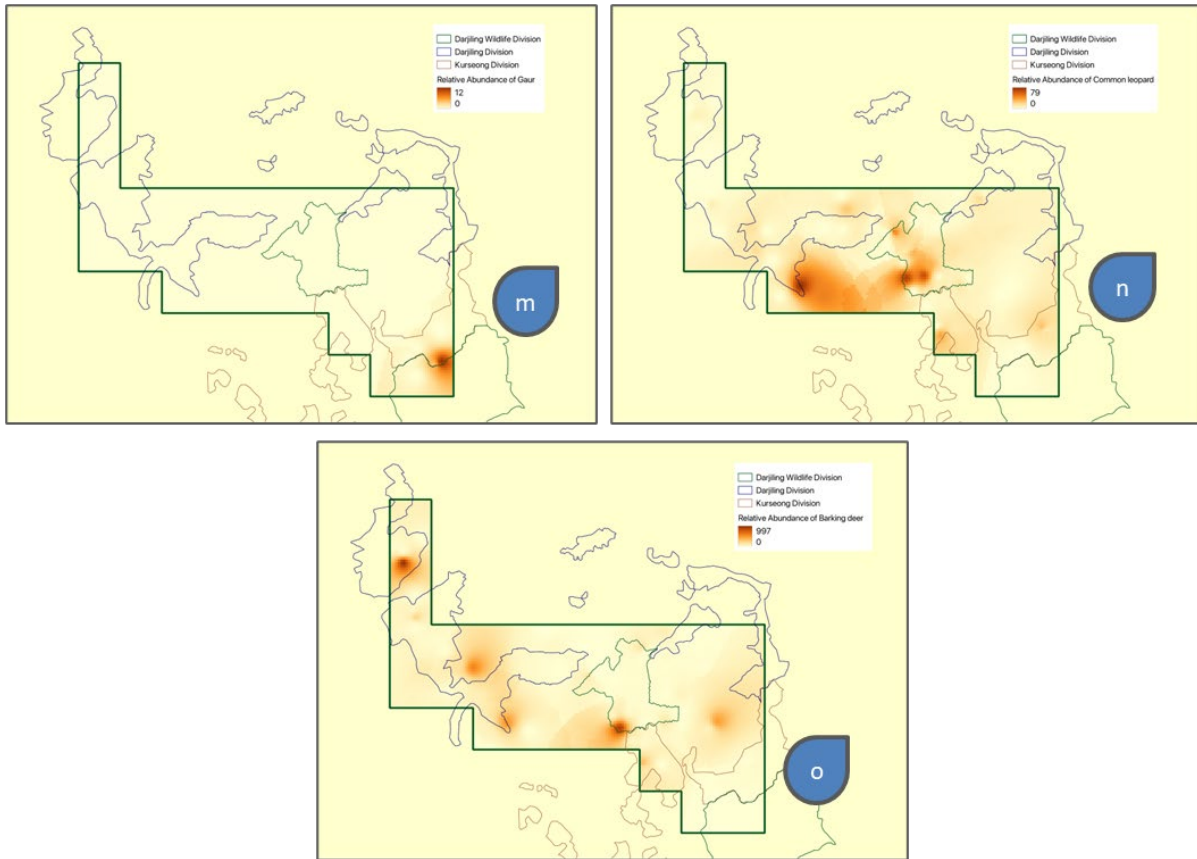


Figure 2: Species wise distributions of mammals captured in the camera traps: a) Yellow-throated marten, b) Wild pig, c) Sambar, d) Rhesus macaque, e) Leopard cat f) Large Indian civet g) Himalayan serow h) Himalayan palm civet i) Himalayan langur j) Himalayan crested porcupine k)Himalayan black bear l) Golden jackal m) Gaur n)Common Leopard o)Barking deer in wildlife and forest areas





Figure 3: Photos of some charismatic and elusive mammal species captured in our camera traps-a) Himalayan black bear b) Leopard c) Golden jackal d) Marbled cat e) Red Panda f) Himalayan serow

- b) Data collected on narratives about 22 species of mammals giving us rich profiles of the species. This is particularly important as a lot of the species reported by local people during our interviews have not been captured in the camera trap at all (for example, the yellow-bellied weasel, binturong, goral and golden jackal). This kind of double pronged approach has helped us identify cultural relevance of the species, potential ecosystem roles, and threats. I conducted semi-structured interview surveys across tea gardens, community lands, and protected forests in Northern West Bengal. I analysed the data using ordinal models, incorporating covariates related to socio-economic factors and ecological traits on sighting frequency, perception towards these mammals and how people respond to them.
- c) Our ongoing analysis will reveal the influence of anthropogenic and environmental factors on habitat-use of 15 species of mammals creating a novel dataset which will be shared with stakeholders: forest department, local community leaders, and other NGOs.
- d) We held a session of wildlife monitoring using camera traps and sign surveys in a Human-wildlife conflict mitigation methods event organized by forest

department (Figure 4). We engaged with local communities, schools and forest department to conduct mammal awareness workshops inspired from oral narratives collected during field work. One workshop was held at St Roberts School in Darjeeling attended by 4 schools and another one, which was conducted in collaboration with Tonglu Range, Darjeeling Forest division was attended by 4 schools (Figure 5), reaching 84 students in total. We also held one workshop on human-wildlife conflict management, attended by 30 forest department staff.

- e) Additionally, our collaborators from ATREE conducted the education workshops in North Sikkim using our materials. So, our project impact extended beyond our project area (Figure 6).



Figure 4: Human-wildlife conflict management workshop with forest department personnel



Figure 5: snippets of education workshops conducted at two locations



Figure 6: Education workshop in Lachen, North Sikkim

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

We incurred multiple camera trap losses during the camera-trapping exercise, despite having a strong network of local partners collaborating with us. To address this, we mapped the affected areas and conducted informal discussions with nearby villages to understand the underlying issues. These conversations revealed deep-rooted inequalities in profit sharing from tourism and conservation initiatives, which have, in some cases, led to retaliatory actions. We are now focusing on outreach activities in these areas to engage with marginalized communities and build trust.

Additionally, although we were able to cover the grids we initially planned, we were unable to adequately survey the tea garden areas due to local political tensions. The ongoing outreach activities are serving as icebreakers, helping us build relationships and foster dialogue in these challenging areas.

4. Describe the involvement of local communities and how they have benefited from the project.

We have collaborated with multiple individuals from local communities throughout this project. Our field associate, Mr. Benoy Thapa, hails from a small tea garden village, and this project has provided him with a platform to travel across various regions of the landscape. He has now become a key point of contact for reporting instances of human-mammal interactions in villages.

We also provided a platform for Mr. Manzil Darnal, who gained valuable field skills in interview surveys, camera trapping, and data management. Motivated by his experience with the project, he has now applied for fellowships focused on sustainable development.

Additionally, we offered opportunities to recent Master's graduates from Darjeeling and Kalimpong, Ms. Alisha Rai and Mr. Rishav Rai. Through their involvement, they gained essential skills and have since embarked on PhD projects. They have also joined fellowships in regenerative agriculture, aiming to address issues such as crop damage caused by changing weather patterns and human-wildlife conflicts.

I also guided a Master's student from northern West Bengal, providing them with exposure to data collection techniques for human-wildlife interaction studies.

Our team and network of collaborators continue to grow, with increasing engagement from local homestay owners and other community members in various capacities.

5. Are there any plans to continue this work?

Yes, I have raised two more research and conservation grants from International Bear Association and The Habitat Trust after Rufford grant and the project is continuing in Darjeeling. We are currently scaling up the outreach activities, conducting another season of camera trapping and aiming to complete 300 interviews in the region.

6. How do you plan to share the results of your work with others?

I have submitted the report of findings to the West Bengal Forest Department. I am currently preparing popular media articles to communicate our work to a broader audience. I attended the Indian Conservation Conference to present our findings and am scheduled to present them at SCCS, Bengaluru. Additionally, I am working on a research paper focused on the human-mammal interactions recorded during the project.

7. Looking ahead, what do you feel are the important next steps?

- Finish the research articles based on the project and ensure that the findings are effectively communicated to managers.
- Continue engaging with local communities to pilot interventions that are suitable for the landscape.
- After gaining an understanding of mammal occurrence in the landscape, the next step will be to study the ecological cascades occurring in shared spaces, such as the activity patterns of mammals and interspecific interactions.
- Design targeted mitigation strategies to address negative human-wildlife interactions, such as adaptive agriculture practices, compensation schemes, and crop insurance.

- During fieldwork, we identified open waste disposal sites near prime wildlife habitats. It is imperative to collaborate with local NGOs, the Forest Department, and local communities to promote better waste management practices.
- Understand the perspectives of local people in surrounding areas regarding these sites and identify the steps they believe should be taken.
- Monitor mammal activity at these sites and assess the potential physiological repercussions on the species involved.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

- Rufford Foundation logo was used extensively during the outreach workshops on our posters (Figure 6), on comic strips and playing cards used during the activities: Wild connection board game and Comic story project.
- Rufford Foundation was acknowledged in the project report submitted to the Forest department.
- I used Rufford logo in a recent a public talk hosted by the CWS in Bengaluru.
- Rufford foundation has been acknowledged, and the logo has been used in CWS annual report.
- In any further scientific publication, Rufford foundation will be acknowledged for the crucial support
- Rufford foundation logo was used in a poster I presented at the Indian conservation conference.

What Traits Gotta Do With It: Unravelling the Multifaceted Relationships Between Rural Communities and Wildlife in Darjeeling Hills, Eastern Himalayas, India

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Introduction

- Intact patches of forest are rare due to expanding human activities such as urbanization, agriculture, linear infrastructure in natural areas,¹ and many species have adapted to live close to people in the human altered landscapes.²
- Certainly, there is a pattern to the kind of species which adapt to these shared spaces and how people perceive them.³

Objectives

1. Understand what factors impact frequency of sightings of various species of mammals
2. Assess the socio-ecological drivers of people's perception of mammals
3. Understand whether perception leads to response

Methods

Data collection

- 200 interviews were conducted in 88 villages across an area of 500 sq. km
- The interviews were focused on the following:
 - Experience
 - Socio-demographic factors
 - Benefits and damages
 - Values, and Sociocultural influences

Quantitative analysis.

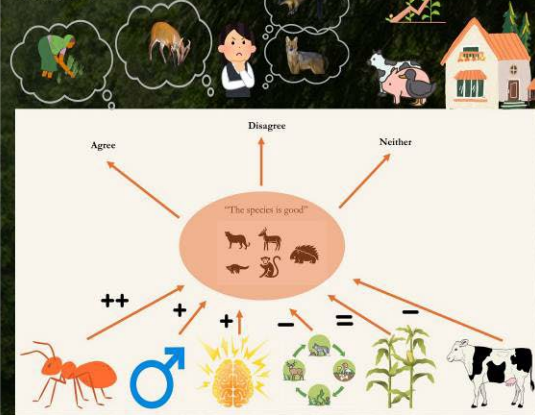
- Generalized linear regression models to look at associations between socio-ecological factors and sighting frequency of various mammals
- Ordinal regression models to look at association between socio-ecological factors and perception about the mammals that occur in multi-use landscapes

Descriptive analysis

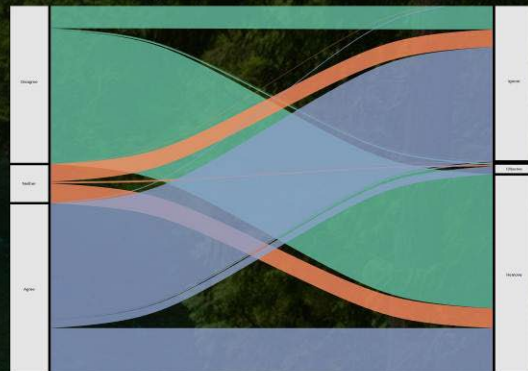
- Use of alluvial plots to understand how perception about various species relates to the response to towards them

Quantitative Results

Perception

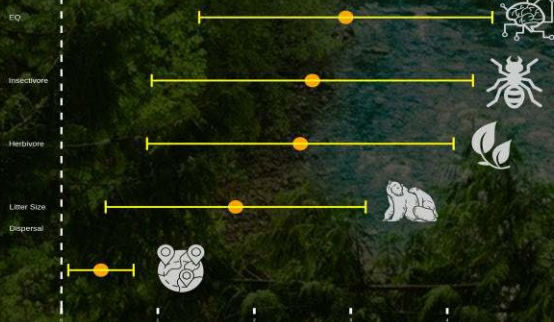


Perception versus Response



Quantitative Results

Sighting Frequency



Conclusion

- Higher odds of frequent sightings for Herbivores (OR = 93.6), Insectivores (OR = 158.4) and Species with high EQ (suggests behavioral flexibility), greater dispersal ability & larger litter size
- Positive perceptions linked to Insectivorous diets (e.g., pest control benefits) and Higher Encephalization Quotient (EQ) — associated with intelligence. Males showed more positive views
- Negative perceptions linked to Broad habitat/diet niches (conflict-prone in human dominated landscapes), Direct experiences of crop/livestock loss, especially crop damage
- These findings highlight the need for management of these shared landscapes based on sociological and ecological characters pertaining to the species

References and Funding

1. DeFries, R. S., Ruel, T., Uriarte, M. & Hansen, M. Deforestation driven by urban population growth and agricultural trade in the twenty-first century. *Nat. Geosci.* 3, 178–181 (2010).
2. Bateman, P. W. & Fleming, P. A. Big city life: carnivores in urban environments. *J. Zool.* 287, 1–23 (2012).
3. Khatrak, R. H. et al. Understanding the Dynamics of Human–Wildlife Conflicts in North-Western Pakistan: Implications for Sustainable Conservation. *Sustainability* 13, 10793 (2021).



Contact and links

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 Facebook: <https://www.facebook.com/ray.shreya1/>
 Twitter: <https://x.com/ShreyaRay152t=VRKj94qXfp5rCDnfhYhbQQ&es=09>



9. Provide a full list of all the members of your team and their role in the project.

- Mr. Benoy Thapa - Field Associate (~1.5 years): Assisted with interview surveys, camera trapping, and outreach activities. He has been instrumental in establishing a network of collaborators in the landscape.
- Mr. Tashi Tamang - Field Associate (~2 months): Assisted with interview surveys.
- Mr. Tenzing Bhutia - Field Associate (~2 months): Assisted with interview surveys.
- Mr. Manzil Darnal - Field Associate (~1 year): Assisted with interview surveys and data management.
- Mr. Rishav Rai - Intern (~6 months): Assisted with camera trapping, interview surveys, outreach activities, and data management.
- Ms. Alisha Rai - Research Assistant (~1 month): Was part of the project for a month, assisting with interview surveys.
- Ms. Arundhati Powdel - Dissertation Intern (~1 month): Worked on her dissertation project using a portion of the data collected.
- Mr. Prabhjeet Singh - Intern (~2 months): Assisted with data management.
- Ms. Aditi Gurung - Intern (~2 months): Assisted with GIS-related tasks.
- Dr. Vikram Aditya - Supervisor: Reviewed the project proposal and provided crucial feedback on field methods, permissions, and management.
- Dr. Aritra Khsettry - Advisor: Reviewed the project proposal, helped arrange logistics, and lent his camera traps for use in the project.
- Dr. Krithi Karanth - Co-Supervisor: Reviewed the project proposal and advised on field methods and timelines.
- Dr. Ajith Kumar - Advisor: Reviewed the project proposal and funding and advised on field methods.
- Dr. Amy Dickman - Advisor: Advised on field methods.

10. Any other comments?

It has been an exceptional journey to lead this project, which is very close to my heart. I am grateful to all our field colleagues and collaborators for working through challenging terrain and weather, not only collecting data on these lesser-known mammals but also conducting meaningful engagement activities. We are thankful to the Forest Department for their support in providing permissions and helping us navigate the forests to place camera traps. It was fulfilling to see school students

learn about these mammals through games and comics, engaging in debates and writing poems about them. This gave us the motivation to continue working toward conserving these mammals and their fragile habitats. None of this would have been possible without the timely support of the Rufford Foundation, for which I am deeply grateful. I would also like to thank Ms Jane Raymond, who has been in close communication with me over the past year and has helped with administrative requirements and the timely submission of reports.



Figure 6: Project banner with mammal atlas used for workshops and events

ANNEX - Financial Report
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