Mid-term Project Report

Project: - Gastrointestinal and Malarial Parasite Prevalence, Diversity and Distribution in Primate Communities in the Lowland Rainforest Fragments of the UBV, Assam, India

Rufford Small Grant awardee- Karshita Bharati (year 2025)

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Work Status

Fieldwork commenced in Dehing Patkai National Park, Tinsukia, after receiving the permit to conduct fieldwork from the Forest Department of Assam in November–December 2024. Before starting, I also conducted preliminary lab work to prepare the necessary preservative solvents. This was done in collaboration with the Department of Environmental Biology and Wildlife Sciences, Cotton University, Assam. A team consisting of myself, a field assistant, one or two local resource persons, and a forest guide worked on existing forest paths and elephant trails to detect our focal primate groups by employing the line transect method. We also collected faecal samples from observed primate groups opportunistically. Strict sanitation protocols were followed, and samples were transported in dry ice boxes to the lab at Cotton University for analysis. This fieldwork and sample collection provided valuable data for understanding primate health and their parasitic load in the region.

Other activities, such as conducting an interview survey (twenty-two households, ongoing) and setting up a small monitoring group from local communities to periodically track and monitor primates' health, were also carried out during this period. Our fieldwork in Dehing Patkai National Park is currently ongoing as we yet to locate stump tailed macaque and pig tailed macaques in the national park.

During January to May 2025, fieldwork was conducted in Bherjan and Borajan Reserved Forests along with a field assistant, one or two local resource persons, or a forest guide. We also surveyed the areas surrounding both the reserved forests for possible sightings of pig-tailed macaques 2–3 times, covering distances of up to 2.7 km. During this period, I also visited the Parasitology Department and the Microbiology Department at the Veterinary College of Assam to secure collaboration for conducting the necessary laboratory analysis of the faecal samples of alloprimates for identifying associated parasites.

When a primate group was encountered, the species was identified, the group size was recorded, and the individuals were classified into different age–sex categories. The team attempted to follow the group to collect faecal samples opportunistically, immediately after defecation. Faecal samples were collected in sterile, leak-proof containers with attached spoon lids: approximately 2 g of the sample in 20 ml of 10% formalin solution for macroparasites and approximately 1 g of the sample in 4 ml of NAP buffer solution for microparasites. The containers were labelled with location, time, date, species identity, and individual identity (age and sex, only if confirmed).

Field data were recorded on various ecological and behavioural parameters, including the name of the trees where the animal was first sighted, the time the primate was first located, and when the faecal sample was collected. Additional information, such as the species' activity at the time of sighting, the

level of disturbance in the habitat, degree of canopy cover, relative humidity, ambient temperature, and GPS location, was also documented.

In the Barekuri villages, near the Bherjan Reserved Forest, we observed three groups of Hoolock gibbons coexisting with the local human communities. Although these groups do not inhabit the selected forest fragments, we decided to incorporate them into our study, as they are surviving within a forest–agriculture–human settlement habitat matrix. The analysis of faecal samples collected from these groups could provide a valuable comparison to groups that primarily forage within fragmented forest patches.

During this period, we conducted household interviews with a total of thirty (30) households to document their accounts of the presence, abundance, current distributions, and historical presence of various primate taxa in the fragments, as well as the nature and extent of their interactions with these primates, both in the present and the past. We have also set up a small monitoring group comprising one individual from the local communities in both Bherjan and Borajan. This group will periodically monitor the status of the focal primate species in our study's rainforest fragments. We also conducted a brief, informal discussion with children from a local government school near Bherjan Reserved Forest to raise awareness about environmental conservation and biodiversity, particularly primates and the importance of preserving nature. During the session, we introduced the children to some of the field equipment used in our research to encourage and inspire these budding young minds.

Fieldwork in the remaining site, Hollongapar Gibbon Sanctuary, has been started from October 2025, and laboratory analysis of the collected samples so far has also been initiated in the respective departments of the Veterinary College of Assam.

Status of Objectives

The multispecies project aimed to build a comprehensive understanding of the macro- and microparasite communities inhabiting the primate population in select rainforest fragments of UBV, Assam and analyse the multiple factors impacting primate–parasite ecologies in these populations. In this context, the status of the objectives and related remarks are given in the following table:

Sl no.	Objective	Status	Remarks
1	Mapping of five diurnal nonhuman primate species populations in four lowland rainforest fragments of the Upper Brahmaputra Valley (UBV)	Ongoing	Mapping of the selected primate species populations has been completed in Bherjan and Borajan Reserved Forests. Fieldwork is ongoing in Dehing Patkai National Park and Hollongapar Gibbon Sanctuary, Jorhat.
2	Identification and distribution of gastrointestinal micro- and macroparasites and malarial parasites in groups of five alloprimate species, and	Ongoing	Faecal samples from encountered primate groups have been collected in three of the field sites and additionally from Barekuri villages.

	in incidental human groups, if any, in the four select fragments		Laboratory analysis of the collected samples is in progress.
3	Evaluation of the influence of species identity, primate group size, host age and sex, and fragment characteristics on the prevalence and diversity of the study parasites in select primate communities across the different chosen fragments	Ongoing	Field data on multiple factors have been observed and recorded. The impact of these factors on the prevalence and diversity of the study parasites in the selected primate communities will be evaluated once the fieldwork and laboratory analyses are completed.

Status of Activities

Although different activities were planned with specific timelines, adherence to the original schedule has been challenging due to multiple field interruptions, logistical difficulties, and delay in the release of project funds (project start date: November 2024; funds received in January 2025). The current status of the activities and their revised timelines are as follows:

Task Description	Initial Timeline	Status	Probable Final Timeline	Output	Remarks
Characterising Rainforest Fragments and Documenting Primate Demography Engagement with Forest Officials and Resource Persons	November to December 2024	Ongoing	October 2025	Documenting the presence and demographic composition of the five diurnal primate species in four lowland rainforest fragments of the UBV	Rainforest fragment characterisation and primate demography documentation have been completed at two sites, are ongoing in Dehing Patkai National Park and Hollongapar Gibbon Sanctuary Information have been collected from forest officials and resource persons Laboratory collaborations have been secured
Biological sample (Faecal) collection Laboratory analysis of the collected faecal samples	January 2025 to July 2025	Ongoing	November 2025	Understand the diversity of gastrointestinal and malarial parasites in selected primate species across the four study	Samples have been collected in three field sites, also from three groups of hoolock gibbon in Barekuri villages, and sampling has started in Hollongapar Gibbon Sanctuary

				rainforest fragments	Laboratory analysis of the collected samples so far as been initiated
Field data collection on various biological, environmental and climatic factors and different habitat- and fragment characteristics	January 2025 to July 2025	Ongoing	November 2025	Evaluation of the influence of multiple factors, including host traits and fragment characteristics on the prevalence and diversity of parasites in select primate communities	Field data have been collected at two sites, ongoing in Dehing Patkai National Park, and Hollongapar Gibbon Sanctuary
Informal, semi-structured interviews with the locals to understand their traditional knowledge, and their attitudes and perspectives of the alloprimate communities Establishment of Small monitoring groups Short, informal discussion/ equipment training with children from local communities	January to July 2025	Ongoing	December 2025	Community engagement, insights and establishment of small primate monitoring groups for conservation of the nonhuman primate populations in the fragments	A total of fifty-two household interview conducted so far, and scheduled to begin in Hollongapar Gibbon Sanctuary Two monitoring groups consisting of two local community members each have been set up for Dehing Patkai NP, Bherjan and Borajan RF. Had an Informal session with local school children near Bherjan RF to raise awareness on conservation, primates, and nature; introduced field equipment to inspire interest
Data analysis, dissemination of key findings and strategising	August to October 2025	Ongoing	January-March 2026	Key findings of the project so far presented in two	Field data analysis has not been started. Strategising future course of action will be done after

future course of action				international conferences	completion of field data and laboratory analysis. Oral presentation in 30th Congress of IPS, Madagascar Poster Presentation in Behaviour-2025, Kolkata, India (25-30th August)

Challenges Faced

First Major Challenge: A complete count of group composition was only achieved for the sighted Hoolock Gibbon Groups.

For the other observed primate species, it was extremely difficult to achieve an accurate count due to the following reasons:

- The large group sizes of rhesus macaques and Assamese macaques, along with the limited manpower in the investigating team

Specifically, in Dehing Patkai National Park-

- The extreme shyness of the observed Groups caused them to retreat deeper into the forest, making it difficult to follow them due to the uneven terrain, thick canopy, and undergrowth of the rainforest.
- More importantly, the rampant presence of wild elephants, which is more severe especially due to the winter season, made it challenging for us to follow the primate groups deep inside the forest.

Second Major Challenge:

Field data collection on certain parameters such as range use by calculating the *defensibility index* (Mitani & Rodman 1979; Nunn & Dokey 2006), will require substantial time dedicated to each troop at each field site. Therefore, only one forest fragment that is Hollongpar Gibbon Sanctuary has been selected based on information collected during a preliminary survey regarding the number of primates present and the level of fragmentation and anthropogenic disturbance. This approach aims to build a foundational yet comprehensive understanding of parasite dynamics at selects sites, upon which subsequent or future studies can be built.

Instead of appointing a single field collaborator for the entire project, we prioritised engaging several collaborators from the local communities at each field site. This approach aimed to ensure local

involvement, empower the communities, and obtain the most reliable information. However, a significant amount of time has been lost due to securing logistics at each field site and the slight delay in the release of project funds (project start date: November 2024; funds received in January 2025). In this regard, we believe that the project would benefit from a no-cost extension until March 2026. This will provide the required time to assemble, organise, and analyse all the obtained field and laboratory data to determine key patterns of parasite presence, distribution, and diversity, and the impacts of multiple factors on the parasite ecology of the study primates.

Importantly, the extension will also allow us to collect samples over two different seasons in the Hollongapar Gibbon Sanctuary. Furthermore, it will enable us to plan the future course of the project that will involve both within- and across-population primate behavioural field data collection. This will lay the foundation for the next phase of the study, during which we aim to employ network modelling to evaluate intra- and interspecies modes of parasite transmission, which is crucial for understanding the parasite dynamics of our study primate populations.

Way Forward

The objectives of the work remain unchanged, and the project will be carried out as planned. In the coming months, fieldwork will be completed in Dehing Patkai National Park and Hollongapar Gibbon Sanctuary, while laboratory analysis of the collected samples will be

conducted simultaneously. A no-cost extension until March 2026 (initial deadline: January 2026; funds received in January 2025) will be beneficial to enable sample collection across two different seasons in Hollongapar Gibbon Sanctuary, as well as to assemble and analyse all collected field and laboratory data. This extension will also allow adequate time for strategising the subsequent phase of the project, thereby preventing any significant delay in its continuity.

Stills From the Field

Measuring Canopy Cover in Dehing Patkai National Park

Wild Elephant on Forest trail, Dehing Patkai National Park

Assamese Macaque, Bherjan Reserved Forest

Collecting faecal samples of observed primate troops

Conducting Interviews with the Locals

Devajit Moran, Wildlife Activist

Sanatan Majhi, Local Guide

Monitoring group set up for Dehing Patkai National Park

Ashim Gohain,
Field Assistant

Deepjyoti Neog,
Local Guide

Monitoring group set up for Bherjan and Borjan Reserved Forests

Engaging with young minds