

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Ashni Kumar Dhawale
<b>Project Title</b>	Ecological and Behavioural Adaptations of the Endangered Lion- Tailed Macaque to a Rainforest- Anthropogenic Habitat Matrix in India: Implications for Management
<b>Application ID</b>	29262-2
<b>Grant Amount</b>	£5,999
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<b>Date of this Report</b>	11/09/21

**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
Group follows of each lion-tailed macaque troop, to establish its size and age/sex composition; each troop will be subsequently visited at intervals of six months to re-establish its various demographic parameters.				All five troops present in the unique semi-commensal population of lion-tailed macaques in the field site were successfully followed and their troop sizes and age/sex compositions noted at regular intervals. Using these data, we calculated population growth rate, birth rate and mortality rates.
Non-invasive following and behavioural observations of specific habituated troops of lion-tailed macaques, in order to record their ranging, foraging and social behaviours as well as their interactions with human communities.				We followed three of the five troops on which detailed behavioural observations were conducted. These troops varied in size and composition. We then investigated the effects of human modified habitats and physical presence of humans on behaviours such as foraging and social interactions. We further examined differences across troops with varied exposure to humans.
Simultaneous monitoring of the ranging behaviour of all resident lion-tailed macaque troops and their interactions with one another, using GPS mapping and non-invasive observations.				We mapped the movement of all five troops present in the field site as they traversed across the landscape matrix of rainforest fragments interspersed with human habitations, roads, swamps and tea plantations. We calculated home ranges and investigated the degree to which this wild population was dependent on human-use resources.
Collection of faecal samples to identify potential methods for studying generic relatedness across troops within the field site as well as in the larger landscape.				We collected faecal samples from troops within the field site, covering individuals of all age/sex categories. The lion-tailed macaque is a relatively understudied species in terms of genetic studies, and we attempted to identify appropriate methods for the same in the field.
Interactions with the local human communities and				We conducted regular formal and informal meetings with the local

<p>dissemination of the results of our study to all stakeholders, including the state Forest Department and the concerned tea estate management groups, through workshops</p>				<p>communities, Forest Department staff and estate management to update them about our findings throughout the study. We held a training workshop with the field staff to initiate a long-term population monitoring programme once the present study was concluded. This programme will work in consultation with the primary investigator to regularly update the data and incorporate these findings in their on-ground conservation and management of the species.</p>
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**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.**

The primary difficulties that arose during the project were due to the global pandemic, during which all protected areas were strictly closed for entry. In these months, we were unable to track the study troops, conduct behavioural observations or collect faecal samples. We, however, continued our troop counts on each troop when they occasionally exited the protected area entirely. Due to these changes in our schedule, we were unable to simultaneously observe multiple troops.

To overcome this change in the study design, we made minor alterations to our planned analyses - fortunately these did not affect the outcome of our project. The other major difficulty we faced during the project was the collection and storage of faecal samples. The genetic analysis of this lion-tailed macaque population could potentially inform us about their ability to persist in a human-dominated landscape and allow us to initiate conservation practises to aid in their survival. Unfortunately, given the terrain and the thick evergreen rainforest habitat, the collection of samples required a greater amount of time and effort than was initially planned.

Additionally, given the high humidity, our initial storage methods proved unsuccessful. Through a process of trial and error, we identified better methods of storage and transport of samples to the laboratory.

**3. Briefly describe the three most important outcomes of your project.**

**3.1 Updated records of the lion-tailed macaque population of Valparai**

The lion-tailed macaque population of Valparai has been studied by multiple researchers over a period of nearly three decades (beginning in the 1980s). This particular population is especially unique, as it is the first to exit its rainforest habitat to explore nearby human habitation and utilise human-use resources as part of its diet. As part of understanding the long-term survival ability of the species in this landscape, it is crucial to regularly re-examine the status of the population by recording troop sizes and estimating growth and birth rates. The present study has provided these data for 2015-2020, linking in with the previous studies on the same population. Our study found that the growth rate estimated in the 2000s was

marginally higher (8%) than the growth rate estimated by the present study (7.8%). This finding supports the hypothesis that populations isolated in rainforest fragments tend to show a gradual increase followed by a devastating decline. Our finding thus brings attention to the urgent conservation requirements of this population which constitutes 5% of the total species population.

### **3.2 First instance of troop migration out of the rainforest, and 'twinning' in a semi commensal population of lion-tailed macaque**

During the course of our study, we recorded multiple rare events as the lion-tailed macaques increasingly explored and utilised human habitations. Some of these include the first record of an entire troop of lion-tailed macaques exiting the rainforest fragment, traversing roads, habitation and swamps over 2 km to discover and ultimately inhabit a small residential colony. The troop initially visited the colony a few days at a time, returning to the fragment but eventually this troop's core home range was recorded entirely within the colony. This finding has multiple implications for the conservation of the species: firstly, troops as a whole are able to traverse over habitat types that were previously thought of as impenetrable - thinking conservation strategies to incorporate preferable habitats could allow for increased connectivity between forest fragments, thus, improving the survival ability of this population and the larger landscape population as well; secondly, this finding shows the degree to which the species has become dependent on human resources, preferring a residential colony to their natural habitat- dependency on human resources has been shown to cause multiple issues including the declining health of the wildlife, conflict with people, etc. A second rare finding recorded during the study period was the occurrence of twins in the Puthuthottam population. While twins may be common in some species of primates, they are rare in the Order Macaca and extremely rare for this species - an 80-year record from captive populations in North America has recorded one instance of twins for the species.

During our study, we recorded the occurrence of three sets of surviving twins within a single year. Twinning is known to be associated with provisioning, where easy to access food allows for additional parental care, suggesting that this population has incorporated provisioned food as a major part of their diet.

### **3.3 Interactions with local communities and Forest Department Staff**

The Puthuthottam population of lion-tailed macaques have been increasingly utilising human habitations: visiting houses, raiding homes for food, attempting to remove tiles from houses to gain access and, in one case, spending their entire time within habitation. This has caused an immense amount of tension between the macaques and the local residents. The residents are often faced with damage to their house structures, loss of food items from their home and various other damage.

Occasionally, younger children or older women are chased by the macaques; consequently, the macaques are chased and deterred using sticks and stones. These interactions have resulted in inconveniences to both macaques and people, whose tolerance is waning by the day. As part of the project, we interacted with local communities to understand the issues they faced. These conversations were extremely helpful in determining specific issues that could be tackled through conservation interventions. We further related their grievances to the Forest

Department staff who have now posted a permanent staff member near highly affected locations to deter the macaques in a safe and effective way. We also conducted 'field sessions' with the local school, to allow the children to understand the species from an ecological and behavioural standpoint. We hope that these sessions will lead to a more tolerant generation.

As previously mentioned, basic long-term monitoring of the lion-tailed macaque population is crucial to understand population dynamics and processes. To maintain these records after the study was concluded, we conducted multiple training workshops with the Forest Department, attended by rangers, foresters, watchers, and the district field officers, to initiate a department-run long-term monitoring programme specifically for the lion-tailed macaque. During these sessions, we trained the staff on how to conduct field surveys, troop counts and identify troops and individuals. We provided details about the methodology so that they may replicate the same methods that were using for our study. The data collected by the staff will be maintained and analysed by the primary investigator.

**4. Briefly describe the involvement of local communities and how they have benefited from the project.**

We interacted with the local community on a daily basis, especially when the macaques were within proximity of human habitation. Since the project has been in place for 5 years, most of the residents were already aware of the work being conducted and we were frequently approached about question regarding the species and other wildlife. Our interactions with the local communities were also expressed to the forest department staff, creating a direct mode of redressal.

**5. Are there any plans to continue this work?**

Some of the work will be continued through the long-term monitoring programme set up as a direct outcome of the project. Further, we are in search of young researchers to take up other aspects of the project and eventually expand the team.

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

The results of the work will be shared with the:

- a) Local communities through interaction meetings and field sessions.
- b) Forest Department staff through a formal session at their training centre additionally, a technical report will be submitted to the field director.
- c) The plantation management through a formal meeting at their head offices and a technical report will be submitted to the same.

**7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?**

The grant was used from April 2020-August 2021 (initially planned for 12 months), with

a 4 month no-cost extension. The primary reason for this delay was the halting of project activities due to the global pandemic.

**8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.**

Item	Budgeted Amount	Actual Amount	Difference	Comments
Fuel charges for field vehicle, INR 9000/month * 10 months	1034	150	-884	This initial budget was planned with a 4-wheeler vehicle in mind, however, both the hired field assistants had personal motorcycles which were easier to use in the field site. Further, due to the pandemic, use of vehicles was banned, causing us to walk a distance of 6-10km each day to arrive at the field site, leading to underspending in the fuel budget. The remaining amount was used for field assistant salaries during the four additional months during which a no cost extension was requested.
Field Expenses	550	550		
Field Assistant Wages	2298	3370	+1072	The remaining fuel budget (+884) and unused contingency amount (+188) was utilised for the additional months of field assistant wages to complete some of the remaining fieldwork which was delayed due to the pandemic. This additional amount allowed us to successfully complete the objectives, which would have otherwise been left incomplete.
Field Station Charges	689	689		
Laboratory analyses of faecal samples	276	276		
Local Travel Expenses	170	170		
Housing charges in	200	200		

Bangalore				
Administration and management overheads	400	400		
Consumables	47	47		
Communication	115	115		
Contingency	220	32	-188	The difference amount was used for the final additional month of field assistant wages.
<b>TOTAL</b>	<b>5999</b>	<b>5999</b>		

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

The most crucial step would be to convince local stakeholders of the importance of the study population and the immediate conservation action they require. Given that this species is, for the first time in evolutionary history, utilising human resources, the effects of these changes are highly unpredictable. Most theory tells us that isolated populations are extremely vulnerable to stochastic events. While monitoring the population closely will allow us to foresee certain changes, proactive conservation strategies are a must. Thus, the long-term monitoring programme would continually interact with the communities, address specific issues through appropriate intervention, and ensure the survival of the species. A positive outcome has been the involvement of the Forest Department in the project. With their support, the project can affect real change in the years to come.

**10. 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?**

The Rufford logo was used in all workshops and conference presentations made by the primary investigator. The logo was used in the presentation made at the International Primatological Society Conference in Nairobi, Kenya. The logo was also used during all Forest Department Presentations and at the National Institute of Advanced Studies, India.

**11. Please provide a full list of all the members of your team and briefly what was their role in the project.**

**Ashni Dhawale, Primary Investigator:** The PI on the project formulated the objectives, created the study design, conducted all field work, data entry, analysis and writeups.

**Anindya Sinha, Project Advisor:** The project advisor reviewed the questions, data and analysis throughout the project.

**Subramani, Field Assistant #1 & Venkatesh, Field Assistant #2:** The field assistants accompanied the PI at all times during the field work. While one would accompany, the other assistant would track nearby troops and collect GPS data. Often, the field

assistants and PI would communicate over phone to relay information regarding troop locations or the locations of other wildlife, like elephants, which were to be avoided.

## **12. Any other comments?**

We are extremely grateful to The Rufford Foundation for supporting our project over the period of 2 years through an initial and continuation grant. The Rufford Grant has been the primary source of funding for the project which has also allowed for the employment of members of the tribal communities present in the field site.