Final Evaluation Report

Your Details	
Full Name	Caleb Daniel Gnanaolivu
Project Title	Will Invasive plants threaten the survival of the vulnerable Spiny-tailed lizard in India?
Application ID	22120-1
Grant Amount	£5000
Email Address	caleb992@gmail.com
Date of this Report	11-10-2018

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
A reconnaissance survey to determine suitable treatment types with replicates.				This was conducted from June - July 2017.
Spiny-tailed lizard population density estimation studies will be conducted across selected sites, in the summer and spring seasons.				This objective was successfully completed following belt transects in the four treatment types (grazing, *Prosopis julifora,* agriculture and non-grazing site).
Focal behavioural observations will be conducted to compute activity budget and movement range on multiple lizards in each selected site.				This was successfully completed targeting 20 focal individuals in each treatment type.
Vegetation diversity and density will be quantified following quadrant sampling protocols.				This objective was successfully completed in each treatment type.
Analyse faecal pellet and vegetation material to quantify nutritional content.				Vegetation samples were analysed for carbon and nitrogen content. We are currently in process of quantifying diet overlap in vegetation by cuticle analysis methods. This process is time consuming, and therefore is yet to be completed.
Analysis and report writing				A preliminary report drafted for the forest department is almost complete and communicated with the respective authorities.
Booklets about the life history of Spiny tailed lizard designed for local school children.				We are in process of designing a booklet which talks about the lizard's life history traits and also help in identifying different reptiles found in that landscape.

Engaging with the forest department for disturbance management.				This objective will be fulfilled soon after submitting the project report and engaging a dialogue with the forest department to plan future actions.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Originally the project was aimed to be carried out in multiple districts of Rajasthan and Gujarat. Due to failure to procure research permits in Gujarat, we were unable to selected study sites there. Additionally, we were successful in finding major treatment types in Jaisalmer districts, therefore we conducted the study in and around Desert National Park (Jaisalmer, Rajasthan) making logistic arrangements easier.

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

a) Spiny tailed lizards had highest densities (420 individuals/ha) in landscape with intense grazing pressure followed by non-grazing (28 individuals/ha) and medium infested *Prosopis juliflora* sites (23 individuals/ha). No spiny burrows were seen in agriculture and highly infested *Prosopis juliflora* sites. Additionally, spiny tailed lizards in the grazed sites spent more time active outside the burrow and showed bimodality (active twice during the day [morning and evening]) in activity patterns as opposed to the un-grazed site where they had a shorted activity period clubbed with a unimodal (active once during the day [morning or evening]) activity pattern.

b) In grazed and *Prosopis* sp. infested sites, the lizards were found to be occupying microspots with higher vegetation cover and higher vegetation diversity compared to what was available in the landscape. But in the un-grazed landscape the lizard occupied areas with lower vegetation diversity and lower vegetation cover compared to what was available. The burrows in grazed sites were more thermally stable as opposed to grazed and *Prosopis* sp. infested site. This suggests a preference by the species towards an optimal vegetation cover and diversity rather than the pursuit for abundance of all vegetation or the preference for a thermally stable habitat, hinting towards a dependence on grazing to maintain the right balance of vegetation cover and diversity that the spiny prefers to occupy.

c) We conclude that long term repercussions of *Prosopis* sp. infestation and agriculture are going to lead to zero occupancy of lizards in these areas. Grazing pressure can be tolerated by the lizard despite of low vegetation diversity and low vegetation cover. One possible reason to this is that a more grazed/ structurally short landscape promotes more social benefits like territoriality, mate selection and anti-predatory behaviour.

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

One field assistant (belonging to ethnic minority communities) was employed from the local village (Sam, Rajasthan, India) to assist at the data collection stage. He was trained and briefed on the standard methodologies and the reasoning behind the methods used.

As majority of the field sites were situated on locally owned grazing pastures and agriculture plots, the researchers had scheduled meetings and explained the project to the village spokesman/elders in order to get approval.

An outreach education programme was conducted for the local schools in the region to distribute a booklet and poster that briefs on the spiny tailed lizards importance in that landscape and provide key identification features to distinguish between venomous and non-venomous snakes in the region. This will help in busting local myths about the reptiles in the region and reduce killing from the fear of misinformation.

5. Are there any plans to continue this work?

Yes. We intend to continue working on spiny tailed lizards in the region. The primary study will provide a ground work for answering deeper question on the life history changes in spiny tailed lizard.

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

We plan to communicate our findings through peer reviewed scientific publications, reports to respective government/forest/management establishments and a booklet and poster for the local school children in the region.

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

The project was carried out for 16 months (July 2018- November 2019). The actual length of the project was 12 months, but analysis, production of reports and the outreach program needed a few more months to complete said tasks.

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
Travel costs	776	780	-4	The over head cost increased marginally due to increase in ticket prices.
Lodging	1300	1050	250	The lodging costs were lower than initially expected.
Food	900	790	110	Food prices reduced considerably due to cheaper meal arrangements.
Faecal pellet and plant analysis	0	150	-150	As we were unable to procure another grant, we utilized Rufford grant for this analysis.
Printing of posters, pamphlets, booklets and reports.	150	150	0	
Field assistant Salary	371	380	-9	As we needed to stay in field for few weeks longer than what was planned, the field assistant was paid his salary for those days as well.
Researcher Salary	1503	1700	-197	As the project needed 3 months more than what was initially planned, The researcher was paid his salary for those days.
Total	**5000**	**5000**	**0**	

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

We now understand that the Spiny tailed lizards are capable of tolerating anthropogenic grazing pressure on its landscape, but not the ecological repercussions of such an adaptation. We intend to explore more lines of behavioural, endocrinal, anti-predatory responses and physiological evidences to better understand these complex trade-offs at a population and species level.

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?

Yes. RF has been acknowledged in materials produced during this project like the forest department progress report, student talks, and Power Point presentations. The RF logo has been used on the cover pages of the technical report, in the outreach booklet and in the presentations. At an informal level, other student researchers have also been told about RF and the method of application.

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

Caleb Daniel Gnanaolivu (Indian Institute of Science, India): Project researcher

Karan Singh (Rajasthan, India): Field Assistant

Dr. Maria Thaker (Indian Institute of Science, India): Project advisor

12. Any other comments?

The ease with which student researchers can apply for this grant, and the fact that the Rufford Foundation is willing to support such pilot studies makes it a very encouraging experience. I think such opportunities are invaluable in motivating aspiring ecologists and conservationists, particularly from developing countries.