

The Rufford Foundation Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other 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. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Raj Kumar Koirala
Project title	Diet and macro-nutrient prioritization of migratory elephants in eastern Nepal.
RSG reference	20035-D
Reporting period	17 Jan 2017 to 17 Jan 2018
Amount of grant	£9990.
Your email address	Raj.koirala68@gmail.com
Date of this report	24 Jan 2018

1. Please 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
To identify and assess the spatial distribution and relative abundance of important food plants available to forest elephants along migration routes.				
To analyse the nutrient content in important food plant species preferred by wild migratory elephants.				
To measure the compositions of the diet of wild migratory elephants.				Our findings of diet composition results were based on indirect evidence of feeding sign survey rather than direct feeding observations.
To compare the diet composition pattern of wild migratory and resident elephants with higher resolution domestic and captive elephants.				The study using geometric modelling has helped to make a direct comparison between nutrient content and patterns of nutrient regulation in the diets of the migratory herd and the wild resident population. The research output is incorporated in the form of a short communication for publication in the journal with initial draft heading "Seasonal diet and macronutrient balance of plants and crops consumed by Wild Asian Elephant (<i>Elephas maximus</i>)".
To assess the human - elephant conflict.				

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

Quantification of food could not be done as anticipated at the initial development phase of the project proposal. Due to logistical and climatic constraints, we were not successful in doing direct feeding observations in the forest despite several efforts.

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

- Primarily, important food plants were identified and quantified. Alongside this, their distribution and availability were evaluated. This was of use to assess the status of food availability and utilisation of the wild elephants in their habitat.
- Secondly, the nutritional analysis of the most preferred plants and crops were conducted. This has helped to get a nutrient composition of the diet of the elephants which has allowed understanding the nutrient intake pattern of these elephants.
- Finally, this current project provides an important baseline for addressing further questions around the role of nutrition in human-elephant conflict. For example, having identified a diet with 13 to 14% protein as a target for elephant foraging, and lesser protein contribution from crops than the natural food opens exciting opportunities to develop predictive models for human-wildlife conflict to help formulate strategies for balancing the elephant's needs and human survival.

4. Briefly describe the involvement of local communities and how they have benefited from the project (if relevant).

During this project, a few locals were chosen as field assistants to collect the data. This has allowed them to become aware and educated about their forest plants and the importance of their conservation to minimise the human-elephant conflict.

5. Are there any plans to continue this work?

I am quite interested to carry on with my elephant work further. I am planning to initiate an elephant project proposal more rigorously and want to examine the seasonal dietary and nutrient intake pattern of wild elephants by using stable isotope technique and compare the known pattern of intake from the captive and domestic herd. I have chosen this technique because diet composition information from this technique is likely to be more reliable and is a proper authentication of the traditional methods (which give low resolution and also logistically very difficult) for the conservation of the habitat of these elephants.

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

This project is a part of the broader work that I have initiated for the last 5 years on nutritional ecology of Asian elephants covering captive, domestic, wild resident and wild migratory herd. The Rufford Foundation grant was the primary source of funding

to help me to initiate this project works for which I was granted PhD degree from New Zealand. These works have generated a baseline scientific data on diet and nutritional aspect of elephants in one hand and also helped to generate conservation awareness of elephants and their habitat among communities on the other.

I have already published two papers on food preference and movement patterns of these elephants. For this particular project, I have drafted a short communication to publish the comparative macronutrient composition of migratory elephants in eastern Nepal with the resident elephant herd of central Nepal. Besides, I have submitted my paper on human-elephant conflict and peoples' perception on elephant conservation in the heading "Patterns, perceptions and spatial distribution of human-elephant (*Elephas maximus*) conflict in Nepal" in the journal Ethology, ecology & evolution. I have made posters on elephants to give conservation awareness targeting school students and community forestry people and also small booklets incorporating few preferred food of elephants, to help locals to identify and help conserve these food plants. The findings of this project along with the previous projects will be widely disseminated among the undergraduates, graduates of forestry and wildlife students as well as faculties of the Institute of Forestry, Tribhuvan University, Nepal. A discussion is underway with the department of forest and wildlife authorities for the possibility of the implementation of significant findings of the projects.

The front cover of the booklet and the poster are attached along with this report.

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

The RSG was used between January 17 2017, and January 17 2018. The timescale was more or less accomplished as anticipated.

8. Budget: Please 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.

Item	Budgeted Amount £	Actual Amount £	Difference	Comments
DSA, Principal Investigator	1500	1500		
DSA, field research assistant	1350	1650	300	The cost was slightly more than budgeted as some extra field days were added to the estimated days initially to track elephants.
DSA, two local assistants	1440	1760	320	Same as above

Nutritional analysis lab cost	1500	1100	400	The cost was less than budgeted as the lesser number of plant samples were reported and analysed in the lab than the previous study.
Local Travel	1600	2000	400	The travel cost was more than budgeted.
Micro-histological analysis	500	500		
Plant identification, herbarium preparation	400	400		
Maps, Field gear and equipment	1500	850	700	Less than budgeted
Miscellaneous	200	200		
TOTAL	9990	9960		1 GBP= 128.75 NPR 31 st March 2017

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

To continue species and ecosystem conservation work in future.

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

I have acknowledged RF in my poster and a small booklet to aware school students and community forestry groups for the conservation of elephants and their food plants. I have acknowledged Rufford Foundation in my previously published and recently submitted papers and also in my PhD thesis.

11. Any other comments?

I have already submitted a research article titled "Diet composition and macronutrient prioritisation in a captive Asian elephant" in the journal *Mammalia* of my earlier project work. I will update any further progress in my elephant research and its conservation work in future to Rufford foundation including my forthcoming research publications.

PLANT FOOD OF ELEPHANTS



RAJ K. KOIRALA