# The Rufford Small Grants Foundation

## Final Report

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

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. 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. 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** | Uttam Babu Shrestha |
| **Project title** | Distribution Modeling and Conservation of Caterpillar Fungus (*Ophiocordyceps sinensis*) in the Nepal Himalayas |
| **RSG reference** | 12729-2 |
| **Reporting period** | 2013-2014 |
| **Amount of grant** | £6000 |
| **Your email address** | ubshrestha@yahoo.com |
| **Date of this report** | March 10, 2014 |

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

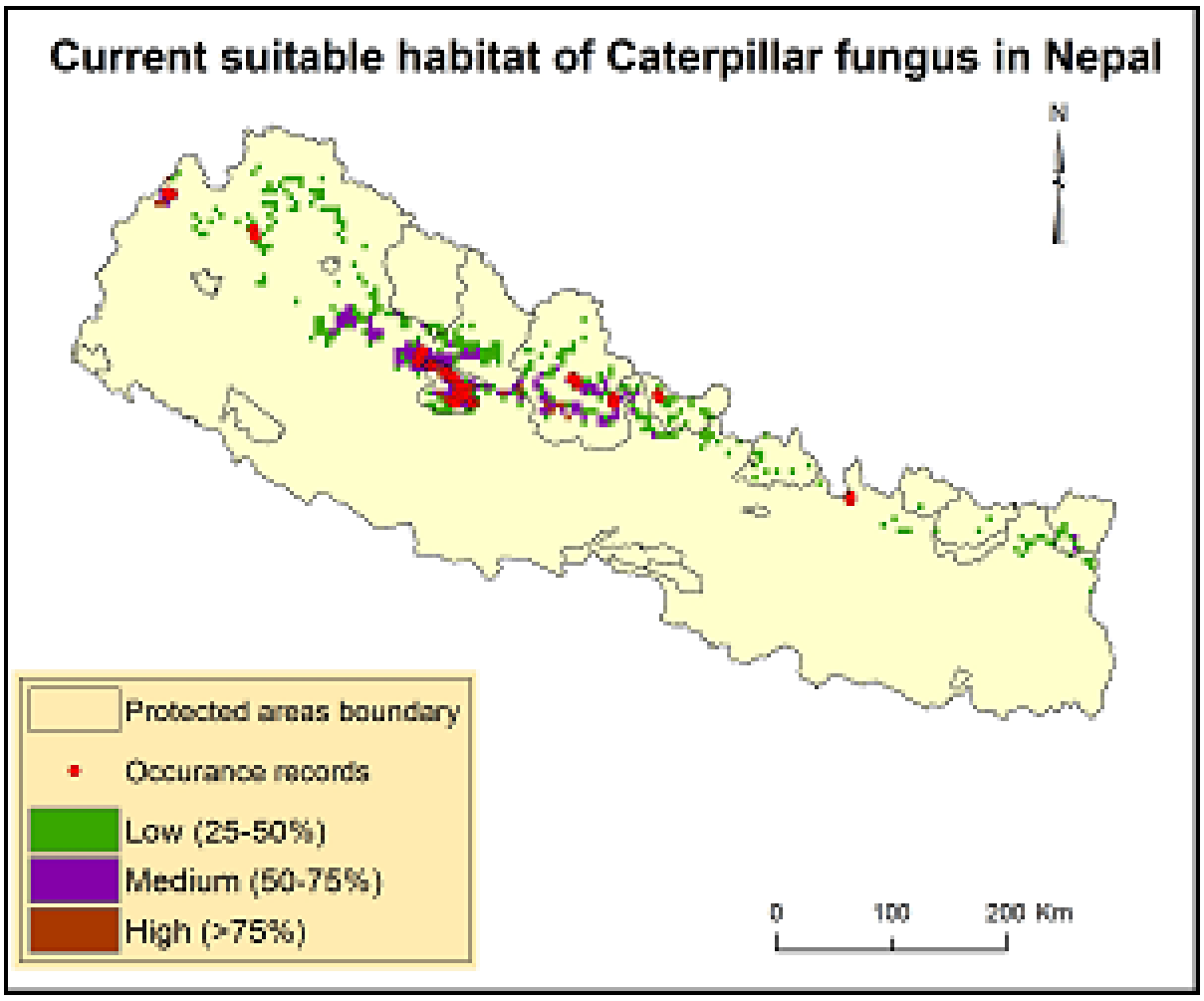
| Objective | Not achieved | Partially achieved | Fully achieved | Comments |
|---|---|---|---|---|
| A fine scale geographic and ecological distribution map of *Cordyceps* will be produced for Nepal at landscape level | | | Yes | Potential distribution map of *Cordyceps* in Nepal is now produced using data layers of 19 bioclimatic variables, land use land cover layer and altitude. |
| Gaps in coverage of this flagship species in current protected area system of Nepal will be determined. | | | Yes | |
| A clear linkage between different bioclimatic factors and the occurrence of species (*Cordyceps*) will be established. | | | Yes | Initially, I used 19 bioclimatic variables, land use land cover and altitude layers to mode the potential distribution. Only seven bioclimatic variables (mean temperature of coldest quarter, isothermality, temperature annual range, precipitation of driest month, precipitation seasonality, precipitation of warmest quarter, and precipitation of coldest quarter) were used for the final model. According to our final model, those seven bioclimatic variables influence distribution of *Cordyceps*. |
| This proposed research will provide the basis for further study about the impact of climate and land use changes on the distribution of *Cordyceps*. | | | Yes | I modelled the change in distribution (area and shifts in altitudinal range) of *Cordyceps* in three different future climate scenarios aka representative concentration pathways (RCP 2.6, RCP4.5, and RCP 6.0) predicted by IPCC (2013) in three different time periods (2030, 2050, 2070) |
| Policy recommendation paper, research and popular articles will create a public awareness for conservation of this valuable but depleting resource | | | Yes | I gave six public talks in Nepal and USA, participated in one workshop at Yale University and gave one interview in National Television of Nepal based on the results of this and previous projects funded by RSGF. One manuscript solely based on this research is under review. |

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

I have to cancel proposed visit to Dolpa because of the bad weather. I had some GPS points collected from Dolpa in 2011 and 2012. In addition, we visited Darchula, Manang and Mustang. Due to this addition, I have to include more research assistants in my team to work in the field. This decision, however, was beneficial as we had data from more districts than we planned for the project. I collected a total 753 GPS points from six districts by Garmin GPS and use to model and map the distribution of *Cordyceps*. We didn't find any specimens from Nepal in Royal Botanical Garden Kew, British Museum of Natural History, Royal Botanical Garden Edinburgh, The New York Botanical Garden.

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

- Produced a fine scale current potential distribution map of *Cordyceps* for Nepal at landscape level.
- Determined gaps in coverage of *Cordyceps* in current protected area system of Nepal.
- Predicted the change in distribution of the *Cordyceps* in future climate scenarios.



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

The nature of this project is scientific, and it aims to generate knowledge required for conservation and management of *Cordyceps* through this research. Therefore, there is minimal involvement of local communities for this project at the local level. I was able to produce a fine scale potential distribution map of *Cordyceps* for Nepal which is useful for sustainable management of this species. The knowledge produced by this project was disseminated among college students, scientists, academics, and public through public talk, general articles and research articles.

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

This project is continuation of a large research project. I was able to collaborate with NAST (National Academy of Science and Technology) Nepal for molecular study of *Cordyceps*. *Cordyceps* specimens collected from past and current field visits were stored at NAST. Through this research, we were able to generate significant amount of knowledge on *Cordyceps*, habitat, ecology, distribution, its contribution to household economy. We were able find gaps and assess local needs. Next step of this project is therefore will focus on increasing awareness among local people, conducting a national level workshop among stakeholders, lobbying to make evidenced based policy and strengthening local institutions.

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

I have been publishing scientific articles and popular articles as a product of this research. Our research findings were covered by several national and international media outlets. Besides, the results of this research have been shared through public talks. I was also interviewed in a TV talk show by Nepal Television in August 2013. The talk was particularly focused on my research on Cordyceps. That was also helpful to share knowledge among wider audience. Here is the You Tube link of the talk programme http://youtu.be/rvdNsIDVZsw

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

The RSGF grant was used to work in the field which lasts for 3 months. After collection of GPS points locations, most of the work was done in the University of Massachusetts Boston.

**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 |
|---|---|---|---|---|
| Research Assistants (Five) 25 days @20 per person | 1200 | 2500 | -1300 | Actual time for field took longer than the expected. I have to add three more research assistants (one volunteer) due to remoteness of the area. |
| Local helper | 1200 | 0 | +1200 | I had to add research assistants therefore to balance the cost we didn't hire local helpers. |

| | | | | |
|---|---|---|---|---|
| Principal Investigator 60 days @ 20 | 1200 | 1200 | 0 | |
| Bus, Taxi, Vehicle and Airfair to Bajhang, Darchula, Dolakha, Manang, Mustang, Gorkha | 1400 | 1300 | +100 | I didn't visit Dolpa due to the bad weather and added Darchula, Manang and Mustang instead. Due to increase the number of research assistants, the bus price has increased but airfare was decreased due to cancelled flight of Dolpa. We also hired private vehicle to travel to Dolakha. |
| Photography | 100 | 100 | 0 | |
| Topographic maps | 500 | 500 | 0 | |
| Supplies and Garmin GPS | 400 | 400 | 0 | |
| **TOTAL** | 6000 | **6000** | 0 | |

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

**Next important steps are:**

- Molecular analysis of the samples of caterpillar fungus (This work has already started).
- Collaboration with scientists of China, Bhutan and India to model the habitat of caterpillar fungus in larger scale (throughout Himalaya). I have developed networks with the scientists working in those countries.
- Contribute National caterpillar fungus policy. This work is also on progress.
- Disseminate information through academic and public writings. Three scientific papers are currently under review.

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

Yes, I used RSGF logo in all of my presentations with acknowledgement. I acknowledge RSGF in all published articles. Last page of my presentation.

**11. Any other comments?**

The support of RSGF is very helpful for this research. I really appreciate it.