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	Lekey Chaida
Project title	"Diversity of Spider's fauna in Different Habitats (Forest, Agriculture land and Houses) in Western Bhutan"
RSG reference	Dr. Dhan Bhadur Gurung, Dr. Ngawang Norbu and Mrs. Sangay Dema
Reporting period	Quarterly
Amount of grant	£5000
Your email address	lekicheda@yahoo.com
Date of this report	20/12/2016

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
I. Determine species diversity of spiders in three different habitats (Forest, Agriculture land and Houses).				
II. To find out the species richness and evenness of spiders.				
III. To develop a checklist of spiders in the western Bhutan.				

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

Being the first person to study the spiders and without experts (archonologist) in the country for authentication it was difficult for me to classify the species into different categories (families and species). Identification of the specimens was one of the most difficult and time consuming part of the project and however, due to my sheer interest and passion to learn about spiders made it comfortable. However, it was solved using the latest pictorial guides and scientific papers like A colour Key to the Common Spiders Found in Alfalfa and Cotton in New Mexico, A Photographic Field Guide to the Spiders of Dominica, West Indies, Spider taxonomy, USA Spider Identification Chart, The World Spider Catalog, Version 15 by Norman I. Platick, 2014, Spider Identification Guide by Gerald S. Wegner, Ph.D., BCE. Key to Identify Indian Spider Families, Hoe to identify (or misidentify) the hobo spider by Vetter and Antonelli, Checklist of Spiders (Arachnida: Araneae) of South Asia including the 2006 update of Indian Spider Checklist by Siliwal and Molur 2007 and other relevant papers and field guides. On top of that to further authenticate the specimens I had send the photographs to few arachonologist like Sanjay Molur in India and Professor Shaqiang Li of Institute of Zoology, at Chinese Academy of Science, in Beijing China.

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

There are many outcomes from this project to point out few important outcomes;

1. Different spider diversities where able to know in the study site in different habitats (forest, agricultural land and household). A total of 359 specimens were encountered during the study comprising 94 species belonging to 24 families. 15 new families were added to the present spider list of the country after (Molur *et al.*, 2007).

Forest had encountered highest species with (*n*=40) species, followed by agricultural land with (*n*=37) species and least was in household with only (*n*=26) species.

2. The species richness in the study area, Lycosidae family dominated with (*n*=102; 28.41%) where Agelenidae, Ctenizidae and Dysderidae were accounted minimum (*n*=1; 0.28%). *Pardosa* sp was recorded maximum (*n*=34; 9.47%) whereas 38 different species were recorded least (*n*=1; 0.28%).

3. With the completion of study a checklist of spiders found in the Western Bhutan was developed;

Sl. no	**Family**	**Species**
1	Agelenidae	*Agelenopsis* sp
2	Amaurobiidae	*Amaurobius* sp
		Amaurobius cf. *ferox*
		Callobius severus (Simon, 1884)
3	Antrodiaetidae	species
4	Anyphaenidae	*Hibana gracilis* (Hentz, 1847)
5	Araneidae (Simon, 1895)	*Araneus* sp
		Araneus mitificus (Simon, 1886)
		Araniella cf. *displicata*
		Araniella cf. *cucurbitina*
		Argiope cf. *keyserlingi*
		Argiope keserlingi
		Argiope sp
		Argiope anasuja (Thorell, 1887)
		Cercidia cf. *promonens*
		Cyclosa trilobata (Urquhart, 1885)
		Cyclosa sp
		Cyrtophora (Forskål, 1778) *citricola*
		Eriophora sp
		Neoscona sp
		Neoscona nautica (L. Koch, 1875)
		Neoscona crucifera (Lucas, 1839)
		Paraplectana sp
		species
6	Clubionidae	*Clubina* sp
		Clubiona sp
		Clubiona cf. sp
7	Ctenizidae (Thorell, 1887)	*Hebestatis* sp
8	Dysderidae	*Dysdera* cf. sp

9	Eutichuridae	*Cheiracanthium* sp
		Cheiracanthium mildei (L. Koch, 1839)
		Chiracanthium inclusum (Hentz, 1847)
10	Gnaphosidae	*Camilina longipes*
		Camilina sp
		Drassodes sp
		Drassodes cupreus (Blackwall, 1834)
		Drassodes lapidosus (Walckenaer, 1802)
		Gnaphosa sp
		Nodocion voluntarius (Chamberlin, 1919)
		Scotophaeus pretiosus (L. Koch, 1873)
		Zelotes sp
11	Lamponidae	*Lampona* cf. *cylindrata*
		Lampona cf. sp
12	Lycosidae (Sundevall, 1833)	*Hogna carolinensis* (Walckenaer, 1805)
		Hogna cf. *carolinensis*
		Pardosa sp
		Pardosa amentata (Clerck, 1757)
		Pardosa Prativaga (L. Koch, 1870)
		Pardosa lugubris (Walckenaer, 1802)
		Rabidosa rabida (Walckenaer, 1837)
		Schizocosa sp
		Tigrosa helluo
		Trebacosa sp
		Trochosa sp
13	Mimetidae	*Uro* cf. *aphana*
14	Nephilidae	*Nephila* sp
15	Oxyopidae (Thorell, 1870)	*Oxyopes salticus* (Hentz, 1845)
		Oxyopes variabilis (L. Koch 1878)
		Hamataliwa sp
16	Philodromidae	*Thanatus atratus* (Simon, 1875)
		Tibellus sp
		Tibellus tenellus (L. Koch, 1876)
		Tibellus oblongus (Walckenaer, 1802)
17	Pholcidae (L. Koch, 1851)	*Smeringopus pallidus* (Blackwall, 1895)
		Pholcus phalangioides (Fuesslin, 1775)
18	Pisauridae (Simon, 1890)	*Pisaurina mira* (Walckenaer, 1837)
		Pisaurina sp
19	Salticidae (Blackwell, 1841)	*Euryattus* sp
		Lyssomanes viridis (Walckenaer, 1837)

		Phidippus sp
		Plexippus paykulli (Audouin, 1826)
		Salticus sp
		Salticus cf. *scenicus*
		Simaetha sp
		Simaetha cf. sp
20	Sparassidae (Bertkau, 1872)	*Heteropoda venatoria* (Linnaeus, 1767)
		Neosparassus sp
		Olios sp
21	Tetragnathidae (Menge, 1866)	*Leucauge* sp
		Tetragnatha sp
		Tetragnatha extensa (Linnaeus, 1758)
22	Theridiidae (Sundevall, 1833)	*Achaearanea* cf. *tepidariorum*
		Parasteatoda sp
		Parasteatoda tepidariorum (L. Koch, 1841)
23	Thomisidae (Sundevall, 1833)	*Misumena vitia* (Clerck, 1757)
		Misumessus oblongus (Keyserling, 1880)
		Ozyptila sp
		Thomisus spectibilis
		Tmarus angulatus (Walchenaer, 1837)
		Xysticus ulmi
		Xysticus croceus (Fox, 1937)
		Xyticus funestus (Keyserling, 1880)
24	Uloboridae (Thorell, 1869)	*Uloborus* sp
		Zosis geniculatus (Thorell, 1890)
		Zosis cf. *geneculatus*

Different spider collecting methods during the field survey

1. Ground hand picking

2. Arial hand picking

3. Sweep netting

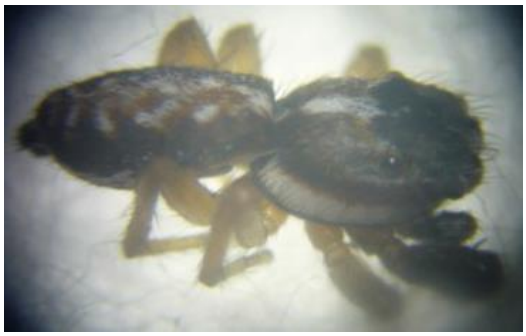
4. Vegetation beating

5. Cryptic searching

6. Pitfall trapping

	
1. *Agelenopis sp*	2. *Amaurobius sp*
	
3. Antrodiaetidae Species	4. *Hihana gracilis*
	
5. *Thomisus spectibilis*	6. *Clubiona sp*

	
7. *Hebestatis sp*	8. *Chiracanthium inclusum*
	
9. *Lampona cf. cylindrata*	10. *Pardosa amentata*
	
11. *Scotophaeus pretiosus*	12. *Uro cf. aphana*

	
13. *Tibellus sp*	14. *Hamataliawa sp*
	
15. *Pisaurina mira*	16. *Smeringopus pallidus*
	
17. *Araneus mitificus*	18. *Plexippus paykulii*

	
19. *Heteropoda venatoria*	20. *Leucauge sp*
	
21. *Parasteatoda sp*	22. *Zosis geneculatus*

23. *Nephila sp*

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

Local communities in the study area were actively involved during the survey and the purpose of the study and importance of spiders in the ecosystem. At the end of the survey and data analysis the findings were presented to the local communities in October 2016 in Baap geog in presence of geog leaders and farmers (297 heads attended).

Figure 1: Awareness program involving local communities in Baap geog. Figure 2: Presentation in CNR to Lecturers and Undergraduates.

In June 2016 the results and research procedures were presented in College of Natural Resources, Punakha Bhutan in presences of lecturers and undergraduates (250 heads). One Higher Secondary School (103 heads), one middle secondary school (237) and a primary school (113 heads) were involved and benefited from the in the study area in the project through awareness programs.

5. Are there any plans to continue this work?

With the fact there is no single study on spider in the eastern part of the country and therefore in the near future I would like to do a diversity study in the eastern Bhutan. Since being the pioneer to study the spider in the country firstly I would like to extensively cover the country for spider diversity and then go for the ecological studies thereafter. After that in-depth studies on diversity of spiders in different forest types and agro-ecological habitats will be carried.

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

The paper on this project will be soon published in the 2017 issue in the Bhutan Journal of Natural Resources and Development. Another article had been submitted to the Journal of Entomology and Zoology Studies and it is under verification. In January 2017 Ministry of Agriculture and Forests have annual report called "Sonam Drupdey" and this issue go nationwide where I have written a short article in that.

Pamphlets leftover will be distributed to relevant Colleges and schools even in the eastern Bhutan also. I have a plan to print banners of common spiders and keep in the institution and forest offices.

Even after ending the RSG project I will disseminate the results from this study with the gathers during the meetings in the daily service time.

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

Exactly the fund from RSG was used in a period of 1 year i.e. from November 2016 till November 2016. According to the proposal (tentative work plan) the activities were able to accomplish according to the schedule and all the activities were done in this give time frame.

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
Field survey : Payment for the staffs (15 personal X 40 days X 3.16)	1896	1889.68	6.32	1 surveyor was absent for last two days during field survey. He was substituted by other team mates.
Conducting awareness campaign to public includes food and refreshment (300 heads)	300	300	0	
Potter charge–(carrying luggage, food items and tent during data collection in the field) 1 head @7/day 15 days.	105	111.32	6.32	In the far flange sampling plots had hired two extra potters to reach our equipment.
Conducting educational campaign to school children and teachers –includes food and refreshment (700 heads). (Materials required are such as charts, banners and printed pictures of spiders)	582	582	0	
Vehicle hiring charge (spot quotation) till the end of project.	250	240	10	During the spot quotation of vehicles for field survey, had got for little cheaper rate
Pamphlet for educational program	230	240	10	More numbers of Pamphlets were printed to reach more schools and institutions
Providing extension kits for supporting staff Field boots (15 pairs @ £20)	300	289.95	10.05	Boots were able to purchase at £19.33

Rain coat (15 @ £7)	105	105	0	
Purchase of four men tent for the field purpose during survey (3 @ 50)	150	150	0	
Purchase of lab chemicals (Formaldehyde solution 37-41% 3 bottles and Alcohol 20 liter)	274	274	0	
Purchase of equipment	0			
Purchase of sweep net (3 @ £18)	54	54	0	
Containers to store specimens, dish, forceps, hand lens, field microscope, cloth pieces, safety gloves, forceps	356	356	0	
Purchase of Garmin ETREX 10 GPS (one number) surveying	110	118.05	8	Since the equipment was bought through a Bhutanese importer it was quite expensive due to transportation cost.
Laboratory fee for sorting the spiders for identification.	30	30	0	
Street banners on spider information and conservation (5 X £30)	150	150	0	
Fees for media	48	48	0	
Payment for report publishing (3 copies @ £20)	60	62	2	Printing of reports as bound booklets were little more than budgeted
Total	**5000**	**5000**		

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

Bhutan lacks researchers in the field of spiders and I am first and only one to taking up the study. Since only few foreigners had reported on spiders of western Bhutan,

eastern part of the country is never explored on the diversity of spiders. So the next step is I will cover whole eastern Bhutan and then come up with a comprehensive checklist of spiders of Bhutan. As eastern part of Bhutan consist of diverse ecosystem comparing to west large numbers and diversity of spiders are shadowed to be present. During the next step looking the diversity of species among different forest types and agroecosystems are observed necessary.

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?

The logo of The Rufford Foundation was used during presentation in college, schools and with farmers during awareness programmes. The logo and the name of the foundation is used and acknowledged in all the articles and reports that are produced as a part of this project. The logo is also used in the pamphlets and banners. Even hereafter if any materials are produced it will be used with due acknowledgement.

11. Any other comments?

World knows that Bhutan is a tiny land locked country between the uprising economy giants with poor economy. Since the country is developing it does not have much funds for protection, conservation and research activities although the importance of the environment is enshrined in the constitution. Therefore the international charity for wildlife conservation and researches like Rufford Foundations had been key to many young researchers to carry out basic research and validate and maintain the data in this scientific world. Bhutan being one of the biodiversity hot spot in the world everyone must think globally and help conservation happen locally. Conservation is costly and without a fund poor conservationist can watch the important species vanish helplessly from this world and it is the known fact that in conservation the loss is permanent. I found RSG foundation is one of the important player in the 21st century in the field of conservation and due to it good works the name of the foundation will flourish throughout the world helping conservation activities even in the future.