

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	Sangay Wangchuk
Project title	<i>Paris polyphylla</i> – The new livelihood option for local communities and likely ecological crises in Bumthang - Bhutan
RSG reference	19212 - 1
Reporting period	March 2016 – April 2017
Amount of grant	£ 4992
Your email address	swangchuk@uwice.gov.bt
Date of this report	7 th March 2017

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
Inform the management of Wangchuck Centennial National Park (WCNP) with regards to the habitat management of <i>Paris polyphylla</i>				I indicated it to be only achieved partially as the plant grows in various locations within the WCNP, so the management aspects in one area may vary slightly depending on the micro-sites. However, the objective remains fully achieved within the project site
Document and inform the distribution of the plant to the management of the WCNP				Information on the distribution of <i>Paris polyphylla</i> within the Chokhor block in Wangchuck Centennial National Park has been gathered
Disseminate the information on the contribution of the plant to the livelihood of people				

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

It was difficult to spot the plant within the study area, though the communities claim to have seen it growing profusely. This was an indication of it being heavily harvested.

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

3.1. Decreasing population of *Paris polyphylla*

From the interview data we came to know that the abundance of this plant seems to be decreasing at an alarming rate. We found that, of the 61 interviewees, 74% reported the plant population to be on a decreasing trend, 23% that it remained the same and 3% that it was increasing. The claims of the collectors were further

corroborated by us when we visited the field sites to undertake ecological survey as it was a challenge to spot even a single plant.

Such a drastic change in the abundance of the plant might have been because of the collection season reported by the collectors. All the collectors admitted of having collected the rhizome of the plant during summer season. This is a direct violation of the Forest and Nature Conservation Rules and the field manual on nursery management and cultivation of *Paris polyphylla* developed by Department of Forests and Park Services, Royal Government of Bhutan, which legalises its collection only from September to October.

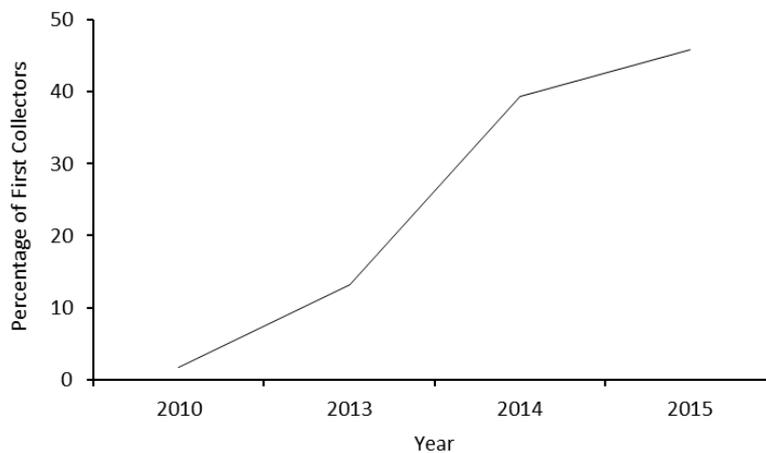


Figure 1: Addition of new collectors in the community

We also found that every year more number of collectors adds to the already existing pool of collectors. This may be another cause for the plant becoming increasingly scarce every year. More than 40% of those we interviewed reported to have begun the collection from the year 2015 (Figure 1) and they all collected in the year 2016.

We estimated that they collected about 125 kg of its rhizome since they started collecting in 2010 based on the reports conveyed by the collectors. All the interviewees reported that maximum they collected from a plant is about 10 g and if we calculate the number of plants destroyed, we found that from 2010 until 2015 they harvested rhizomes from more than 12,500 *Paris polyphylla*.

The graveness of this issue was never felt until this study. Creating awareness to the collectors themselves and to the officials from the Department of Forests and Park Services, in itself is one of the biggest achievements of the project.

3.2. Perception of communities

Though collection of *Paris polyphylla* rhizome has been legalised in Bhutan from October to December and there are forestry rules to levy penalties to those not following the rules of collection season - people seem to be not aware on the existence of such rules. All the interviewees expressed that collection of rhizome of this plant should be regulated and strict monitoring should be put in place after issuing of permits to collect it's rhizome during the collection season. One of the most remarkable suggestions came from the 12 % of the collectors, who stressed on the need to create awareness to the collectors on the importance of harvesting it sustainably.

The project helped in exposing some of the issues with regards to collection of its rhizome. We found that it is not only the communities wherein this plant are found are collecting its rhizome, people from elsewhere also sneak in their forests and harvest it. We make this statement as 11% of the interviewees made a special mention of requiring strict monitoring to prevent people from other areas from collecting it from their locality. We believe that unless this is regulated, harvesting of rhizome from this plant will be rampant and gathering correct information would be difficult.

3.3. Dry and Green biomass of rhizome:

Table 1: Comparative weight of above ground and below ground biomass of *Paris polyphylla*

Sample ID	Above Ground		Below Ground	
	Green weight (gram)	Dry weight (gram)	Green weight (gram)	Dry weight (gram)
p1c1	1.257	0.2	1.95	1
p2c1	0.754	0.1	2.09	1
p3c1	1.602	0.3	4.616	2.7
p4c1	0.755	0.1	2.23	1
p5c1	0.121	0.01	0.662	0.2
p6c1	0.655	0.1	1.825	0.9
p7c1	0.102	0.01	0.935	0.3
p8c1	0.754	0.1	1.389	0.7
p9c1	1.252	0.2	0.684	0.3
p10c1	0.757	0.1	1.168	0.6
p11c1	2.128	0.4	2.832	1.6

p12c1	1.214	0.2	2.225	1.3
p13c1	0.755	0.1	1.816	0.8
p14c1	1.312	0.2	2.197	1.1
p15c1	1.208	0.2	2.275	1.1
p16c1	0.756	0.1	1.718	0.8
p17c1	2.216	0.4	2.778	1.4
p18c1	0.655	0.1	1.943	0.9
p19c1	1.114	0.2	1.834	0.9

Owing to the smaller sized *Paris polyphylla* we came across in the areas where we undertook our surveys, we are concerned looking at the availability of the plant itself let alone the size of it. We harvested 19 plants to determine the weight of above ground and below ground biomass and calculated that average below ground biomass per plant from our study area to be about 1.96 ± 0.8 grams. Going by this calculation of ours, about 511 plants should be destroyed just to gather a 1 kg of green weight rhizome of the species. Since the rhizomes are generally sold dry to the buyers, we found that about 1022 plants [we oven dried rhizome for 48 hours in 60°C] should be destroyed to earn about Nu. 6000.00 (USD 80.00). Considering this calculation, we believe that legalising the collection of *Paris polyphylla* for communities Chokhor block in Bumthang needs to be reconsidered. However, having come across some rhizomes which are relatively larger in size from other parts of the country, its collection may prove profitable but at least not to the communities from the projects study area as of now.

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

For this project, local communities were involved through the setup of interviews to collect information. We involved about 32% of the total households for the project. However, we involved 161 people from the communities of Thangbe, Kharsat, Dhur, Lusbee and Dorjibe during the consultative meetings and creating awareness phase of the project.

Table 2: Number of households interviewed for the project

Village	No. of households	No. of households Interviewed
Dhur	99	29
Lusbee	15	10
Thangbe	20	5
Goling	16	8
Kharsat	41	9
	191	61

Communities benefitted most from the project since they were informed on the importance of conserving the species and also informed them on the existing rules with regards to the *Paris polyphylla*. We found that almost 90% of those interviewed were not aware on the legalised collection season of the plant leading to the confiscation of their priced procession by the forestry officials and requiring paying penalties.

5. Are there any plans to continue this work?

Since this project exposed on how the plants are harvested and the quantity of below ground biomass each plant possesses in Bumthang, Bhutan it definitely warrants another round of study in another location within Bumthang or from some areas in sub-tropical ecological zones. Considering the difficulty in spotting the plant during the field survey, I believe that it has become crucial to study on the possibility of artificial propagation and domestication of the species.

About 50% of the interviewees expressed the need to understand the market chain of the rhizome and final price a kilogram of dried rhizome fetches in its final market. Thus, there is also a need to get answers to this question expressed by the communities and advise the marketing department of the Ministry of Agriculture and Forests. Having this information may help the policy makers of the country to establish better marketing opportunities to the communities to reap higher benefits from collecting it.

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

The preliminary results of the work were already shared with the officials from the Department of Forests and Park Services through participating in some of the meetings organised by various organisations within the country. However, a shorter version of the reports in the form of pamphlets shall be distributed to the management of the Wangchuck Centennial National Park to give the park authorities first-hand information on this species.

Two manuscripts are in preparation to be submitted to international peer reviewed journal, which I believe would be the best platform to share the work from this project. One manuscript shall look at the livelihood contribution to the communities collecting this plant and another shall look at the ecology of the species along with some of the associated plant species.

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 project was planned for one year [March 2016 to April 2017] and the objectives of the projects were met within the planned period of one year.

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
Transportation/Mobility	737	792	-55	More distance was required to travel than expected as the households were scattered and interviewees were working in the field.
Working lunch and refreshment for local community consultative meeting	870	500	+370	Initially over estimated the number of people coming for community consultative meeting. Only 245 people turned up including the organizers and the park officials and officials from local government.
Honorarium for questionnaire survey	393	355	+38	Only 61 people were interviewed and hired 4 helpers from the community to identify the harvesting sites of the plant.
Daily subsistence allowance for two researchers	1179	1267	-88	Required spending more number of days in the field undertaking both social and ecological surveys.
Daily subsistence allowance for two research assistants	590	780	-190	Spotting the plant was tough during the ecological survey which demanded spending more number of days.
Printing of policy briefs	516	516	0	
Working lunch and refreshments for policy makers during	44	91	-47	More participants came for this activity than estimated.

presentation				
Community awareness program (working lunch)	663	692	-29	
Total	4992	4993	-1	

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

I believe that the next important steps should be to sit with the collectors of the plant to really see if it is worth collecting in their locality given the size of the rhizomes. For example, it doesn't seem worth collecting if more than 1000 plants should be totally uprooted just to get 1 kg of dry rhizome which is worth just about USD 80.00.

It is also extremely important to initiate the domestication process of the plant looking at the current market scenario. However, before that, a detail assessment of the plant's rhizome should be carried out from various localities where it is collected to really see if it warrants issuing permits to collect it.

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?

A big YES! The Rufford Foundation logo has been used in any presentations I made and shall continue to use whenever a talk resulted from this project is delivered. RSGF is now known by many Bhutanese and the Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan remains highly indebted to all the contributions made by RSGF this far in the area of conserving floral and faunal diversity of Bhutan.

11. Any other comments?

RSGF has played a major role in the area of conserving some of the important flora and fauna of the world let alone budding Bhutanese researchers. This noble initiative of RSGF to help researchers from the developing world shall go a long way in the area of biodiversity conservation of the world.

This project cannot have been timed well as *Paris polyphylla* is now exploited in the country and in the neighbouring states of India. Through this project, many questions are being answered and again many new questions came up.



Figure 2: Various snapshots from the survey. [1] Social survey while the collectors were working in their agricultural fields [2] Rhizome of Paris polyphylla [3] Ecological survey [4] Paris polyphylla plant

Annexure I: Ecological Survey Data Sheet

Ecological Study of <i>Paris polyphylla</i> in Bumthang, Bhutan				
A. Site Information				
Area (Name of Place):			Data entered by:	
Plot (Plot Number):				
GPS coordinate of plant:	Lat:		Long:	
	Aspect:		Elevation:	
Location of plant:	Center		Distance from Center Plant (m)	
	East			
	West			
	North			
	South			
B. Information on <i>Paris polyphylla</i>				
Collar diameter of Paris (Just above ground):			Height of Paris (cm):	
Phenological stages of Paris:				
	Fruit:		Color:	
	Flower:		Color:	
			No. of Petal:	
	No fruit and flower:			
	No. of branch hold:			
Paris biomass:	Above ground:			
	Below ground:			
Vegetation type:	Tree cover			
	Open area			
Micro-site:	Humus			
	Leaf litter			
	Nurse log			
	Any other			
	Convex site			
	Concave site			
	Level ground			
C. Associated Species Information				
Trees:	DBH	Height		
Shurbs:	Number	Height		
Herbaceous:	Number			

Annexure II: Social Survey Questionnaire

Paris polyphylla - The new livelihood option for local communities and likely ecological crises in Bumthang - Bhutan			
Part A: General Information			
Name of Interviewee:			Gender:
Age:		Village:	Gewog:
Name of Interviewer:			
Main source of Income:		Cordyceps collection	Write 1 to 7 based on highest contribution (1 being highest contributor and 7 being least contributor)
Yak Herding			
Shops			
Contract			
Collection of NWFPs (list from highest to lowest - 1 as highest and 3 as lowest)			
Paris			
Exidia			
Others (specify)			
Part B: Information on Paris			
1. How did you hear about Paris?			When?
	Heard from neighbour		
	Heard from middle man		
	Heard from forestry officials		
	Others (Pl. specify)		
2. Since when did you collect Paris?			
3. In which season do you usually collect Paris?			
	Spring Season		
	Summer Season		
	Autumn Season		
	Winter Season		
4. How has the pricing pattern changed? (get approximate price in Nu. for Paris per kg from the time they started to sell)			
2008		2012	
2009		2013	
2010		2014	
2011		2015	
5. What was the quantity in kg you sold? - by a household in total			
2008		2012	
2009		2013	
2010		2014	

2011		2015	
6. Where did you sell? (Try to get name of middle man if possible; did the buyers come to their place to buy? etc.) - if the answer comes differently for different year, note the year too)			
7. Are you able to find the plant as easily as you used to find when you first started collecting?		Yes	
		No	
8. Is the population of plant:		Reason	
Increasing			
Decreasing			
Same			
Part C: Ecology			
1. In what kind of areas are they found?		Note: Tick as many relevant as the respondents mention	
Marshy area			
Dry area			
River banks			
Mountain tops			
Bamboo thickets			
Coniferous trees			
Others (specify)			
3. Where do you go and collect from your place?			
Direction		Time taken Hrs.)	
East			
West			
North			
South			
4. Do you have any specific criteria for the plant while harvesting (height type; fruiting etc.)			
Yes			
No		Go to question 7	
5. What are the preferred height?			
1/2 feet			
1 feet			
2 feet			
3 feet			
Others (specify)			
6. What type of fruit?			
Based on color of fruit		What color:	
Based on number of fruit		What number:	

7. What is the quantity (kg) generally harvested from one plant?			
8. What do you think the plant is used for (medicinal values)?			
9. Where do you think the final market of Paris is?			
Why?			
10. What do you think government should do with regards to Paris? (What kind of help are they expecting)			
11. Where are the income earned from the sale of Paris used?			
12. What is your opinion on collection of Paris?			
Good		Why?	
Bad		Why?	
13. How many households from your community collect Paris? (No. of hh)			
14. Are you aware of the rules with regards to collection of Paris?			
Yes			
No		Move to question Part D	
15. What type of rules are you aware? (Penalties/collection time)			
Part D: Expectations and General			
1. Are you positive about being within the WCNP?			
Yes		Why?	
No		Why?	
2. What are your general expectations from the Wangchuck Centennial National Park?			