

## The Rufford Foundation

### Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
<b>Your name</b>	Ripu Mardhan Kunwar
<b>Project title</b>	Monitoring and Modeling Medicinal Plants in Mountains
<b>RSG reference</b>	25296-B
<b>Reporting period</b>	July 2019
<b>Amount of grant</b>	9100
<b>Your email address</b>	ripukunwar@gmail.com
<b>Date of this report</b>	August 06, 2019

**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
enumerate/free list all high altitude/mountainous medicinal plants of Kailash-Nepal (Darchula, Bajhang and Humla) and assess their socio-cultural and conservation values,				
evaluate the distribution, population and conservation of the most threatened medicinal plants based on ecology (low population/density/frequency); geography (narrow/limited distribution) and socio-culture (high trade and cultural value; indigenous conservation strategies),				
identify the most vulnerable plants in terms of geography, ecology, socio-culture and conservation and guide district forest offices and local stakeholders for necessary conservation measures.				
map and model aridity of the area and monitor and model the distribution of the selected five most vulnerable plants in terms of increasing aridity, human and market pressure, land-use, climate and socio-cultural changes.				
outreach local and global communities and call for collaborations.				

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

Four out of five objectives were achieved successfully; the one objective was partially achieved because we could not able to collect the required info of our all subject species. We got the best information of only one species and modelled accordingly. Because of this reason, we spent much time on objective 5 (outreach and collaborate global communities) and were able to attain a number of succeeds. Maxent modelling portraying the potentials of *Paris polyphylla* is attached.

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

A. We are able to come up the list of 960 flowering plants of Kailash Sacred Landscape Nepal, which is the one of the strengths of this research. You can find the details in <https://pqdtopen.proquest.com/doc/2118494277.html?FMT=ABS>

B. Identified the most vulnerable plants and their conservation status was catalogued.

Species	CITES 1979	1996 & Joshi	2001 CAMP list	IUCN 2001	GoN 2001	GoN 2006, 2010	Local threat
<i>Aconitum spicatum</i> Bikha,		CT	V	V	--	√	*
<i>Dactylorhiza hatagirea</i> Panchaunle	√		E		Ban for export outside the country without processing	√	***
<i>Nardostachys grandiflora</i> Jatamansi	√	E	V	R	Ban for export outside the country without processing	√√	***
<i>Neopicrorhiza scrophulariflora</i> Kutki,		E	V	V	Ban for export outside the country without processing	√√	**
<i>Paris polyphylla</i> Satuwa		V	V	V	--	--	***
<i>Taxus contorta</i> Loth Salla	√	V	E		Ban for export outside the country without processing	√√	***

CITES: Controlled trade for assuring the survival of species (√); GoN (2006, 2010) National priority species for economic development (√); GoN (2006, 2010) National priority species for research and economic development (√√). CT (Commercially Threatened; V (Vulnerable); R (Rare) and E (Endangered).

Diversity and distribution records of the selected species

Species name	Vernacular name	Study district (Density/ha)				Total districts recorded (out of 75)
		Baitadi	Bajhang	Darchula	Humla	
<i>Aconitum spicatum</i>	Bikha		0.03	0.04	0.07	27
<i>Bergenia ciliata</i>	Vedaite					
<i>Dactylorhiza hatagirea</i>	Hathajadi	0	0.02	0.03	0.03	14
<i>Delphinium himalayi</i>	Atis					
<i>Juglans regia</i>	Okad					
<i>Nardostachys grandiflora</i>	Balaichan		2.25	1.76	2.33	25
<i>Neopicrorhiza scrophulariiflora</i>	Katuko	0	0.41	0.54	0.74	21
<i>Ophiocordyceps sinensis</i>	Buti					
<i>Paris polyphylla</i>	Satuwa	0.06	0.11	0.13	0.09	36
<i>Rheum australe</i>	Dolu					
<i>Taxus contorta</i>	Salla	0.01/100m <sup>2</sup>	0.02	0.03	0.03	43

Estimated biomass stock (tons) in forests

District	<i>Aconitum spicatum</i>	<i>Dactyloctenium aegyptium</i>	<i>Nardostachys grandiflora</i>	<i>Neopicropiza scrophulariflora</i>	<i>Paris polyphylla</i>	<i>Taxus contorta</i>
Baitadi	-	-	-	-	26	6,526
Bajhang	48	7	814	256	33	81,885
Darchula	34	9	690	330	31	12,918
Humla	39	26	1997	1213	15	123722

Trade records of selected six medicinal plants in Nepal (FY 2012-2016)

District	68-69 (2012)	69-70 (2013)	70-71 (2014)	71-72 (2015)	72-73 (2016)
Achham			Pp		
Baglung		As, Ng, Pp	As, Ng, Ns, Pp		
Baitadi					
Bajhang				As, Ng, Ns, Pp	
Bajura		As, Ng, Ns, Pp			As, Ng, Ns
Banke				Pp	Pp
Dadeldhura				Pp	Pp
Dailekh	Ng, Pp	Pp	Ng, Pp	Ng, Pp	Ng, Pp
Darchula	Pp				Pp
Dhading		As, Ng, Pp			
Dolpa	As, Ng, Ns, Pp	Ng, Ns, Pp	Ng, Ns	Ng, Ns, Pp	Ng, Ns, Pp
Dolakha	Pp				
Doti				As, Pp	Pp
Gorkha	Ng, Ns, Pp	Ng, Ns, Pp			
Humla					Ng, Ns
Ilam				Pp	As
Jajarkot		As, Ng, Pp	As, Ns	As, Ng, Ns	As, Ng, Ns, Pp
Jumla		Pp	As, Ng, Ns, Pp		
Lamjung	As, Ng, Ns, Pp	As, Ng, Ns, Pp	As, Ns	Ns	Ng, Ns, Pp
Mugu			As, Ng, Ns, Pp	As, Ng, Ns, Pp	
Myagdi	Ng, Ns, Pp		As, Ng, Ns, Pp		As, Ng, Ns, Pp

Panchthar					Pp
Okhaldhung			Pp	Pp	Pp
Ramechhap		Pp			
Rasuwa					As, Ns
Rukum	Ng, Ns, Pp		Ng, Ns, Pp		As, Ng, Ns, Pp
Sankhuwa	Pp				Pp
Sindhupalc			As, Pp		
Sunsari	As				
Surkhet		Ng, Ns			
Taplejung				Pp	Pp
Tehrathum	Pp	Pp	Pp	As, Pp	Pp

As=A spicatum, Ng=N grandiflora, Ns=N scrophulariflora, Pp=Paris polyphylla

C. Map and Model the threatened species and outreach the global communities. The results of the study were presented in SEB meeting, UC, Cincinnati, USA (June 2-6, 2019) and Agroforestry Workshop, KIB, CAS, China (July 21-Aug 3), 2019. The support was acknowledged in a paper published in the Journal of Forestry Research. Separate file attached in email. <https://link.springer.com/article/10.1007/s11676-019-00987-w>

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

A total of 3,000 seedlings of three species *Taxus contorta*, *Paris polyphylla* and *Polygonatum cirrhifolium* (Khiraunla, Setochini) were produced in Dhukura Community Forest User Groups, Banjha 3, Darchula. Matching funds were generated while carrying out the project. Co-funding from Divisional Forest Office, Darchula was significant. CFG Chairperson Dilip Singh Mahara coordinated in establishment the nursery and production and distribution of seedlings. *In-situ* conservation of medicinal plants and Nursery Development in Kedar Community Forest User Group in Deulek, Bajhang was carried out with the help of Mr. Kalak S Bohora, Village Chairperson and Mr. Amar Dhat, Chairperson of the CFUG. A total of 1,500 seedlings of *Taxus contorta*, *Paris Polyphylla* and *Polygonatum cirrhifolium* (500 each) were produced and distributed. NIMTO, Baitadi and Sigas and Chaukham CFUGs of Baitadi district were supported from the project. In various project activities, the members of the institutions participated and learned more about ecology, ethnobotany, medicinal plants and sustainable harvesting.

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

So far we have +250 geo-coordinates of *Paris polyphylla*. The coordinates of other important species sorted out in this study are under collection process. Once we collect the adequate number of geo-coordinates of all important medicinal plants of mountain, we are able to model the medicinal plants of mountains for effective measurement of monitoring and management. The modelling gives the potential and future distribution pattern that guides local communities to upscale and extend the management interventions. This also gives more options for communities to build resilience against climate change.

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

Partial results of this project were shared in SEB Meeting (June 2nd-6th 2019), Cincinnati, Ohio, USA and in KIB-CAS, China Workshop July 22nd – August 3rd 2019. Moreover the Rufford Booster Grant support was acknowledged in an article published in the Journal of Forestry Research  
[https://link.springer.com/article/10.1007/s11676-019-00987-w?fbclid=IwAR0sagssRNRTdDJ2V1JP79MFnQ\\_8uHWBUqy8xyll5q9CL\\_64teP5pODeTc](https://link.springer.com/article/10.1007/s11676-019-00987-w?fbclid=IwAR0sagssRNRTdDJ2V1JP79MFnQ_8uHWBUqy8xyll5q9CL_64teP5pODeTc)

One article is in progress in Ecological Indicators journal.

**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 grant was used between October and December 2018. The extensive fieldwork, community meetings and workshops were held at that time period.

**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
Community nurseries	100	100		
Equipment	600	550	-50	
Travel Kathmandu	200	200		
Literature books	100	100		
Central meeting	700	600	-100	
MS preparation, review and submission	400	400		
Modelling species	500	300	-200	
Conservation manuals	500	400	-100	
Community meetings	300	400	+100	
Stationary communication	300	300		
Plant sample management	100	50	-50	
Monitoring	1000	1000		
Nursery strengthening	500	500		
District workshop	600	600		
Field accommodation	2300	2000	-300	
Travel US-Nepal-US	1000	1500	+500	
Travel Field	800	800		
<b>TOTAL</b>	<b>10000</b>	<b>9800</b>	<b>-200</b>	

By reviewing the budget expenditure details we could assume that the work was carried out in economic mode and cost efficient approaches. Since the modelling was not successful for all subject species, a few amounts were spared in that title. The travel expense went beyond the expectation, which was not in the control.

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

As our study area is a trans-border and tri-national landscape of India, China and Nepal, it has been emphasised as a geopolitically, socio-economically and bio-culturally important site for research. Since the area is also a site of one of the three fascinating medieval trade routes passes through Nepal, the route passes through Lipulekh, Darchula and Urai Pass, Bajhang is of high importance in terms of human civilisation as the routes were traversed and scaled by early Aryans in 1100 and 1200 AD. The Lipulekh, Darchula and Taklakot, Bajhang are also important pilgrimage routes to access holy Mansarovar and Sacred Mt Kailash. Annually more than 5 million pilgrims have a holy bath in Mansarobar and access Mt Kailash. The historical use of the routes (geology, forests, plants, animals) from human civilisation to ritual attainment is worth researching. Moreover the study of impacts of climate change over habitats, glaciers, forests, plants and animals is immediate. After meetings with communities and modelling the medicinal plants, monitoring the medicinal plants in nexus of climate change is highly pressing. Local people lamented about the adjustments in phenophases, distribution and harvesting calendar of medicinal plants resulting in dissenting traditional management system.

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

Yes indeed. Logo was used in presentations and acknowledgement was shared in published and forthcoming articles. Please see the attached photographs and articles for further details.

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

**Mr. Rameshor Bhattarai**, Bajhang district coordinated the fieldworks. **Mr. Santhos Thapa**, carried out some field works and collected field data from Darchula district.

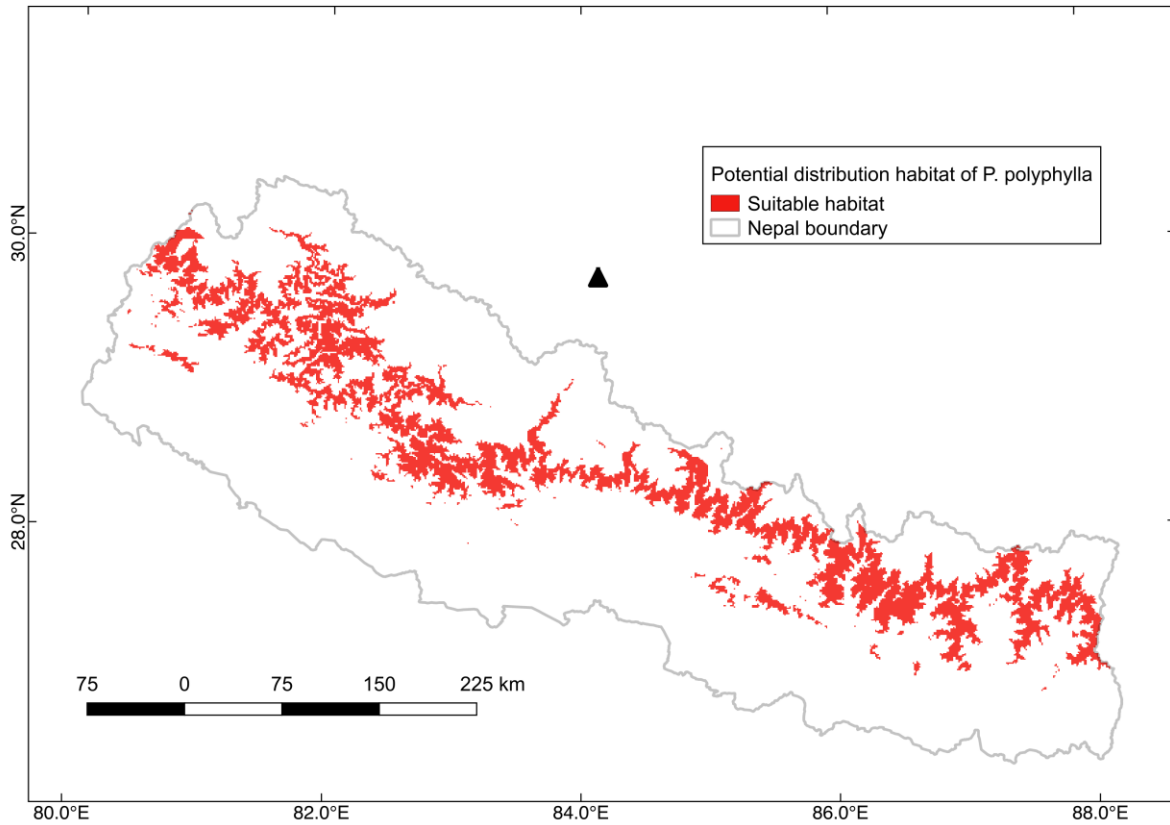
**Mr. Prem Bhat** and **Mr. Shiv R Bhatta** from Baitadi coordinated the field works of Baitadi district.

**Dr. Keshab Shrestha** and **Dr. Rainer Bussmann** guided the project and coordinated for article and presentation preparation.

**12. Any other comments?**

I truly appreciated the support extended by Rufford Foundation. The research in the least accessible and underexplored region like Darchula Nepal became possible

only because of the RF Grant. I am delighted to re-address the Rufford Foundation Grant for being very supportive in this endeavour. Darchula and Baitadi districts are frequently popped up in Google search engine because of the research supported by RF.



Map of modelling *P. polyphylla* Satuwa.



Left: *Paris polyphylla satuwa*. Right: *Paris* rhizome.





Setochini Polygonatum cirrhifolium