

## 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>	Leki
<b>Project title</b>	Grazing competition between blue sheep and domestic livestock in the Bhutanese trans-Himalaya and its impact on the endangered snow leopard
<b>RSG reference</b>	20071-2
<b>Reporting period</b>	June 2016 – June 2017
<b>Amount of grant</b>	£5000
<b>Your email address</b>	lekipunap@gmail.com
<b>Date of this report</b>	18 June 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
The number of graminoids, forb, and shrub species eaten exclusively as well as commonly by blue sheep and by domestic ungulates will be documented				46 species of plants were primarily consumed by wild and domestic ungulates viz. blue sheep, horses and yaks. They were further classified into 3 forage categories: 16 graminoids, 27 forbs and 3 browse.
To understand which among these three dietary groups are mostly eaten by blue sheep and domestic ungulates				From three forage categories, graminoids are the mostly preferred by all three ungulates. Among the graminoids, all the ungulates diets were strongly dominated by <i>Kobresia prainii</i> followed by <i>Kobresia pygmaea</i> of the same genus. The domestic ungulates consumed more forbs and browse compared to wild ungulates. Horse consumed 25 species of forbs and one species of browse and similarly yak fed on 26 forbs species and 3 browse. However in case of blue sheep, it fed on only five species of forbs and one species of browse.
The extent of dietary selection and overlap between the two taxonomic groups will be known				<p><b>Blue sheep</b>            The blue sheep diet was strongly dominated by graminoids (79.2%), among which <i>Kobresia Prainii</i> alone accounted for 33 %. Among the forbs (19%), <i>Oxytropis</i> sp. and <i>Potentilla griffithii</i> accounted for 4.2% and 4.1 % respectively. However, there was very low proportion of Browse (1.5%) in its diet. Blue sheep highly selected <i>Kobresia prainii</i> (DSV = 1.22) and <i>Kobresia pygmaes</i> (DSV= 1.03) among the graminoids. Among the forbs, <i>Potentilla griffithii</i> (DSV=0.89) and <i>Oxytropis</i> sp. (DSV= 0.64) were selected at lower rate.</p> <p><b>Horse</b></p>

			<p>The diet of horse was also dominated by graminoids (57.1%), with forbs contributing quite high (40%) as compared with blue sheep diet. The browse made up only 3.4%, which is still low as compared to other two forage categories.</p> <p>In contrast to Blue sheep, horse did not display any strong selection for any graminoids but showed strong selection for <i>Heracleum nepalense</i> (DSV= 3.8), <i>Bistorta macrophylla</i> (DSV=2.7) and <i>Thermopsis barbata</i> (DSV= 2.5) among forbs.</p> <p><b>Yak</b></p> <p>The diet of yak was dominated by graminoids (51%) but very low as compared to blue sheep and slightly lower than horse. Similar to blue sheep and horse, <i>Kobresia prainnii</i> constituted 17% of graminoids. The contribution of forbs in yak's diet was the highest (43%) among the three ungulates.</p> <p>The dietary selection for graminoids were similar to horse which did not display a strong selection for any species but unlike blue sheep, yak showed strong selection for forbs, particularly <i>Potentilla griffithii</i> (DSV=2.4), <i>Rheum nobile</i> (DSV=2.2), <i>Potentilla aristata</i> (DSV= 2.1) and, <i>Urtica dioica</i> (DSV=2) respectively.</p> <p>The data strongly suggests that there is an overlap in dietary selections among the three ungulates, and a comprehensive analysis is underway for validation in a peer-reviewed journal.</p>
<p>The local communities and livestock extension agents engaged in this study to sensitize on the need to develop pastures for domestic yaks and horses in high competition areas.</p>			<p>The local communities and the livestock agents were engaged during the study and they were sensitised about limiting the number of yaks and horses, particularly the unproductive breeds. As a consequence, the livestock extension agents were involved in an initiative to develop pasture for domestic yaks and horses in the areas deemed as high competition zone.</p>

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

Generally the project was successfully executed; however, some unforeseen challenges and difficulties were faced during the study period. The inclement weather conditions of high altitude posed major difficulties during preparation of logistics.

The data collection was carried out in summer season, knowing the fact that grazing completion was high in this season because nomads migrate their domestic animals from their winter to summer herding camps in the higher mountains. However, the rainy and foggy weather posed a hindrance to identification of plants, especially during collection and storage of plant specimens which needed proper identification.

The team also faced a challenge in plant identification, because there was no reliable field guides that allowed easy identification on site. Part of the reason for a lack of reliable guide book was the Eastern Himalayas is a least studied in terms of plants and grass.

Both these factors prolonged our survey duration, and contributed to escalation of survey cost and manpower strength.

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

- In this study, 46 species of plants primarily consumed by wild and domestic ungulates were successfully identified. These were further classified into three forage categories: 16 graminoids, 27 forbs and three browse.
- The extent of dietary selection and overlap between these three taxonomic groups were known from this study which is very important to know whether these three ungulates compete for grazing at species level or forage categories. The data strongly suggest that there is overlap between dietary selections among them and comprehensive analysis is underway for validation in a peer-review journal.
- The local communities were engaged during the study and they were sensitised about limiting the number of yaks and horses, particularly the unproductive breeds, through the help of local livestock extension agents.

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

Before the onset of the data collection, all possible areas of blue sheep occurrence and summer livestock herding sites were identified and listed through exhaustive consultation with the local yak herders.

About 15 local community members from different localities were also directly involved in the whole project period as local guides and providers of porter/pony services. They were paid the daily wages and charges as per the current rates approved by the government. In addition, some local people indirectly benefited from the project by selling their dairy products and vegetables to the survey team.

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

Now that the study has provided us with exciting findings, there is a need to upscale the efforts on sensitization of local communities in other areas, especially in limiting their unproductive yaks and horses. The livestock population trend in the potential conflict areas with blue sheep will be also monitored over the years.

In addition, researches will be conducted to investigate the extent of inter-specific interactions among Tibetan red fox, wild dog, and snow leopard.

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

The results of the study will be shared with officials of Department of Forest and Park Services, Policy and Planning Division of the Ministry of Agriculture and Forests, Department of Livestock, World Wildlife Fund, Royal Society of Protection of Nature, and Jigme Dorji National Park, and Ugyen Wangchuck Institute for Conservation and Environment Research through seminar, meeting, conference, research papers, and books.

A scientific paper is being prepared which will soon be submitted to an international peer-reviewed journal for wider publicity.

**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 fund was judiciously used from June 2016 to June 2017, for about 12 months, and the activities were completed well within the project duration.

**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 data collection: Transportation and mobility plus daily substance allowances	2800	3000	+200	The cost escalation was due to increase in number of plots to survey and, harsh and rainy season that took more than

paid				expected time.
Hire of field botanist	600	350	-250	The botanist could not stay till the end of survey due to some unavoidable circumstances
Equipment	300	300		
Consultation meeting with local communities	500	425	-75	More local people were involved from different localities
Training research assistants	200	175	-25	
Hire of a high power digital camera	200	200		
Hire of local cook	300	355	+55	
Printing cost	100	75	-25	
Stationary	0	75	+75	Unforeseen expenditure
Bank transfer charges	0	75	+75	Unforeseen expenditure
<b>Total</b>	5000	<b>5030</b>	<b>+405/375</b>	Budget short by £30

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

Sensitisation activities will be carried out through publication of scientific paper in journals and other scientific forum, development of monitoring guidelines, book, and public gathering and seminars, basically to educate on the importance of having blue sheep in the fragile Himalayan ecosystem and how it plays a critical role in maintaining the population of endangered snow leopard. Mainstream media will be engaged at some point of time when the results get more concrete. The next step is to study the food and space requirement/availability/preference of snow leopard, red fox and wild dogs and to investigate competition between these three carnivores in the alpine rangelands in the park.

### 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?

Yes, the RF logo was used in all presentations, posters and education programme. Thus, most of the park officials, researchers from various agencies, lecturers and students from College of Natural Resources, officials from Department of Forest and Park Services, Ministry of Agriculture and Forests, Bhutan and several other relevant stakeholders were made aware about the existence of RF and conservation funding support it provides. As a result, most of the research enthusiasts were inspired and encouraged to apply for RF.

### 11. Any other comments?

This study has provided a valuable data to prove the existence of forage competition between blue sheep and domestic ungulates (yak and horse). I on behalf of all past and current RSGF recipients would like to immensely thank the Rufford Foundation for your generous contribution towards nature conservation projects around the globe in general and Bhutan in particular.