

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	Priya Iyer
Project title	Effect of livestock grazing on the health and social systems of blue sheep and ibex
RSG reference	14311-1
Reporting period	May 2014 to Feb 2016
Amount of grant	£5635
Your email address	priya.iyer@gmail.com
Date of this report	2 nd July 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
<p>To study the mating behaviour and social systems of blue sheep and ibex</p>			+	<p>Detailed observations of the two species were carried out over three consecutive winters (the mating season). Many instances of copulations and courtship behaviours were observed; data were collected on group sizes, compositions and locations, apart from detailed data on behaviours of individuals of different ages and sexes. The analyses of these data for conclusions about dominance hierarchies, mating strategies and the adaptive significance of the age-correlated and sexually dimorphic horns in these species are ongoing. We have many hours of video footage of the two species, which could be edited into a documentary.</p>
<p>To assess the impacts of livestock grazing on the health (stress levels and parasite loads) of blue sheep and ibex</p>			+	<p>We collected faecal samples from blue sheep in five different grazing regimes. We verified that they are more stressed in pastures shared with livestock, and are also more prone to infections by parasites from livestock in these pastures. Hence grazing reserves have a significant impact on improving blue sheep health.</p> <p>Addressing this question for ibex also led us to consider the impacts of migratory herding in Pin Valley National Park. The analyses of the faecal samples collected before, during and after the migratory herds come into this location is ongoing, and preliminary results suggest a high contribution of recent human disturbance on ibex stress levels.</p> <p>My collaborator Abhishek Ghoshal and team have also compared</p>

				<p>vegetation measures and ibex densities in pastures that are grazed by the migratory herds versus not. Combined with my work comparing the health of ibex in these areas, these results may help us make the case for setting up more grazing reserves in this area, and limiting the impacts of migratory herding.</p>
<p>To understand migratory herding practise in Pin valley.</p>			+	<p>We interviewed villagers (including village elders and administrators), herders and Forest Department officials to form a picture of migratory herding in Pin valley and the economic benefits and conflicts of interest associated with it. With estimates of the number of livestock grazing in different areas and their locations, we are also able to map the impacts of this activity in space. The migratory herding traditionally practised in this landscape has never been systematically studied before.</p>
<p>To train the Forest Department staff in the procedures involved in collecting faecal samples and analysing them for parasite loads</p>	+			<p>Our laboratory collaborators were unable to travel with us to the field site, hence we could not offer to train Forest Department personnel on the procedures to analyse the fecal samples. However, we did offer to train them on the methods of collecting these samples and preserving them, but the officials could not make it due to their busy schedules.</p> <p>However, the NCF staff in Spiti have gained much experience in collecting and preserving faecal samples in the course of this work, and would be able to carry out these procedures for any future studies.</p>
<p>Outreach for children in these areas, to try and increase their awareness and interest in their wild heritage.</p>			+	<p>We conducted sessions in 4 schools across Spiti about the wildlife here, apart from informal interactions with children in various villages. The activities included watching documentaries and camera trap pictures of the wildlife of trans-Himalayas, making lists the living</p>

				beings found here and connecting them in a food web. We also talked about the scientific method, design thinking and how one could design a camera trap.
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The proposal was to carry out observations of blue sheep and ibex mating as well as collect faecal samples from these two species in grazed and un-grazed areas, all in one field season. We expected to do this as three researchers assisted by the villagers as field assistants. However, one of our collaborators had severe altitude sickness, and couldn't work on this project. Hence Anni Hämäläinen (my other collaborator) and I could only carry out observations of blue sheep mating behaviours in the Kibber area in the first winter (Dec 2013-Jan 2014). We also found out that faecal samples were better collected in the summer, when the animals were not stressed due to competition for mates or harassment by potential mates, and carried this out for the blue sheep in Aug-Sept 2014. Furthermore, as contrasted with the blue sheep that occur both in pastures grazed by domestic sheep and goat and in areas where these animals are absent, the ibex habitats cannot be as clearly partitioned spatially. Instead, the effect of grazing on ibex health may be better understood by studying them in a location like Pin Valley which receives a high amount of seasonal livestock grazing by migratory herds of sheep and goat. We studied this by collecting faecal samples of ibex before the migratory herds arrive, during the time they were there and after they had left, hence dedicating one summer (June to Sept 2015) to this work, and to understanding the migratory grazing practices in Pin valley.

Finally, the first winter (Dec 2014-Jan 2015) we spent observing ibex mating behaviours turned out to be a very severe one, due to which we couldn't extend our stay in Pin valley. And while we observed many courtship behaviours, we did not see any matings. Hence we decided to continue this study the next winter (Nov 2015-Jan 2016), which turned out to be a successful field season.

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

1. Detailed studies of blue sheep and ibex mating behaviours and social systems: Blue sheep mating behaviours in the Himalayas have been studied earlier by Schaller (in 1960's in Nepal) and briefly in Spiti by Suryawanshi. This study adds to this body of work, and also focuses on dominance interactions and the adaptive significance of horns in this species. Ibex mating behaviours have not been studied in the Himalayas, and almost all the literature is from Alpine ibex in Europe. Hence our observations can yield important insights about similarities and differences between the behaviours of these two sub-species of ibex.

2. This is the first study to examine the impacts of livestock grazing on blue sheep and ibex health, especially so in Spiti where livestock grazing and their consequences for wild animals have been well studied. We find a significant effect of the grazing reserves on improving blue sheep health. We also find a detrimental impact of migratory livestock grazing and human proximity on ibex health. These results suggest conservation measures for these species.
3. With Abhishek Ghoshal, this is the first attempt to systematically understand the migratory herding practised in Pin valley for may be hundreds of years. With interviews of the villagers, Forest Department officials, and visits to herders' camps to interview them and estimate their herd sizes, we are developing a broad understanding of this practise, its impacts on the pastures and their wildlife, and the interests of the various stakeholders.

A bonus outcome was spotting four snow leopards including two cubs in Pin Valley National Park in Dec 2015, suggesting a healthy population of these endangered animals in this landscape.

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

The entire work has been carried out while living in the homes of various villagers, and with them being employed as the field assistants. Hence apart from being a source for livelihood for some of them, this project has also been an avenue for them to engage with the concerns of this project.

Furthermore, as a part of this work, we interviewed many villagers across Pin valley, the migratory herders from Kinnaur and government officials - this forming the first attempt to systematically document migratory livestock grazing in Pin valley, and the concerns of the various stakeholders. We hope to be able to work out more beneficial practises for all the parties involved, including the wildlife, from these conversations.

5. Are there any plans to continue this work?

Yes, the engagement with the community to better understand the migratory herding practice, and to try and make it more wildlife-friendly will continue.

The analysis of the behavioural and faecal sample data are also ongoing, as are attempts to collect more fecal samples from ibex in Pin valley in summer 2016.

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

We intend to submit reports to the Forest Department with the results of this work. One already submitted on the incidence of foot and mouth disease among the migratory herds in Pin valley is attached. We will submit more on the findings of the mating behaviour observations, impacts of grazing on the wild ungulates, and on the understanding of the migratory herding in Pin valley. The government officials are especially keen to learn about our findings on this last topic.

These findings will also be published in the academic literature and perhaps also as popular articles in conservation magazines. The data involved will also be made available to Nature Conservation Foundation who have been working on wildlife conservation in this area for many years. Finally, and most importantly, we are constantly communicating with the villagers about the findings from this work.

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 for work done from December 2013 to January 2016. The anticipated length of the project was only 3 months, but the work was carried out over 2 years, as described in point 2. This extension allowed us to explore all the questions involved in much more detail, as well as venture into understanding the migratory herding practised in this area, which was not originally a mandate of this project.

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 (Actual - budget)	Comments
Salaries for field assistants	480	1664	+ 1184	The salaries were paid over five field seasons, as compared to the budget for only one. Moreover the wages, especially for the winter months, were higher than estimated.
Airfare	350	517.4	+ 167.4	
Road transport	300	643.53	+ 343.53	The amounts spent on transportation, accommodation and food were over five field seasons, whereas the budget was only for one, as described in point 2. Hence the amounts spent were much higher.
Accommodation	450	914.71	+ 464.71	"
Food and groceries	450	762.12	+ 312.12	"
Porterage and pack animals	100	172.5	+ 72.5	
Digital recording binoculars/ recording	2568	725.5	- 1842.5	There were difficulties procuring the budgeted Sony digital recording

equipment				binoculars in India. Further, we felt it was more necessary to carry out the study for a longer duration and to be able to examine the various aspects studied in much more detail, rather than spend on these very expensive equipment. Hence we instead purchased a video camera, spotting scope, Dictaphone, tripods and GPS's for a fraction of the amount budgeted for the recording equipment, and used the savings to able to spend more time in Spiti and make more trips here.
Solar charger	321	0	- 321	We used a solar charger purchased by NCF, hence did not have to buy one from this grant.
Electric vortex and hand centrifuge	186	0	- 186	The analysis of the fecal samples for stress and parasite loads were not carried out on field, as originally planned, as our lab collaborators could travel with us to the field. Hence we did not need these equipment's for use in the field.
Equipment and consumables for fecal sampling	330	250.52	- 79.48	
Miscellaneous (medicines, fuel, courier charges and other equipment)	100	187.08	+ 87.08	
Total	5635	5837.36	+ 202.36	

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

It is important to engage with the migratory herder community to try and limit the extent and intensity of grazing, so that the wildlife impacts are limited. Many measures could be used to implement this, such as better herding practices and

access to better markets in order to earn similar incomes from smaller herds or more localised herding. Working with the herder and villager communities to increase their concern for the wildlife in the area is also key. Lacking this, the incentives to increase economic gains may lead to actions that are detrimental for the wildlife.

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?

We have not yet produced much published material from this work, as some of the behavioural and fecal sample analyses are ongoing. We will certainly acknowledge RSGF and use the Rufford Foundation logo in all our publications and reports.

11. Any other comments?

I am very grateful to the Rufford Foundation for this grant, and for the flexibility granted to me to extend this work over many more months than originally planned. I will continue my efforts to ensure that this work contributes to the better conservation of blue sheep, ibex and snow leopards in Pin and Spiti valleys.