**Project Update: November 2015**

As mentioned in the report from May 2015, I planned a field trip in summer 2015 to accomplish the following goals:

1. Collect fecal samples from ibex in Pin valley, in areas that are grazed migratory herders' herds as well as in other pastures-- both before the herders arrive in late June/ early July, and during their presence there in July-August:

We collected fecal samples from 8 herds before the herders arrived, and 3 after they did. At both times, the samples are distributed across pastures grazed by the domestic livestock and those that are not. Ibex herds are likely moving extensively over the landscape, so we will analyse the data to see if the actual locations of the collection have an impact. The samples collected after the herders arrive are also distributed over different times since their arrival at the landscape.
These samples are currently being analysed for parasite loads and cortisol levels.
We also collected fecal samples from domestic sheep and goats- belonging both to the villagers and to the migratory herders. They are also being analysed for stress levels and parasite loads, which will be compared with data from the ibex.

2. Better understanding the scale of grazing by migratory herders, especially inside the Pin Valley National Park:

With Abhishek Ghoshal from NCF, interviewed the migratory herders about the number of livestock they bring in. Hence, we have an estimate of the number of livestock grazing in the core zone of the National Park, as reported by the herders.
For some of the herds in the National Park, we also videotaped them as they came in, which can be used for an exact count of the herd sizes.

3. Document patterns of grazing in the lower Parahio valley:

One of the reasons proposed for the fewer number of ibex herds observed by us the previous winter, as well as their high mobility and grazing in the higher slopes was possible overgrazing by the migratory herds in the areas en route to their allotted pastures. Hence we observed how these pastures were being used this summer. We found that the herders stayed in these en route pastures for at most a day on the way to their eventual destination. Hence, the migratory herders were not observed grazing for longer than they were permitted to at these pastures, at least not this year.

4. Observe the timing of birthing in summer 2015, to be able to back-calculate the timing of mating for the previous winter:

We observed week to 10-day old kids on 28$^{th}$ June, setting the estimated date of conception to 20-30 Dec 2014. While we were already at the field site and carrying out observations on ibex behaviours by 24$^{th}$ Dec, we may have missed the mating's due to our delay getting there, and being able to observe only one group at a time. I plan to rectify this by being in the field from late-November this winter.

In the tasks above, I was assisted by Prasanna Muralidharan, a volunteer, and Chering Tanfel, our field assistant.

5. Collect blue sheep fecal samples from Tashigang village area, and Lobdur, a grazing reserve, to evaluate the effect of grazing reserves on blue sheep health:

We collected 35 samples from the village area and 44 from the grazing reserve. Many of the samples have the age and sex class of the individuals identified. The Tashigang village pastures are also grazed by cattle, donkeys, horses and yaks, while the reserves are only visited by yaks. The two locations are at comparable altitudes about 9km from each other, and there may not be much movement of ibex between the two locations.
With the samples from Kibber and Tabo collected last year, this study will provide a comparison between ibex healths from four different grazing regimes. I was assisted in this work by Tomden from Tashigang.

From analysis of the data collected last year from blue sheep in Kibber area (where the number of domestic sheep and goats are high) and Tabo (where there are hardly any sheep and goats), we find that as expected, blue sheep Kibber have higher cortisol levels corresponding to higher stress levels ($p<0.0001$). However, no differences were detected in either the number of parasite species, or the total abundance of parasite eggs. When comparing blue sheep from the Kibber village pastures and from the grazing reserve in Chunkar near Kibber, we find no differences in stress levels (which is consistent with our observations that the animals move freely between the two areas). Surprisingly though, we find the Kibber blue sheep to be infested with a significantly higher number of parasite species as well as a greater abundance of parasite eggs. We will try to understand this result better. Data collected from Lobdur and Tashigang should also s h e d more light on the effects of grazing reserves on blue sheep health.

Comparing blue sheep samples with those from domestic sheep and goats from the corresponding villages, we find no differences in parasite loads, and a significantly higher level of stress in the Kibber sheep and goats. We will further analyze these data with comparisons of species diversity of parasites found in these two groups, to look for evidence of transmission of parasites between these species. The samples collected from ibex and domestic livestock from Pin valley should also shed more light on the same.

Apart from these goals, I also joined Abhishek Ghoshal in interviewing many migratory herders at their camps. We discussed how their herding practice has changed over the years, numbers of animals they bring to Spiti, economics of their trade, and their perception of the pasture quality.

Migratory herding is a traditional livelihood that has been in practice for perhaps hundreds of years in this landscape. However, in today's rapidly changing economy, it has become unsustainable to tend the smaller herd sizes that herders used to keep, leading to an increase in the numbers of sheep and goats being brought into Pin valley. The herders typically perceive the quality of the pastures as declining, but they do not see themselves as being responsible for the change.

Abhishek and I also collaborated to conduct focal group interviews of villagers at the three villages that lease their pastures to the migratory herders-- Sagnam, Mudh and Telling. The villagers in these focal groups were mostly elders, or people who had served as Numberdaars or village administrators. We asked them about their perception of changes in quality of the pastures leased to the herders, how pasture quality is evaluated, and the advantages and disadvantages of this interaction with the herders. Prasanna and I also had similar conversations with the Numberdaars at the beginning of the season to better understand the nature and extent of migratory herding in this area. Abhishek and I also interviewed the Numberdaar of Lossar, a village in a different part of Spiti which is one of the few where migratory herders have recently been asked by the villagers to stop using their pastures.

We also had conversations with the Forest Department officials at Kaza, who view the migratory herders as encroaching into the National Park. However, the Forest Department is as yet unable to provide them with adequate compensation for leaving the park, or alternative pastures to graze in. Moreover, asking the herders to move to a different part of the landscape would only shift the problem, but not mitigate the effect they are having on the pastures or the wildlife. All these conversations have helped us better understand the complex picture that emerges regarding the multiple uses of these pastures by the different players, and their possible consequences for the ibex.

The expenses in summer 2015 amounted to about £1104, leaving us with approximately £1231 for expenses in the upcoming winter session. I am heading back to Pin valley now to collect fecal samples of ibex after the migratory herders have left the area. I am also looking forward to observing and better understanding the mating behaviours of the ibex in the winter.