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	Anirban Datta-Roy
Project title	Patterns of local hunting in mixed use landscapes of the Dihang Dibang Biosphere Reserve, Arunachal Pradesh
RSG reference	11031-1
Reporting period	April 2012 – April 2014
Amount of grant	£6000
Your email address	anirban@atree.org
Date of this report	20/08/2014

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
Documentation of faunal diversity in community managed forests		✓		Documentation of the faunal diversity was important as there was negligible existing information for this area. It was also important to highlight the importance of community managed forests in harbouring biodiversity, especially in northeast India where forests are largely managed by local communities as mixed-use landscapes. Avifaunal surveys provided the most comprehensive list of birds for this area as well as information on migrants. The mammal surveys had planned to use camera trapping in addition to trail walks, interviews and examination of animal remains to understand the mammalian diversity of the study area. However, camera trapping presented various problems and had to be shelved. The problems were due to the lack of electricity in the village for charging batteries as well as batteries getting exhausted quickly due to repeated movement of the *mithun,* a semi domesticated free ranging bovine animal that stays in the forests adjoining the villages.
Understanding spatial and temporal patterns of hunting in a village			✓	This was one of the primary objectives of the study and was achieved.
Land use mapping of surrounding areas based on RS/GIS and community mapping			✓	Land use mapping was achieved through the analysis of satellite imagery that was supplemented with detailed information from community mapping
Engagement with stakeholders		✓		Although the process of engagement with the different stakeholders (village council, forest department, district authorities) were initiated and achieved to different degrees, much more needs to be done. A mutual understanding of each other's concerns and positions needed to be established, and this was promoted through my meetings. It will also continue through forthcoming articles and reports.

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

One of the primary challenges of working in this region is the extremely high precipitation levels. The district of Upper Siang (location of study site) recorded 55773 mm of rainfall in 2008 (official statistics from http://uppersiang.nic.in/pages/know-district/profile.html. Such high levels of rainfall throughout the year in steep hilly terrain made fieldwork difficult. This issue was neither unforeseen nor was it possible to tackle it in any way. However, it was a significant drawback towards timely completion of work.

Power supply was virtually non-existent in the village. In addition to the usual problems due to lack of power, it also affected the exercise of camera trapping as batteries could not be charged frequently enough (the batteries themselves would get exhausted very frequently due to the constant movement of *mithun* or *Bos frontalis*). I procured a solar charging kit to address the power situation, but that too developed problems within a couple of months. This situation was finally tackled by discontinuing camera trapping and concentrating largely on the avifauna.

Another issue that was entirely unforeseen involved working in a village and following the rules and regulations of the place. People in the study village are animists with a few exceptions and village life is dominated by various festivals throughout the year. During these festivals, there exist movement taboos on the people of the village for 3-4 days. During this period, since none of the locals would be allowed to come out of their houses including the field assistant, work remained limited. This was tackled by listing all the festivals of the village beforehand and planning the work in advance.

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

- First-hand idea of the nature and extent of large mammal hunting in and around a tribal village

  One of the primary drawbacks with studies on hunting across the world is the lack of accurate information on the levels of hunting. Information on hunting is primarily based on recall interviews and anecdotes. Unfortunately, recall interviews can hardly be considered an unbiased source of information. The recall power among different hunters too, cannot be expected to be the same and there are chances that there may be omissions or even exaggerations. The other problem relates to questions of trust between the hunters and the interviewer. Often, these interviews are conducted by researchers who may be seen as 'outsiders' by the villagers due to their short visits and lack of familiarity with the individuals from whom they are demanding 'sensitive' information. At best, hunters can provide approximate numbers of animals that were killed in a year which fails to provide any insight on the spatial and temporal patterns of hunting and the factors that influence it.

  My long presence and familiarity with the villagers allowed me to gain their trust and set up an offtake monitoring system. Hunters provided me with details regarding the location of the hunt (local name of the area), and the method of hunting/trapping and specific information on the hunted animals (species, age, sex, weight etc.) as and when they were hunted. This allowed me to form the first complete picture of the nature and extent of village hunting in an Adi village. The analysis of seven months of offtake monitoring data provides the following highlights:

- Information on off-take was restricted to large mammals as hunters primarily sought out these animals due to their large body size as well as other cultural reasons. Smaller mammals such as civets and squirrels are also hunted, but are difficult to get accurate information as they are considered too small to be mentioned.
- During the period of the data collection on large mammal hunts, three species were hunted (wild pig, barking deer and Asiatic black bear)
- A total of 25 animals were hunted and trapped by hunters. Of these, 22 (92%) were hunted with guns and three (8%) of them were trapped using snares.
- Among the hunted animals, wild pigs (60%) were the most commonly hunted animals followed by barking deer (36%). Only one individual of a black bear (4%) was killed.
- Successful hunters who set out with guns with the intention of hunting (planned hunt) outnumbered the opportunistic (unplanned hunts). Planned hunts accounted for 92% of all successful hunts, while the rest 8% were unplanned. Among the planned hunts, there were three kinds of strategies adopted by the hunters. These are general gun hunting (which involves actively searching for animals in the forest based on calls or tracks), drive hunt (where a group of people drive an animal towards the hunter to shoot) and waiting (usually near a fruiting tree where wild animals are known to come for fallen fruit). Among the unplanned hunts, the hunters were either searching for their *mithun* or searching for cane in the forest.
- There are two aspects of the temporal distribution of hunting activity. One relates to the most preferred time of day used for hunting. The other relates to the seasonal aspect and distribution of hunting across a year. Short distance hunts that are in the vicinity of the village are completed within one day and the time period within the day during which hunters ventured out for their hunts was between 0300 and 1930 hours.
- Almost all the hunts required more than 6 hours. This time was calculated as the number of hours spent by a hunter outside his house and includes travel time as well as hunting time.
- The average time spent on a hunt was 10.02 hours with a minimum of 4 hrs and a maximum of 13 hours and 30 minutes.

➢ Presence of garden hunting in the shifting cultivation landscape and its importance

'Garden hunting' is an umbrella term for hunting that occurs in cultivated fields and house gardens for primarily terrestrial animals that prefer such habitats (Linares, 1976). This form of hunting not only guarantees the availability of prey species in close proximity to the village, but also acts as a way to control crop predators. In the context of shifting cultivation landscapes and the matrix of recovering fallows and current farmland, garden hunting appears to be extremely important to hunters as shown by Smith (2005) in Panama, where almost half of all hunted animals were from agricultural fields and fallows. There has been no mention of the phenomenon of garden hunting in the context of northeast India, although anecdotal reports existed.

Results from my study indicate that there appears to be a zone of hunting around the village that is primarily composed of a matrix of fallows, *jhum* patches and forest patches that are regularly used. The hunting in this area is synonymous with the 'garden hunting' described by various authors in shifting cultivation landscapes elsewhere in the world. The majority of hunts

take place around the village within a distance of 6 km. Within this, the maximum numbers of hunts are seen within 2-4 km.

My study demonstrates the importance of garden hunting to villagers. This garden hunting that takes place in the mixed use landscapes surrounding the habitations, is used by a variety of animals such as the barking deer (*Muntiacus muntjak*) and the wild pig (*Sus scrofa*). These are the same animals which are predominantly hunted by the village hunters. One of the major factors shaping these landscapes is the mosaic of shifting cultivation, secondary forest and fallows. In the absence of shifting cultivation, such a landscape would not be possible. Government agencies have repeatedly been trying to push for cash cropping and settled terrace cultivation in the hills of northeast India. The consequences of such a transition are not only harmful for food security, but will also affect the production of mixed use landscapes and the animals that can be hunted in these landscapes. This may result in hunters moving to mature forest areas and hunting more endangered animals. It is thus in the interests of biodiversity to encourage shifting cultivation systems in these areas.

- Demonstrating the importance of community managed forests in supporting biodiversity and highlighting the biodiversity richness of this area through the extensive bird list and mammal information.

One of the most significant findings of this project has been the documentation of mammalian and avifaunal diversity that exists in the vicinity of the villages in this area. There exists extensive tracts of primary forests and a matrix of secondary forests, *jhum* fallows and current cultivation areas which are managed by the local communities for shifting cultivation, hunting and fishing and extraction of NTFP. These landscapes are not 'protected areas', and are categorized as 'Unclassed State Forest' by the Arunachal Pradesh Forest Department. The importance of these landscapes to mammals and avian fauna has been consistently underestimated, with most biodiversity surveys and the subsequent conservation efforts being restricted to the protected areas. The results of the faunal surveys have shown that the biodiversity richness of such mixed-use landscapes in this region is comparable to many of the protected areas that are usually surveyed. My surveys have revealed the presence of at least 25 species of mammals and more than 240 species of birds in the area. This includes rare and endangered fauna such as clouded leopard (*Neofelis nebulosa*), Asiatic black bear (*Ursus thibetanus*), wild dog (*Cuon alpinus*), Asian small clawed otter (*Aonyx cinerea*) and the occasional tiger (*Panthera tigris*). The bird list for this area has been significantly increased from the earlier number of ~150 species. This includes various rare species such as the rufous necked hornbill (*Aceros nipalensis*), Asian emerald cuckoo (*Chrsococcyx maculatus*), lesser kestrel (*Falco naumanni*), chestnut thrush (*Turdus rubrocanus*), beautiful nuthatch (*Sitta formosa*) and the greater rufous headed parrotbill (*Pardoxirnis ruficeps*). The area also appears to be an important migratory corridor for birds migrating from the plains of Assam to the Tibetan plateau. These findings will be described in scientific and popular articles subsequently, that can hopefully bolster the case for including this area as an Important Bird Area (IBA) by Birdlife International.

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

This project would not have been possible without the cooperation and involvement of the villagers. Naturally there was constant engagement with them as I also stayed in the village for a year prior to the Rufford grant was received as well.

The grant helped pay for employment of a field assistant from the village for 1.5 years and another additional field assistant for a few months.

The project provided an opportunity to understand the traditional natural resource management practices including the cultural connections with activities such as hunting. I believe my project contributes to providing a true and clear picture of tribal practices such as hunting and trapping that showcases their practices and the strong local institutions which regulate them. It also helps in dispelling ideas on hunting that have developed over the years due to anecdotal and half baked information. At the same time it highlights the importance and effectiveness of local institutions in managing biodiversity around villages and the necessity to engage with them even more.

During the study period, a massive outbreak of Foot and Mouth Disease in the area devastated the population of semi domesticated cattle (*Bos frontalis*). I tried to highlight the plight of the people of this region through an article along with a fellow RSG grantee Karthik Teegalapalli.

As part of the larger project for my PhD, I needed to interact with various government officials including senior bureaucrats of the district. During these interactions, I took the opportunity to discuss issues of concern for the people in the village and suggest measures to address them.

5. Are there any plans to continue this work?

There are plans to continue this close relation with the villagers and district authorities and to ensure the recent spurt of developmental activity in this region does not harm the biodiversity and the traditional livelihoods of the people. Although I am currently busy writing up my PhD thesis, I maintain regular contact with the villagers and various district authorities.

My experience in the field has taught me that studies of this nature cannot be done in a hurry as it requires a great deal of trust and local support. However, it is worthwhile investing that time and effort if we are to get a true picture of the natural resource use patterns by indigenous tribal groups in a place like Arunachal. I plan to continue my work in the current field site and also look to expanding my experience to similar communities in other parts of Arunachal Pradesh.

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

This project forms a part of my PhD work which will be published as a thesis on completion. In addition, various aspects of the work will be highlighted through popular articles, photographs, talks and peer reviewed scientific articles.

I will also be communicating and providing reports to the state forest department as well as other officers in the district and state administration.

Most importantly, I hope to engage more actively with the policy makers in providing inputs based on my work that can be translated into more effective policy. A recent opportunity to provide inputs on the proposed Arunachal Pradesh Forest Act allowed me to use my knowledge of the landscape and drawbacks with existing policies.

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 over a period of 24 months. The anticipated time period for use of the grant was 1 year. The extension was necessitated by the various delays and problems associated with unpredictable weather in one of the highest rainfall areas in the world, logistics of working in a remote mountainous area and the challenges of working in a village.

The grant formed half of my entire PhD fieldwork period and I am extremely grateful to the RSG for extending the time period for utilisation of funds and completion of my work. The extension was critical for me to complete the last leg of my field work.

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
Travel	850	1096.90	(246.90)	Travel expenses in the field site was very high, especially vehicle hiring charges. The prices of petrol and diesel were also hiked during the period of the project. Repeated trips to the study site thus exceeded the estimated travel budget
Field Equipment	263	371.27	(108.27)	Additional field equipment had to be purchased every season because of wear and tear. Also, field equipment for field assistants was also purchased
Consumables	150	300.25	(150.25)	Lack of electricity in the field site necessitated repeated purchases of candles etc. as well as batteries which were used for camera traps. I also maintained a stock of essential medicines for emergencies in the village
Communication	295.70	132.82	162.88	Communication over phone and internet was sporadic and restricted which saved some funds. I was also unable to complete a planned poster on the biodiversity around the village.
Contingency	546.20	545.45	0.75	
Laptop	657.90	654.02	3.88	
Portable Solar charger	131.60	125.76	5.84	
Digital Camera	263.20	0	263.20	The entire fund remained unused as I was

Traps				able to borrow camera traps and for the limited period that I used them, did not require to pay for them
Per Diem	1895	1591.38	303.62	Per diem expenses were high due to the long periods that had to be spent in the village and other interior areas
Salaries	947.40	1142.89	(195.49)	Additional assistants and the additional time after the no-cost extension during which the field assistant needed to be paid exceeded the budget
Total	6000	**5960.72**	39.28	

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

As I mentioned earlier, this project has taught me the importance of working closely with communities and winning their trust and support if we are to truly understand village hunting. Interventions to 'manage' hunting cannot be decided beforehand unless there is a clear understanding of the reasons behind hunting as well as a true picture of the magnitude and spatial and temporal patterns of those hunts. Also, most tribal communities have very strong local institutions which already have rules and regulations with regard to natural resource extraction. It is important to work with these institutions and encourage greater interaction with the government agencies. Thus, research on hunting needs to engage more with the community and understand them from the inside. At the same time, there is a need to promote greater understanding between government agencies and local communities. This can usually be a stumbling block due to the reluctance of both sides. These interactions can however be catalysed by the researcher who is able to the see the issue (hopefully) from the point of view of both the sides.

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?

I am in the process of writing up articles on the work, and all of them will prominently acknowledge the role of the grant provided by RSG. I have also used the Rufford logo at the Annual Work Seminar presentation at ATREE for my presentation titled 'Fallow Hunters: Spatial patterns of village hunting in a mixed-use landscape'. I also plan to make posters on the fauna of the area in collaboration with the local authorities which will have the RSG logo.

11. Any other comments?

I want to reiterate my gratitude to the RSG for allowing me a 'no-cost extension' that allowed me to utilise the funds in an appropriate manner. It has been crucial to my PhD work and took care of my field expenses for most of the PhD field work.