

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	Akash Verma
Project title	Firewood for fuel: monitoring the impact of tourism on local community resources and ecology of Himalayan high-altitude meadows.
RSG reference	20501-1
Reporting period	May 2017-April 2018
Amount of grant	£5000
Your email address	verma.env@gmail.com
Date of this report	18/05/2018

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
Comparative study of firewood consumption at two famous tourist routes in the western Himalayas, namely Rudranath and Tungnath.				Please refer to comment 1
To know the influence of external factors on firewood consumption				Please refer to comment 2
Understanding the perception of inhabitants on the impacts of firewood harvesting				Please refer to comment 3
To develop an informed, sustainable model for firewood harvesting				Please refer to comment 4

Comment 1: Firewood consumption between two tourist sites:

The lodges at Rudranath consumed an average of 27.12 kg of harvested firewood per day during the summer season. The consumption ranged between 9-48 kg for a given day depending on tourist numbers and weather conditions. Tourist activity appeared to influence firewood consumption, but it was sporadic as two lodges were preferred by tourists to camp overnight while the rest were just pit stops for a quick refreshment. More importantly, all the lodges were fully dependent on firewood as their only source of energy, with no other fuel being consumed, including cow dung. In comparison, all the lodges on the Chopta/Tungnath route have switched to LPG cylinders as their primary source of energy (figure 1), but firewood is still used for part of the cooking process, and space heating in winter for the lodges that are still open during the winter season. A total of 10 species were harvested and there was a decrease in number of species harvested with a decrease in elevation. *Rhododendron campanulatum* and *Quercus semecarpifolia* were the only harvested plants at the highest elevation zone surveyed (figure 2).

Comment 2: Influence of external factors on firewood consumption

Accessibility appeared to be the primary cause of firewood consumption for the lodges. Lodges in proximity to a motorable road (Chopta/Tungnath) had all switched to LPG while lodges further away from the road were still exclusively using firewood (figure 1). Economic factors (cost of purchasing firewood vs LPG) and health benefits were further mentioned as the drivers for lodges adopting LPG. The transition from firewood to LPG for the lodges looks promising as it helps them avoid severe indoor air pollution while catering to large number of tourists. The lodges

further from the road currently have no other option but to use firewood. Sustainable harvesting should be encouraged for these settlements.

The number of species harvested decreases with increasing elevation. Lower elevation lodges tend to harvest a larger number of species, with the highest elevation zone dependent on just two species. Lodges in 2500 – 2999 m elevations were all in the high accessibility area and had switched to LPG. Their harvesting and purchasing was driven primarily by space heating requirements during the winter months. This may explain the low species count for that elevation zone. Firewood consumption generally increased with increasing number of tourists for the Rudranath route. Radius of harvest increased with elevation and ranged from 100 m at the lower elevation lodge to almost 1000 m for the higher lodges. Figure 3 shows the various species harvested from the questionnaire responses. *R. arboretum* and *Q. leucotrichophora* face the biggest harvesting pressures and were harvested through a large range of elevations. Whereas, *V. contifolium*, *F. virens*, *C. deodara*, and *A. falcata* are usually harvested in only a given elevation zone. The data includes both lodges and villages.

We expanded our study objectives to include three villages to better understand the factors behind LPG and firewood utilisation. Villages of Mandal, Siroli and Dumak were chosen. Mandal and Siroli are highly accessible and are close to a motorable road, while Dumak is further away and at a higher elevation. Accessibility was a clear distinguishing factor for Dumak and all families were completely dependent on firewood as the primary source of energy. However, majority of families in the villages of Mandal and Siroli still use firewood as the primary source of energy, which indicates that physical accessibility may not be the only factor forcing people to use firewood. To rule out the economic factors, we looked at the households that owned an LPG cylinder. Surprisingly, over 65% of households with an LPG cylinder still used firewood as the primary source of energy, while the LPG usage was restricted to menial tasks or emergencies. This indicated an incongruity between LPG adoption (households that had an LPG) and actual utilisation (households that used LPG as the primary energy source). The most common response given by the villagers was “the food tastes better when cooked on firewood” or “we have been cooking like this for generations”, which highlighted the socio-cultural factor behind firewood consumption.

Average daily firewood consumption was 9.01 kg/day for lower elevation high accessibility villages in the winter compared to 16.63 kg/day for high elevation low accessibility villages. Additionally, differences in stove design was a surprising observation. The lodges and settlements at Chopta/Tungnath had all made a close-structured clay oven with an opening towards the top, which retained and directed heat better towards the base of the cooking vessel. One lodge had the interior of the oven coated with pieces of glass to aid thermal retention. In comparison, all the lodges and households in the Rudranath region were still using a more open-top basic stove design, which caused more smoke and increased the quantity of firewood consumed. Surprisingly, there was no knowledge transfer between the two sites despite such proximity. One of the elders at Tungnath pointed out that the houses and lodges had all shifted to a better stove design about a decade ago,

while the neighbouring villages might still be carrying on the stove design tradition of the migratory shepherds.

Comment 3: Understanding the perception of inhabitants on the impacts of firewood harvesting

The questionnaires revealed some important results regarding the perception of the locals towards firewood harvesting. Majority of the individuals believed there was a decrease in availability of firewood and they had to travel further to harvest now than before. About 22% of the individuals mentioned recent conflict with the forest department over harvesting issues. 88% of the respondents believed that the firewood harvesting was impacting the ecosystem around them in a negative manner. However, more than 82% were unaware of fuel efficient stoves. On a positive note, everyone was willing to use a fuel-efficient stove if provided. More importantly, every individual was willing to contribute towards the cost of a fuel-efficient stove if it meant lesser firewood and smoke.

Comment 4: To develop an informed, sustainable model for firewood harvesting

Through our detailed discussions with lodge owners, villagers, village head/elders, and the local authorities, we were able to emphasise the importance of reducing firewood consumption to maintain the forests. However, we also realised that low accessibility areas had no option but to use firewood. A motorable road is being constructed to the high altitude village of Dumak, which could influence LPG adoption for that village in the future, but provided that the villagers proceed with it. There are conflicting opinions on firewood harvesting for region as regrowth rates for the highly harvested species in the region are unavailable. The villagers would prefer to continue using firewood on a fuel-efficient stove, but the authorities are pushing for complete transition to LPG stoves. Though we were able to have constructive discussions with all stakeholders, it appears the best step forward would be a combination of convincing villagers to adopt and utilize LPG, while simultaneously improving stove technology for those settlements that are inaccessible by motorable roads. This would require further community level work with support from the relevant authorities.

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

Working in the high elevation rural areas is extremely difficult for individuals from urban city centres. The harsh climatic conditions along with remoteness of some of the study sites makes data collection an exhausting process. During the project, we encountered difficult weather conditions, floods and landslides which restricted our movement between study sites. Additionally, team members were met with injuries while trekking between study sites which resulted in gaps in data collection. Building trust with the locals is always a challenging part of a study, even more so when it involves collecting data on a delicate resource such as firewood. Many individuals were not willing to participate in the questionnaires or refused to answer certain questions, believing that it may lead to issues with the forest department. Some lodges and households did not allow quantitative measurements of firewood using the weighted survey methodology, thus restricting the data from these individuals. I

adapted by expanding the scope of the study to include three villages, namely Mandal, Siroli and Dumak. In the later half of the study, I was selected for my PhD programme and had to travel back to the capital to perform the necessary paperwork and registration formalities. This resulted in data collection by the student volunteers which was unsupervised for small periods of time. Additionally, this increased travel costs for the study.

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

1. Accessibility only partially influences firewood consumption. Proximity to motorable road allowed lodge owners to access LPG cylinders, thus eliminating firewood consumption to a large extent. However, the scenario is different for villages, as firewood consumption continues in households that have adopted LPG cylinders.

2. We learned that firewood remains the primary source of energy for village communities. There exists a discrepancy between LPG adoption and actual utilisation, which cannot be explained by physical or economic accessibility.

3. Socio-cultural inertia will need to be overcome to reduce firewood consumption for villages.

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

For this study, I hired a local villager as my field assistant and guide. He was 19 years old and belonged to an economically challenged family. He was able to earn an income from this project, but also gained a lot of experience in assisting research. Additionally, he observed the better stove design in Tunghath and vowed to return to his village after the project and redesign the firewood stove in his house to economise the firewood consumption.

5. Are there any plans to continue this work?

I intend to continue my work in the region. I am currently a registered PhD student and will be studying dynamics of forest resources in the region for my thesis. I am keen on continuing this work with the villages and the local authorities by facilitating the transition from firewood to LPG, which is in line with the larger development agenda of the government. For the settlements that cannot access LPG, I would like to work with an NGO to bring in fuel efficient stoves, or work with the communities themselves in constructing better designed stoves.

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

I am currently preparing a manuscript for a peer reviewed journal. I hope to be able to publish our findings later this year. I am also looking forward to presenting my research at the Student Conference on Conservation Science to be held in Bangalore, India at the end of September.

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 project was started on time and field work continued through till March 2018.

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
Return road travel from headquarters to the field	200	350	150	There were unexpected changes in tickets costs over time. Additional trips to the field site were needed as well.
Local travel in the field, including porter, vehicle hire and bus.	200	200	0	
Accommodation and food for six people (Principal Investigator, Field Assistant, and four volunteers): GBP 400 per month eight months	3200	3200	0	The initial budget was for 4 people, but we were able to fix rates for longer duration with the lodges which allowed us to accommodate 6 people in the same budget.
One Field Assistant GBP 100 per month for eight months	800	800	0	
Field gear (torches, batteries and camping equipment) and clothing	300	200	-100	Some of the equipment was sourced from colleagues and friends.
Spring Balances (8 pieces)	100	100	0	
Consumables and Stationery	100	50	-50	
Contingency expenses	100	100	0	
Total	5000	5000	0	Exchange Rate 1GBP = 81 INR

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

I feel two important tasks need to be done. Firstly, there needs to be communication from the authorities through workshops or village meetings which encourages households to shift to LPG as the primary source of energy and keeping firewood for emergency purposes only, rather than the other way around. This is not only an economic issue but linked to socio-cultural habits of the people, which need to

evolve slowly and internally, rather than through an abrupt external force or pressure. Secondly, there needs to be better ecological understanding of the forest ecosystems surrounding the villages. This requires detailed plant species richness assessment as well as regeneration potential. These two factors would be needed to develop a sustainable harvesting model.

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?

The Rufford Foundation logo was used in all correspondence for this project. This included the advert for volunteers, emails, letters of undertaking, the questionnaire surveys, PowerPoint presentations etc.

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

Bhavuk Vijay and Prashant Mahajan were two student volunteers who handled the data collection on the Rudranath route. They covered the 8 lodges on that route over the course of the study. Prashant later went on to contribute towards another ongoing Rufford's Foundation funded project in the region as a volunteer. Parul Bhatnagar and Gaurav Uppal were two student volunteers who handled the data collection on the Tungnath route and the three villages. Vijay was the local field assistant and guide who helped us to navigate the region, build relationships with the villagers, and provided translation services.

12. Any other comments?

I am very grateful to the Rufford Foundation for this grant. The study helped to shed light on the nuances of firewood consumption in these villages and has opened further avenues of work for everyone who was involved in the project. I hope to receive similar support for my future endeavours.

Figure 1:

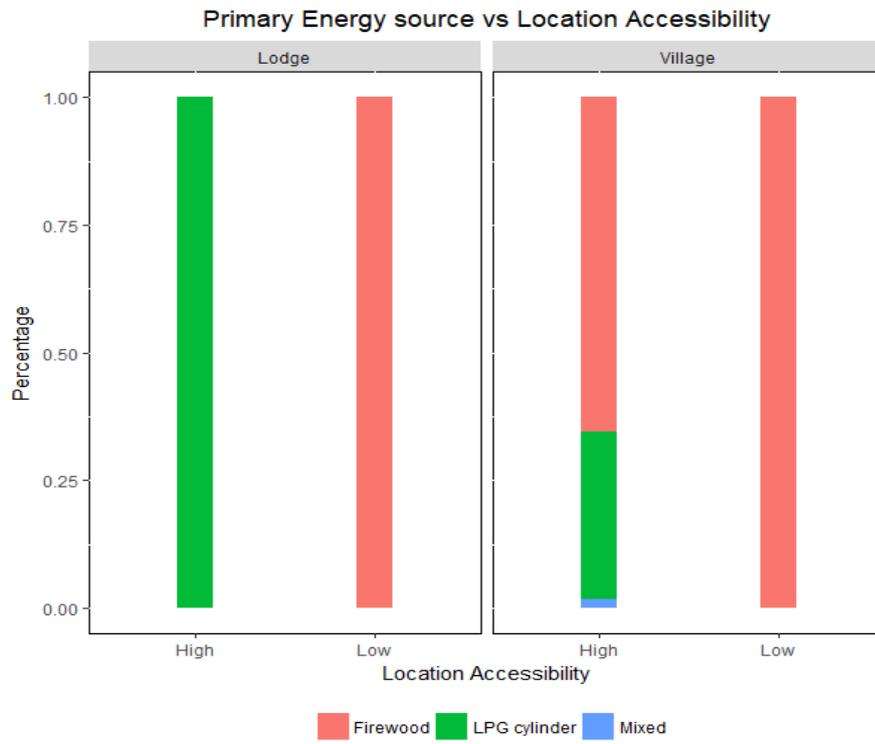


Figure 2:

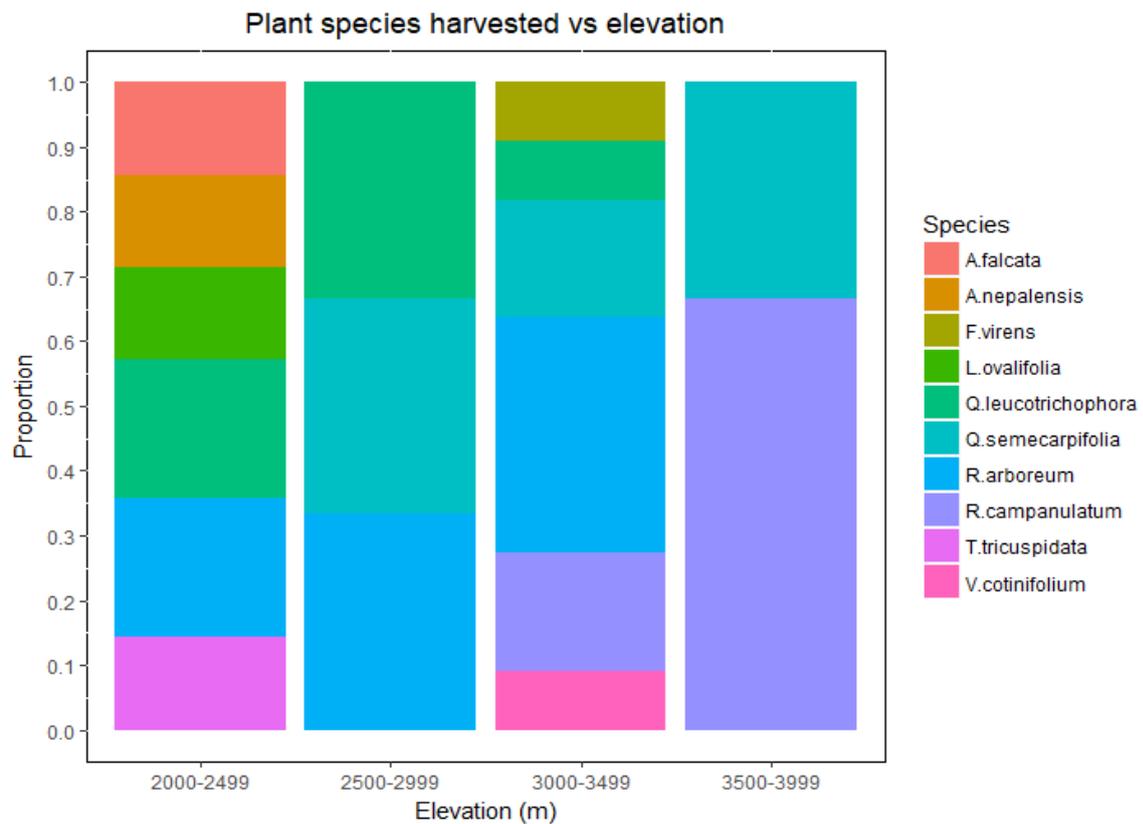
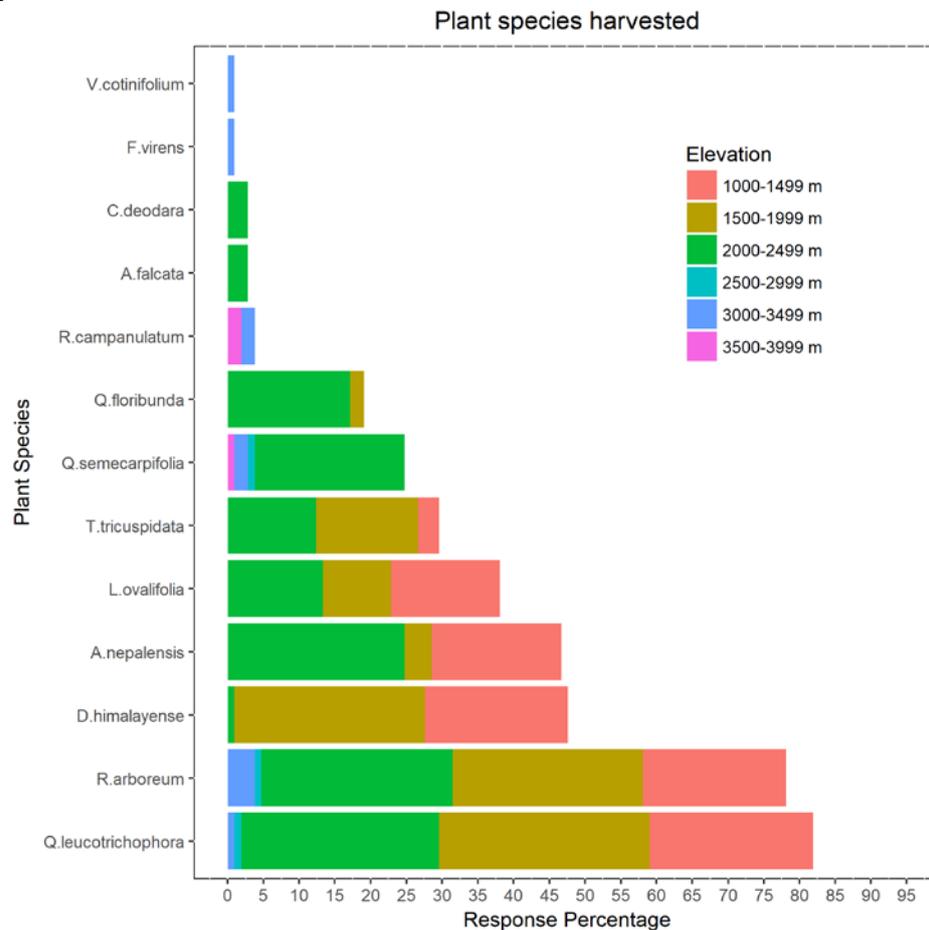


Figure 3:



Species Name	Common Name	Harvested (Response Percentage)
<i>Ficus virens</i>	Thelka	1
<i>Viburnum cotinifolium</i>	Ghenu	1
<i>Arundinaria falcata</i>	Ringaal	3
<i>Cedrus deodara</i>	Deodar	3
<i>Rhododendron campanulatum</i>	Semru	4
<i>Quercus floribunda</i>	Moru	20
<i>Quercus semecarpifolia</i>	Kharsu	26
<i>Trichosanthes tricuspidata</i>	Beladu	31
<i>Lyonia ovalifolia</i>	Angyar	40
<i>Alnus nepalensis</i>	Utis	49
<i>Daphniphyllum himalayense</i>	Ratnyala	50
<i>Rhododendron arboreum</i>	Buransh	82
<i>Quercus leucotrichophora</i>	Baanj	86