Final Evaluation Report

Your Details	
Full Name	Akash Verma
Project Title	Characterizing the dynamics of abandoned agricultural land and secondary forest in the Himalayas for supporting livelihoods and conserving biodiversity
Application ID	35050-2
Date of this Report	14.02.2023

1. 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
Identify and synthesize the motivations of farmers to abandon agricultural land in Nepal			■	Please refer to comment 1
Document the typologies of land management practices on abandoned land			■	Please refer to comment 2
Characterize and appraise the regrowth vegetation on abandoned land			■	Please refer to comment 3
Document the impact of agricultural abandonment on the local community			■	Please refer to comment 4
Develop potential strategies to support forest regrowth on abandoned land		■		Please refer to comment 5

Comment 1: Identify and synthesise the motivations of farmers to abandon agricultural land in Nepal.

We interviewed respondents from 162 households spread across two districts – Sindhupalchok (99) and Kavrepalanchok (63). The proportion of abandoned agricultural land varied between households – two households had abandoned all their agricultural land, and others ranged from 'more than half' (52), 'approximately half' (16) and 'less than half' (91). Most households had de-intensified some of their agricultural lands (reduced agricultural activities on their farmland without completely abandoning it).

Respondents identified seven key factors behind their decision to abandon or de-intensify their agricultural land: 1) crop raiding by wild animals, 2) shortage of agricultural labour, 3) physically unfit or old age, 4) migration of family members/children, 5) farmland was located far away from the house, 6) lack of irrigation facilities and 7) agriculture was not profitable anymore due to increased costs. 17 respondents had attempted to restart agriculture by switching from cereal crops to cash crops and fodder trees, but some failed due to continued crop raiding by wild animals.

Figure 1. A shed built by one farmer to guard his farmland against crop raiding by rhesus macaque (left), and our project team with officials from the Sub-Divisional Forest Department after conducting a focus group discussion (right).

Comment 2: Document the typologies of land management practices on abandoned land.

104 respondents had actively managed the land since abandoning agriculture. Land management activities included cutting grass or shrubs growing on the farmland, removing weeds, or inspecting the land for crop raiding by wild animals. Most of the respondents (139) continued using their abandoned agricultural land either for grazing cattle, collecting firewood, or collecting fodder or timber. One respondent had used his abandoned farmland for rearing pigs, and one respondent had completely converted his farm into a cardamom plantation.
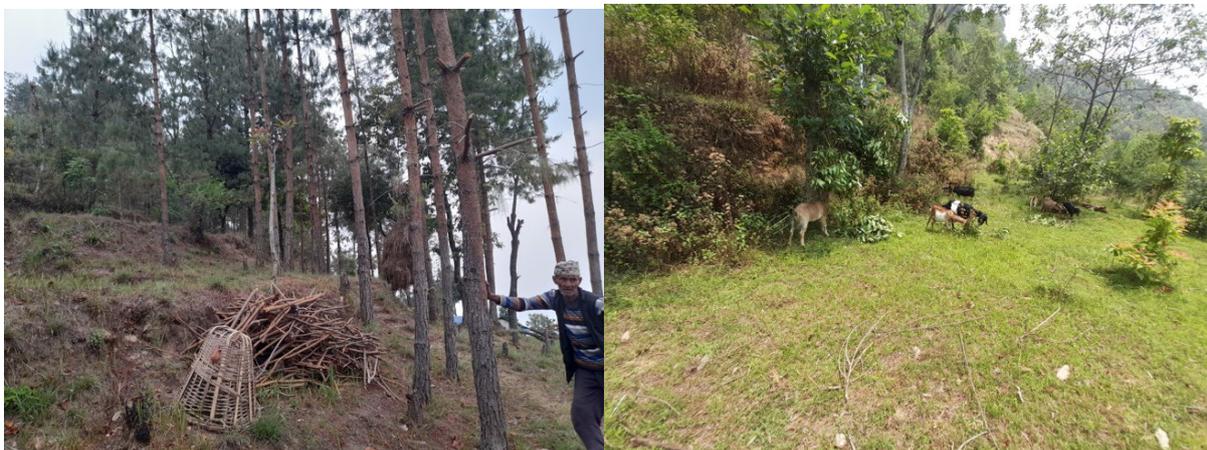

Figure 2. Abandoned and de-intensified agricultural land being utilised for firewood harvesting (left) and grazing livestock (right)

Most respondents did not perform any soil management activities after abandoning their agricultural land, i.e., they did not till the soil or added any fertiliser. Erosion prevention structures were not removed. 115 respondents did not plant any saplings or trees on their agricultural land after the abandonment. 39 respondents planted a mix of *Alnus nepalensis*, *Pinus patula*, *Zanthoxylum armatum*, and *Amomum* sp., and the trees could survive for a long time. Importantly, around two-thirds of the respondents reported that saplings and trees had emerged on their abandoned plots without any interventions.

Comment 3: Characterize and appraise the regrowth vegetation on abandoned land.
Respondents characterised the current condition of their farmland as 'shrub-dominated' (74), 'tree-dominated' (43), 'grass-dominated' (36), and 'bare eroded ground' (four).

Figure 3. The current state of two abandoned farms. farmland with extensive tree regeneration (left) and farmland dominated by grasses (right).

We visited the farms of 153 respondents and assessed the vegetation on the abandoned plots. The time since agriculture was stopped ranged from 1 to 36 years, and some plots had been abandoned for several generations. Maize was the last crop planted on 132 plots before abandonment. All the abandoned plots were currently being utilised by the respondents for grazing livestock and collecting non-timber forest products (NTFPs) such as firewood, fodder, and grasses. Some farmers harvested timber from their abandoned farmland, but most extracted it from community forests. We observed the presence of large trees and evidence of tree regeneration (seedlings and saplings) on the majority of farmland, but most farms were classified as 'shrub dominated' (115). Tree cover was present in small patches or as individual trees scattered across the farm. 15 farms were characterised as 'tree-dominated' and dense tree cover was observed on eight farms where all the abandoned land was covered with trees. Across all farms, the size of trees ranged from 10-60 cm DBH and 3-30 m height. Average tree DBH was 25.5 cm and height 12.19 m. Disconcertingly, we detected the presence of invasive species in almost all the farms.

Comment 4: Document the impact of agricultural abandonment on the local community.
While agricultural abandonment is an outcome of Nepal's changing social and demographic structure, it has important downstream impacts. According to the respondents in focus group discussions, abandoned agricultural land resulted in an increase in crop-raiding on adjoining non-abandoned agricultural lands. Respondents suggested that active agricultural plots acted as buffers against crop raiding, and abandoned plots increased the risk of crop raiding on neighbouring plots. Crop raiding was primarily due to troops of rhesus macaque, but the regrowth of forests on some of the abandoned land had increased the fear of livestock depredation by carnivores. Respondents indicated that agricultural abandonment

had led to an increase in unemployment, and a decline in the availability of locally grown cereal crops, resulting in more pressure on the community to purchase food from external sources. These factors further increased out-migration and agricultural abandonment. Most respondents believed that the availability of timber and NTFPs for community members has increased.

Comment 5: Develop potential strategies to support forest regrowth on abandoned land.

Our interaction with farmers revealed a key aspect of agricultural abandonment – that forest regrowth on abandoned agricultural land is not always the best solution for some farmers. Our respondents could be divided into two groups; 1) farmers who had ceased all cropping and management activities on their farmland, and 2) farmers who had stopped planting cereal crops but maintained some form of active agriculture (de-intensified). Farmers in group 1 were not keen on continuing to utilise the abandoned farmland and were neutral about forest regrowth, but farmers in group 2 had a negative opinion of forest regrowth and were willing to invest time and energy to extract some or any agricultural output (non-cereal crops) from their farmland. For example, some farmers in group 2 had already shifted to agroforestry or had planted shade-loving cash crop plants such as cardamom, which require less labour input and maintenance than cereal crops. One farmer in group 2 was able to sell his cardamom harvest for around NPR 300,000. Thus, our recommendations are intended to support forest regrowth on abandoned agricultural land for group 1-type farmers and restore some agricultural activity for group 2-type farmers.

In discussion with local community members, farmer groups, and officers from the Sub-divisional Forest Offices (SDFOs) and Divisional Forest Offices (DFOs), we were able to develop some key suggestions for relevant stakeholders:

1. The last agriculture census did not account for abandoned agricultural land. We recommend that the next agriculture census by the state and national governments should record information about abandoned and de-intensified agricultural land.

2. Farmers cited the lack of availability and access to suitable seedlings and saplings for tree plantation. The Divisional Forest Office, however, said that programmes to disburse seedlings to farmers had failed due to very low interest from farmers. We identified a critical lack of communication between the two stakeholders and recommended that the Sub-Divisional Forest Office liaison between the DFO and farmer groups to ensure farmers can access the information and resources intended for them.

3. The DFO and farmer groups need to consider crop raiding by animals as a key driver for agricultural abandonment and de-intensification. Relevant authorities and researchers need to develop strategies to reduce the incidents and impact of crop raiding.

2. Describe the three most important outcomes of your project.

a). We identified a key communication gap between the Forest Department and the farmers which may have previously resulted in the underperformance of initiatives by the Forest Department targeted at providing seedlings to farmers. By meeting farmers and officers from the DFO and SDFO, we were able to bring relevant stakeholders together and initiate a dialogue that would improve the transmission of information and resources between the two stakeholders.

b). Through the project, we were able to train four field assistants in research methodology, including delivering questionnaires, conducting focus group discussions, and collecting ecological data.

c). Through the project, we were able to connect senior officials at the Ministry of Forest and Environment, Government of Nepal (MoFE), with senior researchers from the Centre for Nature-based Climate Solutions (CNCS) at the National University of Singapore. The two parties have agreed to collaborate on research focusing on improving carbon estimates of Nepal's forests.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

Working in rural montane regions is extremely difficult, and the field team encountered rough terrain and inclement weather, which made it difficult to travel between villages and collect data. Two unforeseen circumstances arose during the project – the early arrival of an extended monsoon season and local municipal elections in Nepal. These two issues interrupted the field work and threatened to reduce the number of households we could target. We responded by splitting the field data collection into two phases – before and after the monsoon – and increased the intensity of data collection. We utilised the monsoon season to review the preliminary data and adjust our methodology as needed. Once the monsoon ended, the field team was quickly deployed and had uninterrupted data collection. We hired additional field assistants to support the data collection and were able to meet our target for household surveys.

4. Describe the involvement of local communities and how they have benefitted from the project.

During the project, we stayed in homestays which were owned and operated by local residents and farmers. Thus, most of the expenses towards food and lodging contributed to local income. We trained four field staff in qualitative and quantitative data collection. Jibesh Kumar K.C. was the lead field assistant and led the questionnaires and ecological assessment. He gained valuable insight and field experience, which he aims to incorporate into his PhD proposal. Krishna Rawal, Nirajan Rokaya, and Sujan Pandey supported Jibesh in the data collection. All field assistants were paid fair wages in accordance with their work experience.

5. Are there any plans to continue this work?

The scale of agricultural abandonment in Nepal is quite large, but the issue has not gained enough attention from the government. Critically, farmers are willing to convert their abandoned and de-intensified farmland into profitable farmland, provided they have adequate support. I plan to continue working with collaborators in the MoFE, Forest Department, and other researchers to develop strategies which make the land profitable for farmers.

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

I will supplement the field data with remote sensing data from satellites and publish the results in a scientific journal. The publication will be shared with all our collaborators in Nepal. Furthermore, I am working with the communications and outreach team from CNCS to release two newspaper articles which will focus on agricultural abandonment in Nepal and the potential for carbon sequestration. The scientific publication and newspaper articles will be shared with the scientific community through a series of posts on LinkedIn and Twitter. Last, I will present my work at a conference which focuses specifically on land cover change and agricultural dynamics.

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

As described in Section 6, important next steps include preparing a manuscript for publication. Furthermore, I aim to develop research proposals with team members who want to pursue their MSc and PhD programmes.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

All respondents, participants in focus group discussions, and our collaborators were informed about the important role of The Rufford Foundation in supporting this research. The Rufford Foundation logo was used in two public presentations and LinkedIn and Twitter posts, and the logo will continue to be used in all upcoming publicity material.

9. Provide a full list of all the members of your team and their role in the project.

Jibesh Kumar K.C. was the lead field assistant. Jibesh contributed to the development of the questionnaires, established contact with local authorities to inform them of our project, used a snowball sampling method to find farmers with abandoned agricultural land, conducted interviews and focus group discussions, collected ecological data, and reached out to senior officers at the DFO, SDFO, and MoFE to set up meetings.

Jibesh was supported by **Krishna Rawal, Nirajan Rokaya,** and **Sujan Pandey** in the data collection.

10. Any other comments?

I am very grateful to The Rufford Foundation for this grant. The study helped to shed light on the nuances of agricultural abandonment and de-intensification in these villages and has opened further avenues of research and work for everyone who was involved in the project. I hope to receive similar support for my future endeavours, and I aim to guide young researchers to pursue their own grant applications.