

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Swati Dagar
<b>Project Title</b>	Assessing the mechanism and impacts of the integration of non-native plant species into the pollination networks of the native plants.
<b>Application ID</b>	33893-1
<b>Date of this Report</b>	23 August 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
Observational Pilot Study: To identify the appropriate field site and vulnerable native plant species which needs to be studied.				Successfully identified two field sites across the Himalayan foothills and two co-flowering native species namely, <i>Sida rhombifolia</i> and <i>Callicarpa macrophylla</i> , facing possible threat from invader <i>Lantana camara</i> .
Experimental Study: To study the impact of addition or removal of invader species from the neighbourhood of native species on their dependent pollinator behaviours and site factors affecting it.				Delayed a bit because of abrupt weather conditions during the study period but all required data was collected successfully.

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

**a).** The non-native plant species *Lantana camara*, *Ageratum conyzoides*, and *Eupatorium agg.* have extended their distribution to elevations of 3000m in the state of Uttarakhand, whereas they were previously documented to exist only within the range of 2000-2500m.

**b).** In the study area, no noteworthy competition for pollinators was detected between the invasive species and the native focal species. Conversely, when *Lantana* was present at lower densities, up to 25%, there was an observed enhancement of pollination services for the native species by about 12%. However, at medium to higher densities (50% and 75%), there was no significant indication of either facilitation or competition. This implies that the accelerated growth of *Lantana* is likely not driven by competition for pollinators but rather by competition for resources like space, light, soil moisture, and nutrients. While these findings provide insights, additional research in diverse habitats is needed to validate these results further and to ascertain if competition for other resources plays a role in promoting the rapid expansion of *Lantana camara*.

**c).** The surveys from forest dependent communities and neighbouring agricultural field owners suggests that they are facing economical losses due to increasing *Lantana* population. The forest dwellers are losing land to graze their animals on since *Lantana* repels herbivores, and the agricultural fields are being

encroached by these invaders at a faster rate resulting in investment of more time and resources for its removal.

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

Initially, the entire project was planned to be completed in 2021 but due to Covid travel restrictions it took more time than expected. In summer 2021, only a short reconnaissance survey could be done. The pilot study and the rest of the data collection was done in summer 2022 successfully. Because of these restraints some of the minor project components were also altered and improvised but all the essential data were still collected to fulfil the main aim of the project.

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

A short informal survey from the local communities was conducted to understand their perspective on the non-native plant species in question and impacts they might be facing. It was concluded that locals who owned livestock such as goats, sheep, cows and others as a major source of their livelihood were facing serious problems as *Lantana* is not edible by animals and since the peripheries of the forests are now dominated by it, they have to go far deeper in the forests to graze their animals where they have increased threats from wild animals. They rely heavily on the forest managers now to find a solution for removal of these plant species.

So, the project has been able to identify this additional problem being caused by rapidly growing non-native plant species which was overlooked so far.

**5. Are there any plans to continue this work?**

Currently, there are no plans of continuing this work as it was a component of my PhD thesis, but I plan to pursue my career in invasion biology. So, if opportunity arises in future, I will prefer to work in the Himalayan region to explore this research question further with more robust results to promote evidence-based decision making to eliminate such invaders.

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

The results of this study will be published in a relevant journal and have also been shared with the forest managers of the concerned study area to make them aware of the extent of the problem.

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

There is still a huge research gap in this field of research especially in India, which hosts a diverse fragile ecosystem type and facing a severe threat from plant invasions. More and more studies should be conducted from varied habitat types of the country to determine the mechanism behind such rapid expansion of these problematic non-native species and extent of damage they are causing. Based on

such robust data over time the mechanisms can be understood more accurately, and accordingly better conservation strategies can be implemented.

**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?**

The results of this project have not been published anywhere yet, its still in progress. Being the major funding provider of the project, the credits will be given to The Rufford Foundation on publication, definitely.

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

No team members were hired for this project, I conducted all the field data collection on my own.

**10. Any other comments?**

No.