

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Luis Carlos Beltrán Lacouture
<b>Project Title</b>	Development of Plant-Disperser Networks in Restored Fragments in Los Tuxtlas, Veracruz, Mexico
<b>Application ID</b>	40460-2
<b>Date of this Report</b>	August 19 <sup>th</sup> , 2024

**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
Conduct a plant census in 24 restoration plots and 8 primary forest plots			X	Once in the field, after reviewing what would be necessary for data analysis, we determined that only 2 of the primary forest plots would be necessary. All 24 restoration plots were censused.
Conduct a bird and bat census.			X	These censuses were completed without incident.
Processing of seeds in fecal matter			X	154 seeds were collected from bird and bat faeces during the fauna census and subsequently processed for species identification.
Bat natural history workshop			X	Dr. Edith Rivas (INECOL) led the planning, coordination, and communication with the primary school for the event, with support from other experts who helped design and produce materials. The event, which included activities like drawing, games, and observing live bats, engaged 18 students from grades 4 to 6, and concluded with a plan to organize a future visit for younger students.
Data Analysis		X		Data processing and analysis is ongoing. A total of 5635 plants were censused. There are various unidentified species for which we have descriptions and photos. However, I have not yet finished going through the descriptions and photos to obtain the final IDs

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

**a).** The plant census alone is an invaluable complement to previously collected data and published studies. Because the census included plants smaller than 2 meters, the population reflects recent seed dispersal to the restoration plots. As in recent years some of the species planted in the restoration plots in 2006 started fruiting, they are very likely influencing the dispersal of animals that carry seeds to the plots. Ultimately, the results from the plant census should show how the provision of edible fruits to seed-dispersing animals influences recruiting plant communities, which is likely to provide recommendations for future restoration projects in the Neotropics.

**b).** One of the most significant outcomes of the project was the successful execution of fauna censuses in the restoration plots and primary forest. We conducted comprehensive sampling using 12 restoration plots, each equipped with two 10-meter-long mist nets. A total of 24 nets were deployed over two nights and two days in these plots, while in the conserved forest, we utilized four nets across two plots for the same duration. The census yielded 256 bat records (11 species), accompanied by approximately 148 excreta samples. For avian species, point counts were performed, resulting in 137 records of bird observations (45 species) and captures by August, along with six excreta samples. These efforts provided valuable data on the presence and activity of key species in the study areas, contributing significantly to our understanding of the ecological dynamics in both restored and conserved environments.

**c).** Through the Bat Workshop, we engaged primary school students from Balzapote and nearby towns in Los Tuxtlas about bats, fostering their understanding and appreciation by guiding them through interactive activities, including drawing, games, and the observation of live bats. Moreover, connections between Dr. Edith Rivas and the schoolteachers were strengthened, leading to an agreement on future activities with these schools to continue educating students about their local fauna.

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

Various difficulties arose during the project, but conversely, some parts of the project went better than expected, ultimately yielding a net positive:

- We had originally planned for a team of 12, but due to various unforeseen circumstances, only 8 were able to come.
- Of those unable to come was Dr. Cristina Martínez-Garza, who we were expecting as one of the leaders of the plant census as well as someone who would bring a vehicle with which to transport the team from the Biological Station to the experimental site. Thankfully, after relaying these developments to the head of the Los Tuxtlas Biological Station, she connected us with colleagues of hers who were willing to lend us their truck for the days we needed them.

- Of the eight people left on the team, one of these announced close to the census date that he would be unable to come. We were able to secure a new 8<sup>th</sup> member, but she was in Cancun and needed to be flown into Veracruz.
- Anticipating these difficulties, I devoted extra time to developing a photographic field guide for Los Tuxtlas plant species, which proved essential when we had to replace absent census leaders. Combined with a set of walkie-talkies and the team's exceptional morale and work ethic, this preparation enabled us to complete the plant census with remarkable efficiency, finishing all the plots necessary for data analysis in just six days instead of the anticipated ten.
- When we developed the grant application, I was assured by our team member at INECOL (in Mexico) that once the funds were received by INECOL, she could then access them, which seemed ideal given its proximity to the experiment. Unfortunately, this proved inaccurate, as INECOL would only release the funds to me as the project manager, and I did not have a bank account in Mexico. Consequently, I had to receive the funds in my Colombian bank account and then transfer them back to Mexico to cover the project costs. Due to multiple transfers and fluctuating exchange rates, the actual amount available was less than originally budgeted. However, because our team of eight accomplished in six days what we anticipated a team of twelve would do in ten, and with our colleagues securing additional funds for specific project needs (e.g., snake gaiters), we were ultimately able to complete the project within the available budget.

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

Local community involvement in this project has been most directly reflected through the participation of schoolchildren and their teacher from a local school in Balzapote, a key town in Los Tuxtlas. The workshop was developed in response to ongoing discussions with community members, where bats were often perceived negatively, occasionally resulting in harm to these animals. Given our research on the vital role bats play in restoration through seed dispersal and how forest protection benefits local agriculture and livelihoods, we recognized the importance of engaging with the community to educate them on the ecological value of bats. This workshop successfully engaged 18 students and their teacher.

In addition to direct involvement, the project indirectly benefits local communities through the restoration experiment itself, which, over time, offers anecdotal evidence on the compatibility of livestock farming with forest stewardship and restoration. Community members, like Jorge Velasco, who assist with experiment-related tasks, help ensure the experiment is well-known and easily observed. Through ongoing conversations about the experiment and the benefits that the local landowner, Benito Palacios, receives from the shade provided by the plots—along with other ecosystem services—we aim to demonstrate how restoration can be integrated into their land-use practices.

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

Yes, there are plans to continue this work! The experiment is expected to run at least until 2036, when the land lease expires. There is also a possibility that the plots could remain beyond 2036, depending on either a new agreement between Dr. Martínez-Garza and Benito Palacios, the landowner, or if Benito himself decides to preserve the plots as they are.

Moreover, given the workshop's resounding success, we plan to conduct similar workshops in the near future. We also intend to publish one or two studies based on the data collected through this Rufford Small Grant in peer-reviewed journals and to present our findings at conferences.

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

The results of our work will be shared through multiple channels to reach a broad audience. First and foremost, as mentioned earlier, we will disseminate our findings by publishing research studies in indexed, peer-reviewed journals, ensuring that our work contributes to the academic community and is accessible to researchers worldwide. Additionally, we plan to present our results at international conferences, where we can engage with experts in the field, receive valuable feedback, and foster collaborative opportunities.

Beyond academic dissemination, we aim to share our findings with the local community and stakeholders involved in the project. This will include organizing workshops and community meetings to discuss the outcomes and implications of our work, ensuring that the knowledge gained directly benefits those who are most affected by the research.

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

Looking ahead, the immediate next step is to finalize the identification of plants for which we were uncertain, enabling us to proceed with the statistical analysis. The insights gained from this analysis will be crucial in determining the direction of our research. Specifically, we will assess whether the data supports a single comprehensive study focused on plant-animal networks or if the botanical census alone offers sufficient novelty and insight to be published as a standalone study. Once this decision is made, we will move forward with preparing our findings for publication and presenting them at relevant conferences.

Beyond these immediate tasks, it's also important to consider how these findings might influence future research directions and conservation efforts. Depending on the outcomes, we may identify key areas for further investigation, such as the dynamics of specific plant-animal interactions or the impact of these networks on ecosystem restoration. Additionally, we will explore opportunities to expand our work to include other species or regions, further contributing to the understanding of ecological networks and their role in conservation.

#### **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?**

Not yet, but we are committed to using the Rufford Foundation logo in future presentations and other materials related to this project. Additionally, we will ensure

that the Rufford Foundation is credited in the acknowledgments section of the research studies that emerge from this work, recognizing their crucial support in making this project possible.

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

- **Dr. Luis Carlos Beltrán Lacouture (Project Leader):** I was responsible for coordinating all teams, leading the plant census, managing the project budget, and maintaining direct communication with the Rufford Foundation. Additionally, I conducted the data processing and analysis of the botanical data.

- **Dr. Edith Rivas-Alonso:** Led the bird and bat censuses, and was instrumental in designing and conducting the workshop. She was responsible for processing and analyzing the fauna census data and served as one of the four team leaders for the plant census.

- **Dr. Cristina Martínez-Garza:** Though initially scheduled to join us for the botanical census, Dr. Martínez-Garza was unable to participate due to unforeseen circumstances. However, she played a crucial advisory role, providing invaluable guidance in decision-making both in the field and afterward. We continue to collaborate closely with her as we plan the next phases of the project.

- **Dr. José Flavio Márquez-Torres:** Served as one of the team leaders for the plant census, overseeing the fieldwork and contributing to data collection.

- **Neptali Cabrales Sánchez:** Acted as one of the team leaders for the plant census, directing field activities and ensuring data integrity.

**- Plant Census Team Members:**

- Camila A. Marín
- Laritza González
- Rosmery Hernández
- Naomi Campos Rodríguez

These team members worked under the guidance of the respective plant census team leaders.

**- Animal Census Team Members:**

- Victor Manuel Vásquez Reyes
- Jorge Velasco
- Ana Laura Villalba Almendra
- Emmanuel Carlos Paniagua Domínguez
- Daniela Michel Carreño-Ochoa
- Hanya Arellano
- Penélope Daniela Ávila Burgos
- David Amador Ortega
- Haixa Yirimen Quiroz Gamez
- Oscar Oswaldo Flores Guerra

Each member contributed significantly to the fieldwork, data collection, and initial data processing stages of the animal censuses.

- **Dr. Santiago Sinaca Colin:** Continues to provide assistance with plant species identification, offering expertise crucial to the accuracy of our botanical data.

- **Dr. Lilia Roa-Fuentes (lilia.roa@javeriana.edu.co):** At the time, my postdoctoral supervisor at Pontificia Universidad Javeriana, Dr. Roa-Fuentes provided logistical guidance and strategic insight, which were pivotal to the success of the data collection stage.

- **Dr. Vinicio Sosa Fernández (vinicio.sosa@inecol.mx):** As the supervisor of Dr. Rivas-Alonso, Dr. Sosa Fernández offered general guidance and insight throughout the project and assisted with the fauna censuses.

**10. Any other comments?**

Regarding the "Transfer Fees" section of the budget below, I corresponded with Simon Mickleburgh of the Rufford Foundation regarding reallocation of funds to cover these fees.