

Final Evaluation Report

Your Details	
Full Name	Nancia Nasandratra Raoelinjanakolona
Project Title	Impacts of habitat fragmentation on plant-frugivore mutualistic networks in Madagascar's rainforests
Application ID	24944-1
Date of this Report	1st July, 2022

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
Characterize the structure of plant-frugivore networks in forest edge and forest interior				In total, we observed 36 plant species for 12 months. We conducted direct observation with 222 trees of 29 species and used camera traps with 22 trees of 19 species.
Assess how plant functional traits influence these networks				We measured the plant functional traits of the species we observed in the field as much as possible. However, we completed the data from the literature for the species that we could not get the traits in the field.
Quantify how frugivore loss caused by forest fragmentation might affect the strength and robustness of these networks				We used the empirical data from the field to attend this.

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

a). This project provided significant insight to better understand species interaction in Madagascar ecosystem and new information on the impacts of habitat fragmentation on plant-frugivore mutualistic network while both species tend to be vulnerable.

b). Conducting this project provided important professional and even personal, development for myself and the field research technicians. I developed experiences in coordinating and managing a research project with challenging difficulties and in training field research technicians. The local field research technicians also acquired new experience in various aspects of field data collection. Additionally, they gained basic skills in preparing a CV, interviews, communicating in basic English, and entering data into a computer. They also improved their knowledge of biodiversity, conservation, and science. They now become a leader in small-scale outreach activities in their villages and can manage a school built by the local communities for kids.

c). We provide recommendations of conservation strategies for each habitat type (especially in the forest edge or interior habitat) based on the interactions to preserve in each area.

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

For some tree species, we did not find a duplicate of trees in each habitat type because of intra-specific variations in fruiting time and duration among plant species. Therefore, instead of working on the forest edge closer to our campsite, we expanded our field site to find more trees in a very remote area to have enough individuals. We also added a second observation of the same fruiting tree to ensure we had similar observation times on each tree.

During data collection, we had difficulty in counting fruits/seeds consumed by frugivores when there were multiple on the same fruiting tree, and they ate very quickly. Thus, we changed our protocol a little so that we had focal individuals to observe the number of fruits consumed.

The batteries of camera traps that we used discharged very quickly because the camera traps were always in the field. Therefore, we had to go out into town to charge the batteries more frequently than expected.

At the beginning of fieldwork, we did not get sufficient data on frugivore feeding, maybe because of the weather. To compensate for this, we increased the number of local technicians when the number of fruiting trees in the field increased. Therefore, we made a few changes in the budget and expenditures to ensure that we had sufficient funds to conduct the project.

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

Local communities have been involved in different ways. First, I engaged three local people to assist in collecting data and the maintenance of our camp site. The job provided by this project benefited the local people economically and professionally. Even though only a few people could work on this project, I could say that this project contributed to the balance of economic and social in the village because it reduced the number of unemployed. Some local villagers who were not directly associated with the project benefited by providing services such as porters and by selling their crop products to our team.

The field research technicians who worked on this project gained new experiences and skills that would be useful for their future careers, such as improved understanding and speaking of English. They gained important skills on manipulating different materials such as camera traps and GPS. They also increased their understanding of local biodiversity and its conservation.

Additionally, I conducted outreach activities to raise awareness and improve the knowledge of local communities on the local biodiversity, their values, and the practice of sustainable agricultural techniques.

Finally, the local communities were very helpful in providing information about where we could find fruiting trees within the forest and finding locations for a new campsite

when we changed sites. Their involvement in that way allowed us to be close in relationship, and currently, they benefit from our support (my own contribution and our association) in school construction and materials.

5. Are there any plans to continue this work?

I have achieved all the stated objectives and end up of this work. However, this project allowed me to get new ideas on other research questions that are still around the plant-frugivore mutualistic network in a fragmented landscape that I am conducting.

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

I will share the results of this project with the scientific community and my professional network through:

(1) a doctoral dissertation, which will be archived in the online repository of the University of Antananarivo (<http://repository.ruforum.org>),

(2) publications in scholarly scientific journals, such as Biotropica, Ecology,

(3) talks and poster presentations at professional meetings (e.g., at the annual meeting of the Association for Tropical Biology and Conservation – ATBC).

I have already presented part of my research findings at ATBC 2018 in Malaysia, ATBC 2019 in Madagascar, and at the SCCS 2019 (Student in Conference and Conservation Science). I also have an approved abstract for presentation at the Frugivores and Seed Dispersal conference in 2020, but I could not present because of the lack of travel funding.

I made the results public by submitting reports to Malagasy authorities and local outreach activities. I will submit updates of this project on Facebook and Twitter as well to communicate my results to various audiences.

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

I have already submitted the project results to a peer-reviewed journal Biological Conservation and am still waiting on the outcomes. My next steps are to:

1) Address comments and feedback from reviewers.

2) Develop the models which reflect the future of the plant-frugivore interaction in the future.

3) Do more and more public and formal reports to the local communities on the results and its implication for the project

4) Develop ideas and expand the project.

5) Strengthen collaboration with experts on modelling and plant-animal interaction to discuss current and future projects.

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?

I have presented part of my research findings at two international conferences (Student in Conference and Conservation Science SCCS 2019, ATBC 2018, and ATBC 2019). During my talk presentations, I acknowledged The Rufford Foundation and put the logo in my slides. The foundation also received publicity among my colleagues and professors as I discussed my research project and the funding support I received. I do publicity of the foundation to students in the university who are seeking support for their projects. I also helped students write their grant application based on my experience with the Rufford grant.

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

My team members are composed by:

Myself

My two academic advisors: **Dr. Onja Razafindratsima** and **Pr. Aristide Andrianarimisa**, who have been providing support and advice during the development and implementation of this project

My field research technicians: **Rolland Jerome**, **Leda Eugene**, **Ratonganirina Gerdya**, who assisted me in data collection, and **Rakotomalala Josepha** and **Rasoanambinina** for their help at the campsite.

10. Any other comments?