

Final Evaluation Report

Your Details	
Full Name	Veronarindra Ramananjato
Project Title	Nocturnal omnivores: how do they ensure forest integrity?
Application ID	33285-2
Date of this Report	27 June 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
Define patterns of seed deposition of mouse lemurs				The use of fluorescent powder did not work well in the rainy environment of Ranomafana. After 1 month of trials and readjustments in the fieldwork methods, we decided to stop it because it was inconclusive. Instead, we collected data on the seed dispersal services of mouse lemurs under two different seasons: dry season (July-September) and rainy season (February-April).
Identify the differential contributions of males and females				None
Examine eventual shift in their seed dispersal services in degraded forests and agroecosystems				None

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

a). As the fieldwork ended in mid-April 2022, we are now in the process of data entry and preliminary analyses of the results. First, in terms of research, this project has documented the efficiency and limitations of certain methods to study seed dispersal by nocturnal animals in the rainforests. Such lessons learnt have long been lacking given the small attention given to such animal taxa and can now be used by other researchers in various fields of ecology. Additionally, this project has provided novel insights into the seed dispersal patterns of mouse lemurs, especially the differences of services between forest edges/gaps and cores, males and females, habitat types, and seasons.

b). In terms of personal and professional development, this project has tremendously strengthened my ability to lead research projects under challenging and changing conditions. I learnt to be flexible and improvise solutions in a restricted period by weighing and incorporating all ideas from the team members to readjust field protocols. This project also gave me the opportunity to start delegating tasks, which has increased the amount of data collected as we covered more sampling sites simultaneously. Additionally, with the data we collected, I can successfully make of this project the first chapter of my PhD dissertation. This project has also given me

opportunity to readjust the future chapters of my dissertation based on the data limitations we have identified to document the seed dispersal of mouse lemurs and promote their conservation.

c). One important outcome of this project is our ability to identify the threats on the local forest landscape. Although it was not an objective of this research project, we cannot help locating them sampling in the four sites we chose, and most importantly noticing that each site is experiencing different types of threats. Such differences make the current one-size-fits-all conservation actions ineffective because threats should be addressed by case to maximise biodiversity conservation and habitat management. For example, preventing fires is not necessary in one site, but illegal mining needs more control, and in another site, monitoring forest fires is more important than selective logging. We have submitted a preliminary report to the local park managers and governmental representative on those threats along with some recommendations on the prioritisation of conservation actions. We will complete such reports with a workshop in mid-July 2022, with the local managers to discuss better options of biodiversity conservation and habitat management and full reports this summer.

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

a). The COVID-19 pandemic has significantly delayed the beginning of my fieldwork season, making the training of one Malagasy student and the local team in the forest a bit rushed. However, this has given us enough time to prepare administratively and logistically for the fieldwork. Therefore, for 6 weeks before the start of the fieldwork, I used the time to discuss and refine field methods and protocol via weekly meeting with the team, during which each meeting specifically focused with one field activity. By the start of the fieldwork, each team member was familiar with the methods and could have anticipated technical issues. Once in the field, we only spent 1 week on training and practice, and started data collection in two separate teams right after that. Additionally, we had a weekly briefing so we can discuss any readjustments or arrangements, which were minor during the field season.

b). Another major difficulty we had during the fieldwork is the inefficiency of the fluorescent dye powder for tracking animal movement patterns in the rainforests. Although it was based on previous studies in mainland Africa and we started the experiments in the dry season, the highly humid montane rainforest of Ranomafana made the dye powder quickly fade away. Therefore, we were only able to locate the fluorescent traces from the station. This latter refers to the plastic plate full of fresh banana and fluorescent dye powder, placed about 1.5-2m above the ground to lure the mouse lemurs. We repetitively changed approaches for an entire month to maximise the location of the fluorescent traces, including sheltering the station, using a high amount of powder, switching to more performant UV lamps, clearing around any dead branches and leaves around the station to easily spot the traces, waiting next to the station for any animal visitor and following the individual if it was a mouse lemur. Unfortunately, the traces never went beyond 3m from the station, though either the team or the camera traps placed next to station showed that the mouse

lemurs went way further. Therefore, we decided to stop as it was inconclusive and dangerous for the team to follow the individuals without clear routes in the dark. Instead, upon agreement with The Rufford Foundation via Jane Raymond, we reallocated the budget for this activity to sample for another 2 months (February-April) and now have data on the seed dispersal services of mouse lemurs under two different seasons in four different habitats.

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

The local community has been an important part of this project as they tremendously helped in the implementation as well as in data collection. Also, they are the first beneficiaries of the conservation recommendations we have formulated. In terms of professional development, I have trained three local research technicians, five local guides, and one student throughout this project. They have gained experience in capturing, handling, and identifying small mammals, surveying plant communities, readjusting field protocol without changing the objectives, setting up experiments, and managing field resources.

The student also had the opportunity to increase her capacities in leading and managing a research project, including the coordination of the field activities as well as data entry, management, and analysis. She will also participate in the writing of the upcoming manuscript based on this project. Local managers and village leaders have received our first recommendations for biodiversity conservation and habitat management and are now working on integrating them as applicable conservation actions.

Finally, this project has temporarily leveraged the living of the local community, especially after a year of unsteady income because of the COVID-19 pandemic. Such contribution includes working as local guides, cooks, and porters during the fieldwork, and buying fresh local produce from the farmers at reasonable price. We have also contributed to helping farmers and local cooperatives connect with produce collectors and sellers such that the local communities can capitalise their production.

5. Are there any plans to continue this work?

Yes, there are. Currently, we are monitoring the germination experiments for another 2 months to complete our data on the seed dispersal services of the mouse lemurs. We will also finish analysing the data along with the project hypotheses. We are also planning a workshop in mid-July 2022 with the local protected area managers, research centre staff, and village leaders, during which we will discuss our findings and their application for biodiversity conservation, habitat management, and forest restoration. We will also emphasise the readjustment of conservation actions and the reinforcement of the national and local regulations. Additionally, we will develop other approaches to measure the seed dispersal distance and characterise the seed deposition sites of the mouse lemurs, which we could not have been done during this project.

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

This summer, I am planning on presenting my preliminary results to the University of Antananarivo and discussing their applications with the local managers during a workshop. By the end of 2022, we will also submit a manuscript based on this project, which will be the first chapter of my PhD dissertation as well. I will also present the results at the ecology or conservation-related seminars at the University of California Berkeley, as well as at international conferences such as the British Ecological Society's and American Society of Primatologists' annual meetings.

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

The most important next step is completing the activities of Objective 1 of the original project. These activities include: 1) the characterisation of mouse lemur seed deposition sites; and 2) the measurement of their seed dispersal distance. We are currently working on finding a good alternative to the fluorescent dye powder via consulting with researchers that have done night tracking and other non-invasive methods.

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 used the logo to acknowledge the award on:

a). My presentations at the Annual Meeting of the Association for Tropical Biology and Conservation in 2021 and the biannual congress of International Primatological Society in 2022.

b). My presentation as an Invited speaker at the Integrative Biology Seminars at University of California (UC) Berkeley in 2021.

Additionally, I recommended the Rufford Small Grants programme to my lab mates and cohort at the UC Berkeley as well as to my co-workers and younger students at the University of Antananarivo (Madagascar). At the time of this report, there are three students, one from UC Berkeley and two from Madagascar that have submitted a proposal to the foundation.

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

Tsinjo Annick Andriatiavina: She is a student from the University of Antananarivo, and she assisted in the data collection, coordinated field team activities, and data entry.

Finaritra Randimbarison: He is a member of Association Ary Saina and helped in coordinating the fieldwork and the data management.

Hasinavalona Rakotoarisoa: She is a MS student from the University of Antananarivo and has participated to the project as an intern gaining experience on capturing and surveying small mammals and entering data.

Research technicians: **Neree Beson, Jean Claude « Manana » Ramanandraibe, and Maminiana Tolojanahary.** They assisted in data collection, especially in plant identification, site localisation, and animal handling.

Local guides: **Randrianjakanirina Jean Emmanuel, Sabo Gilbert, Rasoarimalala Joroniaina Sylvia, Razainjatovo Jean Felix, and Joseph Philemon.** They assisted in data collection, local hiring, and were particularly helpful in the navigation of the forest at night.

Dr. Zafimahery Rakotomalala: He is the Chair of the Mention Zoologie et Biodiversite Animale at the University of Antananarivo. He has helped in hiring and training of the student working on this project and the research authorization issuance.

Dr. Onja Razafindratsima: She is my PhD advisor at the University of California Berkeley and has helped me design my project, redirect the project goals, and address the difficulties we encountered during this project.

Mr. Jacques Rakotoarisoa, Mention Zoologie et Biodiversité Animale at the University of Antananarivo: He has tremendously helped in the preparation of research authorization application and issuance, as well as in various administrative requirements related to our project.

10. Any other comments?

Research permit #: 297/21/MEDD/GS/DGGE/DAPRNE/SCBE.Re &
428/2/MEDD/GS/DGGE/DAPRNE/SCBE.Re



A torpid mouse lemur. © Veronarindra Ramananjato.



A rufous mouse lemur foraging next to an abandoned house. ©Veronarindra Ramananjato.



A mouse lemur captured by hand by children during the day. © Veronarindra Ramananjato.



An unexpected dwarf lemur captured in our trap. © Neree Beson.