

Final Evaluation Report

Your Details	
Full Name	Janete Ferreira Andrade
Project Title	Herbivory under chronic human disturbance and reduced rainfall: implications for the conservation of the Brazilian Caatinga
Application ID	21218-1
Grant Amount	From January 2017 to December 2018
Email Address	£5000
Date of this Report	janebiologia@gmail.com
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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
Host plants selection and leaf-marking (woody and herbaceous plants)				We sampled the community of adult plants present in the permanent plots of Long-Term Ecological Project (PELD-Catimbau) from March to July 2017
Quantification of herbivory (woody plants)				From March to July 2017 we conducted several expeditions in which we marked at least three completely expanded young. We took a digital picture of each leaf, and we are quantifying the leaf damage. We repeated this records from February to June 2018
Quantification of herbivory (herbaceous plants)				In June 2017 we performed four expeditions in which we marked from two to nine completely expanded young leaves per ramet in an area of 0.25m ² . We took a digital photo of each leaf, and quantified the leaf damage.
Identification of insects				From April to May 2018 we sampled arboreal insects through the technique "entomological umbrella", which contemplates all the arthropods present in the plants at the time of sampling. The technique does not select only the herbivorous insects, which is interesting, since it is possible to make inferences from groups of predators and possible networks of interactions. The identification of the insects is being carried out by a specialist.
Experiment of palatability with herbaceous and woody plants				From May to August 2018, we performed this experiment to evaluate if the reduction of precipitation and the increase of chronic anthropic disturbance alter the nutritional quality of plant species. We used a caterpillar from butterfly species, as herbivorous

			model, since this species presents a general diet. As a host plant model we used two species with different life forms (woody and herbaceous plant). We offered young and completely expanded leaves to these caterpillars, and evaluated the weight difference of the first and the last day of sampling as a measure of palatability.
Partial data analysis			We are finalising the construction of charts and tables related to leaf damage in herbaceous plants along the rainfall gradient.
Broadcasting and dissemination of the results			We are contacting the manager of the municipal school of the Catimbau village to carry out a scientific dissemination activity for the school community. This action will occur together with other researchers linked to the PELD-Catimbau, which are also developed in the Catimbau National Park.
Publication of the main results			We are finalising the analyses and intend to submit the first paper until April 2019

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Initially some difficulties occurred because of Brazilian bank bureaucracy. This fact delayed the grant payment for more than 45 days but the fieldwork began in March 2017 using other sources.

In addition, we had problems related to the logistics of field work, since the study area has very limited access (the displacement in the region is only possible with four-wheel drive vehicles). Therefore, we adjusted our work dynamics with other teams to cover a larger study area.

We also had problems executing an experiment foreseen in the doctoral thesis. We used a butterfly species to test how the plants are being altered by reduced rainfall and increased chronic anthropic disturbance. However, caterpillars languished at the end of the experiment due to a contamination by fungi and we did not have the expected results from this stage of the work.

Finally, we had problems in carrying out the dissemination activity with the community proposed in this work. Initially, we would work with the tourism guides. However, we did not have any feedback from this group, even though we

contacted them through the tourism guide cooperative. As a second plan, we intended carrying out the activities at the school in Catimbau village. But, as other groups had recently worked on this topic and due to the school calendar, the school management asked us to look for them in the beginning 2019. Although we have not yet carried out the dissemination activity, we are in contact with the school's management and expecting to carry out this activity by the end of April.

3. Briefly describe the three most important outcomes of your project.

- The most frequent trophic guilds were chewing, sap-sucking, rasping and leaf-mining insects. We did not observe the incidence of galling insects. 16 plant species suffered any kind of damage. However the set of plants attacked by chewing insects was different from the set of plants attacked by the other trophic guilds (sap-sucking, rasping and leaf-mining insects).
- Foliar damage in herbaceous plants was less than found in other dry tropical forests, varying from 0 to 1.84% damage. However approximately 33% of the leaves remained intact throughout the sampling period. Total leaf damage increased along time, but the plant abundance and richness had no effect on leaf damage.
- We found that rainfall alters leaf damage by chewing insects (e.g. caterpillars, beetles, grasshoppers). We observed that in drier areas of Parque Nacional do Catimbau (PARNA-Catimbau) there was more leaf damage by this group of insects. The other trophic guilds did not vary according to the rainfall.

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

This project involved directly local people in participation since the permission to work on their properties and their help on field work. All this contact allowed us to introduce the importance of plant conservation to maintain their life quality and local diversity. I hope that information generated with this RSG could be helpful and encourage local governments to invest in private area conservation and economic alternatives to conciliate the conservation of these areas and also economic sustainability to people.

5. Are there any plans to continue this work?

This project and others realised in PARNA-Catimbau stimulated local people to know more about local diversity, biological interactions and their importance. In general, we have concluded the major proposal of this project, which is part of a doctoral thesis. However, we will continue to investigate how anthropic changes alter interactions. To do this, we will use approaches to networks of interactions between plants and insects in a landscape ecology perspective. Thus, we aim to analyse the effects of spatial configuration and composition on interactions.

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

We are preparing a great communication action focused mainly on the school community of the Catimbau village. We will promote this activity with participation of other researchers of PELD-Catimbau and Universidade Federal de Pernambuco (UFPE). In addition, we are also finalising the first paper related to this work, which will be submitted by April 2019. The second paper is expected to be submitted in August 2019. In February 2020, the complete work will be presented at doctorate's defence in UFPE.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

The grant use started in April 2017 for trips, field assistant, notebook and other costs. The RSG was used for 16 months (from April 2017 to August 2018). The length of the project was in accordance with the chronogram submitted and the resource was used concisely during the execution of the project.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Field assistant	1310	1373	+63	The cost destined for field assistant was fully spent
Fuel	785	722	-63	Fully spent. We reallocated an excess part of this amount to cover field assistant costs
Feeding in the field period	1205	1205		We reallocated part of this amount for the adaptation of the physical space in which we perform the palatability experiment.
Hosting in community	732	648	-84	We use an excess portion of this amount to cover personal computer costs.
Personal computer	476	560	+84	Fully spent
GPS	178	178		The money was relocated for additional field costs as such as the purchase of consumable items to carry out the survey work. In addition, we also had

				additional costs with the maintenance of the field car.
Photographic camera	314	314		The amount was reallocated to the execution of the plant palatability experiment. In this, we covered transport costs, such as car rental for the field and fuel, as well as the organization of the physical structure and the purchase of components of the animals' diet.
TOTAL	5000	5000		
Exchange rate assumed: £1 = R\$ 3.82 (Brazilian local currency when made the application)				

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

Initially, I intend to carry out the dissemination action in the school of Catimbau village. This action is being planned in conjunction with other researchers from UFPE and aims at a great dissemination of the work done in the region, as well as promoting awareness of young people to nature conservation.

Also, as a next step I will do a doctoral internship in Mexico's Institute of Ecology. I intend to deepen the evaluations of how plant-insect interactions are being altered in Caatinga vegetation using landscape ecology and networks of interactions approaches.

I intend to prepare a technical report and submit it to the management of PARNA-Catimbau, to contribute with scientific knowledge in the preparation of the management plan of PARNA-Catimbau.

10. 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 RF logo was and will be used in oral presentations of this work and also will be referred in future scientific publications.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Dr. Bráulio Almeida Santos collaborated with the experimental design, data analysis and production of scientific papers derived from the project.

Fredy Alvarado Roberto collaborated with the data analysis and production of scientific papers derived from the project.

12. Any other comments?

I am very grateful to Rufford Foundation for funding this project. Without this financial help this work would not be feasible. Thank for invest in diversity knowledge and nature conservation in many countries around the world.