Final Project Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF format**. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Complete the form in English and be as concise as you can. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

Your Details	
Full Name	Thamyrys Bezerra de Souza
Project Title	Functional diversity of dung beetles along a deforestation gradient in the Atlantic forest
Application ID	22333-1
Grant Amount	4700
Email Address	biotbs@gmail.com
Date of this Report	27 June 2018

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
Dung beetle sampling			✓	We conducted three field campaigns in 16 forest fragments in the Atlantic Forest in southern Bahia, Brazil.
Dung beetle identification			✓	Dung beetles were identified to species level at LE-UESC – Laboratório de Entomologia, Universidade Estadual de Santa Cruz, Bahia, Brazil and in the CEMT – Seção de Entomologia da Coleção Zoológica, Universidade Federal de Mato Grosso, Cuiabá, Brazil.
Dung beetle response variable			✓	From the field data, we were able to estimate the following response variables: dung beetle resource-relocation behaviour, diet preference and morphological traits associate with ecological functions, from which we also estimated functional diversity metrics that describe different aspects of dung beetle communities.
Explanatory variables			✓	Beyond native forest cover, we calculated percentage of pastures in the matrix and edge density within a 1-km radius from the centre of each fragment. Because these are commonly listed as important for dung beetle communities
Share results with academic and local community in order to discuss the importance of conservation		✓		Preliminary results of the project were shared in one meeting: II Workshop of Applied Ecology of the State University of Santa Cruz (UESC) in Bahia, Brazil and to reserve managers of 'Reserva Biologica de Una' through of SISBIO platform. After, we intend to present the project results to students and farmers of region study. At this occasion, we will show photos of beetles found in the region, highlighting their importance to ecosystem functioning. Furthermore, we are currently preparing folders with information on the conservation Atlantic Forest. Moreover, we plan to publish two papers with the mainly results of this project of T.B.Souza' PhD thesis.

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

We had some difficulty with access some study sites due poor condition of roads in raining periods, mainly in Una landscape. However, a few days later we were able to do the fieldwork. Not delaying the schedule.

We had difficulty of obtaining fresh human faeces. Thus, we reduced from 15 to 9 pitfalls traps and, even so statistical analysis to estimate accuracy of inventories demonstrated that the sampling was satisfactory. Some studies advise the use of human and pig faeces mixture for large-scale fieldwork, but I also had difficulty finding pig farms near the study sites and preferred to reduce the number of traps.

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

a). A total of 3944 individuals from 37 dung beetle species and 16 genera were recorded in the studied Atlantic Forest landscapes. Sample coverage was high in all sites indicating that our sampling effort was adequate. Landscape metrics were not correlated and this permitted us to address the effects of these variables on dung beetle communities independently.

b). The explanatory variables that best predicted changes in dung beetle communities were those associated with forest loss at landscape scales, compared to the other predictors. Considering the independent contribution from explanatory variables and the dung beetles responses for which complete models showed the highest percentage of explained deviance, we found that landscape forest cover were the main attributes positively affecting resource-relocation behaviour, diet preference and morphological traits.

c). We found that abundance of rollers declined with lower amounts of forest cover at the landscape scale and the richness of tunnelers declined with increase edge density. Forest loss had a negative effect on all diet groups and edge density on coprophagous beetles. The body size and pronotum area were reduced in forest sites surrounded by lower amount of native forest and with increase of percentage of pasture matrix. The protibia area was reduced in forest sites surrounded by high amount of pasture cover. On the other hand, landscapes with more edge density had species with higher metatibia length.

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

Local resident (Rubens Vieira Lopes) participated in the project as field assistant and received training on sampling techniques, becoming qualified to assist in future researches in the region. Before of fieldwork, we present our project to farmers and reserve managers of 'Reserva Biologica de Una' where sample sites are located. Next steps, we will present the main results of project to students and farmers, highlighting the importance of biodiversity conservation.

5. Are there any plans to continue this work?

Yes. This study is an extension of a long-term project entitled "Research Network in the Ecological Functioning of Anthropic Forest Landscapes" (Rede SISBIOTA). Part of specimens purchased with The Rufford Foundation will be donated to the Universidade Estadual de Santa Cruz (UESC) and will be used in further entomological studies in the region. Other specimens will be donated to the collection of CEMT – Seção de Entomologia da Coleção Zoológica, Universidade Federal de Mato Grosso - Brazil under supervision of Fernando Vaz-de-Mello, strengthening several studies of taxonomy and phylogeny.

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

Preliminary results of the project were shared in one meeting: II Workshop of Applied Ecology of the State University of Santa Cruz (UESC) in Bahia, Brazil and to reserve managers of 'Reserva Biologica de Una' through of SISBIO platform. We will produce an education environment material to distribute to schools and farmers surrounding our study sites. Furthermore, results of this research will form two chapters of T.B.Souza' PhD thesis at the Universidade Estadual de Santa Cruz and publications in scientific journals.

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

The RSG funds were used from June 2017 to June 2018. This project will comprise T.B.Souza's PhD thesis to be finished by February 2019.

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
Fieldwork food supplies	£1200	£930	£270	Economics of £270 that was applied in the item daily car rental
Field assistant	£1500	£707	£793	Economics of £454 that was applied in the item daily car rental and £339 in the item equipment's fieldwork
Fuel (gasoline)	£2000	£985	£1015	Economics of £21 that was applied in the item equipment's fieldwork, £894 in the travel to dung beetle identification and £100 in the education material

Daily car rental	£0	£724	£0	It was necessary to add Daily car rental
Equipment's fieldwork	£0	£360	£0	It was necessary to add Equipment's fieldwork
Travel to dung beetles identification in the Mato Grosso, Brazil	£0	£894	£0	It was necessary to add travel to dung beetle identification in the Mato Grosso, Brazil
Education environment material	£0	£100	£0	It was necessary to add Education environment material

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

We believe that the next steps for the project are: (1) data analysis, (2) manuscripts publications and doctoral thesis, (3) communicate our findings to the public disconnected with the science literature. Furthermore, it is important to apply new studies based on projects aimed to conserve the Atlantic Forest, in addition to providing information to elaborate laws aimed at the management and biodiversity conservation.

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?

Yes. The logo of The Rufford Foundation was shows at the presentation held at the II Workshop of Applied Ecology of the State University of Santa Cruz (UESC, Brazil). The logo of The Rufford Foundation will be recognised in all future publications of the project results such as scientific papers, reports, folders, and lectures at conferences.

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

MsC. Thamyrys Souza - Brazilian PhD candidate in Ecology and Biodiversity Conservation at the Universidade Estadual de Santa Cruz, Ilhéus, Brazil. She is the primary investigator of this proposal. She was responsible for planning and execution of all project steps and will be responsible for the database analysis, scientific papers preparation and presentation of results to academics and local community.

Prof. Dr. Júlio Baumgarten – Professor in Ecology at Universidade Estadual de Santa Cruz, Ilhéus, Brazil. Dr. Baumgarten contributed with research advising and organization of project steps.

Dr. Deborah Faria - Professor in Ecology at Universidade Estadual de Santa Cruz, Ilhéus, Brazil. Dr. Faria contributed to the sample design of the project (Rede Sisbiota) and available structure in the Applied Ecology and Conservation Lab.

Dr. Pavel Dodonov – Post-Doc at Universidade Estadual de Santa Cruz, Ilhéus, Brazil.

Dr. Dodonov did relevant statistics contributions to the study and also contributed to corrections in the project.

Prof. Dr. Jos Barlow - Professor in Conservation Science, Lancaster Environment Centre, UK. The partnership with Jos Barlow was extremely important to improve data analysis and discussion. Dr. Jos Barlow has a vast experience in the study of dung beetles, tropical forest ecology, biological conservation and human-modified landscapes.

Dr. Filipe França – Post-Doc at Universidade Federal do Pará, Pará, Brazil. Dr. França did relevant project contributions to the study, improving the value of field data and results interpretation.

Mr. Rubens Vieira Lopes - A local field assistant who was hired to help in the collect of dung beetle data.

12. Any other comments?

I'm extremely grateful to Rufford Foundation for helping me in this important phase of my research. Without this invaluable economic support, the collection of data would not have been possible. Thank you very much!

Left: Thamyrys Souza installing pitfall trap in one of the sample areas of Atlantic Forest, Bahia-Brazil. *Right*: Rubens Lopes, a local field assistant, in the fieldwork to collect dung beetle data in the Atlantic Forest, Bahia-Brazil.