

Final Project Evaluation Report

Your Details	
Full Name	Cindy Cosset
Project Title	Restoration experiment demonstrating the impacts of climber-cutting on biodiversity and habitat recovery in logged tropical forests.
Application ID	24653-B
Grant Amount	£9489
Email Address	ccpcosset@gmail.com
Date of this Report	22 August 2019

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
Biodiversity sampling: dung beetles				Our aim for dung beetle sampling has been fully achieved and we have added a further two experimental blocks to the project to make the data even more rigorous.
Biodiversity sampling: ants				Due to extended periods of rainfall, ant sampling (via fogging) has not been fully completed, but will be completed soon.
Surveying forest structure (canopy and understorey metrics)				Measures of canopy openness and understorey vegetation density have been completed for all of the main blocks, and some within one of the further two blocks (equating to 224 of the 304 plots in total).
Biodiversity sampling: trees (including estimates of timber yields and carbon stocks)				Full tree censuses have been completed for 174 of the original 240 sample plots. Over 12,000 individuals have been tagged, measured and assessed for liana prevalence and load, across all size classes (Adults, juveniles, saplings and seedlings).
Training local university students and research assistants in biological and carbon sampling.				Six undergraduate and one postgraduate student from Universiti Malaysia Sabah (UMS) have been involved as research assistants and a postgraduate researcher, respectively, on the project. We will continue to work with local students in future field seasons.

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

The initial sampling (before liberation cutting treatment) was delayed due to severe rain damage to the single access road to the field site. This included the collapse of a number of bridges. Road repairs were completed by the Forestry Department Sabah (FDS) July 28th 2018 and we are now in continued contact with our collaborators at the FDS to report problems as they arise with road access and to arrange regular maintenance work.

Due to a change in the Malaysian Government in May 2018 (the first since Malaysian independence from UK in 1957), government permission to apply cutting treatments by the FDS was delayed by 10 months, until summer 2019. However, we were still able to conduct pre-cutting sampling of trees, dung beetles and environmental variable (as outlined above). We have used these observational data to address questions, such as; how does liana infestation affect local patterns of logged forest tree functional and phylogenetic diversity? Answering such questions is vital to understanding the impacts of increased liana load within disturbed systems and how liana removal is likely to affect forest restoration agendas.

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

1. We have successfully sampled three key functional taxa; trees ~12,000 individuals of 320 species, dung beetles ~20,000 individuals of 30 species, ants over 5000 individuals (species are currently being identified).

2. We have trained six local students (Universiti Malaysia Sabah) in numerous sampling methods, including long-term tree censuses, measures of vegetation cover and density, canopy openness, pitfall trapping, dung beetle identification, insect fogging and Winkler trapping. In addition, the project has provided the opportunity for a Malaysian postgraduate student, Koid Qian Qun, to conduct fieldwork as part of her Master's thesis.

3. In the next 2 months, we will have set up the first climber cutting experiment to include a gradient of liana removal, providing an opportunity to answer novel questions within tropical forest restoration and, more broadly, ecology.

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

Local university students have been taught numerous sampling methods, which have improved their field research skills and built on their interests in a conservation or research career. Past students have continued to work in related areas of conservation biology and tropical ecology, including two students who have chosen to return to the project to conduct fieldwork for their final year projects. Additionally, we have worked closely with a team of local research assistants including, a local tree taxonomic expert and two local para-botanists for tree identification.

5. Are there any plans to continue this work?

Sampling of biodiversity, forest structure, timber yields and carbon stock will continue with current and prospective PhD students. Future research will include both fine-scale research questions based upon the effects of retaining uncut areas of forests, as well as using long-term data to parametrise forest and population models. Possible future questions include:

- 1) Are dung beetle communities dependent on proximity to uncut strips of lianas?

- 2) How does a gradient of disturbance within a selectively logged forest impact dung beetle communities?
- 3) Does climber cutting reduce natural recruitment of seedlings within selectively logged forests?
- 4) How do lianas recolonise post cutting?
- 5) Do liana seedlings have a competitive growth or survival advantage over tree seedlings and how is this affected across a gradient of liana removal?
- 6) Survival of planted seedlings across gradients of liana removal, understory temperature and light.

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

The results will be published in scientific peer-reviewed journals such as (1) Journal of Applied Ecology, (2) Journal of Ecology, and (3) Ecology. Patrick Cannon has already found preliminary results describing relationships between local patterns of liana infestation and tree functional and phylogenetic diversity, which he hopes will be submitted for peer review in 2020. Our collaboration with the Sabah Forestry Department has allowed them to be closely involved with the project and thus to incorporate our findings and management recommendations into their forest management guidelines. We plan to share these results via presentations and conferences in the near future, the next one being the Association for Tropical Biology and Conservation conference 2020, and thus hope that they can gain wider traction (e.g. in Indonesia's Economic Restoration Concessions).

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

The grant was used from May 2018 to early August 2019. Fieldwork was intended to commenced May 2018, which was delayed due to events beyond our control as outlined above, until July 2018.

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
4WD vehicle fuel	420	389	-31	
Flagging tape	9	20	+11	
Bait traps	100	116	+16	
Winkle traps	100	118	+18	
Pit fall traps	100	123	+23	

Research assistant accommodation	1200	1724	+524	Price increase for accommodation.
Scientist accommodation	3200	1442	-1758	Price changes.
Food (self-catered)	2100	2323	+223	Higher prices due to new goods and service tax.
KK transport	60	152	+92	Additional transport needed to obtain research passes and visa.
Research assistant passes	10	19	+9	
Scientist research pass	60	149	+89	Research passes now incur additional charges since 2019.
KK hostel-transfer lodging	150	754	+604	Hostels booked up for certain periods, needed to book hotels instead to accommodate the team (more expensive).
KK to LD flight (return)	180	371	+191	Additional flights needed to be taken to KK to collect research visas.
UK to KK flight (return)	1800	1840	+40	
TOTAL	9489	9539	+50	Exchange rate: 1GBP = 5.0 MYR

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

To oversee the implementation of cutting treatments, currently arranged for September 9th 2019. Critical will then be to acquire funding for the post-cutting census to take place May – October 2020. In addition, Edwards and Freckleton are seeking a further 1-2 PhD students to join the project from September 2021-2022.

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?

All previous and future presentations will include The Rufford Foundation logo and The Rufford Foundation will be thanked for their support in publication acknowledgements. Cindy Cosset has used The Rufford Foundation logo and acknowledged the Rufford Foundation when presenting results for the previous seed project funded by the Rufford Foundation in the recent ICCB (International Congress for Conservation Biology) Conference in July 2019. We plan to share these results via presentations and conferences in the near future, the next one being the Association for Tropical Biology and Conservation conference 2020.

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

Prof. David Edwards, University of Sheffield, senior project advisor.

Prof. Robert Freckleton, University of Sheffield, senior project advisor.

Dr. Kalsum Yusah is a local collaborator of the project and a lecturer at the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah. Dr. Kalsum provides logistical support for the project, including coordinating the involvement of Universiti of Malaysia students with the project.

Julsun Joseph Sikui, Forestry Department Sabah (FDS), is a local collaborator of the project. Julsun provides logistical support to the project, including organising the contractors for applying climber cutting treatments.

Patrick Cannon, University of Sheffield PhD student. In combination with local botanists and Professor Robert Freckleton, University of Sheffield, Patrick conducted tree censuses.

Gianluca Cerullo, University of Sheffield Master's Student. In coordination with Dr. Felicity Edwards, a dung beetle taxonomic expert, Gianluca conducted dung beetle sampling.

Catherine Finlayson, University of Sheffield PhD student. Catherine has continued the work of Gianluca Cerullo, in addition to conducting sampling of forest 'soundscapes' and measuring variation in forest microclimates linked to disturbance and restoration practices.

Koid Qian Qun (Yvonne), Universiti Malaysia Sabah Masters student. In combination with Dr. Kalsum, an ant taxonomic expert, Koid has conducted ant sampling and estimates of vegetation cover and density.

12. Any other comments?

We would like to thank the Rufford Foundation for this opportunity as we have been successful in creating the first large-scale climber-cutting experiment that includes a gradient of liana removal in the tropics. This project has laid crucial groundwork for forest restoration research, which is of timely importance, given the state of the world's changing climate and the emerging forest and landscape restoration agenda across the tropics.