

Final Evaluation Report

Your Details	
Full Name	Mukhlis Jamal Musa Holle
Project Title	Contribution of Millipedes to Ecosystem Functioning and Conservation in a Tropical Forest
Application ID	29299-1
Grant Amount	£3410
Email Address	Holle.mukhlis@gmail.com
Date of this Report	18 th February 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
Millipede exclusion experiment				
Seedling planting experiment				
Decomposition and community variability in edge effects.				

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

The unprecedented global health crisis less affected field data collection but affected some other lab testing. Because all testing laboratories were closed soil chemistry analysis has to be delayed until the lab is re-open. Therefore, I had to wait a bit longer until the lab was open. Another issue raised in this project was my field assistant got personal accident, not during the field work, so that I had to work either with other person or by myself. In this situation, the field work became more intense, but I was able to manage the fieldwork to finish on time.

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

- Millipede plays crucial role in decomposing organic matter in the forest floor, complementarily improving other litter invertebrate functionality, and maintain decomposition resilience towards climate change.
- Creating refuge in the farmland (i.e., soil mulching by adding organic litter in the ground) and green corridor could support forest litter invertebrate mobility thus crop could be benefited by their ecosystem services.
- Completely clearing forest into open areas could disable decomposition process.

4. What do you consider to be the most significant achievement of this work?

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

The project has been exploring forest conservation through ecological approach. Therefore, the local community engagement is not part of this project yet.

6. Are there any plans to continue this work?

Yes, I am planning to continue the project by promoting sustainable agriculture that could support forest protection and restoration. Because there are some ways to improve agriculture production using ecosystem services provided by invertebrates, particularly millipedes, I would like to promote some of the practices that could improve crop productivity. As this could maintain farmer's crop production, farmers might have no reason to expand their land by clear cutting forest as they used to do when their crop production is failing. To do so, I am planning to develop some campaign materials that can be used as an educational material for different targeted groups.

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

Yes, I am planning to disseminate the results by publishing the results in the peer-review journals, scientific conference, and popular media. I am currently preparing two manuscripts to be submitted in peer-reviewed journals. I have presented some parts of the funded project to the ATBC virtual conference in 2021. In addition, I have submitted an abstract to be presented in the Frontiers in experimental research on changing environments meeting in June 2022.

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

The field data collection was conducted as planned. However, due to global pandemic, I had to extend my stay in Indonesia before returning back to the UK.

9. **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
Daily meal (3 times x 30 days x 4 months)	360	540	+180	I eventually spent 5 months in Indonesia.
Accommodation (4 months)	230	375	+145	
Net cloth (1x18 m)	80	80		
Roof (plastic 0.7 mm 1.4 x 18 m)	107	100		
750 buckets (15 cm in diameter)	80	80		
Litterbag (1000 pieces)	143	143		
Soil chemistry analysis (60 composite samples)	320	165	-155	I reduced the number of samples to be 30 samples.
Sample delivery service (20 kg)	70	70		
Three research assistants (30 days with 10 per day)	900	900		One research assistant over 3 months instead of 3 assistants in 1 month.
Two local guides (30 days with 10 USD per day)	600	300	-300	There were 1 local guide instead of 2.
Motorcycle renting (4 months)	130	130		
Shuttle Gorontalo airport-Pohuwato	40	120	+80	I needed to travel back and forth three times to buy some instruments that were not available around my study site.
Roundtrip (Surabaya-Gorontalo)	250	300	+50	After adding the baggage cost, the roundtrip transportation cost was added by £50
Roundtrip International Flight (UK-Indonesia)	100	100		
TOTAL	3410	3403	-7	

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

I feel that scaling up the scope of the study is important as I need to understand the general context in various condition. After knowing the general method that can be used to conserve tropical forest while maintaining crop production, I think that implementing the outcome of this study would be the next important step.

11. 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?

As we do not produce any materials in relation to this project, I did not use the Rufford Foundation logo. However, I used the logo in any digital visual material (poster/presentation) that explains the research supported by The Rufford Foundation.

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

Owen Lewis: Advising the study design, supporting fieldwork, co-writing the report.

13. Any other comments?

Thank you for the financial support and for the flexibility under various unexpected circumstances. I will inform The Rufford Foundation when the supported study is published in the peer-reviewed journals.