Final Evaluation Report

Your Details	
Full Name	Damptey Frederick Gyasi
Project Title	Arthropod colonization of a restored post-mining site in a community forest: the use of citizen science in diversity assessment and conservation
Application ID	27866-1
Grant Amount	£ 5,000
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Date of this Report	5th August 2020

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
To quantity the levels and dynamics of selected arthropod groups for the creation of a baseline database for habitat conservation, research, and education				Arthropod diversity and distribution in the community forest have been estimated. Endemic species (*Ricinoides atewa* (Order: Ricinulei) have also been discovered. The dominant arthropod groups characterising the restored forest include the Hymenoptera, Orthoptera, Coleoptera, and Araneae.
Identify the factors influencing the colonization of arthropods in the community forest				The creation of a conducive habitat structure through active restoration has been deduced to be the main factor influencing arthropod colonisation in the community forest. The complex habitat structure is also believed to be making resources available (food) for different arthropod groups.
To examine biodiversity citizen science project in an outdoor school class context				School children were engaged and trained to undertake biodiversity assessments in the community forest. They were also trained to use the microscope for sample identification. They have hence become ambassadors of change community forest and stewards of their local environment.

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

The major issue was with the weather. The project was supposed to have started in September 2019, but last year, September experienced prolong rainfall, which didn't permit early outdoor sampling. Most of our activities were carried out outside in the forest, which needed rainy free weather. We were able to tackle this issue by rescheduling our starting date for the programmes to December 2019 when the land was drier.

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

a) The first important outcome of the project was the imparting of conservation knowledge to citizen scientists and hands-on experience in ecological research. Participants (both school children and community members) were trained and allow to participate in the data collection (using pitfall traps), sorting of arthropods into various taxa, as well as estimating their abundance. They were also engaged to discuss from their indigenous perspectives the possible causes of why we have different types of arthropods in the community forest.

b) Another important outcome is the conservation awareness creation, which has mould citizen scientists to be stewards and ambassadors of their environment. Through this project, the interest of school children as well as community members in science and the environment has increased, and they now have empathy for insects and their habitats (forest). The involvement of citizen scientists has helped introduced indigenous conservation approaches to management.

c) Another important outcome is the collection of large volumes of ecological datasets that are currently being used by students and other researchers. Part of the dataset obtained has already been analysed by experts and presented in the form of a technical report to advise the general public, researchers, management, and civil organisations on the conservational status of the community forest. An important group of insects and their respective roles in the forest ecosystem have also been highlighted in this technical report to guide management.

   Out of this dataset came an essential endemic species called the tick hooded Spider (*Ricinoides atewa* (Order: Ricinulei, Arachnida). According to Naskerecki (2008), it is the largest known extant ricinuleid, which is associated with closed undisturbed forests.

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

Through forums, workshops, focus group discussions, and nature programmes in both schools and communities, interested and willing participants were selected for the project. The local communities were then involved in conservation outreach programmes as well as participating in both the fieldwork and laboratory work. They were trained and guided to set up pitfall traps in the forest, sort arthropods into various taxa, and communicate our research findings with an indigenous process to the entire community.

They benefited by taking advantage of our training in useful skills to conduct basic biodiversity assessment. Their involvement in the project has indirectly made them managers and ambassadors of the community forest, and also increased their social acceptance of the conservation project. Through this project, the communities

have benefited from the skills and knowledge in identifying which arthropod groups we have in the community forest and their respective ecological roles.

5. Are there any plans to continue this work?

Yes, plans are far advanced to continue this work. The impartation of knowledge and citizen science project should always be a continuous process to achieve long-lasting and sustainable impacts. Only a few schools and communities benefited from this first phase. We plan to incorporate more schools, more communities, and organisations in this conservation campaign in the future. We hope to educate and train more school children and community members to be ambassadors of change and stewards of their environment. Plans are also far advance to extend this biological assessment to other community forests using citizen scientists so we can be able to estimate the conservation status of such forest as well as their levels of endemism. In this current project, we were able to identify hotspot areas of biodiversity, which requires additional studies to deduce their abundance and distribution.

In addition, this survey was carried out in the rainy season. Plans are that we replicate the same survey in the dry season in other to get a full seasonal variation of arthropod diversity in the community forest. With just this data, we are only able to infer what species we have in the rainy season, and since arthropod diversity is influenced by seasons, it would be prudent to also take a closer look at what species there are in the dry season to be able to formulate better conservational goals and plans.

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

The preliminary results of this work have already been presented in seminars at the Presbyterian University College of Ghana, Akropong campus, and the University of Energy Natural Resources, Sunyani-Ghana, early this year. There are also plans to present the finding in both BTU-Cottbus Environment and Resource Management PhD seminar and the Department of Ecology Colloquium later in September 2020. A technical report which has been prepared from the results of this project is also in circulation to various institutions, universities, and other stakeholders in Ghana and abroad. Forest Aid Ghana and Eco Care Ghana also plan to publish this technical report on their websites in the coming weeks. A detailed manuscript is also in preparation and shall be published soon to help widely circulate the findings of this important project.

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 between December 2019 and July 2020. The actual project started in December 2019 instead of September because of erratic rainy weather conditions in September 2019, which didn't allow outdoor field demonstrations and activities**.** However, an adjustment was made to be able to undertake all planned activities successfully within the stipulated time 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
Gift cards and items to recognise students and community participation	100	100		
Cost of billboards and T-shirt printing	400	300	-100	We printed only the T-shirts and couldn't erect the billboard because of technical reasons. The compulsory government lockdown because of COVID-19 prevented the contractor from working on the billboard
Food for project participants	400	400		
Conservation awareness creation on radios stations	270	370	+100	This amount was higher than the budgeted because of the high radio airtime charges
Community education (printing of demonstration materials and questionnaires)	160	100	-60	We bought a printer equivalent to £100 which could print all materials at a lesser cost
Cost of solvent (Glycol for trapping insects and ethanol for preserving insects)	450	720	+270	The cost of solvent (e.g., ethanol) increased in early February because of the high demand for such solvent for the preparation of hand sanitizer to prevent the COVID-19 virus.
2 battery powered megaphones for campaign + lithium batteries	120	120		
Fuel cost for the entire duration of the project	2300	1990	-310	There was a reduction in fuel cost by the Government which reduced the budgeted

				amount for fuel
Reconnaissance survey, stakeholder engagement (Refreshment and lunch for participants)	200	300	+100	This had to increase because more stakeholders were engaged at the initial stage of the project
Accommodation for the principal investigator and supporting ecologist for the entire duration of the project	600	600		
Total	**5000**	**5000**		*Exchange rate: 1 £ Sterling = GHC 6.77 as at the project initiation stage

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

The most important step is to finalise the manuscript I am currently working on for publication and also to continue disseminating the technical report to a wider audience. I also plan to undertake another sampling campaign in the dry season with citizen scientists in other to be able to deduce what arthropod groups persist in the dry season to have a clearer picture of species distribution and their ecology in the community forest. This would also help us to deduce the seasonal variations in arthropod community structure of the restored forest. There are also plans to continuously (yearly) monitor arthropod diversity in the community forest for us to know their status with time. This will result in a time series data, which could be used to deduce if diversity is increasing or decreasing with time. Citizen scientists who benefited from this campaign shall also be visited timely and train so they can be abreast of conservational and management issues. We also plan to extend this campaign to other regions of conservational importance using citizen scientists. Lastly, in consultation with other relevant stakeholders, we shall in the future, prepare a management plan to regulate the use and access of the community forest to prevent deforestation and indiscriminate resource exploitation.

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 Rufford Foundation logo has been displayed on all academic presentations and other communications since the award was granted. The logo was also displayed on t-Shirts and banners we used for the campaign and awareness creations in Ghana. It's also displayed on the cover page of our median technical report and shall again be displayed and acknowledge in future subsequent presentations. Plans are far advance for Forest Aid Ghana to also highlight this project on their website and display the Rufford logo and also acknowledge Rufford Foundation as the sponsor of this citizen science project.

In November 2019, I was invited by the graduate research school of the Brandenburg Technical University, Cottbus-Senftenberg, Germany, to give a presentation on grants application in a seminar "Essentials of grant writing" in which I used my Rufford grant as a case study. During the presentation, I explained the steps involved to get a grant from Rufford as well as Rufford Foundation's thematic areas.

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

Members	Roles
Kwabena Adu-Bonnah	Botanist
Augistine Oti Yeboah	Community education and awareness creation
Clement Wulnye	GIS specialist
Richard Quarshie	IT and camera personnel
Daniel Kwame Debrah	Arthropod sorting and identification
Collins Nsor Ayine	Contributed to the overall research framework design and data analysis
Klaus Birkhofer	Academic Supervisor, advised on insects related issues, sampling
Udo Bröring	Academic Supervisor, advised on the research framework
Enrique G. de la Riva	Data analysis and interpretation

12. Any other comments?

I sincerely appreciate the financial support of RSG to undertake this conservation citizen science project. Without this support, school children in my region wouldn't have known the essence of protecting their forest as well as being stewards of the environment. This financial support also exposed such school children for the first time to practical science in out of school environment. I look forward to another future collaboration. Thank you