

Final Evaluation Report

Your Details	
Full Name	Evans Ewald Nkrumah
Project Title	Foraging Ecology and Conservation of Robbin's house bat in Ghana
Application ID	36098-B
Date of this Report	25th July 2023

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
Ecology of <i>Scotophilus nucella</i>				<p>Fieldwork was generally successful as we recorded a total of 15 species of bats, and two species were new to the reserve. We also know where the species concentrate its foraging activities, that is, the relatively good portions of the forest free from the invasive <i>Broussonetia papyrifera</i>. However, the whole ecological work is rated partially achieved because:</p> <p>1) We did not get the expected faecal samples of <i>Scotophilus nucella</i>, only 10 individuals were sampled. Only six out of the 10 provided us with faecal samples and we are yet to confirm what they are currently eating by using molecular tools with our European collaborator.</p> <p>2) Field data is in the process of being explored statistically for publication.</p>
Conservation Education at Amantia				<p>The project was able to embark on several conservation education activities. Social surveys carried out through questionnaire administration before and after conservation activities showed that our activities were very impactful. And about 79% of interviewed community members expressed interest in supporting bat conservation at Amantia.</p>
Capacity Building				<p>The project was able to train approximately 15 students exceeding the target of 10. Four of these students received direct support from the project to carry out bat-related research and they have graduated from their undergraduate studies.</p>

2. Describe the three most important outcomes of your project.

a). Understanding the Ecology of *Scotophilus nucella*: Previous efforts to record the echolocation of *Scotophilus nucella* and its sibling species *Scotophilus nux* were unsuccessful. The project was able to record their calls to aid in the separation of these two at the species level in the field. The study updated the species list in the forest reserve and recorded *Hipposideros jonesi* and a *Glauconycteris* sp. as new to the Pra-Anum Forest Reserve. *Glauconycteris* sp. will further be investigated through our European partner to confirm the species identity using collected DNA samples. We also found our target species *Scotophilus nucella* to select the forest environment during foraging as we did not sample any individual in any other area such as farms and the degraded areas dominated with the invasive *Broussonetia papyrifera* (known in Ghana as yorok).

b). Conservation Evidence for Bat Conservation Education: Before this work, there was no conservation evidence found to support bat conservation education. Specific questions such as: "Educate the public to improve the perception of bats to improve behaviour towards bats" and "Educate farmers, land managers and local communities about the benefits of bats to improve management of bat habitats" had zero conservation evidence. Other questions like "Inform local communities about the negative impacts of bat hunting to reduce the killing of bats" had only one conservation evidence. Through this work, we developed and issued questionnaires with recommendations from the Prism Evaluation Toolkit before and after our conservation education activities. And we have evidence that educating people on bat conservation has beneficial effects towards the conservation of bats. People at Amantia near the Pra-Anum Forest Reserve now have a positive attitude towards bats and are willing to support bat conservation in their community. The data for this study will be submitted for publication for other researchers and conservation practitioners to have access.

c). Capacity Building: Building the next generation of bat researchers and conservationists is a key strategy to achieve bat conservation in Ghana. The project has been able to increase in-country expertise by introducing bat research and conservation to early scientists who are likely to make significant contributions to conservation in the future. The project initially trained 10 students and later on, gave other students the opportunity to join as volunteers in the field. Four of the trained students directly worked on bats ecology and the human dimension during their undergraduate. One of them a lady was instrumental in leading the gathering of conservation evidence for this project. Currently, all these students have graduated.

The most significant achievement of this project is the key contribution to the natural history of *Scotophilus nucella*, and an ecological understanding of where it forages that directly feeds into its conservation. First, several attempts had been made previously to record its echolocation which were unsuccessful. *Scotophilus nucella* and its sibling species, *Scotophilux nux*, are morphologically indistinguishable, and also sympatric requiring sometimes molecular confirmation which is readily not available. This means alternative ways to identifying these two species were an urgent conservation need. Through this project, we now have the echolocation calls of these two species. The calls are distinct with each species echolocating on

different frequency. This is very important information for future population monitoring. In the future, we intend to involve citizen scientists by empowering them with acoustic devices to monitor their population. Such a conservation initiative can only be achieved only when the species can be acoustically identified. In addition, we know where the species concentrate its activities at the Pra-Anum Forest Reserve, which is the areas in relatively good condition, and is free from the invasive *Broussonetia papyrifera*. This information will significantly influence the next stage of the project.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

The project leader received an administrative position as the Head of the Department at the University during the execution of this project. He was sometimes unavailable for fieldwork. In addition, one project member had also finished his national service and was sometimes not available during data collection. To solve this issue, more training sections were organised on campus than planned, so that already trained student could receive further trainings and become more confident in handling bats to join other team members. These trained students were recruited and joined the fieldwork. This assisted the trainees to be confident in bat field experimentation to carry out their own bat research during their undergraduate thesis. Currently one of those trained students is a research assistant to the team leader.

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

This work would not have been successful without their support. The community was directly involved in the work in diverse ways. First, they benefited from knowledge enhancement through our education activities. The project educated them and assisted them to appreciate the contribution of bats to their community. Selected members of the community were also recipients of our project t-shirt which we distributed during our conservation activities. In addition, we enlisted the services of four local guys who supported our night work in the forest based on their availability. These persons directly benefited financially from the project as we paid for their services. Another indirect benefit the community derived from the project is our contribution to their local economy. We purchased local food instead of sending our own to the community, and also paid for their community information centre during conservation talks.

5. Are there any plans to continue this work?

The project will continue. We intend to concentrate on habitat restoration in some areas which has been identified. However, there are some heavily illegally mined areas of the reserve that require land reclamation initiative before the habitat is restored. This, however, is not within the scope of our current work. Ecologically, we intend to monitor the population using citizen scientists by means of acoustic monitoring, but we will need to come out with a good model that can be implemented at other locations in Ghana when we are successful at Amantia. For

reclamation activities, we intend to liaise with bigger NGOs in the next phase of the project to seek a concerted efforts in reclaiming degraded land sites.

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

First, copies of our report will be made available to the Forestry Commission and other local NGOs. In the long term, we have an excellent data we are going to publish from the ecological and conservation research for a broader audience to have access. When published, other scientists will also have access to recorded echolocation calls. The calls for these species will be curated in our local call library which is still in development and made available online when fully completed.

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

From this study, we know at least there is a thriving population at the Pra-Anum Forest Reserve at Amantia. This brings the known location of this species to two locations: Pra-Anum Forest Reserve and Krokosua Hill Forest Reserve in Ghana. One thing that is similar between these locations is habitat destruction and illegal mining activities. For the two populations, as we have also encountered at Pra-Anum, *Scotophilus nucella* populations are very small in numbers suggesting local extinction threats could be real and not perceived, should habitat destruction remain. To protect these species, conservation efforts should be put into restoring habitats to ensure their continual existence.

8. 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 Rufford logo was used in several ways. We used it on our project T-Shirts and on our presentation slides. The Rufford Foundation would also be acknowledged in any paper or publication that will arise in the future from collected data.

9. Provide a full list of all the members of your team and their role in the project.

Dr. Evans Ewald Nkrumah: Evans is the main project leader who was responsible for project implementation. He led the capacity building and bat field experimentation.

Mr. Amponsah Kelvin Sylvester: Amponsah assisted during student training on campus and fieldwork when available.

Mr. Maxwell Brefo Kwame Nkrumah: Maxwell assisted in conservation activities and also ensured social media presence. He also led fieldwork when the team leader was not able to join field trip.

10. Any other comments?

We are very grateful for the award of this grant. Thank you, Rufford Foundation! Personally, as a conservationist and researcher, Rufford Small Grants has been a solid rock in providing financial support to carry out impactful research and practical conservation. This has helped pushed my career dramatically because it is difficult

accessing financial support in Ghana. Your support for grass root organisations such as Batlife Ghana has ensured that, although we are small, can still have a real impact on bat conservation in Ghana. Rufford Foundation truly understands the significance of local initiatives. Through you, we are building a future where wildlife especially bats thrive whiles shaping the dreams of young and future conservationists. We cannot express enough gratitude for this invaluable support for biodiversity conservation throughout the world, especially in my country Ghana!



Trained students processing bats in the field.



Talking to farmers about bat conservation.



Recording bat calls with EchoMeter Touch 2 Pro.



Illegal logging within the reserve.



Field team.



Female student interviewing community members.