

The Rufford Foundation Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other 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. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Emily Norma Kudze
Project title	Assessing bat priority areas for Ghana
RSG reference	21270-1
Reporting period	2017-2018
Amount of grant	£2245
Your email address	Emily.kudze@africanbats.org
Date of this report	28 August 2018



1. Please 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
Compile updated catalogue of bats in Ghana				Due to the fact that specimens in Ghana were not of recent data, rather historical data, it was difficult to even understand the current state of bats in Ghana.
Identification Key				The identification key was supposed to be done based on current specimens found in Ghana, and use skull measurements and body measurements to create an identification key, but due to lack of specimens, this could not be done.
Distribution of bats in Ghana				The use of previous records compiled by online databases, map showing the distribution of bats in Ghana was made. It must be made aware that this information from the online databases were dated between 1950s-2000 roughly, very few were of specimens found from 2010 onwards.
Conservation status of bats in Ghana				Conservation status of bats in Ghana was taken from what the IUCN Red data list provided.
Conservation plan				A conservation plan therefore could not be established with no current records of bats in Ghana found in Ghana during the trip to Ghana.

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

Before heading for Ghana, I had the expectation that, there were projects happening that were storing their specimens at the University of Ghana. Unfortunately, upon arrival I was made aware that there were a lot of collaborations with foreign universities and that due to lack of infrastructure and correct lab space to hold specimens caught in the field, majority of specimens if any were caught were taken from Ghana. It was noticeable that almost all specimens were dry specimens and were all from the 1950s.



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

Using information on the land use change in Ghana from 1975, 2000 and 2013, it was discovered that between those years, land used for agriculture has slowly been increasing and so has the savanna. Therefore, any forest land has been over taken by either plantations or crop land and has furthermore fragmented the forests in Ghana. Agriculture covered about 13.25% of Ghana in 1975, by 2013 it had increased to 33%. Forests went from covering 9.45% of Ghana to only 6.77% by 2013.

The 2nd outcome was that, species diversity within the land use and biotic zones of Ghana reflected that the Agricultural lands had the highest diversity as compared to forests or savanna. This then revealed that bat species found in Ghana seem to adapt to agricultural lands, also that there are more insect eating bats than fruit eating bats. The Shannon's index for Agriculture (Plantation and Cropland with oil palms) was 3.34.

Lastly, to find out if land-use change influences the distribution of bats in Ghana apart from climate (precipitation and temperature) we used MaxEnt to model the species points and the different variables. Continuous variable were the temperature and precipitation data and categorical data was the land use change data. After evaluating the outputs from the modelling in MaxEnt each model output was evaluated. According to literature those with training and test AUC (area under the curve) less than 0.7 need to be excluded as they reflect poor accuracy in terms of predicting the which variable influences the distribution of bats in Ghana. It was noticed that five out 17 species, that were influenced by the land use variable were agriculture, the rest were either savanna, degraded forests or forests, which would be considered as natural. This showed that, although land use change influences the distribution of bats in Ghana, it still possess the question that do we really consider changes in "natural" land uses as a driving factor for distribution or is climate change still the number one driving force of species distribution.

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

With the outcome of this project, already from discussions with the University of Ghana, and its staff, it was realised that Ghana needs to try and keep specimens in their care. Even if there are collaborations, there needs to be a contract drawn up to leave one or two specimens for reference sake. In terms of the land use changes and what this means for the bats in Ghana, it would seem that the bat species have adapted to the changes in the area. This is evident by the species diversity in the agricultural areas.

5. Are there any plans to continue this work?

It would be very nice to go and do a full bat survey in the whole of Ghana. This of course needs careful planning and collaborations with the different universities in Ghana. We can then do a full assessment of bats found in Ghana, the different hotspots and urban areas as well. With this research we can then establish a



mammal museum in Ghana that focuses on all and any mammals found in the country. This will not only educate the locals but also get more students in the university involved in mini projects and learn different skills of not only capturing bats and studying then in the right way but other small mammals.

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

I still communicate with the professor I corresponded with in Ghana as well as the lab technician. I have already assisted them in cataloguing all the dry specimens they have in their lab with pictures as well. The list has been sent to them. I also shared a report with them sharing my findings. I plan to go back to Ghana to have a mini lecture and presentation at the university to show my findings. This is still something I need to organise but will let Rufford know and send pictures.

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

The Rufford grant was used between February 2017 and August 2018. Previously I had said that the project would be finalised by May of 2018 but due to no data actually being collected in Ghana to be used to conduct a full conservation plan, the project had to then focus on records from international databases.

8. Budget: Please 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.

Item	Budgetec Amount	Actual Amount	Differenc	Comments
Fuch an action			Ø	
Exchange rate				K18,30 = E1
Bank charges	13	56	43	Bank charges were more than estimated
Camera D1300	312	274	38	Camera was bought on sale, hence the
				cheaper amount
Seagate 2TB	113	77	36	Another sale was used to buy the
expansion hard drive				external hard drive
Flight ticket	563	479	84	Flight ticket was bought earlier than, so
				it was cheaper than buying a flight
				ticket right before flying out to Ghana.
Internet contract for	384	455	71	There was a once off payment for the
24months @ r250p/m				router that could take any sim card,
with an internet				even international sim cards. Instead of
router to accept any				a contract, it was easier to buy data
sim cards				when in Ghana. So it became a bit
				more expensive, but it did make



				communication easier
Callipers	663	558	10 5	Callipers were bought from a company that had a good deal so there was a good saving made. We opted not to have the callipers calibrated and also the add on.
DNA barcoding	195	-		There was no DNA barcoding done, because there were no samples to collect.

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

We will need to conduct a full research in the whole Ghana and not just in parts of Ghana. This will make it easier to understand the distribution of bats in Ghana and the extent of their conservation. It will also be a good idea to make sure specimens remain in the country of research.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

The Rufford Foundation logo was used during presentations to supervisors and other presentations during the course of the year.

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

Dr Mark Keith: Supervisor University of Pretoria

My main supervisor who assisted in writing the proposal for the Rufford Grant. He assisted in assessing the progress for the project.

Mr Ernest Seamark: Co-Supervisor African Bats

He was associated with African Bats and helped with connections in Ghana and assisted in any bat information I needed

Prof Langbong Bimi: Head of the Department of Animal Biology and Conservation Science

He really assisted in finding assistance in Ghana and the University of Ghana. He also helped with access to the lab where specimens were being held in.

12. Any other comments?

The remaining money from the grant was given to me before heading to Ghana and that was used for transportation between accommodation and the University of Ghana. I had previously not included it in the budget. It did assist in times where I stayed late on the campus and my lift has already left.