

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	Mercy Nambu Diangha
Project title	The effects of habitat heterogeneity and anthropogenic influence on the abundance and distribution of mammals in the Deng Deng National Park
RSG reference	11773-1
Reporting period	August 2012- July 2014
Amount of grant	£6000
Your email address	diangmer@tu-cottbus.de , mamafranky@yahoo.com
Date of this report	July 2014

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
Identify and characterise the spatial and temporal patterns of habitats present within the Deng Deng National Park			Yes	Habitat classification results revealed the presence of seven habitat types in the Deng Deng National Park. Landscape metrics (mean patch sizes, shape indices, densities and richness) analysed for the identified habitats highlighted the heterogeneous nature of the park landscape. Change detection analyses for the contrasting periods 1987, 2000 2009 indicated that primary production has increased over time within the park, with the dense forest cover dominating and covering about 90% of the park surface area.
Determine the relationship and variation between the identified habitats and the diversity, density and distribution of large mammals in Deng Deng National Park			Yes	Eleven mammal species were selected for this study. Using line transects sampling technique; five of the habitat types identified in the park (excluding settlement areas and water surface) were sampled for selected mammals. Sampling effort ensured representativeness of selected habitat types. Species were noted for their presence and then analysed for their densities, relative abundance and distribution in the respective habitat types in the study area. Though no significant differences were noted,

				diversity and relative abundances of mammal species showed positive correlations with area, richness and shapes of habitats. Dense forest habitat was most preferred by mammals, reflected by its comparatively higher relative abundances of mammals in this habitat.
Determine where human caused threats are occurring, their corresponding intensities and how they impact the large mammal species in the Deng Deng National Park			Yes	Threat factors affecting the park were identified both from literature and field observations. The intensity of threats was quantitatively and qualitatively analysed. It is now clear where the most threats are occurring in the park. Spatial analyses of threats distribution showed areas of concentrations (hot spots) of the multiple threat factors affecting the park.

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

Difficulties experienced that in effect prolonged the duration of the project included among others:

- Delays in securing satellite images required for habitat classification. To overcome this problem, two scenes of Aster (2009) images obtained from World Resource Institute (WRI- Cameroon database) were mosaiced to establish a single image covering the entire park area. Other images used for analyses were later obtained in the course of the project.
- Delays in securing official approvals from institutions managing the park to implement field surveys. After several personal consultations, phone calls and meetings with responsible officers, my research team was authorised to carry on with project activities.
- Irregular means of transport (bush taxi, train) especially from Belabo to project sites and back, kept research team waiting for days. However, complete support from WCS with project vehicle helped from time to time to solve this problem.

- The sampling process was difficult, since some of the sampling sites were remote and required moving camps and long distance trekking with back loads. However, increase in daily wages, good team spirit and complete cooperation with team members motivated field work and helped to overcome this.

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

- This project permitted the classification and characterisation of habitats within the DDNP. Results revealed the presence of seven habitat types that constitute habitats for fauna and flora in the park including; dense forest, mature secondary forest, young secondary forest, and tree and grassland savannah. Spatial representation showed a continuous distribution of dense forest cover, occupying 90.5 % of the park landscape. Primary production of the park dropped during the period 1987 to 2000 but increased during the periods 2000 to 2009 with dense forest cover dominating. Change detection analyses for the contrasting period 1987-2009, showed a remarkable increase in extent (25.6 %) and mean patch size (43.2 ha) of the dense forest cover. Annual rate of change of the park's land cover indicated that for every successive year, dense forest cover may increase by 1.1 % in the absence of human disturbances, environmental variations or other factors that may alter the physical conditions of habitats within the park. Given this ideal condition, a shift towards a more homogenous landscape is projected in the next 23 years (2032).
- This study marks the first record of Elephant (*Loxodonta africana*) in the Deng Deng National Park. It spatially presents the distribution of ungulates and also contributes to the known distribution of apes (gorilla and chimpanzee) and buffalo in the park. It defines statuses of the studied species as common or rare based on their relative abundances and frequencies. Species including blue duiker (*Cephalophus monticola*), bay duiker (*Cephalophus dorsalis*), red river hog (*Potamochoerus porcus*), gorilla (*Gorilla gorilla*) are among the common species, while sitatunga (*Tragelaphus speki*), elephant (*Loxodonta africana*), bongo (*Tragelaphus eurycerus*), are among the rare species in the park. Diversity and relative abundances of mammal species showed positive correlations when associated with habitat metrics (area, richness and shapes indices), though no significant differences were noted. Dense forest habitat was most preferred by mammals, reflected by their comparatively higher relative abundances in this habitat. Nonetheless, all mammal species studied are free roaming and non habitat specialist.
- Threat analyses revealed four hotspots, where management could immediately focus activities to advance the conservation objectives of the park. Spatial distribution of threats revealed that the eastern half of the park is experiencing more pressure with concentration of human activities around the current damp construction sites (e.g. logging, hunting), along the Cameroon-Chad pipeline (grazing, hunting, human tracks) and in the south (hunting, human track) where minor road or larger concentrations of human tracks are common. Of the multiple categories of threats facing DDNP, the presence and relatively higher frequencies of hunting signs (human

tracks, cartridge shells, wire snares) randomly distributed all over the park, specify that the park is suffering from hunting pressure exerted by adjacent communities.

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

Local community members were fully involved in the field implementation phase of this project. Locals from villages around the park (i.e. Deng Deng, Tete D'elephante, Goyoum) were engaged as field guides and porters. Daily field activities including camp keeping and monitoring along transects and reconnaissance surveys were done together with local community members on the research team. In addition to the daily wages paid to locals who participated in this project, they also were introduced to my research approach and trained on the use of field equipment (compasses, hip chain, and altimeter, measuring tap reading). During my project period, informal discussions on sustainable exploitation of natural resources were passed on to locals as they are known to extract bush meat and other forest products for subsistence and trade. As regular user's familiar with the project site, their involvement in the project reduced the difficulties of assessing remote areas and also facilitated the assignment of indirect signs (dung, tracks, nest, feeding residues, sounds of animals) to specific species group in the project site.

5. Are there any plans to continue this work?

Yes. It is important to carry on additional ecological research and monitoring in the Deng Deng National Park in areas within the project site that were not surveyed but particularly in hotspots (areas of high concentrations of large mammal species and threat categories) identified from this research.

The fact that more efforts need to be exhausted to fully understand the ecology of all large mammal fauna in the park (in addition to apes and the other nine species selected for this study) and the shy and elusive nature of large mammals in general, justifies chances of applying new survey approaches for large mammal (e.g. use of camera traps to determine species presence) where visual findings may boost the ecological and geographical relevance of this park. I particularly would recommend continuing monitoring of large mammals using camera traps if funds are available.

The continued use of park landscape despite its protection status by the human society living adjacent to this area to satisfy their needs, calls for more research specifically targeting the people's perception, values and needs. Where funding is available, I would fully engage in activities to address these pressing conservation issues in the project area.

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

Partial outcome of my research were presented last year October 2013 at a conference "Conservation and Sustainable Use of Ecosystems" in Greifswald, Vilm Island, Berlin. Germany. Detailed outcome addressing the effects of habitat heterogeneity on large mammals and the effects of anthropogenic influences on large mammal respectively were presented in two PhD research seminars organised by BTU-Cottbus-Senftenberg Germany in June 2014 and July 2014.

Scientific manuscript specifying the spatial and temporal pattern of the park landscape; large mammal status; and intensity and extent of human threats within and adjacent the project site are being reviewed for publication.

A PhD thesis is being finalised and will soon be submitted to BTU Cottbus –Senftenberg library for general public consumption

A concise technical report detailing project aims, objectives important results, challenges and recommendations for immediate or future conservation actions is being prepared and will be sent to key stakeholders especially the government department responsible for protected area management in Cameroon and other influential non-governmental conservation organisations particularly WCS, Cameroon programme.

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 RSG was awarded in August 2012 but project activities actually ran from November 2012 and continued beyond the anticipated project period till November 2013. Delays in acquiring satellites images, time spent in improving GIS Skill, waiting time for authorisation to conduct research and a later need for more data are among reasons for late reporting

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.

(There was a drop of currency rate from 1£ = 774 CFA at grant reception to 1£ = 745 CFA and even less during project implementation.)

1£ Sterling = 745 Francs CFA

Item	Budgeted Amount	Actual Amount	Difference	Comments
Travels: Airfare / Airport tax	1270	1380	-110	
Purchase of field equipment	650	530	+120	Few equipments were purchase and others

				solicited from WCS and IUCN/Mike Cameroon programmes
Transportation: Ground transport	140	300	-160	
Field survey cost: Wages , team logistics	2740	3000	-260	
Subsistence allowance for principal investigator during field work (lodging, feeding)	650	1950	-1300	
Pre field work	100	100	0	
Post field work	150	150	0	
Contingency	300	300	0	Was used to cover additional cost ensued for payment of wages and purchase of field logistic for research team. It also covered additional cost incurred in ground transportation of research team
Total	6000	7710		

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

First focus is directed to sharing of project findings to vital audience possible. Continuing monitoring of Deng Deng National Park by the project team operating on the ground (WCS) is essential. Research geared towards population census around the park and targeting people's perception, values and needs are critical next step for this project.

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?

Yes. RSG logo has been conspicuously displayed on all presentations and short field trip reports (submitted to WCS-Wildlife Conservation Society Cameroon Program) conducted since the award of small grant. Rufford Foundation has been fully acknowledged as the principal funder of this project in my thesis and in all manuscripts under review for publication. Information on how to apply for RSG grant was shared among colleagues and research team member in Cameroon.

11. Any other comments?

I sincerely appreciate RSG for this great financial support. With your support, I was able to make a little contribution to conservation, through my project findings (See section 2) that may help advance the conservation objective of the Deng Deng National Park.

Working towards an academic degree, I have achieved an incredible amount thanks to your financial support. I hope to continue working to achieve more measurable conservation objectives in the fast changing Cameroon ecosystems and do rely on more of your support. Thank You.



PROJECT ACTIVITIES IN PICTURES

Project Title

The effects of habitat heterogeneity and anthropogenic influence on the abundance and distribution of mammals in the Deng Deng National Park

Mercy Nambu Diangha

RSG Ref: 11773-1



Training of field assistants



Training from room to field



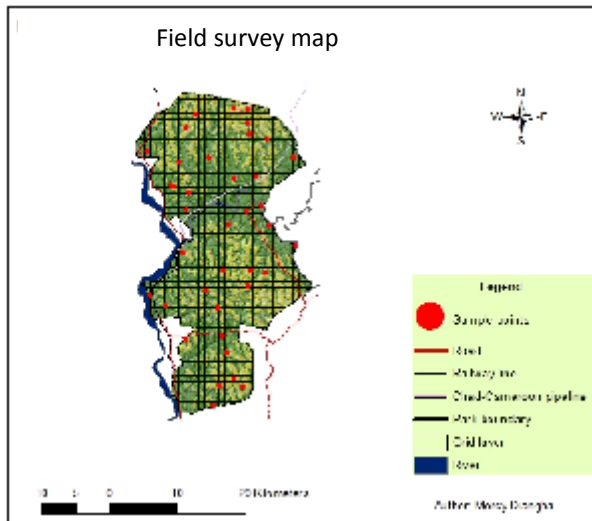
Collaboration





Research team with Chief of Tete D'elephant village at Tête de L'elephant

Field trip planning



Reading maps prepared for field surveys with research team (at Belabo WCS base office)



Set for field work with necessary equipment, enough food and first aid for research team.

Field expedition



Set to leave Belabo. Team transported to Deng Deng village close to park (Vehicle support from WCS)



Off-loading at Deng Deng Village (MINFOF forestry post)



Embracing true nature where vehicles cannot reach.



Ecoguard on research team found cooking items hidden by hunter in tree buttress trunk



Local assistant (from community) with Ecoguard (MINFOF) destroying wire snare set to trap mammals in the Deng Deng National Park

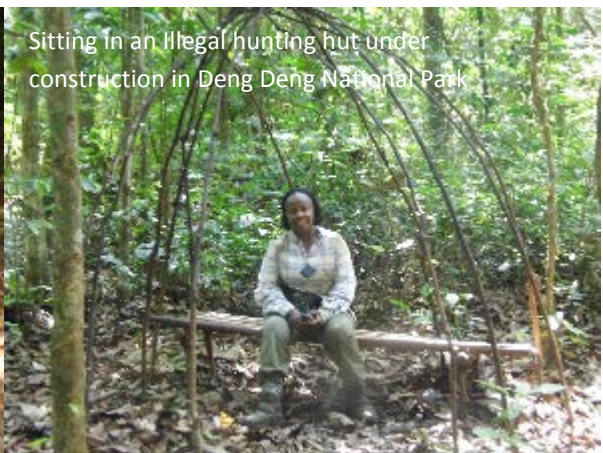
Camping in the wild



Tents to sleep in after every day work. With my research team



Active hunting camp (typical style during dry season) in the park



Sitting in an illegal hunting hut under construction in Deng Deng National Park

Seminars and Conferences

Rufforo
www.rufforo.org

BTU
Brandenburgische Technische Universität Cottbus

Human influence and the sustainable conservation of the Deng Deng National park

By
Mercy Nambu Diangha

11-17 October 2013
Greifswald University, Island of Vilm, Berlin, Germany

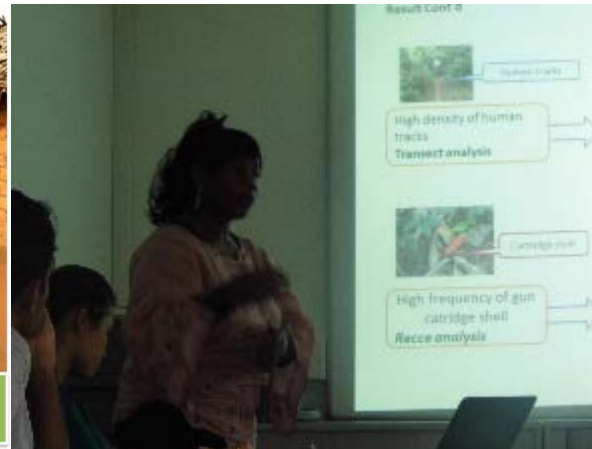
Rufforo
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The effects of habitat heterogeneity on the diversity, density and distribution of large mammals: the case of Deng Deng National Park, Cameroon

Mercy Nambu Diangha

PhD Research Seminar: 25.06.2014

btu Brandenburgische Technische Universität Cottbus - Senftenberg
Chair of General Ecology, Brandenburg University of Technology, Cottbus-Senftenberg, Germany



Results from project have been presented in two seminars and one international conference all held in Germany. Also shown is a photo of me sharing project results at the International Alumni conference "Conservation and sustainable use of ecosystems" held during 11-17th of October 2013 at Griefswald, Island of Vilm and Berlin.