

## The Rufford Foundation

### Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
<b>Your name</b>	Padonou Elie Antoine
<b>Project title</b>	Involving local community in conservation of termite mounds on bowé in Benin, West Africa
<b>RSG reference</b>	20246-2
<b>Reporting period</b>	11 Jul 2016 – 11 Jul 2017
<b>Amount of grant</b>	£5000
<b>Your email address</b>	padonouelie@gmail.com
<b>Date of this report</b>	17 Jul 2017

**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
Assess the role of termite mounds on soil conservation and floristic composition on bowé				Two types of termite mounds characterised bowé: the big and the small mounds. The big mound characterising the genus <i>Macrotermes</i> was three times the height and six times the circumference of the small termite mound characterising the genus <i>Cubitermes</i> , <i>Trinervitermes</i> and <i>Microcerotermes</i> . However, the small mounds were more abundant than the big mounds on bowé. Three herbaceous communities were found on bowé with different proportion of termite mounds. The plant diversity decreased while the abundance of the termite mounds decreased in the plot. Termite had positive influence on plant community diversity in terms of species richness, diversity and composition. They also contributed significantly in soil restoration. Thus their conservation is of high importance for biodiversity and soil restoration on bowé. The termites should therefore, be taken into account in the global strategy of biodiversity management on bowé.
Provide fieldwork, training workshops and meetings towards farmers and local institution on the role of termite on soil and biodiversity conservation				Practical manual and posters was used during training workshops and meetings with farmers, local communities, associations, NGOs and locals.
Raise awareness of land use departments, local NGOs, local				The outputs of the workshops helped to develop and implement several sensitisations on the importance of

<p>training institutions, local decision makers, local associations and local communities on conservation of termite on bowé sites</p>			<p>termite mounds for biodiversity and soil restoration on bowé. However, I am still doing the lobbying based on the results to facilitate the adoption of certain indigenous soil conservation and restoration with termites.</p> <p>I find out that the big mound density was very low compared to the density of the small mounds on bowé. Thus, it is important to investigate the determinant of the principal abiotic and biotic factors shaping mound densities on bowé landscape and raise awareness in local communities on the abiotic and biotic determinant of spatial variability of termite mounds on bowé in order to sustain the conservation and management of termite mounds on bowé.</p>
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**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

No difficulties arose during the project as we conducted several sensitisations and fieldwork with the local communities in the previous project.

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

- a) The assessment of the role of termite mounds on soil conservation and floristic composition on bowé gives an overview on the importance of termite mounds for biodiversity and soil restoration on bowé.
- b) Fieldwork, training workshops and meetings gives new ways to learn from nature and build conservation actions on biological process
- c) I increased awareness of 500 farmers in the municipality of Banikoara in Benin where bowé are abundant.

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

Local communities were closely involved in the project activities in several ways:

- a) They was trained on the role of termite on soil conservation, floristic composition, and plant cover on bowé.
- b) I involved local communities in field school and their results have been presented during training workshops and meetings.

- c) Exchange experiences with local communities allowed building the framework of observed restoration strategies of *bowé*.
- d) Several sensitisations on the role of termite on soil conservation, floristic composition, and plant cover on *bowé* were developed and implemented towards local communities.

**5. Are there any plans to continue this work?**

While investigating the role of termite on soil conservation, floristic composition, and plant cover on *bowé*, I found two types of termite mounds (small and big termite mounds) characterizing different termites' species on *bowé*. The small mounds were abundant than the big mounds. However, how the patterns of the big and the small mound distribution vary on *bowé* landscape remain poorly understood. The big mounds density was very low compared to the density of the small mounds on *bowé*. Thus, it is important to investigate the determinant of the principal abiotic and biotic shaping mound densities on *bowé* landscape and raise awareness in local communities on the abiotic and biotic determinant of spatial variability of termite mounds on *bowé* in order to sustain the conservation and management of termite mounds on *bowé*.

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

I am currently writing one manuscript title "Can termites restore plant diversity and soil on *bowé* in West Africa?" that will be published to share this experience of using conservation science to solve conservation problems in developing countries. I will continue the dissemination of the practical manual and posters on the role of termite on soil conservation, floristic composition, and plant cover on *bowé* to institutions involved in conservation of natural resources at national, regional and international level.

**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 used from 11 Jul 2016 to 11 Jul 2017 and this period was as anticipated.

**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	Budgeted Amount	Actual Amount	Difference	Comments
Scientific literature and field guide	70	160	-90	I produced poster (£10 per poster with one poster per village and 6 posters in total) and practical manual (£0.5 per manual with 10

				manual per village and 6 villages in total) in addition to the Scientific literature and field guide
Internet	200	110	90	I reduced the internet budget due to the printing of the posters and the practical manual
Radio and public crier communication	300	300	0	I provided 4 sessions of Radio and public crier communication per village with 6 Villages (£12.5×24)
Phone communication	180	300	-120	£50 for phone communication per village with 6 villages in total
Travel to sites	1200	1200	0	I made 3,000km during travel to sites (£0.4×3,000km)
Research assistance and local workers	600	1200	-600	I used one research assistance and one local worker for the 6 villages (£100×6×2)
Hiring room for training workshops	150	120	30	I negotiate the room for training workshops at £20 per village with 6 villages in total
Transport per diem for participants	600	600	0	I paid £10 for each participant with 10 participants per village and 6 villages in total
Foods	300	300	0	I paid £5 for each participant with 10 participants per village and 6 villages in total
Education awareness, sensitization and lobbying	1400	710		I still doing the lobbying but I have no money left. I will continue the lobbying in addition to and the dissemination of the practical manual with new project

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

I will still doing the lobbying to facilitate the inclusion of indigenous soil restoration practices in laws, decision making on soil conservation strategies and policies in Benin as many of the official documents are still in revision. Moreover *bowé* cover two types of termite mounds (small and big termite mounds) characterising different termites' species on *bowé*. However, how the patterns of the big and the small mound distribution vary on *bowé* landscape remain poorly understood. The big mounds density was very low compared to the density of the small mounds on *bowé*. Thus, it is important to investigate the determinant of the principal abiotic and biotic shaping mound densities on *bowé* landscape and raise awareness in local communities on the abiotic and biotic determinant of spatial variability of termite mounds on *bowé* in order to sustain the conservation and management of termite mounds on *bowé*.

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

I used the Rufford Foundation logo on the posters and practical manuals on the importance of termite mounds for biodiversity and soil restoration on *bowé*. I also acknowledge The Rufford Foundation in the manuscript in preparation for publication in peer review.

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

**Dr Ir Elie Antoine Padonou : Principal investigator**

Dr Ir Padonou is research assistant at Laboratory of Applied Ecology. He is involved in understanding and combating desertification and land degradation in Benin since 2010. He investigated the role of termite mounds on soil conservation and floristic composition on *bowé*. He also planned the meetings with farmers and local institutions and prepared the reports and publications of the results.

**Mr Alexis Akakpo: Research assistance**

Mr Alexis Akakpo has master degree in management of natural resources. He was the assistant of the Principal investigator for the assessment of the role of termite mounds on soil conservation and floristic composition on *bowé*, the meetings with farmers and local institutions and the preparation of the reports and publication of the results.

**Samuel Aratogné: local workers**

Ir Aratogné is an agricultural engineer in charge of coordination of combating desertification and land degradation at GOETE Benin NGO since 2009. He is working with local communities and other NGOs working on environmental issues in Benin. He helped to implement the fieldwork, training workshops and meetings with farmers and local institutions.

**Prof. Brice Sinsin**

Prof. Sinsin is the vice chancellor of the University of Abomey-Calavi, the director of the laboratory of Applied Ecology. He is advisor especially for lobbying.

**Others**

Politicians, technicians in ministries, land use departments, institutions in charge of environmental policies; local NGOs, local training institutions, local decision makers, local associations and local communities associated to attend the goals especially for sensitization and lobbying.

**12. Any other comments?**

I am indebted to the local communities involved in this project who share graciously their knowledge and make this project possible. I thank The Rufford Foundation for financial support.

# Can termite contribute to restore plant diversity and soil on bowé in West Africa

Author: PADONOU Elie A.

Laboratory of Applied Ecology, Email: [padonouelie@gmail.com](mailto:padonouelie@gmail.com); Phone +229 97212586

## Introduction

*Bowé* are often associated with termite mounds in West Africa. However, up to now little is known on the role of termite mounds on biodiversity conservation and soil restoration on *bowé* (Aubrèville 1976; Padonou *et al.*, 2015b). However, up to now little is known on the role of the termite mounds on biodiversity conservation and soil restoration on *bowé*. This work investigates the role of termite mounds on soil conservation, floristic composition, and plant cover on *bowé*. We consider as reference, *bowé* sites without termite mounds for comparison.



**Photo 1:** Termite mounds built on the bowé in Bénin

## Material and Methods

A number of 32 sampling plot of 10 m × 10 m, were considered in five sites (Sampeto, Somsoro, Ankoamon, Samper peulh and inside the Park W). Data were recorded on the circumference and height of the termite mounds and species inventory using point-intercept method (Strandberg *et al.*, 2016) (photo 1). As *bowé* have shallow topsoil, the holes were dug to measure soil depth in the sub-plots with and without termite mounds (photo 2).

A cluster analysis, a Nonmetric Multidimensional Scaling (NMS) and ANOVA were used to analyze data between the plots with termite mounds and their respective adjacent plots without termite mounds.



**Photo 2:** Herbaceous vegetation inventory



**Photo 3:** Soil depth measuring

## Results

Two groups of termite mounds were found on *bowé*. There are the small and the big termite mounds (table 1).

Table 1. Characteristic of the groups of termite mounds observed on *bowé*

Group	Height (cm)		Circumference(cm)	
	m	s	m	s
<b>G1</b>	49.63	17.51	169.18	64.22
<b>G2</b>	146.78	33.32	709.33	350.17

Three plant communities (C1, C2 and C3 ) were found with C1 located in the plots dominate with termite mounds (71.86 % of termite mounds with 78.26 % small mounds and 21.74 big mounds). C2 had few termite mounds (30.43 % of termite mounds with 42.86 % small mounds and 57.14 % big mounds). And C3 had very few termite mounds (25.00 % termite mounds with 100 % small mounds). C1 was more diversified (S: 15; H: 1.52±0.48; E: 0.81±0.09; and D: 0.71±0.13) than the two others plant communities.

The results of ANOVA revealed a high difference between the soil depth in the plots with termite mounds and the plots without termite mounds on *bowé* (Table 2).

SNK grouping	Mean (cm)	Numbers	Termitaria Cluster
<b>A (Big)</b>	35.23	18	CT2
<b>B (Small)</b>	14.63	46	CT1
<b>C (Without)</b>	1.50	46	CN1
<b>C (Without)</b>	1.28	18	CN2

Table 2. SNK Grouping of soil deep according to termite mounds groups

## Conclusion

Two types of termite mounds characterized *bowé*: the big and the small mounds. Three herbaceous communities were found on *bowé* with different proportion of termite mounds. Termite had positive influence on plant community diversity in terms of species richness, diversity and composition. They also contributed significantly in soil restoration. Thus their conservation is of high importance for biodiversity and soil restoration on *bowé*.

## KNOWLEDGE:

Rufford small grant (RSGApplication-padonouelie-20246-2)