

## 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>	Ouachinou Jérôme Marie-Ange Sènamì
<b>Project title</b>	An Assessment of the Ecological Status, Endangerment Factors and Socioeconomic and Cultural Importance of Rare, Endemic and Threatened Plants Harboured of Atacora Mountains in Benin: A Baseline for Installing Vegetation-Based Conservation Areas
<b>RSG reference</b>	21724-1
<b>Reporting period</b>	05/2017 – 05/2018
<b>Amount of grant</b>	£4990
<b>Your email address</b>	ouajeronime@gmail.com
<b>Date of this report</b>	12/05/2017

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 abundance, ecological and floristic characteristics of habitats and endangerment factors of rare, threatened and endemic plants of the Atacora Mountains				Initially, we identified through bibliographic research 29 plant species classified as threatened by Benin Red list and found on the Atacora Mountains in Benin. These were classified as follow: 7 CR, 15 EN and 7 VU. Among them 2 endemic species to Benin: <i>Thunbergia atacorensis</i> and <i>Ipomoea beninensis</i> , and one genus endemic to the Sudan zone: <i>Vitellaria</i> . Distribution area of the 29 species was delimited. All species weren't well known by our guides in their repartition area. Thus, we have had some difficulties to find them in the field, above all when their last occurrences were changed in landfarms or habitations. Finally, 65 localities in five towns were prospected; the bibliographic research revealing that Kopargo doesn't belong to the Atacora Mountains.
Assess the socioeconomic and cultural importance of rare, threatened and endemic plants harboured in the Atacora Mountains				Ethnobotanical study was conducted on the 10 threatened species found during vegetation studies and confirmed by our guides as useful for population. A total, 300 (60 per town) people were interviewed.
Initiate a community-based program for the conservation the Atacora Mountains landscape				We planned education sessions in the classrooms with pupils but period fallen into the general strike in the country. However, a part of conservation programme (ongoing) begun with farmers, charcoal makers, granitic rock workers, carpenters.

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

Important changes of species habitats in landfarms or habitations were noted. Time of vegetation survey was get longer. As pupils are heir of biodiversity, we thought that is very important to inform them about our results of our project and conservation actions about Atacora Mountains but we hadn't been able.

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

The three most important outcomes of the project:

- **Abundance, ecological and floristic characteristics of habitats and endangerment factors of rare, threatened and endemic plants (RETP)**

We collected 489 plant species (17.42% of Benin flora) distributed in 261 genera and 98 families. In general, species were found in woodland, tree and shrub savannahs, dry forests, gallery forests, tickets and farmlands. Their distribution is function of soil, soil moisture, topography, and anthropogenic activities. Several habitats were degraded (important proportion of species with large distribution, 15%) and need to be restored. Tree density ranged between  $17 \pm 4$  individuals/ha in the farmland to  $320 \pm 98$  individuals/ha in the gallery forests. Biogeographically, Atacora Mountains flora was dominated by Sudano-Zambezi species (21%). Among the 29 RETP provided by bibliographic research, only 10 species were found during vegetation survey. There was: *Azelia africana* (IUCN: VU; Benin: EN), *Afraegle paniculata* (Benin: EN), *Chrysobalanus icaco* L. subsp. *atacorensis* (Benin: CR), *Commiphora pedunculata* (Benin: CR), *Khaya senegalensis* (IUCN: VU; Benin: EN), *Pterocarpus erinaceus* (Benin: EN), *Terminalia brownii* (Benin: CR), *Thunbergia atcorensis* (Benin: EN), *Vitellaria paradoxa* (IUCN: VU; Benin: VU), and *Zanthoxylum zanthoxyloides* (Benin: VU). Among these threatened plants, *A. paniculata* (2.3 individuals/ha), *C. icaco* (6.5 individuals/ha), *T. atcorensis* (8.20 individuals/ha) *C. pedunculata* (12.2 individuals/ha), and *D. africanum* (12.4 individuals/ha) had lowest densities. A total, 16 positions harbour threatened species. Here are some: Bounta, Koussoukouangou, Kotiakou, Kotopounga, Perperikou, Pouya, Tagaye, Tanougou, Tipteti, and Yarpao. Among towns, Natitingou is the only harbouring the majority (90%) of the threatened species.

- **Socioeconomic importance**

The 10 RETP found during vegetation survey were potentially plant useful for local communities constituted of Waama, Natimba, Ottamari, Bariba, Berba, Ditamari, and Peulh.

- Medicinal species: *Azelia africana*, *Afraegle paniculata*, *Commiphora pedunculata*, *Khaya senegalensis*, *Pterocarpus erinaceus*, *Vitellaria paradoxa*, and *Zanthoxylum zanthoxyloides*,
- Food species with commercial value: *Vitellaria paradoxa*, *C. icaco*,

- Fodder species : *Azelia africana*, *Khaya senegalensis*, *Pterocarpus erinaceus*, *Thunbergia atacorensis*,
- Woody species: *Azelia africana*, *Khaya senegalensis*, *Pterocarpus erinaceus*, *Terminalia brownii*.
- Firewood and charcoal species: *Azelia africana*, *C. icaco*, *C. pedunculata*, *K. senegalensis*, *P. erinaceus*, *T. brownii*.

Usages of RETP showed highly significant dependence to the sociolinguistic groups (Chi<sup>2</sup> = 194.47, df = 55, p-value < 0.001) and to the sex (Chi<sup>2</sup> = 143.54, df = 55, p-value < 0.001). *K. senegalensis* and *P. erinaceus* were most known and used by sociolinguistic groups Peulh, Ottamari and Waama. Women prefer plants with commercial and food values as *C. icaco* and *V. paradoxa* while men had a preference for plants with wood (*A. africana*, *P. erinaceus*) and medicinal (*A. paniculata*, *C. pedunculata*, and *Z. zanthoxyloides*) interests.

- **Endangerment factors of RETP and proposed conservation measures**

RETP were threatened because of:

1. Land management practices: conversion of their habitats in landfarms for the production of crops (cotton, tuber, cereal) and in habitations (noticed by myself and reported by about 90% of the informants).
2. Climate change (reported by 100% of the informants).
3. Bad harvest practices for the various uses (medicine, human food, grazing, logging, firewood and charcoal) (noticed by myself and reported by about 100% of the informants);.
4. Vegetation fire (reported by 100% of the informants).
5. Invasion of alien species (noticed by myself).

Waiting for the implementation of long term conservation actions, we agreed with local communities (farmers, breeders, healers, and local leaders) on some conservation measures to be adopted for reducing the threats: agroforestry, home garden installation, promotion of apiculture, creation of local seed banks, good harvest practices. In view of usefulness of RETP local people requested help for their domestication and approved the installation of the vegetation-based conservation areas for safeguarded original value of this magnificent patrimony, the Atacora Mountains.

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

Local communities were involved in the field study and definition of conservation programme. Firstly, they served as guides, interpreters and also provided information during the course of the interviews. Objectives and results of the project were shared through a sensitization campaign to local communities and of definition of short term conservation methods in collaboration with the assistance of foresters and a mini-seminar for the students of my lab.

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

Yes. For an effective installation of the vegetation-based conservation areas for the Atacora Mountains, many scientific questions remain and deserve to be solved. How climate and human activities affect Atacora Mountains? What is the reproductive capacity of interest species, above all these with low densities? What are effects of organ collection and invasion of alien species on their population? What sites could be harboured the conservation areas on the Atacora Mountains? Is preservation of the sites in the state enough to ensure persistence of the populations? What is history of the localities of Atacora Mountains? Which could look like to a touristic event?

In addition, we will promote cultivation of quick-growing plants with important economic value for solving vegetation fire problems in the project area.

After collection of additional data, we will start the installation of the conservation areas.

At present, two manuscripts are ongoing for the valorisation of the project. They are entitled Atacora Mountains flora: ecological status and implications for the conservation and Local value and use diversity of rare, endemic and threatened plants hosted by Atacora Mountains.

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

We plan to publish two scientific articles. The manuscripts are in the preparation. The first focused on the ecology of the RETP found on Atacora Mountains and the second on the socioeconomic importance of these species. They will be also shared during local and regional conferences for students.

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

Activities were planned to be begun in March 2017. After we received the grant in May 2017, period was readjusted to be finished in May 2018.

**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
GPS Garmin ETREX 30	290	290	-	-
Suunto Clinometer	150	150	-	-
camera Canon	370	370	-	-

Local transportation (public transport, Motor-bike rental and Fuel for motor-bike)	1880	1880	-	-
Stipend for 5 students	500	500	-	-
Assistant for local awareness (farmers, local leaders, charcoal makers, carpenters)	400	400	-	-
Awareness raising and Mini-seminar (foresters and students)	500	500	-	-
dissemination of results (edition of Pamphlets and Posters)	900	500	400	Used for the telephonic communications with local communities because this wasn't budgeted
<b>Total</b>	<b>4990</b>	<b>4590</b>	<b>400</b>	<b>-</b>

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

We think it would be very important to: 1) map spatio-temporal dynamics of vegetation (per town) on Atacora Mountains, 2) estimate extinction risk of threatened species by modeling their occurrence under global warming scenarios and infer, 3) predict effects of invasive alien species under climate change, 4) estimate effects of organ collection on their populations, 4) assess their reproductive capacity, 5) prioritise the sites that can harbour conservation areas, 6) define conservation actions required to maintaining the populations, and 7) create and strengthen local governance capacity and enable engagement with other actors for the management of conservation areas.

### 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?

Yes, the Rufford Foundation logo was used during the implementation of the project and this acted as publicity for the Rufford Foundation. We posted Rufford Foundation logo on the first page of photography catalogues that we elaborated for the useful species of the Mountains and showed to the people during ethnobotanical investigations. In addition, Rufford Foundation logo was used during oral presentation of results to the students of my lab.

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

The project was implemented by:

- **OUACHINOUE Jérôme Marie-Ange Sènamé**, Msc, Botanist and ethnobotanist: coordination and management of all activities (abundance assessment, ecological status, ethnobotanical investigation and public awareness).
- **Prof. ADOMOU Aristide Cossi**, PhD, Systematic Botanist: identification of plants.



- **Dr. Ir DONOU Marcel**, Ph.D, Agronomist: advice on forest inventory methods.
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- **Mr PLAGBETO Hermann**, MSc, Geographer: realization of vegetation map and creation and management of data base through GIS.
- **FAVI Abraham**, MSc, botanist: ethnobotanical investigation.
- **DASSOU Stève**, MSc, Socioeconomist: supervision of the documentation of socioeconomic interests of plants.
- **ZOUNTANGNI Mathieu** and **DJIDOHOKPIN Donald**, MSc students, collection of ecological data.
- **Mr GNANANDO Albert**, local population, responsible of a botanical garden: education on conservation actions.
- **300 farmers, charcoal makers, granitic rock workers, carpenters** of Tanguieta, Kouandé, Natitingou, Toucountouna, Boukoumbé: participation to the investigations
- **5 foresters** help in education on conservation actions.

## 12. Any other comments?

Atacora Mountains is really an ecologically and floristically important site for Benin. Despite, no conservation strategies exist for most of 489 plant species. Habitats/stations of the majority of threatened species are degraded. Our study is a first baseline for setting effective conservation of several plant species, especially the threatened plant species. Other data must be collected for setting final baseline.

We thank Rufford Foundation for providing research funding. We would like to extend our gratitude to Jane Raymond and Josh Cole.



Interviews



Left: Discussion on conservation methods to be used. Right: Participation of a guide to the activity.



Left: Habitations on base of the chain. Right: Human activity on the Atacora chain.



Left: *Thunbergia atacorensis*, an endemic plant species attached to the Atacora Mountains. Right: *Vitellaria paradoxa*, an endemic species plant to the Sudanian floristic region.