

Final Project Evaluation Report

Your Details	
Full Name	OUACHINOUE Jérôme Marie-Ange Sènam
Project Title	Define suitable sites for installing vegetation-based conservation areas for the Atacora Mountains in Benin
Application ID	26432-2
Grant Amount	£4880
Email Address	ouajeronime@gmail.com
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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
Map first soil occupancy (areas used for crop cultivation, livestock grazing, and reserved area for transhumance) and spatio-temporal dynamics of vegetation on Atacora Mountains				We selected three dates (1986, 2001 and 2016) for analysing the evolution of the vegetation areas on Atacora Mountains. This allowed us to identify the waste lands, high cultivation areas, and natural vegetation areas.
Map mature plants of rare, endemic and threatened plants (RETPs) for seed collection and germination and regeneration tests				Study was done on 10 RETPs. Collection and analysis of field data towards addressing this objective were successfully completed.
Estimate extinction risk of threatened species and infer				Environmental and occurrence data were gathered, and analysis are completed but final analysis is underway. We predicted the probability of occurrence of the RETPs for each plot using a GLM. Preliminary results showed a strong dependency of all RETPs on temperature and alien species cover. Thus, the probability of occurrence of the RETPs increased with decreasing temperature and of the rate of alien species cover.
Document Atacora Mountains history, events related to the mountainous tribal with their life process				For the moment, field data collection towards addressing this objective was focused on archaeological sites we found on the Atacora Mountains. Analyses of these data are completed.
Prioritize suitable sites to be hosted conservation areas with local communities				Grid cells based on mileage were used for the spatial patterns of RETPs analysis. Suitable sites were assimilated to the biodiversity centres which were identified based on species richness and number of special species in each spatial unit for each site of the

				study area. These factor variables were opposed to plant lists of state forest reserves in a gap analysis for identifying priority conservation areas on the Atacora Mounts. This method was discussed with local people.
Teach local communities on sustainable use of RETPs, their domestication, and create and strengthen local governance capacity of sites				As the project is a community initiative, first we created local eco-guarding team which gathers five farmers who have participated to the selection of suitable sites.

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

We (I and my team) initially underestimated the data ruggedness to be collected. It was also hard to find mature plants of the RETPs in the Atacora Mountains. Thus, fieldwork taken more time than foreseen. We worked with field staff who were more familiar with the study sites, and it helped in getting the representative number of seed per species.

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

Map of soil occupancy and spatio-temporal dynamics of vegetation on Atacora Mountains

Our results reveal that in 1986 about 96.92% of Atacora Mountains was covered by dense tree cover and 1.84% of mosaic of crops. Over the 2001-2016 period, the net loss of dense tree cover was estimated at 2.31% and we noticed during the same period an increasing of the cover of mosaic of crops (2.15%). Important loss was recorded in the special habitats such as gallery forests and dense forests where populations of the RETPs are found. Through images and personal field data, potential cultivation area and waste land were delimited.

Map of mature plants of rare, endemic and threatened plants (RETPs) for the seed collection and germination and regeneration tests

Over the activity period, we mapped 435 mature individuals of the target plant species. From the experimentations, a total of 328 seedlings (of which 105 from regeneration tests and 223 seedlings from germination tests) are ready to plant in the degraded habitats.

Prioritize suitable sites to be hosted conservation areas with local communities

Investigations revealed a total of 55 special taxa of which 10 species we name RETPs. The 55 taxa were distributed into four categories recorded on the Atacora Mountains. Among them, the most common category was threatened species (46 species, 74%) followed by exclusive species (13 species, 21%). By considering the conservation status of the threatened species category, 60.90% of the species have been assessed as Endangered (EN) against 21.70% and 17.40% of them have been

respectively characterised as Vulnerable (VU) and Critically endangered (CR). From this study, three biodiversity centers were identified notably Natitingou and Tanguieta (26 special species each) and Boukoumbé sites (21 special species). The selected conservation area is archaeologically important because it harbours several structures (caves, rock shelters, anthropogenic mounds, metallurgical sites) notably installed during KABA resistance, one of the Atacora Leaders to the colonization. A total of 33 archaeological sites were recorded along Atacora Mountains.

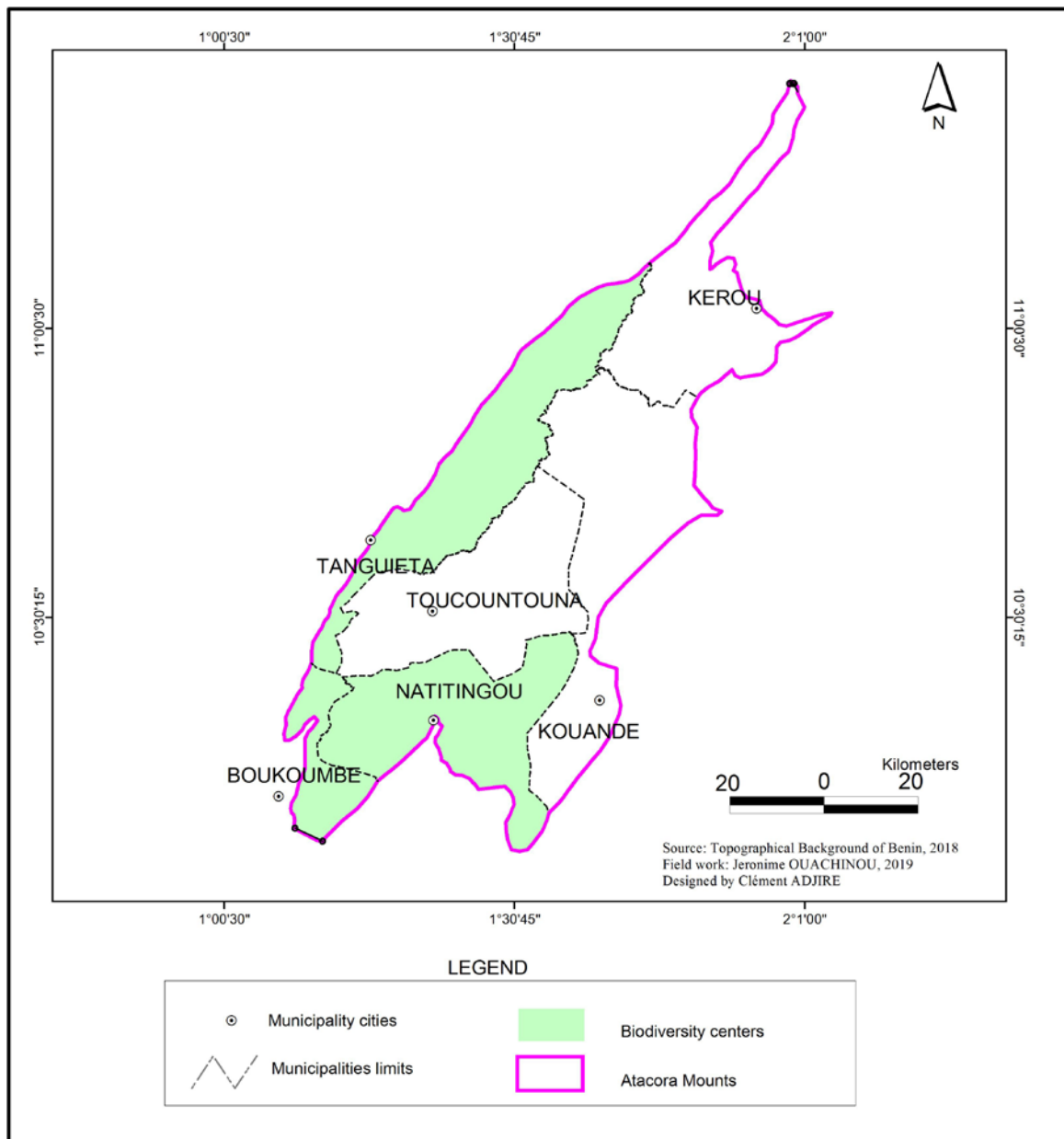


Figure. The Atacora Mountains showing the identified conservation area (three centres of species).

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

Local communities were involved at different stages of the project:

- a) As guides for mapping the mature plants of rare, endemic and threatened plants (RETPs) and seed collection, identifying anthropogenic mounds, metallurgical sites, etc.
- b) As assistants for the germination and regeneration tests and helping to identify priority sites.

5. Are there any plans to continue this work?

The project revealed key priority sites for the biodiversity conservation on the Atacora Mountains in Benin. Following the completion of the final analysis we will spatialize, in the selected sites, the opening zones, waste lands and breastplates which don't favour the reconstitution or enrichment of vegetation. For this, we hope to initiate a study to understand the pedological profile of the selected conservation area. This will allow to select the adapted species for each site and thus to well conduct the reforestation activity. An emphasis will be making on gallery forests. In addition, we plan to conduct a study for assessing other threatened species notably orchids, fungi and fauna (birds, elephants, monitor lizards, rodents, etc.) known for the selected conservation area. In fact, during the discussions related to the selection of priority conservation sites, local population reported the presence of these species' groups. Unfortunately, to date no data exist on these organisms. Yet, documentation of these information will give more to our conservation challenge.

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

- A Master thesis was defended during the implementation of the project and a copy of document was sent at the library of National Herbarium of Benin. The subject was botanical and ecological studies of the Atacora Mountains vegetation: implications for the phytodiversity conservation.
- A manuscript entitled: "Unique botanical value on Atacora Mountains: reasons for the creation of new conservation areas in Benin" was submitted to *Checklist*.
- We planned to publish another manuscript on reproductive abilities of the rare, threatened and endemic plant species harboured by Atacora Mountains in Benin.
- We plan also to prepare a book which will highlight all plant species harboured by Atacora Mountains with special focus on the rare, threatened and endemic plant species.
- An oral communication (certainly by visio-conference) will be given at international conference organised by University of Abomey-Calavi.

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

The project was planned to last 12 months but in consideration of field exigencies, it was reorganised. Thus, the grant was used from September 2018 – July 2020.

8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Local transportation (public transport, Motor-bike rental and Fuel for motorbike)	1880	1880	-	-
Communication and internet expensive	400	400	-	-
Seed handling (pots, hormone, soil, acquisition for germination and regeneration)	600	600	-	-
Stipend for 5 students	500	500	-	-
Assistant for local awareness (farmers and pupils)	400	400	-	-
Awareness raising and Mini seminars (foresters, researchers, NGOs, students)	400	0	+400	We used this amount for having the landsat images. Normally, 1 m ² (of image) costs £ 4.70. We benefited a forfeit of £1100.
Dissemination of results (edition of Pamphlets and Posters)	700	0	+700	

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

To date, we think that it is very important to: 1) analyse the pedological profile of the selected conservation area, 2) ensure the ecological restoration of the target area through the plantation of trees according to the pedological profil, 3) establish checklist of melliferous plant species among documented flora, map their distribution and initiate apiculture in the target area like wished by local people, and 4) inventory other species notably orchids, fungi and fauna (birds, elephants, monitor lizards, rodents, etc.) in order to have global biodiversity occurring on the selected

conservation area, and classify these species according to several factor-variables, notably threat, restriction and rarity.

10. 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?

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 target species and showed to the people during map of the mature plants. In addition, Rufford Foundation logo was used by students during defence of their thesis.

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

Team leader: OUACHINOUE Jérôme Marie-Ange Sènam,

Map designer: ADJIRE Clément

Statistician: DONOU Marcel

Historian: N'DAH Didier

Field Assistants:

AHOUEANDJINOUE Thibaut

ESSOU Lopez,

BADOUE Romael,

DJIDOHOKPIN Donald

ZOUEANGNI Mathieu

ANAGOUNOU Alain

Field Collaborators:

Mr GNANANDO Albert,

M'BOUE Cyrille

M'BOUE Norbert

12. Any other comments?

Other lab and fieldworks were firstly done during the implementation of this second stage of our project for having an exhaustive list of the Atacora Mountains flora. At the present time, this ecosystem encompasses 835 plant species of which 55 special taxa (RETPs) distributed into four categories. Among them, the most common category was threatened species (46 species, 74%) followed by exclusive species (13 species, 21%), endemic to Benin-Togo (3%) and endemic (2%). By considering the conservation status of the threatened species category, 60.90% of the species have been assessed as Endangered (EN) against 21.70% and 17.40% of them have been respectively characterised as Vulnerable (VU) and Critically endangered.

Other data must be collected for setting final baseline on biodiversity occurring on this particular ecosystem in order to ensure its completely ecological restoration through reforestation and promotion of income activities notably apiculture.

We thank Rufford Foundation for providing research funding. We would like to extend our gratitude to Jane Raymond and Josh Cole. We apologise for being so late for the reporting.