

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	Eméline Sêssi Pélagie ASSEDE
Project title	Degraded habitat Restoration and Participatory Conservation action plan for Threatened Orchid species in Pendjari Biosphere Reserve (Northern Benin)
RSG reference	24777-2
Reporting period	April 2018 – Avril 2019
Amount of grant	£5000
Your email address	assedemeline@gmail.com
Date of this report	21 June 2019

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
<p>O1: Develop effective <i>in situ</i> conservation and management interventions for the threatened orchids species in the village around the Biosphere Reserve of Pendjari;</p>				<p>- Community forums and workshops on best environmentally sound practices for harvesting wild orchid were conducted first with representative of the four main ethnic groups: Gourmantché, Waama, Biali (or berba) and Fulani. The best environmentally sound practices for harvesting wild orchid were discussed. This workshop also helped in the evaluation of the existing practices and state management systems of the gallery forests. The heads of the household and the oldest woman were included in each targeted household.</p> <p>- We evaluated the recruitment potential of the Biosphere Reserve of Pendjari riparian zone's gallery forests through the diversity, the structure and the regeneration potential of the ligneous vegetation of these galleries. To this end, 60 plots of 500 m² (50 * 10 m) were systematically installed every 200 m on each side of the galleries of selected villages. The species richness of the regeneration stand during our study is estimated at 110 species.</p> <p>-The data collected here were capitalised by a master's student to submit his master thesis.</p>
<p>O2: Develop appropriate ex situ conservation strategies for the threatened orchids;</p>				<p>We are in the process of pulling the data from all parts of the project to create these recommendations.</p>
<p>O3: Promote local communities participation in orchid conservation.</p>				<p>- In a context of fragmentation of forest landscape and sustainable use of orchid species, local knowledge base analysis to develop conservation strategies of orchid habitat is more</p>

			<p>requested. We first analysed the perception of the populations living near the Biosphere Reserve of Pendjari in relation to the conservation status of the orchid habitats, the gallery forests, and the factors affecting these habitats. Specifically, we: i) assess variability in local perception on conservation status of orchid's habitats, and ii) determined degradation factors. We used questionnaire-based survey to assess knowledge on orchids and habitat degradation, from the four main ethnic groups (Gourmantché, Waama, Biali (or berba) and Fulani), including the demography and level of education, translating into 390 respondents.</p> <ul style="list-style-type: none"> - We then worked with stakeholders to identify the best strategy in promoting local community participation in orchid conservation. They highlighted two main actions: 1. awareness on the importance of gallery forests; and 2. restoration activity through tree planting or original tree species replacement along the gallery forests. - An educational campaign was then conducted in villages of Wama, Berba and Gourmantché ethnic groups around the Biosphere Reserve of Pendjari as suggested by stakeholders and planned by our project. The restoration activities of degraded lands of targeted villages (including Batia, Nanébou and Tanongou) designed with local actors followed the awareness programme. Local population including women, men and kids of various social groups were effectively engaged in these activities. The importance of orchid species in their livelihood was highlighted. The anthropogenic activities responsible for the degradation of their gallery forests were developed from their own point
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			<p>of view. They understood the necessity to proceed to the restoration of their degraded lands especially the gallery forests, as main habitats of orchids species used for several purposes by most of villages.</p> <ul style="list-style-type: none"> - We combined all these results with those from objective 1 to define ecological restoration, rehabilitation or reclamation areas, depending on the level of recovery required regarding the original ecosystem. - The restoration activities focused on the villages of targeted ethnic groups. Around 150 seedlings of native tree species (including <i>Khaya senegalensis</i>, <i>Ceiba Pentandra</i> and <i>Azelia africana</i>) were planted per village along gallery forests and degraded lands by local population. Beside the common degraded land, each woman of Tanongou village and mainly men in Batia village received seedlings to be planted in their farmland and home garden. These activities were a real success.
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

- Since 2018 I got a new position at the laboratory of Ecology, Botany and Plant Biology (LEB). We got an increasing number of project participants due to necessity of inclusion into field team the former and new staff members of my institution. However, this was possible by decreasing the number of days of actual field work.

- I had a delay in the implementation of the activities, as planned in the original project. At the beginning of the project, the Government of Benin changed the manager of the study area, The Biosphere Reserve of Pendjari from public to private management in August 2017: African Park Networks (APN) (<https://la-maison-pendjari.jimdo.com/>). Early in 2018, after their installation, APN established new rules for research activities. The institutions of all ongoing and new research activities had to conclude new partnerships with APN before they continue or start their activities. So, it took times to formalise this partnership between APN and my institution (LEB). In the same times some activities planned to be executed at specific time were not done on time because waiting for the partnership document. This formality caused a delay in some activities of the project.

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

Perception of local population on the conservation status of orchids and factor affecting their habitats

Ethnicity and level of education significantly influences knowledges on orchids, as well as the perception on their habitat conservation status. The ethnic groups Waama, Biali and Fulani perceived more the degradation of their gallery forests, habitat of orchid species. Several factors are responsible for the degradation of forest galleries. According to the populations, the conservation status of the habitat of the orchids is degraded and highly degraded and the factors causing the degradation are respectively: tree cutting, agriculture, wildfires, rambling, strong currents and the natural death with respective quotation frequencies: 35.77% 28.08% 28.88% 24.66% 6.10% 3.66% and 1.71%. Of the listed causes of degradation, the principal causes of degradation of the galleries is tree cutting (65.64%) followed by shifting agriculture (44.10%) and wildfires (39.49%). These results highlighted the relevance of population surveys on the conservation status of orchids and the factors affecting their habitats.

Recruitment potential of orchid habitats in unprotected area of the Biosphere Reserve of Pendjari

The average species richness per studied site varies between two and 16 species. The Shannon index varies between 0.69 and 2.55 bits showing that the diversity in our study is relatively low. The Jaccard index shows that the distribution of tree regeneration is not normal because the median is very far from the average. This implies that some sites have more individuals than others. The most abundant species are in descending order of importance: *Sarcocephalus latifolius* (142), *Diospyros mespiliiformis* (125), *Anogesus leiocarpa* (120), *Detarium microcarpum* (80) and *Myragina inermis* (74), respectively. Very few typical gallery forests tree species were recorded in the studied gallery forests. According to the Anosim test, the correlation between the ecological matrix (basal area) and the environmental matrix (presence / absence of orchids) is good ($R = 0.4$). Similarly, the Mantel test between the ecological matrix (basal area) and the environmental matrix (width of the river ($r: 0.07$), or distance to the closest ($r: 0.01$)) shows that the correlation between these matrices is low. However, the correlation between the distance from the plots to the centre of the villages is strong ($r: 0.7$). This result suggested that the closest is a gallery forest to a village, the highest is human action of degradation. Structural parameters of the gallery forests were analysed based on the density, mean basal area, and mean height of tree regeneration. The density varies between 810 stems / ha and 342 stems / ha. The average basal area varies between 9.73 m² / ha and 19.67 m² / ha, while the average height varies between 6 and 4 meters. Many plots have a low regeneration, even if some sites have a good regeneration potential. However, the recruitment of the regeneration in the upper classes is often compromised by overgrazing and wildfires suggesting management intervention for the vegetation restoration in gallery forests.

Conservation plan for orchid habitats preservation and restoration

Restoration strategies for degraded primary forests depend on the state of the forest stand, the objectives of the restoration program and the resources available. In

general, four main restoration strategies tested: protection and natural recovery, management of natural regeneration, enrichment planting and direct planting. Each of these strategies requires a series of silvicultural interventions to facilitate the survival and growth of pre-existing regeneration (seedlings, saplings, poles), as well as, in the last three cases, various planting methods. The restoration plan chosen and implemented for orchid habitats is the model enrichment planting as proposed by local population. These activities include: protection, planting of native tree species, maintenance operations (thinning, thinning and thinning or depressing to enhance tree growth), forest protection from fire and awareness raising, fire, firewood, timber or lumber and the exploitation of non-timber forest products. This proposal also comes from the observation that the total protection without production reinforces the illegal activities and demotivates the communities. During this activity around 150 seedlings were planted per village along gallery forests and degraded lands in collaboration with local population including men, women and kids. These activities were a real success as suggested by attached photos to this report.



Left: Group of women involved in tree planting: Tanongou village. Right: Tree planting with women along a gallery forest at Tanongou Village.



Left: Group of women in charge of seedling watering after planting at Tanongou village. Right: Tree planting with villages: Batia Village.

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

Local community members were involved in the entire conservation programme. During the seedlings transplantation in degraded gallery forests we selected several villagers volunteered to participate to the work. They were 155 from the four main ethnic groups Gourmantché, Fulani, Biali, Waama. We worked with two field assistants and one was a master's student from Biali ethnic group, who used the data of this project to write his master thesis submitted to the University of Parakou. We got support from the forest management office and all vehicles used during the field work whenever needed were provided by them. It is expected that the project produces an analytical and operational basis which will guide the forestry and wildlife agency to redefine the conservation strategies, politics, priorities and laws on the orchid conservations in Benin. This will be achieving in associating the municipal and government authorities.

5. Are there any plans to continue this work?

Developing and improving propagation methods for terrestrial orchids inventoried could be one of the next project ideas to work on. In such consideration the next generation of orchid taxonomists, ecologists, para-ecologists and conservationists must be nurtured through improved training, education, publicity and awareness-raising programmes. Using citizen science as an effective means of motivating individuals and amateur groups to record orchid occurrence will help to provide an effective map of orchid in Benin and help scale-up the collection of verifiable data. In addition, this important example of co-management of gallery forests around the Biosphere Reserve of Pendjari can be prolonged to other sites in the whole department of Atakora where there is a potential orchids diversity and where human activities threatens their sustainability in conserving orchid species.

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

The results of the present work are being shared with the local NGOs and university. Also, information on the present work will be disseminated through print media. The scientist world will be informed through the ongoing master thesis which will be defined before the end of this year. An abstract on the first results was submitted to the VII Symposium of Sciences, Cultures and Technologies of University of Abomey-Calavi to be held September 16 – 21 2019, Campus of Abomey-Calavi, Benin Republic. The manuscript of this oral presentation entitled "Ethnic disparity in perception of conservation status of orchid's habitat in Sudanian woodland" will be published for large dissemination. A second manuscript will be published on "Recruitment potential of orchid habitats in unprotected area of the Biosphere Reserve of Pendjari" in international journal. The dissemination of the results of this project will also be published in local newspapers both in English and the local languages. Posters were developed and shared with local populations. The results will be put on the website of the Laboratory of Ecology, Botany and Plant Biology (LEB) of the University of Parakou in Bénin.

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 Foundation grant used ended 6th April 2019. I had a delay of 2 months in the implementation of the activities, as planned in the original project. At the beginning of the project, the Government of Benin changed the manager of the study area, The Biosphere Reserve of Pendjari from public to private management in August 2017: African Park Networks (APN) (<https://la-maison-pendjari.jimdo.com/>). Early in 2018, after their installation, African Park Network established new rules for research activities. The Institutions of all ongoing and new research activities had to conclude new partnership with APN before they continued or started their activities. So, it took time to formalise this partnership between APN and my institution (LEB). In the same times some activities planned to be executed at specific time were not done on time because waiting for the partnership document. This formality caused a delay in some activities of the project.

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
Elaboration and dissemination of conservation action plan	800	800		
Training workshops organisation	600	600		
Tree husbandry Activity	1500	1500		
Environmental education (Awareness materiel (poster, technical papers...))	400	400		
Field work cost and local workers per diem	800	800		
Transportation cost to research sites and within sites	700	700		
Communication : phone, internet, fax	200	200		
Total	5000	5000		

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

We urgently need to search funding to implement *ex situ* conservation strategies plan for the threatened orchids. One of the urgent actions is the developing and improving propagation methods for terrestrial orchids inventoried in the Biosphere Reserve of Pendjari. The next generation of orchid taxonomists, ecologists, par-ecologists and conservationists must be nurtured through improved training, education, publicity and awareness-raising programmes. Using citizen science as an

effective means of motivating individuals and amateur groups to record orchid occurrence will help to provide an effective map of orchid in Benin and help scale-up the collection of verifiable data. This work should be urgently done for most decreasing populations, which may extinct in very near future.

It is also urgent to prolong these actions to other sites in the whole department of Atakora where there is still other potential orchids species habitats not yet inventoried from our two previous projects, and where human activities threats their sustainability in conserving orchid species.

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. RF logo was used for all the awareness materials, the workshop and training on the importance of gallery forests beyond wood production. The logo was also used in the poster realized as the main funder of this project. The ongoing master thesis also referenced Rufford Foundation for financial support in the document.

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

Samadori H.S. Biaou: Dr. Biaou is Associate Professor at University of Parakou (UP), Laboratory of Ecology, Botany and Plant Biology (LEB). He assisted in the supervision of the master student working on data analysis of this project.

Djaléni Y. Djatto: He is the executive Secretary of union of local community for conservation of the BRP, the local organisation in charge of co-management of the Biosphere Reserve of Pendjari (BRP). He provided me with the local authorization to conduct activities in the villages and assisted in explaining the objectives of the project to the stakeholders of each ethnic group. He was involved in all activities.

Cherifou Ikoukomon: He is the master student working on the data collected from this project. He is student at University of Parakou, Republic of Benin.

Michaël Tidangou: Mr Tidangou is a local guide working with researchers in the BRP since 2006. He is skilled in making link between local names of orchid species and scientific names. He also understands the three major languages spoken in the villages surrounding the reserve. He helped to implement the environmental education activities and conducting the various surveys in local languages and also the translator during analytical workshops and sensitization activities.

Head of villages: They were involved in the workshops, training on the importance of gallery forests beyond wood production. They also participated to the restoration activities.

12. Any other comments?

Our knowledge goes to Rufford Foundation for funding this project. Several positive changes in the attitude of the local communities towards orchid's conservation have been noticed at the end of the project.