

Final Project Evaluation Report

Your Details	
Full Name	Mbouwe Irene Franceline
Project Title	Regeneration dynamic, influence of tides and assessment of carbon biomass in the mangroves ecosystems of the Manoka island area, Littoral, Cameroon
Application ID	24999-1
Grant Amount	£5000
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Date of this Report	January 10, 2019

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
<p>Make an inventory of mangrove forests in Manoka and determine the access possibilities to the wood resource</p>				<p>To achieve this activity, a household survey has been conducted in three different villages of Manoka island. A total of 26 households have been assessed and interviewed, 10 in Kalaba kwater, nine in Nyangadou and seven others in Dahomey. The unequal repartition is due to the religious diversity and less density of people in each area. Our results has shown that mangrove forests are exploited by women and their children. The common highly exploited species is <i>Rhizophora mangle</i>, used for fish smoking, firewood, trading and for building of canoes and houses. The survey took place at the same period local communities were exploiting mangrove wood. Average 30 bundles of <i>Rhizophora</i> wood of about 30 kg each were stacked behind each household - approximately 300-400 wood per household. According to our global estimation, 10 to 12 tonnes of wood can be used per season in these three villages, causing serious damage to local biodiversity.</p>
<p>Carry out a study of the regeneration dynamics and forest stands of mangrove forests in Manoka</p>				<p>Floristic inventories have been conducted to estimate the density of trees according to three defined types of vegetation (intact stand, medium disturbed and highly disturbed stands). A total of three transects were done and one transect was materialised in each village.</p>

			<p>Three permanent plots in different stands have been designed. Results show that 448 species have been identified, dispatching into <i>Rhizophora mangle</i>, <i>R. racemosa</i>, <i>Avicenia germinans</i>, <i>Laguncularia</i> sp, etc.</p> <p>Concerning regeneration activities, it has been observed that surrounding people are cutting down trees without replacement. They are not informed or are willing to learn how to proceed. Some are thinking that these trees can be regenerated naturally avoiding their intentional planting necessity. Here we initiate regeneration activities with 10 women from Nyangadou villages, teach them how to collect germoplasm, prepare substrate and establish nursery, integrate propagules in substrate and how to water plants in nursery anytime the need arises. A total of 800 propagules have been collected and integrated in nursery. The last follow-up monitoring show the success rate of 92% and plants should be integrated in degraded areas in participatory manner with local population. Such results are partial and the process needs to be continued at a large scale in these three villages to be sure that any degraded areas are restored within a time. For this end, the next step of our project is focused on the production of about 15,000 to 20,000 plants to restore 4 to 5 ha of degraded sites. Also, the 92% of regenerated plants need to be integrated in degraded areas with the involvement of surrounding women.</p>
<p>Assess the aerial and underground carbon biomasses sequestered in different facies of Manoka's vegetation</p>			<p>The results of aerial carbon show a difference biomass of carbon recorded. Depending of the site, we obtained 34.55 tonnes C/ha in Kalaba kwater, 16.42 tonnes C/ha in Nyangadou and 6.49 tonnes/ha in Dahomey. This study need to be continue to be sure that any amount of carbon is assess, such as soil carbon and necromass.</p>

				These data will be important when taken decision on the conservation issue.
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

It was very difficult to collect *Rhizophora mangle* propagules due to the height of the tree and difficult access to swampy areas. The propagules collected across the sea and around different type of vegetation were directly planted in those sites.

During the monitoring step, we observed that those propagules were destroyed by water. Therefore, to continue with the regeneration of site, we walked in a distance of 3 km to collect other propagules. We established a nursery of mangrove propagule near household and habitat. The other difficulty we encountered is that those propagules are eaten by crabs. Also, the attendance of community was too low while implementing regeneration activities. However, we made a point of explaining the negative effect of destroying mangroves as well as the positive effects of their conservation through restoration of degraded sites.

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

The three most important outcomes of our project were:

- 1- The sensitisation of local communities particularly women involving the overexploitation of mangrove wood, especially *Rhizophora mangle* for fish smoking; these women are aware on the effect of tides in the front of their village where mangrove trees have been cut down and now expect the restoration of this front after plantation to avoid their house demolition.
- 2- The training/capacity building of women on germoplasm collection and nursery establishment was a great achievement as they learnt the importance of mangroves both as nurseries for swampy species (fish, crabs and shellfish) that support their livelihoods and the ecological importance the plays against floods, sea winds and other disasters. They also learnt on threats and are able to participate to the next step of the project to produce plants for restoration.
- 3- The establishment of mangrove's propagules nursery is effective; Nyangadou women enjoy the rich activity and are therefore ready for massive participation. They are willing able to start with the next step, produce endangered tree species and restore themselves their degraded areas.

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

In each selected village, local communities were very involved in all project activities implemented from the first step to the end. Local administration (DUO, Chefs villages, guides) helped us by providing information on the best

targets for educational activities aiming at sensitise their population towards the risks following mangrove destruction. The Chief of each locality informed us about the places where we could find the most farmers that were cutting down the mangrove forest as well as some SWOT analysis from passed project. They also helped us to regroup particularly those persons involved in the exploitation of mangrove wood and discussed to the community. Household surveys were conducted during project and local communities involving also benefiting from sensitisation campaign and training/capacity building. The Global Environment Protects Association played an important role in the management of this project by providing some technical support; expertise and one student participate as GEP intern.

5. Are there any plans to continue this work?

Local communities depend daily on these resources of mangrove such as exploited wood, fish, crabs and so on. We are planning to continue this work to gather enough information and data to be use for conservation strategies for protection of Manoka Island of Cameroon and then other mangrove ecosystems and their biodiversity. Local authorities gave us more information concerning another mangrove area where the species (*Rhizophora mangle*) is very exploited for trading in local market.

Firstly, we plan to continue the same project in the adjacent localities such as Cap Cameroon, Number 1 and Number 2 villages. The same activities will be conducted and at the end, a sustainable management plan will be proposed.

Secondly, we plan to train furthermore these local communities to the establishment of mangrove nurseries and initiate plantation together to restore degraded sites.

Thirdly, we will try to conduct deeply the study on carbon stock (soil and necromass) to better understand the relationship the overexploitation threats will have in long term on climate resilience of the mangrove ecosystem.

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

Results obtained from this project will be published in a scientific peer review journal. A workshop will then being organised for one day to share the outcomes of our project with scientific communities and students. The final report of this project will also be published in Global Environment Protects website and download by anyone. A copy of final report will be shared among partners and universities.

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

Our project started in August 2018 and ended at the same delay in January 2019 according to the following table.

Period of time	Activities	Location	Status	Observation
		Manoka	Achieved	
	Plant regeneration	Manoka	Not achieved	Plan for next step
		Manoka		

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
Interurban transport	541	541		The urban transportation was as initially budgeted
Canoe from Douala to Manoka	440	440		The boat cost were as initially budgeted
Printing of T-shirt with the both logo	300	300		The coast initially budgeted were effective
Food and accommodation	1100	1100		During the entire mission, own food and the subsistence for the guide, intern and assistant were purchased with funding
Botanist and GIS Expert	550	550		As initially budgeted
Research assistants and local guide	565	560	5	Per Diem were as initially budgeted, but sometime with less fluctuation
Garmin GPS	120	115	5	We found a cheaper one
Inventories material (clinometer, decameter, shears and clippers)	60	60		This coast represent the flat cost give to GEP for renting
Internet, communication and miscellaneous	218	200	18	We manage to make some economy
Analysis of sample	456	30	156	We have benefited from our intern employment to have some reduction
Polyethylene plastic	50	50		
Computer	300	240	60	We found a cheapest one
Restitution workshop	100	100		

Publication articles	of	200	200		Initially they publication fee was not included as well as the bank transfer fee. Economies gathered contributed to this
Total		5000	5000		

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

Mangrove ecosystems play a fundamental role in the wellbeing of Cameroonian rural and urban societies by providing market goods such as firewood, timber, natural honey, charcoal and medicinal plants. Thus, they constitute a unique natural heritage in terms of biological diversity. For the next step, we would like to sensitise deeply all women involved in the overexploitation of mangrove wood; train further those women from this subdivision (Kalaba kwater, Dahomey and Nyangadou) to the implementation of germoplasm collection and nursery establishment and finally help them to proceed to the restoration of their degraded areas. In terms of carbon stock, studies conducted by some authors revealed that mangrove stocked more quantities of carbon than forest. Following to that, our results confirm that the amount of carbon stocks was important. After sharing this project with authorities of Manoka, they advised another sites where mangrove woods are exploited for commercialisation in local market. Therefore, we would like to extend our activities in such adjacent areas (Cap Cameroon, Number 1 and Number 2 villages). Those concerned communities will be sensitised on the importance of conservation of mangrove. Future studies are still important by the way they helps to continue monitor the dynamic of mangrove ecosystem in term of biodiversity, carbon biomass, trees exploitation, etc.

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?

The Rufford Foundation logo was used in any educational materials produced in relation to this project. We can also say that the Global Environment Protects, Cameroon logo was added in all those materials and I will acknowledge the support of the Rufford Foundation in all our presentation, publication and workshop.

No, the foundation did not receive any direct publicity during the course of my work.

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

Irene MBOUWE: the principal investigator who coordinated all activities during project and provided final report;

Dr René JIOFACK: the botanist expert who carried out floristic inventories related to objective 1

Yannick MENDOUGA: was the GIS expert who produced a map of the mangrove site

Patrick CHOUNGO: the agroforestry expert who established mangrove nursery in Manoka

Gaëlle MANGUELE: was our intern who conducted study for her Bachelor degree

Adalbert DJOBAJO: was our local guide who participated to our entire field mission, assist us and facilitate household survey and participated to nursery establishment

12. Any other comments?

We would like to address our thanks to the Rufford Foundation for this opportunity. This support helps us to implement our project. We hope that RF will give us another grant to continue sensitising local communities in Manoka and reach this mangrove project in other localities such as Cap Cameroon, Number 1 and Number 2 villages and implement more nurseries in those different localities. You can find below some pictures related to our project activities.







