Final Evaluation Report

Your Details	
Full Name	BIAOU Séverin
Project Title	Conserving Degraded Natural Habitats in the Trois-Rivières Forest Reserve, a Biodiversity Hotspot Threatened by Human Pressure in Northern Benin
Application ID	40740-1
Date of this Report	13 August 2024

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
1) Analyze Land use land cover change (LULCC) from 1990 to 2022			■	The methodology used and the findings obtained are clearly described in the detailed final project report.
2) Impact of LULCC on plant biodiversity in Trois – Rivière forest			■	The methodology used and the findings obtained are clearly described in the detailed final project report.
3) Conduct interviews with the local population to gather their perception about the forest lost drivers and their motivations for LULCC			■	The methodology used and the findings obtained are clearly described in the detailed final project report.
4) Raise awareness of local communities on the conservation of remnant forests and restoration activities based on the findings of our fieldwork.			■	The methodology used and the findings obtained are clearly described in the detailed final project report.

2. Describe the three most important outcomes of your project.

a). From 1990 to 2022, natural forest formations such as dense forests, gallery forests, open forests and shrub-tree savannahs have regressed over time. In contrast, anthropogenic formations (fields, dwellings, bare ground) have increased considerably. These results indicate a high degree of anthropization of the Trois-Rivières Forest reserve, with an annual deforestation and degradation rate estimated at 1.15% and 0.40% respectively between 1990 and 2006, with no effort being made to restore the forest. However, between 2006 and 2022, these rates almost doubled, reaching 2.00% for deforestation and 1.42% for degradation. The rate of reconstitution is 0.62%, mainly made up of exogenous species such as *Anacardium occidentale* L. This strategy considerably alters the ecological balance and leads to a loss of local biodiversity. Analysis of temporal beta diversity from 2007 to 2023 shows that, of the 56 study sites, only 19 plots, or 33.92%, show a significant gain in species and high abundance. On the other hand, 33 plots showed a significant loss in terms of abundance and species, i.e. 58.92%, while 7.14% of plots remained stable between 2007 and 2023.

b). Most members of the local community believe that natural forest formations are in decline and that agriculture and population growth are the main drivers of land-use change. They also see poverty as a major issue. This perception is strongly influenced by socio-cultural and professional groups. For example, each household does not perceive its activities as a factor in the forest's decline, but rather those of others. This perception could pose a threat to the conservation of the forest reserve. This result shows that residents tend to minimize the impact of their actions on forest degradation, blaming instead the activities of other households. This collective disempowerment can pose a serious obstacle to the implementation of effective conservation strategies. If everyone thinks the problem lies with others, it becomes difficult to mobilize the community for joint efforts to protect and restore the forest, thus compromising the sustainability of conservation initiatives. The local community's motivation to settle in the forest reserve is mainly due to the lack of agricultural land in the buffer zone, soil fertility in the forest, the collection of non-timber forest products and improved incomes. The local community also adopts conservation practices that are strongly influenced by socio-demographic, economic and

cultural factors. Piecewise SEM analysis reveals that the adoption of conservation strategies or the perception of forest regression is mediated by the degree of motivation.

c). The attention of local and municipal managers was raised on the status and progress of deforestation, as well as its impact on biodiversity conservation in the Trois-Rivières Forest. The suggestions received were used to guide community awareness-raising sessions on the impact of their activities on biodiversity conservation and their well-being. The diachronic maps enabled the 20 local actors involved in reserve management, selected from the 12 villages surveyed, to see in concrete terms the forest's past and present trends. Radio broadcasts of these activities and their consequences reached a large part of the local community.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

Our main difficulty was the weather conditions: during heavy rains, some forest access roads and streams were flooded. Given that we wanted to monitor the plots from IFN 2007, we couldn't do anything but wait for the flooding to pass. At the same time, most of the local community was on the farms, and this also delayed data collection activities for the surveys. However, this was not a major obstacle, as we often mobilized more teams in the field to collect inventory and survey data and to check and validate satellite images as soon as this period of flooding had over, so as not to affect the project timeframe too much. We also used high-resolution images to improve the quality of visual interpretation.

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

Contrary to our expectations, the local community does not perceive its activities as the cause of biodiversity loss. One of our findings clearly showed that farmers believe it is transhumance that hurts biodiversity, while herders point to agriculture. The same observation was made during the workshop with stakeholders. Forestry officials, for example, tend to attribute these problems to political factors.

Faced with this situation, the project has had a positive impact on the local community and forest management stakeholders. One of the driving forces behind conservation has been the community's active participation in the activities. Community members took part in semi-structured interviews to provide information on drivers of biodiversity loss, the decline of natural forest formations, motivations for forest encroachment and traditional conservation practices. Their active involvement promoted the acceptance of advice during awareness-raising sessions. We organized a consultative workshop based on the project results with local, municipal and forestry leaders to explain the project objectives, gather feedback and address concerns. This participatory approach enabled the community to feel included and valued in the decision-making process.

Awareness-raising helped educate the community about sustainable forest management practices, biodiversity conservation and the importance of their role in these efforts. These sessions were designed to build capacity and provide the skills needed for effective participation. These skills are transferable and can be applied to other community development initiatives.

The local community has become more aware of the impact of its actions on the environment and has been motivated to adopt more sustainable practices. Working together towards common conservation goals has fostered a sense of unity and cooperation among community members. This has strengthened social ties and encouraged collective action for future environmental education initiatives.

5. Are there any plans to continue this work?

Yes, there are plans to continue this work to ensure long-term conservation and sustainable management of the forest ecosystem. The continuation of this work will involve several key steps:

- Given the high rate of deforestation and degradation of this forest, it is crucial to initiate a monitoring program based on ecological sustainability indicators, using satellite images. It is also essential to identify priority areas for conservation based on these indicators and involving the local community. This initiative will make it possible to measure the impact of conservation efforts on biodiversity.

- The results of this project also revealed a loss of density of endangered species such as *Afzelia africana*, *Pterocarpus erinaceus*, *Khaya senegalensis*,

etc., which are multiple-use species for the local community but remain very little produced by them and in nurseries, unlike exogenous species such as *Anacardium occidentale L.* It would be relevant to understand the reasons for the lack of production of these endogenous species, even though they play a vital role in the local community.

- Train the community in the silviculture of endogenous species and involve them in the enrichment of identified priority restoration areas.
- To make the management of this forest more effective, it is important to train the community in soil conservation measures to reduce the loss of soil fertility, which is driving farmers to move to the forest.

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

Two manuscripts are in preparation and will be published. Our results on land use land cover change and factors driving this change, motivation and traditional conservation practice will be published in Land use policy while our results on spatio-temporal species diversity and forest dendrometry, the structural parameter will be published in Forest ecology and management. Oral presentations will be given at conferences (Conference of Lomé, Togo and University of Ketou, Benin). Once the articles have been accepted for publication, we'll broadcast the main take-home message on Twitter, and LinkedIn and highlight the Rufford Foundation for funding the project. We'll also upload articles to ResearchGate for further visibility. The data from this project will be used by a master's student in Natural Resource Management at the Faculty of Agronomy, University of Parakou to write and defend his master's thesis. The findings of this project will be presented during the monthly seminar held at our laboratory.

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

The results of this project raise awareness about the level of deforestation and degradation in the Trois-Rivières Forest, alerting the local community and stakeholders to the necessity of adopting conservation strategies and sustainable management. It is also important to implement a continuous monitoring program using satellite imagery to track the evolution of forest cover and degradation in the Trois-Rivières Forest over time. This will allow for the rapid identification of areas requiring immediate intervention. Indeed, the development of ecological indicators

to evaluate the sustainability of conservation efforts will be crucial in clearly measuring the impact of actions on biodiversity and forest health.

Reforestation activities in degraded habitats, as well as training farmers and nurserymen around the forest in techniques for producing native plants, will be essential for better forest preservation. During the implementation of this project, local populations expressed a desire to acquire knowledge of silvicultural techniques to ensure the proper growth of native species, most of which are slow-growing. These various points highlight the need to continue our work in this forest.

8. Did you use The Rufford Foundation logo in any materials produced about this project? Did the Foundation receive any publicity during the course of your work?
The Rufford Foundation logo was used throughout the activities of this project. First, when the project was granted, we published this on our research unity page (https://biplac-leb-up.bj/) and the logo of the foundation was highlighted. In addition to this, we edited posters and on the knowledge page of my PowerPoint presentation during my PhD defense, the logo was also used. Finally, on the t-shirts, and posters used during the awareness campaigns. We also acknowledged The Rufford Foundation in the two manuscripts in preparation for publication in peer-reviewed journals.

9. Provide a full list of all the members of your team and their role in the project.

- Dr IDJIGBEROU S. Eudes (Project leader assistant): He helped implement the survey and organize the analytical workshop and outreach activities.

- Dr. SOSSA Léonce: He was a key agent during the training and sensitization of the local community.

- Ms Leslie Assongba : Field agent. She was involved in all project activities (inventory, field monitoring, local community survey and awareness-raising).

- Msc. Ayena Kajogbe Jacques: Field agent. Involved in the collection of inventory data.

- - Mr KOUTO Nicanor: He took part in data collection and assisted in processing changes in land use.

- Mr Gado Chabi (local guide): Mr Chabi is a local guide working with researchers in the Trois- Rivières. He helped to survey local languages and was the translator during analytical workshops and sensitization activities.

10. Any other comments?

We would like to express our gratitude to The Rufford Foundation for funding this conservation project, which has revealed some unknown interesting realities; we hope to continue the intervention in the immediate future with another project, as mentioned above. Secondly, our thanks also go to all the members of the project team whose commitment was of great help to us. Finally, we are grateful to all the local communities involved in this project for their collaboration and availability.