Final Evaluation Report

Your Details	
Full Name	Jules Christian Zekeng
Project Title	Improving conservation and sustainable management of threatened species in Angossas communal forest of Cameroon under logging and human pressures
Application ID	38845-B
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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
WP1. Determine the threatened species phytosociology distribution, natural regeneration, and potentially available.			■	A 2-day working session between our team and the members of communal forests was held, which allowed us to stratify the study areas and identify potential locations for the botanical inventory. Following this, two fieldwork campaigns for botanical inventory were conducted using 13 transects of 2000 x 20 m, spaced 1 km apart. This effort led to the inventory of a total of 287 species with a diameter ≥ 5 cm, belonging to 205 genera distributed across 60 families. A lab desk review carried out at the Cameroon National Herbarium confirmed the species identifications made in the field. Additionally, a search on the IUCN web database identified 28 threatened species among the 287 species recorded. Finally, quantitative and qualitative statistical analyses revealed a Natural Regeneration Index (NRI) in the Angossas Communal Forest (AFC) ranging from 0.8 to 3.63, with an average of 1.69, demonstrating the AFC's good potential for natural regeneration. The average density of woody species in the ACF is 203

				individuals/ha, with an average basal area of 58.92 m²/ha.
WP.2. Identify the ecosystems services and potential threats associated with target species within the ACF.				When designing data collection tools for Angossas Council, we engaged with local leaders and forest authorities to understand their priorities as well the problem our project aims to resolve. We ensured cultural sensitivity and inclusivity, using appropriate language and local translators. Using a context-specific questions, pre-test for feedback, and combine structured and semi-structured questions, we designed a questionnaire. Contrary to the initial plan of conducting a socio-economic survey in all 30 villages of the Angossas municipality, preliminary discussions with the administrative authorities of the sub-prefecture and the municipal authorities led to identifying villages with significant pressure on local forest resources. As a result, a socio-economic survey was conducted with 223 individuals from 10 selected villages in the Angossas district. This survey provided information on the goods and services (timber, firewood, fruits, medicine, etc.), and associated human wellbeing of threatened species to local communities and identified threats and human pressures affecting these species that include direct impact like agriculture area extension, forest fragmentation, logging with a consequences like forest loss,

				threatened species habitat loss/fragmented, species population decreasing.
WP.3. Modeling the distribution of target threatened species individuals in entire communal forests.				We partially achieved this objective because this activity aimed to develop a bigger picture of the distribution of threatened species within the Angossas-Doume-Doumaintang Communal forests. Nevertheless, it is in progress.
WP.4. Increase ACF's conservation and sustainable management capacities and tools for long-term monitoring. It will contribute to the long-term monitoring and in-situ conservation of critically threatened species				Five members of the Angossas communal forestry cell as well as 10 local leaders of 10 villages of the Angossas Council, have seen their capacity in tree monitoring, seed collection, and tree nursery establishment improving. In addition to what was planned, instead of three nurseries, only one nursery with 1800 plants of four threatened species was established for the practical application of theoretical training. A workshop for threatened plant restitution to the Angossas communal forestry was done. We initiated WP.4.1 by conducting comprehensive training sessions for five local community managers and 10 Forest Committee Peasants. These sessions focused on tree monitoring, seed collection, and establishing and maintaining tree nurseries. The training was designed to empower participants with the necessary skills and knowledge to effectively manage and conserve their forest resources.

				To complement the theoretical knowledge imparted in WP.4.1, we established a nursery for four threatened species (Moabi, Mukulungu, bitter kola, Assamela). This hands-on approach enabled trainees to practically apply their learning by engaging in activities such as seed sowing, watering, and monitoring the growth of the seedlings. The nursery served as a live demonstration, reinforcing the training concepts and ensuring that participants gained practical experience. Following the establishment of the nursery, we organised a workshop for restitution and transplanting the nursery-grown plants into the field. This workshop allowed trainees to observe and participate in the final stage of the process, ensuring a comprehensive understanding of the entire cycle from seed collection to transplantation. The collaborative effort reinforced community involvement and commitment to sustainable forest management.
WP.5. Improve the capacity of stakeholders involved in the project for long-term CSM: critical factors for the long-term monitoring of CSM in Communal forests.				One of my stated ambitions, as well as that of the organisation CSNRM-NET, is to contribute to the training of as many young Cameroonians passionate about conservation and sustainable biodiversity management as possible and to strengthen the capacities of local actors. As in our previous Rufford projects, within the framework of this project, six young Cameroonian

				volunteers at CSNRM-Net and students at the University of Yaoundé 1, including three females and two males, have benefited from capacity building in botanical inventory techniques, socio-economic data collection using the Kobocollect tool, and reforestation in-situ techniques. In addition, the data gathered during this project are used by a PhD student to produce a PhD thesis. Other parts of the data will contribute to a database for another PhD student working at a scale of several communal forests. Moreover, for long term monitoring in the field, 5 local community managers and 10 Forest Committee Peasants were trained during this project.

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

a). One of my stated ambitions, as well as that of the organisation CSNRM-NET, is to contribute to the training of as many young Cameroonians passionate about conservation and sustainable biodiversity management as possible and to strengthen the capacities of local stakeholders. As in our previous Rufford projects, within the framework of this project, six young Cameroonian volunteers at CSNRM-Net and students at the University of Yaoundé 1, including three females and two males, have benefited from capacity building in botanical inventory techniques, socio-economic data collection using the Kobocollect tool, and reforestation in-situ techniques. Additionally, five members of the communal forestry unit have strengthened their capacities by participating in the project. One student is developing a PhD thesis.

b). When asked about the benefits of the species to their communities, nearly 23.56% of people said they help fertilise the soil. About 20.71% mentioned they help regulate the climate. For other services, 18.81%, 18.09%, and 15.23% said they help regulate erosion, water, and pollination, respectively. In terms of cultural benefits, only spiritual and cultural practices were mentioned, with 13.41% and 14.08% respectively. These

socio-economic findings reaffirmed the substantial pressure exerted on the forest resources within the Angossas communal forest, a trend consistent with prior observations. Furthermore, it underscored the prevalent agricultural activities being carried out within the Angossas communal forest, which are significantly encroaching upon the forested areas, leading to forest fragmentation. Moreover, it highlighted the systemic issues associated with the inadequate management of forest resources.

Regarding the direct anthropogenic impact on the threatened species under study, it became evident that their exploitation is not being conducted in a sustainable manner. This unsustainable practice is attributed to several factors, including the economic value of certain species, leading to their overexploitation and habitat loss due to various anthropogenic activities.

c). A botanical inventory of a total area of 52 ha was conducted using 13 transects, each measuring 2000 x 20 m. Despite the extensive survey effort, only 28 out of the targeted 287 species, all considered threatened, were successfully identified and inventoried, totalling 624 individuals. Furthermore, the survey revealed a concerning reality on the ground – forest fragmentation attributable to agricultural activities and human interventions. Alongside species inventory, the study also delineated seven distinct habitat types, each with unique ecological features. GPS points were diligently recorded for each habitat type of field, fallow land, mature secondary forest, young secondary forest, periodically flooded swamp forest, permanent flooded swamp, and agroforestry systems cocoa-based.

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

The conflict between Russia and Ukraine has led to numerous challenges globally, including in Cameroon. Indeed, the cost of living has significantly increased since the beginning of this conflict, resulting in a variation in the project budget between its development and implementation phases. Additionally, the negative difference in the value of the pound sterling between the project development period and the implementation phase has also impacted the degree of project implementation. All these factors have contributed to a downward revision of the ambition initially set when we were developing this project. However, to avoid ultimately reducing our ambition, we undertook efforts to seek alternative funding sources. Fortunately, we secured additional funding, which helped maintain the level of implementation of certain activities. This proactive approach allowed us to mitigate unforeseen difficulties and ensure continued progress towards our project goals.

During the execution of our project in the Angossas Communal Forest (ACF), several unforeseen difficulties arose. One significant challenge was the unpredictable weather conditions during the fieldwork campaigns. Heavy rains and

flooding disrupted the planned schedules and access to remote sites. To tackle this, we developed a flexible fieldwork schedule, allowing for adjustments based on weather forecasts. We also procured additional resources, such as all-terrain vehicles and portable shelters, to ensure continuous operations despite adverse conditions. Local guides were engaged to navigate challenging terrains safely, enabling us to continue our fieldwork effectively.

Another challenge was the species identification process (WP.1.3), where some plant specimens were difficult to identify due to a lack of distinguishing features or similarities with other species. Existing botanical references did not document some species well. To address this, we collaborated with botanical experts from local universities and international herbaria.

Engaging local communities and ensuring their participation in training sessions also posed challenges due to varying levels of interest and understanding of conservation practices. To overcome this, we conducted preliminary awareness campaigns to highlight the importance of conservation and the benefits to local livelihoods. Incentives, such as stipends and certificates, were provided to encourage participation. We also tailored the training sessions to be more interactive and practical, making them more appealing and understandable to community members. This approach fostered greater engagement and commitment from the local communities.

Establishing a nursery for threatened species faced difficulties due to limited availability of quality seeds and seedlings, and an initial lack of expertise among trainees. To resolve this, we sourced seeds from reputable botanical gardens and conservation organisations. Additionally, we provided ongoing support and monitoring through regular follow-up visits and extra training sessions, ensuring the nursery were well maintained and trainees were confident in their skills. This continuous support was crucial for the successful establishment and maintenance of the nurseries.

Organising training sessions on biostatistics, remote sensing, GIS analyses, and research writing encountered logistical issues, including scheduling conflicts and varying skill levels among participants. To address this, we made the training schedule more flexible, offering multiple sessions to accommodate different time availabilities. The content was also adapted to cater to various skill levels, starting with foundational concepts before progressing to advanced topics. This approach ensured that all participants, regardless of their prior knowledge, could benefit from the training. Through proactive planning and adaptive strategies, we were able to overcome these challenges and achieve the project's objectives, gaining valuable experience for future conservation efforts.

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

The involvement of local communities in the project and how they have benefited can be described as follows:
The local communities were engaged in the study area stratification process during the working session required before botanical inventory. Their knowledge of the local landscape and ecosystems contributed to the identification of areas for forest inventory. Through participating in this activity, local community members better understood the project's objectives and methodology. Their input helped ensure the accurate selection of study areas, enhancing the relevance of the subsequent data collection efforts. Also, they were involved in botanical inventory and ecological knowledge data collection in the field.

Two local interviewers and three field team members were recruited and trained to conduct household surveys and focus groups within the target villages. They actively participated in data collection, engaging with community members to identify ecosystem services provided by threatened species. By being involved in data collection, local community members developed research skills and gained insights into the ecological importance of threatened species in their forests. Additionally, their contributions ensured the project captured diverse perspectives on ecosystem services, enriching the overall analysis.

Local community managers and Forest Peasant Committees received training sessions on tree monitoring, seed collection, nursery establishment, and monitoring. They were actively involved in establishing and managing tree nurseries. Two members of Forest Unit, five local community members and 10 leaders of Forest Peasants committee acquired valuable forest management and conservation skills through these training sessions and practical activities. Establishing a nursery for threatened species together with local community contributed directly to conservation efforts.

Overall, the involvement of local communities throughout the project empowered them with knowledge and skills related to forest conservation and management. By actively participating in various project activities, they contributed to the project's success and enhanced their capacity to engage in sustainable natural resource management practices in the long term.

5. Are there any plans to continue this work?

Yes. We have developed strong connections with the local communities living around the Angossas communal forest and the administrative authorities responsible for managing the communal forest. The current project's results require us to act. As in the Doume and Doumaintang case, the following actions must be taken to ensure long-term conservation and sustainable management in the Angossas commune.

- Develop a comprehensive community-based conservation programme focused on the Angossas communal forest. This project could involve capacity building for local community members, including training in biodiversity monitoring techniques, sustainable land management practices, and alternative livelihood development. The programme could also include initiatives to raise awareness about the importance of biodiversity conservation and engage community members in decision-making processes related to natural resource management.
- Continue with implementing forest restoration initiative started during this project to rehabilitate degraded areas within the Angossas communal forest. This project could involve reforestation, including planting native tree species and establishing agroforestry systems.
- Since this project finds that the Angossas population is highly dependent on forest resources, developing a sustainable livelihood development project to reduce dependency on forest resources and promote alternative income-generating activities for local communities will be welcome. This could involve training in sustainable agricultural practices, developing eco-tourism, and establishing community-based enterprises focused on non-timber forest products. The project could also include initiatives to improve rural communities' access to markets and financial services.
- Develop an education and outreach programme to raise awareness about biodiversity conservation and environmental stewardship among local communities, schools, and youth groups. This project could include developing educational materials, workshops, and outreach events focused on forest ecology, wildlife conservation, and sustainable land management. Additionally, it could involve the establishment of environmental education centers or nature reserves to provide hands-on learning experiences for community members.

Overall, these project ideas aim to address key challenges and opportunities related to biodiversity conservation and sustainable development in the Angossas communal forest and surrounding areas. By implementing projects in these thematic areas, stakeholders can work together to promote ecosystem health, support local livelihoods, and ensure the locality's long-term sustainability of natural resources.

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

We have prepared a comprehensive plan to disseminate the results of our project to various stakeholders. Initially, we prioritised sharing findings with the Angossas council members, particularly those not directly involved in the project. We have already begun this process by presenting our results to them, and we will further reinforce our engagement by submitting a final research report and providing copies of all publications as they become available.

Additionally, we are preparing to showcase our results at international conferences in the coming months, aiming to highlight the significance of our findings on a global platform. Furthermore, we are finalising several scientific

publications based on our study data, which will contribute to the academic discourse in our field. The results of our study are already being presented in seminars by the PhD student involved in the project, further disseminating our findings within academic and non-academic.

Lastly, we are planning, as usual, to use our various online platforms, including ResearchGate, Facebook, and our organisation's webpage (www.csnrm-net.org), to share our work with a broader audience. As the CEO of the Conservation and Sustainable Natural Resources Management Network (CSNRM-NET), which comprises other researchers, we are committed to promoting biodiversity conservation and disseminating research outcomes to a broader community.

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

The following steps are crucial in addressing the challenges highlighted in the project:

a) We will continue to train young Cameroonians passionate about conservation and sustainable biodiversity management. Building on the success of our previous Rufford projects, we aim to expand our capacity-building initiatives. By empowering local stakeholders and young volunteers, we can strengthen conservation efforts and ensure sustainable management practices in the long term.

b) Addressing the substantial pressure on forest resources within the Angossas communal forest is imperative. Understanding the issue is urgent to quantify forest fragmentation and, therefore, develop and implement sustainable management strategies to mitigate forest fragmentation caused by encroaching agricultural activities. This involves engaging with local communities and stakeholders to promote alternative livelihoods that reduce dependency on forest resources. Effective forest management practices must also be established to ensure the conservation of threatened species and their habitats.

c) Advocating for Policy Change: The findings from the socio-economic assessment highlight systemic issues in forest resource management. Advocacy efforts are needed to influence policy change at the local and national levels. This includes advocating for the enforcement of existing regulations on forest resource management and the development of new policies that prioritise sustainability.

d) Promoting Community Engagement: Engaging local communities in conservation efforts is a key to achieving long-term success. We will work closely with community members to raise awareness about the importance of biodiversity conservation and sustainable resource management. We can build strong partnerships that promote environmental stewardship and resilience by involving local communities in decision-making processes and fostering a sense of ownership over conservation initiatives.

8. 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 logo of The Rufford Foundation has been consistently used throughout the project and will continue to be featured during presentations of the project's results. During workshops and training sessions held at the Angossas Council Town Hall, we prominently displayed the Rufford Foundation logo.

The results of this study were showcased at the Fair on Biodiversity and Biodiversity Products exhibition in the city of Douala, Cameroon, on March 26-28, 2024, and the Rufford Foundation logo was prominently featured in our presentation materials. In addition, the Rufford logo will be used during the PhD thesis defence of the students involved in the project. Furthermore, the study's outcomes, including the several manuscripts currently under finalisation, appropriately acknowledge The Rufford Foundation's support. Copies of these publications will be provided to The Rufford Foundation upon publication.

In recognition of The Rufford Foundation's support, its logo is prominently displayed on the Conservation and Sustainable Natural Resources Management Network (CSNRM-NET) website, serving as a testament to their contribution as the project's funder.

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

1. **This study will rely on the technical support of several experts, who will testify to the reliability of the results.**

Prof MBOLO Marie Marguerite: former thesis supervisor of the Principal Investigator. She gave and continues to provide us with advice in terms of forest ecology and conservation.

Prof SYAMPUNGANI Stephen is the Chair of the Oliver R. Tambo Research Chair Initiative (ORTARChI) of Environment and Development at the Copperbelt University in Zambia. He specializes in socio-ecology, Agroforestry, conservation, and restoration. My current postdoctoral Supervisor at ORTARChI in Zambia.

Prof SEBEGO Reuben was my former Ph.D. co-supervisor during my mobility at the University of Botswana. His spatial modelization, GIS, and remote sensing expertise were valuable in this project.

Dr. Maginot Ngangyo Heya (Senior Lecturer at the Facultad de Agronomía, Universidad Autónoma de Nuevo León (UANL): He is a great collaborator and I have benefited from his expertise in Natural resources management since my Ph.D studies. He also contributed to the scientific valorization of this project.

2. **Data collection will be done by two field team**

Dr. ZEKENG Jules Christian is the principal investigator, Forest ecologist, and botanist. He had supervised all project activities.

Dr. FOBANE Jean Louis (Senior lecturer): He helped plan the fieldwork and had contributed to valorize (that is in the progress) the results of our project through writing papers as a botany and forest ecology specialist.

Dr. CHIMI DJOMO Cédric: Program Manager at Conservation and Sustainable Natural Resources Management Network (CSNRM-NET) and Researcher at the Ministry of Scientific Research and Innovation. He was involved in the project like field team member, botanist and ecologist, He has contributed immensely to mentoring young students and volunteers within the CSNRM-NET organization.

Dr. Njouonang Djomo Harold Gael: he was field team member, community animator, and facilitator. He is a socioeconomic expert. He conducts the implementation of the socio-economic survey and focus groups discussion in the field.

This project contributed to building the capacity of all students and volunteers at the Conservation and Sustainable Natural Resources Management Network (CSNRM-NET) in several areas, namely (i) techniques of selective botanical inventories, (ii) techniques of socio-economic surveys, and (iii) management of human resources during the realization of the various activities of a project.

Mr. EBANGA Paul Andre is a Ph.D. student in plant ecology and conservation, a Project Manager assistant, and a volunteer at the CSNRM-NET. He is using the data from this project to develop his PhD thesis.

Miss YONGA Guilaine is a field team member, PhD student, and volunteer at CSNRM-Net. Field team member and ecologist. She was responsible for managing logistics and human resources during the socio-economic survey phase of the project.

Miss SAKOU WANDJI Rozane is an MSc student and volunteer at the CSNRM-NET. Field team member and ecologist. She was responsible too for managing logistics and human resources during the socio-economic survey phase of the project.

Miss MAKOUTSING TALLA Ameline Clarence, MSc student and volunteer at the CSNRM-NET. Field team member and ecologist. She was responsible for managing logistics and human resources during the botanical inventory phase of the project.

Miss GUEMKAM KAMGUIN Dolvie, Msc Student and Volunteer at CSNRM-NET. She is developing an MSc thesis in the Doumaintang communal forest.

Mr. Noutanewo Pany is an MSc student and volunteer at CSNRM-NET. GPS operator during the forest inventory

Mr. Tsile Patrick is a botanist; hence, he assists with plant identification during botanical field inventory.

Mr. MPAZANG Brice: Angossas field team, transect materialization.

Mr. MIASSE Martin: Angossas field team. He has significant knowledge about plants and their uses in the locality, so he was very helpful in determining the actual threats to the species.

10. Any other comments?

We want to express our sincere gratitude to The Rufford Foundation for their invaluable support throughout this project. Without their generous funding and unwavering commitment to conservation efforts, our endeavors to address critical biodiversity conservation challenges within the Angossas communal forest would not have been possible.

The financial assistance provided by The Rufford Foundation has enabled us to implement a range of activities to enhance biodiversity monitoring, community engagement, and sustainable land management practices. Moreover, their support has facilitated capacity-building initiatives for local stakeholders and students, ensuring the long-term sustainability of conservation efforts in the region.

We are truly grateful for the trust and confidence The Rufford Foundation has placed in our organisation and project. Moving forward, we remain committed to maintaining the principles of biodiversity conservation and sustainable management, and we look forward to continuing our partnership with The Rufford

Foundation in future conservation endeavors. Once again, thank you for your continued support and dedication to conserving the Cameroonian forests.