Final Evaluation Report

Your Details	
Full Name	Kodjovi Mawuégnigan Léonard AGBODAN
Project Title	Uses, structural characterization and ecological niches of three vulnerable woody species in the Guinean forest formations of Togo
Application ID	43221-2
Date of this Report	20th July 2025

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. Inventory endogenous uses of three vulnerable woody species			■	The survey was conducted among 250 individuals across 42 villages. Endogenous uses of three vulnerable woody species were collected and categorized according to Millennium Ecosystem Assessment (2003) and International Classification of Primary Care (Jamoulle *et al.*, 2018).
2. Study structural characteristics of stands			■	A total of 377 inventory plots were surveyed across six vegetation types. The recorded flora comprised 224 species, distributed among 145 genera and 42 families. Additional occurrence records were procured from GBIF, utilizing the integrated data acquisition module implemented within the Wallace software package (v. 2.0) for the R computing environment.
3. Determine current and future ecological niches of three vulnerable forest resources in Togo			■	Under current climatic conditions, 71.42%, 94.34%, and 78.67% of the territory are highly suitable for the conservation of *A. africana, K. senegalensis*, and *Vitellaria paradoxa,* respectively. Forty potential models were produced for each species and the best model were selected. The model prediction indicates that Ecological Zone II constitutes a suitable habitat for the three vulnerable species.

				Protected areas—including Monts Amalo, Siriabe, Behao, Manda, Sirka, Djamdè, Kémeni, Fazao Malfakassa, Kabou, Sotouboua, Bassar, Sokodé, Anié, Alédjo, Doumboua, and Kindja—function as critical biodiversity hotspots for these species. These conservation zones are crucial for in situ preservation efforts and booster the capacity of these plant populations to endure in the face of escalating environmental change.

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

a). Among the four ecosystem types defined by the MEA (2003), the goods and services provided by the species of interest are classified as provisioning and cultural services. In provisioning services, six categories were identified: food, artisanal, wood, fodder, magico-religious, and medicinal. Medicinally, *K. senegalensis* treats 24 diseases/symptoms, *A. africana* 20, and *V. paradoxa* 31. The most commonly treated ailments include skin conditions (14), general/unspecified diseases (13), and blood/hematopoietic/immunological disorders (10). Local populations attribute the decline of these vulnerable species to multiple factors: wood cutting (80.76%), population growth (70.8%), bushfires (32.84%), unsustainable harvesting practices (25.13%), climate change (15.56%), and overgrazing (10.76%).

b). This floristic inventory included one endangered species (*Pterocarpus erinaceus*), four vulnerable species (*Afzelia africana, Garcinia afzelii, Khaya senegalensis*, and *Vitellaria paradoxa*), and four near-threatened species (*Hallea stipulosa, Albizia ferruginea, Milicia excelsa,* and *Mitragyna stipulosa*). Two types of structural distributions are observed. The "L" or "inverted J" distribution and the platykurtic Gaussian distribution. This pattern reflects an active vegetation recovery dynamic driven by successful natural regeneration across all sampled plots. It appears a strong positive correlation is obtained for the growth parameters measured in conserved areas, and a moderate positive correlation in anthropised areas.

c). Projections for 2040 indicate that approximately 88.99% (SSP 245) of the land area is suitable for *A. africana* conservation, compared to 83.46% under the pessimistic scenario (SSP 585). By 2060, suitable areas are projected to decline to 81.12% (SSP 245) and 79.04% (SSP 585) for *A. africana*. By 2040, suitable land for *K. senegalensis* is expected to decrease by 8.5% (4,838 km²; SSP 245) or 13.43% (7,601 km²; SSP 585), with further declines by 2060 (14.42% under SSP 245 and 47.36% under SSP 585). For *V.*

paradoxa, projections suggest reductions of 3.95% (2,236 km²; SSP 245) by 2040 and 8.06% (4,562 km²; SSP 585), culminating in a national loss of 6,682 km² of suitable land by 2060.

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

- In the savanna region, located north of the study area, obtaining data collection permits proved extremely difficult due to the ongoing security emergency. As a result, the scheduled dates for ethnobotanical and phytosociological surveys had to be postponed because of delays in receiving authorization. Nevertheless, data was successfully collected in the savanna region, though not all initially selected sampling points could be accessed.
- Additionally, frequent adjustments to the work schedule were required due to weather conditions.

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

Local communities played an active role in several project phases: during objectives implementation, they assisted in documenting new occurrences of target species and recording their traditional uses through ethnobotany survey; for dendrometric measurements, local guides helped locate species populations (hotspot) and occasionally supported field data collection, including plot delineation.

5. Are there any plans to continue this work?

Yes, without a doubt. The first booster grant, if awarded will aim to investigate and promote low-cost propagation techniques for vulnerable plants species. By developing these propagation techniques, vulnerable plant species will become more accessible (through domestication) and affordable (using locally available materials) for communities. This sustainable approach will reduce pressure on wild populations while improving local livelihoods through enhanced economic opportunities and health benefits.

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

The research outcomes will be disseminated through peer-reviewed scientific publications. Additionally, technical fact sheets detailing the current and future distribution areas of the target species will be distributed to conservation NGOs and associations working on biodiversity protection.

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

The next steps project will help to (1) investigate seed germination characteristics to optimize propagation protocols, (2) initiate domestication and cultivation methods for vulnerable species production, and (3) restore community forests through the planting of 1,000 seedlings per priority species. Together, these interventions will promote both ecological conservation and socioeconomic development

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 findings of this research were presented at the International Scientific Day of Lomé (JSIL 2024) and during my postdoctoral fellowship in Benin. A scientific paper is currently in preparation to share these results with the broader research community.

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

- M. Kodjovi Mawuégnigan Léonard AGBODAN (Ph.D): Coordination of all activities of the project as principal investigator.
- M. Kossi Béssan AMEGNAGLO (Ph.D): Help in ecological niche modelling
- M. Jean-Luc Ayéfouni AKPAKPAH (Ph.D student): Help in botanical investigation
- M. Benjamin AKAGANGOU (Ph.D student): Help in ethnobotanical data collection

10. Any other comments?

I would like to express my gratitude to Rufford Foundation for the financial support that enabled me to carry out this project focused on the conservation of vulnerable plant species. I hope to secure additional funding to further advance this critical initiative.

ANNEX – Financial Report

[Intentionally deleted]