Final Project Evaluation Report

Your Details	
Full Name	Konoutan Médard Kafoutchoni
Project Title	Traditional knowledge, genetic diversity and conservation of the endemic and threatened *Thunbergia atacorensis* Akoègninou & Lisowski in Benin
Application ID	26172-1
Grant Amount	£5000
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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
To document the traditional knowledge on *Thunbergia atacorensis*				For this objective, surveys were carried out in five districts of the Atacora mountain chain region: Boukoumbé, Djougou, Kouandé, Natitingou and Toukountouna. The study revealed that the species was used to treat dermatosis and candidiasis, but only a few elderly people, aged over 65 years, had this knowledge. Consequently, the species has virtually no importance for most dwellers who see it more as a weed than a valuable resource to conserve. This is an additional threat factor as local populations have no direct socioeconomic interest in conserving the species, meaning that this interest has to be stimulated through public awareness. All respondents had great knowledge about the habitat of the species and reported an important decline in its populations over the years. The most important perceived threat factor was gallery forests clearance for agriculture due to the declining fertility of cropping lands.
To assess the molecular genetic variation in the species				Six populations with 15 individuals randomly selected per population (90 individuals in total) have been sampled across the mountain chain. For each individual, two young leaves were harvested and dried using silica gel. DNA was extracted and genotyping by sequencing was performed using the Diversity Array Technology (DArTseq). However, the sequencing data are still being processed for Single Nucleotide Polymorphism (SNP) calling.
To organize a joint germplasm collecting mission with the conservationists from the				The germplasm collecting mission has successfully been organised with the staff of the Botanic Garden of the University of Abomey-Calavi. Seeds

Botanic garden of the University of Abomey-Calavi in Benin				were collected from 10 randomly selected mature individuals in each sampled population. Collected seeds were germinated in trays containing compost and subsequently transplanted by the garden conservationists. The data from this activity revealed that *Thunbergia atacorensis* has a quiet low germination rate, which would affect the natural regeneration of the species.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

The set of restriction enzymes we selected for the AFLP technique (*Pst*I and *Ase*I) did not perform well because it yielded a very few numbers of restriction fragments as revealed by the electrophoresis in agarose gel. To overcome this difficulty, we outsourced the genotyping to the Integrated Genotyping Service and Support (IGSS), based at BecA-ILRI Hub, Nairobi, Kenya. This has impacted the planning of the genetic analysis as the data is still being analysed.

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

a) The species has no socio-economic importance for the local dwellers who see it more as a weed than a resource to value and conserve for future generations. This lack of interest might be an additional source of threat for the species. Consequently, the interest of the communities needs to be stimulated by the means of public awareness, environmental education and planting campaign among others.
b) The species is under high pressure in the gallery and swamp forests, its main habitat, due to their increasing destruction for agriculture. This situation is favoured by the decline in cropping lands fertility and suggest the need to take immediate and urgent actions of sensitisation toward local farmers.
c) The species presented a very low germination rate which may affect its population dynamics and natural regeneration.

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

Local communities were closely involved in the project activities in several ways:

a) They helped identify the populations sampled for genetic analysis and seed harvesting.
b) They participated in focus group discussions and semi-structured interviews to give insights on the use of the species, its abundance and the (current) threats it faces.

5. Are there any plans to continue this work?

Yes, we do have plans to continue the work. The fieldwork revealed a low interest of communities towards the valuation and conservation of the species. Besides, the species is undergoing high anthropogenic pressure due to increased destruction of its natural habitat. These call for an urgent need to initiate a community-based programme for the sustainable conservation of the species. This can be achieved through communication, environmental education, public awareness raising and planting campaigns which can help reduce the pressure on the species and promote its domestication as an in-situ conservation strategy. On the other hand, we found that the seeds collected for introduction in the Botanic Garden of the University of Abomey-Calavi did not germinate very well. This would affect not only the regeneration of the species but also the dynamic and structure of its populations. Thus, it is crucial to determine the best propagation techniques for the species as a prerequisite for setting up domestication and community-based planting campaigns or restoration programmes. Therefore, we have plans to apply for a second Rufford Small Grant to conduct our project on the determination of the best propagation techniques, environmental education of local communities, and planting campaigns.

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

We are currently writing two manuscripts that will be published in open access journals to avail the results of the project to the scientific community and conservationists. Oral and/or poster presentation will be given at national and international conservation-oriented conferences. The project updates will also be shared on ResearchGate. Besides, a Twitter account is created to share the project update. The Rufford Foundation will, of course, be acknowledged as the funding body of our work.

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

The Rufford grant was used for the entire period of the 12-month project. Funds were received in late September 2018 and the project activities started in October 2018.

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
Reagents for DNA	2000	2820	+820	This was higher than expected

extraction and fingerprinting				because the restriction enzymes selected did not perform very well. We, therefore, outsource the genotyping.
Pen, memory stick, water-resistant and shockproof external hard disk of 500 GB	80	80		
Local labour costs (£3/capita/day labour), 3 people (interpret and two field assistants) for 100 days each	900	900		
Fuel for motorcycle (£3/day × 200 estimated days)	600	590	-10	
Motorcycle renting for local travels (£3.5/day × 200 estimated days)	700	700		
Questionnaire sheet production and copying	45	45		
Travel laboratory-field-laboratory (£135/shuttle/people) for 5 people in 2 trips (ethnobotanical survey and germplasm sampling)	675	675		
Total	5000	5810	+810	**NB:** The additional £810 were covered by our institution

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

The important next steps should lead to a paradigm shift in local communities towards the active conservation of the habitat of my species, and the development of an action plan and conservation strategies for the species in Benin. These can be achieved through education of communities and other stakeholders (students, NGO staff, natural resource managers, government bodies, etc.) by the means of public awareness, training workshops and seminars, demonstration plots, and planting campaigns. For instance, training on integrated soil fertility management practices can help decrease the rate of destruction of gallery forests by farmers in search of more fertile lands. Also, assessing the population structure and dynamics is important for determining recruitment and population growth rates, and assessing risks of extinction for the species. This would not only inform conservation decision but also foster the development of efficient strategies and action plans for the species.

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?

Yes, we used the Rufford Foundation logo on the slide of an oral talk given at the training workshop on analysis of next generation sequencing data in September 2019 in Nairobi, Kenya. We also acknowledge The Rufford Foundation in the two manuscripts in preparation for publication in peer review journals.

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

Mr. Konoutan Médard Kafoutchoni (Principal investigator): supervised the ethnobotanical surveys, collected leaf sample, extracted DNA, conducted the germplasm collecting mission, and currently performing genetic analyses)

Mr. Bebotti Wegnike and **Mr. Thibaut Ahouandjinou** (field assistants): Provided operational field support in setting up and conducting the project activities.

Ms. Ahouéfa Kégbé: Involved in surveys, sample collection, germplasm collecting mission. Drafted the report.

Prof. Achille E. Assogbadjo (supervisor): Provided advice in ethnobotanical studies and gave directives for report and manuscript writing, and germplasm collection.

Prof. Clément Agbangla: Provided advice in molecular genetic diversity studies.

12. Any other comments?

We would like to express my sincere gratitude to the Rufford Foundation for funding this project and allowing us to gain great insights into the value of *T. atacorensis* to local communities and the genetic diversity in the species. These are capital for designing and implementing efficient long-term conservation of this endangered plant species.

Perception of respondent on the decline of *T. atacorensis* populations (n=45)

Sociodemographic characteristic		Population dynamic			Declining rate		
		Extincted	Increasing	Declining	Low	Moderate	High
Gender	Female	2	1	6	1	2	6
	Male	9	2	25	1	18	17
Age category	Youth (age≤35)	3	-	6	-	4	5
	Adult (35<age≤55)	6	1	16	-	12	11
	Elderly (age>55)	2	2	9	2	4	7
Ethny	Otamari	11	3	6	2	2	16
	Peulh	-	-	15	-	10	5
	Yom	-	-	10	-	8	2
District	Boukoumbé	-	3	6	2	2	5
	djougou	-	-	10	-	8	2
	Kouandé	-	-	15	-	10	5
	Natitingou	11	-	-	-	-	11
Education level	None	5	3	25	2	16	15
	Primary	2	-	6	-	4	4
	Secondary	2	-	-	-	-	2
	High education	2	-	-	-	-	2

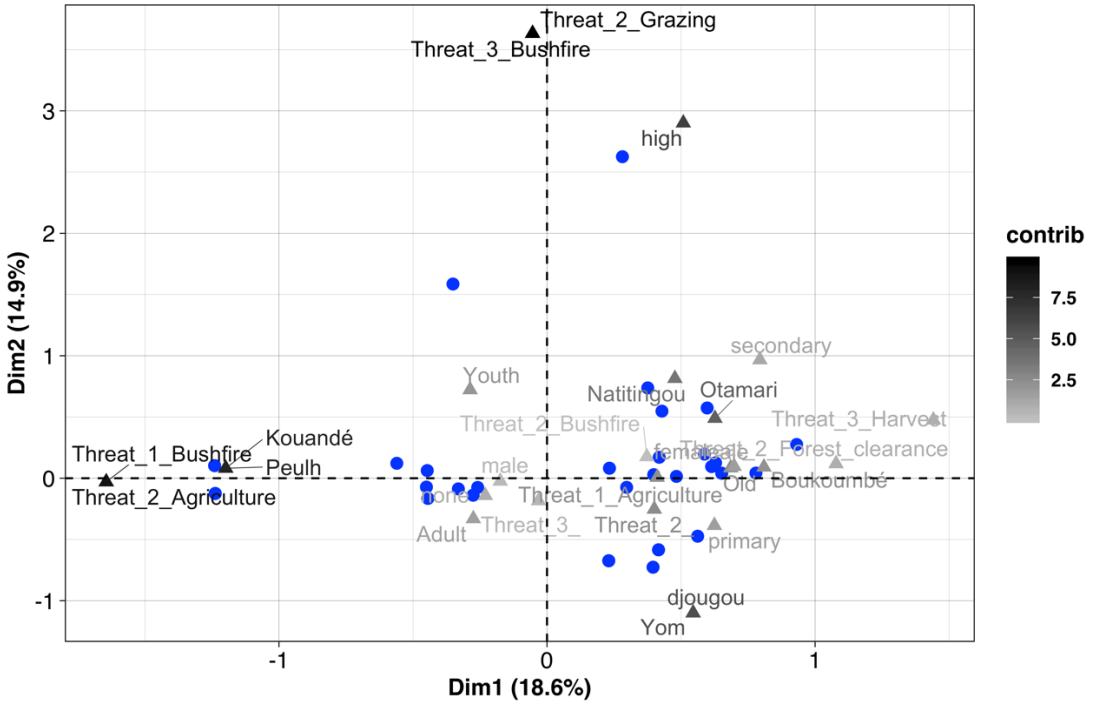

Fig. 1: Multiple correspondence analysis biplot showing the relationship among sociodemographic factors and threat factors

Fig. 2: Atacora mountain chain: the study zone of the project

Fig. 3 and Fig. 4: During field work

Fig. 5: Altitude gallery forest: the primary habitat of *Thunbergia atacorensis*

Fig. 6: *Thunbergia atacorensis* in its natural habitat

Fig. 7: Informants examining a sample of the species

Fig. 8 to Fig. 10: informants during interview

Fig. 11 and Fig. 12: During seed collecting mission

Fig. 13: Sensitisation of students after fieldwork in Boukoumbé district

Fig. 14: Photo with the class after sensitisation