

Final Evaluation Report

Your Details	
Full Name	CODJIA Jean Evans Israël
Project Title	Diversity and Sustainable Conservation of Natural Habitats of Fungi in Tanongou Waterfall Region in Northern Benin
Application ID	30156-1
Grant Amount	£5998
Email Address	evans_codjia@netcourier.com
Date of this Report	21/02/2022

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 diversity of fungi of Tanongou waterfall				A total of 84 species of macromycetes were collected within 75 days of inventory.
To document endogenous knowledge relative to fungi				Six ethnic groups, including Biali, Fon, Gangam, Gourmantche, Peulh, and Waaman were investigated within three surrounding villages. Information regarding the local taxonomy, the different uses of fungi have been collected.
To reforest the fragmented areas				Together with the forest office, NGOs, villager authorities, villager committees, heads of schools, students, local people in general, 5000 plants were used for the reforestation of target fragmented areas. The activity was successfully performed. However, additional fragmented areas were recently defined with the forest office and will be reforested during our future projects.
To raise public awareness activities in collaboration with the forest office, NGOs, villager authorities, villager committees, and heads of schools.				One of the best ways to convince local populations to stop or prevent destroying forests' ecological balance is through awareness activities. Thus, the thematic related to the necessity to preserve durably the habitats of fungi species were addressed.

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

No significant difficulties were encountered during the project. The only aspect that could be highlighted is the evolution of the Covid 19 pandemic in the country that has delayed the ethnomycological investigation because of the restrictions implemented at the national level by the government. But finally, we were able to complete the investigation. Moreover, we were not allowed by the forest office to

put advertising boards transmitting the messages on the protection of the habitats of fungi in the study area since the area is under their control. We didn't get permission for such an activity.

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

Diversity of fungi

A total of 84 species of macromycetes were collected within 75 days of inventory. These 84 species comprise saprotrophic, parasite, and ectomycorrhizal species grouped into 30 different genera. The most represented genera are *Amanita* (35.8%), and *Russula* (19.4%). About 12 genera are represented by at least two different species (Figure 1). These genera include *Amanita* (24 species), *Russula* (13 species), *Agaricus* (five species), *Lactifluus* (four species), *Marasmius* (four species), *Ganoderma* (three species), *Clavulina* (three species), *Termitomyces* (three species), *Boletus* (two species), *Lactarius* (two species), *Scleroderma* (two species), and *Lentinus* (two species). Eighteen other minority genera in our inventory are represented only by a single species. These genera include *Pycnoporus*, *Inocybe*, *Trametes* and *Psathyrella*.

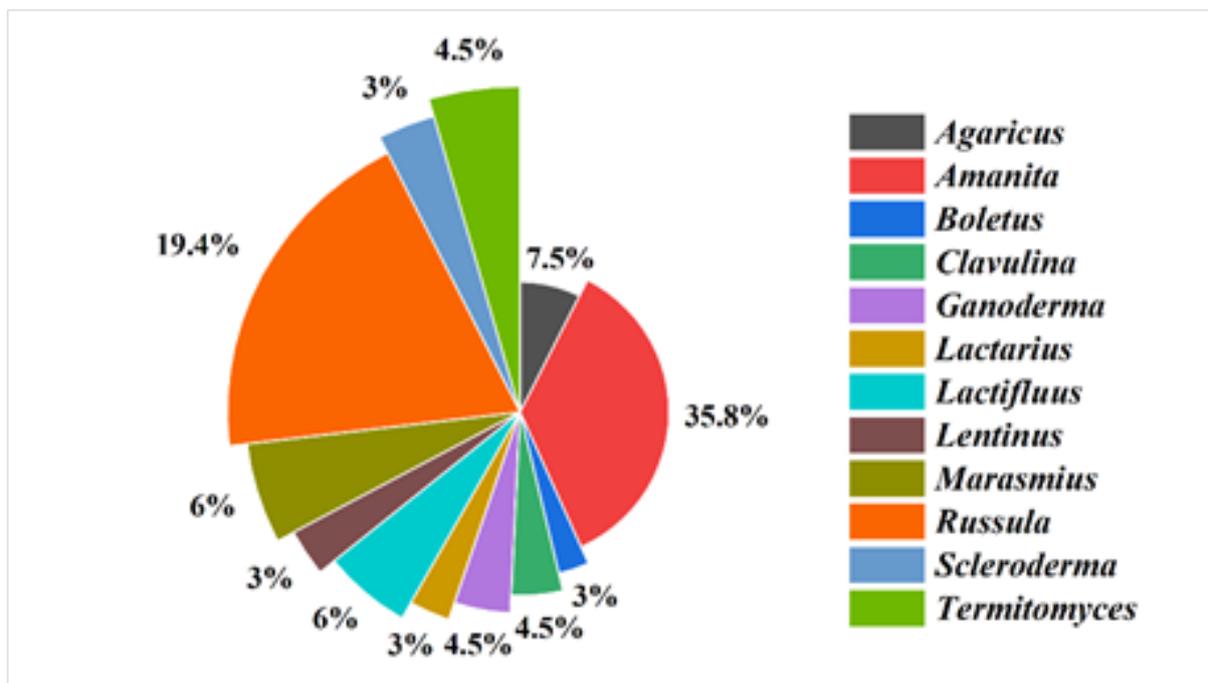


Figure 1. Diversity of genera

The most common species of fungi found through the transects during the collection include *Scleroderma citrinum* (11 times), followed by *Amanita* cf. *craseoderma* (10 times), *Amanita* cf. *annulatovaginata* (nine times), and *Termitomyces microcarpus* (eight times) (Figure 2). The wild edible species, including *Psathyrella tuberculata*, *Russula congoana*, *Amanita masasiensis*, and *Amanita subviscosa*, and other unknown species such as *Russula* sp1 and *Amanita* cf. *albolimbata* have also been encountered several times. Representative species encountered in the study area are summarised in photo 1.

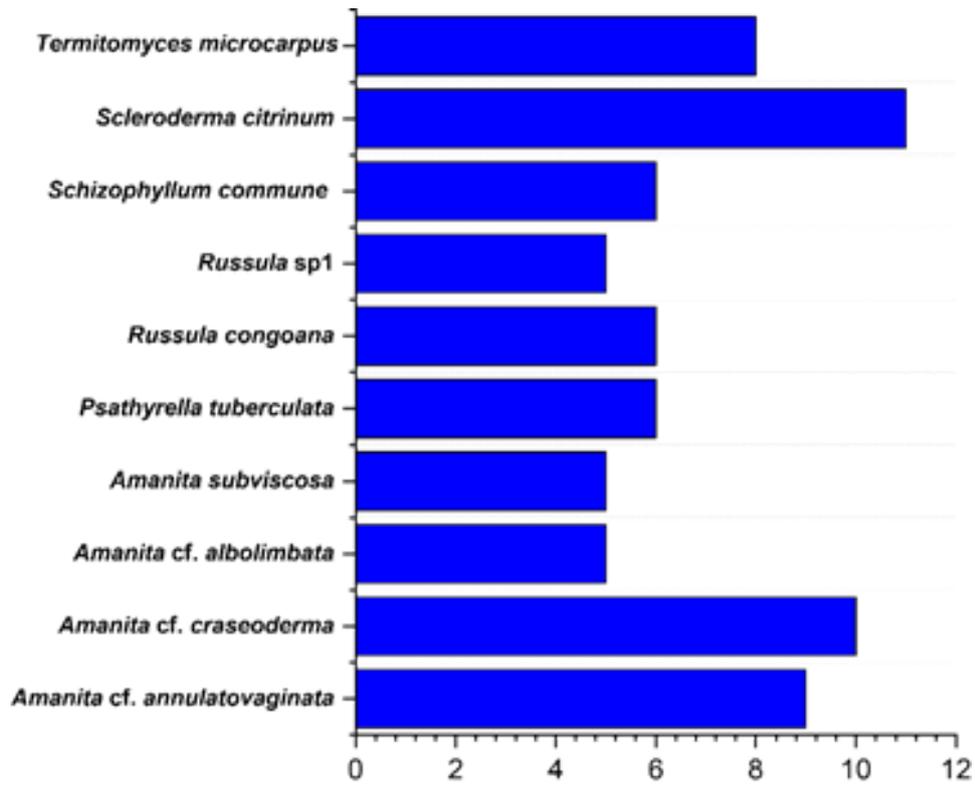


Figure 2. Frequency of species collection

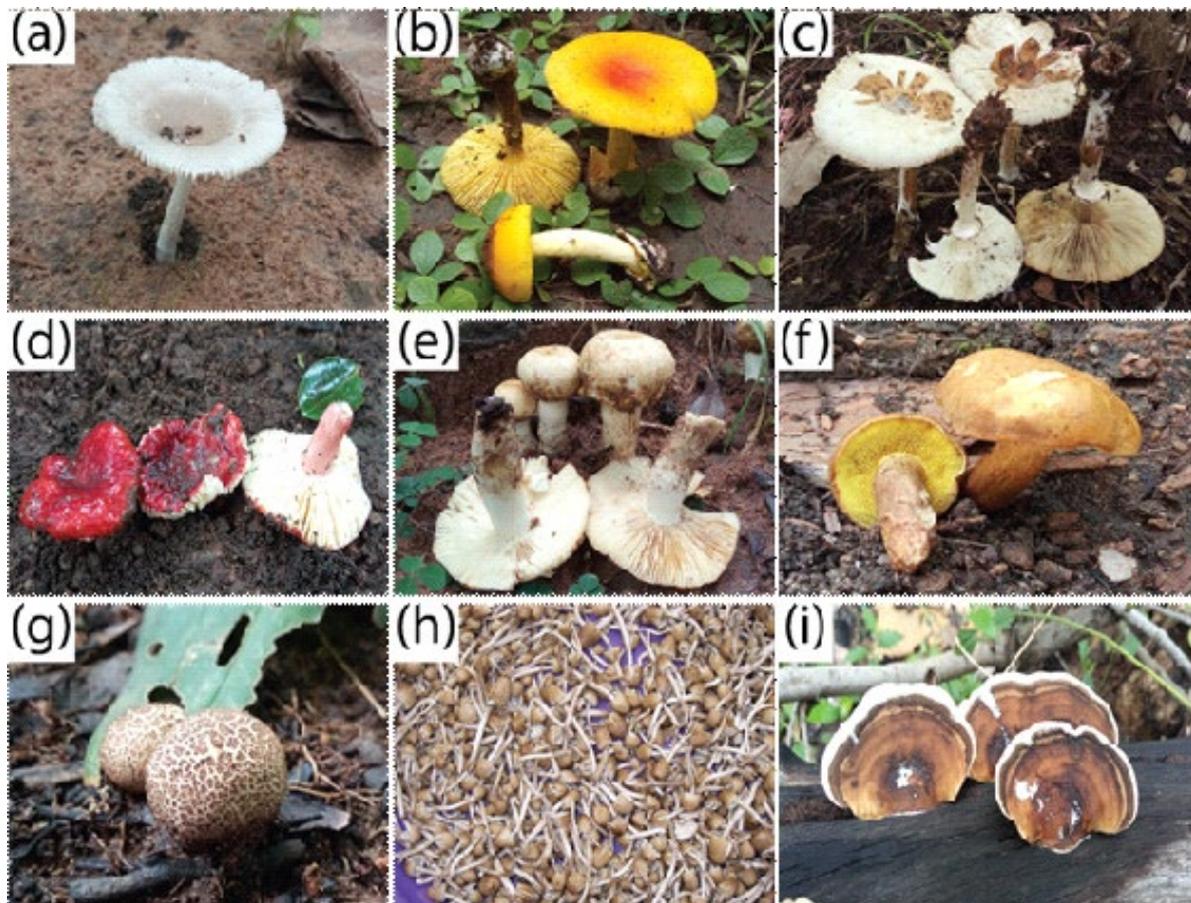




Photo 1. Species diversity in the study area. a. *Amanita* cf. *craseoderma*. b. *Amanita* *masasiensis*. c. *Amanita* sp1. d. *Russula* *congoana*. e. *Russula* *oleifera*. f. *Boletus* sp1
g. *Scleroderma* *citrinum*. h. *Psathyrella* *tuberculata*. i. *Trametes* *cingulata*. j. *Marasmius* sp1.

Ecology of fungi

The area is characterised by the presence of ectomycorrhizal tree species, which explains the dominance of the ectomycorrhizal fungi species. More than half of the specimens collected are ectomycorrhizal fungi (i.e., 143 specimens) (Figure 3). Very few parasite species were collected, mainly represented by the genus *Ganoderma* which is also an excellent saprotroph. Saprotrophic species are also well represented (57 specimens), including edible species highly appreciated by the local population, such as *Psathyrella tuberculata* and *Lentinus squarrosulus*. Fungal species were collected from different substrates, including dead leaves, dead woods, litter, living wood, and soil (Figure 4). The substrate soil presents the highest number of specimens collected among those substrates, followed by the substrate dead wood (Figure 4).

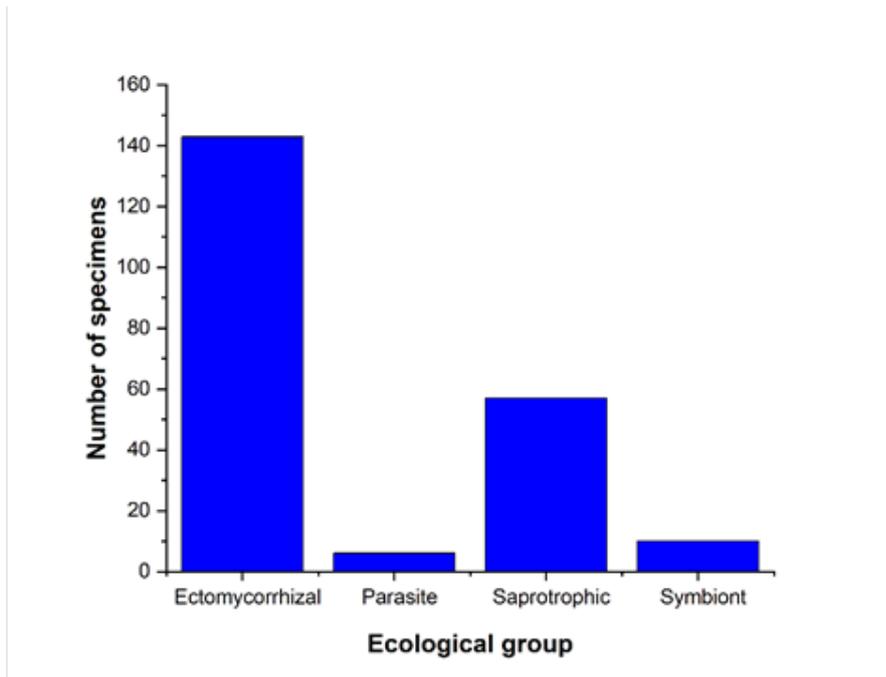


Figure 3. Different ecological groups of fungi in the study area

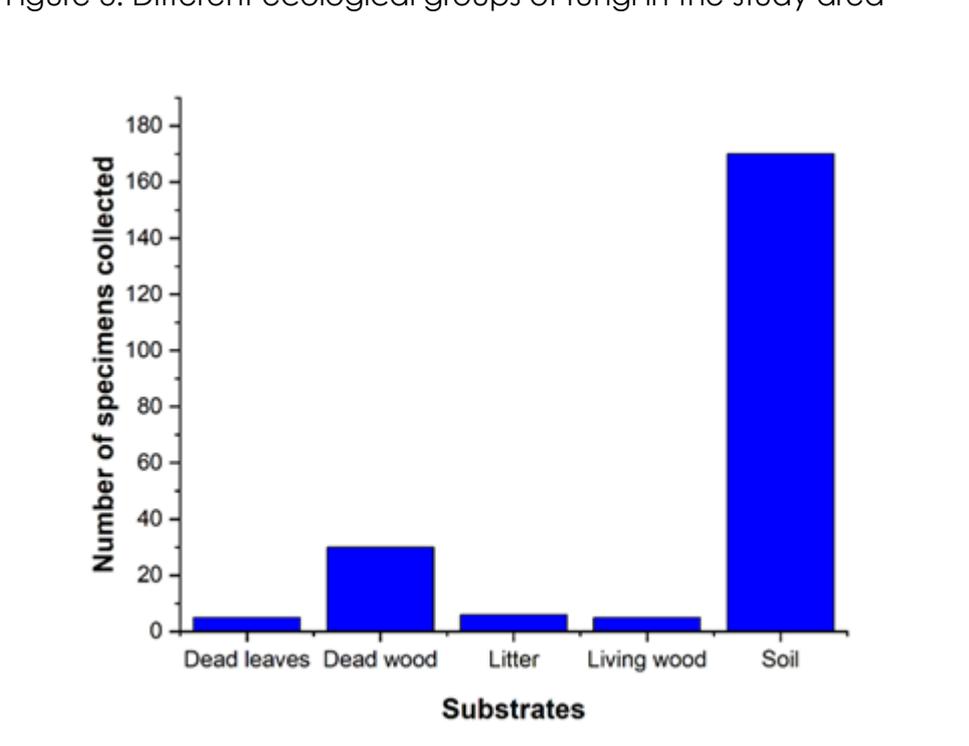


Figure 4. Different types of substrates of fungi in the study area

Different uses of wild fungi by local populations and mode of transmission of knowledge

In the study area, local populations use wild fungi for different purposes, including food and traditional medicine (Figure 5). However, they use fungi primarily for food rather than traditional medicine (Figure 5). Several fungi are very popular for their

exciting taste and texture, similar to those of meats. The most appreciated and consumed by different ethnic groups are *Psathyrella tuberculata*, some species of the genus *Lentinus* and *Termitomyces*. Some species of the genus *Amanita* are not consumed and are prohibited from consumption because of the intoxication cases reported after their consumption. It has also been noted that the species *Podaxis pistillaris* is consumed when immature while the mature carpophore is mainly used in traditional medicine, especially in the rapid healing of wounds. Other species not identified have also been mentioned in the treatment of bewitchment problems, and children's skin infections. Those species are also used when women want to give birth. The most dominant ethnic groups per village and within the three villages are Gourmantché and Waaman.

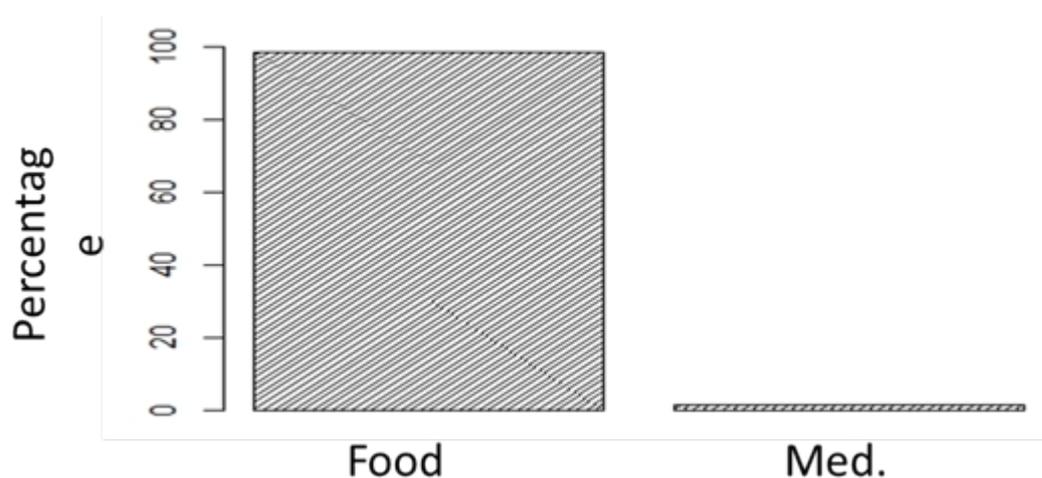


Figure 5. Uses of fungi in the study area.

In total, six ethnic groups were investigated in three villages of Tanongou. The same terminology is used within the different ethnic groups. So, the local names given to fungi don't almost change from one ethnic group to another. Local taxonomy is generally based on certain characteristic features of fungi, including size, shape, taste, colour, texture, and ecology (Table 1).

Species	Local name	Meaning
<i>Psathyrella</i> sp.	Pem kandjoro	Little fungi
<i>Amanita crassiconus</i>	Tigbébpienne	White fungi growing on cow's dung
<i>Chlorophyllum</i> sp.	Pemmètèfougou	Cow's fungi
<i>Lentinus</i> sp.	Kpantargo	Elastic
<i>Termitomyces</i>	Titougouri	Grows on termite mound
<i>Polyporales</i>	Dopirapemna	Dead branch fungus (medicinal)
Unkown sp.	Kokopemna	Tree fungus
Unkown sp.	N'potiyamann	Old woman's urine

All ethnic groups use fungi mainly as food sources. But the use of fungi in traditional medicine is only observed within two ethnic groups, namely the Gourmantché and the Waaman (Figure 6). As for the level of appreciation of the fungi consumed, there is no difference. The level of appreciation of the species consumed varies from one person to another.

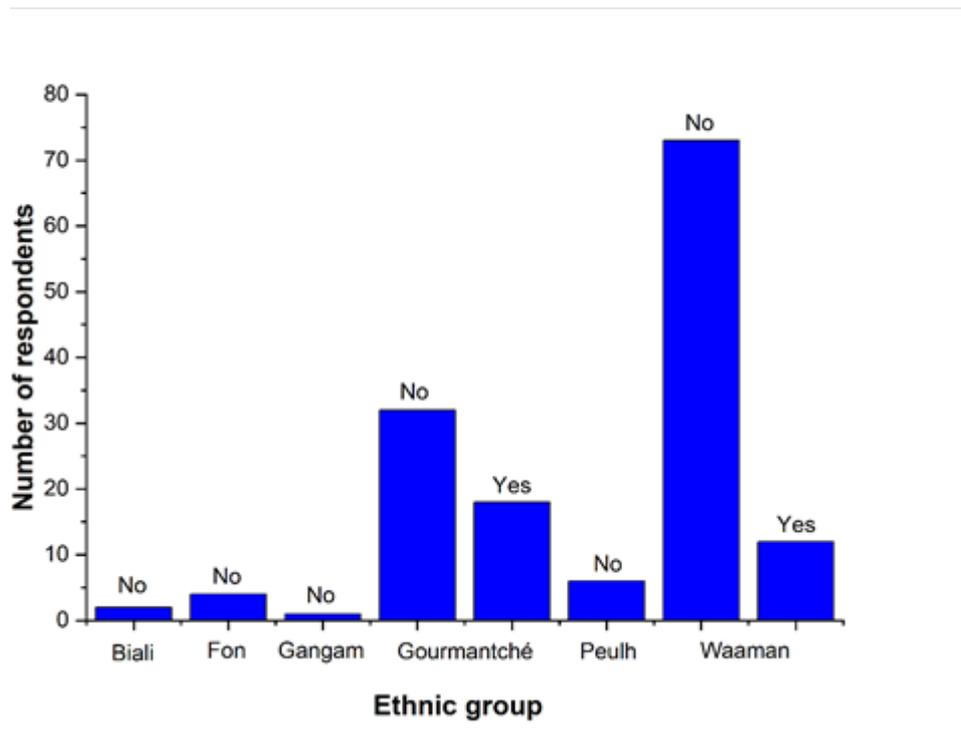


Figure 6. Medicinal use of fungi according to ethnic groups.

Ethnomycological knowledge is generally transmitted from generation to generation and most often from parents to children. However, the knowledge is distributed according to gender. The majority of ethnomycological knowledge is held by women (Figure 7).

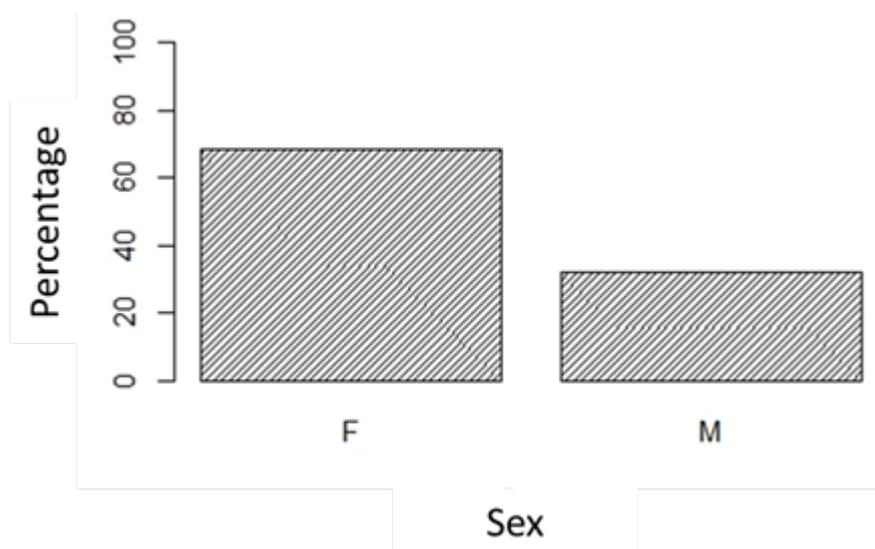


Figure 7. Distribution of knowledge about mushrooms according to gender. Legend. F: Female, M: Male.

4. What do you consider to be the most significant achievement of this work?

5. Briefly describe the involvement of local communities and how they have benefited from the project.

Conservation education and reforestation activities were performed with the help of local people. Also, before starting the project activities, we contacted the local authorities, who disseminated the project's goals to the population through the villages. During data collection especially for the ethnomycological surveys, we were assisted by a young native of each selected village. During conservation education activities a local shouter was recruited with the help of the chief of each village to spread the schedule of the activities in advance. Moreover, during those seances, people came out massively, proving that local people were at the core of all activities, and they really appreciated the process.

6. Are there any plans to continue this work?

I think to capitalise the results of this project, new species collected will be described for the documentation of the mycoflora of the country and the biodiversity in general. We also plan to train local people on the good habits regarding harvesting wild edible fungi to perpetuate the ecosystem services provided by fungi. We need to go further to establish a fungi value chain in the area. This is a good opportunity to create jobs for local people and significantly reduce human disturbances that negatively impact the habitats of fungi in Tanongou waterfall.

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

I plan to publish the first checklist of fungi of Tanongou waterfall in a peer-review journal. Moreover, the results will be disseminated through several workshops and conferences related to biodiversity at the national and international levels.

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

The grant was used over the period and ranged from August 2020 to December 2021. Due to the measures implemented by our government regarding the Covid 19 pandemic, we have been delayed during the execution of some activities of the project. Hence, I will say that in general, the timescale does change so much from the previous timescale set during the writing of the project.

9. 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
Electric dryers	£200	£200		
GPS Garmin	£250	£250		
Laboratory work fees for identification and expertise in fungal identification accessories	£500	£650	+£150	Some Lab stuff got overpriced due to the closed borders of the country.
Tree nursery + reforestation + maintenance + awareness costs	£1200	£1300	+£100	Things like plastic bags got expensive
Accommodation + food (mycological surveys and awareness)	£750	£750		
Field guides	£100	£100		
Fuel for motorbike	£768	£950	+£182	Due to the closed borders, fuel got very expensive
Motorbike rental	£960	£960		
Travel to the field	£200	£200		
Advertising boards	£350	£350		Since we could not establish advertising boards in the study area, we used this amount to cover the additional costs
Media campaign	£100	£100		
Leaflets	£70	£70		Finally, we didn't produce leaflets for the awareness activities. Only posters were produced. So, we used this amount to cover the additional costs
Posters	£150	£150		
Plastic bags type minigrip + silica gel	£150	£150		
Digital photo camera Canon 60D + macro lens	£950	£950		

Internet, fax, telephone	£150	£150		
Literature consulting	£100	£100		
Total	£6948	£7380	+£432	

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

In a nutshell, it is urgent to implement income-generating activities in the study area, especially the fungi value chain, to provide jobs to local people.

11. 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, I have used the Rufford Foundation logo for the posters during conservation education activities (Photo 2). I have also kept informed local people, forest office, and NGOs that this project was possible thanks to the funding of Rufford Foundation grant.



Photo 2. Awareness activities with local populations of Tanongou.

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

BONI Souleymane. He was helpful in the identification of woody plants present on the site. He was also helpful in identifying all fungi species met in the natural habitat.

In addition, he helped us to ensure good practices on sustainable conservation and management of fungi habitats.

HOUDANON Roel. Due to his vast experience in conservation projects, he was very helpful for experimental design for data collection and the awareness activities.

TORE Eric. He was helpful during fungi inventory, ethnomycological surveys, the training of local people on the establishment of nurseries and the reforestation activities.

OLODO Francine. She is from the study area and speaks very well the common language of the area. She had even carried out fungi inventory activity in Pendjari Park close to the study area. So, she knows the area very well and was very helpful in communicating with the stakeholders.

13. Any other comments?

I want to address a special thanks to the teammates for their implication leading to the successful completion of the project. I also thank the local populations for their availability and Tanongou NGOs, and forest officers as well. I am also thankful to the Laboratory of Ecology, Botany and Plant Biology and particularly to the Research Unit in Tropical Mycology and Plants-Soil-Fungi Interactions members for their advice and supports. Finally, I am so grateful to Rufford Foundation for funding my project N°30156-1.