

# **Final Evaluation Report**

Your Details	
Full Name	Dossa Winnie Binabo Ingrid
Project Title	Restoration of degraded natural habitats in the Alibori Supérieur Forest Reserve through education and community conservation in north Benin.
Application ID	31944-1
Grant Amount	£6,000
Email Address	winnie.dossa18@gmail.com
Date of this Report	07/10/2021



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
Raise awareness of good practices for the sustainable management of natural habitats				
Identify endogenous knowledge related to multiple-use forest species.				
To determine the land use dynamics and population structure of multiple-use forest species				
Reforesting degraded natural habitats				

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

During the implementation of the project activities, we did not encounter any difficulties. Rather, we had the support of the local population and the forest authorities responsible for the conservation of the Upper Alibori Forest Reserve. The barrier actions against COVID19 were also respected (Photo1 A, B).



Photo 1. (A and B) Awareness session to explain the project's objectives in Sonsoro village, Source: Dossa 2020

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

# Raising awareness among local populations of good practices for the sustainable management of natural habitats

We raised the awareness of the local population about the good practices of sustainable management of natural habitats with the help of posters (see posters) in the villages of Sonsoro, Bagou, Kerou, and Toura (Photo 2 A, B, and C). The good practices popularized were limiting wood cutting, adopting controlled fires, orienting



new natural rangeland channels for cattle grazing in order to limit animal rambling, reforesting natural habitats with multipurpose species, limiting charcoal production in alternation with environmentally friendly activities.



Photo 2. (A, B, and C) Presentation of poor agricultural practices and their effects on biodiversity to the local population of Sonsoro, **Source**: Dossa 2020

#### Population structure of forest species

The 1 ha plots (Photo 3 A, and B) were set up within the forest reserve according to the age of regeneration, which varied from 0 to 40 years in 5-year intervals. In the plots, we assessed all multipurpose forest species and other locally useful NTFPs following the method explained by Assogbadjo et al. (2006). This allowed us to determine the species richness as well as the use of forest species by the population.





Photo 3: A delimitation of plots, B Measurement of dendrometric parameters in Bagou village, Source: Dossa 2020



Left: Vitellaria paradoxa Gaertn. f. Right: Piliostigma thonningii (Schumach.) Milne-Redh. Below: Diospyros mespiliformis Hochst. Ex A. DC.





Photo 4: (A, B and C) some forest species recorded in our plot in Kerou village, Source: Dossa 2020

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lable		SUBELIES	nenness	OFFOREST	SDECIES		IO INE	OOS INSIONEO
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Species/ Plots	1	2	3	4	5	6	7	8	9
Acacia dudgeoni Craib ex-Hall.		7				1			
Acacia flava (Forssk.) Schweinf.								7	
Acacia sieberiana var. vermoesenii (De Wild.) Keay & Brenan								3	
Acacia sp		1	4			9			1
Annona senegalensis Pers.					4		1		
Anogeissus léiocarpa (DC.) Guill. & Perr.	1	1	1	4		7			
Bridelia ferruginea Benth.		1							
Burkea africana Hook. f.		1	1			1			
Combretum collinum Fresen.		4	2						
Combretum glutinosum Perr. Ex DC.							1		
Combretum nigricans Lepr. Ex Guill. et Perr.				1		5			
Combretum paniculatum Vent.		1							
Daniellia oliveri (Rolfe) Hutch. & Dalz.				1				1	
Dyospiros mespiliformis Hochst. Ex A. Rich.	2								
Ficus ingens (Miq.) Miq.					1				
Entada africana Guill. & Perr.									1
Isoberlinia doka Craib & Stapf	5	1	1	4	4		7	1	9
Lannea acida A. Rich.	2	2	1		2			1	2
Lannea kerstingii (Enql.) K. Krause.	1				1		1	4	
Mytragina inermis (Willd.) Kuntze	1								
Opilia celtidifolia (Guill. & Perr.) Endl. Ex Walp.			1						



Piliostigma thonningii (Schumach.) Milne-Redh.				1					1
Prosopis africana (Guill. & Perr.) Taub.			3					1	2
Pterocarpus erinaceus Poir.	3	2		1					1
Strychnos spinosa Lam.		3	7	6		5	1		
Tamarindus indica L.	3			1				1	
Terminalia avicennioides Guill. & Perr.					3		7	1	1
Vitellaria paradoxa Gaertn. f.	4	1		3	3		2	4	7

### > Determining endogenous knowledge related to multiple-use forest species

Ethnobotanical surveys were carried out on 100 people, with 25 people per village according to the Bariba, Fon, Yorouba, Peulh and Haoussa ethnic groups (Table 2).

 Table 2. Lists of useful species and their uses according to ethnic groups

Useful species	Family	Ethnic groups	Vernacular name	Common name	Ethnobotanical use
Acacia sp.	Mimosaceae	Bariba	Unknown	Unknown	Medicinal, firewood, lumber
Adansonia digitata L.	Bombacaceae	Bariba, Hausa	Sommou, Sonnan		Food (PNFL), Medicinal, Lumber, Firewood, Charcoal
Afzelia africana Smith ex Pers.	Caesalpiniaceae	Bariba, fon	Gbebou	Lenke, lengue, African mahogany	Medicinal, Lumber, Firewood, Charcoal
Annona senegalensis Pers.	Annonaceae	Bariba	Batoko	Cannele apple from Senegal	Food (PNFL), Medicinal, Lumber, Firewood



Aphrodisiaca sp	_	Bariba	Sonwan	Unknown	Medicinal, Lumber, Firewood
Borassus aethiopum Mart.	Arecaceae	Bariba	Banrou	Ronier	Food (PNFL), Medicinal
Ceiba pentandra (L.) Gaertn.	Bombacaceae	-	Unknown	Unknown	Medicinal, Lumber, Firewood
Diospyros ebenum J. Koenig	Ebenaceae	Bariba	Wimbou	Eben wood	Food (PNFL), Medicinal, Lumber, Firewood, Charcoal
Ficus sp.	Moraceae	Bariba	Gannou	Ficus	Food (PNFL), Medicinal, Lumber, Firewood, Charcoal
Isoberlinia doka Craib & Stapf	Caesalpiniaceae	Bariba	Gbaou	Unknown	Medicinal, Lumber, Firewood, Charcoal
Khaya senegalensis (Desr.) A. Juss.	Meliaceae	Bariba	Gbiribu	Khaya	Medicinal, Lumber, Firewood, Charcoal
Parkia biglobosa (Jacq.) R. Br. Ex G. Don	Mimosaceae	Bariba, Hausa, Fon and Peulh	Dom	Néré	Food (PNFL), Medicinal, Lumber, Firewood, Charcoal
Piliostigma reticulatum (DC.) Hochst.	Caesalpiniaceae	Bariba, Hausa	Bagourou	Unknown	Food (PNFL), Medicinal, Firewood
Prosopis africana (Guill. & Perr.) Taub.	Mimosaceae	Bariba	Guinrou	Iron tree	Food (PNFL), Medicinal, Lumber, Firewood, Charcoal



Terminalia macroptera Guill. & Perr.	Combretaceae	Bariba, Fon and Hausa	Kakara	Bandicoot	Medicinal, Lumber, Firewood, Charcoal
Vitellaria paradoxa Gaertn. f.	Sapotaceae	Bariba, Fon, Peulh, Hausa, Yoroub a	Sombou	Shea	Food (PNFL), Medicinal, Lumber, Firewood, Charcoal
Vitex doniana Sweet	Verbenaceae	Bariba, Yoruba	Yambou	Black plum	Food (PNFL), Medicinal, Lumber, Firewood, Charcoal

# To determine the land cover dynamics and population structure of multiple-use forest species

### Acquisition of data

The data used is Landsat scenes downloaded from: https://earthexplorer.usgs.gov/whose characteristics are listed in Table 3.

**Table 3.** Characteristics of the scenes Satellite Acquisition date Scene identifier PATHROW

Landsat 7 2000-10-26 LE71920522000300EDC00 192 52	
Landsat 7 2000-10-26 LE71920532000300EDC00 192 53	
Landsat 7 2010-01-23 LE71920522010023ASN00 192 52	
Landsat 7 2010-01-23 LE71920532010023ASN00 192 53	
Landsat 8 2020-02-28 LC81920522020059LGN00 192 52	
Landsat 8 2020-02-28 LC81920532020059LGN00 192 53	

## Processing of data

It should be noted that the Landsat 7 scenes in 2010 are gridded. The railed scenes were corrected by an ArcGIS processing tool. This is the "Landsat 7 ScanLine Error Fill" model from "Landsat toolbax". The Alibori Supérieur forest reserve is located in a channel between two scenes. The "Mosaic to New Raster" tool was used to mosaic the scenes band by band. The combined bands of each snapshot were classified and then vectorized to facilitate the calculation of the areas of each land use unit.

### > Method of prediction

The prediction model used is the MOLUSCE model. MOLUSCE is an extension (plugin) of QGIS developed by NextGIS in cooperation with Asia Air Survey in Japan. The abbreviation MOLUSCE stands for "Methods of Land Use Change Evaluation." The plugin implements the following process takes a raster of land use categories for period A (here 2010 land use), a raster of land use categories for period B (here 2020 land use) and rasters of explanatory variables or factors. The explanatory factor rasters are proximity to the urban area and accessibility to the forest by roads (Figure 1).





Figure 1. Predictive variables a. the agglomeration factor; and b. the road factor, Source: Dossa 2020

The proximity of settlements to the forest, as well as the accessibility of roads to the forest, favored forest degradation. These two factors are moderately correlated (r = 0.515). However, controlling for these two factors yielded a substantial result.

#### Results

Figures 2, 3, and 4 show the land cover dynamics and population structure of multipleuse forest species. It was noticed that from 2010 to 2020 there is a reduction of forests and an increase of mosaics of fields and fallows, an advance towards desertification.





Figure 2. Depicts FCAS land use in 2000 in The Alibori Supérieur forest reserve, Source: Dossa 2020



Figure 3. Depicts FCAS land use in 2010 in The Alibori Supérieur forest reserve, Source: Dossa 2020





Figure 4. Depicts FCAS land use in 2020 in The Alibori Supérieur forest reserve, Source: Dossa 2020

### > Reforesting degraded natural habitats

For this activity, seedlings were produced and maintained between March and May (Photo 4) and then transplanted to the project areas between June and July 2021 (Photo 5 A, B and C).



Photo 4. Afzelia seedling nursery, Source: Dossa 2020





**Photo 5.** (**A**, **B** and **C**) Reforestation activities with Afzelia plants, forestry authorities and local populations involved, **Source**: Dossa 2020

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

For the proper execution of the project activities, the work was carried out with the open participation and collaboration of village groups and local actors in the area. These village groups were made up of active women, farmers, youth and children who collect PNFLs as well as farmers in the study area and forestry operators. Collaboration was also effective with local chiefs, land chiefs, forest authorities and NGOs specialized in conservation and sustainable management of biodiversity, with whom we listed the various guidelines for good sustainable management of natural habitats. We also worked closely with the General Directorate of Water and Forests of Benin, the National Association of Forest Operators of Benin, and the Community Union of Agricultural Producers of Benin in the study area (Photo 6). Some members



of the village groups served as local field guides for the selection of data collection sites for ethnobotanical surveys. They were helpful in carrying out the reforestation of natural habitats in the forest reserve.



Photo 6. Consultation with forestry authorities in Sonsoro village, Source: Dossa 2020

### 5. Are there any plans to continue this work?

This work should continue over the next few years in order to implement the following ideas for biodiversity conservation in the project area. These are:

- Continue reforestation activities in the project area,
- Establish a broad-based value chain for PNFLs to provide income-generating activities that contribute to the conservation and sustainable management of natural habitats.
- Carry out cohorts to raise awareness of the various stakeholders on agricultural practices in order to sustainably manage agricultural land and avoid the search for fertile land through deforestation.

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

A scientific paper on the status of the forest reserve in the study area and the use of LFNs by local people will be published in a reputable journal. The results of our project will also be presented at several workshops and conferences in the sub-region, including the conference at the University of Parakou (Benin). Similarly, the results of our project will be used to support teaching and research at the Faculty of Agronomy of the University of Parakou in Benin.



However, being an assistant in different laboratories, I intervene in practical work oriented to ecology and characterization of natural habitats at the Laboratory of Ecology, Botany, and Plant Biology (LEB), and I also intervene in those oriented to sustainable soil management at the Laboratory of Innovation in Integrated Production Systems and Sustainable Land Management (InSPIREs-SLM). I will effectively transmit the acquired know-how to the young students and to my colleagues from the results of our project.

# 7. Timetable, over what period was the grant used? How does this compare to the anticipated or actual length of the project?

The activities were carried out according to the periods indicated in the project. Awareness activities were carried out in February as well as the establishment of a local committee in charge of monitoring new or adapted management practices. The reforestation was done between June and July 2021 after having produced the seedlings between March and May 2021.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in  $\pounds$  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
Cost of Food	400	410	+10	We used this fund to ensure our food on the ground.
Local labour costs	750	750		We used this fund to pay the local guides in the different villages.
Local travel	1082	1082		We used the funds to ensure our travel on the ground more precisely in the different villages and inside the forest reserve.
Maps, office supplies, printing costs (posters), media (radio)	718	400	-318	We used this background to print the various posters and posters, the interventions on the local radio antennas and the realization of the maps.
Computer, printer and software	700	700		We used this fund to pay for a laptop to store the databases, a printer to print the various ethnobotanical and dendrometric survey sheets.



Tree nursery, reforestation cost and assistants Digital camera Canon	1150 700	1150 700		We used this fund to ensure the nursery of the plants, the reforestation of natural habitats and also to pay the local assistants who helped us in the field. We have Vons used blends to pay
1400D with 60mm macro lens, and Accessories				a camera with accessories. She allowed us to take the photos in the field.
Satellite images	300	315	+15	We paid for the activities related to the processing of satellite images
GPS (Garmin Etrex 20x)	200	200		A GPS was paid to take the geographic coordinates of each plot.
Eestablishment of a local committee responsible for monitoring good agricultural practices disseminated		293	+293	We used this amount for setting up the monitoring and evaluation committee and for its operation. Its mission is to ensure strict compliance with the various measures for the conservation and sustainable management of natural habitats that is to say to limit harmful human activities as much as possible and to ensure that the reforested areas are intact. Likewise, it will ensure the continuity of sensitization by radio on good agricultural practices in order to avoid damage to the plots installed in the reserve and consequently to avoid the conflicts between farmers and breeders which are topical in our country.
TOTAL	6000	6000		

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

The next step after this project is to fight to set up a PNFLs value chain in the villages bordering the study area and which were not taken into account for this project. It will also initiate the establishment of farmers' organizations composed mainly of women and youth in order to manage PNFLs in an efficient and sustainable manner. This will be done through their agri-food processing and packaging that can be sold at an affordable price to all classes. The reforestation activities will be carried out over a long period of time during favorable seasons and the plots where the reforestation has been done will be monitored with the help of the actors involved in the project



implementation. Particular emphasis will be placed on the different agricultural practices and solutions in this framework will also be the subject of future projects.

# 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?

Our work was assured by the emphasis we placed on the Foundation's logo in our various communications. During awareness sessions with the target audience in the study area, posters and signs were displayed with the Foundation's logo. Similarly, during conferences and communications in the laboratories with which I am affiliated, the preliminary results presented also bore the logos of the Rufford Foundation.

# 11. Please provide a full list of all the members of your team and briefly describe their roles in the project.

In order to achieve the various objectives of our project, we worked with the following competent people:

**Abahi Simon**, with his experience, ensured the identification and recording of data on the current state of natural habitats in the study area.

Yao Rebecca, she was useful for the sensitization activities.

**Imorou Souleymane**, He trained the target audience on the establishment of forest tree nurseries and the monitoring of reforestation activities.

#### 12. Any other comments?