Final Evaluation Report

Your Details	
Full Name	Aicha GOMEH-DJAME
Project Title	Assessing Lobéké National Park (Southeast Cameroon) as an area of importance for African bat conservation.
Application ID	39932-1
Date of this Report	16 July 2024

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. To undertake the first bat study and provide the first provisional bat species list for LNP			X	Our team (Fig. 1) undertook the first bat study of Lobéké National Park (LNP) with three field surveys in both the dry and wet seasons. We captured 313 individuals of 28 bat species of six bat families. They include rare and little-known vespertilionids. Some of the identifications are provisional and need to be confirmed. We have compiled the first bat list for LNP which is available on request. The study is ongoing.
2. To provide the first provisional assessment of the conservation value of LNP for bats.			X	Our data suggest that LNP has the potential to be included as an AICOM (Area of Importance for the Conservation of Bats) following the ideas of RELCOM (2022). With further field work, we believe it will meet all three criteria: (i) holding bats of national/ regional importance; (ii) holding key roosting sites (of forest bats); and (iii) containing high species richness.
3. To provide the first preliminary assessment of threats to bats and their habitats in LNP			X	Our data shows that the key threat to bats in LNP is anthropogenic habitat modification. In areas of high forest loss, the bat fauna is dominated by two common fruit bat species. In areas of selective logging and intact forest, the bat diversity has a higher

				diversity of vespertilionid and other insect-eating bat species. Interviews with 31 local villagers from various ethnic groups suggest that direct disturbance and hunting are not a major threat to bats in LNP.
4. To provide the first recording, undertaken with standardized recording protocols, for an acoustic database for bats in LNP		**X**		Active recording of bat echolocation was undertaken in the field for the 21 species of echolocating bat. Also, passive records were taken in the forest. These data are currently being analysed. As this is our first attempt at bat acoustic research, we need to improve our techniques and skills.
5. The first training and awareness campaign for LNP's staff and park rangers in understanding and conserving bats.			**X**	Training of the park rangers in bat research techniques took place. The role of bats in LNP's ecosystem and the importance of LNP for African bat conservation was explained to park rangers. A formal community workshop will take place when we feel we have developed a good trust with the local villagers – to understand the complex relationships in LNP see Lambini et al. (2019).
6. Provide the first report with initial conservation recommendations for LNP's bats		**X**		A report is currently being written and will be circulated once our first scientific publication (also in preparation) has been submitted to an international journal.

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

a). This is the first study of the bat fauna of Lobéké National Park (LNP) (Fig. 2). It was undertaken with mist nets, a canopy net, and harp traps (Fig. 3). It included taking acoustic recordings of bat echolocation (Fig. 4), a wing punch for molecular

research, and wing-shape drawings. So far, 28 species of six families and 19 genera have been captured (further details available on request). This is based on 36 capture nights in three different zones of the park: 11 nights in the Zone of Hunting Interest with Community Management (ZICGC Outer Zone); 12 nights in the Buffer Zone Forest Management Units (FMU) and 13 nights in the Intact Forest of the core area of the National Park (Figs. 5&6). Further study is currently being undertaken to confirm the species identifications of the molossid and vespertilionid bats. The species accumulation curves for the three habitat types suggest that there are additional species to be found (Fig. 7).

b). This is the first provisional assessment of the conservation value of the LNP for bats. Our study supports the view of Herkt et al. (2016) that LNP is in an area of high diversity for African bats (Fig. 8). Our initial data suggests that it will meet the criteria of an Area of Importance for the Conservation of Bats (AICOM) following RELCOM (2022) principals (Fig. 9). It does hold forest bat species, such as five potential species of *Glauconycteris* (identifications to be confirmed), which may be of national and regional conservation relevance, and we anticipate that further field studies will capture more rare forest-dependent taxa. We also think that the forest is a key roosting site for forest-dependent bats (although we do not yet have direct factual evidence of this). We believe that further research will confirm our initial finding that LNP contains a high species richness of northwest Congolian Lowland Forest bat species.

c). Our study is the first preliminary assessment of threats to bats and their habitats in LNP. The provisional data indicates that anthropogenic habitat modification is the key threat. In the open habitats of the ZICGC Outer zone, the bat fauna is dominated by two common species of fruit bat, *Megaloglossus woermanni* and *Myonycteris torquata*. Together these two species represent two-thirds of all bat captures in the zone (66.9%; 81 of 121 bat captures), and the four species of fruit bats together represent 73.6% of captures (Table 1). In comparison, in the intact forest, only nine individuals of two fruit bat species were captured compared to 5 species of vespertilionid. The edge habitats of the FMU have the highest bat diversity and abundance. However, we believe that further data will show that the intact forest provides a key refuge for many of the species collected in the FMU zone. Our interviews with 31 villagers, aged between 15 to 55 years, and belonging to 11 ethnic groups (Bagando, Baka'a, Bassa'a, Eton, Kounambebe, Mbimo, Mvon von, Peul, Toupouri, Wimbong, Yambassa) revealed some knowledge of bats (74.1% of the seven females and 24 males combined). However, in general there was little interest and low hunting pressure. Only 35.4% (11 of 31) of villagers recorded a use of bats. Of these two villagers used bats for medicine and nine for food. Despite the lack of interest, 35.4% (11 of 31) of the villagers said that bats were a bad omen (Fig. 10).

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

Travelling to and from Lobéké National Park (LNP): The roads to LNP are very bad, and the trip from Yaoundé to the field study area takes at least 2 days each way and has frequent problems, especially during the rains. It is also expensive. This caused some delay at the start of the project as we believed that it was better to have a fully prepared methodology before conducting the field work. Otherwise, we risked having to repeat some aspects of the study at considerable cost. In this way, we believe we have saved time and money and maximised the outputs.

Working in LNP: Living and working in LNP is difficult, particularly as the park rangers are uncomfortable to work at night in the forest (Fig. 11). It was their first experience of bat research and they were cautious of working in the dark in habitats that are home to potentially dangerous animals, including forest elephant, gorilla, buffalo, and snakes. They refused to access sites in the forest that they did not know. This, and other issues, sometimes made it difficult for the team to set up the nets and harp traps systematically. To cope with these problems, we worked closely with the rangers, listening to their advice, providing our own experience, and looking for positive outcomes.

Community awareness issues: over the years there have been issues between the park and the local villagers – for a summary see Lambini et al. (2019) (Fig. 12). Therefore, we were particularly sensitive to the issue of building trust with the local community. For this reason, the planned workshop and the associated distribution of t-shirts and learning materials was temporarily postponed whilst we develop a closer relationship with the local people, who come from a wide variety of ethnic backgrounds (Bagando, Baka'a, Bassa'a, Eton, Kounambebe, Mbimo, Mvon von, Peul, Toupouri, Wimbong, Yambassa).

Identification of species: It proved difficult in the field to identify some of the cryptic vespertilionid bat species. We are now working to confirm the identification using a range of techniques including morphometrics and hopefully some molecular studies. As soon as we have completed the identifications, we will complete a publication on the bat fauna of LNP and circulate the report on LNP's bats to a wide national and international audience.

Acoustic surveys: We recorded bats in the field using both active and passive recorders (Fig. 4). However, the team is not expert on bat acoustic surveys, and we realise that we need more training in both collecting calls in the field and in analysing the data. In addition, we had problems to borrow equipment. We have now bought our own detectors and are trying to get help with further training in acoustic methods.

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

The local communities were curious about the study (Fig. 13). In the past there has been some friction between the villagers and the national park (Lambini et al., 2019) (Fig.12). For this reason, we were careful with our interactions trying to ensure the best possible relationship. The villagers directly benefitted from the project as we generated employment in Lobéké village by working with men and women as carriers, cooks, and guides. We also bought some supplies from the village. At the end of the project, when we have a clearer understanding of the needs of the bats and the villagers, and we have built trust with the local community, we will do an outreach workshop. We will explain that bats have very positive effects through their ecosystem services and need not be feared.

5. Are there any plans to continue this work?

This was the first phase of an ongoing bat project in LNP. There is a programme of field work planned as my PhD study is looking at the impact of road density on bat diversity, composition, and abundance in LNP and its implications for conservation. The results will also look at how changes in bat guilds have the potential to increase risk of spillover of harmful viruses from bats to humans. There will be additional master's students working on different aspects of the bat fauna, including acoustics. Bat research in LNP is a long-term project.

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

As this project is part of my PhD, copies will be deposited at the University of Yaoundé and at the universities of my national and international advisors (in Austria and UK). Results will be published in a peer-reviewed international journal(s) and contributed to GBatNet (conservation focus-group). The project was presented at a workshop in the University of Yaoundé and at the SCCS student conference in Cambridge, UK (March 2024) (Fig. 14) and will be presented at future national/international conferences. Results will be updated on our website www.batcameroon-lpn.org (Fig. 15). Reports/publications will be circulated to staff of (1) LNP, (2) Cameroon Ministry of Scientific Research and Innovation (MINRESI), (3) Cameroon Ministry of Forestry and Wildlife (MINFOF) and (4) WWF Cameroon. After publication, data will be contributed to GBIF and IUCN Red List and acoustic data to ChiroVox, a public library of bat calls (Görföl et al., 2022).

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

The important next steps include.

- Ensuring that all stakeholders, especially the LNP park rangers and staff, the government ministries (MINRESI, MINFOF), and the conservation community, especially WWF Cameroon, are aware of:
    - the importance of LNP for bat conservation,
    - the impact of forest loss on bat communities, leading to an impoverished bat fauna dominated by two widely distributed fruit bat species.
- Further study of the forest bat species in order to capture as many of the rare, forest dependent species as possible; this will allow for a better evaluation of LNP as an Area of Importance for the Conservation of Bats (AICOM) for conserving the Northwestern Congolian Lowland Forest bat fauna.
- Developing an acoustic library of bat calls for LNP, which will allow for on-going, rapid, non-invasive bat surveys and monitoring.
- Involving the local communities in a positive conservation process built around a better understanding of the role of bats and other local fauna.

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 Rufford Foundation received publicity at the University of Yaoundé 1 where I presented the progress of this project and at the SCCS conference in UK (Fig. 14). The logo is included on the project's website (written in French and English) at https://www.batcameroon-lnp.org/home (Fig. 15). When we have built trust with the local community, we will distribute t-shirts and posters, with the logo, to the local community at a workshop and as part of a bat awareness campaign.

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

All members of the team (Fig. 1) contributed to the success of the project. They worked on a range of aspects, both in the field and in the university. There were also some additional members on the second and third field trips. The team comprised:

- Ms Aicha Gomeh-Djame, who was the PI and particularly contributed to:
    - funding and finance
    - liaising with grant-giving organisations
    - liaising with national and international advisors
    - organising transport to and from, and within LNP
    - field studies in LNP
    - acoustic recording and analysis
    - outreach, including conference presentations and the website
    - reporting and preparing publications

- Ms Agodigo Eugenie, who particularly contributed to:
    - organising the equipment
    - safety, concerning the handing of bats
    - morphological identification of bats in the field
    - co-leading the mistnet team, including the monitoring of nets and the removal of bats

- Mr Abiazhiem Junior, who particularly contributed to:
    - co-leading the mistnet team, including the monitoring of nets and the removal of bats
    - training of the park rangers
    - morphological identification of bats in the field
    - helping with acoustic recordings

- Mr Guy Marcelin Bidias Nango, who particularly contributed to:
    - co-leading the mistnet team, including the monitoring of nets
    - helping with acoustic recordings
    - supervising the work of porters and guides.

- Mr Nalsou Godwe Jean Us (Park Ranger: Head of the Ecology Research and Monitoring Unit), Mr Pilate Kiyoekoi (Park Ranger: Head of Sector of ''Bolo platform '' in the core area of the park), Mr Igor (Park Ranger: In charge of Baka community), Ms Ghislaine Engoum (Park ranger) and Mr Justin Souhe Balepa (Park Ranger) who particularly contributed to:
    - security and protection of the field team
    - assisting the team in all aspects of working in the field
    - setting mist nets and harp traps
    - building trust between the team and the local community
    - learning about the role of bats in the ecosystem and the importance of LNP for African bat conservation.

In addition, there were two porters (Mr Glenn and Mr Konda) who helped with the transport of equipment; the cooks (Mr Franck and Mr Papa) and two local guides (Mrs Omer and Mr Simons).

10. Any other comments?

We thank the Ministry of Ministry of Forestry and Wildlife for permission to work in Lobeke National Park and the local communities for allowing us to work in their areas. We are most grateful to all the staff of LNP, including Nalsou Godwe Jean Us (Park Ranger: Head of the Ecology Research and Monitoring Unit); Moele Ibrahim (Captain, Head of Protection and Ecological Monitoring in the Conservation Service); Pilate Kiyoekoi (Head of Sector of ''Bolo platform"), Igor (in charge of Baka

community), Justin Souhe Balepa, and Ghislaine Engoum. We are grateful to Mr Glenn and Mr Konda (who helped with the transport of equipment), the cooks (Mr Franck and Mr Papa), and two local guides (Mrs Omer and Mr Simons). We thank Prof. Dr Erik Bakwo Fils (University of Ebolowa); Cameroon and our two international advisors, Dr Marcela Suarez-Rubio of BOKU Vienna and Dr Paul Bates of Harrison Institute UK for their invaluable support and advice. We thank SCCS for the opportunity to visit Cambridge, UK to speak about the project.

Finally, all the team would like to thank The Rufford Foundation for its support. We believe that this work in the Congo Forest of southeast Cameroon is very exciting and important for bat conservation. It would have been completely impossible without your help. Now our aim is to expand the study and help put Lobéké National Park on the map for bat conservation as one of Africa's first AICOMs, if the data supports this. We thank you all from the bottom of our hearts.

Annex

We have included a series of figures and tables that help illustrate some of our more important findings.

As we are preparing to publish a paper(s) on this study, we have not included bat species lists or the detailed questionnaire results. These are available on request.

Fig. 1. Team members at the UNESCO site of LNP (PNL – Parc National de Lobéké). From left to right: ***Nalsou Godwe Jean Us (Park Ranger: Head of the Ecology Research and Monitoring Unit); Justin Souhe Balepa (Park Ranger); Ms Agodigo Eugenie (Team Member)****; Moele Ibrahim, Capitain, Head of Protection and Ecological Monitoring in the Conservation Service;* ***Ms Aicha Gomeh-Djame (PI, Team Member)****; Neba Kingsly, Head of Eco-development and Participatory Management); and* ***Mr Abiazhiem Junior (Team Member)****. Those in bold joined the field studies. Other researchers and park guards additionally joined on different field trips.*

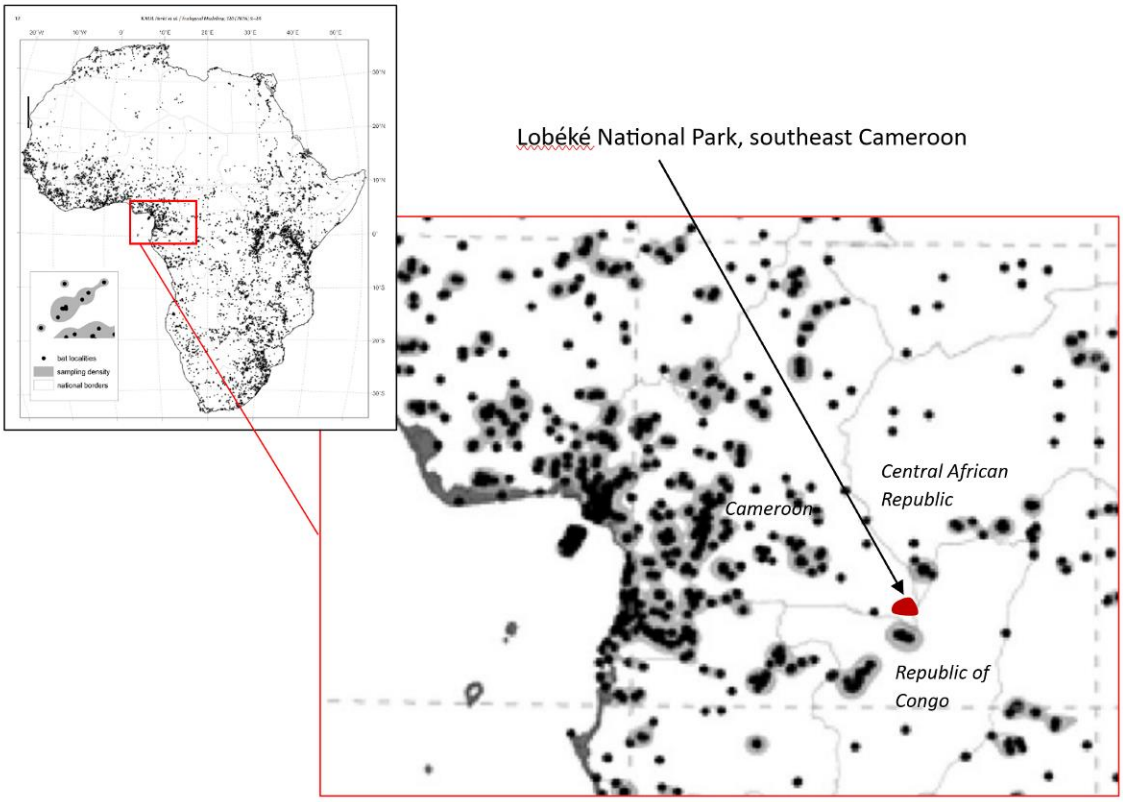


Fig. 2. Map of georeferenced bat occurrences (black dots) for Africa (sourced from Herkt et al, 2016). This shows that there were no records from the Lobéké area (pre-2016) and the nearest available locations were in Central African Republic and the Republic of Congo.

Fig. 3. Field study techniques for bats in LNP – Above left: harp trap; Above right: canopy net; Below: mist net.

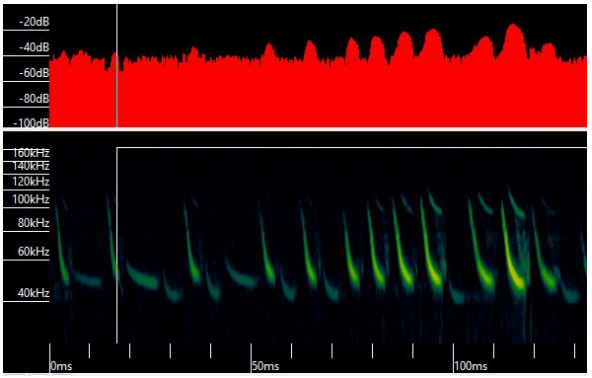


Fig. 4. Active and passive recording of bat echolocation was undertaken in the field.

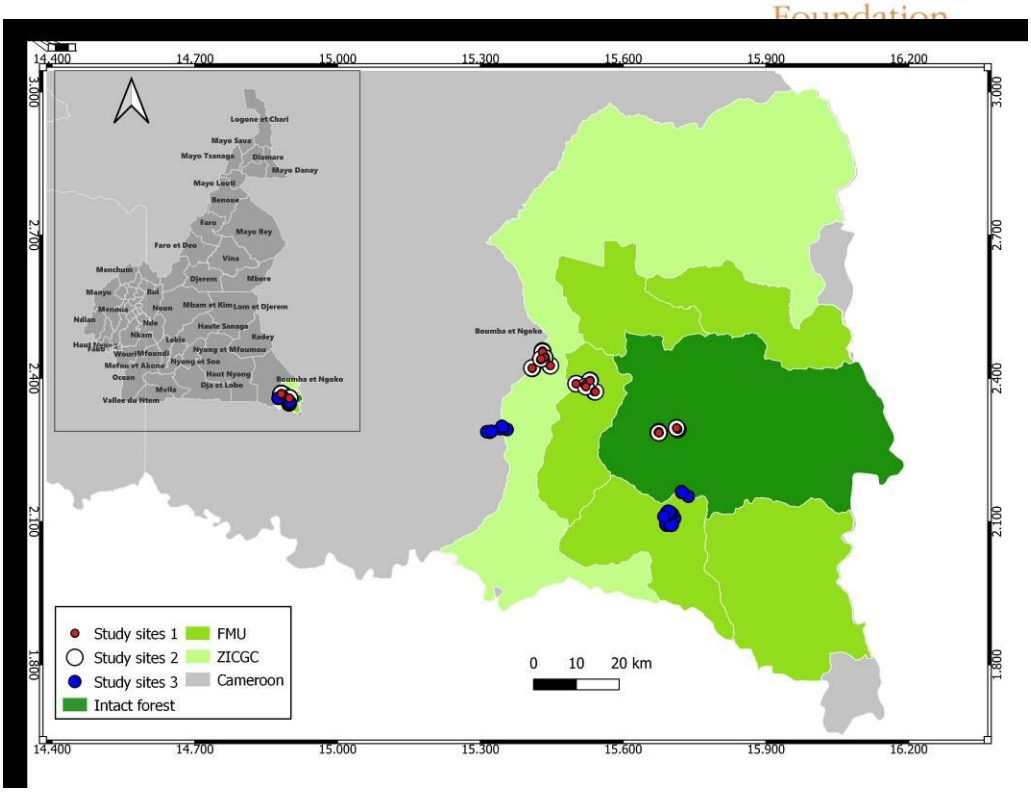
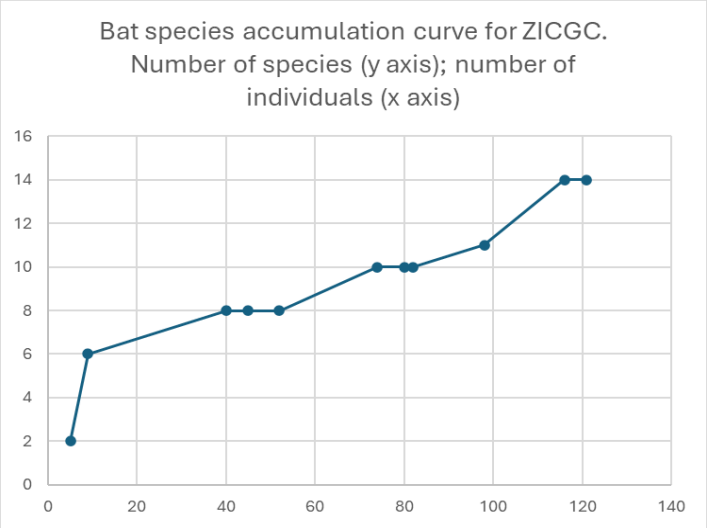
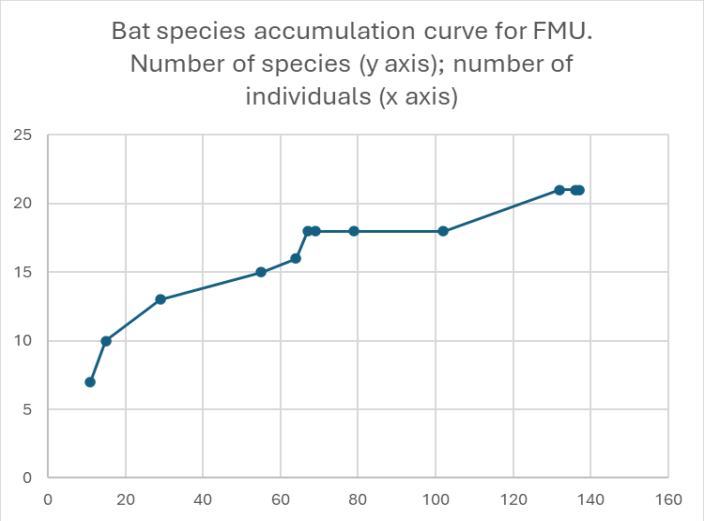


Fig. 5. Map of Lobéké National Park study area, showing the distribution of survey points in the Intact Forest (Core Zone), the FMU Buffer Zone (Forest Management Units) and ZICGC Outer zone (Zone of Hunting Interest with Community Management). The three field visits are coloured in red (July 2023), white (November 2023) and blue (May-June 2024).

Fig. 6. Three different habitat types. Previous page bottom: Intact Forest; above : FMU Buffer Zone (Forest Management Units) and below: ZIGCG Outer Zone (Zone of Hunting Interest with Community Management.





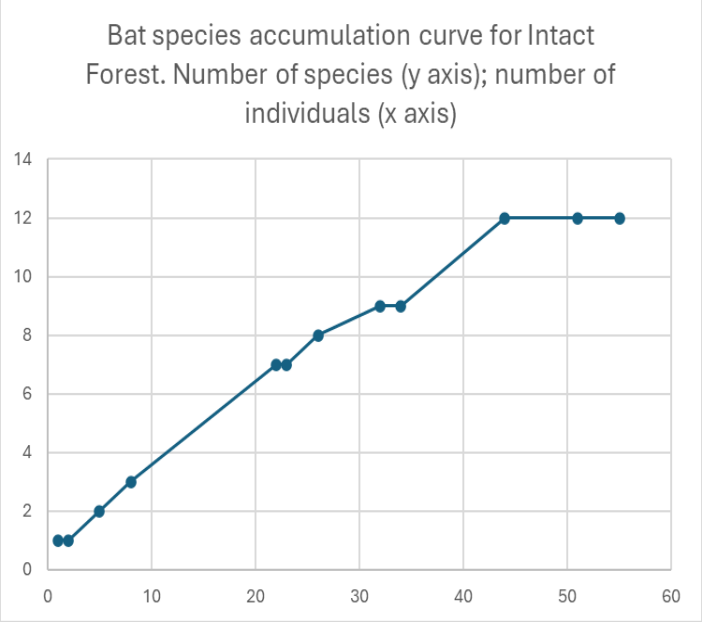


Fig. 7. Species accumulation curves for the three habitat types (number of species v number of individuals captured). Above: ZIGCG Outer Zone (Zone of Hunting Interest with Community Management); middle: FMU Buffer Zone (Forest Management Units) and below: Intact Forest (Core Zone). *<<Make sure that the x and y-axis have labels. It is not a good idea to include this in the tittle>>*

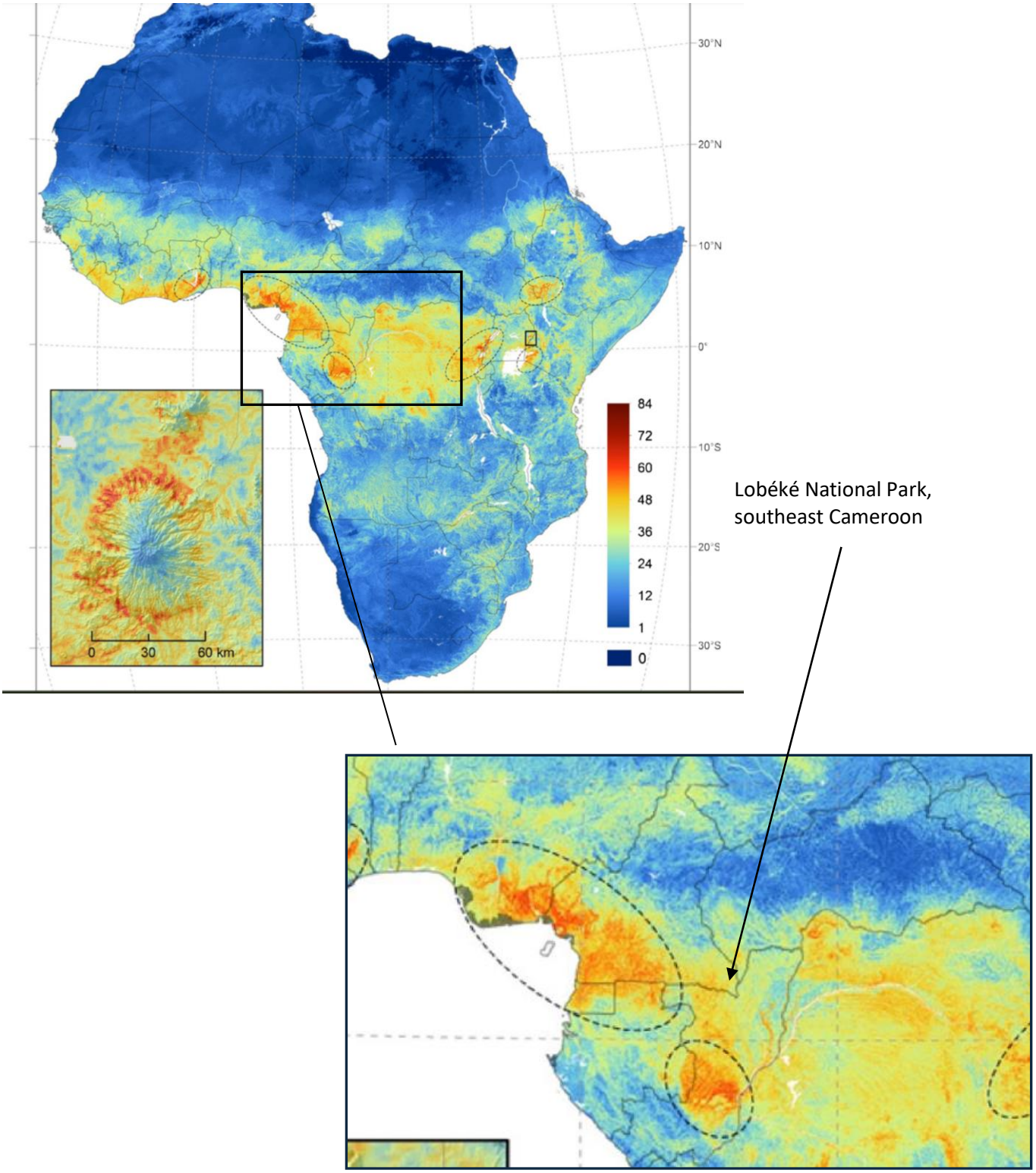


Fig. 8. Predicted species richness of African bats (sourced from Herkt et al., 2016) : red and orange = highest diversity ; blue = lowest diversity.

AICOMs and SICOMs

AICOMs and SICOMs are an essential tool for the protection of threatened bats through the declaration of locally protected areas and sites.

At the regional level, these can be integrated into a system of protected areas called:

- **Areas of Importance for the Conservation of Bats** (AICOMs). Those areas that cover a sufficient surface area for populations of one or several species of bats to develop their vital processes in a way that guarantees their permanence over time.
- **Sites of Importance for the Conservation of Bats** (SICOMs). They differ from AICOMs in that they are smaller and more specific places. They present bat populations of interest for conservation; They can be caves, bodies of water, important foraging sites (parks or others) or anthropogenic constructions (houses, bridges, tunnels, abandoned mines, etc.). Their protection, care, conditioning and management should be promoted.

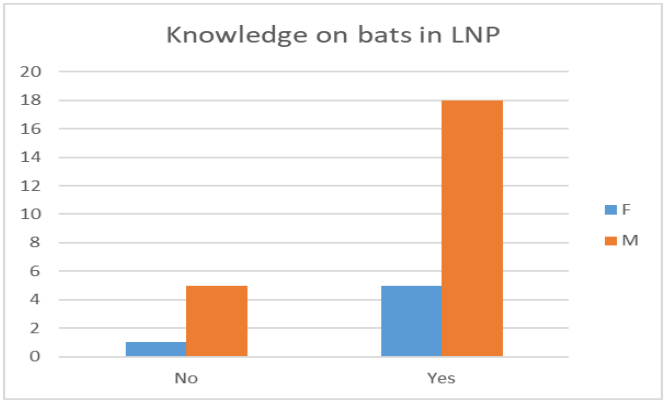
Each country can establish AICOMs and SICOMs to ensure the conservation of bats in its territory. RELCOM will recognize areas and sites as long as they meet one or more of the following criteria:

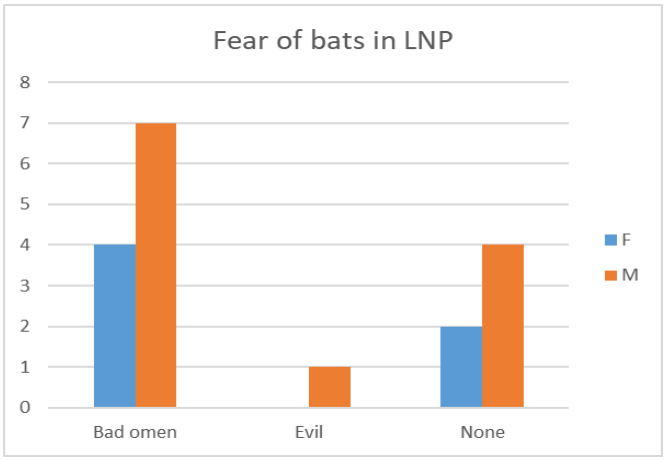
- ***Criterion 1*** . The area contains species of national or regional conservation concern.
- ***Criterion 2*** . Contains refuges used for one or more species of conservation concern.
- ***Criterion 3*** . The area contains a great richness of species, regardless of their level of threat.

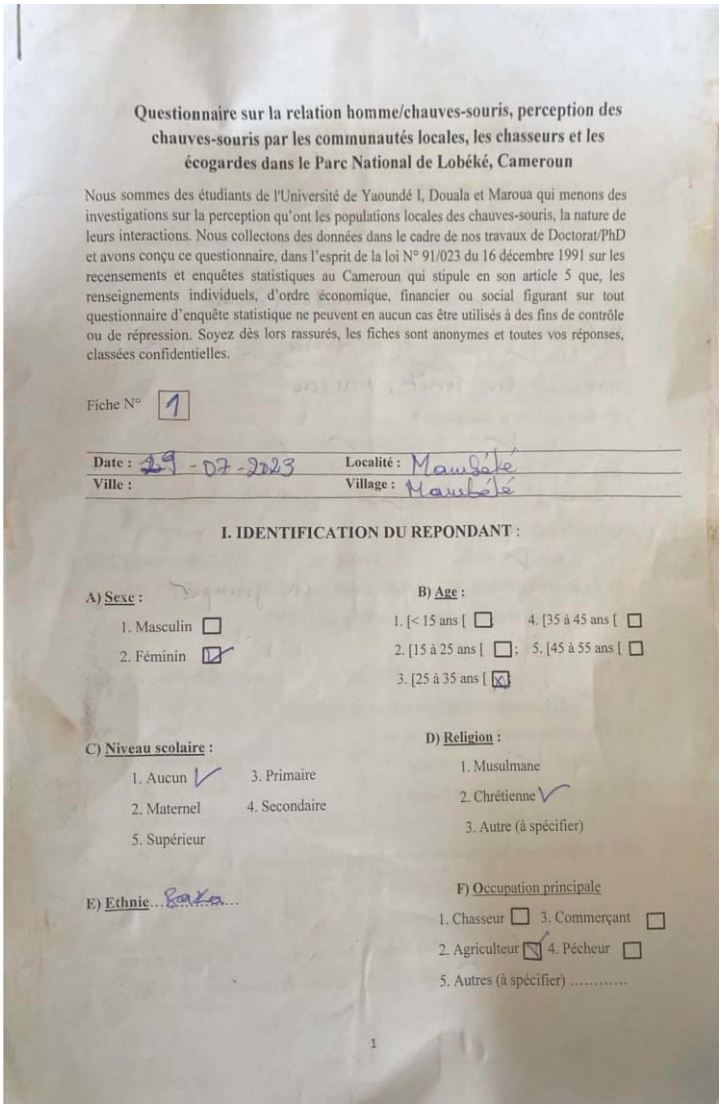
Fig. 9. Left: Summary of criteria for AICOMs and SICOMs – sourced from RELCOM (2022).

	ZICGC Outer Zone (Zone of Hunting Interest with Community Management)											FMU Buffer Zone (Forest Management Units)												Intact Forest (Core Zone)											
No of individuals/day	5	4	31	5	7	22	6	2	16	18	5	11	4	14	26	9	3	2	10	23	30	4	1	1	1	3	3	14	1	3	6	2	5	5	7	4
No of species/day	3	3	3	2	2	4	3	1	4	6	2	7	3	6	4	3	3	2	5	7	8	4	1	1	1	2	2	5	1	2	4	2	4	2	4	2
Total no of individuals	121											137												55												
Total no of species	13											20												12												
Total no of individuals of Pteropodids (% of total number of individuals of all bats caught)	89 (73.6%)											76 (55.5%)												9 (16.4%)											
Total no of individuals of Molossids (% of total number of individuals of all bats caught)	5 (4.1%)											30 (38.%)												0 (0.0%)											
Total no of individuals of Vespertilionids	5 (4.1%)											8 (10.1%)												6 (5.5%)											
Mean number of individuals/day	11.0											11.4												4.2											
Mean number of species/day	3.0											4.4												2.5											
Cumulative no of species	2	6	8	8	8	10	10	10	11	14	14	7	10	13	15	16	18	18	18	21	21	21	21	1	1	2	3	7	7	8	9	9	11	12	12	12
Cumulative no of individuals	5	9	40	45	52	74	80	82	98	116	121	11	15	29	55	64	67	69	79	102	132	136	137	1	2	5	8	22	23	26	32	34	39	44	51	55

Table 1. Summary of 313 individuals of 28 bat species collected from the three different zones of Lobéké National Park: left column: ZICGC Outer Zone (Zone of Hunting Interest with Community Management; middle column: FMU Buffer Zone (Forest Management Units) and right column: Intact Forest (Core Zone). Five of the 23 species of bat are illustrated (other species are available on request).







Questionnaire sur la relation homme/chauves-souris, perception des chauves-souris par les communautés locales, les chasseurs et les écogardes dans le Parc National de Lobéké, Cameroun

Nous sommes des étudiants de l'Université de Yaoundé I, Douala et Maroua qui menons des investigations sur la perception qu'ont les populations locales des chauves-souris, la nature de leurs interactions. Nous collectons des données dans le cadre de nos travaux de Doctorat/PhD et avons conçu ce questionnaire, dans l'esprit de la loi N° 91/023 du 16 décembre 1991 sur les recensements et enquêtes statistiques au Cameroun qui stipule en son article 5 que, les renseignements individuels, d'ordre économique, financier ou social figurant sur tout questionnaire d'enquête statistique ne peuvent en aucun cas être utilisés à des fins de contrôle ou de répression. Soyez dès lors rassurés, les fiches sont anonymes et toutes vos réponses, classées confidentielles.

Fiche N° 1

Date : 29-07-2023 Localité : Mambélé
Ville : Village : Mambélé

I. IDENTIFICATION DU REPONDANT :

A) Sexe :
1. Masculin ☐
2. Féminin ☑

B) Age :
1. [< 15 ans [☐ 4. [35 à 45 ans [☐
2. [15 à 25 ans [☐ 5. [45 à 55 ans [☐
3. [25 à 35 ans [☒

C) Niveau scolaire :
1. Aucun ✓ 3. Primaire
2. Maternel 4. Secondaire
5. Supérieur

D) Religion :
1. Musulmane
2. Chrétienne ✓
3. Autre (à spécifier)

E) Ethnie... Baka...

F) Occupation principale
1. Chasseur ☐ 3. Commerçant ☐
2. Agriculteur ☒ 4. Pêcheur ☐
5. Autres (à spécifier) .....

1

Fig. 10. Summary of local community attitudes to bats in LNP. Above left: number of individuals with a knowledge of bats (females/males separate); Above right: number of individuals with a fear of bats (females/males separate). First page of the questionnaire that was used to gather community attitudes to bats. More analysis is being undertaken. <<The two figures above also need labes in the x- and y-axis.>>

Fig. 11. Top left: In discussion with Senior Park Ranger. Top right: In the field with one of the female Park Rangers, Ghislaine Engoum; Above: discussions with Pilate Kiyoekoi (Park Ranger: Head of Sector of "Bolo platform " in the core area of the park) and Ghislaine Engoum (both in green) about different aspects of field work and conservation; Right: Igor (Park Ranger: In charge of Baka community) and Mr Simons (guide) assisted with setting up field equipment.

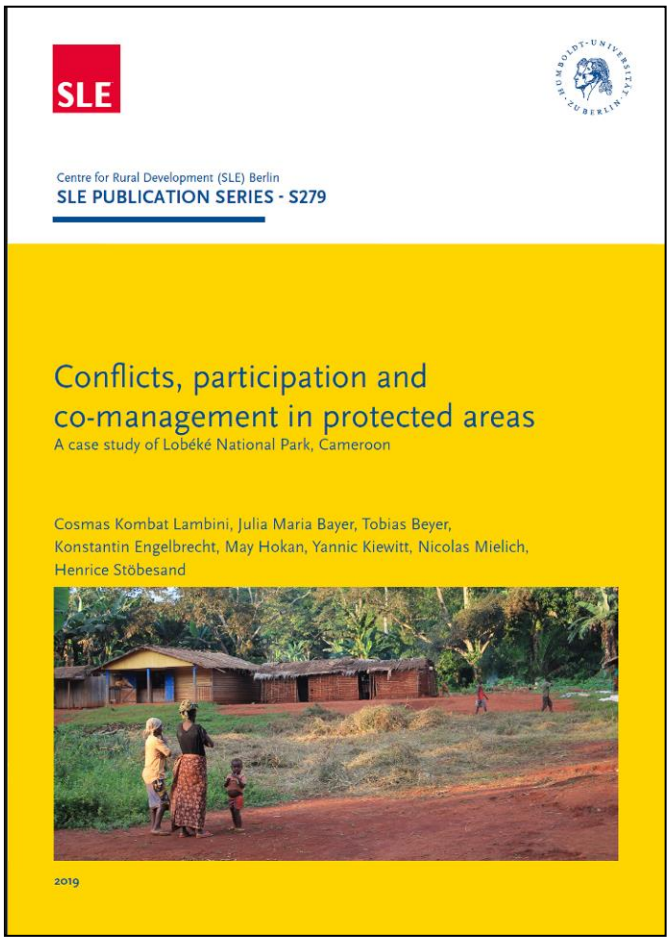


Fig. 12. Left: Report on the relationship between the local communities and Lobéké National Park.

Fig. 13. Above: Children of the local community were curious about the activities of the team. Left: The team interacted wherever possible with the local community, including buying food and hiring villagers to help with transporting equipment to the field.

The Rufford Foundation logo

Fig. 14. Presentation by team leader, Aicha Gomeh-Djame, on the Lobéké National Park bat project at the SCCS conference (Student Conference on Conservation Science) (March 2023) in Cambridge, UK.

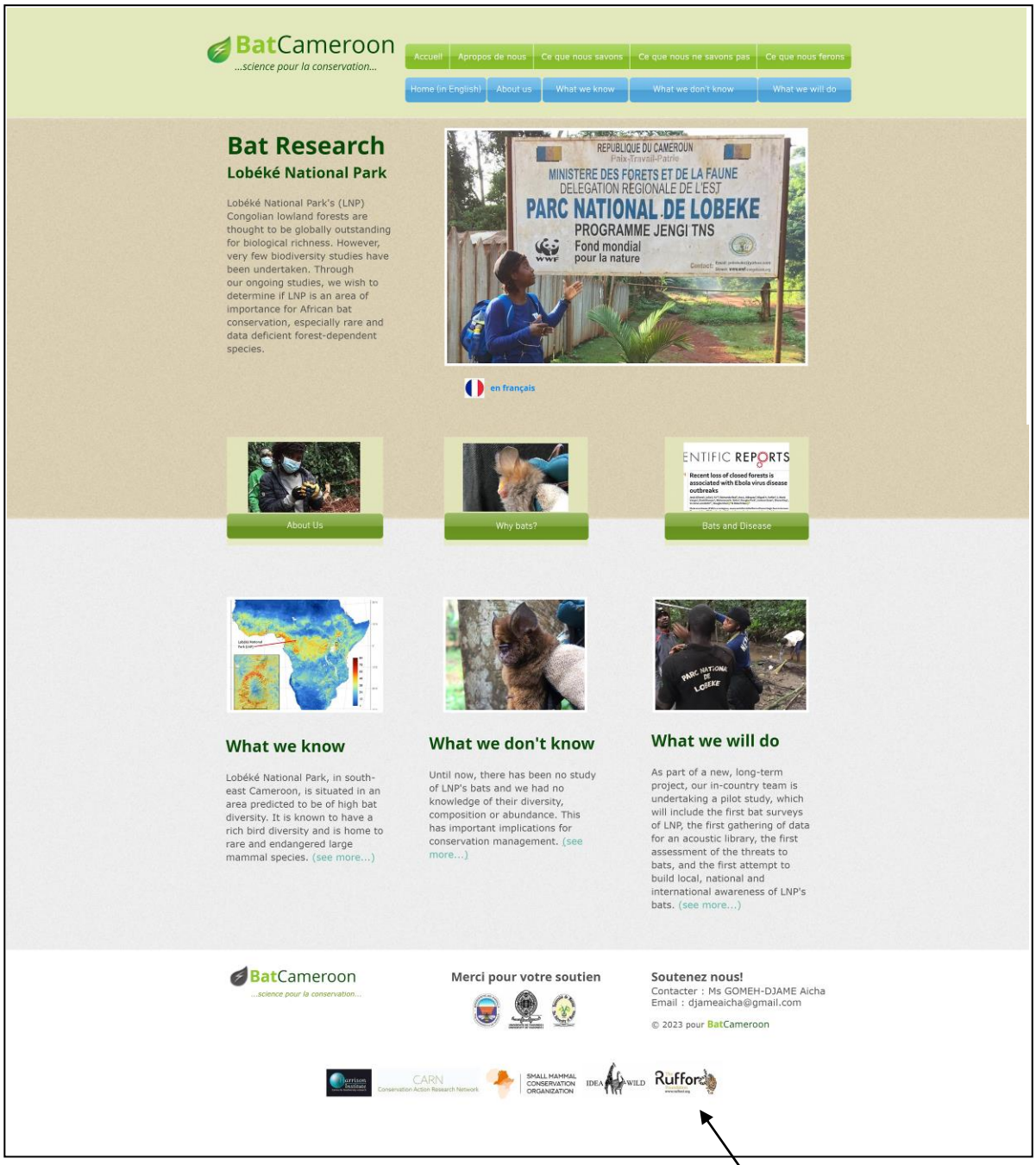


Fig. 15. The project website https://www.batcameroon-lnp.org/home is written in French and English. It includes the Rufford Foundation logo.