

The Rufford Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Your Details	
Full Name	Mahamat Sali
Project Title	New assessment of the biodiversity of avifauna from Adamawa Plateau, northern part of Cameroon: implication for conservation
Application ID	26031-1
Grant Amount	£4978
Email Address	sali_mahamat@yahoo.fr
Date of this Report	September 30 th , 2019

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
<p>To determine the density, abundance and distribution of the Adamawa plateau's avifauna</p>				<p>To achieve this project, three main sites were targeted (meadow, dry woodland and forest) and each site was surveyed each month on a 500 m² line transect. Thus, a total of 12 line transects were realised during 1-year period in Adamawa plateau.</p> <p>A total of 205 individuals were reported in our surveys: 186 captured individuals and 19 individuals with visual and auditive count methods. We identified a total of 61 bird species and the majority of these species had an estimated density ranging from 0 to 2 individuals/transect (see table1 below). Species such as <i>Pycnonotus barbatus</i> and <i>Turdus pelios</i> were more abundant with respectively 16.13% and 10.21% (see table1 below). The dominance of these two species indicates disturbance of the environment by agriculture and logging. Okosodo <i>et al.</i> (2016) reported a similar result for <i>Pycnonotus barbatus</i> from the secondary forest that provided the highest food source of 69.8% and Akinsola & Oluseye (2004) reported similar results that concern <i>Turdus pelios</i>. Our results show an important abundance of birds in dry woodland (58.06%) whereas forest habitats present high diversity with 35 encountered species (see table 1 below). This is verified by the value of Shannon index ($H' = 3.33$ and $H'_{max} = 3.55$) (see table 2 below).</p> <p>In the specific richness plan, we reported 12 species which are newly recorded in Adamawa plateau for example <i>Lagonosticta sanguinodorsalis</i> that was described as endemic species from Jos plateau in Nigeria by Payne</p>

			<p>(1998) and the morphological characters evoked concerning adult female corroborate our observations (see figure below). Those are:</p> <p>-The eye-ring is grey (20B2). the iris dark brown (8F4), the bill black with bluish grey (20B3) base to the lower mandible and the feet medium grey (20E1). The back and upper wing coverts are reddish brown (9E5), the crown and face are brownish grey (10E2) and the lores are greyish red (10C5). The rump and upper tail coverts are deep red (10GD8), the tail is black with red edges on the outer rectrices. The underparts from throat to breast and upper belly are greyish red (10C5), the flanks have fine white spots bordered by dark grey, the lower belly is deep red (10GD8) and the under-tail coverts are black. The wings are dark reddish brown (8E-F4) ...Payne (1998). But we will do a molecular analysis in the future to clarify this situation.</p> <p>Recently, in order to exactly confirm the range of this species (which described as endemic from Nigeria) in the forest areas along the Volcanic Line of Cameroon, we conducted 3 days of additional surveys in mounts Mbamboutos. During this additional survey, we reported two threatened and endemic bird species from the area: <i>Ploceus bannermani</i> and <i>Laniarius atroflavus</i>.</p> <p>Furthermore, from 19 observed individuals through visual method six species were identified including <i>Necrosyrtes monachus</i> which is critically endangered species in the Red List of IUCN. We have observed this critically endangered species at two times during the dry season in Banyo forest (Adamawa plateau).</p>
<p>To determine the distribution and preferred habitats of threatened birds of global conservation</p>			<p>After our observations on the field, the majority of bird species or threatened birds were more much present in undisturbed environments by human activities. Closed habitats or pocket</p>

<p>concern occurring in the area</p>			<p>forests, high altitude forest sites and semi-open habitats are the most frequented by these species.</p> <p>In our results different obtained values of Equitability Index showed an equal distribution of individuals within species in the forest environment ($J' = 0.94$) nearer to 1 than dry woodland ($J' = 0.83$) and meadow (0.87) (see table 2 below). Otherwise, it is documented that the distribution of many tropical bird species is closely related to a particular vegetation type (Louette, 1981) and more generally a correlation between food areas and birds is well established (Parsons <i>et al.</i>, 2006). It was important to apply some conservation measures to decrease threat in Adamawa plateau such as the sensitization of the local populations.</p>
<p>To identify threats on birds and associated habitat, and assess their effects on bird's community</p>			<p>In Adamawa plateau, we found on the ground that villagers uproot the vegetation either by cutting or setting fire to develop the cultivable space. The cultivated plants in this region belong to the families of Poaceae, Solanaceae, Convolvulaceae and to fight against insects they use the pesticides which impact the life of birds through their food. Some of them (villagers) use deadly poison for birds such as caffeine and theobromine mixed with seeds to bait them. Additionally, some people weave traps with wires and others directly target birds with homemade weapons such as slingshots.</p>
<p>To raise the level of awareness and knowledge of the local community on the importance of the Adamawa plateau forest and its associated exceptional biodiversity, by sensitizing at least 95% of the people</p>			<p>In all visited sites in the Adamawa plateau during our field works, several action plans were undertaken such as raising awareness, community workshops to explain the importance of the forest and its associated biodiversity.</p> <p>In the field and during the workshop sessions, we suggested to the famers, villagers, students of different localities from Adamawa plateau to reduce the use of the pesticides, to limit the</p>

<p>living around the site through ongoing sensitization, Community workshops and school lecturers</p>			<p>poisoning as well as direct attack with slingshots of bird species.</p> <p>In Adamawa region, population listens more to their traditional Chiefs and for that, we also have spent some times to explain them the negative effects of these toxic products and the use of any dangerous material to the birds and other animals; and during our workshop sessions these leaders also intervened to convince the population. We also attracted attention of the community that the preservation of biodiversity in general especially birds is a major asset for this region because it can attract the attention of public authorities to develop tourist sites that will give jobs to the young people in villages.</p> <p>Then we have contributed to increase knowledge of the local populations on threatened and endemic bird species through photographed images.</p> <p>Additionally, we also have explained them morphologically these birds as well as the importance to apply a global conservation. we have contributed to raise the knowledge of local people on ecological importance of the birds for example insectivorous birds contribute to the fight against pest infestation in the ground (Ndang'ang'a <i>et al.</i>, 2013). In health terms, Vultures play a very important role; they quickly pick carcasses before disease-causing spores settle, helping to combat outbreaks of disease such as rabies, botulism and tuberculosis (Ogada <i>et al.</i>, 2012).</p> <p>However, we think that this purpose must be extended in other regions of Cameroon to attempt the absolute majority of the different local communities, traditional and administrative authorities.</p>
---	--	--	--

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

The main difficulty encountered on the ground was weather during the rainy season. In fact, when the rain found us in full sampling with my field assistants, the catch success was almost zero because birds would be hidden in their nests. To solve this problem, we sometimes have extended the initial sampling time by 2 to 3 more days to maximise the birds capture.

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

- The forest environment with 35 reported species is more stable and diversify ($H' = 3.33$; $H'_{max} = 3.55$) than meadow and dry woodland habitats. In addition to previous works in the Adamawa plateau (Good, 1953; Louette, 1981; Fotso *et al.*, 2001), we have also added at the list of birds in this region with 12 newly recorded species. Those are: *Lagonosticta sanguinodorsalis* (Estrildidae), *Ploceus intermedius* (Ploceidae), *Cyanomitra obscura* (Nectariniidae), *Ficedula hypoleuca* and *Melaenornis pallidus* (Muscicapidae), *Batis orientalis* (Platysteiridae), *Laniarius aethiopicus* and *Laniarius leucorhynchus* (Malaconotidae), *Macrosphenus concolor* (Macrosphenidae), *Smithornis capensis* (Eurylaimidae), *Streptopelia capicola* (Columbidae) and *Dendropicos goertae* (Picidae)
- Captured birds are equitably distributed within species in the forest environment ($J = 0.94$ more near to 1 than $J = 0.83$; $J = 0.87$ respectively in dry woodland and meadow). This equal distribution could be explained by the luxuriant vegetation which provides a food abundance thus limiting interspecific competition in the environment. While highly disturbed habitats are characterised by low specific richness (three species in meadow and 31 species in dry woodland habitats) and high abundance of indicator species such as *Pycnonotus barbatus* (16.13%) and *Turdus pelios* (10.21%).
- *Necrosyrtes monachus* only critically endangered species observed in Banyo forest (06°37.892' N, 011°57.319' E) during the 12 months of sampling is now sheltered from such pressures from human activities. It is interesting to note that my local field guides are now trained on the different bird sampling techniques used specially capture-mark-recapture technique with Japanese mist nets and how to collect routine data on behalf of conservation action plans. We also recently captured two endemic and threatened bird species (*Ploceus bannermani* and *Laniarius atroflavus*) from mounts Mbamboutos which are the continuation of the Volcanic Line of Cameroon in the west part.

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

In all visited villages in Adamawa plateau, local people were interested to this project focusing on conservation of biodiversity and ecosystems.

The Chiefs of the villages helped us in mobilising families involved actively in agriculture as well as those which cutting the forest to firewood. From that, we were able to target our activities more accurately since we discussed a lot with the people near to the Banyo forest where *Necrosyrtes monachus* was observed. These people have been helped to understand the urgency and necessity of maintaining a healthy ecosystem and of saving an endangered species from extinction. Additional, traditional chiefs and our local assistants also participated during our workshop sessions using the local language to convince populations concerning the health of ecosystems.

Our field guides were very active in showing us the different bird nesting sites as well as in collecting data and to educate local people using local languages. Actually, those local field guides are already now trained on the different bird sampling techniques used specially capture-mark-recapture technique with Japanese mist nets and visual method.

Shepherds and famers gave us the information that (*Necrosyrtes monachus*) most often nests in the Banyo forest during the dry season. This led us to explain them the usefulness of protecting this critical endangered species by limiting direct attacks, dispersal of poisons in forest and cutting forests. We also told them that the presence of this endangered species in their locality could be an important lever of development through the tourism.

In the field small gifts such as foods and drinks were given to the Chiefs, famers, shepherds which helped us to collect data and raise awareness.

Local communities from Adamawa plateau can benefit in the long-term from the influx of tourists and scientists from other universities of Cameroon which will need their service as guides for the wildlife research that is found there. In addition, the local markets and local houses in Adamawa plateau will benefit from the increased flow of foreign customers and this will contribute to the development their locality.

5. Are there any plans to continue this work?

Since, I reported that both endemic and threatened species are under anthropogenic pressures. So, the next and urgent plan will be to settle a conservation action plan in Mt. Mbamboutos, in order to protect and safe from extinction the two endemic and threatened bird species reported from this area. Given to the fact that Mt. Mbamboutos is a conservation priority, I think that work on half of conservation action from there will certainly have a great benefit to the whole ecosystem, as other endangered animal and plants are found there.

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

One part of our results based on the specific richness, abundances and distribution was presented in our Institution, University of Yaounde 1 as part of scientific seminar. In this moment, one paper is being prepared for publication in an international peer-reviewed journal focusing on "Bird diversity of the forest-savannah transition zone (Adamawa plateau, Cameroon): ecology and conservation".

Ecological data of some birds and conservation actions conducted in Adamawa plateau will also be presented at the University of Maroua as part of the 26th annual scientific conference on the theme “Innovative Bioscience, climate change and food security” in November 26th - 30th, 2019. In addition, all these results will be presented at some Cameroonian ministries such as Ministry of the Scientific Research and Innovation, Ministry of Wildlife and Forestry and the Ministry of Tourism. These results can also be presented in international forums for the conservation of the biodiversity and ecosystem.

I will also suggest to the Cameroonian Government through discussion sessions with the Ministry of Wildlife and Forestry and the Ministry of Tourism, to develop a protected ecological reserve in the Adamawa plateau specially in the Banyo area.

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

This project funded by the Rufford Foundation was defined over the 12-month period from October 2018 to September 2019.

Several monthly study sessions were conducted (12 days per month) in many localities from Adamawa plateau and three additional days were carried out in mounts Mbamboutos where endemic and threatened bird species were captured and identified.

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
Workshops session for sensitization	1000	950	-50	During our various workshop sessions in Adamawa plateau some traditional Chiefs lodged us free of charge in their residence.
Subsistence for me and my two field guides during the fieldwork	985	985		The cost is as initially budgeted
GPS to use to take geographic data in the field	163	150	-13	The cost of the GPS was lower than initially budgeted
Digital camera to	140	120	-20	The cost of the digital camera

photograph species and their habitat in the field				was lower than initially budgeted
Motivation for two guide fields	1 58	1958		The cost is as initially budgeted
Rounding travel from Yaounde to Adamawa plateau	732	680	-52	In some months, the travel ticket by Bus from Yaounde to Adamawa region sometimes cost less than initially budgeted in the project.
Unforeseen expenses (3 days additional surveys in mounts Mbamboutos)		135	+135	The discovery in Adamawa plateau forest of <i>Lagonosticta sanguinodorsalis</i> , described by Payne (1998) as endemic species from Nigeria has led us to question whether if this species is actually present in Cameroonian forests? For that, it was very important to undertake similar surveys to clarify this endemism situation in other eco-zones of tropical forests located along the Volcanic Line of Cameroun for example mounts Mbamboutos where endemic and threatened bird species were captured.
Totals	4978	4978		

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

As said earlier, I think the important next steps is to extend this conservation project along the Volcanic Line of Cameroon specially in Mbamboutos mounts where we already identified endemic and threatened bird species. Furthermore, we will also wish more to implement our conservation actions in other regions from Cameroon at the benefits of health of the ecosystem and biodiversity.

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, I still advertise the Rufford Foundation through its logo in all carried out reports as well through the logo and oral presentation in the acknowledgement parts of my all scientific seminars at University of Yaounde 1. I have also used the Rufford Foundation logo in my PhD thesis document.

I will also advertise the Rufford Foundation in my future publications and in international or national conferences such as the 26th annual scientific conference

on the theme “Innovative Bioscience, climate change and food security” in November 26th - 30th, 2019 at the University of Maroua.

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

My supervisor **Dr. Nguembock** (University of Yaounde 1) helped me through the identification document of birds in the field “A guide to the Birds of Western Africa (Demey & Borrow, 2001)”. His advices helped me to improve the sampling methods in the field and how to approach the local populations. I also list **Dr. Mvogo Ndongo P. A** for his advices and his experiences in the conservation domain of the Cameroonian ecosystem which helped me to convince the local people to reduce all dangerous activities mentioned above.

Similarly, **Pr. Sophie CALME** (University of Sherbrooke, Canada) and **Pr. Christiane DENYS** (National Museum of Natural History, Paris-France) both contributed with constructive advices which helped me to develop a survey strategy among villagers that allowed me to target the areas most effected by human activities to apply our conservation action plans.

I do not forget my **field local guides** who helped me throughout the year to collect data and also to raise awareness specially through the local language in the field and during our workshop sessions. Additionally, the **Chiefs of villages** also facilitated the sensitization of local populations through their interventions for example during our workshop sessions.

12. Any other comments?

This project helped to identify practically all threats to the ecosystem and associated biodiversity in the Adamawa plateau. From that, conservation actions have been applied and the local people are now involved and aware of the importance of protecting forests and biodiversity.

Additionally, this project also helped me to establish important links with traditional and administrative authorities of the Adamawa plateau and to get more experience concerning educational activities.

Furthermore, collected data during the project implementation are very important for me because they are used to complete my PhD thesis at the University of Yaounde 1 here.

Table 1. Indexes of diversity

Indexes	Habitats		
	Meadow	Dry woodland	Forest
Individuals	07	108	71
Taxa (S)	3	31	35
Shannon (H')	0.95	2.86	3.33
<i>ln</i> (S)	1.09	3.43	3.55
Equitability (J)	0.87	0.83	0.94



Photo of *Lagonosticta sanguinodorsalis* (Estrildidae family) captured in Adamawa plateau by Mahamat Sali (2019).

Table 2: abundances of bird species captured in Adamawa plateau

Taxonomic levels			Individuals number captured per site				Relative abundance per species (%)
Orders	Families	Species	Meadow	Dry woodland	Forest	Total	
Passerines	Estrildidae	<i>Amandava subflava</i>	1	0	0	1	0.52
		<i>Eushistospiza dybowskii</i>	0	0	1	1	0.52
		<i>Estrilda nonnula</i>	0	1	0	1	0.52
		<i>Lagonosticta sanguinodorsalis</i>	0	0	1	1	0.52
		<i>Pytilia hypogrammica</i>	0	0	1	1	0.52
	Ploceidae	<i>Euplectes macrourus</i>	2	0	0	2	1.07
		<i>Euplectes gierowii</i>	0	2	0	2	1.07
		<i>Euplectes hordeaceus</i>	0	1	0	1	0.52
		<i>Ploceus</i> sp.	0	6	0	6	3.22
		<i>Ploceus nigricollis</i>	0	1	0	1	0.52
		<i>Ploceus intermedius</i>	0	1	0	1	0.52
		<i>Ploceus cucullatus</i>	0	2	0	2	1.07
	Nectariniidae	<i>Cinnyris chloropygius</i>	0	0	2	2	1.07
		<i>Cinnyris</i> sp.	0	1	0	1	0.52
		<i>Cinnyris venustus</i>	0	1	0	1	0.52
		<i>Cyanomitra obscura</i>	0	0	1	1	0.52
	Pycnonotidae	<i>Eurillas virens</i>	0	0	2	2	1.07
		<i>Chlorocichla</i> sp.	0	1	0	1	0.52
		<i>Atimastillas flavicollis</i>	0	2	1	3	1.61
		<i>Pycnonotus barbatus</i>	4	24	2	30	16.13
		<i>Pyrrhurus scandens</i>	0	0	1	1	0.52
	Muscicapidae	<i>Cossypha niveicapilla</i>	0	3	6	9	4.84
		<i>Cossypha albicapilla</i>	0	0	3	3	1.61
<i>Ficedula hypoleuca</i>		0	2	2	4	2.15	

		<i>Melaenornis pallidus</i>	0	1	0	1	0.52
		<i>Muscicapa aquatica</i>	0	0	1	1	0.52
Leiothrichidae		<i>Turdoides plebejus</i>	0	3	0	3	1.61
		<i>Turdoides reinwardtii</i>	0	2	3	5	2.69
Zosteropidae		<i>Zosterops senegalensis</i>	0	1	0	1	0.52
Motacillidae		<i>Anthus sp.</i>	0	1	0	1	0.52
		<i>Anthus cervinus</i>	0	1	0	1	0.52
Turdidae		<i>Turdus pelios</i>	0	14	5	19	10.21
Platysteiridae		<i>Batis orientalis</i>	0	6	0	6	3.22
Monarchidae		<i>Terpsiphone viridis</i>	0	0	2	2	1.07
Malaconotidae		<i>Laniarius aethiopicus</i>	0	5	0	5	2.69
		<i>Laniarius leucorhynchus</i>	0	0	2	2	1.07
		<i>Laniarius poensis</i>	0	0	1	1	0.52
		<i>Tchagra senegala</i>	0	2	0	2	1.07
Indicatoridae		<i>Indicator minor</i>	0	0	2	2	1.07
Macrosphenidae		<i>Macrosphenus concolor</i>	0	0	2	2	1.07
		<i>Sylvetta brachyura</i>	0	0	1	1	0.52
Eurylaimidae		<i>Smithornis capensis</i>	0	0	2	2	1.07
Sturnidae		<i>Cinnyricinclus leucogaster</i>	0	0	1	1	0.52
Oriolidae		<i>Oriolus auratus</i>	0	0	1	1	0.52
Fringillidae		<i>Crithagra mozambica</i>	0	0	1	1	0.52
Capephagidae		<i>Coracina pectoralis</i>	0	0	1	1	0.52
Non- passerines	Alcedinidae	<i>Ceyx pictus</i>	0	0	6	6	3.22
		<i>Halcyon malimbica</i>	0	0	2	2	1.07
	Coliidae	<i>Colius striatus</i>	0	8	0	8	4.30
	Meropidae	<i>Merops bulocki</i>	0	0	1	1	0.52
	Picidae	<i>Dendropicos goertae</i>	0	1	0	1	0.52
		<i>Streptopelia capicola</i>	0	1	0	1	0.52
	<i>Streptopelia semitorquata</i>	0	0	1	1	0.52	

Columbidae	<i>Turtur afer</i>	0	8	4	12	6.45
	<i>Turtur tympanistria</i>	0	0	6	6	3.22
Lybiidae	<i>Lybius dubius</i>	0	1	0	1	0.52
	<i>Pogoniulus chrysoconus</i>	0	4	0	4	2.15
	<i>Pogoniulus bilineatus</i>	0	0	1	1	0.52
Psittacidae	<i>Agapornis sp.</i>	0	1	0	1	0.52
Accipitridae	<i>Accipiter badius</i>	0	0	1	1	0.52
Falconidae	<i>Falco vespertinus</i>	0	0	1	1	0.52
Total individuals		7	108	71	186	100
Relative abundance per habitat (%)		3.76	58.06	38.17	100	



Left: *Coracina pectoralis* (Campephagidae). Right: *Smithornis capensis* (Eurylaimidae).



Left: *Cyanomitra obscura* (Nectariniidae). Right: *Laniarius leucorhynchus* (Malaconotidae).



Left: *Dendropicos goertae* (Picidae). Right: Agricultural land through shifting cultivation in the forest.