

Final Evaluation Report

Your Details						
Full Name	Mohamed Thani Ibouroi					
Project Title	Patterns of diversity, distribution and conservation status of some highly threatened bird's species in a fragmented landscape: the case of the Comoros Island's					
Application ID	26731-2					
Grant Amount	£4,990					
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Date of this Report	March 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
Assessing the diversity (presence, density, distribution, genetic diversity) of the Comoros birds in the three islands of Comoros (Anjouan, Mohéli and Grande Comoro)				
Assessing the first ecological study, population sizes, total distribution area of some threatened birds' species of these islands (Otus pauliani, Humblotia flavirostris, Otus moheliensis, Columba polleni and Humblotia flavirostris)				
Dispense throughout different courses about the ecological data collection (Species distribution, population densities, Capture-mark recapture methods etc.) and many statistical training (Species Distribution Modelling, Distance Sampling methods, GIS tools etc.) to Master students				
Dispense some field training on some locale guides, in order to develop local conservation and population monitoring skills (i.e., capacity building).				
Enhance public awareness about the importance of biodiversity and natural forests.				

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

Our fieldwork has been conducted on the three islands of Comoros. On Grande Comoros and Moheli, fieldwork was easy with more accessible forests. Data collection in these two islands was thus easy. In the contrast, data collection on Anjouan Island was difficult because of remote regions and highly inaccessible areas. Some locations were more difficult to reach than we expected, and some field constraints significantly differed from our expectations.

The transportation between islands within the Comoros archipelagos is generally done using small, motorised canoes which are locally called KWASSA KWASSA. It has often happened to us that the canoe breaks down and gets filled with water, which damaged our electronic equipment. For this reason, field data were saved using different ways including USB flash drives, hard drive, smartphone etc. and plastic bag was used for field material protection.



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

The first outcomes of this project relate to the educational and training aspect: Basic guiding, scientific field work, and basic conservation training have been provided to our local guides from all localities as well as a complete training for our Comorian master's students (Anziza Ali Hassane, Mohamed Nassabia). The training courses included population density estimate models, lemur presence and absence data collection, basic computing knowledge such as excel etc., computation of density estimates, species distribution modelling, basic statistics using the freely available R statistical language and Geographical Information System (GIS) tools. These courses were conducted by me (software programmes, statistical methods, GIS tools, socio-economic data collection and analysis using the Qsort approach) and allowed the master's students to carry out and improve their data analyses and master thesis writing.

The second outcomes of this project are the evaluation of bird's population density and distribution but also the effect of ecological and anthropogenic factors on the habitat selection by the species. These results are useful for assessing management plans for the long-term conservation of this species and local biodiversity. Results of this part are already published in international journal (see Ibouroi et al. 2019, Journal of Ornithology).

In addition, we conducted semi-structured interviews with Comorians and a Qmethodology approach in order to better understand the relationships between humans and nature in these islands. Specifically, we assessed: (1) how stakeholders perceive benefits from natural resources, (2) how their practices impact biodiversity, and (3) their knowledge about, perceptions of and attitudes toward biodiversity and conservation actions. As social factors such as the level of formal education, employment and geographic location can affect knowledge and determine attitudes, we assessed what factors were related to positive or negative perception of forests and biodiversity conservation. This information may help: (1) to understand the local community representation of biodiversity, (2) to interpret the current and on-going changes to the natural habitat, and (3) to predict future changes, with the objective of proposing relevant long-term conservation actions and habitat management strategies. An international publication is currently under revision in the review "Global Ecology and Conservation".

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 benefitted from the project.

Two to three local guides and one to two master students were involved in this study for each locality. They benefitted from courses in which we provided basic and theoretical training on lemurs and flying fox population monitoring, population density estimates models, basic computing knowledge, ecological niche modelling. Some new methods and techniques of ecological agriculture have been proved in the collaboration with the GIDD NGO during these training. All the training was open for everyone in the village that will allow local populations to improve their



agricultural production. During the training, we focused on young students from each locality who can easily understand both the ecological and agricultural methods. At the same time, we tried to favour exchange with local people to better understand how they view their environment. We are continuously providing exchange with local community to in order to enhance their agricultural technics but also to enhance their awareness about the importance of biodiversity and natural forests

6. Are there any plans to continue this work?

In the Comoros, a project of natural habitat conservation (Comoros National Parks or Parcs Nationaux des Comores-PNC) is currently signing agreements with the Ministry of Forest-Comoros to create a national system of protected areas on the Union of Comoros. The objective is to ensure the long-term biodiversity conservation of natural forests. This project includes three Comoros rain forests in the network with protected area status of national parks (the Karthala National Park in Grande Comoro, the National Park of Mont Ntringui in Anjouan and the National Park of Moheli in the Mohéli Island). On Grande Comoro and Moheli, protected areas cover almost all rain forests and all potential habitats for biodiversity that can ensure the protection of fauna and flora within these areas. On Anjouan where areas are subjected to strong anthropogenic pressures with the highest rate of habitat loss comparing to the two other islands (Ibouroi et al. 2018), a large part of the rain forests of the island is not included in the protected area and many highly threatened species including those classified as critically endangered or endangered occur ousted protection. For instance, five of the principal roosts of the Livingstone's flying fox (the world's most endangered fruit bat) are outside protected areas and that increases its vulnerability to extinction. Because of the fact that the creation of protected areas in the Comoros is not yet effective (agreement in progress) but also the fast-growing population on Anjouan inducing a higher rate of habitat loss, it is necessary to include all potential habitats for Anjouan biodiversity in the protected area network to ensure their long terms protection.

We are very interested to continue to explore the biodiversity of Anjouan because the island has been very poorly studied and natural habitats of the island are raidly being lost. We will thus continue conservation programmes on this island. The main goal is to propose the extension of the Mont Ntringui National Park on Anjouan by including a 60 km² of the Anjouan rain forests in the protected areas system.

To do so, we propose to:

- Inventory and study the diversity (presence, distribution) of biodiversity including birds, reptiles, and mammals in the area which will be include in the Mont Ntringui Protected Area (Anjouan).
- Assess the population size and dynamic of some highly threatened species for instance the Livingstone's flying fox (*Pteropus livingstonii*), the Anjouan scops owl (*Otus capnodes*), the Mongoz lemur (*Eulemur mongoz*), etc. in the new area to protect.



- Categorise all species according to their conservation status following to the IUCN Red List criteria in order to classify and statute the new area to protect within the whole protected area.
- Investigate legal processes for potentially designating the site as a nationally recognised protected area.
- Define and delimit the area to extend with the respect to the previous protected area.

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

A large part of this project was published through a master's thesis submitted of my former student (Ali Hassani Anziza) and defended in the "Ecole Pratique des Hautes Etudes" in France. This final master's report is a part of the knowledge sharing. Moreover, to offer the findings of the study to a larger audience, international articles are already published in the Journal of Ornithology (see reference, Ibouroi, M.T., Ali-Hassane, et al., 2019. The first comprehensive survey of habitat suitability and population size for the endangered Grande Comoro Scops Owl (Otus pauliani): implications for its conservation. Journal of Ornithology. 160:1121-1132. https://doi.org/10.1007/s10336-019-01689-0) or (Ibouroi et al. 2020, Non-invasive genetic sampling for flying foxes: a valuable method for monitoring demographic parameters. Ecosphere 00(00): e03327.10.1002/ecs2.3327).

Other papers are currently under revision (Ibouroi et al. Global Ecology and Conservation international Journal).

Moreover, information of project activities are communicated to some acquainted people through informal discussions. Personal communication was thus a mode of sharing of the final results. Pictures of the study (mostly taken in the field) are also shared on the Facebook page of the team.

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

The RSG was used from February 2019 to February 2021.

9. 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
Master student (x4 x 50 £ per month x 4 months)	500		+500	This cost was provided by the CNRS institution, France



Local guides (2x 110 \pounds	1320	1760	-440	Higher costs than expected
per month x 8 months)				
Cook (1x110x8 months)	1320	1760	-440	Higher costs than expected
Food 6 month (6 persons)	2300	2300		
Research permits and	150	150		
other costs				
TOTAL	4990	5970	-980	Additional financial have
				been proved by the lab of
				Aurélien Besnard (CEFE CNRS)

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

In the next steps of the project, I would like to use the combination of different methods and experiences I acquired from this project (line and point transect distance sampling, GIS tools, socio-economic approaches and species distribution modelling) with other methods such as multivariate analysis, population dynamic modelling to establish conservation strategies such as the creation of a new protected area or the extension of the Mont Ntringui National Park on Anjouan.

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?

The Rufford Foundation support is acknowledged in one scientific paper (Ibouroi et al 2019, Journal of Ornithology), (Ibouroi et al. 2020, Ecosphere) and in (Ibouroi et al. Tropical Conservation Science) but also in the master's thesis of my former student Anziza Ali Hassani in Montpellier, France.

The RF logo has been used during the national conference in the Comoros and other communications in the Comoros media. I plan to participate in international conference during which The RF logo will be acknowledged.

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

Project Leader: Said Ali Ousseni DHURHAM

Dhurham Said Ousseni is a student of the Primatology Master from Mahajanga University. He has been working with lemur species from north-western and northern regions of Madagascar since 2011, and he is now finishing his Master thesis on "The density, distribution and diversity of Northern sportive lemurs", a scientific work entirely performed during the RSG project (Field work, courses, data analysis, Thesis writing, etc.). Since 2014, he continuously worked in the Comoros Islands with the Ibouroi Mohamed Thani team as research assistant aiming at assessing relevant conservation action for Comoros biodiversity.

Mohamed Thani Ibouroi

Dr. Mohamed Thani Ibouroi is a research assistant and post PhD in the French prestigious research agency (CNRS) and the Center of functional and evolutionary



ecology, Montpellier, France. For the five last years, he continuously worked in the conservation of endangered species including flying fox and lemur species in the Comoros islands. His group in Comoros has worked and published research on several flying fox species, Pteropus livingstonii, P. seychellensis comorensis, (Ibouroi 2017, Ibouroi et al. 2017, 2018, 2020, Ibouroi et al. in press).

Rabarivola Joseph Clement

Pr. Rabarivola Joseph Clement is professor in the Mahajanga university, ''Department de Biologie Animale et Ecologie'' ''Option: Ecologie des Primates''. He is one of the best specialists on primatology in Madagascar working on population genetic and primate ecology in the context of conservation biology.

Ali Hassane Anziza

Anziza is a Master student from the University of Antananarivo (Madagascar). Until now she has been working extensively on the Comorian biodiversity including bat and lemur species with our team. She plans to submit a RSG on the endemic bat species.

Mouniati Ombade

Mouniati Ombade is our most recent Master student. His project will focus on the Comoros terrestrial fauna including birds and will assess the inventory and distribution of the endemic avifauna of Comoros and their implication for conservation.

13. Any other comments?