The Rufford Small Grants Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants 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

Grant Recipient Details	
Your name	Eaton Mitchell
Project title	Long-Term Monitoring and Management of Wildlife Resources in the Lac Tele Community Reserve (LTCR), Republic of Congo: fisheries, bushmeat and crocodiles.
RSG reference	79.09.08
Reporting period	April 2009 – May 2010
Amount of grant	£6000
Your email address	eaton.mitch@gmail.com
Date of this report	December 2010

1. Please 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
Understand seasonal patterns in volume and composition of fish and wildlife harvested in villages of the LTCR		X		Understanding patterns in the human use of fish and terrestrial wildlife resources in the protected area is needed to understand potential species or areas that may be over-exploited in the near future. Such information can help managers identify areas, temporal periods or particular taxa for future conservation activities such as development of alternative protein sources, seasonal harvest limits or implementation of no-hunting zones. Characterization and monitoring of the harvest of terrestrial wildlife, crocodiles and fish in the LTCR.
Estimate the biomass of fish and wildlife harvested across the Reserve, using stratified sampling by season, habitat and year.		X		Although budget and logistical limitations prevented a greater level of sampling, both spatially and temporally, we now have nearly 2 years of harvest sampling from five villages in the LTCR, providing an initial estimate of the overall harvest, consumption and export of wildlife products. These data will now be available as baseline figures with which to monitor long-term harvest trends.
Monitor and estimate the relative volume of fish and wildlife consumed locally within the LTCR (subsistence) and transported outside the protected area (export, commercialised).		X		An attempt was made to collect information on the origin and intended destination of wildlife resources harvested within the LTCR. This, in addition to monitoring markets outside the reserve and along the principle transportation axis connecting the LTCR to the regional capital, we were able to begin quantifying the economic impact of resource extraction relative to local consumption. This information will provide guidance on acceptable subsistence harvest levels required to meet protein requirements for Reserve inhabitants and may be useful for future consideration of setting harvest limits, should this be determined to be an

				appropriate management alternative.

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

The greatest difficulty we faced in attempting to monitor the harvesting of natural resources in a large swamp-forest reserve was gaining access to a representative sample of the population and habitats of the LTCR. In order to make accurate inferences on harvest results and trends, an appropriate sampling protocol was required for the monitoring project. Conditions in the Reserve are such that a random sampling of harvest-days from a large number of villages distributed throughout the reserve was infeasible given staff and other resources available. These difficulties were largely anticipated prior to the start of this project, leading to the sampling protocol we adopted. Over the course of the granting period, however, we became more efficient in the coordination and transportation of Reserve personnel and attempted to make use of trained village assistants as much as possible.

One unforeseen difficulty encountered was communications between the grantee and the LTCR team. A large amount of data has been collected and entered into a database over the course of the 2-year monitoring programme, resulting in difficulties of transmitting raw information and analyses via electronic networks. Relying on postal services to send data discs has slowed progress on sharing these data and the results of this research. Between periods where we have sent raw data files, we compensated by sharing research summaries, analyses and narrative updates. Wireless communication infrastructure is slowly modernising in northern Congo and we anticipate an increase in the ability to exchange large data files in the future.

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

The three most important outcomes of our project are related to the characterisation of the use of natural resources over time and space by the human population living within the protected area. The mandate of the Lac Tele Community Reserve is to manage and protect wildlife while enabling a natural resource-based livelihood for village residents. To meet these dual objectives and implement best management practices, Reserve managers must have an understanding of (1) the abundance and composition of harvested wildlife, (2) the spatial distribution and seasonality of wildlife use and (3) the ecological drivers that may lead to changes in resource use behaviour (e.g., resource switching between terrestrial wildlife and fish use). An additional critical outcome of this project is the participation by local villagers in the monitoring of harvest activities (see #4 below). Ensuring the success of the LTCR requires the engagement of the local population and their acceptance of management activities and practices. In addition to contributing to the local cash economy through the employment of trained village assistants, we believe that the active participation of villagers in monitoring and other research programs provides an immediate return to the success of the LTCR program.

1) Harvested Wildlife Species Abundance and Composition

During the survey period covered by this report (April 2009 - April 2010), a total of 188 village survey-days recorded an estimated 16,613 kg of non-fish bushmeat harvested in the 5 LTCR villages and in 3 markets located in the provincial capital, Impfondo. The average daily quantity of wildlife recorded per village was 102.7 kg (SD = 195.4), and ranged from 32 kg/day in the village of Dzeke

(population 1,595; 2002 census) to an average of 343 kg/day totaled across Impfondo's larger markets.

The African dwarf crocodile was the most common individual species observed in the harvest, by count and weight (579 individuals, 25% of total harvest biomass). Bush pigs (*Potamochoerus porcus*) were less common (*n* = 316) but, because of their size, made up a close 24% of the harvest by weight. As a group, the 8 primate species found in the Reserve contributed a total of 1,936 kg (10%) to the harvest, with the grey-cheeked mangabey (*Lophocebus albigena*) being the most common primate observed (*n* = 100). Duikers (genus *Cephalophus*) and the sitatunga (*Tragelaphus spekii*) together made up 17.1% of harvested wildlife biomass with the blue duiker (*C.monticola*) and Peter's duiker contributing 3.2% and 3.9% to the total, respectively. Turtles and tortoises comprised 3.1% of the harvest volume total. By continuing the collection of harvest data over the long-term, we intend to assess temporal trends in harvest returns by species and settlement area. Until then, we are unable to interpret whether these results suggest unsustainable levels of hunting exist for any of the species observed.

2) Spatial and Temporal Harvest Distribution

Greater than half of the total volume of bushmeat was recorded in commercial markets of the regional capital. Although the village of Dzeke represented 30% of the population surveyed in the 5 Reserve villages, bushmeat harvest from Dzeke's upland terra firma forest contributed only 6.1% of the total volume recorded within the Reserve boundaries. Bushmeat harvest records from the seasonally flooded forest (represented by Ibolo, Kouondoumou and Epena villages) contributed 85.8% of the surveyed total, though these villages represented only 47.5% of the LTCR population surveyed. Bushmeat harvesting from the swamp forests of Mokengui village (22.2% of surveyed population) contributed only 6.5% to the Reserve total. It appears that the seasonally flooded forests may contain higher densities of wildlife, possibly from the increased seasonal habitat diversity created by changing water levels.

The commercial markets in Impfondo create a significant economic force, attracting a large volume of natural resources from the surrounding area due to its population size and more robust cash economy. Besides that originating from the LTCR, bushmeat arrives in Impfondo from a number of other regions. The largest source (47%) of harvested wildlife observed in Impfondo was the Democratic Republic of Congo (DRC), situated opposite Imfondo on the eastern bank of the Oubangui River. The second single largest source of bushmeat recorded in Impfondo was Epena, providing more than 30% of the sampled wildlife in Impfondo markets. This bushmeat likely originated in the LTCR.

Two water-level seasons were recognised in the region of the LTCR – the period from May to October was defined as high water season and November to April was considered low water season. From harvest records collected from all markets surveyed, 59% of bushmeat was recorded during the high water season while the remainder (41%) was recorded during low water season. During high water, access to a larger hunting catchment is made easier by the use of pirogues to reach areas not accessible on foot during low-water season. Transportation of bushmeat to markets along waterways is also made easier during high-water season. Finally, the harvest of wildlife is more efficient as ground dwelling mammals retreat from the flooded areas to occupy small islands of terra firma where hunters have a greater probability of encountering them. During the low-water period, from November to April, hunting is closed and theoretically no hunting activity is allowed. However, observations suggest that animals are dispersed more widely and hunter movement in the forest is

made more difficult under low-water conditions. Additional data support these observations with declines seen in the harvest of terrestrial wildlife and an increase in fishing activity during low-water periods (see below).

3) The Harvest of Fish in the LTCR
An estimated total of 14,167 kg of fish was recorded in 5 LTCR villages during the survey period between April 2009 and April 2010. Fish were not monitored in the Impfondo markets. The majority of the fish harvest was observed during the low-water season, with an average of 20% of the total catch returned each month during this period. In contrast, the average return per month during the low water season was only 2.3% of the annual total. The high water season corresponds to the open legal hunting season, but it is believed fishing activities are naturally slow because fish are widely dispersed and returns are therefore lower. In contrast, during the low water period fishing activity is observed to increase dramatically in response to the concentration of fish populations in a smaller area and the lack of hunting opportunity caused by more difficult conditions for movement in the forest (see above).

As was seen for bushmeat, a larger volume of fish biomass was observed in Epena relative to other LTCR villages, with 47% of all fish recorded in this village. Epena serves as a transit bottleneck for both fish and bushmeat being exported from the Reserve to the regional capital, Impfondo.

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

A broad range of community involvement has been realized through the implementation of this monitoring project. Prior to the beginning of monitoring activities in any village, meetings were held with community leaders, interested villagers and LTCR personnel to explain the objectives and methodology of the study. We elicited suggestions and concerns of village members regarding the monitoring protocol to mitigate any potential disturbances to residents or their livelihood. Occasional formal meetings and routine social interactions between project staff and village members and leadership has reinforced the relationship between the two entities. Such contact is used to raise awareness of ongoing programme activities and update the status of village monitoring activities. A total of three reserve staff and 14 local villagers were employed and given training to conduct the monitoring activities reported here. Salaries paid to village assistants have helped fuel the cash-based economies of Reserve villages.

5. Are there any plans to continue this work?

Funding from other agencies (USAID-CARPE, USFWS) supports several LTCR activities, and has been earmarked to assist with ongoing harvest monitoring activities in the Reserve and surrounding markets.

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

One of our funding partners (CARPE) maintains a website dedicated to the dissemination of conservation and management activities and results. Once further analysis is completed, we intend to share the findings of this project through this website.

Additionally, we will share results with local partner NGOs, such as CFC (Conservation de la faune Congolaise). We intend that some of the outcomes from this work can be used in the outreach activities of this conservation and education NGO to promote further awareness of natural resource issues and sustainability.

Finally, we plan to eventually publish aspects of this research in an international, peer-reviewed journal.

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

The monitoring period supported by this second Rufford Small Grant from April 2009 to April 2010. A small amount of RSG funds were reserved (£1700) to allow for a site-visit by the grantee or, if this was determined to be unnecessary, to allow for continuation of monitoring activities if other funding sources were not identified. Monitoring activities were able to continue till November 2010 under USFWS and CARPE funding. We now intend to use the final RSG reserve funding to allow an extension of monitoring into 2011.

8. Budget: Please 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.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Local salary	1037	1037		
Staff per diem	828	828		
Fuel	1233	1500		difference supported by additional CARPE funding
Computer	720	720		
Material	193	193		
International travel	1722	0	1722	Intended for site visit, but now will be applied to continue monitoring activities
Total	**6028**	**4278**	**1722**	

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

Although the LTCR project has installed a control post along the road from the Reserve to the regional capital, Impfondo, to interdict the transport of bushmeat from the protected area, it appears that illegal trafficking continues. Large quantities of bushmeat are still observed to enter the commercial markets in the capital. We plan to continue and improve monitoring protocol along this travel route and in Impfondo village in order to assess the effectiveness of modifications to interdiction efforts. Enforcement activities planned include more efficient fixed control posts situated strategically along the trade route, as well as mobile patrols conducting surveillance along this road and on rivers routinely used for the transport of natural resources. The village of Bouanala is located in the south of the LTCR, along the Likouala aux Herbs River, and will be an additional site of expanded monitoring activities.

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes. The RSGF logo was used in the acknowledgement section of several presentations by the grantee. Presentations included a public doctoral dissertation defense, as an invited speaker to the St. Mary's College Math and Science symposia (MD, USA), the 2008 Crocodile Specialist Group Meeting (Santa Cruz, Bolivia) and the Ecological Society of America general meeting (Albuquerque, NM, USA). The RSGF was also acknowledged as a funding source in the following published manuscripts:

Eaton, MJ, G Myers, SO Kolokotronis, M Leslie and G Amato. 2009. Barcoding bushmeat: molecular identification of Central African and South American harvested vertebrates. *Conservation Genetics.* 11(4): 1389-1404.

Eaton, MJ, A Martin, JB Thorbjarnarson and G Amato. 2009. Species-level diversification of African dwarf crocodiles (Genus *Osteolaemus*): a geographic and molecular phylogenetic perspective. *Molecular Phylogenetics and Evolution* 50(3): 496-506.