

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. 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. 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	Milton José de Paula
Project title	Game Fauna and Hunting Sustainability in the Xerente Indigenous Land, Brazilian Cerrado
RSG reference	14215-1
Reporting period	March 2014 – February 2015
Amount of grant	£ 5 784
Your email address	miltonuft@yahoo.com.br
Date of this report	August 2015

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
Implement a participatory hunting monitoring programme (PHMP)			X	Ten villages from Xerente Indigenous Land (XIL) were chosen for the PHMP implementation. In the initial phase, we collaborated with 52 local hunters from a total of 54 hunters. Among them, three were not indigenous hunters but lived in the villages, were married to Xerente women and agreed to participate, and therefore were included in the PHMP.
Knowledge about the game species exploited by the Xerente Indians, offtake rate for each species and estimate of their biomass.			X	48 of 52 hunters participating in the research returned information about the hunting events on the monitoring record during the whole study period. This represents 89% of the hunters from the monitored villages.
Evaluation of preferred game species.			X	11 species were identified as high preference species in terms of hunted biomass and number of dead animals.
Estimation of harvest rate (HR) ($n./km^2$) for most preferred game species.			X	Using the participatory mapping of hunting areas methodology, the approximate hunting area (km^2) used by participants ² was calculated. This allowed estimation of the species HR ($n./km^2$).
Estimation of theoretical harvest rate (THR) ($n./km^2$) for preferred game species based on the sustainability model (Robinson & Redford 1991).	X			Using standard linear transection methods (distance sampling), low encounter rates made it impossible to estimate actual game species population density ($ind./km^2$), and hence THR ($n./km^2$). Literature values were used instead.
Comparison between HR and THR harvest rates and assessment of sustainability estimates for the most valuable game-species.		X		Data available in the literature allowed comparison between HR and THR from ten out of eleven species.

Investigation of ethnographic aspects of the relationship between the Xerente and its game-fauna.			X	49 hunters were questioned about the importance of game animals for Xerente culture. In addition to food value, 4 four broad use categories were identified: medicinal; crafts and ornaments; pets; mythological importance. Preferences and food taboos involving these species were also identified.
Registration of terrestrial fauna with camera trap.			X	In the initial proposal camera traps were not included. However, during the project's early development, a few Xerente leaders asked to record species present in their territory. Therefore, 8 camera trap were acquired.

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

There was a wide acceptance of the project by participating hunters. However, unsuccessful hunting event data are underestimated (a common problem in this kind of project), since most hunters did not fill correctly these reports. We believe this is due to cultural issues, perhaps a resistance of demonstrating failure and damaging the image of a good hunter, since good hunters are treated with great respect in the Xerente society. During the project, this issue was addressed with the hunters, stressing the importance of reporting all events, even when unsuccessful. It was also explained that data would remain anonymous. Still there was great resistance from the hunters. This example of the rich cultural context of hunting among the Xerente could not be fully addressed within the limited time and scope of the present study, but will be studied in more detail in future research.

Records for four hunters could not be retrieved because they were not found in their residence, as they were working outside of the XIL. Some of their monitoring records were delivered by the hunter's family. However, since these four hunters spent most of the research period outside of the XIL, we believe that it did not have a significant effect on the PHMP data.

The standard linear transection method, which was chosen for the census of the game-species populations, proved to be inadequate for the XIL. Two hundred and seventy-five km was covered, of which 173 km was in Cerrado and 102 km in forest environment. However, the only species for which we obtained sufficient sightings to calculate population density estimates was *Sapajus apela* (black-capped or tufted capuchin), with 30 ind./km². A more robust evaluation of the sustainability model was not possible because the number of sightings of most preferred game species were insufficient to estimate population densities. Though camera traps were obtained, it was not possible to implement during the study period them with an adequate experimental design to use to estimate animal densities.

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

I. Between March 2014 and February 2015, 390 successful hunting events were registered, which yielded 451 animals and a mean slaughtered biomass of 5,877.26 kg. Thirty-four species were killed

by hunters, of which medium to large size mammals were the most representative taxa, confirming hunting patterns found in other traditional societies in the Neotropical region.

II. 11 species were identified as most preferred game species (Table 1). *Cuniculus paca* (spotted paca; n=55) and *Tapirus terrestris* (Brazilian tapir; n=1,439.90 kg) were the most representative species in terms of number and biomass. The number of individuals of each of these 11 species was divided by the hunting area used by the ten villages monitored (approximately 1,128 km²), corresponding to nearly 60% of the XIL. All species evaluated using literature data for densities presented HR values below THR, indicating a possible level of sustainable exploitation of these species in the monitored villages (Table 1). However, this result must be interpreted cautiously since THR values were calculated without actual data from the study area.

Table 1: Sustainability evaluation of the most valuable game-species. **HR:** harvest rate; **THR:** theoretical harvest rate.

Species	Common name	Xerente name	HR (n./km ²)	THR (n./km ²)
<i>Cuniculus paca</i>	Spotted paca	Krawa	0.05	1.31 ^a
<i>Dasyprocta sp.</i>	Agouti	Zâwri	0.05	8.98 ^a
<i>Dasypus novemcinctus</i>	Nine-banded armadillo	Wrâku	0.03	5.19 ^a
<i>Mazama americana</i>	Red brocket deer	Ponẽ	0.01	0.67 ^a
<i>Mazama gouazoubira</i>	Grey brocket deer	Ponkêrê	0.03	1.23 ^a
<i>Ozotoceros bezoarticus</i>	Pampas deer	Aze	0.02	0.38 ^b
<i>Pecari tajacu</i>	Collared peccary	Kuhârê	0.04	2.41 ^a
<i>Penelope superciliaris</i>	Rusty-margin guan	Akka pre	0.03	0.38 ^c
<i>Tapirus terrestris</i>	Brazilian tapir	Kdâ	0.01	0.03 ^a
<i>Tayssu pecari</i>	White-lipped peccary	Kuhâ	0.01	0.83 ^a
<i>Hydrochoerus hydrochaeris</i>	Capybara	Kumdâ	0.01	-

^aRobinson & Redford, 1991

^bLeeuwenberg & Robinson, 1999

^cPeres & Nascimento, 2006

IIIa. It was surprising to learn that the Xerente cite 33 species of game animals as having some kind of medicinal use; 17 different animal parts are utilized for the treatment of 43 illnesses. Medium to large mammals were the most cited for medicinal use. Likewise, medium and large animals were the most cited in the Xerente myths. Other uses involved animal parts (feather, teeth and skin) for body ornaments and craftwork. Some birds and other species are commonly raised as pets. Other animals were mentioned in relations of conflict, for example jaguars attacking people or dogs, rodents that raid gardens for food, and poisonous snakes. The species most appreciated for consumption by the hunters was the paca. Food taboos are attributed to four species, where pregnant or lactating women and diseased people must avoid the consumption of its meat.

IIIb. Between April 2015 and January 2015, camera traps were installed in Cerrado and forest environments. A total of 28 species were registered, including 20 mammals, seven birds and one reptile. Nine of these species are listed as endangered. Two more species, *Dasyprocta prymnolopha* (black-rumped agouti) and *Tinamus tao* (grey tinamou) are new registers for the region.

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

The broad participation by the hunters was fundamental for the Project. With their and the communities' participation, it was possible to monitor hunting activity in all villages simultaneously, which would be impossible for a lone researcher in the field. This broad participation allowed the development of a considerable data set, given the time limitations, on the local hunting preferences. Two young Xerente biology students helped us develop the research project, helping to reinforce the relevance of the study for the Xerente people.

5. Are there any plans to continue this work?

Yes. Even though the main goal of this Project, the sustainability evaluation, was not fully accomplished, other important aspects influencing game exploitation were identified, such as: climate seasonality, phenological cycle of some fruit trees, and the use of motor vehicles. We plan to continue this hunting study, and having learned from the limitations of the methods used in this phase, we plan to apply different methodologies more appropriate to the situation observed in the field. We plan to spend more time in the field and cover more villages, since the ten monitored villages in this study represent only 15% of the villages in the XIL

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

This Project formed the basis of my master's thesis at Universidade Federal do Pará (UFPA, Belém, Brazil) and Museu Paraense Emílio Goeldi (MPEG, Belém, Brazil). Some of the results described here are discussed in the thesis, which will be available online soon. Two papers in international scientific research journals are also planned for prompt submission. Some results were already presented in academic events:

- I. De Paula, M.J.; Pezzuti, J. CB.; Giradin, O.; Sumekwa-Xerente, V. Monitoramento Participativo da Caça na Terra Indígena Xerente, Cerrado do Tocantins. 2014. X Simpósio Brasileiro de Etnobiologia e Etnoecologia. Sociedade Brasileira de Etnobiologia e Etnoecologia, Montes Claros, MG, Brasil;
- II. De Paula, M.J.; Pezzuti, J. CB.; Giradin, O.; Sumekwa-Xerente, V. Fauna cinegética utilizada na zooterapia dos índios Xerente, Cerrado do Tocantins. 2014. X Simpósio Brasileiro de Etnobiologia e Etnoecologia. Sociedade Brasileira de Etnobiologia e Etnoecologia, Montes Claros, MG, Brasil.

Results were also presented and discussed with the Xerente themselves. They recognized the relevance of this project and the importance of the participation of hunter-monitors. They also acknowledged the need for ongoing PHMP continuity in more villages. One of the results they most appreciated was the recording of species by camera trap. These records are going to be used for the production of a book on the fauna of the XIL, addressing the importance of these species for the environment and Xerente culture. It will be produced in collaboration with Xerente teachers and students, and it will be written both in Portuguese and in Xerente language. This material will contribute for the promotion of the Xerente culture and will be used in indigenous schools as a textbook.

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

The donation from *The Rufford Foundation (RSG)* was used from February 2014 to March 2015. The subsidy was fundamental for the PHMP implementation and development of other methodologies, such as linear transect census and camera traps. This funding allowed us to acquire essential materials and logistics needed to implement the project throughout the year, fulfilling the work within the planned time frame. The field project was fully subsidized by RSG and received no funding from other institutions. Additional funding supported the graduate scholarship of the researcher Milton de Paula.

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.

Local exchange rate: £ 1,0 = R\$ 3,415

Item	Budgeted Amount	Actual Amount	Difference	Comments
Fuel	1558	1610.54	-52.54	Additional fuel cost was needed due to a longer field permanence than expected.
Food	935	1172	-237	Additional food was needed due to a longer field permanence than expected.
Field assistant	312	440	-128	We had to hire more field assistants for a longer period for the transects in forest environment, owing to difficulties imposed by cutting of the vegetation.
Bus fare Belém-Palmas (round trip)	430	235	195	Only two Belém-Palmas to XIL trips were needed.
Air fare Belém-Palmas	997	0	997	The general coordinator was not able to go to XII due to academic commitments.
Voice recorder	66	67.4	-1.4	
GPS	406	439.82	-33.82	The initial budgeted value was for internet shopping and would take eight days for delivery. Since the beginning of the field work was at the same time as the donation was received, there was an urgency to buy the GPS. However, the GPS bought in a shop in Belém was not much more expensive than the budgeted amount.
Laptop	561	497.8	63.2	
Scales	113	204.97	-91.97	At the beginning, we considered leaving two scales for each village to be shared by the hunters. However, this strategy was not efficient, and we had to buy more scales to be delivered for each hunter/monitor.
Personal vehicle maintenance of Leandro Ramos	0	292,82	-292.82	The vehicle maintenance was not predicted in the budget, but because the roads inside the XIL are unpaved and part of the project was conducted during the rainy season, there were problems with the vehicles that needed to be fixed.

Camera traps	0	890	-890	8 camera traps were bought in the US for half the price that they would cost in Brazil. We managed for a friend to bring the traps from the US without additional costs. The cost for the memory cards and batteries are included in this amount.
TOTAL	5784	5850.35	-66.35	The total value was slightly higher than budgeted.

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

The expansion of PHMP for more villages and for a longer duration is essential to provide information regarding the hunting activity in a greater spatial and temporal scale. This will allow a more robust evaluation about wild fauna exploitation inside the XIL. The improvement of the hunter's/monitor's data collection capability and greater involvement of the population is also fundamental for the next steps, enabling the formulation of other hypothesis and more detailed data collection. The new research efforts should prioritize those species already identified as most exploited, as well as those who in threatened conservation status. Methods to evaluate sustainability need to be chosen that are more appropriate for the local context. Furthermore, other important aspects deserve special attention, such as: climate seasonality, phenological cycles of some fruit trees, and the use of motor vehicles. Ethnographic aspects also need to be studied in greater depth. We hope these ongoing efforts will contribute to conservation and management in the XIL.

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?

We used the *The Rufford Foundation* logo in two posters presented in academic events:

- I. De Paula, M.J.; Pezzuti, J. CB.; Giradin, O.; Sumekwa-Xerente, V. Monitoramento Participativo da Caça na Terra Indígena Xerente, Cerrado do Tocantins. 2014. X Simpósio Brasileiro de Etnobiologia e Etnoecologia. Sociedade Brasileira de Etnobiologia e Etnoecologia, Montes Claros, MG, Brasil;
- II. De Paula, M.J.; Pezzuti, J. CB.; Giradin, O.; Sumekwa-Xerente, V. Fauna cinegética utilizada na zooterapia dos índios Xerente, Cerrado do Tocantins. 2014. X Simpósio Brasileiro de Etnobiologia e Etnoecologia. Sociedade Brasileira de Etnobiologia e Etnoecologia, Montes Claros, MG, Brasil.

11. Any other comments?

We thank *The Rufford Foundation* for crucial financial support that allowed that made this project possible. Even though we were unable to measure the sustainability index as accurately as we would have liked, using local data, the data gathered are still of great relevance for the Xerente people. The project has contributed to our knowledge of wild fauna exploitation in the Cerrado biome, an area still little studied in this regard. In this context, this project reflects the need for allocation of more research in this highly threatened biome, which will contribute to the conservation and sustainable management actions of this global biodiversity hotspot.

Annex 1



Leopardus wiedii / Margay / Pattérê kumto pre.
Status: **VU** (MMA, 2015).



Leopardus pardalis / Ocelot / Pattérê



Puma concolor / Puma / Kuza



Panthera onca / Jaguar / Huku. Status: **VU** (MMA, 2015).



Chrysocyon brachyurus / Maned wolf / Ku. Status:
VU (MMA, 2015)



Cerdocyon thous / Crab-eating fox / Wapsã
wara



Urocyon cinereoargenteus / Hoary fox / Wapsã wara wasterê.
Status: VU (MMA, 2015).



Nasua nasua / coati / Wakõ



Pampas deer' cub



Gray brocket deer' cub



Procyon cancrivorus / raccoon / Wapsã pra po



Ozotoceros bezoarticus / Pampas deer / Aze.
Status: VU (MMA, 2015).



Mazama gouazoubira / Gray brocket deer /
Ponkẽrê



Mazama americana / Red brocket deer / Ponẽ



Tapirus terrestris / Brazilian tapir / Kdâ. Status: **VU** (MMA, 2015; IUCN, 2015).



Pecari tajacu / Collared peccary / Kuhârê



Dasyprocta iacki / Red-rumped agouti / Zâwri



Priodontes maximus / Giant armadillo / Warã



Tayassu pecari / White-lipped peccary / Kuhâ. Status: **VU** (MMA, 2015; IUCN, 2015).



Cuniculus paca / Spotted paca / Krawa



Dasyprocta prymnolopha / Black-rumped agouti / Zâwri



Dasypus novemcinctus / Nine-banded

wawẽ. Status: **VU** (MMA, 2015; IUCN, 2015).



Tinamus tao / Gray tinamou / Amtro wawẽ



Penelope superciliaris / Rusty-margin guan / Akka pre



Cariama cristata / Red-legged seriema / Wakrdi



06-19-2014 00:01:32

armadillo / Warãku



Crax fasciolata / Bared-faced Curassow / Akka



Rhea americana /Greater Rhea/ Mã



Crypturellus undulatus / Undulated tinamou/ Nõzâkmõ



04-21-2014 00:22:00

Crypturellus soui /Little tinamou / Amtro kuze



Crypturellus parvirostris / Small-billed tinamou / Amtorê

Rhynchotus rufescens / Red-winged tinamou / Wíki



Geochelone carbonaria /Red-footed tortoise / Kukã

References

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