

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	María Camila Latorre Cárdenas
Project title	Effect of persistent organochlorine compounds on the physiological health and habitat suitability of the Neotropical otter in Veracruz, Mexico
RSG reference	11745-1
Reporting period	November 2012-December 2013
Amount of grant	£5947
Your email address	masshini@gmail.com
Date of this report	December 6 th 2013

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
<p>To quantify the levels of organochlorine pesticides (OP) and PCBs bioaccumulated by the Neotropical otter and the fish and crustacean species she consumes in two river systems in Veracruz, Mexico.</p>			X	<p>We quantified the OP and PCB levels bioaccumulated by otter and its prey at La Antigua and Jamapa rivers, during the dry and rainy seasons. We found that otter bioaccumulated higher concentrations of both type of compounds than its prey, indicating that top predators in riparian ecosystems reflect the “contamination status” of species at a basal position in the trophic chain.</p> <p>We found that otter during the rainy season bioaccumulated higher OP levels than during the dry season but the opposite was found for its prey. This suggests that in the rainy season, otter may consume food items not considered in the study, such as reptiles, amphibians and rodents.</p>
<p>To determine the pattern of POCs in different areas of the rivers (upper, medium and lower sections) in order to identify the most polluted areas.</p>			X	<p>We quantified POCs levels in one transect of the upper, medium and lower sections of both rivers, during the dry and rainy seasons. We did not found significant differences between these sections, but we observed higher POC levels at upper zones in the Jamapa river, whilst at La Antigua river they seemed to occur in lower zones. POCs did not present a pattern along the river which may be related to the heterogeneous distribution of grassland and crops along the river. Therefore, we did not identify differential most polluted areas.</p>
<p>To evaluate the effect of POCs on neotropical otter glucocorticoid (cortisol) levels</p>			X	<p>We found that POCs in otter faeces, specifically ddrines and metoxychlor, may act as endocrine disruptors because they were related with otter faecal cortisol levels. It is difficult to conclude that species of lower trophic levels are experiencing the same effect because the physiological response could change depending on sex, life history and habitat requirements.</p>
<p>To establish how the physiological health of the otter can be affected by disturbances in their habitat</p>			X	<p>We observed that otter physiological health could be affect by habitat disturbances because faecal cortisol levels were higher in zones were human activities were higher. Prey overexploitation at La Antigua river was severe</p>

				<p>during the dry season and this was related to higher otter faecal cortisol levels. These results indicate the possible effect of human disturbances as stress factors on riparian species.</p> <p>We could only measure the otter prey availability during the dry season because during the rainy season the river level rose to the point that the local fishermen would not go out to collect fish and crustaceans. For this reason we used an indirect variable (number of pools) to evaluate prey availability.</p>
<p>To organise workshops for the local people to inform them about the effects of POCs on human health and riparian ecosystem species</p>			X	<p>We organised workshops for the local people from Jalcomulco at La Antigua river and people from Jamapa at the Jamapa river. We could not work in more locations because of the time it would take to get permission to work in the municipalities. For a complete work we decided to focus on a municipality in each river. We chose these locations because we found that there is higher human activity and dependence on the river.</p> <p>We interviewed people of these municipalities to know how they use the river and what knowledge they have on regional wildlife.</p> <p>We conducted a total of 21 workshops, open to the entire town or specific workshops for groups. Targets of each workshops belonged to different groups of students (elementary, middle and high school), farmers, and women in collaboration with the health centre. These workshops allowed increasing information on the otter found in the project, their conservation status and ecological importance especially in rivers. The problem of pollution, sources of pollution, the role of pesticides on health and the human environment were also discussed. Information on alternatives that are friendlier to the environment, however, this issue is complex to develop and implement (a more comprehensive project and long term effort is needed) but emphasis was placed on preventing health risks to the humans and the environment.</p>

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

We worked only in two municipalities because of two reasons. First, because in the latter half of this year were finalising the activities of the present government in the state of Veracruz, the process to get permission to work in the municipalities were more time-consuming. Therefore we preferred to choose one municipality on each river. Second, because of the construction of a hydroelectric dam along La Antigua River, the inhabitants of the localities hesitated to participate in the interviews and workshops during our initial work. However, as the results showed that the otters of the la Antigua River faced greater human pressure than at the Jamapa River, we found it necessary to work with them. We design more specific workshops that allowed us to successfully get closer to the people. These workshops took more time each locality.

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

We found that the Neotropical otter and its prey bioaccumulated organochlorine pesticides levels (mainly HCHs, drines, endosulfan, metoxychlor) that could affect their health, even though they are lower than those set as lethal for foxes, mink and river otter. Organochlorine pesticides were higher in otter than its prey, indicating that the otters as a top predator in riparian ecosystems reflect the “contamination status” of basal species of the trophic chain.

We found that the Neotropical otter experience a physiological stress related with the habitat disturbances around rivers (closer human activities, fish and crustacean overexploitation and seasonal prey availability). Also, the pollution with drines and metoxychlor pesticides probably acts as endocrine disruptor, altering cortisol levels.

Interviews allowed us to realise that people from Jalcomulco (La Antigua River) support their families, either by food extraction from the river or by tourism activities (rafting, canoeing) which represents almost 70 % of their income. Men students, fishermen, tourism workers and farmworkers are the ones who routinely use the river, unlike housewives, teachers and health workers. Throughout workshops, we could provide knowledge about the Neotropical otter, their ecological importance as a bioindicator of the river health and a top predator; the problematic of pollution and the damage of pesticides on human and environmental health. This information was prepared for each of the groups approached to ensure full understanding. In addition, this information was promoted at the town through outreach with posters made by students.

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

The involvement of local communities was achieved through interviews and workshops. With the interviews we knew how they used the river, the benefits offered by the river and the knowledge they have on the coastal ecosystem. We realised that people do not know much of the regional biodiversity, including otters and their ecological role in rivers, and its usefulness as a bioindicator species. Also they did not know the effect of pesticides on human and environment health. Women are the ones who know about diversity and pollution problems.

Communities benefitted from the project knowing aspects of the negative effects of pesticides on human health and the environment, and the precautions and care that should be taken to protect

the health of all. They recognised the importance of preserving the otter in rivers and its importance as a sentinel of health of rivers. In Jalcomulco there are programmes offered by the health centre focused on the proper care of food and drinking water. Information about the damage to human health and the environment by pesticides are not developed in programmes. We made workshops in collaboration with the health centre to make pollution a public issue and to promote prevention and alternatives.

The workshops conducted for specific groups (students and teachers, health and housewives, farmers) allowed us to work in a timelier and successfully manner.

In Jalcomulco, 40% of the people routinely make use of the river, mainly men and students, fishermen, tourism workers and farmworkers are the ones who use the river, unlike housewives, teachers and health workers. People support their families, either by food extracted from the river and by tourism activities (rafting, canning) which is almost 70 % of their income. Sixty nine percent of interviewees know about otters; however there is little knowledge on this species. 86% considered that otter is in danger, mainly by pollution and hunting. 65% think that it is important to maintain the otter in the area; however, they do not know about the ecological importance of this species. Thirty-five percent of interviewees knew of cases of people poisoned with pesticides in crops and livestock. Symptoms such as headache, skin irritation, dizziness, stomach pain and even cases of lung cancer are reported. No poisoning by eating food or water from the river that has been contaminated by pesticides is reported. In Jalcomulco there are programmes by the health centre in which information on the proper care of food and drinking water is given. As for the damage to human health and the environment by pesticides, there are no talk programmes informing about these issues, their problems and prevention.

5. Are there any plans to continue this work?

We have plans to continue this work as new questions arose from this project. Dr Carolina Valdespino, Dr Luciana Porter and I are interest in a second part of the project although not immediately. People from localities at Jamapa and La Antigua Rivers got interested on the thematic developed using the otter and the pollution as study subjects. Questions about the overexploitation of watershed resources and the relationship with the abundance and physiological stress of otters are of those that we would like to answer.

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

Besides the workshops, we would share the result of this project though scientific papers. We have sent a manuscript about the relationship between the human disturbances and the physiological stress of the otter. We are planning to send a manuscript about the persistent organochlorine compounds found in otter and its prey. We participated on the Open House programme of the Instituto de Ecología, A.C., sharing the knowledge about otters. We shared our results with the National Water Commission CONAGUA, Comisión Nacional del Agua. They will use this information according their needs.

We share the results with local community, giving them thesis and printed information to the municipal government.

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

The RSG was used between October 2012 and November 2013, but project began in May 2012 and ended in November 2013.

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
Field Sessions				
Transport (gasoline)	1578	987	591	We spend less than we planned. However, we used the difference to complete the cortisol analysis and extra equipment that was required.
Food allowance	1578	1386	192	We spend less than we planned. However, we used the difference to complete the cortisol analysis and extra equipment that was required.
Materials for sample collection	38	38		
Local assistant salaries	329	399	-70	We need more assistants for the field work.
Equipment- Inflatable boa	141	141		
Equipment- GPS	312	312		
Equipment- Binoculars	117	117		
Workshop Sessions				
Transport (gasoline)	563	563		
Food allowance	507	507		
Stationary	56	56		
Snacks for participants	56	56		
Sample Analysis				
Steroids extraction	33	33		
Cortisol analysis (chemiluminescence enzyme immunoassay)	610	962	-352	Sometimes we needed to quantify two times the level of cortisol of faecal sample because of coefficient of variation was higher that required for a precision criterion. We needed to do validation tests of the entire assay.
Freezing box	15	15		

Sending cost	14	14		
Extra equipment		416	-416	We bought dry bags to protect the electronic equipment of water. We bought a projector for presentations and workshops. The institute could not lend the projector for the entire period that we needed, therefore we decided to buy one and not delay the workshops session.
TOTAL	5947		-55	

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

I consider that the next steps are keeping developing workshops with local communities, to show the importance of riparian ecosystems and all fauna and flora found there. With this project we found out that people are interested in learning more about their natural goods, they really depend on them, and are discovering that those resources are limited.

Concerning the use of pesticides, it is necessary to include a different professional team where social workers, enterprise frame researchers and educators should take a part. New friendly pesticides such as biodegradable and less toxic pesticides, sexual attractant, specific viruses for a target pest are being used in some experimental efforts. Even though trying to change agriculture traditions is a complex process, it is important to work with farmers, but especially with the industry, which are what really drive and promote the use of pesticides.

Concerning the conservation status of Neotropical otter, the next step is to monitor their population size, evaluate how human disturbance affect their abundances and physiological stress in the long term.

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 use the RSGF logo in presentations at scientific conferences and the workshops we developed. People who participate in this project, researchers, students, fishermen, local communities knew about the small grant contribution.

11. Any other comments?

We are grateful for the support given to us by RSGF. This allowed us to learn more about the conservation status of otters, a species of great ecological importance that can be a flagship species for the protection of rivers. Moreover, working with local communities gave us a new perspective on applied sciences, and the need to involve local communities in the conservation of biodiversity. We would be lost without this bridge and participation in society.

We really have achieved enormous and invaluable knowledge with the support given and we hope to soon continue to work with your support if our project shows prototypical.