

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	Wilbert T. Kadye
Project title	Assessing the impact of multiple non-native invasive fishes in the Great Fish and Sundays Rivers.
RSG reference	12622-2
Reporting period	December 2012 to June 2014
Amount of grant	£5,950.00
Your email address	kadyew@yahoo.com
Date of this report	18 July 2014

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
To provide an overview of ecosystem impacts of non-native invaders within the selected river systems.			Fully achieved	A complementary approach based on species-environmental relationships and stable isotope analysis was used to examine distribution patterns and resource utilisation, respectively, for both native and non-native ichthyofauna. For the native species, the results revealed that spatial organisation was important in explaining species distribution patterns, whereas trophic niche segregation suggested differences in resource utilisation for species occurring in similar environmental conditions. In comparison, most non-native species had broad distribution patterns, which suggested ubiquitous distribution within the mainstem of the invaded rivers. However, these non-native species exhibited trophic segregation, which suggested that resource utilisation was non-random. The potential for competition was inferred between two predators, native longfin eel <i>Anguilla mossambica</i> and non-native sharptooth catfish <i>Clarias gariepinus</i> that both had similar distribution ranges and appeared to share similar trophic niche sizes and positions. Furthermore, the results indicated that high non-native species richness was associated with low native species richness. Overall, these results reveal the potential of non-native fishes to influence ecosystem processes within their invaded range and highlights the need to limit further invasions.
To disseminate information to conservation managers and encourage participation of various communities and			Fully achieved	Several liaisons have been conducted with private landholders and conservation agencies to disseminate information based on the findings of this research. Technical reports have also been written to conservation agencies, such as to the Eastern Cape Parks and Tourism Agency (See ANNEX 1).

<p>land holders so as to enhance conservation of biota both within and outside protected areas.</p>				
<p>To provide an effective continuous monitoring system for different forms of biota, such as fishes and macroinvertebrates.</p>			<p>Fully achieved</p>	<p>During the first phase of monitoring (2009 to 2011), this research reported that most non-native species were widespread within the mainstem sections of the invaded rivers. This monitoring phase coincided with a period of drought and low flow that resulted in the headwater tributaries being disconnected to the invaded mainstem. These tributaries contain native minnows, including chubbyhead barbs <i>Barbus anoplus</i> and the Eastern Cape redbfin minnow <i>Pseudobarbus afer</i> that is cited on the IUCN Red-List as being Endangered. During the second phase of monitoring (2012 to date) most tributaries had continuous flow that connected them to the mainstem. This study revealed the invasion of some headwater tributaries by sharptooth catfish and smallmouth yellowfish <i>Labeobarbus aeneus</i> from the mainstem sections of the invaded rivers. This project has therefore highlighted the need to protect headwater habitats from invasions in order to conserve the native fishes.</p>
<p>To provide ecological information through peer reviewed journal papers that will highlight the conservation efforts within this region that harbours several endemic and endangered species.</p>			<p>Fully achieved</p>	<p>One manuscript has already been published in the journal PLOS One (see Attachment). This manuscript highlighted the diel behavioural of two native minnows, chubbyhead barbs and redbfin minnows and the implications of their responses to potential invasions by non-native piscivores. Another manuscript is in the final stages of write-up and will be submitted soon.</p>

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

This project initially proposed to use Multiple Before-After Control-Impact approach to test the response or recovery patterns of invaded systems following eradication of some invaders. However, most invaded rivers had high flow that made it difficult to conduct this experimental procedure. To tackle this problem, an alternative experimental procedure was conducted to test the behavioural responses of native fishes to potential invasions into their habitats. This alternative procedure was based on both field and laboratory experiments.

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

- a) This project has revealed the consequences of multiple non-native invasions within freshwater ecosystems in the Eastern Cape region of South Africa. The outcome of this study has highlighted the need to conserve habitats that are not yet invaded, and recommendations have been made to conservation agencies.
- b) This project has allowed for continuous monitoring of both native and non-native fish distribution patterns. In particular, this project has noted the range expansion of some non-native species into streams that they were previously not recorded.
- c) This project has developed synergies with both private land holders and nature conservation agencies in order enhance the conservation of native fish species.

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

The local community within the study area comprised predominantly of private land holders who gave permission us permission to conduct this research. Many of these landholders expressed high enthusiasm about this study by participating in some of the field observations. We used these excursions as an opportunity to highlight the importance of limiting the spread of non-native fish species through illegal angler introductions, which is one of the major problems in the area.

5. Are there any plans to continue this work?

Yes. The immediate concern is to limit the spread of non-native fish into rivers inhabited by native minnows.

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

The output of this study will be disseminated through workshops, seminars, technical reports and peer reviewed articles.

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

The RSG grant was used for period of 18 months (December 2012 to May 2014), which was within the anticipated time frame.

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
Portable freezer	£500	£500		
Stable isotope analysis	£1500	£1500		
Field sampling	£750	£750		
Accommodation + Field assistant	£3200	£2,800	£400	Budget was adjusted to finance laboratory experiments
Laboratory experiments	0	£400		Laboratory experiments had to be conducted to complement field observations. In order to do these, additional material, such as aquaria, had to be purchased.
Total	£5,950	£5950	0	

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

Continuous education and awareness on the importance of conserving native fishes is vital. In some invaded rivers and stream, it may be possible to eradicate non-native fishes. Small scale trials need to be conducted in such streams to test the feasibility of non-destructive manual eradication (through electric fishing, seining and fyke netting) or localised use of rotenone.

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 RSG logo has been used in all presentations and workshops. Funding from RSG has been and will continue to be acknowledged in all publications arising from this work.

11. Any other comments?

I thank the Rufford Small Grants Foundation for the continuous support that it has given to this project. The outcomes of this project are both timely and important in developing mitigating measures in order to conserve native biota of the region.