

Final Project Evaluation Report

Your Details	
Full Name	Lyle Vorsatz
Project Title	The nursery role of mangrove microhabitats at their northern and southern distributional limits: An invertebrate and fish larval perspective
Application ID	24522-1
Grant Amount	£3986
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Date of this Report	25/05/2019

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
Fieldwork sampling in South Africa and Hong Kong				Overall during the duration of the project I managed to carry out 3 months of sampling in Hong Kong and 4 months of sampling in South Africa.
Provide data on the composition, abundance and distribution of invertebrate and fish larvae within mangrove microhabitats				I have analysed the data sets and am busy preparing two manuscripts addressing the roles that microhabitats have on the distribution of larvae within them. I have found that each microhabitat has a distinct community of larval assemblages that are driven by the abundance of one or more species.
Conduct Physiological experiments on larvae				Physiological experiments were successfully conducted in Hong Kong between June and August 2018 where the University of Hong Kong supplied the apparatus to conduct larval physiology. Physiological experiments were concluded in October 2018 for South Africa making use of a mobile laboratory. These datasets still need to be analysed.
Dissemination of research results				The results of the present study are being written up as three separate manuscripts on the assemblages, physiology and Hong Kong as a case study on microhabitat roles. Preliminary results have been presented at three seminars one in South Africa, Hong Kong and Malaysia.

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

For the most part sampling and conducting project activities went smoothly. The only difficulties experienced while in the field were:

- 1) The loss of lighting rods due to water seeping in and making contact with the electrical circuit resulting in them fusing.

- 2) The loss of light traps due to poor anchorage and the tide sweeping them away.
- 3) Equipment failure such as the zooplankton pumps and saltwater refractometers.
- 4) The language barrier in remote parts of South Africa where nobody spoke English.

For the first three points, extras were always on hand when they needed to be replaced. This however resulted in material and light trap building expenditure to increase slightly. For the fourth point, we were lucky to have an intern that was a polyglot and spoke majority of the African languages frequently encountered in rural areas.

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

Larval invertebrate and fish assemblages differed between microhabitats. Although mixed, Invertebrate larvae that have an export strategy were retained within these different microhabitats temporarily, while larvae that have a retention strategy were actively utilising them for protection.

Mangrove microhabitats also provide an opportunistic refuge to fish larval euryhaline species that use the estuary-mangrove system as a nursery. These functional processes at a microscale level contribute to the overall ecological functioning of the mangrove ecosystem as well the flux of organisms between mangroves, estuaries, seagrass beds and the nearshore coastal zone.

The isolation of mangrove species in terms of their microhabitat contributions can also inform conservation priorities as they provide value in of themselves to both healthy ecosystem functioning as well as economic benefits through the recruits into adult populations of commercially important species.

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

Locals from the community were involved in helping identify areas of the mangrove forests where most of the fish, crab and prawn are caught. This aided in identifying the most productive areas of the mangrove for evaluation the roles that specific species play. The community in Mngazana will especially stand to benefit from the project as the area has the largest unprotected mangrove in South Africa. Informing them of the importance of these habitats will convince them even more about conserving and protecting their livelihoods while promoting sustainable extraction of resources.

5. Are there any plans to continue this work?

There are plans to continue this work on a larger spatial and temporal scale. The methods will be improved upon to incorporate better and more effective traps as well as modelling the 3D habitats using cost-effective 3D imaging techniques within the mangrove system.

The complexity of whole ecosystem functions broken down to a microscale informs the roles of specific species interactions and thus in predator-prey interactions will inform specific drivers of the role of mangroves in aiding predator avoidance and establishing itself as a value fish and invertebrate nursery area.

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

This work will form the integral chapters of my PhD dissertation. I have presented the preliminary results of this work at two seminars. I have also made my data available to the Mangrove Action Project as well as the Ezemvelo Wildlife Trust. In total three manuscripts will be the result of the project. I am going to present the Hong Kong section of this work in July 2019, in Singapore at the, The Mangrove, Mactobenthos and Management Meeting (MMM5)

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

The grant was used over the period of May 2018 to December 2018.

8. Budget: 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. 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
Subsistence	1092	1092		Under budgeted for subsistence especially when fieldwork was carried out in Hong Kong
Materials to build light traps	800	800		
Transport costs to and from field sites	498	500	+2	With fuel hikes in South Africa fuel prices has risen dramatically since the start of the project. Vans had to be hired in Hong Kong for transportation of equipment to field sites and back to the laboratory
Accommodation costs on field trips	1596	1600	+4	The grant covered at least two field trips in South Africa where I was able to conduct physiological experiments

Total	3986	4000	+6	Exchange rate: 1GBP = 16.26 ZAR
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9. Looking ahead, what do you feel are the important next steps?

More data is needed at greater spatial and temporal scales in order to corroborate patterns found in this project. The next step is to incorporate not only larvae, but also, the whole spectrum of life stages into a study to find out exactly how these mangroves contribute to the biotic-abiotic relationship in the ecosystem.

10. 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?

Yes, the Rufford foundation logo was used on the presentation slides of the two seminars I presented in South Africa, Malaysia and Hong Kong

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

Dr Paula Patrick (Co-supervisor) helped with co-ordination of the project and provided expertise on larval fish identification

Dr Francesca Porri (principal supervisor) assisted with sampling and physiological experiments in both South Africa and Hong Kong. Provided support and expertise on invertebrate larval dynamics.

Prof. Stefano Cannicci assisted with sampling logistics in Hong Kong. Provided expertise on the flora and fauna of the mangrove systems in South East Asia, assisted with sampling.

12. Any other comments?

I would just like to extend my gratitude to the Rufford Foundation for funding this research. Without the grant, many things would not have been possible due to financial constraints. Here we lay the foundations of larval dynamics within mangrove systems in South Africa, which either directly or indirectly affect the livelihoods of people staying in close proximity to them, the poor and the vulnerable.