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	Julia K. Baum
Project title	Coral Reef Conservation on the World's Largest Atoll, Kiritimati
RSG reference	13598-1
Reporting period	July 2013 – August 2014
Amount of grant	£6000
Your email address	juliakbaum@gmail.com, baum@uvic.ca
Date of this report	August 22nd, 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
1a) Socioeconomic surveys		✓		We conducted surveys in all four villages, using our new survey design incorporating questions on fisheries dependence, management, and climate change. We completed 103 surveys instead of the initially proposed 200 surveys, because our expanded number of questions meant that each survey took significantly more time (~ 1 – 1.5 hours per survey). We have already submitted a manuscript (attached) based upon this research to a peer-reviewed journal, lead by my undergraduate student Maryann Watson, and co-authored with my PhD student Danielle Claar.
1b) Ecosystem monitoring		✓		We conducted all types of the proposed monitoring (underwater visual censuses of fish, invertebrates, photographs of benthos), but only at 20 sites instead of the originally proposed 37 sites, because we concentrated on doing more surveys per site (i.e. Two rounds of fish surveys per site instead of one) and added a new type of benthic surveys – videos to capture coral recruitment.
2. Conservation outreach: Participatory research with Kiritimati's Fisheries technicians			✓	This again worked well this year. The Ministry of Fisheries could only spare one employee (Kiaueta) this year, so we also worked with Aana from the Ministry of the Environment, and she was an excellent translator – engaged, reliable, and very knowledgeable.
Meetings with Fisheries Managers and Government Officials	✓			This was challenging this year. The head of the Ministry of Fisheries retired a few weeks before our arrival and the new head was initially receptive to us when we first met with him to share our research report, photos, and discuss our objectives with him, and hear about their current work. On subsequent visits, however,

				he was belligerent with my team, which made it difficult to work further with him.
Communication with Kiritimati community		✓		We had great success conducting conservation outreach with the local primary and middle schools, including educational presentations on coral reefs and sharks, and activities for the primary school children. This is the most rewarding component of our programme. We were unable to arrange a radio interview this year. We had a successful time interviewing people in each community, and this again is very rewarding to speak with and learn from the community.
Papers		✓ (still in progress)		We created and shared a research report overviewing our work on Kiritimati (a PDF copy is attached) and have shared this with the local and Federal government of Kiribati. We have submitted one manuscript from our 2013 research, and are in the processing of data analysis of all of the monitoring data in order to prepare a manuscript based upon it.
Global media communications		✓		We did not communicate our research via blogs (the NY Times Scientist at Work and Green Blog ended shortly before our field season started). Instead, we communicated our research via social media – twitter and facebook (@BaumLab). We have created a new website (kiritimati.weebly.com) highlighting our research and conservation efforts on Kiritimati.

In addition to these original objectives, we also carried out the following work while there:

- Collected and photographed the coral settlement tiles on each megaphotoquadrat. We retrieved the coral settlement tiles (6”x6”) on the corners of each of the photoquadrats (n=60 total) that we had deployed as part of my 2009 RSG. Two corners had single tiles and two corners had double tiles to test for effects of open surfaces and crevices (created between the double tiles) on coral settlement. We have photographed these each since 2009, and in 2013 we retrieved the tiles for more detailed sampling. Detailed image analysis remains to be done in my lab at UVic.

- Herbivore grazing observations: We conducted quantitative herbivore grazing observations for multiple species at sites across the disturbance gradient.
- Collected algal samples for biomass estimates: Four to six samples of three major algal types (*Halimeda*, turf, and *Lobophora*) were collected from sites within and outside the upwelling region to provide biomass-area relationships.

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

Working in such a remote location as Kiritimati always poses some challenges, but we were fortunate to have a great, hard-working, experienced team and we were able to overcome all obstacles. We also had the best weather that we have ever encountered on Kiritimati, and this meant that we were able to access sites at the remote end of the atoll by boat, which greatly improved our sampling ability.

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

1. Socioeconomic Surveys. We collected and analysed household surveys in each of the atoll's villages, surveying ~12% of households on the island. These surveys included i) the same questions as in previous surveys (2007, 2009, 2011), and thus provide a fourth time point in our assessment of socioeconomic change on Kiritimati, as the atoll's population increases; and ii) new focal questions about fisheries dependence, perceptions of change in the local coral reef resources, fisheries management, and perceptions about climate change. Between January and July 2014, we analysed the data from these surveys, and submitted a manuscript entitled '*Subsistence in isolation: fishing dependence and perceptions of change on Kiritimati, the world's largest atoll'* to a peer-reviewed journal for review. In brief, we found that:

- People were aware of declines in their fishery resources, and attributed these to overfishing by the atoll's growing population. High immigration rates to Kiritimati have created a shifting baseline in the community, with more recent immigrants perceiving the local fishery to be in better condition than those who have fished on Kiritimati over the long term. In response to hypothetical fishery declines, 70% of respondents anticipated continuing to fish because of their high dependence on fishery resources, and limited alternatives for feeding their families.
- The people of Kiritimati were open to discussing new conservation policies that would conserve their fisheries, suggesting that locally supported conservation strategies may aid in alleviating some of their vulnerability. Recognition of climate change was common, and connectivity may play a role in awareness of impacts and adaptation programmes for those who will be most affected.
- The people of Kiritimati have a low adaptive capacity to resource changes driven by poverty and geographic isolation, which suggests that interventions are needed to avoid further reef fishery degradation and to support fishery-dependent livelihoods.

2. **Conservation Education.** We again made presentations about coral reef biology and conservation, and shark biology and conservation, in primary and middle schools in the atoll's villages. These presentations are always well received. In 2013, we also did ocean and shark focused arts and crafts activities with the primary school children, which they really enjoyed.

3. Ecological monitoring. We collected a fourth round of ecological survey data at each of 20 of our permanent monitoring sites spanning the atoll's disturbance gradient. This monitoring is uniquely linked to the spatial and temporal scale of the household survey data. Monitoring included underwater visual censuses of the fish and urchin communities, and photos and videos of the benthic community using small benthic quadrats, and photos of our established permanent mega-photoquadrats. Over the course of the next year, my new PhD and undergraduate students and I, will work to analzye these data and produce multiple manuscripts for peer-reviewed journals. To date, we have conducted about half of the image analyses of the benthic community data, and we have produced a report (attached) overviewing the project.

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

By conducting the household surveys with the Ministry of Fisheries, we achieved a shared goal of assessing artisanal fishing and extended this goal to a broader assessment of socioeconomic activities and welfare. The Ministry of Fisheries benefited from our management of the survey, and fisheries officers gained additional experience in enumeration and survey implementation. We also were able to work with the Ministry of the Environment, which has strengthened our collaboration with them, and we look forward to working with them in future years. In addition, the Ministry of Fisheries and the local community will benefit from our analyses of the survey data that extend beyond the analyses typically conducted by the Ministry of Fisheries for artisanal fishing survey data. The local dive operator and his employees benefited from additional profits generated through providing dive services and lodging to our research team. We expect that they also benefited, as we did, from discussions of our knowledge and perceptions of changes in reef health. The local school children benefited from the educational activities we conducted with them about coral reefs, reef fish, and sharks. We believe that enhancing understanding about the importance of the local natural environment, and instilling a love of the ocean and these resources, is a critical step for fostering improved conservation practices in the future on Kiritimati.

5. Are there any plans to continue this work?

Yes, we plan on going back to Kiritimati each year, and my team is currently on Kiritimati conducting scientific research. I will join them next week. Our current field season is partially funded by a U.S. NSF RAPID grant, focused on understanding the ecological impacts of the upcoming El Niño event. On this trip, we will be collecting important 'pre-El Niño' data. The NSF RAPID will support a small team (2 divers) to return to Kiritimati in January 2015 to study the 'during El Niño' effects and in April 2015 to study the initial 'post-El Niño' recovery. I would like to apply for a second Rufford Small Grant to support household surveys and conservation education activities in January 2015 that would focus on the impacts of the El Niño and climate change adaption measures.

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

We have shared all of our results to date with the local government on Kiritimati (Ministry of Fisheries, Ministry of the Environment) through in person meetings and with copies of our research report; we also send the research report to the federal Government of Kiribati in Tarawa.
Our current fieldwork (August-September 2014) is funded by NSF and thus fully focused on our ecological work. We will be in the water all day each day (from 7am – 5:30pm, and doing lab work

until late at night), such that we will unfortunately not be able to conduct outreach or meet with the local communities on this trip.

In January 2015, if we can obtain funding to support conservation outreach and socioeconomic research, my team and I will then have the opportunity to arrange an interview on Radio Kiritimati and to make presentations at churches and schools.

We also will communicate our results to the academic community by publishing in the peer reviewed literature and presenting at conferences. Lastly, we share our work via social media on Twitter and Facebook: @BaumLab, which now has almost 1000 followers.

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

Preparation and planning: April – June 2013.
Work on Kiritimati: I used the RSG funding over our four-week trip to Kiritimati in July and August 2013, during which time we worked with two collaborators on Kiritimati, two boat captains from Kiritimati, and with four research assistants from Canada and the U.S. The actual length of the field trip is the length that we anticipated.

Data analysis and write-up: August 2013 – December 2014. We are continuing to analyze data and prepare reports and publications from the data we collected, using my faculty salary and my students' scholarships as support for this work.
The actual timescale of the project is as expected.

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.
I used the following exchange rates: CDN $0.5514, AUS $0.60629, USD $0.6558 from summer 2013

Item	Budgeted Amount	Actual Amount	Difference	Comments
Flights (mainland – Honolulu – Kiritimati return) for JB, MW	£2393	£2253	+£140	Flights were cheaper than anticipated.
Kiritimati food/lodging for JB, MW	£1550	£1669	-£119	Food/lodging was slightly more expensive than budgeted.
Salaries for Fisheries Department Collaborators	£730	£730	£0	
Supplement to Dive Kiribati employees	£132	£132	£0	
Truck rental and gas for local transportation	£905	£848	+£57	This was slightly cheaper than budgeted
Supplies for household survey supplies	£123	£52	+£71	Supplies were cheaper than anticipated
Outreach materials	£166	£316	-£150	I purchased a pico projector to use in our

				education presentations because we were no longer able to borrow one from my university Department. It worked well and will be used in subsequent years for the same purpose.
TOTAL	£5999	£6001	-£2	

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

The important next steps are to determine what conservation policies might be feasible on Kiritimati, both in terms of fisheries resource management and climate change adaptation. I would like to focus on the latter over the coming year because the upcoming El Niño makes it especially timely to do so. My team and I could then re-focus on fisheries management in subsequent years. I would also like to continue working with the Ministry of Fisheries, and also deepen ties with the Ministry of the Environment because of the excellent people working there. I would like to expand our conservation education efforts in the schools i.e. by developing materials for the high schools, and by hiring local high school students to work with us as interns. Successful community engagement would also involve communicating our results and recommendations through the radio and church presentations.

Overall, I would like to start reaching out to conservation NGOs with the goal of engaging one of them to start work on Kiritimati. There is a great need for sustained and focused conservation effort on Kiritimati, and the additional help of an eNGO could be highly beneficial.

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 is posted on my lab website, and has been shown (as an acknowledgement to our RSGF funding) on a poster and a talk about this research. We also acknowledged Rufford in tweets last year.

11. Any other comments?

I am grateful for Rufford's continued support of our socioeconomic research and conservation education efforts on Kiritimati, and look forward to continuing this work next year.