The Rufford Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford 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	Rucha Karkarey
Project title	The status and growth of a coral reef fishery targeting groupers (Epinephelids) in the Lakshadweep archipelago, India
RSG reference	20666-D
Reporting period	March 2018
Amount of grant	£9950
Your email address	rucha@ncf-india.org
Date of this report	21st March 2018

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
1. Document patterns in catch and consumption of ecologically important coral reef fish species (snappers, jacks, needlefish, surgeonfish, parrotfish, and groupers) and specifically to determine the contribution of groupers (epinephelids) to this growing commercial reef fishery.				
2. Map the relative importance of different inhabited and uninhabited atolls within the archipelago as critical fishing grounds in the current commercial reef fishery.				At the moment we have information about the frequency of trips made by fishermen (from four different islands) to a series of uninhabited islands. However, there appears to be a high seasonal variation in the use of these different uninhabited atolls and it appears to be contingent on the movement of commercial motherboats in the islands (ie, the licence/access they are issued from the Fisheries Department). We also believe that because the reef fishery has still not entirely stabilised, we need to monitor movement and usage across multiple seasons to get a holistic understanding of resource use in the region.
3. Monitor the growth of the commercial reef fishery across the islands.				
4. Understand the socio-economic triggers of change in fisheries from offshore tuna to nearshore reef-based fisheries.				While we did undertake a formal study of socio - economic triggers of change in fisheries, the study was limited to only four islands where we have been

				monitoring underwater reef fish populations for nearly two decades. These four islands were largely homogenous in their social and economic conditions. In the coming years we hope to expand this study to incorporate more islands, specifically Minicoy, Chetlat and Androth to expand the gradient of socio-economic conditions available and make our results more generalisable.
5. Quantify fishing pressure during aggregation and non-aggregation periods at identified grouper spawning aggregation sites.				We were unable to access Bitra Island during non-aggregation periods due to logistical difficulties. As a result, we have a sense of fish catch and consumption in the islands through few key informants that we spoke to over the phone. The survey remains to be replicated in Bitra during the non-aggregation periods.
6. Provide baseline information for, and lay the foundations of a community-based reef fisheries monitoring program in Lakshadweep.				

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

The main difficulty we faced during the project was the intensive nature of the survey methodology. While we would have liked to replicate the survey in many more atolls, the small size of our team limited us to just four islands. We chose to conduct the survey in those four islands that the Nature Conservation Foundation has been monitoring (in terms of benthic reef condition and underwater reef fish communities) since 1998.

Last season was an unusual fishing season in Lakshadweep, owing to a sudden boom in the availability of '*bangda'* (*Rastrelliger kanagurta*) in the island of Kadmat in January 2017. This unforeseen circumstance biased our estimates of reef fishing catch and consumption in the early half of the season as most fishermen were engaged in catching *bangda*. We therefore decided to split the fishing season into two sampling periods and conduct another round of interviews in the latter part of the season (March-April), in the hopes of capturing a more representative picture of reef fishing pressure in these four islands. The small nature of our team coupled with

the intensive nature of the survey (which needed to be conducted within 5 months of the fair fishing season), made us compromise on the extent (in terms of sample sizes). We tackled this difficulty by focusing our efforts in the four well-studied islands and limited our inferences to these islands and a particular survey period only.

Another difficulty was to gain reliable estimates of the catch and consumption of fish which are caught and eaten in the islands. Once again, owing to the spike in catch and consumption of *bangda* in the earlier part of the fishing season, there was a high variation in the data on rare species, yielding unreliable results. At the moment, we have excluded these rare fish from the analysis and concentrated on the commonly caught and eaten species only. However, we are now working on a way to analyse and interpret the data on rare fish.

While we have managed to obtain data about catch and consumption of reef fish during the aggregation periods in Bitra, we were unable to get a large sample of catch and consumption data during the non-aggregation periods. We mainly faced logistical challenges which made it impossible to sample Bitra during non-aggregation periods (inability to travel to Bitra due to unsuitable ship schedules, or poor weather conditions, lack of accommodation and food availability etc). Data on catch and consumption during non-aggregation periods was derived from a few key informants.

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

We have put together a detail report of the survey which highlights all our findings. Please find that attached along with this document. The three most important outcomes of our project are as follows;

1. Our study is the first effort to estimate the current nature and extent of commercial reef fisheries in the Lakshadweep Archipelago.
2. With the help of this project we have identified the inclination of local fishermen to shift from pelagic tuna to reef fishing in the islands of Agatti, Kavaratti, Kadmat and Bitra. Our results indicate that the shift may no longer be driven purely by declines in tuna availability, but the economic benefits fishermen are perceiving with the opening-up of export markets for reef fish in the Lakshadweep.
3. The main outcome of this project is that it enabled us to have a dialogue with key stakeholders in the community to take cognisance of the need to manage commercial reef fishing in the Lakshadweep. In February 2018, we met authorities of the Fisheries Department regarding initiating and institutionalising a reef fish catch and consumption monitoring programme in Lakshadweep. We also had a discussion with the local governing council (*District Panchayat*) about the scale and impacts of the rapidly expanding commercial reef fisheries in the islands. Both stakeholders are very keen on engaging with our suggestions in the next season.

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

As mentioned above, one of the key outcomes of this project is that it enabled us to have a dialogue with key stakeholders in the community regarding management of commercial reef fishing in Lakshadweep. With the Fisheries Department we were able to discuss the urgent need to initiate an archipelago-wide and long-term reef fish catch and consumption monitoring programme in Lakshadweep. We also had an opportunity to engage with the local governing council (*District Panchayat*) about the scale and impacts of the rapidly expanding commercial reef fisheries in the islands. Both stakeholders are very keen on engaging with our suggestions in the next season. This would be a key first step in the management of commercial reef fisheries in Lakshadweep.

It is difficult to say what the direct benefits of the project are to the local community in such a short time frame. The aim of this project was to simply assess the status of the fishery. We hope that our survey has laid the foundations of a monitoring protocol for reef fisheries that can enable the local stakeholders to monitor the scale, extent and consequences of commercial reef fishing in Lakshadweep.

The local community (fishermen) and local islanders were involved in this project through the interviews we conducted. At every given opportunity we engaged with the people regarding our broader work in the Lakshadweep and the impacts of unregulated reef fisheries on coral reef resilience. We hope to formalise these interactions in the next season by launching into an outreach and awareness programme about the management of commercial reef fishing to enhance reef resilience and island biosecurity.

5. Are there any plans to continue this work?

Since this survey was only a preliminary assessment of reef fishing in the Lakshadweep archipelago, it is necessary to continue monitoring over the next few years to discern trends. While it is difficult for our team to continue the work in the same spirit, we hope to engage actively with the Fisheries Department next season to formalise an institutional protocol for monitoring reef fisheries in Lakshadweep. This will enable us to scale up the survey and get the local stakeholders involved in the active monitoring of their fishing activities in the long-term.

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

We plan to share the results of our work in the form of reports to the Fisheries Department, and the Department of Science and Technology, Lakshadweep. We also plan to produce a brochure in the local language of Malyalam which will summarise our results. This will be shared with the local governing councils (village and district Panchayats) and Fisheries Unions from various islands.

We also plan to use the data and learnings from this project for an awareness and outreach programme we are planning for next season - about the importance of healthy coral reef fish populations for reef resilience and island biosecurity.

We plan to use some of the data in peer-reviewed publications and conference presentations in this year. The support given by the Rufford Foundation towards this study will be duly acknowledged.

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

The Rufford Foundation grant was used from December 2016 - December 2017. The Rufford Foundation has been immensely gracious and flexible with our projects and we are very grateful for their support. This project was an initial assessment of reef fisheries in Lakshadweep and the duration of the project was envisioned to be one year, for which the duration of the grant was perfect.

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
Travel to Lakshadweep from mainland (2 round trips, 4 people)	1500	1537	-37	
Accommodation	4300	3500	800	We rented a field station in the island of Kavaratti (from where we based ourselves), this substantially helped reduce our accommodation expenses
Food	1500	1200	300	
Travel within Lakshadweep	2500	3700	-1200	Local travel is where we had to overspend. The schedule of the government speed vessels was not conducive to our survey and we required to privately hire fishing boats to take us between islands on various occasions. As a result we overspent on local travel. Also, because we based ourselves out of Kavaratti (the capital island), the cost of living was slightly higher than we had

				expected. Our multiple trips to Bitra from Kavaratti overshot our budget.
Contingency funds	150	0	150	
Total	**9950**	**9937**	**13**	

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

Based on our results and our work in the islands from the last 20 years, it is very clear that the growing reef fishery in the islands will have an adverse impact on coral reef resilience and island biosecurity. Our objectives are now to help regulate commercial reef fishing pressure in the islands to enhance reef resiioence. We would like to do this by using different approaches:

1. Regulatory approaches - By working with the Lakshadweep island administration, (Environment and Forest Department, Department of Science and Technology, Fisheries Department) and in close association with the local panchayats (local governing councils) and fishermen, to come up with reasonable rules and regulations on commercial reef fishing based on ecological and socio-economic data.
2. Value addition - We hope to work towards the value addition of pelagic fish (mainly tuna) and with models of distribution of benefits of value added tuna to a larger population, in order to divert fishing pressure away from the reefs to more resilient pelagic species like skipjack tuna.
3. Creating awareness - We will be working towards increasing awareness in the broader community about the functional importance of coral reef fish, the importance of healthy coral reef fish populations for reef resilience and the consequences of commercial reef fishing in Lakshadweep under the current climate change scenarios.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?

The Rufford Foundation Logo was used in presentations made to the Fisheries Department and the village panchayat. The Rufford Foundation was also duly acknowledged in our report to the Fisheries Department.

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

Rucha Karkarey - Principal investigator – Roles:

1. Conceptualisation and fundraising
2. Study Design
3. On ground field work, Interview surveys.
4. Data compilation and analysis
5. Outreach and dissemination

Mayuresh Gangal - Co investigator – Roles:

1. Conceptualisation and fundraising
2. Study Design
3. Data compilation and analysis

Stella James - Research Associate – Roles:

1. On ground field work, Interview surveys.
2. Data compilation and analysis
3. Outreach and dissemination

Al Badush - Research Associate – Roles:

1. On ground field work, Interview surveys.
2. Data compilation and analysis
3. Outreach and dissemination

Rohan Arthur - Advisor – Roles:

1. Conceptualisation and fundraising
2. Study Design
3. Data compilation and analysis
4. Outreach and dissemination

12. Any other comments?

We would like to extend our heartfelt gratitude to the Rufford Foundation for supporting us through all these years in our work in Lakshadweep.