

## The Rufford Foundation

### Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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#### Grant Recipient Details

<b>Your name</b>	Tanmay Wagh
<b>Project title</b>	Fish on a mission: Assessing the role of herbivorous fish in maintaining coral-algal balance on post-disturbed reefs of the Andaman Islands, India.
<b>RSG reference</b>	20898-1
<b>Reporting period</b>	June 2017 to August 2018
<b>Amount of grant</b>	£4950
<b>Your email address</b>	twagh97@gmail.com
<b>Date of this report</b>	28 August 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
To identify gradient (low, medium and high) in algal cover across the reefs in South Andaman group of islands.				We surveyed reef sites at 16 locations across South Andaman within and outside marine protected areas to estimate the algal cover at each site along with other benthic variables including live coral, dead coral, sand and rubble etc.
To identify the associated herbivore fish community across the algal gradient and the algal species composition				Fish surveys were carried out at each site to assess the herbivore community. In total, we recorded 60 species of herbivores from 10 selected sites. The herbivore community was dominated by grazers (surgeonfishes and rabbitfishes) and scrapers (parrotfishes). We also identified eight species which contributed in excess of 80% to the total herbivory highlighting the importance of certain fish groups.
To understand the role of herbivorous fish in controlling the algal community in post-disturbance reefs.				Underwater video surveys (24 hours total) were carried out to estimate the bite rates and the extent of herbivory at each site along with understanding the impacts of herbivory on the reefs. The dominant herbivore groups responded differently to the rapid growth of algae post-disturbance. While grazers seemed to respond positively to the algal growth, it seemed to be a limiting factor for foraging by parrotfishes. We also set up herbivore enclosures at these sites to empirically test the findings.
To understand the preferential feeding of herbivores towards certain macroalgal groups and its implications to phase-shifts from coral to				Underwater video surveys were used to analyse the feeding specificity of each herbivore species towards different groups of algae. The dominant species fed mostly on algal turfs as compared to other algal species.

macro-algal dominated stage and vice versa.			However, we were unable to use algal feeding assays to understand the feeding specificity in more detail due to logistic constraints.
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**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

In order to empirically test the effects of herbivory on the growth and succession of algae, we set up 36 herbivory enclosures at four reef sites which varied in the extent of herbivory. However, the surveys and maintenance of the enclosures needed a lot more boat trips than we had estimated earlier.

Towards the end of May 2018, there was an unexpected cyclonic surge in the islands during which we lost the enclosures at all but four of the enclosures we had initially set up. Thus, the data from those three sites was lost. However, whatever data we found seems to support our hypothesis.

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

- a) Herbivore functional groups seem to have different responses to the growth of algae in terms of foraging behaviour and time invested in foraging. This feeds into our larger understanding of how these fish groups are responding to global disturbance events.
- b) The fish surveyed revealed few fish species (Acanthuridae: three species, Scaridae: four species and Siganidae: one species) that contributed significantly more to herbivory (>80%) than the others. These fish need special attention during potential future management interventions.
- c) The cages from one site, showed a clear impact of herbivory on the growth and succession of algal community further highlighting the importance of herbivore fish in the recovery of coral reefs in light of severe anthropogenic threats combined with warming oceans and climate change.

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

We presented the work to two local and one international school visiting ANET. Along with this, the importance of reefs and reef fish to the islands was explained to the local community at Wandoor during one of the outreach events February 2018. We also presented the work at a Marine Biology course conducted by the Department of Biotechnology (DBT), Government of India.

The staff of the Andaman Forest department accompanied us on a few surveys where they were introduced to the different methods of carrying out underwater surveys (photo quadrats, fish counts and video assays).

The field staff at ANET, mostly constituting locals, also accompanied us on most dives and helped us set up enclosures and identify sites. We plan to involve them in future work as well.

**5. Are there any plans to continue this work?**

Yes. I look forward to continuing reef ecology and applied research in the Andaman Islands in the future.

The project raised few interesting questions regarding the impacts of herbivore removal on the reefs as well as the implications of overfishing and increasing tourism on these systems. I plan to take this work forward and address few of these problems in the future. I also intend to do my PhD on similar lines of research in the coming years.

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

I presented the work at the Rufford Conference in 2018 in Goa, India.

I am also presenting the work at the Students Conference for Conservation Science (SCCS), Bengaluru, India. <https://www.sccs-bng.org/webpages/student-presentations-sccsbng>

Along with this, we are writing a manuscript to publish the findings of this project in peer reviewed scientific journals.

**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 grant was used for a period of 15 months (June 2017 to August 2018) which is three months more than the estimated duration of the work.

**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
Stationery	35	0	35	These expenses were covered from the monthly per diem costs.
Contingency	59	0	59	
Miscellaneous	118	0	118	
Field Medication and other emergencies	82	0	82	
Field assistant salary	635	2285	-1650	We did not hire a field assistant as

				expected earlier. However some of the amount was used to cover the researchers per diem costs ( @ 7.6 £ per day for 10 months)
Boat hire	565	533	32	The boat rate was calculated at 19 £ per day for 28 days
Tank Fills	339	100	239	Calculated at 0.63 £ per tank for 150 tank fills
Other equipment (Dive gear, field equipment etc.)	412	205	207	Includes dive gear and equipment needed to set up the experiments
Underwater Camera with housing	828	304	524	We purchased the Apeman 4K (X 5) action cameras which were significantly cheaper than the GoPro cameras and gave equivalent video resolution
Local Travel	235	62	173	Inter-island and other local transport required much lesser expense than expected
Airfare (Mumbai-Port Blair x 2)	530	550	-20	Includes two return trips from the Andaman Islands to Mainland India
Food + Stay	1,112	953	59	The food and stay was calculated at 3.18 £ per day for 300 days

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

The immediate next step is to undertake more rigorous research to improve our understanding of how coral reef systems recover from recurring disturbances and the role of numerous fish groups in supporting the reefs through experiments and long-term reef monitoring

Along with this, the importance of reefs needs to be relayed to local stakeholders and management officials to identify sites of importance to sustainably manage and conserve reef resources.

With the rapid growth of tourism and emerging global markets in the islands, it is also necessary to explore the reef fishery and the possible impacts it could have on reef ecosystems and the dependant coastal community.

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

The Rufford logo was used during all the presentations we have given so far and will be used in future publications and outreach materials.

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

**Vardhan Patankar and Zoya Tyabji**

Vardhan and Zoya helped me during all stages of the project from writing the proposal, formalising the methodology, fieldwork, data entry and analysis.

**Nairika Bharucha**

Nairika helped in carrying out the fieldwork, data entry and field logistics.

**Babu Kutty**

Babu, our boat captain, helped us in identifying sites, maintaining the enclosures, and was a key cog in the smooth functioning of the project. He is well versed with the herbivory protocol now and I plan to involve him more in any future projects.

12. Any other comments?

I thank the Rufford foundation for this opportunity and being flexible and supportive throughout the course of the project. I have learnt a lot from this work.



Underwater fish transects

Video surveys to record fish herbivory





Herbivore enclosures

Explaining the work to local kids during one of the outreach events

