

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	Anand Osuri
Project title	Assessing Recovery of Large Rainforest Trees and Carbon Storage in Ecologically Restored Degraded Rainforest Fragments
RSG reference	20963-B
Reporting period	Feb 2017 – Aug 2018
Amount of grant	£9987
Your email address	moanand@gmail.com
Date of this report	30 Aug 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
Evaluating the recovery of forest structure, tree diversity, carbon storage and soil functions in restored tropical rainforests				A comprehensive assessment of 12 indicators of vegetation and soil recovery across 25 rainforest restoration sites was conducted in the Valparai Plateau of the Anamalai Hills. Recovery was assessed based on comparisons to adjacent sites that were not restored, and benchmark sites within nearby less-disturbed rainforests. A scientific manuscript describing our findings is nearing completion and will soon be submitted to an international peer-reviewed journal in the field of applied ecology and/or restoration ecology.
Assessing natural regeneration of rainforest trees in restored forests				A field study was conducted to examine the diversity and species composition of natural tree regeneration under the canopies of ecologically restored rainforests. Regeneration patterns in restored forests were compared to those in unrestored forests, monoculture tree plantations and less-disturbed rainforests. Alongside, a shade-house experiment was conducted to elucidate the potential influence of differences in soil and shade characteristics on tree regeneration under the contrasting overstories. A scientific manuscript based on this work is in preparation and will be submitted to an international journal in the first half of 2019. A third component of this work was intended to understand patterns of and differences in seed dispersal across the above ecosystems. We developed protocols and did some

			preliminary field trials but ultimately decided not to carry out this component due to time and logistical constraints at the time. However, this remains an important objective within our plans for systematic long-term ecological monitoring of the restored ecosystems.
Training and capacity building			A week-long workshop titled 'Ecological restoration: Principles, Practice and Monitoring' was conducted at our restoration programme sites in the Valparai Plateau of the Western Ghats. Ten participants from different parts of India were selected from a strong pool of 51 applicants. Participants attended classroom sessions on restoration theory, planning and scientific monitoring, got hands on training in nursery and site management and had interactions with stakeholders.

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

The project largely went as planned and the main objectives were mostly addressed to our satisfaction. One component, namely the field sampling of tree regeneration, was delayed by unseasonal late rain during 2017, for which we sought and were granted a 6-month extension that enabled us to complete the work.

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

(A) Our restoration assessment research showed that the extent of recovery can vary depending on the metric used to define restoration success, ranging from greater recovery of forest structural attributes to weaker recovery of ecosystem functions. Our findings highlight the benefits of ecological restoration in degraded tropical forests, while emphasising the need for caution – given the highly variable recovery of ecosystem functions such as carbon sequestration – in promoting restoration as a strategy to offset the ecological impacts of planned deforestation and degradation.

(B) Our shade-house experiment showed that both monoculture and mixed-species restoration plantations might offer conditions that favour the germination and early survival of rainforest tree species, and both habitats are therefore useful for promoting ecological recovery in degraded areas. Restoration plantings, however, might be superior to monocultures in other respects, such as their attractiveness to

mammal and birds, which are important seed dispersers for a number of rainforest tree species.

(c) Our workshop on ecological restoration provided an opportunity for restoration practitioners and scientists from different parts of India to share ideas and learn from one another about planning, implementing and monitoring ecological restoration projects in different contexts. We established Ecological Restoration Network, India – at present an email mailing list that we plan to build on and develop as a common platform for restoration scientists and practitioners in India.

(For more information, please refer to detailed report included as a separate submission)

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

Our rainforest restoration and research programmes have been pursued in close partnership with three major tea and coffee plantation companies in the Valparai landscape over the past 20 years. Our assessments of restoration success are of interest to these groups not only because they pertain to forests owned by them, but also because they align with these companies' policies and strategies pertaining to sustainable and biodiversity-friendly agriculture.

A number of members of a local tribal community, who have remarkable field skills and traditional botanical knowledge, play a key part within our larger and long-term restoration and research programmes. These programmes have, in turn, provided employment to many individuals from this community over the years. This Rufford project has supported two such individuals as field assistants over the last 18 months.

5. Are there any plans to continue this work?

Yes. As we near 20 years of our rainforest research and restoration programme in the Valparai landscape, a number of plans are being put in place to broaden and scale up our restoration and research initiatives. Data collected and protocols developed over the last 18 months through our Rufford project provide a template and baseline for periodic long-term monitoring of ecological processes and recovery across our expanding network of restoration sites. Ongoing and future work also aim to monitor a wider range of biodiversity groups such as birds and mammals, and more comprehensively monitor ecosystem functions such as carbon sequestration. The partnerships and networks with other restoration practitioners and scientists established over the course of this Rufford project also offer exciting opportunities for expanding our restoration monitoring efforts to other regions and ecosystems.

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

(A) Srinivasan Kasinathan led a presentation of our research findings as an oral presentation at Student's Conference in Conservation Science – Bangalore 2017.

Anand Osuri led a poster based on the work at the annual meeting of the Ecological Society of America in New Orleans, USA (2018). Anand Osuri was a panellist and speaker and presented data results from this project at a webinar titled “Biotic interactions in the tropics. Challenges for restoration and conservation in the Anthropocene”, which was organized by the Association for Tropical Biology and Conservation and the Society for Ecological Restoration during September 2018.

(B) Two scientific manuscripts describing the research findings are in preparation and will be submitted to widely-read journals in the fields of restoration ecology and applied ecology. As and when these are published, we will engage with the media and write blogs to ensure that our message reaches a wider audience.

(C) We have published one semi-technical article on ecological restoration and forest recovery in the Valparai landscape, including material from the current project, in the magazine “Current Conservation” URL: <https://www.currentconservation.org/issues/restoring-rainforest-remnants-experiences-from-the-anamalai-hills/>. The detailed project report (included as a separate submission) will be updated with results from the scientific articles and made into a booklet that will be submitted to plantation company managers and the forest department, and posted online.

(D) Our restoration workshop brought together restoration practitioners and scientists for our workshop and catalysed the establishment of Ecological Restoration Network India. Some of the workshop participants have expressed interest in building on our workshop format and materials to organise restoration workshops in other parts of India. We look forward to contributing to these future workshops as co-organisers, resource persons and/or participants.

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 original duration of the grant was 12 months starting February 2017. Some components for the field work were delayed due to unseasonal rain towards the end of 2017, which necessitated a six-month extension. The grant was therefore used for 18 months from February 2017 to August 2018.

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
Project research assistant salary	2778	2722	+56	Some of the assistant’s time was paid from another project
Field assistant salary	2760	2687	+73	Some of the assistants’ time was

				paid from another project
Accommodation and utilities	287	287	0	
Travel and transport (including vehicle hire and fuel)	2622	2793	-171	The costs associated with travel for field work were higher than initially anticipated because (1) we sampled more sites than originally proposed and (b) fuel prices increased over the last 18 months.
Field equipment	380	401	-21	This head was slightly exceeded due to the purchase of a wind speed sensor for our weather station, which was not included in the original budget.
Consumables (including for soil analysis)	380	490	-110	The importance of expanding the soil-related work was recognized during the project and this entailed some additional analyses and increased expenditure under this head.
Workshop	598	587	+11	
Publications	150	0	+150	A booklet summarizing key project findings for stakeholders will be finalised after the scientific manuscripts are completed. This will be published using resources at NCF, and funding support from RSG will be prominently acknowledged.
Office costs/communication	32	7	+25	Decreased tariffs for mobile telephone and internet
Other costs	0	13	-13	International bank charges
TOTAL	9987	9987	0	Exchange rate: £1 = ₹ 83.75

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

An important next step is to complete writing up the project research as two scientific articles that we will aim to publish in widely read journals in the fields of restoration and applied ecology. Research of this nature is generally underrepresented in the scientific literature, and especially so in the South Asian tropics. Simultaneously, it is important to disseminate the scientific findings in more accessible formats to private land owners and forest administrators, whose involvement and support are crucial for sustaining and scaling up restoration efforts.

Building on the scientific insights gained and baselines established during this project, it is important to carry the research momentum forward through rigorous and long-term ecological monitoring programmes alongside our ongoing restoration

efforts. Such research would address theoretical as well as conservation and policy relevant questions.

Our restoration workshop catalysed interest and efforts towards establishing a common platform for restoration practitioners and scientists in India. Currently a 29-member email mail list named Ecological Restoration Network – India, an important next step would be collectively develop other mechanisms for strengthening and sustaining the interchange of ideas, experiences and resources amongst India's ecological restoration 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 prominently displayed in the acknowledgements sections of all presentations that drew from RSG project work. The logo will be printed on report booklets for plantation company managers and forest administrators that are in development. The Rufford Foundation will be acknowledged in all scientific articles that are based on the project data.

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

Anand Osuri – Project lead. Developed research ideas, supervised data collection, led analysis and preparation of scientific outputs. Led workshop organization.

Divya Mudappa – Project co-lead. Provided inputs at all stages of research projects. Organizer and key resource person for restoration workshop.

TR Shankar Raman – Project co-lead. Provided inputs at all stages of research projects. Organizer and key resource person for restoration workshop.

Srinivasan Kasinathan – Employed by the project as a research assistant. Organized and led all the research field work and data collection. Organizer and key resource person for field-based activities at the restoration workshop.

Sundarraaj – Employed by the project as a field assistant. Supported the team during field work.

Vanidass – Employed by the project as a field assistant. Supported the team during field work.

Manjunatha Chandregowda – Soil scientist and independent researcher. Collaborated on soil-related research within the project. Resource person at the restoration workshop.

Mrinalini Siddhartha – Research assistant with the rainforest restoration programme. Assisted at various times with field work. Organizer and key resource person for field-based activities at the restoration workshop.

Sathish, Stella, Murthy, Ambika, Selvarani, Kumar, Vijaykumar – Employees of other projects under the rainforest restoration programme who provided occasional yet valuable assistance during field work.

Smita Prabhakar, Naveen Raj, Vinay Hegde – Accounts and grant administration

12. Any other comments?

We are grateful to The Rufford Foundation for funding our work. We thank the Tamil Nadu Forest Department for granting research permits for field work within the Anamalai Tiger Reserve. We have also benefitted greatly from the long-standing support and encouragement from our partner plantation companies, Parry Agro Industries Ltd., Tata Coffee Ltd. and Tea Estates India Ltd.

