

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. 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	Maan Barua
Project title	Conservation of Figs and Frugivores in Assam, India
RSG reference	09.03.09
Reporting period	
Amount of grant	£6,000
Your email address	maan.barua@ouce.ox.ac.uk / maanbarua@gmail.com
Date of this report	April 21, 2011

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
Investigation of the role of <i>Ficus</i> trees in agroecosystems as a food source for frugivores			√	We were able to determine how patterns of frugivory changed with land use intensity, and have significant results. This was what we had hoped to achieve at the outset of the project, but we believe there is a lot more scope to do additional work and to add to our findings.
Identification of threats to <i>Ficus</i> in Assam			√	We identified key threats to figs within the landscape by mapping tree distributions and examining peoples' practices relating to cutting down of trees. In order evaluate population viability of figs there is a need to examine seedling recruitment in the future.
Assessments of threats to frugivores in Assam			√	We were able to assess threats to frugivores
Determining local perceptions of <i>Ficus</i> and social practices relating to <i>Ficus</i> in agroecosystems			√	Fully achieved
Assessment of the feasibility of a community-based <i>Ficus</i> conservation programme			√	A roadmap for implementing a future community-based conservation programme has been devised

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

The ecological research component of the project was stalled in the middle due to excessive monsoon rains. We then had to extend our study period by 3 months and were eventually able to generate the desired number of samples. The key learning from this for us (and others working in similar climate conditions) is to have a buffer of 2 months so that work can be continued at a later stage.

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

(1) *Enhanced understanding of the biogeography and conservation of Ficus and frugivores in agricultural landscapes outside Protected Areas*

The project made important contributions toward understanding how processes of frugivory play out outside protected areas. We found that *Ficus* helps sustain frugivore populations in a wide range of matrix habitats, and potentially help in the dispersal of frugivores. However, there was a decline in forest dwelling species (e.g. great hornbill, blue-eared barbet) as distance from forest fragments and agricultural intensity in the landscape increased. Similarly, visitation frequency of frugivores and the number of fruits consumed per visit decreased with agricultural intensification. This suggests that as land use pressures increases, there may be a decline in the dispersal of *Ficus* seeds.

⇒ This outcome has important conservation implications, as it points to the need to maintain habitat heterogeneity if processes of frugivory are to be maintained outside protected areas.

Further, we found that the most effective dispersers of the Banyan fig (*Ficus benghalensis*), India's national tree and a species with larger synconia (fruit), were birds that were larger-bodied than those on other species of *Ficus* (Fig. 1). Frugivorous birds showed shifts in fruit-handling behaviour as the size of the synconium increased: species that swallowed smaller fruit pecked or bit at larger synconia, resulting in a decline in seed dispersal efficiency. Moreover our study suggested that larger-bodied species were more susceptible to hunting pressures in the landscape.

⇒ This outcome suggests that it is vital to conserve larger-bodied frugivores such as hornbills and green pigeons if *Ficus* such as the Banyan are to survive. Local awareness should be raised so that hunting pressures on frugivorous birds are minimised.

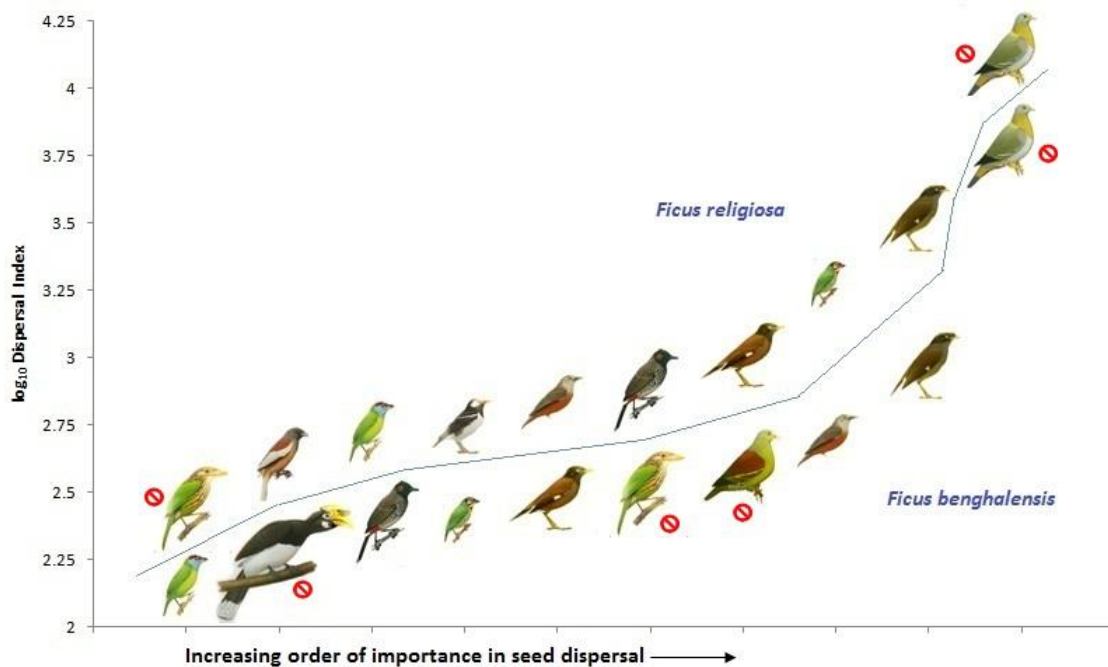


Fig. 1: Dispersal indices for the ten most important seed dispersers of *Ficus benghalensis* (larger fruit) and *Ficus religiosa* (smaller fruit) in the agricultural landscape. Larger-bodied species are

more important for dispersing seeds of *Ficus benghalensis*. Red marks indicate species on which hunting pressures are locally high.

(2) Generation of relevant data on the cultural significance of *Ficus* and development of a roadmap for building a culturally-attuned model of *Ficus* conservation outside Protected Areas

This study generated empirical data on the local cultural significance of figs and perhaps for the first time showed the opportunities and pitfalls in using them for conservation. We found that the overall economic importance of *Ficus* was low in comparison to other trees in peoples' home gardens. As a consequence, people seldom plant *Ficus* trees, but once individuals attain a particular size and morphology, religious values are endowed upon them (Fig. 2). This is particularly true for three species – *F. benghalensis*, *F. religiosa* and *F. virens*. Further, trees also have a social value as a resting place or marker of place. Our study found that trees that had temples or shrines were larger in size than those that did not (Fig. 3), potentially making them less vulnerable to being cut down. However, few people were willing to take individual responsibility to conserve *Ficus* trees in villages, and most suggested that some form of public action should be taken to conserve them (Fig. 2). This suggests that local traditional institutions might be used to conserve *Ficus* trees in the landscape, as they function as 'sacred groves' at very small (tree-level) scales. As conservationists, we might be able to supplement existing cultural institutions through awareness, and potentially generate considerable purchase from a locally-valid approach.

⇒ This outcome has enabled us to generate a roadmap for future conservation activities (see section 5).

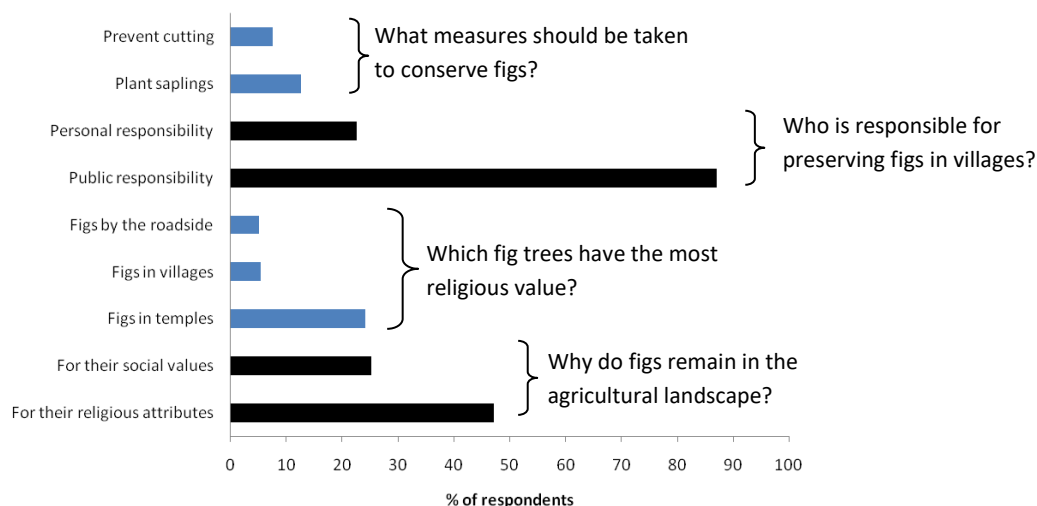


Fig. 2: Responses to some important questions regarding local perceptions of *Ficus* trees. Religious values were important for the sustenance of *Ficus* in the landscape.

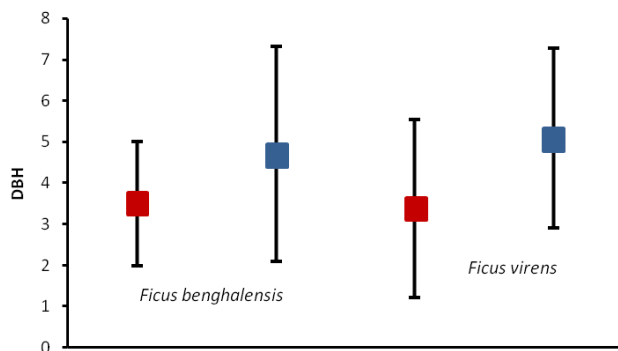


Fig. 3: Diameter at breast height (DBH) of trees that have shrines (blue) and those that do not (red). Shows that trees with shrines are larger ($P \leq 0.05$ for both pairs).

(3) *Development of local capacity to conduct conservation research and outreach*

The third most important outcome of this project has been the building of local capacity to conduct research and to do conservation work. The PI was given the opportunity to work with a range of people including conservation academics, conservation NGOs, and most importantly, local youth. It has helped him bridge ideas between conservation theory and its implementation in practice, and has significantly contributed to his understanding of both the science and social aspects of conservation on the ground. Moreover, the lead field assistant (Jatin Tamuly) benefited considerably from the various links enabled by the project, notably through interactions with the scientific community at the School of Geography and the Environment at Oxford. JT was trained in field data collection methods, social surveys and in preliminary data analysis. In addition, he ran a conservation outreach programme involving school children and as a result has substantially improved his communication and motivational skills.

⇒ We believe this is an important outcome of the project as it provides scope for training more individuals to conduct research and monitor frugivore-*Ficus* interactions. There is an overall lack of research capacity in many parts of India, and such capacity building could contribute to an important shortfall and potentially lead to the development of a new generation of local conservationists.

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

This project worked closely with six local youth in mapping *Ficus* trees and monitoring frugivores within the landscape. These individuals were trained in *Ficus* and bird identification skills, and by the end of the year were able to independently collect data on frugivore usage of *Ficus*. Two of these youth were also employed in the local ecotourism sector as a result of their improvement in natural history skills after being involved in the project.

We conducted awareness programmes amongst school children in different schools within the landscape to try and understand how future conservation outreach activities might be planned. Four village schools were targeted. Team members gave talks about *Ficus* trees in the landscape and their conservation value. There was high attendance, and we reached out to over 200 students and teachers. After the talk, selected students (age category 14-17) were taken the following day to a fruiting fig in the landscape to observe birds and learn more about frugivory. Students were taught basic skills in bird identification and how to observe birds in the field. Further, they were given on-ground demonstrations of how *Ficus* trees are pollinated by fig wasps, how their seeds are dispersed

by birds and bats, and the ecological importance of these trees as keystone structures. A total of 24 students from four different schools took part in the field awareness programme that spanned over six weeks.

5. Are there any plans to continue this work?

We feel that the findings of this project are important and there is an urgent need to continue the current work on two fronts: (1) ecological research; and (2) conservation outreach. Further, the project has made local youth interested in conservation work, and we feel there might be considerable purchase from continuation of this work. A roadmap for future work is detailed in section 9 of this report.

In the next 2 months we hope to:

- (1) Popularise our findings through the media / Write up the findings for a journal so that the findings are available to the international community.
- (2) Continue small-scale monitoring of figs and frugivores in the study landscape.
- (3) Impart more training to the project team to develop their communication and motivational skills so that this can be utilised in future *Ficus*-oriented conservation outreach programmes.

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

- (1) A final project report has been compiled. This will be disseminated amongst local NGOs, Forest Department and key individuals in the study area.
- (2) We will now write two popular articles on *Ficus* and conservation outside protected areas (one for a local newspaper / periodical) to further publicise the findings and conservation implications of our study.
- (3) We hope to publish two academic papers: (i) one on the ecological aspects of *Ficus*-frugivore-landscape interactions and (ii) one on the human dimensions of *Ficus* conservation (potential journals: *Biodiversity & Conservation* / *Oryx*)
- (4) Design and distribute a poster to create local awareness

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

We started our project in September 2009 and it was completed in April 2011. Initially, we had planned to complete the project in 15 months, but for various reasons, had to extend the project to 19 months from start to finish. The RSG was used over a 14 month period from September 2009 to November 2010.

A more detailed outline of the anticipated and actual components of the project are presented below. The project had to be extended on the following grounds: (1) excessive monsoons during June 2010 lead to delays in frugivore monitoring; (2) assessments of threats to *Ficus* trees involved extensive mapping of over 470 trees in the landscape and this was not initially factored in; (3) we did not budget enough time for data analysis and writing up, both of which were time-consuming activities.

We feel this was a big learning curve for us in terms of project implementation. In the future, there is both a need to plan for contingency in terms of weather (for ecological work) and time for data analysis, writing up and dissemination need to be budgeted more liberally.

Blue indicates initial proposed timeline; actual implementation in pink

Sept 2009	Dec '09	Mar '10	June '10	Sept '10	Dec '10	Mar '11	Apr '10
Ecological research on <i>Ficus</i> and frugivores							
			Paused due to excessive monsoons				
Assessments of threats	Started earlier as mapping of trees not factored in						
Social surveys							
	Began later as ecological work took more time						
Conservation programme							
	Delayed as social survey data was not analyzed						
Data analysis and write up	Not factored initially						
	Project was extended as data analysis and writing up took considerably more time						

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.

Heading	Item	Budgeted Amount	Actual Amount	Difference	Comments
Field equipment	GPS	200	212	+12	
	Clinometer, Measuring tape	50	42	-8	
	Other materials (rope, herbarium sheets, etc)	100	0	+100	Met through personal sources
Travel Costs	London-Delhi return	445	480	+35	Cost exceeded due to changes made in departure dates
	Guwahati-Delhi return	170	216	+46	Rise in air ticket price
	Guwahati-field site	50	75	+25	
Research assistant salary	Permanent project assistant	1710	1425	-285	The PPA took his salary for 12

	salary				months and not the 15
	Local members honorarium	300	277	-23	
Community outreach programme	Focus groups with village bodies	350	240	-110	We conducted three workshops and not five as initially planned
	Village youth training	300	370	+70	Several training sessions held; worked with individuals throughout the year
Accommodation and Food		580	620	+40	
Local Travel and Fuel	Vehicle hire	700	1295	+595	Our fieldwork period was extended by 4 months; we also incurred greater expenditure because of added local travel for social questionnaire surveys
	Fuel	700	1034	+334	As above
	Total	5655	6286	+731	Exchange rate at £1= Rs. 72.00

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

We believe that there is significant scope for developing interdisciplinary modes of conservation research and practice through further work on *Ficus* in the landscape. The findings of the project are significant, and show exciting prospects for incorporating extant cultural practices to develop modes of doing conservation outside protected areas. The initial ground work done by this project is an ideal platform to foster community involvement and to make an impact on *Ficus* and frugivore conservation. Areas for future activity that have been identified by this pilot project are outlined in the figure below (see Fig. 4). The most important next steps include:

- (1) Ecological research to understand the *Ficus*-frugivore system better:
 - a. Examine dispersal capacity of frugivores for different *Ficus* species (both bird and mammal dispersed).
 - b. Understand fruiting phenology of *Ficus* in relation to other trees.
 - c. Look at sapling recruitment in order to better identify threats to *Ficus* regeneration.

(2) Direct conservation interventions in the form of:

- Starting a *Ficus* plantation programme involving a tripartite arrangement of local youth, community elders and conservation NGOs.
- Enhance capacity building amongst local conservationists for *Ficus*-oriented conservation research, and community outreach programmes.
- Developing a sustained outreach programme with 2-3 local schools.

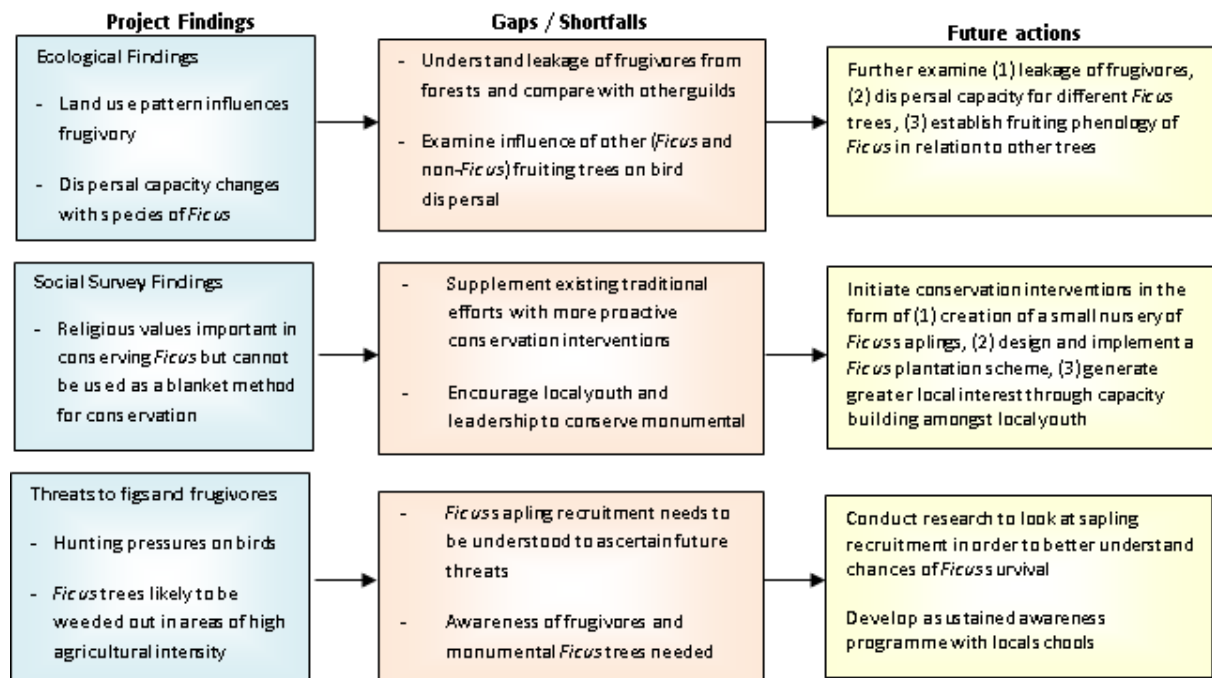


Fig. 4: Future steps for *Ficus* conservation in the region.

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?

All of our awareness programmes had banners with the RSGF logo on it. This allowed local participants to know about RSGF support. Moreover, news about this project was publicised through the bulletin of the School of Geography and the Environment at the University of Oxford. A brief profile of this research was also put up on PI's academic profile with a link to the RSGF website. The PI has been invited by the Institute of Australian Geographers to present this research at a forthcoming conference in Australia this summer. We hope to publicise RSGF's contribution in this important forum on human-plant geography.

11. Any other comments?

We have been unable to publicise our research through the local media thus far as a lot of the data analysis had not been completed till recently. Now that significant findings are available, we will be publicizing some of this work both through the Assamese and English press in the state.