

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	Ayesha E. Prasad
Project title	Impact of Lantana camara, a major invasive plant, on wildlife habitat in Bandipur Tiger Reserve, southern India
RSG reference	17.09.06
Reporting period	2007-2008
Amount of grant	£ 4990
Your email address	ayasha@ncf-india.org
Date of this report	25th June 2008

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. To determine the effects of Lantana on forest-tree regeneration rates and grass growth.			✓	See Study 3 of project report
2. I will map the distribution and intensity in Lantana infestation across the Park			✓	See Study 1 of project report
3. Patterns in wild herbivore habitat use using dung-pellet counts			✓	See Study 3 of project report

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

After the proposal for funding was submitted to the Rufford Foundation, it was decided, based on discussions with senior scientists at NCF, that an enclosure experiment be initiated as part of objective one. That is, objective one would involve two simultaneous experiments – a natural experiment within the Tiger Reserve and an enclosure experiment in degraded forest land outside the Reserve. An electric solar-powered fence was purchased and erected for the enclosure experiment and forest regeneration was being monitored on both sides of the fence (with and without herbivory treatments). The experiment was begun in May 2007 and was expected to end in May 2008, after one year of repeated sampling in each of 4 seasons. In February 2008, however, at the start of the dry season, a forest fire spread to the enclosure and burned the experimental plots. No further sampling could be carried out in these plots as they were badly charred. As a result this enclosure experiment had to be abandoned.

Forest fires are common in this area and vegetation plots need to be guarded against fires by constant watching and creating fire-breaks surrounding the plots. In this case, even though there was no significant vegetation between the forest, from where the fire came, and our plots, due to the exclusion of herbivores, grass over a meter in height had grown inside fence and probably caught alight from a flying ember. It was a windy day and before my assistants were able to reach the plots and extinguish the fire, most of the plots had already burned. While I do have 7 months of regeneration data from the enclosure, this may not suffice for rigorous statistical analyses. This was an entirely unexpected turn of events, and I was extremely sorry to abandon what would have been a very interesting and insightful experiment.

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

1. I was able to explore and establish the usefulness of a relatively straight-forward method to describe the severity of Lantana invasion at the landscape level. With minimal sampling of Lantana in the field, which is difficult and time-consuming, I was able to map Lantana distribution in Bandipur Tiger Reserve, using satellite imagery and other GIS information. Further, this approach can be used in seasonally deciduous forests across India, after accounting for site-level phenology, rainfall, and other relevant conditions. Future Lantana-related work in Bandipur may also use this technique to assess the occurrence and severity of invasion.

2. I was able to assess the impacts of Lantana invasion, along with other locally prevalent forms of forest degradation such as livestock-grazing and edge-creation, on forest vegetation. Few studies in the tropics, particularly in India, have addressed the effects of exotic plants on native flora. This project showed that Lantana is having significant impacts on forest structure – trees, tree seedlings and understory, as well as species composition. This is, thus, a wake-up call to pay greater research and management attention to Lantana and exotic plant invasion in general. Specifically, it strongly suggests taking immediate action to remove this species, and restore invaded habitats, if these forests and their wildlife are to be effectively conserved.

3. Owing to over 3 years of time spent in the field, during the project as well as in preparation for it, I have witnessed 3 seasonal cycles in these forests. I have been able to observe the phenology of Lantana, other invasive plants and native vegetation. I have also witnessed yearly dry season fires and the response of forest vegetation to these fires that vary in their spread and intensity. I have observed habitats that vary in their levels of exploitation by people, natural forest vegetation type, and levels of invasion. This has enabled me to understand this endangered forest ecosystem to a greater degree, particularly with respect to exotic plant invasion. This greater understanding has paved the way for further work in the area that explores the most effective ways of dealing with the Lantana invasion problem. Several ideas have been spawned and several potential avenues for greater research and collaboration have been opened. This time also helped in building trust among the local communities and co-operation with Park authorities for future work.

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

My entire field team consisted of youth from local communities, predominantly the indigenous Kuruba community. I spent over 3 years interacting with them, and their families. They worked in the capacity of assistants, trackers, guides, and friends. Based on their input field sampling protocols and schedules were developed. They were enthusiastic about the work, especially because it addresses Lantana which they perceive as a real and serious threat to 'their' forests.

While they imparted their traditional forest knowledge and experience to me, they were also trained in several research techniques including vegetation sampling, large mammal sampling, the use of GPS, and photography. They were, for the first time, exposed to scientific research, understanding how the forest works, the importance paying attention to detail, the natural history of the plants and animals around them, and the urgent need to conserve the forest and its resources. Several of them were exposed to the English language, computers and other technology for the first time. They were able to earn steady salaries instead of sporadic, and undependable daily wages from labour. As a result some of them began to save, opening bank accounts and investing in more sustainable livelihoods such as farming. Several of these assistants are keen on participating in any further work.

As a result of my close rapport with my field team I was acquainted with their families and their culture. I believe these three years have been a time for important capacity as well as trust-building. I have been able to garner the support of these local communities, including the Kuruba, and the local Park staff for taking this work ahead.

5. Are there any plans to continue this work?

This project has emphasized the need to initiate research on the most effective and ecologically sustainable methods to rid these forests of Lantana. I believe that the necessary next step is to experiment with different removal-restoration methods at the level of the landscape and identify the best strategy. The state forest department together with Bandipur Tiger Reserve authorities have expressed an interest in supporting this experiment. Therefore, a next phase is imminent. I plan to design the study and raise funds to support it in a year's time, once the current project is concluded, and all the results have been disseminated.

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

The results of this work will be disseminated as:

1. Technical reports to funding agencies – The Rufford Foundation, and Save the Tiger
1. Fund whose joint support made the work possible
2. Technical report to the Karnataka Forest Department
3. Technical report to the Nature Conservation Foundation
4. Peer-reviewed papers in internationally-acclaimed journals
5. PhD. Dissertation to the State University of New York, College of Environmental Science and Forestry

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 funds were received in 2007 and were used between March 2007 and May 2008. The overall project duration was January 2006-June 2008. The work was also supported by the Save the Tiger Fund (STF; National Fish and Wildlife Foundation,

Washington D.C., USA). Work prior to the receipt of the RSG was supported by the STF grant.

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. All figures in £ sterling, with 1 £ = approx. 85 INR

Item	Budgeted Amount	Actual Amount	Difference	Comments
Investigator stipend	1224	1227	-3	
Field assistants (FA) salaries	512	627	-115	I hired an extra part-time field assistant.
Research assistant (RA) salary	512	0	512	I did not need to hire a research assistant
AWD vehicle hiring charges	390	496	-106	Duration of field work was extended, and hence vehicle needed to be hired over a longer period.
AWD vehicle maintenance & fuel	1200	654	546	Total distance travelled within the study was much lower than expected. Consequently, only about 50% of the budgeted fuel and maintenance costs were realised.
Equipment and supplies	136	1492	-1356	The major expense was an electric fence serving as an enclosure for an experiment investigating the combined effects of herbivore exclusion and Lantana removal on forest regeneration. This was not originally planned and was a later inclusion to the larger project. The cost of the fence was around 1340 GBP.
Food	736	252	484	My team and I spent fewer days in the field than anticipated
Rent	160	71	89	For the last study we camped and did not need to rent the field station. Even during the other studies, overall time spent in the field was less than expected
Field station expenses	40	65	-25	
Miscellaneous	80	97	-17	Included extra travel for field assistants as well as some minor

				hospital expenses in addition to budgeted travel, communication and stationary costs.
Total	4990	4981	9	

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

The most important next step with regard to the problem addressed in this work is research into methods to remove Lantana, restore degraded invaded habitats, and control spread of the species, in an ecologically sound manner.

Further, other local drivers of degradation such as livestock-grazing, fuelwood harvest, fire and clearing must be addressed. Greater research and development with respect to alternative livelihoods for local forest-dependent communities must be planned and supported.

Research into economically viable and ecologically safe harvest and processing of Lantana for fuel would provide greater incentive for the rapid removal of this plant from invaded areas, and help to partially alleviate fuelwood pressures on the forest.

Overall increase in the level of awareness regarding the negative impacts of exotic species, as well as other widespread forms of degradation, is critical, particularly among local and indigenous communities for sustainable conservation in this landscape. Community-based conservation, capacity building, awareness-creation, and hands-on involvement in research and conservation are ways to foster greater co-operation, participation and goodwill among local forest-dependent communities. This will also help to mitigate pressures on the forest and its resources.

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?

Interim reports to the forest department have acknowledged the RSG. All upcoming reports and manuscripts to journals will also acknowledge the Foundation. Several presentations of the work did include acknowledgement of Rufford support as well as the Rufford logo. I also recommended The Rufford Foundation as a source of support to several colleagues and fellow-researchers.

11. Any other comments?

Once again, the loss of the enclosures experiment and the investment made in it is deeply regretted. However, the remainder of the funds were crucial for the successful completion of this work and are sincerely appreciated. The timely manner in which grant proposals are reviewed, the broad scope of the Foundation's funding interests and the overall ease of interaction with the Foundation, makes the RSG a significant source of support for small projects dealing with important conservation issues.