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	Zuzana Burivalova
Project title	Impact of illegal selective logging on biodiversity and ecosystem services in Madagascar
RSG reference	11576-1
Reporting period	1st May 2012 – 30th April 2013
Amount of grant	£6,000
Your email address	zuzana.burivalova@env.ethz.ch
Date of this report	8th May 2013

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
Estimate the original and current density of logged species		yes		A model with past, current, and future densities of rosewood and ebony was created, based on field observations and existing literature. The model considers all logged species as one group. (See 6.)
Impact of logging on invasive plant species		yes		Half of the historical plots that we planned to use to study the invasive plants were burnt for agricultural expansion, therefore the effect of logging could not be separated from the effect of fire and cultivation. The resulting number of plots was too small to draw decisive conclusions about the impact of logging on invasive plants. However, even the limited number of plots is informative for future research.
Impact of logging on invasive ant species		yes		Ant samples from logged and pristine sites in Masoala are currently being identified to species level by Nandi Fatro (PhD student in Antananarivo, Madagascar). Planned completion: June 2013.
Help prioritise national park protection		yes		We created a map of Masoala National Park with recent forest disturbances (See 6.) and seemingly undisturbed areas. We verified our classification on the ground.
Quantification of carbon loss through selective logging			yes	We quantified the long and short-term carbon loss through the selective logging and general deforestation in Masoala National Park (See 6.).
Exchange of knowledge with a Malagasy PhD student			yes	A continuing collaboration was established with a Malagasy PhD student, Nandi Fatro, who received training in basic GIS, field navigation, and sampling design in ecology during the two field seasons.

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

During the first fieldwork (May 2012) it became apparent that it is impossible to detect the illegal selective logging on the Masoala peninsula using even the highest-resolution satellite images. We confirmed in the field that approximately 60% of areas, which were assigned the class `selective logging' during a preliminary classification of satellite images, were in fact damaged by natural

landslides. Nevertheless, in order to study the impacts of selective logging on the flora and fauna, we needed to know the exact locations of this low-density forest exploitation.

We decided to tackle this by trying a new technology, the `conservation drone', an unmanned small airplane capable of taking georeferenced pictures and videos with a resolution superior to satellite images (see conservationdrones.org). During the second fieldwork (October – December 2013) we tested this new technology in three different areas of the Masoala peninsula, with a conservation drone kindly donated by the Applied Ecology and Conservation group (this additional cost was not envisaged when originally applying for the RSGF). We obtained good photographic material from areas that are relatively flat, for example on the eastern side of the peninsula (see photos and video available at http://www.youtube.com/watch?v=rZGiTQmkM1o). Flying over hilly terrain was, however, difficult and the conservation drone will need to be adapted to efficiently detect and monitor the illegal selective logging in Madagascar.

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

The importance of selective logging
Through the observations we made in the field, satellite data analysis, the preliminary data obtained using the conservation drone, and through literature review, we established how important the illegal selective logging is compared to non-anthropogenic damage to the forest (frequent cyclones and flooding) and general deforestation, mostly through slash-and-burn agriculture (paper in preparation, see 6.).

Testing of a new technology in conservation
By testing a new technology, the conservation drone, in Masoala for the purpose of our project, we gained a lot of experience, which will be valuable if the conservation drones are used also in other conservation projects in Madagascar in the future. Representatives from numerous conservation organisations were present in the field during the test flights (including the Madagascar National Parks and the Wildlife Conservation Society Madagascar) and were able to see the potential of this technology in, for example, monitoring of protected areas.

Ground verification of forest degradation visible on satellite imagery
We established that not all of the recent damage to the Masoala forest visible on high-resolution satellite images (QuickBird) is anthropogenic. This result is very important with respect to estimating the current deforestation rate, which is in turn crucial for estimating the human caused emissions of carbon dioxide. Additionally, our results also emphasise the need to develop better tools that can distinguish between anthropogenic and natural forest degradation, such as the conservation drone.

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

During the two fieldwork seasons, we employed, in different villages, eight assistants and local guides. All of these, by the end of our stay with them, understood what we were studying, were enthusiastic about our aims, and gained a good salary. I taught two of the guides, who were very interested, basic skills in navigating in the forest with a map and compass.

5. Are there any plans to continue this work?

Our project opened up numerous exciting possibilities for conservation and its study on the Masoala peninsula. Depending on the results from the ongoing ant identification, it may be interesting to extend the use of ants as indicators for example in reforestation projects within Masoala, or compare the results to other sites with similar environmental problems, e.g. Makira Reserve.
Secondly, we hope to make full use of the conservation drones in Masoala and elsewhere in Madagascar as a forest monitoring tool. Particularly, we believe that the conservation drone can bridge the gap between satellite images, that provide a good overview of entire regions, but are infrequent and obscured by cloud cover, and field visits, that can provide very detailed data, but only at a very local scale.

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

Carried out:

Presentation at the Wildlife Conservation Society Madagascar (Antananarivo, May 2012)
After the first fieldwork season in May 2012 I gave a 20 minute presentation to the staff of the WCS Madagascar. In the presentation I focused on the results of the satellite image analysis, compared to our findings in the field.

Presentation at the Madagascar Symposium (Zürich, Switzerland, April 2013)
Together with Prof. Lian Pin Koh, we gave a 20 minute presentation entitled 'Conservation drones: a new tool for monitoring forest and wildlife'. My part of the talk focused on the outcomes of the research in Masoala National Park I carried out over the last year. The help of the RFSG was acknowledged. (Abstract: http://www.madagascar.ethz.ch/Programme/ProgrammeKoh.html)

A short film 'Conservation drones in Madagascar'
Using the video and photographic material I collected on the ground and from the conservation drone, I assembled a short film, aimed for non-scientific audience. The main purpose of this light-hearted film is to increase the awareness of the environmental problems that threaten the forest on the Masoala peninsula. The help of the RFSG is acknowledged. The film is available at http://www.youtube.com/watch?v=rZGiTQmkM1o.

Additionally, our work in Masoala National Park was filmed by the Swiss television SRF and appeared in a documentary about the involvement of the ZOO Zürich in conservation of Masoala National Park. The documentary can be seen at http://www.srf.ch/player/video?id=5979B9CA-5237-40D1-BF8D-18BD036D96ED&referrer=http%253A%252F%252Ftvprogramm.srf.ch%252Fdetails%252F6e2c8060-8385-4bbe-b43c-ceb5be3d6111.

Planned:

The main results are summarised in two papers, to appear in press later in 2013, provisionally entitled:
Are current precious wood and forest conservation policies insufficient for complex causes of deforestation and forest degradation? Burivalova et al., in preparation.
Distinguishing anthropogenic and natural causes of forest degradation in a tropical humid forest. Burivalova and Fatro, in preparation.

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

As planned, the grant was used over the period of 1 year from May 2012 to April 2013.

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
Internal flights (Antananarivo – Maroantsetra – Antalaha) (EUR)	1,010	1,693	-683	Extra return flight for a guide from Masoala National Park from Maroantsetra to Antalaha, extra fees for baggage, higher flight prices.
Local transport (MGA)	580	676	-96	High cost of petrol caused high prices of boat transport.
Salary for local help (MGA)	450	493	-43	More local assistants employed, to help with different aspects of the project.
Food in the field (MGA)	1,320	729	+591	For a part of the fieldwork food for the team was sponsored by the ZOO Zurich.
Camping equipment for Malagasy PhD student and guides (EUR, CHF)	400	497	-97	Extra cost: hiking shoes, waterproof jacket and bags for Malagasy student.
Water filter + purification (CHF)	85	100	-15	
Medical supplies (CHF)	100	100	0	
Specimen preservation and transport (USD, EUR)	450	438	+14	Costs for laboratory work after fieldwork paid from additional funding.
Paper for herbarium	85	0	+85	Not needed
Malagasy PhD student fees (12 months) (MGA)	1,410	82	+582	The remainder of the student fees was paid from additional funding.
Fieldwork material (EUR, MGA)	110	448	-338	A camera and batteries needed for 2nd fieldwork, due to damage during the 1st fieldwork.
Total	6,000	**6,000**	0	

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

Firstly, we will focus on publishing our results in two separate papers in scientific journals. At the same time the ant samples that were collected on the Masoala peninsula will be identified to the species level over the next few months. Hopefully, this will provide some insight into the influence of

selective logging, cyclone, and fire on the ant diversity of Masoala, which will then be used to further refine future research.

Secondly, the possibilities of improving and adapting the conservation drones to the use in Madagascar's humid forests will be researched. Several partners capable of providing technical help have already been contacted. If the conservation drones prove to be cost-efficient, they will be employed to monitor repeatedly a selected area of a forest impacted by selective logging and other types of disturbance. This will enable the creation of a dynamic land cover map, useful in studying further the interactions between different deforestation and forest degradation drivers.

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?

The support of RSGF was acknowledged in both presentations that were given during the funding period and in the short film compiled (details in 6.). The RSGF will be also acknowledged in both scientific papers that we are preparing.