

Final Project Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF 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 – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Complete the form in English and be as concise as you can. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

| Your Details | |
|----------------------------|---|
| Full Name | Sheherazade |
| Project Title | Pollination services of the flying foxes on ecologically and economically important plants in Sulawesi, Indonesia |
| Application ID | 21903-1 |
| Grant Amount | £5,000 |
| Email Address | sheherazade12@ufl.edu |
| Date of this Report | 26 th January 2018 |

1. 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 understand flying fox pollination services to durian and significance to local economy | | | | <ul style="list-style-type: none"> • I managed to do floral biology study of durian to know if it depicted chiropterophilous (bat-pollinated) syndrome. • I worked together with the local people to set up 30 camera traps at seven durian trees (20 m tall). These cameras successfully recorded several species of bats feeding on the durian's flowers. • I monitored the durian fruit sets under the experiments until Day 60 and recorded its market price in order to quantify the economic value of bat pollination services. |
| To compare pollination services of endemic and widespread flying foxes. | | | | <ul style="list-style-type: none"> • I captured 33 individuals of endemic flying fox (<i>Acerodon celebensis</i>) and 53 individuals of more relatively widespread species (<i>Pteropus grisesus</i>). • I managed to classify pollen collected to different morphotypes and identify which plant species these pollens belong to. |

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

The flowering of durian trees was delayed due to the unpredictable weather conditions. I changed my field site from the one originally planned in central Sulawesi, to another village, which was Batetangnga, west Sulawesi. This village was one of the biggest producers of semi-wild durian in the Regency, and worked well for my data collection.

I planned to compare pollen composition and diversity on a widespread species of black flying fox (*Pteropus alecto alecto*) to a flying fox species with a narrow geographic range, the Sulawesi flying fox (*Acerodon celebensis*). I could not

capture the black flying fox (*Pteropus alecto alecto*) as I originally intended, due to limited access to the roost areas. I set up a mist net at the edge of the island where the bats were, but they unpredictably still flew above the maximum heights of my nets. I could not put the mist nets closer to the roost since it might disturb the bats. Thus, I captured another species with a narrower distribution than *P. alecto alecto* but that still had a wider geographic range than *A. celebensis*. The new species was *Pteropus griseus*. I still could achieve my objective to compare the diet and pollination services between endemic and widespread species of flying foxes.

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

- a). I confirmed that bats were the primary pollinators of semi-wild durian in Sulawesi. These bats included *Eonycteris spelaea*, *A. celebensis*, and *P. alecto alecto*.
- b). I documented that flowers visited by flying foxes (*A. celebensis* and *P. alecto alecto*) had relatively higher durian fruit set compared to flowers that were only pollinated by smaller fruit bats (*E. spelaea*).
- c). I found that the widespread species of flying fox (*P. griseus*) was more of a pollinating generalist than the endemic one (*A. celebensis*). *Pteropus griseus* used flower resources more than *A. celebensis*, which mainly fed on fruits. This indicated one species provides pollination services (*P. griseus*) and the other provides seed dispersal services (*A. celebensis*). About 16 of the plants species used by both species were economically valuable and important components of the Sulawesi rainforest.

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

I worked together with the local communities at every aspect of my research, which were capturing the flying foxes, doing pollination exclusion treatments, deploying camera traps, and monitoring the durian fruit sets. I trained many of young people to use field equipment. Since I stayed with one of the families in the village, I had a chance to become close with them and share knowledge. While I explained the importance of the research and flying fox conservation, the locals helped me understand about the phenology of durian and the changes in populations of flying foxes in the region due to hunting.

In Batetangga village, they now know the pollinators of their durian, which was the main factor responsible for the durian production. Previously they thought bats, notably flying foxes, were only pests for their langsat and rambutan trees. They sometimes put poison on the fruits that would be eaten by the flying foxes. Due to my research, they are now willing to use less extreme methods to deter the flying foxes instead killing them, which was hanging rotten meat on the fruiting trees. In addition, I taught English in the local school.

In Taima village, there were two islands with two different species of flying foxes. The Tangkuladi Island, where *A. celebensis* was, has been protected by Alliance for Tompotika Conservation and the local community. This research provided important information for them to justify and strengthen their conservation efforts and make outreach materials. This information would be used by the local communities and NGO to talk to the local government on the importance of flying fox conservation and their ecosystem services.

In Salu village, this was the first *P. griseus* colony recorded in Sulawesi. It was not protected yet. The local communities would be really happy if there was also a protection on the island since hunters kept coming and took most of the bats.

5. Are there any plans to continue this work?

Yes, I plan to establish the first in situ conservation project for *P. griseus* in Salu village. I had talked to the local communities and they were willing to work together to make it happen. I want to apply for another Rufford grant to support this project.

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

This research is the first comprehensive study of flying fox ecosystem services in Indonesia. It is pivotal to share the results with the scientific community. I plan to publish it in peer-reviewed journals and present it at international conferences. I will also write a popular article about it. In addition, I will go back to my field sites and present my final results to the local communities using posters, brochures, and videos to further increase appreciation for flying foxes among the local villagers.

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

I used the grant from May to December 2017 as planned.

8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

| Item | Budgeted Amount £ | Actual Amount £ | Difference £ | Comments |
|------------------|-------------------|-----------------|--------------|------------------------|
| Travel | | | | |
| Domestic flights | £139 | £157 | £18 | I got a cheaper flight |

| | | | | |
|---|--------|--------|-------|---|
| Meal allowance for research team | £710 | £1,300 | £590 | I had 3 research assistants, instead of 2 due to huge amount of works and I must work at 2 provinces for roughly 8 months |
| Local transportation (gasoline, rent 2 motorcycles and cars) | £355 | £880 | £525 | I need to rent cars for a couple of times to the new field site and apply for another permit in another city |
| Local accommodation in several field sites | £355 | £323 | -£32 | I stayed at local's house for several months which was cheaper |
| Boat rent in October and December | | £135 | £135 | I need to pay the boat along with its drivers (local fisherman) to across the ocean to the island where I captured bats |
| Field equipment | | | | |
| 10 of camera traps | £1,183 | £766 | -£417 | I found the cheaper camera traps in the amazon and they did not come with the SD cards |
| SD Card for camera traps | | £92 | £92 | I bought separated SD cards for the camera traps |
| Nix pro color and rangefinder | £398 | £375 | -£23 | I found the cheaper one in the amazon |
| Batteries | £1420 | £96 | -£46 | Due to baggage limitation, I bought batteries in Indonesia which were cheaper |
| Insect traps (blacklight UV, tweezers, chemical substances, etc.) | £134 | £43 | -£91 | I need to use only a little bit of chemical substances |
| Plastic net | | £27 | £27 | I need more to cover all the durian flowers in the experiment. |
| Flexible wire and its cutter | | £9 | £9 | It was cheaper in Indonesia |
| Headlamp | £95 | £9 | -£86 | I got headlamps from other grants |
| Excess baggage | | £18 | £18 | Equipment was quite heavy |
| Boxes for field equipment | | £12 | £12 | A lot of equipment need to be stored properly |
| STEM analysis for pollen | | £135 | £135 | To get better picture of pollen for identification, some of the samples were documented using electron microscope |
| Salary | | | | |
| Research assistants | | £624 | £624 | I had 3 research assistants for the period of September to December to be paid. For previous months, my research assistant salaries were paid by another grant. |
| Total | | £5,000 | | |

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

Establishing in situ conservation for the flying foxes, reducing the hunting and consumption rate on flying foxes, and doing more ecological studies to understand deeper the huge potential of flying fox ecosystem services (e.g. putting on GPS loggers on the bats to know more about their foraging activities and understand the long-distance pollination/seed dispersal).

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

Yes, I used the logo for every presentation during my field work. I will use the logo and the name for every publication including the outreach materials to the local communities and government, and also in acknowledgments during presentations at conferences.

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

Marcy Summer, Alliance for Tompotika Conservation (AITo). She has been the director of AITo for ten years. She helped me design the safest protocol to capture the bats in order to minimize the disturbance. She is also willing to use the information from this research in AITo's outreach programs and its flying fox conservation project.

12. Any other comments?

Durian studies



Figure 1. *Acerodon celebensis* (Sulawesi's Flying fox) fed on nectar from durian's flowers.



Figure 2. *Pteropus alecto* (Black Flying fox) fed on nectar from durian's flowers.



Figure 3. *Eonycteris spelaea* (Cave Nectar Bat) fed on nectar from durian's flowers.



Figure 4. *Strigocuscus celebensis* (Small Sulawesi Cuscus) ate durian's flowers.

Durian studies - Field works



Figure 5. A 20-m durian tree (left); Durian's flowers (upper right); Observation of durian's flowers (bottom right).



Figure 6. Working together with local people to do the experiments (upper left); a camera trap deployed (bottom left); monitoring durian fruit set (upper and bottom right).

General pollination studies



Figure 7. *Pteropus griseus*, Gray Flying fox captured in Besar Island.



Figure 8. *Acerodon celebensis*, Sulawesi Flying fox, captured in Tangkuladi Island.



Figure 9. Loading equipment to a boat (upper left); unpacking mist net poles (bottom left); putting up the mist net poles (upper right); a mist net set up.



Figure 10. Disentangling the bat (left); collecting pollen (upper right); taking morphometric measurement (bottom right).