Final Project Evaluation Report

Your Details	
Full Name	Nadine Ruppert
Project Title	Pigtailed Macaques in Oil Palm Plantations - Pest or Pest Control?
Application ID	19842-2
Grant Amount	£5,000
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Date of this Report	27 August 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
Assessment of impact of Macaca *nemestrina* on oil palm plantations rats (pests).				The assessment of the population of plantation rats in and outside home ranges of *Macaca nemestrina* is fully completed, data analysis (GLM) is 75% completed, and the data is currently processed for an ongoing PhD project with the data to be published next year.
Rat feeding behaviour of Macaca nemestrina (focal animal observations on two groups)				We have completed the observation of rat feeding behaviour of two groups of macaques in oil palm and presented a poster at the conference of the Association of Tropical Biology & Conservation in Sarawak and of the International Primatological Society in Nairobi (July & August 2018). We have also assessed the oil palm feeding behaviour and monetary impacts of macaques to oil palm harvest and the data will be published next year.
Stakeholder engagement				This part of the project is still ongoing. We have established contact with FGV who are currently pending approval from their board to invite us for a workshop; and with Sime Darby, whose board has verbally expressed interest to engage us in a sharing session; we are waiting for the written invitations. We are also waiting for the Malaysian Palm Oil Council to get back to us about a workshop. The several representatives of these three organizations have all expressed strong interest verbally, but formal approval is pending on the board decision that takes time. We will follow up and share new information we gain from the ongoing project with the stakeholders via email communication and hope to soon

				receive a formal invitation to conduct workshops about vertebrate pest management in oil palm and macaque-human conflicts. However, we have reached a wide audience on social media and in science journals that have reported our results and thus, we have created wide public awareness about the potential role of macaques as pest control in oil palm. Our Facebook combined posts about macaques feeding on rats have reached more than 20,000 people. During exhibitions and outreach events of the Malaysian Primatological Society (MPS), we have presented our project and engaged with the general public to create more awareness about primate conservation in Malaysia in general and the positive role of macaques in specific.

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

The research is completed, however with some delays as our plantation study plot was completely flooded for 2 months due to the heavy rains in November 2017. Three stakeholders have expressed interest to engage further with us but we are still waiting for formal invitations. Verbally the representatives have confirmed to pursue to arrange for a meeting/ workshop with us but they also depend on board approval. We are in contact and I frequently follow up and share the latest results. But I hope to be invited soon to fulfil the last goal of this project.

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

a). We have obtained strong data support of our hypothesis that macaques have a negative impact on plantation rat populations and as such may be a biological pest control species.

b). We have obtained data on the oil palm feeding behaviour that suggest a rather small impact of macaques on the crop yield.

c). We have gained wider local and international recognition of the project as it was featured in both, local and international print and social media (New Straits Times, Science Health News and Science News; July 2018) and have created wide public awareness about macaques as potential pest control.

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

We have had local field assistants and students engaged in the project and especially in the public outreach programmes all over Malaysia (exhibitions and booths that were co-organised with the Malaysian Primatological Society and Universiti Sains Malaysia; held in KL, Penang, Kuching and other places).

Our field site is situated in a small Malay fishing village, and the students and assistants on the project (both Malaysian and foreign) frequently engage with the village community in environmental programmes (quarterly beach clean-ups and tree planting at the study area that has a long beach and turtle nesting site); and give briefings and information about our research work to the local community during these events that are usually partnered with local NGOs (KUASA, SAM, GRASS, PEKA , MPS and more).

Our field camp is owned by a Malaysian family and we support their livelihood by renting the accommodation from them and we also support the villagers by eating in their food stalls, buying their seafood (fishermen) and occasionally employ them as short-term field assistants/ guides or renting cars/motorbikes for a short period.

5. Are there any plans to continue this work?

Yes, this is a long-term project studying various aspects of macaque behaviour and ecology and the pest control part of it has great potential to be further developed into a far reaching programme for sustainable oil palm plantation management and design. We have plans to assess the impact on population genetics of *Macaca nemestrina* caused by landscape fragmentation of plantations; and also to use computer modelling to design plantations in a way to allow more wildlife corridors, esp. for *Macaca nemestrina* to safely enter and exit plantations for rat-foraging bouts. Further, we plan to intensify our collaboration with local oil palm growers and policy makers to enhance sustainability of oil palm plantations and conservation of macaques within.

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

We have been sharing our results on Facebook (Facebook.com/nemestrina; almost 1200 followers) and our website (www.macaca-nemestrina.org).

We have attended various conferences and workshops as outlines in our progress reports and published in Malaysian and international scientific and non-scientific media (in progress reports).

We are currently drafting a manuscript for publication in a scientific journal (American Journal of Primatology) to have our work peer-reviewed published.

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

March 2017 to July 2018 (applied January 2017-January 2018): The grant was fully utilised by end of July 2018. It took longer than expected as the grant had to be disbursed through our university bursary (account only opened in March, not January 2017 and closed August 2018) and the flooding of the study site led to significant delays of the rat trapping programme.

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
Accommodation	1800	1800	-	For assistants/ students at the study site
Assistants	0	200	+200	Occasional employment of local assistants (on a daily basis, 10GBP a day)
Petrol for field vehicles and transport of field assistants/students to nearest town to buy weekly supplies (20 km, 1-3 times per week).	780	2250	+1470	Extended study period (6 months) and national hike in petrol prices. Change of car (4WD) with higher fuel consumption than expected and temporal use of 2 extra motorbikes for the forest/ plantation trails (often not accessible by car due to flooding).
Materials for Workshop	500	0	-500	Workshop hasn't taken place yet
Travel to Workshops	300	0	-300	As above
Cage traps	1500	0	-1500	Cage traps could be borrowed from School of Biological Sciences, USM's Zoology programme.
Metal ear tags	100	0	-100	We used nail clipping instead of metal tags as rats lost the tags soon after application (trail tags provided by USM).
Field work materials (consumables), e.g.	0	120	+120	

batteries for GPS, battery chargers, machetes, compasses, wire for the traps, pliers etc.				
Travel to/ from the study site (mileage USM Penang – Segari Perak, 160 km one way; once a week)	0	630	+630	
Total		**5000**		

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

1. It is important to intensify the engagement with the local oil palm sector. While most have expressed strong interest in the project, formal collaboration hasn't yet kicked off and we strongly want to promote our results to oil palm companies to make them applicable in the field. We will keep following up about the workshop organization to have at least one programme run by end of this year.
2. It is further important to keep engaging the local communities, especially the public in and around oil palm areas, but also urban areas who experience conflicts with macaques. Education and awareness can change the public perception toward a more wildlife friendly attitude.
3. We also want to recruit more local field assistants for this project. While it is relatively easy to attract foreign volunteers/students, local students still lack a general interest in primate research and conservation. We can change this by creating more awareness, also in the classroom/ lecture hall of the university.
4. Lastly, we will develop a research road map for the next 2 years ahead, collaborating with international universities and primate researchers, to expand this project to a broader scope (macaque population genetics, sustainability in oil palm, design of plantations to maximise impact of biological pest control species, primate conservation, especially mitigation of human-macaque conflicts).

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:

Social media. Macaca Nemestrina Project https://www.facebook.com/nemestrina/

Website: www.macaca-nemestrina.org

-Scientific posters (presented at ATBC & IPS 2018) & all oral presentations (as stated in the progress reports); acknowledgment given in publishes articles.

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

The current core team consists of me (Nadine Ruppert) and two graduate students and a field assistant who work together with +/- 3 rotating volunteers and short-term interns.

Anna Holzner – PhD student USM/UL (macaques in oil palm), 2017-ongoing

Giovanni Villa – PhD student USM (macaques as seed dispersers), 2017-ongoing

Hafizuddin Sa'adan – field assistant (intern for 7 months; Jan-July 2018)

12. Any other comments?

We are very grateful to Rufford Foundation, as the first and second RSG helped us to conduct our research, cover most of the field expenses for the assistants and enhance the local and global visibility of this project. Although we had wished to make better progress with the oil palm companies, we have achieved a big portion of our set goals and will continue to work hard for primate conservation in Malaysia.