

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	Paul Henric P. Gojo Cruz
Project title	Biodiversity and Distribution of Amphibians and Reptiles of the Pantabangan- Carranglan Watershed, Nueva Ecija, Philippines
RSG reference	19494-1
Reporting period	September 2016- March 2018
Amount of grant	£4999
Your email address	paulhenricgojocruz@yahoo.com
Date of this report	August 9, 2017

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
Assessment of Herpetofaunal Diversity				The survey area only represents a small portion of the watershed, yet we recorded 59 species of herpetofauna. This gives us a glimpse into the diversity of the area. A very large portion of the watershed is still waiting to be explored.
Creation of an updated vegetation map				
Creation of distribution map				
Assessment of factors affecting herpetofaunal distribution				
Production of IEC materials				Data processing and writing of the final paper was given priority. IEC material production is currently being worked on.

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

The fieldwork coincided with the rainy season in the area. At times, we were forced to cancel fieldwork due to heavy rains for safety reasons. Two consecutive typhoons (Typhoon Karen and Lawin) also hit the area during our fieldwork, resulting in an 11-day gap in data gathering. These typhoons greatly affected local livelihood and our logistics (no electricity and inaccessible road networks). Fieldworks were cancelled in order to allow the local guides to repair damages to their livelihood. Additional data processing was done during the cancellation of fieldwork. Subsequently, the fieldwork was extended to compensate for the time loss due to the typhoons.

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

- A. List of amphibians and reptiles from the study area** – the survey resulted in the discovery of 59 species of amphibians and reptiles (17 frogs, 14 skinks, nine lizards, two varanids, and 17 snakes). Forty species were Philippine endemics, of which 26 species are Luzon endemics. Five species (four *Platymantis* and one *Parvoscincus*) are probably new to science. Two species of snakes (*Hologerrhum philippinum* and *Pseudorhabdion cf. mcnamarae*) were also morphologically different from those recorded in

other parts of Luzon. The rare *Brachymeles elerae* and *Parvoscincus duwendorum* were recorded from the area. Four out of the five endemic genera of reptiles in the Philippines (*Parvoscincus*, *Pinoyscincus*, *Hologerrhum* and *Cyclocorus*) were also represented in our collection. Six species (*P. mimulus*, *L. macrocephalus*, *P. similis*, *S. luzonensis*, *B. bicolor*, and *O. ancorus*) are listed as near threatened; four species (*K. kalingensis*, *K. rigida*, *H. pustulatus* and *O. hannah*) are listed as vulnerable. Several endemic species had not yet been assessed. This includes *S. aurantipunctata*, 12 species of skinks (mostly from genus *Parvoscincus*), *L. cf. lugubris*, *V. cf. bitatawa*, *D. luzonensis* and *P. cf. mcnamarae* (IUCN, 2016). This makes the area an important center of diversity and endemism comparable to other biogeographic regions in Luzon. The presence of rare and possibly new species also adds to the importance of the area and the immediate need for its conservation.

B. Updated vegetation map of the area – The survey allowed us to identify eight major habitat types in the area. This includes lowland dipterocarp forest (61%), grassland (13%), lower montane forest (12%), upper montane forest (7%), pine forest (4%), agricultural areas (2%) and riparian habitats measuring 27.68 km. Forest are found at elevations 800 – 1,250 m asl, with several fragments found near Sitios Calisitan and Binbin. The upper montane forest or mossy forest occurs at 1,250 m asl, dominated by small trees covered with mosses, *Nepenthes* sp. and other herbaceous plants. Agricultural areas planted with vegetables such as eggplants, beans and cabbages are widely distributed in the area. Riparian habitats (streams and rivers) are found in the mountains. The largest river, Binbin River serves as source of water for both domestic and agricultural use. Among the major habitat types in the area, the natural pine forest had a reduction in the area. According to the locals, a 1995 fire destroyed much of the pine forest near Sitio Binbin. A fire also damaged parts of the pine forest in Sitio Calisitan on August 2016.

C. Distribution maps of amphibians and reptiles – GIS mapping showed that the mid-elevation (1,000 – 1,200 m asl) forest and riparian habitats harbour the highest number of individuals. The merging of two habitat types often resulted to the mixing of herpetofaunal elements composed of forest species and non-forest species. Fewer species and individuals were encountered in areas higher than 1,250 m asl. Individuals in the lower elevations (below 900 m asl) are situated around moderately to heavily disturbed areas (i.e. forest fragments, residential and agricultural areas) where human-associated species like house lizards and non-endemic frogs such as *R. marina*, *H. rugulosus* and *P. leucomystax* are common. It was observed that many of the endemic species are associated with the forest. Frogs such as *K. rigida*, *K. kalingensis*, *S. luzonensis* and *S. aurantipunctata* and reptiles such as *Parvoscincus* spp., *Brachymeles* spp., *L. lugubris*, *C. philippinicus* and most of the snakes, with the exception of *A. prasina*, *G. oxycephala* and *D. luzonensis* are exclusively found in the forest.

Distribution of amphibians is influenced by presence of water, vegetative cover and slope gradient. Non-direct developers (those that undergo the tadpole stage) are commonly found around riparian habitats where they can lay their egg. Direct developers (those that do not have a tadpole stage) in particular *Platymantis* sp. are commonly found farther from water resources due to their unique life strategy.

Unlike amphibian distribution, reptiles are not limited around riparian habitats, although a number, particularly semi-aquatic skinks and snakes are found in close proximity to water sources, due to availability of prey items. Factors influencing reptile distribution includes presence of water, vegetation cover, presence of leaf-litter and elevation. Small skinks (genus *Parvoscincus*) and fossorial skinks (genus *Brachymeles*) are common in mid- to high elevation forest while large-bodied skinks (*Pinoyscincus*, *Otosaurus* and *Eutropis*). Elevational range extensions were recorded for *B. bicolor* and *O. cumingii*.

Gekkonid, agamid and varanid species were seldom encountered during the survey resulting in sparse distribution patterns for these species, although gekkonid species are often found in human habitation. Temporal activities and limited sampling of the canopy likely resulted in the underestimation of the actual diversity for this group of reptiles.

G. oxycephalum, *D. luzonensis* and *A. prasina preocularis* are found in lower elevation areas, while the other snake species are limited to the forest (with the exception of one *T. flavomaculatus* and *O. leporinum* collected from the provincial road). Elevational range extension was detected for *C. bitorques* (1,143 m asl), *L. muelleri* (1,235 m asl), *O. ancorus* (1,065 m asl), *O. leporinum* (1,245 m asl) and *T. flavomaculatus* (1,201 m asl). Elevational range extension for some species signifies that these species utilise a wider range of elevation than previously thought. This is valuable information which can be used for IUCN evaluations. Occupying different habitat types and elevation ranges reduces competition between species.

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

The local community provided the additional manpower needed for the survey. They provided the local guides and porters who helped with data gathering. Aside from this, they provided ethno-biological information with regards to the area's flora and fauna. They also recommended suitable sites for actual herpetofaunal surveys.

5. Are there any plans to continue this work?

Yes, since there is still a very large portion of the watershed which had not yet been surveyed. Comparison with the herpetofaunal diversity of nearby mountain range

will provide a better understanding on the biogeographic relations between the mountain ranges. Data gathering during the dry season is also necessary to determine temporal distribution of species. The result of this project only provides a glimpse into the diversity of the watershed and the Caraballo Mountain range and that the area as a centre of herpetofaunal diversity, endemism and the possibility of new species requiring conservation. At the same time, a diversity survey for plants, invertebrates, birds and mammals are also proposed. The impact of climate change on species distribution also requires further study as it had been shown that distribution is affected by changes in microclimatic conditions.

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

The study had already been presented with the guidance committee composed of some of the country's leading wildlife biologist. The study had already been reviewed by Dr. Arvin Diesmos, head of the Herpetology section of the Philippine National Museum and Dr. Rafe Brown, a world-renowned herpetologist. Part of the result of the study, specifically the distribution maps had already been presented locally and is in review by a peer-reviewed journal. Other results will be presented in other symposia and submitted to peer-reviewed journals. Printed copies of the results will soon be provided to the Local Government Units, regional offices of the Department of Environment and Natural Resources and Biodiversity Management Bureau in the hope that they will use it in the generation of conservation plans for the area. Field experiences were also shared with my biology students hoping that some will get interested in the work.

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 grant was used from the period from September 2016 to November 2016. During this period, the grant was used to purchase field equipment and supplies. Fieldwork was from September to November 2016, the grant was used to purchase food for the survey team, gasoline for local transport and services fee. It was during this time that most of the budget was utilized.

The grant was utilised during the preparation prior to fieldwork and data gathering phase of the project which covers the period of September to November. Data processing, including species identification, mapping statistical analysis, and writing of the papers took another 6 months.

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
Food	1,435	1,339.8	95.2	The initial budgeted amount was for 11 persons for 30 days. We added 3 additional personnel and reduced the sampling period into 22 days. The added personnel were needed to increase sampling effort and allowed us to reduce the days of sampling without affecting the result of the survey.
Transportation	355	305	50	We got discounts since we only have to pay for the gasoline for the vehicle we used for transport within the survey area.
Personnel Services	2,174	2,073.5	100.5	The initial budgeted amount was for 10 persons for 30 days. We added 3 additional personnel and reduced sampling period into 22 days. The added personnel were needed to increase sampling effort and allowed us to reduce the days of sampling without affecting the result of the survey.
Equipment and Supplies	1,035	1,255	-220	The requested equipment from IdeaWild came in late for the fieldwork. We have to purchase some of the equipment in advance instead. Additional preservatives and batteries were also needed.
Total	4,999	4,973.3	25.7	The remaining amount will be used in the production of IEC materials and printing of copies of the research.

Exchange rate used: 1 GBP= 69.01 PHP; 1 PHP= 0.014 GBP

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

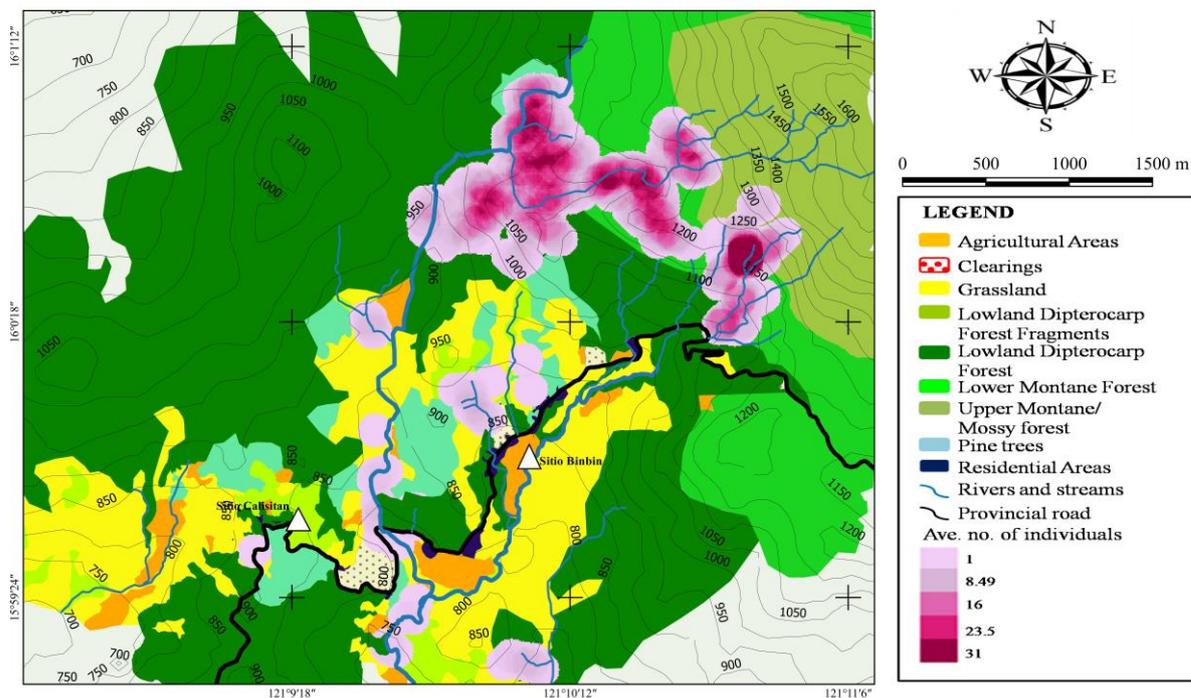
The next important step is to actually incorporate the data generated by the project into a conservation plan for the area, especially that several man-made activities (kaingin, logging, intentional forest fires, small scale mining) and natural events (stronger typhoons, longer dry months, occurrence of natural forest fires) are posing threat to the area's diversity. The high diversity and endemism concentrated on forest and riparian habitats in the area merits a well-coordinated management plan which can be aided by generated information which will be provided to the LGUs, indigenous people and NGOs.

Annual monitoring of the area's flora and fauna and their respective habitats is also necessary to determine changes in species composition and distribution. Currently, no annual monitoring is being done in the area, but it is being proposed that such activities be conducted with partnerships from local universities and agencies.

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?

Yes, the logo was incorporated during the initial and final report to the guidance committee. During the 26th Philippine Biodiversity Symposium of the Biodiversity Conservation Society of the Philippines where I presented part of result of the study, the logo of RSGF was incorporated in the presentation.

11. Any other comments?



New heat map