Final Project Evaluation Report

Your Details	
Full Name	P. Gowri Shankar
Project Title	Assessing diversity and distribution of the king cobra (*Ophiophagus hannah*) with specific focus on the Eastern Ghats and the Andaman Islands populations.
Application ID	d96f84-1
Grant Amount	£5,000
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Date of this Report	31/10/2018

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
Elucidating the intra-specific diversity which will help in identifying sub-species/ populations of concern			▊	We have collected demographic data and genetic samples, some of which have already been analysed. Preliminary data have shown significant results and laid the foundation for future work.
Creating awareness among local communities in the political states of Andhra Pradesh, Odisha in Eastern Ghats and Andaman Islands.			▊	We conducted awareness programmes for local communities. Many trained rescuers have taken the initiative forward and are working with the local communities and forest department now. Designed king cobra poster about its natural history in Hindi, Odia and Telugu languages. (we are attaching Telegu for the reference)
Developing an open access snake application and initiate a blog.		▊		*Kalinga App- platform will enable and facilitate the rescuers and researchers to become regular contributors to the database of king cobra rescues and research. Kalinga app for Android will be provided to people in the field to collect essential data related to the specimens and rescued snakes. This crowd sourced data would be organised to analyse and carry out further research. Scientific data contributed by the registered users will be reviewed by the experts and in the meantime, snake enthusiasts will get access to the data through their phones. The blog will be updated as soon as results are available.
Contributing to management through training for the forest department and urging appropriate			▊	We were successful in conducting awareness programmes in parts of Andhra, Odisha and Andaman Islands. Many forest officials have requested us to conduct

| conservation measures. | | | | programmes in their respective ranges in the coming months. |
| Publishing results in both scientific journals and popular publications. | | | | Data compilation and analysis is in the process. Once analysis phase is completed, we will publish the data. |

*Note : https://play.google.com/store/apps/details?id=com.kalinga.kalingaApp

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

As king cobras belong to Schedule-2 of Indian wildlife protection act 1972, we require permits from the forest department to collect biological material from specimens. We encountered unforeseen difficulties due to delayed permits and administrative issues in Andhra Pradesh which prevented us from collecting the samples, as a result of which, we had to reschedule the lab work many times.

We follow opportunistic sampling method, i.e. we collect samples only when our team rescues a king cobra or when we find dead specimen or collect shed skin for our genetic work. We were not able to collect many samples this season in Andhra Pradesh but managed to collect three samples from Odisha state which falls under Eastern Ghats range of our study area.

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

1. Identify genetic and morphological variations among king cobras from across their distribution
Based on preliminary data analysis, we found distinct lineages and deeply divergent clades in the king cobra phylogenetic tree. We are planning to carry out further analysis using fossil calibration to find out the divergence time and reconstruct the biogeographic history of the king cobra. We will carry out haplotype analysis to understand genetic relationships between populations.

SL NO.	Regional (States)	Number of samples	Total number of samples
1	Easter Ghats: Andhra Pradesh Odisha	1(from museum collection) 3	4
2	Andaman Islands: Mayabundar Havelock	1 2	3
	Total		**7**

2. Outreach and Education programme
We adapted "scientific training in snake rescue and management – a structured training programme" to train local rescuers and to equip them in efficient rescue and management protocol.

We conducted training programmes and sessions for the Forest Department which comprised of ground staff, rangers and officers. This helped in establishing management ideas and urged them to use appropriate conservation measures.

Below is the list of trained teams of snake rescuers from Forest departments, NGOs and naturalists in Eastern Ghats (AP and Orissa) and Andaman Islands (Mayabundar and Diglipur) to mitigate human snake conflict.

SL NO.	Places	No. of Participants	Snake rescue kits given
1	Sriakakulam Forest Division Local snake rescuers **Andhra Pradesh**	50 12	2 kits 1kit
2	Angul Forest training Institute Local snake rescuers **Orissa**	98 22	1kit 3 kits
3	Mayabundar Forest Division Digilipur Forest Division ANET- School kids Andaman Karen Crafts Co-operative Society (AKC) and Women's Centre **Andaman Island**	35 41 15 10	4 kits 3 kits 1kit (ANET)
	Total	**283 participants**	**15 snake rescue kits**

3. Developed a snake 'app' for efficient data collection for the network of snake handlers across South and South East Asia.

Kalinga App-platform will enable and facilitate rescuers and researchers to become regular contributors to the database of king cobra rescues and research. Kalinga app for Android will be provided to people in the field to collect essential data related to rescued snakes and specimens. This crowd sourced data would be organised to analyse and carry out further research. Scientific data contributed by registered users will be reviewed by the experts and in the meantime, snake enthusiasts will get access to the data through their phones.

The second version of the app will have other exciting features to explore:

Upcoming Features:

1. Enhancements to online features:

      a. Google places integration for quick entry of rescue location.
      b. Auto-capture location and altitude.
      c. Photo capture through camera and tagging.

2. Offline mode which allows the rescuer to use the app even when internet connection is unavailable.

3. Rescue listings with rescuer name and location visible.

4. Filtering and search capabilities in list views.

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

We employed local people for field work, to conduct outreach programmes and surveys. Local rescuers were our main point of contact during our field surveys and sample collection.

Their involvement played an important role in gathering information and creating a network at the community level. Many local snake rescuers/ young men from the community were trained in snake rescue and management, and the skills they obtained will help them in mitigating snake human conflict.

5. Are there any plans to continue this work?

I plan to continue to collect more fine scale data and conduct outreach programmes in the Andaman Islands. After we conducted our workshop at the Forest department (Mayabundar and Diglipur) many rescues and sighting of king cobras were reported to us and many forest officials requested us to conduct workshops and research programmes in other Islands.

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

I will publish my research results in peer reviewed journals. I will also write popular articles in English and other regional languages. I will update the blog. We also plan to make a short video on our findings.

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

The project was designed for 12 months (October 2017 to September 2018). Though we did not get permits from Andhra Pradesh Forest Department for sample collection, we did manage to conduct training programmes for them. Though the App materialised towards the end of the grant period we are confident that with the ground work done so far and our active network of rescuers it will reach maximum contributors soon. The rest of the project went according to plan.

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
Education, Training and mobile app	1,575	2093	-518	Training equipment like hooks, bags and baggers become expensive as all the snake recue kits given were custom made, Mobile App development charges were more than what we anticipated initially.
Salary	1,590	1439	+151	Salary was paid only for generating sequence data (5-months).
Travels	251	359	-108	The costs associated with travel for field work were higher than initially anticipated due to increased flight and fuel prices over last few months.
Accommodation	1,584	851	+733	We saved more on accommodation charges by staying in local field stations and during training we stayed in the forest department guest houses offered free of charge by them.
Centage		213		Consultation fee for office (CES,IISc).
Miscellaneous		45		Camera accessories and other field expenditure.
Total		**5000**		

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

1. It will be interesting to collect more tissue samples from different Islands in the Andaman and Nicobar archipelago and assess gene flow between these isolated populations.

2. Interacting with locals and collecting more natural history and distribution details will be an addon information that will be vital in conserving their habitat.

3. In the Andamans, there is a need to create more awareness among the locals regarding this apex species as these Islands might be the last refuge for this population.

4. We also need to conduct more training programmes in the Andamans and prepare the Forest Department for better management of this species.

5. It would be interesting to carry out radio telemetry studies to understand their home range and natural history and compare with across populations.

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?

We printed The Rufford Foundation logo on our snake bags which were distributed to snake rescuers and forest department officials (photos attached). We also used the logo on educational material like posters which are printed in Hindi, Odiya and Telugu (30 copies each). During our presentation and on social media, we acknowledged the foundation for their support of our work.

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

P. Gowri Shankar (Team leader)

I am currently enrolled as a PhD candidate at the North Orissa University and am a visiting student at Centre for Ecological Sciences, IISc, India. I was awarded a fully paid scholarship as an Exchange student at Uppsala University, Sweden (ERASMUS-MUNDUS EMINITE Program-2014-2016).

I planned the project and carried out sampling and conducting training programmes to snake rescuers and Forest Department officials.

I will analyse the data and produce publications.

Kartik Shanker (Associate Professor, CES, IISc), Advisor and Collaborator

Kartik's experience and knowledge of these landscapes and of conservation in practice was invaluable for this project. He provided guidance on the genetic analysis as well as helped arrange logistics for the field work in Odisha and Andaman and Nicobar Islands.

Priyanka Swamy (Research Assistant)

Priyanka was part of the core team in field sampling and conducting training programmes. She carried out the lab work (DNA extraction, sequencing etc) for all the samples collected and will support in analysing the data.

Adhith Swaminthan (Senior Research Assistant and Base Manager – Andaman Nicobar Environment Team) helped us coordinate with the Andaman Forest department officials and execute our outreach programmes.

Murthy Kantimahanti (Founder Eastern Ghats Wildlife Society) helped us coordinate with the Andhra Forest department officials and execute our outreach programmes.

Biplab Mahapatra (PFA Angul) helped us coordinate with the Odisha Forest department officials and execute our outreach programmes and field work.

Field staff: Several local field assistants helped me with field work.

Fig1: Session in progress at the Mayabandur Forest Department (Andaman Island). Fig2: Talk at Andaman Karen Crafts Co-operative Society (AKC) and Women's Centre (Andaman Island)

Fig3: Talk for school kids at ANET (Andaman Island)

Fig4: Training Session (Scientific training in snake rescue and management)

Fig6: Forest Department training at Diglipur (Andaman Island)

Fig7: Snake recue kits (Hooks, bags and baggers) distributed to the Forest Department

Fig8: Talk at Srikakulam Forest Department (Andhra Pradesh)

Fig9: Practical session on Sanke rescue and management (Andhra Pradesh)

Fig10: Training Session (Scientific training in snake rescue and management) and session at Odisha Forest Rangers' College

Fig11: Training Session (Scientific training in snake rescue and management) and session at Odisha Forest Rangers' College

Fig12: Training Session (Scientific training in snake rescue and management) for local rescuers in Angul (Odisha)

Fig13: Our work was covered by local new papers in Andhra Pradesh