Final Project Evaluation Report

Your Details	
Full Name	Jignasu Dolia
Project Title	Nesting Ecology and Conservation of King Cobras in the Himalayan State of Uttarakhand, India
Application ID	25752-1
Grant Amount	£ 5000
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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
Locating & monitoring King Cobra nests			■	We met our target of locating at least two nests during the 2018 field season, and successfully monitored them until hatching. A third nest was also found, but miscreants had badly damaged it by the time we could visit it.
Collecting behavioural data of nesting females		■		Unfortunately, this objective was only partially met because: (1) nesting started earlier than expected, and (2) the female cobras abandoned their nests too soon. On the few occasions that we saw the female on nest #1, she was skittish and disappeared from sight within minutes of our arrival. In nest #2, we saw the female cobra only once, that too barely. It was logistically not feasible to set up camera traps/CCTV for nest monitoring at these locations.
Recording nest & ambient microclimate data			■	As planned, we collected hourly temperature/relative humidity data for two nests and their immediate surroundings via data loggers.
Collecting morphometric data of hatchlings			■	We collected detailed morphometric data for 44 king cobra hatchlings and took individual photographs of each before releasing them back safely in the wild.
Carrying out snake-awareness/sensitization programs			■	We conducted 16 awareness programmes in local schools and one community radio station (Kumaon Vani). In total, >1700 local people were made aware of snakes and their importance in the environment. The programme consisted of a 90-minute multimedia presentation, which was displayed via a projector. We also designed

				relevant outreach material to be handed out to these schools/organisations.

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

The two nests that we monitored were relatively far from our field station, and thus commuting time was greater than expected. In order to reach these nests, we had to travel a total of 80 km by motorcycle, and another 12–16 km by foot through undulating terrain. Thus, frequency of monitoring reduced a little due to this, and also because the cobras had abandoned the nests by early July. When required, we stayed overnight at somebody's home in the nearby village to save time and energy. However, it was not feasible to do this on a regular basis.

The third nest that we got to know of was unfortunately damaged by miscreants prior to our visit. This was the first time we saw such blatant damage to a king cobra's nest in our study area. Incidentally, this nest contained the largest clutch size (40+ eggs) we have seen so far. Sadly, none of these eggs survived. In the field, we had to tackle this situation tactfully. We tried to gather information pertaining to this dastardly act fairly discretely (as villagers here can turn hostile or may not cooperate with us the next time a nest is found). I immediately informed the concerned Forest Department officials regarding this incident. In order to try and prevent such an incident from happening again, we conducted a special awareness programme at Lohali Intercollege (the nearest high school to this nest's location). During this programme, I made it very clear to our audience that what happened to this nest was not only unfortunate, but also a punishable offence. Most locals here are not aware that it is illegal to kill a king cobra or destroy its nest. Moreover, there is a general apathy towards snakes in general. Through our educational cum sensitisation programmes, we hope to slowly bring about an attitudinal shift in the common man's perception towards snakes, but we are well aware that this will take a long time.

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

(A) We successfully protected two king cobra nests
We protected two nests and released 44 king cobra hatchlings safely in the wild. Hatching success was high (100% and 95%) and all hatchlings appeared healthy and strong. Despite the fact that these nests were fairly close to human settlements, we were able to convince the locals to not harm the cobras or their nests. This is no minor achievement, especially given the highly venomous nature of this species and the prevalent attitude of the common man towards snakes.

(B) We involved the local people to help us conserve king cobras
Even though the law protects this species in theory, ground realities are unfortunately different. Most local people usually don't think twice before harming a snake, be it venomous or not. Over the years, we have built a good rapport with some of the locals who have slowly learnt to value our work. It is thanks to information provided by them regarding nest sites that we have been able to carry out this work successfully for nearly a decade now. Since the last three years, we have also monetarily rewarded

informants of nests and other locals who helped us conserve the species. Even after our fieldwork is over, some of them keep in touch with us via phone and send us pictures/videos of king cobras, which adds to our understanding of the species.

(C) We spread awareness regarding snakes among local people
By conducting awareness programmes in village schools/colleges, we hope to have increased the chances of conserving snakes in general and king cobras in particular. Our PowerPoint presentation was much appreciated and sparked genuine interest among many members of our audience. The outreach material that we designed (especially the poster on common venomous snakes along with basic first-aid information, uploaded as a separate submission) will be especially useful to local people for better management of human-snake conflict.

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

As mentioned earlier, local communities have been an integral part of our conservation work. Over the years, we have invested considerable time/energy to spread awareness regarding snakes in the study area, which has benefited the locals and us. Trivial as it may seem, convincing village folk to protect nests of such a highly venomous snake, often in their backyards, is a big challenge. This year too, select locals received a cash prize for their active participation in king cobra conservation. More importantly, they were publicly felicitated by the Forest Department for their contribution, which brought them respect and recognition. Through this project, we were able to nurture established relationships and also build new ones at the grassroots-level through our outreach related activities. I also gave an interview on a popular local community radio channel, which helped spread much-needed awareness regarding snakes and snakebite.

5. Are there any plans to continue this work?

Yes, definitely! The current project is part of a long-term effort by our team to conserve king cobras in this unique landscape. I plan to continue this work for the next 3–4 years at least. I recently enrolled for a doctoral programme at the Wildlife Institute of India, Dehradun, and my PhD research will focus on the distribution and nesting ecology of this snake in Uttarakhand. In the coming years, I would like to broaden the scientific scope of my work to answer some fundamental ecological questions (such as home range, movement pattern, diet etc.) that will help us conserve this species more effectively. Also, I plan to expand the study area to include other parts of Uttarakhand as well. We are also determined to carry out many more awareness programmes, highlighting the need to protect this apex predator.

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

I aim to publish results from this work (along with data from our previous work) in peer-reviewed journals. I also plan to write popular articles on this magnificent animal for reputed wildlife magazines. In the near future, we might make a short film showcasing this magnificent species and our efforts to conserve it.

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

The grant was used over a period of 12 months (June 2018 to May 2019 inclusive), more or less 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
Equipment	1555	1512	-43	One item I had planned to initially purchase (CCTV camera) was not bought and some additional items needed were purchased. Also, I ended up buying a different brand (Moultrie) of camera-trap than what was initially planned (Cuddeback).
Travel	875	740	-135	We reduced costs under this head by using public transport and motorbike during fieldwork, whenever possible
Salary	450	452	+2	This minor difference is due to conversion differences (i.e. budgeted amount was in Sterling £, but payment was made in Indian rupees, INR).
Per Diem for PI	1620	1620		Expenses under this head were incurred over a longer duration (i.e. 8 months instead of 6) than initially planned, because I had to spend more time in Uttarakhand than expected
Remuneration	200	200		
Consumables	45	7	-38	We did not need to purchase one item (*viz.* ethanol) that was budgeted for under this head; also, we required nest enclosure material for only two nests (instead of four as initially budgeted for)
Outreach	120	125	+5	We printed some more outreach material than planned
Miscellaneous	135	135		
Other costs		209	+209	See budget note 2 below
TOTAL	**5000**	**5000**		

Budget notes:
1. Exchange rate used for converting actual expenditure in Indian Rupees to its equivalent amount in British Pounds was: 1GBP=92.92 INR (same rate as mentioned in budget preparation). Figures have been rounded off to the nearest pound

2. Rate of exchange (ROE) used during budget preparation was 1GBP= INR 92.92. However, actual ROE when the grant was received was 1GBP= INR 89.03. Thus, for every pound received, we lost 3.89 rupees, bearing a total loss of (5000 x 3.89) =19,450 Indian rupees (equivalent to 209 Sterling Pounds)

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

1. To locate, monitor and protect more king cobra nests in the coming years
The conservation aim of our work is to protect this declining species at the population-level, rather than at the individual-level. By safeguarding king cobra nests *in situ*, we will try to ensure that local populations of this snake persist.

From a scientific point of view, we recognise the need to increase our sample size for nests, in order to do more robust analysis of our data. We also need to identify landscape and local level factors that possibly influence nest-site selection, in order to protect existing or potential nesting habitat.

2. To map the distribution of this species in Uttarakhand
There is a paucity of information regarding the local distribution of this snake in the study region. Occurrence data, based on primary and secondary information, must be collated to create a fine-scale distribution map. Given that this snake is rather uncommon and that direct sightings may be limited, an important next step is to conduct widespread interview surveys among the locals to obtain presence (and qualitative abundance) data for this species in other parts of Uttarakhand.

3. To conduct more snake-awareness programmes in the study area
This is highly necessary to bring about a fundamental change in local perceptions towards snakes and snakebite. Until now, our target audience for these programmes has mainly been students and young adults. However, we also need to reach out to a wider community of people, such as village elders, self-help groups, rural women, labourers, staff at government health centres etc.

4. To possibly initiate a radio-telemetry study on this species in the subtropical forests of Uttarakhand
There are only two radio-telemetry based studies conducted on king cobras so far (one in Karnataka, south India & the other in Sakaerat Biosphere Reserve, Thailand). Conducting similar studies in a subtropical/temperate habitat may reveal interesting and novel insights into the biology/ecology of this species. For instance, in our study area, there are regular records of king cobras being sighted at relatively high altitudes (1800-2300 m), where winter temperatures are often close to freezing. Tracking these snakes during the winter months (November-February) would enable us to study their thermal biology. Whether they hibernate, like most other snakes in cold climates do, or not is unknown. Telemetry would also allow us to study home range, habitat use,

movement patterns, foraging, mating etc., which would undoubtedly help us conserve this elusive species in a more scientifically sound way.

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?

The Rufford Foundation logo was prominently displayed in the PowerPoint presentation that was screened in various schools. The logo also featured in the outreach material that we distributed (*viz.* 32 A2-sized & 14 A3-sized posters). In any scientific or popular articles that will result from this work, we will duly acknowledge the Rufford Foundation, and also display its logo wherever appropriate.

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

Jignasu Dolia (Project Lead) – conceptualized and executed the project

Krishna Kumar (Field Assistant) – helped carry out fieldwork (nest monitoring, measuring & releasing the hatchlings, conducting awareness programmes)

Tulsa Negi (Volunteer) – helped organize awareness programmes and distribute outreach material

Manish Rai – provided valuable advice to the project lead when required; also helped design content used for the awareness programme and outreach material

Anup Sah – helped liaise with Forest Department officials in Dehradun

K.S. Sajwan – assisted in some of the fieldwork (visiting nest #3, measuring one batch of hatchlings, and collecting morphometric data of a rescued King Cobra)

12. Any other comments?

I am very grateful to the Rufford Foundation for providing funds, and to the Uttarakhand State Forest Department for granting me the necessary permission, to carry out this work

Upon the request of Ms. Tejaswini Patil (Conservator of Forests, Southern Kumaon), I prepared a short report on king cobras to be included in the next Working Plan[1] for the Nainital Forest Division. This will hopefully help bring official recognition to this species, and the need to conserve it within the study area. It will also help prioritize research and conservation related activities pertaining to this unique snake.

I also gave an interview to a popular community radio channel called *Kumaon Vani,* whose programmes are broadcasted to nearly 500 villages in this region, covering a population of about 350,000 people who are mainly pre-occupied with agriculture. The main purpose of this interview was to help raise awareness regarding snakes found in this region, by dispelling myths about them and by providing useful facts instead. The interview was conducted in the local language Hindi.

Note:
1. A Working Plan for a forest division is an important document prescribing the scientific management of forests and wildlife. The plan must be approved by the Government of India, and has a periodicity of 10 years