

Project Title: Distribution, threat assessment and conservation of King Cobras in the Kumaon Region of Uttarakhand, northern India

Project ID: 31295-2

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Interim Report: October 31, 2020



(Above): Female king cobra on nest; (Below): hatchling king cobra.

Note: All images in this report are taken by Jignasu Dolia, unless mentioned otherwise

Nest monitoring:

This year, we were able to locate two king cobra nests with the help of village informants. Despite the COVID-19 pandemic, associated travel restrictions and general apprehension/fear among people, we managed to successfully carry out the first phase of fieldwork, which involved monitoring of two nests, collecting behavioural data of nesting females (when possible) through direct observations and camera traps, recording microclimate at nest sites via data loggers, and collecting/measuring/releasing the resultant hatchlings in a safe location.

Raising awareness:

In early July, I was interviewed via phone by Mr. Mohan Singh Karki (Chief Station Manager, *Kumaon Vani*) a popular community radio channel in the study area. The dual purpose of this interview was to help raise awareness regarding snakes and snakebite, as well as to potentially get information on king cobra nest sites. The 40-min interview was broadcasted to thousands of listeners in the Kumaon region.

In early September, Mr. Sanjiv Chaturvedi (Chief Conservator of Forest- Research Wing, Uttarakhand FD) invited me to deliver a lecture on king cobras to increase awareness on this unique snake and also build research capacity among the department's Junior Research Fellows, who work in different parts of the state. The lecture was much appreciated by the audience.





Images 1, 2. The project lead carrying out a snake-awareness programme for Junior Research Fellows of the Uttarakhand Forest Department. Location: UFTA, Haldwani. Photographs taken by R. S. Bacchal on September 6, 2020.

Distribution & threats:

We also gathered opportunistic data on distribution, natural history and threats faced by this snake within the study area. Four king cobras (three hatchlings and one adult) were found killed by vehicular traffic, suggesting that roadkill mortality may pose a significant, but overlooked threat. Apart from these confirmed roadkill records, an adult king cobra was also badly injured by traffic and is unlikely to have survived. Also, for the first time, I rescued a hatchling king cobra, which was not born from the nests that we monitored. This live hatchling was found by a teacher on October 19, inside the premises of a private school. After talking at length to him (briefing him about this species and asking him which other snakes he had rescued), I released the hatchling in a nearby forest.



Images 3, 4. Two road-killed king cobra hatchlings from different locations. The photograph on the left was taken by K. S. Sajwan on October 20, 2020.

Below is a summary report of the two king cobra nests that we successfully monitored this nesting season.

Nest 1:



Image 5. A king cobra's nest made from pine needles. The female cobra is not visible in this photograph. August 19, 2020.

The first nest of this season was discovered by a villager (Mr. Arya) around mid-June in a forest patch not far from his house (~130 m, ‘crow-fly’ distance). As the pipe that supplied water from the forest to his house was blocked due to some debris, the villager decided to check on it. That is when he chanced upon this nest and its architect, as the nest was built on a narrow forest path leading to the source of water. In fact, part of the nest was actually built over the water pipe!

We first visited this nest site on June 30 but were unable to spot the female cobra then. The nest was surrounded by six tall Chir Pine (*Pinus roxburghii*) trees. Judging from the shape of the nest and the arrangement of the nest material, it seemed as though the female king cobra had not yet fully completed nest construction. She was not visible for three consecutive days (29 June - 1 July). It is possible that she was inside the nest during this period and may have even been laying eggs; however, it is impossible to ascertain this.

The nest was located at an elevation of ~ 1170 m, and the nest material mainly comprised of pine needles (Image 5). The female cobra stayed on the nest for almost two entire months (mid-June to mid-August), the longest we have recorded thus far. During these two months, we made regular field visits (typically lasting 2-3 days) to document the female cobra’s behavior, and to ensure that the nest remains protected from potential human disturbance. Luckily for the nesting cobra, and for us, the nest was built in a location where villagers, apart for Mr. Arya and his wife, seldom ventured.

We were first able to sight this female king cobra on July 4. Since then and August 13 (when she was last seen on her nest), we observed her for hours on end and video-recorded some interesting behavior (e.g. body-twisting, body twitching, jaw-opening, dilatation of the neck, repairing/mending the nest etc.). In order to check her activity pattern during late evening/night/early morning hours, we set up a camera trap overnight for a total of seven camera-trap nights. We also wanted to know whether any other animal (potential predator) approached the nest or not. Camera trap footage revealed that during night and early morning hours, the snake invariably stayed on top its nest. During this time, she hardly moved at all, except for occasional brief movements to reposition her head and/or body. On one occasion (August 5), while the cobra was not visible in the afternoon hours, just prior to darkness setting in, she emerged from her hiding place behind the nest and positioned herself on top of the nest, staying there the entire night. During daylight hours, we observed that she did not always

remain on top of her nest. She sometimes retreated for a few hours in some refuge behind the nest (out of our sight). This behaviour may be linked to the thermoregulatory needs of the nesting female. From this and our previous observations, it seems likely that the main reason for a female cobra to stay on/near its nest, especially throughout the night is probably to deter potential egg-predators.



Images 6, 7. The mother cobra in the process of ‘repairing’ the nest by rearranging the nest material. July 9, 2020.



Image 8. The female king cobra lying on top of her nest. For most of the time we observed her, she lay motionless or moved very little. July 22, 2020.



Image 9. The female king cobra dilating her neck (see red arrow), probably to maximise absorption of the sun's heat. July 15, 2020.

In order to make one of the key stakeholders (i.e. Uttarakhand Forest Department) realize how much effort and dedication is involved in protecting a nest, I urged Mr. Sanjiv Chaturvedi (IFS; Chief Conservator of Forest - Research, Uttarakhand FD), a Ramon Magsaysay awardee, to accompany us in the field, which he gladly did! He was very appreciative and respectful of our work and was delighted to witness a king cobra and its nest for the first time.



Images 10, 11. The Chief Conservator of Forest (Research Wing, Uttarakhand Forest Department) visiting the field site to see the king cobra's nest. Access to this nest site involved a one-way trek of about 6 km. July 4, 2020.



Image 12. Mrs. Arya observing the king cobra's nest through a pair of binoculars, while standing on the trunk of a Malu (*Bauhinia vahlii*) creeper. July 27, 2020.



Image 13. Showing the newly born king cobra hatchlings to Mr. Arya's family. September 17, 2020.

Hatching in this nest occurred sometime during the 2nd week of September. We opened up the nest on September 17. The clutch size comprised of 18 eggs, 17 of which (94%) hatched successfully. All hatchlings seemed healthy and were very active. We measured, weighed and photographed the hatchlings prior to releasing them safely in the wild. Mean total body length of the hatchlings was 56.0 ± 3.5 cm (range= 48 to 60.5 cm), and their mean body weight was 21.6 ± 1.3 g (range= 19 to 23.5 g).

Nest 2:



Image 14. The tail of the female king cobra visible on top of her nest. August 8, 2020.

The second nest of this season was first seen by some villagers around the 3rd week of July, at an elevation of 1150 m. One of our team members (K. S. Sajwan) was informed about it on August 2, through a local contact of his who lives in the vicinity of where the nest was found. I visited the nest site the following day and found it to be located < 50 m away from a quaint village temple, seldom visited by people except for certain days during the year. I was able to spot the female king cobra, but only barely. Her eyes looked ‘milky’, a sign that she was about to moult soon. There was no clear view of this nest from a distance, as it was well hidden by the surrounding vegetation. In order to see the nest and the snake, one had to approach dangerously close. This nest was much smaller than Nest 1, and consisted of a mixture of leaves (Baanj Oak being one of them). The female cobra did not appear large; I estimated her length to be 6-7 feet.

After seeing the nest, I proceeded towards the temple to converse with the few village folk gathered there. While talking to them, I learnt that this nest was accidentally discovered by one of four priests, who were temporarily residing in the temple for about three weeks. They were

unaware of the identity of the snake they saw, and strongly believed it to be an incarnation of God. In fact, part of their daily routine consisted of worshipping the snake from up close! Standing less than 2 m away from the king cobra and its nest, they offered their prayers to it thrice a day (all while blowing conches!), including at night. I was both shocked and amazed at the behaviour of these priests and that of the nesting snake. I thought to myself: *Here is the world's longest venomous snake, apparently at its most vulnerable and tense period (i.e. nesting and likely to shed her skin), quite unperturbed by such close and regular human contact! If this is not a sign of its intelligence, then what is?*

Nevertheless, I had to very tactfully explain to the priests that the snake they had been worshipping all along was highly venomous, and potentially deadly. They were completely unaware that it was a king cobra or that the mound of leaves it was sitting on was actually its nest, containing her eggs. I strongly urged them to not approach the snake henceforth, and requested them to instead offer their prayers from a safe distance. Although they heard me out, I'm not sure whether they fully realized or appreciated the seriousness of the matter, except for one priest. It must be noted that a combination of factors (including the priests' faith and belief, location of the nest, time of the year when the nest was found) is likely to have contributed in saving this snake in the first place. Had the nest not been in the vicinity of the temple, or had it not been found during the auspicious month of '*Shravan*', in all likelihood, it would have been chased or even killed.

We were also told that in about a week, hundreds of villagers (including young children) would gather at this temple for an annual event, locally known as a "*bhandara*". Foreseeing the potential danger this event may bring about (both for people as well as for the snake), we decided that it would be best to cordon off the nest area, so that people would not venture close to the snake, at least unknowingly! I immediately informed the concerned Forest Department officials, briefed them about the on-ground situation, and told them about our plan to barricade the area. A few days later, accompanied by Forest Department staff, we managed to temporarily cordon off the nest area. We also hung some signboards requesting people to not disturb the snake and to keep a safe distance.



Image 15. Field assistant Krishna (rightmost) in the process of barricading the nest area. August 8, 2020



Image 16. Warning sign displayed near the barricaded area to alert the public about the venomous nature of this snake and urging it to maintain a safe distance from the nest. August 8, 2020.



Image 17. A group photograph including village folk and Forest Department officials after having cordoned off the nest area. August 8, 2020.



Image 18. A village elder helping us measure the height of the nest. Note: this was done after the female cobra abandoned the nest, and prior to building the nest enclosure. August 22, 2020.

After the event was over, we were told by some villagers that all went well and that the timely barricading of the nest area was indeed useful. A day after the event (August 9), we came to know that the female cobra had abandoned her nest, leaving behind her shed skin on top of it. Soon after, we constructed the nest enclosure, in preparation for hatching.



Image 19. Villagers checking the nest enclosure we erected around Nest 2 prior to hatching. August 22, 2020

Hatching in this nest occurred sometime in the third week of September. Clutch size comprised of 24 eggs, all of which hatched successfully, yielding a 100% hatching success. All hatchlings seemed healthy, some were even feisty. Mean total body length of the hatchlings was 57.1 ± 2.3 cm (range= 52 to 62 cm), while their mean body weight was 24.9 ± 1.2 g (range= 23 to 27.5 g). On average, hatchlings from this nest were longer and heavier than those from Nest 1. After collecting morphometric measurements, the hatchlings were safely released back in the wild.

Plan ahead:

The next phase of fieldwork will involve carrying out more awareness programmes in the study area. This will include audio-visual presentations on snakes in general, king cobras in particular. As our original target audience (i.e. students of local schools/colleges) is unavailable because schools/colleges are still closed due to the pandemic, we will redirect our outreach efforts to other stakeholders, such as Forest Department staff and possibly some NGOs, whom we think will benefit from these programmes. If and when schools reopen, we will conduct these programmes there, if feasible (the uncertainty is due to the pandemic having disrupted the regular academic schedule). In the meantime, we will also begin designing outreach material to be distributed in the study area and begin data analysis as well.