

## The Rufford Foundation Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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| Grant Recipient Details    |   |
|----------------------------|---|
| <b>Your name</b>           | Tulsi Subedi  |
| <b>Project title</b>       | Understanding the proximate cause of population declines on the population of Bearded vulture ( <i>Gypaetus barbatus</i> ) in the Annapurna range of Nepal. |
| <b>RSG reference</b>       | 18462-B   |
| <b>Reporting period</b>    | Feb 2016 to Jan 2017  |
| <b>Amount of grant</b>     | £10,000   |
| <b>Your email address</b>  | <a href="mailto:Tulsi.biologist@gmail.com">Tulsi.biologist@gmail.com</a> ,<br><a href="mailto:trs15_mar003@student.usm.my">trs15_mar003@student.usm.my</a>  |
| <b>Date of this report</b> | 10-02-2017  |

**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   |
|---|--------------|--------------------|----------------|--|
| Conduct field survey and population monitoring.                     |              |                    |                | Line transect established to conduct the distance sampling of the species. And survey was conducted from transect of 168 km length.                  |
| To study on movement ecology of bearded Vulture using GPS telemetry |              |                    |                | Total of nine GPS telemetry devices were attached on the bearded vulture, which is the first ever study conducted on this species in Asia.           |
| Develop of vulture monitoring protocol                              |              |                    |                | Line transect distance sampling (LTDS) data showed the good fit on the model, so the study shows LTDS is applicable on monitoring of the species     |
| Establish site support group  |              |                    |                | Support group established in Syanja, Jomsom, Muktinath and Chusang   |
| Conduct conservation awareness programs                             |              |                    |                | Approximately 500 people directly and indirectly involved in the research activities and learn about the importance of bearded vulture conservation. |

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

No serious issues, however due to the altitudinal sickness (field assistant) during the survey effort some portion of transect around Lomanthang area could not be completed.

**3. Briefly describe the three most important outcomes of your project.**  
**Followings are some of the important outcomes of the project**

**a. Population structure, density and Abundance of Bearded Vulture**

Total of 35 individuals were detected during the survey. Of the total record 75% were adults, 11% sub-adults, 3% juvenile and 11% birds could not age. Lowest elevation of

bearded vulture sightings was 1392 m and highest elevation was 3861 m. Bearded vulture detection rate in overall line transects was 0.20/km (CV = 22.63%, df = 41) and the estimated density was 0.18/km<sup>2</sup> (SE = 0.074, CV = 39.94%, df = 60.65) at 95% confidence interval. The estimated population was 122 (range 57 – 264) within the survey area Annapurna Himalayan Range of Nepal (SE = 48.73, CV= 39.94%, df = 60.65) at 95% confidence interval. The effective stripe width (ESW) for the detection was 564.02 m (SE = 185.66, CV = 32.92 %, df =33), detection probability = 0.67 and the encounter rate = 32.1 in the surveyed area.

**b. Bearded vultures are trapped and fitted with GPS telemetry for the first time in Asia**

Total of 9 individual bearded vultures (four adults and five juveniles) were trapped and fitted with GPS-GSM telemetry unit. Summary of each bird along with their distribution range is provided below;

Bird Name: Shankar  
 Telemetry code: nbv1601  
 Capture date: 17-05-2017  
 Capture location: Aarukharka, Syangja (1500 masl)  
 Age: Adult  
 Sex: Male  
 Weight: 5,000 grams



**Description:** Shankar is a breeding adult in Syangja district of western Nepal at the elevation of 1550 m in warm and humid environment. He is giving us really good data. Movement of Shankar is within more or less fixed territory along the Panchase Mountain Complex. Occasional modest movements has been observed that includes some visits to the Parbat district (nearby Dobilla) to the west and along the territory of Pokhara city to the east. However north-south movement remained more or less similar.

Bird Name: Gauri  
 Telemetry code: nbv1604  
 Capture date: 18-05-2016  
 Capture location: Aarukharka, Syangja (1500 masl)  
 Age: Adult  
 Sex: Female  
 Weight: 5,500 grams



**Description:** Gauri is pairing with Shankar. Movement is much similar as her mate but shown to have smaller core habitat. Unlikely to Shankar she performed shorter movement to the east but longer to the west. Occasional long movements were reported to the northwest visiting the area Kyang and Salija in Myagdi district and also to the south to Khilung Deurali of Syangja district.

*Bird Name:* Himal  
*Telemetry code:* nbv1603  
*Capture date:* 18-05-2016  
*Capture location:* Aarukharka, Syangja  
*Age:* Juvenile  
*Sex:* Unknown??  
*Weight:* 4,380 grams



**Description:** Himal is the baby from Shankar and Gauri. Himal has largest home range among all family members, extending much movements in all directions from the nest area. In the east this bird travelled to Majhthana of Kaski district, to the north in Shikha/Ghodepani and further north, to the west along the border of Dhorpatan Hunting reserve area in Muna/ Adhikarichour and Chinnebas to the south.

*Bird Name:* Kali  
*Telemetry code:* nbv1602  
*Capture date:* 22-05-2016  
*Capture location:* Karanse Hill, Kaski (1950 masl)  
*Age:* Juvenile (2<sup>nd</sup> calendar year)  
*Sex:* Female??  
*Weight:* 4,980 grams



**Description:** Kali disappeared outside the network coverage from 9th June 2016 and suddenly reappeared on 27th December 2016. Although those units can store up to 20,000 locations, I couldn't receive the data from 10th June to 26th November 2016. Whatever reason this is the system error during the data transfer from the cell phone company to the system. The existing data shows the movement is much east and west with some extensive movements in particular areas like Annapurna, Langtang and Manaslu conservation area. Kali has travelled to Langtang national park in the east and Dailekh district in the west (aerial distance 450 km) with some transboundary movements between Nepal and China. Largest home range (>20,000 km<sup>2</sup>) has been observed for this individual.

*Bird Name:* Devi  
*Telemetry code:* nbv1605  
*Capture date:* 21-10-2016  
*Capture location:* Muktinath, Mustang (4000 masl)  
*Age:* Adult  
*Sex:* Female  
*Weight:* 6,840 grams



**Description:** Devi is breeding female from the high altitude area of Himalayan Mountains in Mustang district. She is showing mostly northwest-southeast movement pattern which extends from the northeast of Muktinath to northwest of Chusang village in Upper Mustang. Core habitat has been observed at the altitude of 5500 m, most probably a nesting site above the snow line. Devi is heaviest bird among all nine individuals we caught.

*Bird Name:* Kesang  
*Telemetry code:* st2010-1528  
*Capture date:* 25- 10- 2016  
*Capture location:* Muktinath, Mustang (4000 masl)  
*Age:* Juvenile  
*Sex:* Male??  
*Weight:* 5,400 grams



**Description:** Kesang is the high altitude juvenile bird that showed very interesting movement along the Nepal-China Boarder occasionally crossed the country boarder nearby Upper Mustang and travelled over Zhangba, Xigaze in Tibet and frequently over 5700 m asl. After that the bird enter into Nepal over Karnali zone and arrived at Khagenkot village in Jajarkot district and further west crossing the aerial distance of approximately 170 km west from the trapping station of Muktinath .

*Bird Name:* Ratna  
*Telemetry code:* st2010-1529  
*Capture date:* 26-10-2016  
*Capture location:* Muktinath, Mustang (4000 masl)  
*Age:* Juvenile  
*Sex:* Female??  
*Weight:* 4,950 grams



**Description:** Ratna is another juvenile bird tagged in Muktinath. This bird showed very interesting movement with frequent crossing the high Himalayas (>7700 m asl) along the Annapurna Himalayan Range. Ratna has visited the area nearby Lake Paiku in

Tibet after crossing approximately 180 km from the trapping station. Approximately 50% of movement range of this individual has been observed in China (map 1).

*Bird Name:* Henk  
*Telemetry code:* pfs1601  
*Capture date:* 18-11-2016  
*Capture location:* Karanse Hill, Kaski (1950 masl)  
*Age:* Juvenile (1<sup>st</sup> calendar year)  
*Sex:* Male??  
*Weight:* 5,690 grams



**Description:** Henk is first year juvenile bird, mostly north-south movements was observed between Panchase Mountain complex to the south and Ghorepani to the north. Unfortunately this unit downed shortly within few days of tracking. We tried to find out the cause by checking its last location however couldn't find any evidences. There were massive high tension powerlines around the last location. The bird might hit those metal lines with high voltage of electric current during the foraging.

*Bird Name:* Durga  
*Telemetry code:* nbv1608  
*Capture date:* 20-11-2016  
*Capture location:* Karanse Hill, Kaski (1950 masl)  
*Age:* Adult  
*Sex:* Female??  
*Weight:* 6,430 grams



**Description:** Durga is a breeding female (most probably) showing complete territorial movement pattern with some modest movement routes. In the east this bird travelled up to Ghachowk of Kaski district, Shikha to the North, Banskharka to the west and Aarukharka to the south. Durga has a core habitat to the north of small town Dobilla in Parbat district of west Nepal – a probable nesting site.

### **c. Home range size of bearded vulture studied**

The initial result shows that the adult birds are more territorial and having moderate home range size with the core area around the nesting location/cliff, while subadult prefer to wander and explore new area and they have largest home range among all birds.

Movement data showed the fledgling remains within the natal area until 89 days after first flight, with the maximum overlap of home range with the parents with the home range size of 105.77 km<sup>2</sup>. On 90<sup>th</sup> day the fledgling dispersed out from the natal area and home range increased by five times reaching overall range to 526.63 km<sup>2</sup>, which

suggest fledglings starts to disperse from the 90 day of first flight or approximately at the age of 216 days. The largest home range size was observed for the juvenile bird was 20,170 km<sup>2</sup> and that of adult bird was 620 km<sup>2</sup>. Table 1 summarises the home range size of each bird with age category and duration of movement data.

**Table 1.** Home range size of individual bird calculated using Minimum Convex Polygon (MCP) in 100% fixes.

| SN | Name of Bird | Age      | First location date | Last location date | Home range size in sq.km (MCP-100%) |
|----|--------------|----------|---------------------|--------------------|-------------------------------------|
| 1  | Devi         | Adult    | 21-Oct-16           | 10-Nov-16          | 146                                 |
| 2  | Durga        | Adult    | 20-Nov-16           | 3-Jan-17           | 620                                 |
| 3  | Gauri        | Adult    | 18-May-16           | 3-Jan-17           | 488                                 |
| 4  | Henk         | Juvenile | 18-Nov-16           | 22-Nov-16          | 79                                  |
| 5  | Himal        | Juvenile | 18-May-16           | 3-Jan              | 5,180                               |
| 6  | Kali         | Juvenile | 22-May-16           | 27-Dec-16          | 20,170                              |
| 7  | Kesang       | Juvenile | 24-Oct-16           | 2-Jan-17           | 15,244                              |
| 8  | Ratna        | Juvenile | 26-Oct-16           | 4-Nov-16           | 10,907                              |
| 9  | Shankar      | Adult    | 17-May-16           | 3-Jan-16           | 230                                 |

Initial results have shown some fascinating movement patterns for example three of the juveniles perform frequent transboundary movements between Nepal and China, which suggest the needs of transboundary conservation approach for the survival of bearded vulture population in the Himalayan range. Data also revealed that these birds fly above the altitude of 7,700 m asl over the Himalayan Mountains. Core habitat of territorial individual of high altitude area shows some of breeding pairs are most likely nest above the snow line of 5,500 m asl. The data from the fledgling shows they are dependent to the parents approximately around the age of 215 days. After that period they tend to be more independent and start to perform long distance travel outside the parent range and starts to stay independently for few days but frequently returns to the natal range.

Juvenile birds are not experience to the new environment during their dispersal time therefor they are very prone to several kind of threats. Transmitter from the juvenile bird (Henk) stopped sending the active locations after 5 days of tracking. After immediate checking of the last location we found area with massive high tension powerlines. Although did not find the dead body or fallen off transmitter it can conclude the most possible cause of downing the transmitter was death of bird due to collision of bird with the powerlines. Therefore those powerlines are potentially lethal for these magnificent birds in the mountainous area of Nepal and urgent consideration should be made for the long term survival of large birds of prey.

#### **d. Studied threats to bearded vulture**

Threats information to the bearded vultures were collected through questionnaire surveys and also from the GPS tracked bird. One of the GPS tracked bird had died due to collision with high tension powerline. This shows powerlines over the slopes of mountains are extremely lethal for the vultures. Questionnaire survey result shows in total 38.2% respondents has experienced population decline of bearded vulture, similarly 44.4% respondents believe poisoning targeted to exterminate the predators is the cause of population decline, which found statistically significant ( $P = 0.035$ , Fisher's exact test) and also 60% respondents believe that the body parts of bearded vulture are used as a traditional medicine to cure diarrhoea (intestine), arthritis (bones) and respiratory disease (intestine, lungs, liver). When this evidence was tested against the population decline that found statistically significant ( $P = 0.002$ , Fisher's exact test). Spearman's rank correlation test shows statistically significant negative correlation between altitude and population decline ( $r = -0.445$ ,  $P < 0.01$ ) which means the rate of population decline decreases with the increase of altitude in the research area. Similarly 55.9% respondents believes to have sufficient food but significant correlation of food availability was observed with the altitude ( $r = 0.717$ ,  $P < 0.001$ ) and also 90.5% of the high altitude respondents believe food is not a problem at their territory but it seems one of the significant problem in lower elevation ( $U = 30.00$ ,  $P < 0.001$ ), where all the respondents believe food is not enough for bearded vulture, however in overall the correlation between food availability and population decline of Bearded vulture remains not significant ( $r = 0.322$ ,  $P > 0.05$ ). This study did not find any significant effect (or sign) of hunting, collection of eggs/nestling or destruction of nests to reclaim fabrics that some of the earlier studies were indicating. All of the respondents have strongly disagreed on the above questions. Thus in overall collision with powerlines and electrocution, poisoning to extermination predators and use of body parts could be the significant cause (but not the only) for the overall population decline of bearded vulture, in addition to that in the lower altitude food is also an additional cause. The results of this study also indicates the population trend of bearded vulture is declining in the lower altitude but more stable population trend in the higher elevation of Nepal.

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

During the project implementation I have closely worked with several local peoples of project area. Our project site in Syanja district was in the small village so that lot of local peoples get involved in the project activities, we also used the local village houses as a homestay for several days so the local peoples also could get some economic benefits from the project. On the other hand whole the village get educated about the vulture because the project team has explained details about project and its importance. Beside those onsite communities, at least five peoples get well trained on vulture monitoring, tapping and use of satellite telemetry among them

four are the university graduates. This will certainly help to establish a team of experts in Nepal to conduct satellite telemetry study in the future. Sandesh Gurung is the one who is now preparing to submit the thesis (master level) on demography of Himalayan vulture and their migration pattern.

**5. Are there any plans to continue this work?**

Very strong national and international collaboration has been established with several organisations to continue this work in the future. Those organisations include The Peregrine Fund, Korea Institute of Environment Ecology, Savannah Tracking Limited, Kenya Birds of Prey Trust, The Vulture Conservation Foundation, Himalayan Nature, etc. So our team is very interested to continue this work in the future.

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

This project is a part of PhD study. Total 10 copies of thesis will be submitted to the Institute of Postgraduate Studies (IPS), Universiti Sains Malaysia (USM). Also one copy of thesis will be provided to the library in Tribhuvan University Nepal. Results of the movement ecology will be presented in Asian Raptor Research and Conservation Network (ARRCN) Symposium in October 2017 (18th – 22nd October 2017 in Philippines) and also in November 2017 in Annual Bearded Vulture Meeting (France). Besides this articles will be published in relevant scientific journals.

**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 between February 2016 and December 2016.

**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   |
|----------------|-----------------|---------------|------------|--|
| Transportation | 1595            | 2865          | -1217      | Increases was due to two catching attempts and also due to decrease on GBP exchange rate |

|  |        |        |        |  |
|--|--------|--------|--------|--|
| Field accommodation                                      | 1016   | 1558   | -543   | It took longer time for trapping of birds so the expenses increased  |
| GPS telemetry units purchase                             | 4517   | 4773   | -257   | Increase of USD exchange rate and transfer cost lead to increase the amount  |
| Allowances for the field Assistant                       | 1245   | 1245   | 0      | Although the field days increased into 115 days, the cost was managed because Sandesh had supported us voluntarily in the site for several days    |
| Educational materials                                    | 996    | 0      | 996    | Did not produce educational materials because it took lot of time for field preparation and the field work but still have plan to publish booklet. |
| Meetings, and awareness activities                       | 631    | 600    | 31     |  |
| Bones and meat for baiting and trapping                  | 0      | 175    | -175   |  |
| Materials purchase to make traps and measuring equipment | 0      | 200    | -200   |  |
| <b>Total</b>   | 10,000 | 11,416 | -1,416 | The Deficit amount was covered by The Peregrine Fund   |

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

Collaboration has already been established with the national and international organisations, so we plan to attach more satellite units in the future and also have a thought to establish some conservation programs including feeding sites for bearded vultures in the Himalaya.

**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?**

The project activities are updated on The Peregrine Fund Facebook page <https://www.facebook.com/ThePeregrineFund/posts/10154145984731240> <https://www.facebook.com/ThePeregrineFund/posts/10154134031241240> which has more than 80,000 followers worldwide where Rufford Foundation was acknowledged as a supporter of this project. Also the news was published on The Peregrine Fund e-newsletter (below is the portion of newsletter).

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Vultures are one of the most valuable, yet often most misunderstood, animals on the planet. By feeding on carrion, they remove harmful bacteria and disease from our environment and from leaching into our waterways, livestock, and more. The Peregrine Fund is currently training and supporting a student in Nepal, Tulsı Subedi, who is studying the movement of Bearded Vultures for his PhD thesis at Centre for Marine and Coastal Studies (CEMACS), Universiti Sains Malaysia. He recently tracked one that flew over a 7500 meter (24,600 feet!) peak into Tibet. These vultures are phenomenal birds that will often feed on bone marrow. They access the marrow by flying up in the air with a bone and dropping it onto a hard surface to break it open. Tulsı has a number of collaborators on this project including Mr. Hansoo Lee of KoEco South Korea, Rufford Foundation, Simon Thomsett of the Kenya Bird of Prey Trust, and Sandesh Gurung and the field staff. Stay tuned for future updates on this exciting project!



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Similarly news was published on vulture conservation foundation website.  
<https://www.4vultures.org/2017/01/04/tracking-bearded-vultures-in-nepal-new-research-project-by-tulsi-subedi/>

Also the same news was share through the face book page of vulture conservation foundation which has more than 10,000 followers

<https://www.facebook.com/vultureconservationfoundation/posts/110294838980395>

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Project update was presented in Universiti Sains Malaysia and Rufford foundation was acknowledged.

### **11. Any other comments?**

I thank to The Rufford Foundation and all the other collaborators, so that the first ever satellite tracking project on bearded vulture in Asia was possible. I look forward to working more with The Rufford Foundation in the future.