

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	Tshering Dema
Project title	Collaborative Acoustic Monitoring of the Critically Endangered White-bellied Heron in Bhutan
RSG reference	21101-1
Reporting period	Jan 2017 to Feb 2018
Amount of grant	£5000.
Your email address	tsheringde@gmail.com
Date of this report	

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
Interviews and focus group discussions with stakeholders to build partnership, discuss deployment sites and gain local knowledge at various sites				<p>A total of 30 one-to-one interviews with multiple stakeholders (villagers residing near habitat area, foresters and ecologists) across five different communities and the head conservation office (RSPN) was conducted. In addition, focus-group discussions and field observations were carried out at each community area.</p> <p>We also took part in community gatherings where we used audio-visual presentations of bird acoustics and videos to raise conservation awareness. As a result, we build good partnership with local people to take part and support our project.</p>
Capacity building on configuration, deployment and maintenance of acoustic sensors at each site				<p>A small team at each site (comprising of local people, local foresters, and ecologists) are trained on how to configure, deploy, and maintain the acoustic recorders. Several in-the-field training across sites as well as in-house training at the RSPN (Royal Society for Protection of Nature) office was conducted. In the post-training discussions, some participant expressed their interest to further investigate other types of vocal and cryptic species using acoustic monitoring technologies.</p>
Fieldwork for deployment of sensor across various habitat and potential habitat sites during breeding season				<p>Deployment of wildlife acoustic recorders were successfully carried out with local partners. Our study sites included both known habitat areas as well as old and potential feeding sites.</p> <p>Long duration recordings were</p>

			collected from known nesting sites at 1. Waklaytar, Tsirang 2. Berti Middle Stream Nesting Area, Tingtibi, Zhemgang Recordings were gathered from both existing and potential feeding sites: Ada Lake, WangduePhodrang Phibsoo Wildlife Sanctuary Berti Village, Tingtibi, Zhemgang Upstream, Tingtibi, Zhemgang Ada Kangku chhu
Acoustic detection and analysis of the raw recordings			The entire data is harvested and analysed. Due to solar recharging time variation across sites, there were sporadic gaps in the long duration data. However, there are enough sample data gathered from each site across the breeding season of the species. Two main analysis were run on the acoustic datasets: A custom-built WBH call recogniser. Extraction of Acoustic indices of all available dataset for further analysis. The first approach on the data across sites proved that the species breeding call density is much higher in more pristine habitats (Berti Chhu, Tingtibi) compared to the other known nesting site at Waklaytar (Along the Puna tshangchu river). Moreover, there was no common call type (or the breeding call) detected at other feeding and roosting sites (Phibsoo Near Longo Khola and Ada lake)
Acoustic "reference" data repository			All the captured data are backed up and shared for future reference with collaborating partners This resulted in a rich acoustic reference data for future analysis and to document acoustic library for each of the sites.
Socio-ecological factors that influence conservation of White-			From our interviews and focus group discussion, we found that there was not much direct social

bellied Heron				<p>values or cultural beliefs associated to the species. An important finding through our fieldwork was the indirect associations between community's local practices and heron habitat conservation. We found two cases. At Jara village in Punakha, local residents narrated that the trees selected for roosting for many years by white-bellied heron are the two trees that they worship as local deity. Therefore, the habitat area has high community respect and value. Likewise, in Ada village, the lake is worshipped by the local community. However, with changes in developmental activities and changes in practices, people conduct more than once-a-year annual ceremony at the lake site where a huge crowd is assembled. In such, we found that there are subtle shifts in local practices that might influence species habitation. We suggest the need of more in-depth local accounts and negotiations in order to build locally relevant conservation strategies.</p>
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The main challenge of using acoustic monitoring was the issue of solar charging. Since the habitat areas were on terrain cliffs and remote sites, first deploying and configuring the sensors was challenging at those locations. Second, after it was configured and under operation, the recording has been on and off at different time period across the sites. For some of the sites, we switched back to using replaceable battery-based recordings. This required scheduling small teams or local people to do the weekly or bi-weekly visits to replace the batteries. The latter strategy worked well as our local partners in each community were supportive and were keen to take part in our collaborative project

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

Following a socio-technical approach to conservation of white-bellied heron, the following three are the most important outcomes of the project:

- i Documentation of in-the-nest acoustic reference data from different habitat areas. Species call types, diurnal patterns and call density variations across the known nesting sites are measured. Our custom made heron call recogniser in the long duration recordings shows that the species has much higher call density at more pristine habitat compared to the nest site at Waklaytar. It also confirmed that the species does not make the common call type ("ock ock ock urr") at feeding and roosting sites. Therefore we learned that the breeding call detector is more suitable for assessing population during the breeding season. The second call type that was determined from the Waklaytar nesting site was rare and was found in other feeding and roosting sites. However, it remains as a weak acoustic signature since it has close resemblance to many other species calls such as rufous hornbill and even barking deer that are found in recordings from Ada Lake. This is the first acoustic monitoring study for conservation of endangered species conducted in Bhutan
- ii Collaborative network of support group across different sites in Bhutan. Building upon the existing local support group members in the RSPN Heron Conservation Group, our project involved much wider potential volunteers across institutes and communities. We gathered local knowledge and perspectives on the species' habitat and also investigated the existing monitoring practices across different sites. At each of the following sites, we carried out focus group discussions and participatory field work:
 - a. Phibsoo Wildlife Sanctuary forestry team and the local elephant care takers.
 - b. Forester and RSPN local support members and local villagers.
 - c. Waklaytar nearby residents.
 - d. Tingtibi foresters and local support group members.
 - e. RSPN heron conservation group members.
 - f. Conservationists, Ugyen Wangchuk Institute for Conservation of Environment (UWICE).
- iii Engagement and Capacity building of local stakeholders (villagers, foresters, and ecologists) on sensor deployment, data retrieval and maintenance the local stakeholders shared their local knowledge and monitoring practices. We used audio-visual probes and presentations (bird calls from the nesting sites and available videos (produced by RSPN) in our focus group discussions with members of the community at various sites.

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

Local communities across different sites were closely involved and benefitted by this project. Firstly, we carried out several discussions with the focal conservationists/staff at the Royal Society for Protection of Nature to understand existing monitoring practices and support member across the distributed sites. At each community, we trained our local partners on sensor configuration, data retrieval, and maintenance.

Each community has gathered long duration environmental acoustic recordings which comprises of sounds of different kinds of local species. We plan to expand the local support group to local school children and engage them in discovering and learning different species identification and calls in their communities.

5. Are there any plans to continue this work?

Yes, we plan to continue this project.

The data gathered in this phase has huge opportunity for raising awareness and educating different sectors of people in conservation needs. We aim to carry out further research on how we can raise people's awareness about endangered and local species through networked interfaces to curated species sounds.

Our target sub-communities are schools and non-formal education groups in the villages to advocate for conservation.

On a more ecological front, for the next round, we are planning to deploy all the sensors along the *Berti River, Tingtibi* as it is the most pristine habitat. We aim to investigate the breeding species population in Tingtibi area. The acoustic survey will be conducted at the same time with the RSPN's population survey of the species in March 2018.

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

We plan to share the data and results of our work through different modes:

1. Currently all acoustics recordings are shared through Ecosounds acoustic workbench. Original copies of the datasets are also backed up in Ugyen Wangchuck Institute for Conservation of Environment (UWICE) Lab in Bhutan.
2. A multi-authored publication titled "Acoustic detection and Acoustic Habitat Characterization of White-bellied Heron" is under progress in a peer-reviewed special Issue journal.
3. Another peer-reviewed conference paper titled "Towards Situated and Participatory Conservation of Species through Citizen's Engagement using Sensor Technologies" has been submitted to 2018 Designing Interactive Systems (DIS) Conference. This article mainly highlights the need of tool support that can trigger community action and engagement in conservation of species and environment.
4. A poster outlining the results of this collaborative acoustic monitoring project outcomes will be presented at the Ecoacoustics Congress 2018, Brisbane Australia.

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 RSG grant was spent over 14 months. The costs incurred were close to the anticipated plan.

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
Acoustic Sensors 849x6	5094			Equipment provided by Ecosounds Lab
Memory cards	2418	1800	618	Reusable Also bought two external drive for data backup
Solar Panel and Battery costing	1350	1150	200	We had to use batteries at most some sites due to irregular solar charging issues
Other accessories cabling and stationaries	200	200		
Travel expenses and daily allowance (Per diem)	500	1000	-500	Three field trips in total (once in the beginning, once in the middle and once at the end)
Vehicle rental and maintenance	400	700	-300	Covered from the excess amount of other activities
Food during site visit and deployment	150	150		
Report writing, presentation and exit meeting	0	0		Some of these activities are still ongoing

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

As an immediate result of this conservation project, we are continuing our collaboration with ecologists and birders aiming to design nature probes (in other words technological artefacts and apps that can help disseminate and learn about nature). This will help in raising awareness and connect people across different geographical areas. Particularly, we are keen to design a collaborative system where distributed members can sign up, discuss and annotate on the acoustic data that they have collected.

Based on our results from the current study, we aim to focus on conducting acoustic survey in Tingtibi area along Berti River. This is the most pristine habitat. Both visual

observation and our acoustic approach has confirmed breeding success in this area. However, to date it is not known if the chicks (three chicks were recorded in the monitoring nest during this season) are inhabiting in the local area or are displaced completely far from existing nest area. Therefore we plan to carry out more extensive acoustic survey of white-bellied heron in Tingtibi Berti area. All work will be carried out in partnership with local people and the Berti Forest team members.

Our interview findings showed that people across different parts had varying knowledge about the species. While most knew the criticality of the species, their knowledge of the species was heterogeneous and partial especially in sites like Ada village. People often were observed to become complacent about no or rare sighting by few people from having a nest and breeding pair few years ago.

In such community context, there was need to convince people to conserve the feeding area (the lake) and to remind the global effort towards conservation of this species. As social practices change (such as annual ceremony at the lake change to bi-annual ceremony and new development plans are brought up) there are subtle shifts in socio-ecological practices. We recommend need of support to build locally relevant conservation strategies and plans in these remote sites.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?

Yes we used the logo in our presentations and design workshops. We also acknowledged The Rufford Foundation in the papers that we have submitted. I will also use Rufford Foundation logo in the presentations and posters that I will be submitting and presenting this year.

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

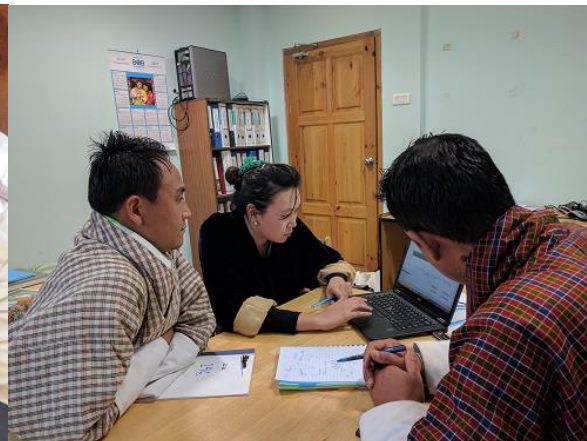
Team Members	Roles
Tshering Dema	Lead Researcher/Team Leader
Dr. Sherub Sherub Conservationists/Ecologists	Fieldwork and data analysis
Kinley Kinley Forester, Tsirang Forest Division	Fieldwork and data analysis
Wangchuk Forester, Jigme Singye Wangchuk National Park	Field work
Jigme Sonam Forester/Researcher, Community Based Conservation Program	Fieldwork, sensor testing and configuration with solar, maintenance and data analysis
Phibsoo Wildlife Sanctuary Forest team	Sensor deployment and field work
Ada local support members	Sensor deployment and field work

12. Any other comments?

Our team would like to express our deepest gratitude to The Rufford Foundation for funding this conservation project on white-bellied heron across multiple habitat areas.



Left: Interview with local residents at Jara Village, Punakha. Right: Zawa village, Wangdue.



Left: Discussing existing monitoring practices of White-bellied Heron with a local support member at Zawa Village. Right: Visualizing and listening to acoustic data from Waklaytar with Heron Conservation group members at RSPN head office.



Sensor deployment discussions, in-the field training and focus group discussions on deployment sites



Left: Wildlife Acoustics Recorder deployment at the Nesting site of White-bellied Heron at Tingtibi. Right: Acoustic recorder deployed at a known roosting site in Jara village, Punakha.



Left: Exploring the acoustic patterns to search for heron calls in months of data with local participants. Right: Focus group discussion during a community gathering using audio-visual clips of the target species.