Final Evaluation Report

Your Details	
Full Name	Vishal Kumar Prasad
Project Title	Conservation of amphibians in human dominated mountain landscape in Nainital, Uttarakhand, Indian Himalayas through citizen science and education
Application ID	35454-1
Date of this Report	2 August 2023

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
Fieldwork for obtaining baseline data				Fieldwork was successfully conducted for 9 months. • As a result of the study, we found over 18 new records of amphibian species in 60 new sampled locations in Nainital district. • We found a new country record for India and five state records of amphibians for Uttarakhand state. • The novel baseline data is crucial for planning, management and conservation of amphibians in this region.
Passive Acoustic Monitoring (PAM) technique for detecting rare amphibians.				We used PAM technique for amphibian's detection and monitoring but due to high background noise due to calls of crickets, cicadas and birds and stream water noise in most of the sampling sites during rainy season, PAM technique didn't yield desired results and wasn't successful. To fulfil the gap and meet project objective, we changed PAM method to real-time bioacoustics techniques. Using bioacoustics techniques, we detected 12 species including few rare ones such as *Amolops mahabharatensis*. Additionally, we recorded 600+ calls of more than 20 species in the project with recordings acoustic signals of five species for the first time for science.
Collecting data on direct and indirect threats to amphibians				We have received data for all 60 sites. We produced evidence as images and detailed notes on the different level of threats at each site.
DNA barcoding of all species				Genetic barcodes (16S mtDNA) has been generated for 15 species of frogs and toads. Seven species will be DNA barcoded for the first time.
Prioritisation of amphibian sensitive				Amphibian sensitive areas (ASAs) have been identified and prioritised on several

areas				locations for conservation management and capacity building. This activity is still going on at some sites/villages.
Training of locals and citizen science programs				We have imparted 18 hands-on training programmes including citizen science initiatives i.e., training using www.inaturalist.org under project - Amphibians of Himalayas in more than 20 villages and 691 participating observers so far. This programme is still active. Follow the project: https://www.inaturalist.org/projects/amphibians-of-himalayas
Scientific Publication and media outreach				1) A research paper highlighting discovery of *Euphlyctis adolfi* is published in Systematic and Biodiversity journal (impact factor: 2.31; attached with this report). DOI: https://doi.org/10.1080/14772000.2022.2102686 Another research paper is under preparation. 2) Our project findings were featured in Times of India newspaper in the May 2023. Cutting of newspaper is attached with this report.
Awareness programs, workshop				Three major workshops cum awareness programmes were conducted in different towns (namely: Reetha Pokhra, Aarohi, Mukteshwar) of Nainital district following COVID related restrictions. We are planning to organise more such programs.

2. Describe the three most important outcomes of your project.

Thanks to the grant from Rufford foundation because of which we were able to do significant work for amphibian conservation in Nainital. Following are the three major outcomes of the project:

a). Capacity building, awareness and training:
Our project has boosted capacity building for amphibians in Nainital district at the grassroots level awareness and participation of local communities from villages, school, colleges, private resorts, government departments and NGOs. The project laid a foundation for local stakeholders to come together and get involved in capacity building. Stakeholders were first time introduced to local species of amphibians, ecosystem services and benefits of amphibians to farmers, for example: hands-on training of 'identification of frogs' to our local nature-guides in Mukteshwar has encouraged the nature guides to learn key characters to identify species.

Now they are trained to upload frog pictures they take in their phones on citizen science platforms such as iNaturalist (inaturalist.org). They have been trained on the outdoor nature trail ethics. They like to show frogs to their tourists and clients to earn perks during trekking and promote saving local amphibians. The training and awareness activities have greatly helped initiate their interest to learn about frogs and toads. This activity has been making them resourceful for fellow scientists, researchers and conservation biologists.

Figure 1: Scientific data collected during the project.

Interestingly, within a year, we have over ~3000 observations from trained and online volunteers in the Himalayan amphibian project on iNaturalist website (https://www.inaturalist.org/projects/amphibians-of-himalayas). These citizen science observations are becoming a huge dataset for researchers and scientists. According to our database (Figure 1) of individuals participated in training and awareness programs in the first year of project, 55% are adult men (over 18yrs), ~32% are youths/children (below 18 yrs) and ~10% are adult women. We will work to increase the participation of women by the following year.

b). Scientific research data:

The vital baseline data obtained in the first year is crucial for species conservation assessment, identifying critical areas and policy recommendation. The record of an amphibian species for the first time from Nainital in India (new country record) and five species recorded for the first time from Uttarakhand state (new state records) highlights that the amphibian diversity of the Nainital in Kumaun region was thoroughly underestimated. Moreover, record of 19 amphibian species from Nainital district were taxonomically identified and documented for the first time from this region (Figure 2). This project is proved important not just for a district but for the entire biogeographic landscape of central Himalayas. This project is significant for all amphibian species in central-western Himalayas.

Importantly, we produced DNA barcodes for 15 amphibian species, of which DNA barcodes of seven species are new for science, species namely: Napal's Paa frog (Vulnerable on IUCN), Blanford's Paa frog, Himalaya Paa frog, Mahabharat torrent frog, Beautiful Torrent frog and so on. The data will help scientists delimit the

distribution range and correctly establish taxonomic status of the species. Additionally, our team has obtained call recordings i.e., advertisement, release and distress calls of 15 amphibians, of which calls of four species are new to science. This data is vital in developing Android phone application for citizen science in future. The call library will also help other researchers to study ecology, taxonomy and population monitoring of amphibians in this region.

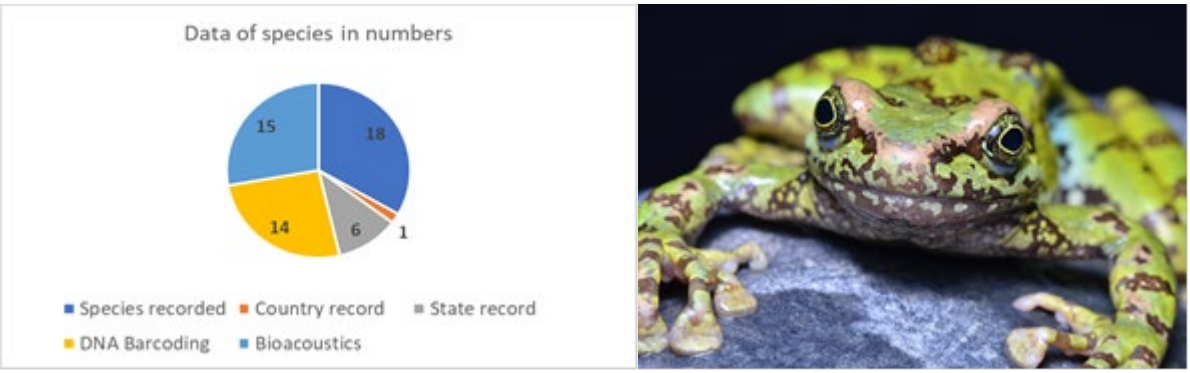

Figure 2: Scientific data collected during the project.

c). Contribution in conservation management:
Developing conservation strategies for Himalayan amphibians is not possible without having baseline data that we collected during the project, the data such as species geographical distribution, genetics, threats, habitat degradation-loss, bioacoustics, behaviour and ecology.

We rediscovered few lost species in the region, for example, Jaunsar's torrent frog - *Amolops jaunsari* which was considered lost for over 30 years. This species had not been reported since 1985, we are glad to have rediscovered it and provided its morphological evidence, DNA barcode, vocalisation and distribution modelling for the first time. We are in process of preparing IUCN Red List conservation reassessment of such species at high risk. These aspects will undoubtably help in receiving protection to these species at local as well as global level. Our team is preparing recommendation policy to help the species conservation at country and global level.

Our data of 'threats to amphibians and habitat' has greatly helped in prioritising the areas where the endemic and threatened species occur, and their habitat is continuously degrading at fast rate. Such areas are in the top list of conservation management. We are meeting officials of Ministry of Environment and Forests of India and Forest department of Uttarakhand to publicise amphibians and to be included in the government's annual wildlife management plan.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

We faced logistics and travelling problem during field surveys in July-September 2022 due to heavy rains. Flash floods and landslides at certain areas in the mountainous region of Nainital district delayed our work. These issues restricted our team's ability to reach at project sites on time. During the rainy season, several incidences of

broken roads and disrupted road connectivity hindered execution of project activities for several weeks to months. We partially prevented these issues with the help of our local volunteers who informed us on local weather and road connectivity situation in their villages. This helped us plan the activities better and saved time and resources.

Secondly, delay in response from government authorities (due to partial COVID restrictions) on supporting projects awareness and outreach programmes with forest department was bit of a concern. We visited offices of forest department and local school and colleges often to follow up on proposed programmes to be held in their institute and schools, etc.

Prior to this work, Kumaun region of Western Himalayas was underrated for amphibian diversity due to the scarce knowledge. Not even a single systematic study was ever conducted in this region. However, with the help of this grant, we could systematically document and work on 19 amphibians with a new country and four state geographical distribution records. DNA barcoding has revolutionised the amphibian taxonomy and has helped in rediscovering lost species in this region. Our field surveys have found more than 60 major amphibian habitats/sites where the conservation process can start. Including this, the capacity building and involvement of local communities in amphibian conservation is a major highlight of our work. Knowledge and support from locals are essential in making any conservation project successful in long term. We have covered both these elements in the project successfully. The accomplishment of our project is evident in the media coverage of the work in local and national radio and newspapers.

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

The local communities were crucial, and their participation immensely helped the project and without the local's support, project couldn't have been successful. Volunteers from a total of 26 villages participated in either fieldwork training or education and awareness programs. We trained locals from 24 villages.

Table 1: Number of individuals participated in project in each site in one year:

S.no.	Site	Men	Women	Below 18	Above 60	S.no.	Site	Men	Women	Below 18	Above 60
1	Mukteshwar	37	8	2	5	*16*	Chaafi camp	8			
2	Reetha Pokhra	16	4	26	1	*17*	Bhawali	15			
3	Aarohi School	32	16	104	2	*18*	Odakhan	7			
4	Wildlife Institute	22	13			*19*	Askot Munsiyari	6			

5	BRCF NGO	8				*20*	Golapar	23		2	1
6	CEDAR	3				*21*	Bhalugad	6	1		
7	Simayal Resort	6	1	3		*22*	Deodwar	17	1		
8	Paora	22	1	3	1	*23*	Simayal	41	11	4	2
9	Maheshkhan RF	8				*24*	Nathualhan	13			
10	Chakra	8	1			*25*	Dadima	8			
11	Sahi	5				*26*	Sunkiya	15	1	2	
12	Haldwani	8		1		*27*	Forest Department	6			
13	Almora	16									
14	Kapileshwar	12									
15	Chaafi	19	1	1			**Total**	**387**	**38**	**124**	**9**

5. Are there any plans to continue this work?

Yes, we are highly motivated to continue this project. The results of 1st year of work were promising and our team is cheered to continue the project activities further. Some activities such as capacity building and field work requires follow ups to be able to give long lasting impact. We think one year is a short duration to harvest the long-term success of the project. We have started and we just need to keep doing the work to be able to achieve long term goal of amphibian conservation in the region.

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

We have shared the results of the work in form of final project report, informative posters, coloured laminated folding field guide, through newspapers and radio with all stakeholders. The project report has been sent to the forest department, NGO Biodiversity Research and Conservation foundation, Wildlife Institute of India and many other official institutions. The informative posters have been distributed in more than 60 sites (villages, offices, school, colleges and public points in towns). The project output has been covered in national newspaper and radio channel. We have published a research article already and one more article in under review. The project report will be shared on the websites of NGO Biodiversity Research and Conservation foundation, Wildlife Institute of India, Youtube channel, and Lab of animal behaviour and conservation soon for interested public to download the read the results.

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

We are aspiringly ascending the field work and capacity building programmes into surrounding districts — Pithoragarh, Champawat and Udham Singh Nagar in Kumaun Uttarakhand. In 2022-2023, we sampled in +60 sites collecting field data, imparted training to ~700 local individuals in 26 villages and organised three major workshops with stakeholders in different hilly towns of Nainital district. In 2023-2024, we aim to include three more districts in Kumaun region of Uttarakhand. Overall, we

expect to complete nine major workshops across Himalayan landscape of Kumaun region of Uttarakhand.

8. 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?

Yes, we used the logo of Rufford Foundation in all printed posters, leaflets, banners, power-point presentations and annual reports. The Rufford Foundation was acknowledged in our research articles and publications with the project number.

9. Provide a full list of all the members of your team and their role in the project.

Vishal Kumar Prasad (Team leader) — executed all project activities inc. planning and performing fieldwork, DNA analysis, bioacoustics analysis, taxonomic work, management of workshops and training programs.

Kumudini Bala Gautam (Team member) — executed genetic work and DNA analysis of entire project and participated in the fieldwork.

Dhwani Dave (Intern & Project coordinator) — administered communications and promotion of project activities and monitoring of workshops.

Swastik Pritam Padhy (Project intern) — oversaw the bioacoustics monitoring in fieldwork sites.

Dr. Bhim Singh (Team member) — helped in planning and managing the fieldwork in mountainous terrain of Himalayas and helped in genetic analysis.

Dr. Manish Kumar (Team member) — support in site selection in aquatic habitats in high altitude.

Dr. Ghazala Shahabuddin (Co-Investigator) — Mentor in outreach and capacity building and guide in developing conservation plan.

Dr. Amaël Borzée (Co-Investigator, Guide and Expert) — Chief supervisor of the entire project and guide in the conservation action plan.

10. Any other comments?

We would like to thank The Rufford Foundation for providing this grant because of that we could work on the systematics and conservation of amphibians of Nainital in Himalayan region of Uttarakhand. The outcome of the pilot project is promising, and we assure to continue this work. We will be applying for the funding for the second stage to ensure that the momentum gained in the first year is carried on further and we achieve the ultimate goal of amphibian conservation in Kumaun region of Uttarakhand.

Thank you!