Final Evaluation Report

Your Details	
Full Name	Arjun Pandit
Project Title	Tuberculosis surveillance in Asian elephants of Nepal at captive-wild interface and TB awareness among elephant handlers.
Application ID	31905-1
Date of this Report	2022/11/10

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
Determining the Prevalence of elephant tuberculosis through DNA extraction, culture, and PCR examination.				• Sample collection (faecal samples, trunk wash samples, trunk drip samples) from elephants of Chitwan national park. • Culture of the above-mentioned samples as well as tissue samples from dead elephants (nine dead elephants that died of suspected elephant tuberculosis) since 2017 in the molecular laboratory of GENETUP (German-Nepal Tuberculosis Project). • DNA extraction, PCR and LAMP tests were performed in the molecular laboratory of National Trust for Nature Conservation (NTNC), Sauraha, Nepal.
Awareness generation about elephant tuberculosis				• Distribution of t-shirts with logo of The Rufford Foundation (Slogan: Control Elephant Tuberculosis). • Distribution of leaflets to the visitors. • Training to elephant handlers about elephant tuberculosis.

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

a). The project has determined the prevalence of elephant tuberculosis by various methods like culture of bacteria, PCR and LAMP tests and gave good database for the Government of Nepal to control the disease in elephants and humans.

b). Besides this, awareness programme helped public get the information of elephant tuberculosis and engaged them in control of the disease.

c). Both the epidemiological study and awareness programme helped in the conservation of elephants and check the transmission of disease to other wild animals.

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

Due to COVID-19, I could not start the project in time and have completed the field works in September to October 2022. So, I became unable to present my final report in time and have requested to The Rufford Foundation to consider this situation through my last email.

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

I involved local communities during the training about the elephant tuberculosis and distributed t-shirts and leaflets to them during awareness campaign. Besides this, I highlighted about the activities of project in various local media like FM radio and local newspapers. In this way, local communities were engaged in the conservation campaign.

From this programme, the local communities benefited because they knew about the importance of conservation of elephants by controlling elephant tuberculosis. Similarly, they also became aware about elephant welfare and were highly motivated in conservation of elephants through promotion of elephant welfare. Besides this, they became aware about the transmission of the disease in both human and elephants and were motivated to control the disease in both human and elephants. In this way, the project became highly beneficial to local communities.

5. Are there any plans to continue this work?

Yes, I am planning to continue this work. I am planning to continue the project focussing on following activities:

- Genotyping study of the bacteria to know about the type of bacteria and know about drug sensitivity test of the drugs used in the treatment of elephants.
- Awareness programme to mitigate human-elephant conflict in Chitwan National Park, buffer zone and other regions of Chitwan districts.

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

Since I have completed the field works, I will analyse data after getting all the results of culture, PCR and LAMP tests performed in the molecular laboratory of GENETUP and NTNC, Sauraha, Nepal.

After data analysis, I will focus on the publications of the results in the renowned journals. Besides this, I will share my findings with The Rufford Foundation, Ministry of Forest and Environment, Department of National Parks and Wildlife Conservation, universities, different institutions, local level government offices, National Trust for Nature Conservation (NTNC), German Nepal Tuberculosis Project (GENETUP) and various local newspapers.

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

In the continuation of this project, following are the important next steps:

- Genotyping of the bacteria to cause the disease: For the control of the elephant tuberculosis in Nepal, we need to know the exact mode of transmission of the disease, i.e., we need to know whether it is transmitted from wild elephants to captive elephants or transmitted from human to elephants or vice versa. To know this information, we need to know which lineage of bacteria is infecting the elephants and causing death of elephants in the previous days.
- Drug sensitivity test of the drugs used in the treatment of elephant tuberculosis: Drug resistance is one of the problems in the treatment of elephant tuberculosis. So, we should know which drug sensitive and which drug is resistant to the infecting bacteria. So, I am planning to do this test.
- Awareness about mitigation of human-elephant conflict and improving elephant welfare as a means of elephant conservation through awareness campaign.
- Publication about the elephant control programme in local media like FM radio and local newspapers.

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, I used the logo of The Rufford Foundation on t-shirts distributed in the awareness campaign and also in the local newspapers during the publication of my project.

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

Full list of all the members of my project team with their role in the project is described below:

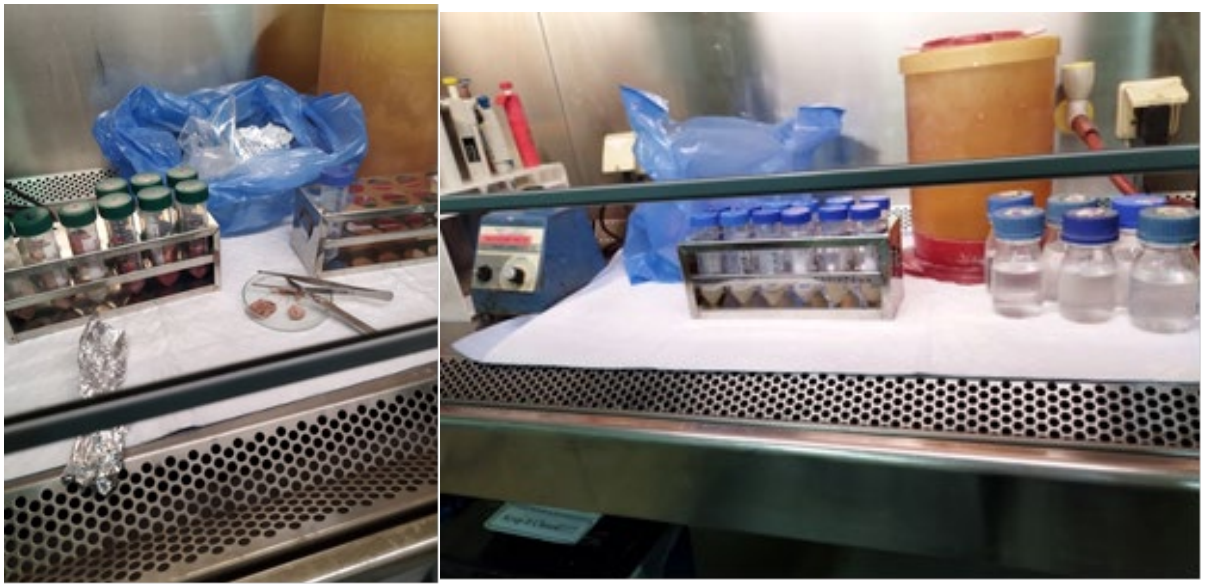
Dr. Amir Sadaula, Veterinary officer of National Trust for Nature Conservation: My university, Hokkaido university has made MOU with National Trust for Nature Conservation (NTNC) for various research work. As a PhD student at Hokkaido university, I conducted all the fieldworks like sample collection (Faecal samples, trunk wash samples, trunk drip samples) of live elephants and tissue samples of dead elephants that died of suspected elephant tuberculosis in coordination with Dr. Amir Sadaula and other veterinary technicians in the field of Chitwan National Park. Besides this, we make awareness campaign with elephant handlers and other public in coordination with the team of NTNC. I have also performed various molecular works like PCR, LAMP tests in the molecular laboratory of NTNC

Dr. Naresh Subedi, Conservation Manager of NTNC was my supervisor and he supervised and coordinated my project. Similarly, **Dr. Toshio Tsubota**, Professor of Graduate School of Veterinary Medicine, Hokkaido University is my supervisor in the university during my PhD course. **Dr. Sarad Paudel**, research associate in Department

of Pathobiology & Diagnostic investigation, College of Veterinary Medicine, Michigan State University is another supervisor providing knowledge about elephant tuberculosis in the field work.

10. Any other comments?

I want to share some of the photos of the field work to The Rufford Foundation as follows. Since, I have not published the result of my work, I want to kindly request you to consider my copyright in these photos.

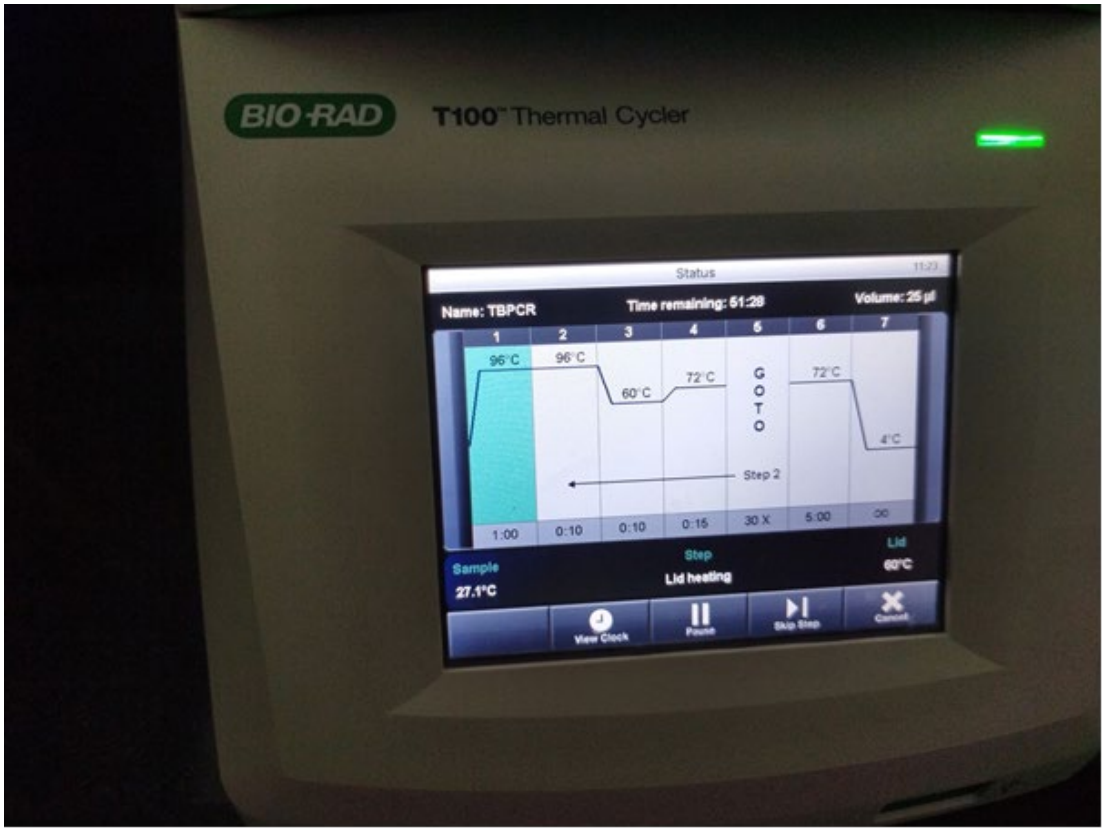


Photos showing various steps during culture of tissue samples.

Photos showing sample collection for test of elephant tuberculosis (First photo: collection of trunk drip and second collection of faecal samples).

Steps showing DNA extraction from the tissue samples.

Faecal samples stored in zipper bag.



Thermocycler setting during Polymerase chain reaction (PCR) of my samples in laboratory of NTNC, Chitwan.

Photo showing my laboratory work in Nepal.

Setting of Incubator for LAMP test of my samples.

Some of the photos during meeting of my PhD supervisor in National Trust for Nature Conservation and GENETUP.

Preparation and distribution of T-shirts to different people involved in elephant handling and elephant conservation in Nepal.

Trunk drip collection.

Trunk wash.