Final Evaluation Report

Your Details	
Full Name	Tran Van Dung
Project Title	Conservation on genus *Paramesotriton* (caudata: Salamandridae) in Vietnam based on Ecological niche modelling and Phylogeography
Application ID	31908-2
Grant Amount	£5988
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Date of this Report	22 November 2021

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
Objective 1: Collecting information on the presence data of the genus *Paramesotriton* in Vietnam.				For the objective, we conducted several surveys in Cao Bang, Bac Kan, Thai Nguyen, Quang Ninh, Lao Cai, Yen Bai province to collect the presence data on warty newts applying the survey transect method. A total of 63 living adult samples of genus *Paramesotriton* were used for morphological comparison with 12 characteristics. Additionally, I obtained 123 occurrence points of *P. deloustali*, and 24 observed points of *P. guangxiensis.*
Objective 2: Assessing the genetic diversity of the genus *Paramesotriton* in Vietnam.				Tissue from 63 individuals of five separate populations was collected, and 15 samples were genetically amplified approximately 1100bp fragment of the mitochondrial gene ND2. We release captured newts back to recorded localities after collecting muscle tissues. Then we combined our sequences with 17 DNA sequences of *Paramesotrion* obtained from Genbank were used to construct the phylogenetic tree. Due to extreme weather, we could not collect sufficient samples in Quang Ninh province for genetic data.
Objective 3: Developing the habitat suitability models, and assessing the impact of climate change on distribution of these species.				To complete the objective, we use 123 occurrence points of *P. deloustali*, 24 observed localities of *P. guangxiensis,* and 31 environmental variables to generate the suitable habitat of these species using the MaxEnt model. We also used two climate change scenarios (RCP4.5 and RCP8.5) of two climate models (ACCESS1-0 and MPI-ESM-LR) in 2050 and 2070 to assess the impact of climate change on the distribution of newts in Vietnam. The suitable distributional maps were a foundation to propose appropriate recommendations

				for warty newt conservation in northern Vietnam.
Objective 4: Determining major threats on genus *Paramesotriton* in Vietnam as well as providing recommendations to conserve these species.				The project determined three major threats to the warty newt population and its habitat based on field surveys. We, then, also provided several conservational recommendations from the result of the project.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

The main unexpected challenge during the project was extreme weather in winter 2020 - 2021. It was one of the coldest winters for more than 40 years in northern Vietnam. Snow occurred in many mountainous areas. We had unexpected results in the field survey in Quang Ninh province and had to cancel field surveys in Phia Oac – Phia Den National Park because of the unusual snow and replace by another field survey in the spring of 2021.

Figure 1, 2. Unusual snow in Phia Oac – Phia Den NP in January 2021

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

The three most important outcomes of our project:

- ***The genetic diversity of the genus Paramesotriton in Vietnam***

From the molecular analysis, we obtained 1101 -1125 bp sequences of partial ND2 gene for 15 specimens from five separate populations. Of the 1037 nucleotide sites, 432 sites were variable, and 284 sites were parsimony informative for the ingroup. The likelihood value of the ML tree was -5334.40 while the mean likelihood score of the Bayesian analyses for all trees sampled at stationarity was -5,554.69. The phylogeny tree showed that Cao Bang population was clearly separated from the remaining populations (ML bootstrap value = 99%), and mainly corroborated as a sister taxon of *P. guangxiensis*. By contract, other populations were mainly clustered with *P. deloustali* divided into two different groups. The first group contained Bac Kan and

Tam Dao population, while the second group included Lao Cai and Yen Bai population.

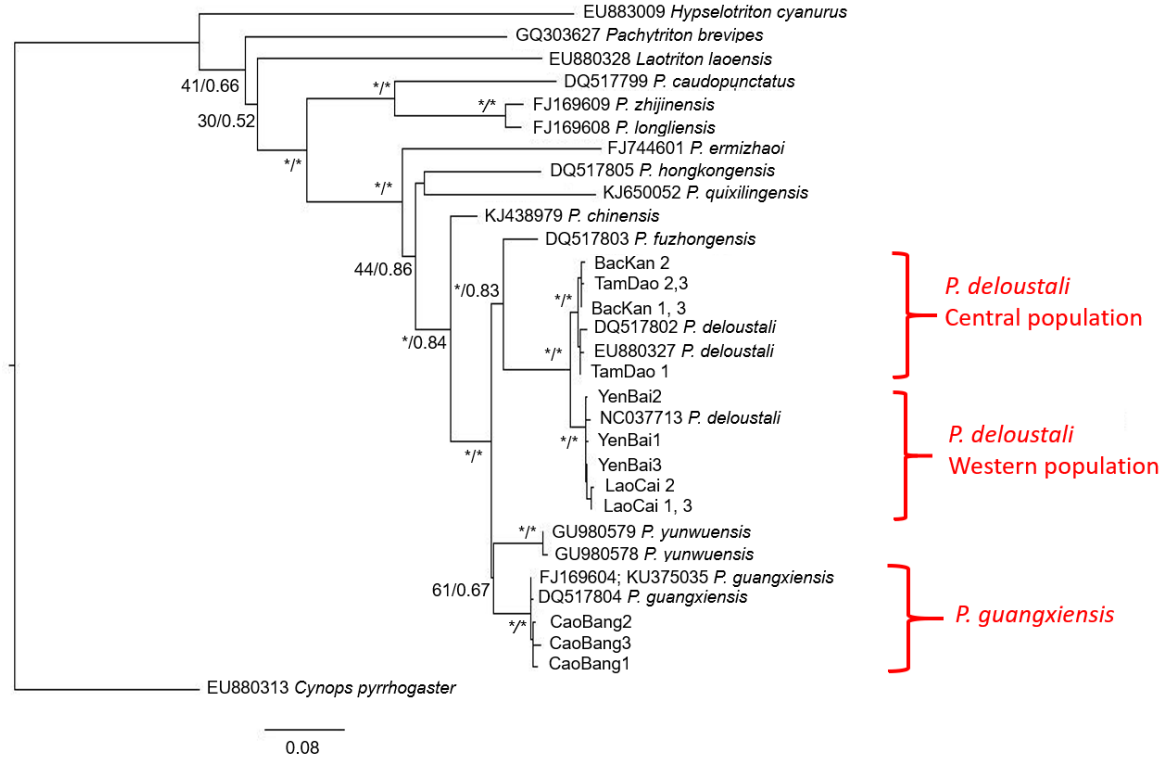

Figure 3. Maximum likelihood tree based on partial ND2 gene for genus Paramesotriton in Vietnam and related species (Asterisks indicate nodes with bs > 70 % and bpp > 95 %).

In term of averaged genetic distance, the population from Cao Bang differed from other populations from 6.63 % to 7.04%. The pairwise distance between Bac Kan versus Tam Dao population, and Lao Cai versus Yen Bai population were very small, only 0.55%, and 0.69%. The remained genetic distance pairs were from 1.78 to 2.24% (Table 1).

Table 1. Mean and range of pairwise distances (%) among warty newt populations in northern Vietnam used in molecular analysis

Population	Bac Kan	Cao Bang	Lao Cai	Tam Dao	Yen Bai
Bac Kan	1				
Cao Bang	6.81 (6.56-7.11)	1			
Lao Cai	2.24 (2.07-2.46)	7.04 (6.89-7.22)	1		
Tam Dao	0.55 (0.28-0.84)	6.63 (6.56-6.78)	2.07 (1.97-2.16)	1	
Yen Bai	1.87 (1.69-2.27)	6.99 (6.79-7.45)	0.69 (0.37-1.12)	1.78 (1.69-1.98)	1

- ***Predicting the suitable distribution of species in genus Paramesotriton in Vietnam***

The predicted models based on MaxEnt software showed strong ability to generate potential distribution warty newts in northern Vietnam, with AUC values > 0.9, particularly, the AUC for *P. deloustali* model was 0.973 ± 0.015, and for *P. guangxiensis* was 0.9928 ± 0.1. The potential distribution of *P. deloustali* resulting from our models covered a fragmented area in northern Vietnam. The distribution can be divided into three main regions: Eastern region in Quang Ninh province, Central region covered Bac Kan, Tuyen Quang and around Tam Dao NP, and Western region contained the suitable area in Ha Giang, Lao Cai and Yen Bai province. On the contrary, the predicted distribution of *P. guangxiensis* concentrated in Cao Bang province and Bac Kan province.

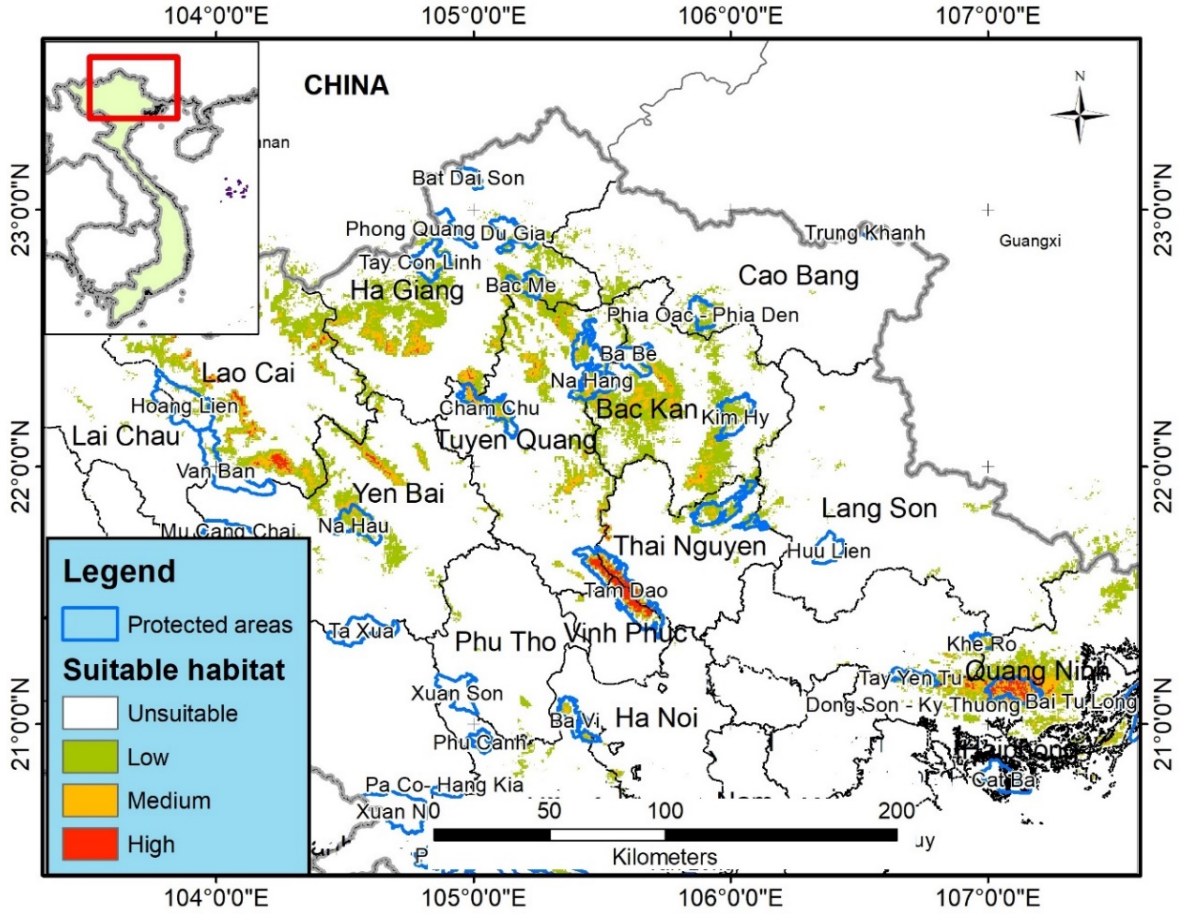

Figure 4. The suitable distribution of P. deloustali in northern Vietnam

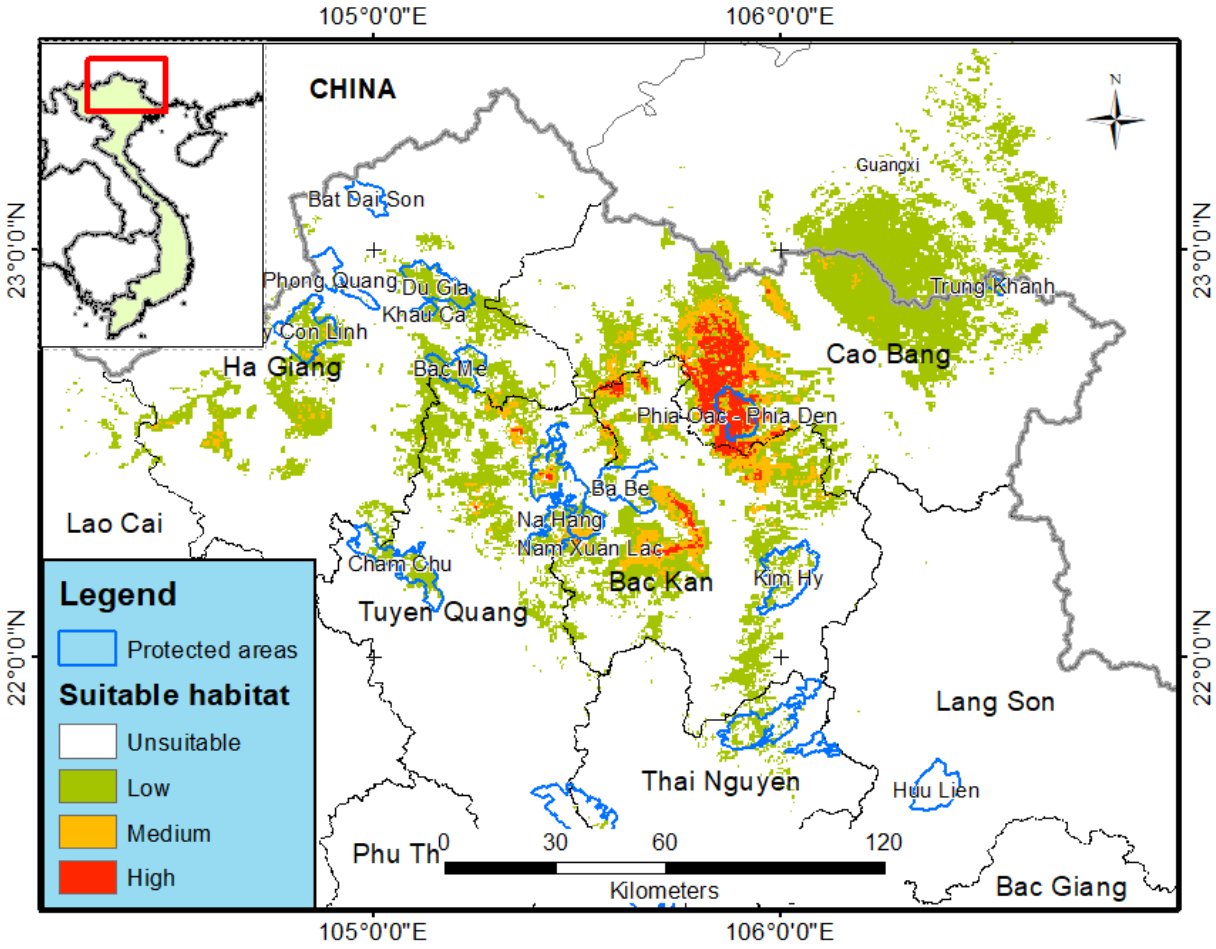

Figure 5. The suitable distribution of P. guangxiensis in northern Vietnam

- ***The major threats to warty newts (genus Paramesotriton) in northern Vietnam***

Throughout the project, we identified the main threats to warty newts in northern Vietnam. Firstly, habitat loss and degradation occur both inside and outside protected areas where the species distribute, such as Phia Oac – Phia Den National Park, Tam Dao National Park. Secondly, illegal hunting for traditional medicine also can impact negatively on warty newts, especially for the populations that occur outside protected areas, for example, the population in Lao Cai and Yen Bai province. Our interview data also showed that the awareness for conserving warty newts is not high. In particular, there is no conservation project focusing on raising awareness of local communities on warty newt protection although these species have been currently protected by Vietnamese law (NĐ06/2019/NĐ-CP) and CITES. Based on the threats, we proposed several recommendations focusing on increasing the capacity for law enforcement management; establishing monitoring programs for warty newts and their habitats; and raising awareness for the local communities.

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

Three local people in each study area were involved in our project as local guides for field surveys, including Quang Ninh, Bac Kan, Yen Bai, Vinh Phuc, Lao Cai, and Cao Bang province. During the field survey, we always encourage local guides in protecting warty newts as well as wildlife species and their habitats by training and providing information on protecting forest and wildlife laws. In each field survey area, the local people also participated in our interviews to share the status, distribution, and threats to warty newts and other wildlife species.

5. Are there any plans to continue this work?

Yes, there are. We are planning to investigate deeply the population status, distribution, and other ecological characteristics of warty newts in Phia Oac – Phia Den National Park – the unique population of *P. guangxiensis* in Vietnam. In the area, the warty newt is mainly facing habitat loss and degradation. Then, a conservational programme will also be proposed to enhance the awareness of local communities on warty newts and other endangered species conservation.

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

The principal investigator (Dung Tran) presented the results of the project in a seminar at Biodiversity Conservation Laboratory, Kyoto University, Japan. Additionally, we also shared the results with students and updated them in lectures on Wildlife subjects in Vietnam National University of Forestry, Vietnam. Now, we also prepare a manuscript to publish our results in a scientific journal.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

We received the fund in November 2020, and then, the project was implemented in 1 year. The actual length of the project coincided with the proposed plan.

8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Vehicle rental (motorbike) + Gas + Maintenance	1320	1360	+40	Due to extreme weather, we conducted an additional field survey in Cao Bang province.

Lodging	900	750	-150	Due to COVID-19, the price for lodging was lower than budget.
Food for field survey - team member	900	950	+50	Due to extreme weather, we conducted an additional field survey.
Food for field survey - local guides	432	450	+18	Due to extreme weather, we conducted an additional field survey.
Wage for assistants (local guides)	1008	1050	+42	Due to extreme weather, we conducted an additional field survey.
Travel to study area by bus	600	650	+50	Due to extreme weather, we conducted additional field survey.
Batteries for digital camera, GPS	120	95	-25	The price was lower than our budget.
First aid kits	60	60		
Equipment: Garmin GPSMAP 78	507	490	-17	The price was lower than our budget.
Individual field equipment	141	135	-6	The price was lower than our budget.
Total	**5988**	**5990**	**+2**	(The Exchange rate at the time was £1 to VND 30,707)

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

The most important activity for next step is raising funding to implement conservation program for enhancing awareness for local communities on warty newt conservation in northern Vietnam.

10. 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 did. The Rufford Foundation logo was presented and acknowledged in my presentation in the seminar at Kyoto University and the Vietnam National University of Forestry. The information of The Rufford Foundation also was published in all documents during our project. During field surveys, we also introduced the opportunity to receive funding for conservation from the Rufford Small Grant to the staff of several protected areas in northern Vietnam.

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

Mr Tran Van Dung (Principal investigator): He directly implemented all the contents of the project: planning, contact with local authorities, interview, field survey, data analysis, writing report, and presentation.

Mrs Ta Tuyet Nga (team member): Mrs. Nga supported Mr. Dung Tran in planning, interview, and field survey.

Mr. Giang Trong Toan (team member): Mr. Toan joined the project as a technical member. He participated in all field surveys.

Mr. Ha Van Ngoan (additional member): Mr. Ngoan supported us in field surveys.

Mr. Dong Khac Thanh (additional member): Mr. Thanh participated in our field surveys.

12. Any other comments?

I would like to share some photos of the project.

Left: An individual of P. guangxiensis in Phia Oac – Phia Den NP. Right: *The ventral view of* P. guangxiensis *in Phia Oac – Phia Den NP*

Left: An individual of P. deloustali in Yen Bai province. Right: The ventral view of P. deloustali in Yen Bai province

Left: Habitat of warty newt in Phia Oac – Phia Den NP. Right: A cover presentation document about the result of the project in a seminar at Kyoto University

Left: Field survey in winter. Right: Field survey in summer