Final Evaluation Report

Your Details	
Full Name	Ngan Thi Lu
Project Title	Study on diversity and conservation of two fern genera Arachniodes and Polystichum (Dryopteridaceae) on limestone karsts and caves in Vietnam (Phase 1. Endangered, rare species of Dryopteridaceae in Hagiang province).
Application ID	30213-1
Grant Amount	£6000
Email Address	vnmngan@gmail.com
Date of this Report	Oct. 28th 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
Field investigations: specimens, current conservation status				-Conducted two field trips in limestone and cave areas in Hagiang Province. -Collected about 30 specimens of fern family Dryopteridaceae, including endangered species, *Cyrtomium hemionitis*, a new record for Vietnam and a new species of fern family Polypodiaceae. -Interviewed H'Mong and Dao ethnic groups about conservation and forest uses.
Endangered species, *Cyrtomium hemionitis*				-Assessment of conservation status, characteristics, distribution area, coordinates, etc. - Proposed In situ Conservation: *Cyrtomium hemionitis* distributes inside Bat Dai Son National Park boundaries and clearly demarcated for *Cyrtomium hemionitis.*
Conservation training course focused on endangered species				+ A training course took place in Pai Chu Phin Hamlet, Quan Ba District, Ha Giang Prov. - Conservatists introduced about biodiversity and its important; factors of biodiversity loss; Red List of Threatened Species; conservation ways and models, pollen and spore banks; strengthening participant behaviour that they could build positive change to forest. -Dealing both with theoretical and practical questions about plant conservation. Concrete actions in situ conservation of endangered species, *Cyrtomium hemionitis* for local people and Boards of Management of Bat Dai Son Nature Reserve and the leader of Bat Dai Son Commune.

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

- Interview: I thought that I could use Vietnamese language to communicate and interview the ethnic people there. But it was surprising that a lot of people didn't understand Vietnamese or understand very little. So, we asked Boards of Management of Bat Dai Son Nature Reserve and the leader of Bat Dai Son Commune translated for those who not understanding well the national language (Tiếng Việt).

- Cave character and plant recognition:
  - We described about what kind of caves and limestone mountains which are suitable for ferns that we want to explore. But sometimes we still were led to small, low-dark caves and even caves for tourists that have been greatly embellished by humans. The best solution was to ask both experienced guides and forest rangers.
  - Ferns bear small morphological characters and most of these tiny features are diagnostic for recognising species and genus level. For local people they think most of ferns look the same. Fortunately, endangered species, *Cyrtomium hemionitis* has very special simple and large lamina. We showed the colour pictures of *Cyrtomium hemionitis* for recognizing.

- Growing: We tried to grow *Cyrtomium hemionitis* from its spores but failed. It is necessary to find different ways to grow.

- Our field trips didn't find the endemic species, *Polystichum hagiangensis* due to limited time.

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

- Assessed conservation status of endangered species, *Cyrtomium hemionitis* and proposed a reasonable conservation solution that is to in situ conservation with the participation of local people and nature reserve staff.
- Trained local people, foresters with increased awareness about protecting forest and endangered species.
- Endangered species *Cyrtomium hemionitis* data and cave *Polystichum* species all the necessary information (distribution, latitude, longitude, and elevation), guide how to recognise *C. hemionitis* which will help scientists, rangers and people easily look up when needed, to avoid any confusion later on.

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

People living in mountainous areas, most of them depend on forest products without thinking about the negative effects. Our training course have trained participants that collecting forest products must be based on the principles of sustainable development. Harvesting is combined with protection and afforestation. Harvest should only use plant parts that do not affect the whole plant. For example, leaves,

stems, etc. avoid uprooting a whole tree. Collection and commercialisation are strictly prohibited for those precious IUCN Red List species.

Local people have trained to protect endangered species, *Cyrtomium hemionitis* and its surrounding habitat. Losing even a single species can have disastrous impacts on the rest of the ecosystem.

These activities are correct way to enrich nature sources that will benefit lasting.

5. Are there any plans to continue this work?

Yes. It would be very nice if this work can be continued in the longer term in order to extend study regions and methodologies.

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

Project results fully communicated to the local management and leaders of Bat Dai Son Nature Reserve. In addition, the project report will be sent and presented to the Scientific Council and the Vietnam Academy of Science and Technology-VAST committee broad.

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

We use finance for field trips (car renting, accommodation in Ha Giang Province, hiring guiders); for conservation training course; for equipment (collecting, treatment of specimens); for planting spores.

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
Field work	4742	4742		
Conservation training courses	467	467		
Equipment and supplies	791	791£		
TOTAL	**6000**			The exchange rate used in Oct. 2020: 1£=29.476.000 VND

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

I would love to continue this project in 2022 or 2023. For the following reasons:

- Endangered species, *Cyrtomium hemionitis* has only been found in Bat Dai Son Commune, Quan Ba District, Ha Giang Province. We have propagated by spores, but due to some objective reasons, it not yet germinated into seedlings. So it is very important to try in different methods, including plant tissue culture technology. When we have enough materials, we can conduct research on biological compounds, medicinal sources from *Cyrtomium hemionitis*, as a springboard to promote interdisciplinary collaboration and future research. This efforts can help to remove the endangered species from the list of Endangered and Threatened Plants.

- Limestone areas are often harsher due to topography is very complex, strongly dissected, and dangerous, so the fauna and flora on the limestone mountains are very sensitive and easy to change under adverse factors. In addition, *Cyrtomium hemionitis* is only distributed in the limestone mountains. So spores dispersal is more difficult. Therefore, it is necessary to strictly protect the existing population and make breeding efforts.

- Due to time limitation, this study only focused mainly in Quang Ba District, I would like to investigate more locations in Ha Giang Province and Quang Binh Province (Phong Nha-Ke Bang National Park, central Vietnam where the second most limestone mountains are recorded).

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 colour printed for training course posters and t-shirts as spiritual gifts for participants who answered the most questions correctly on the biodiversity, conservation and fern species training course.

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

Dr. Nguyen Quoc Binh: specimens (collecting in field work, treatment and preserve and identification)

Dr. Luu Dam Ngoc Anh: meeting and interviewed local people
Dr. Do Van Truong (a replacement for Dr. Bui Van Thanh): training course, conservation skill and field work.

MSc. Doan Dinh Son: Field work, conservation model
And I took part in all of these works.

12. Any other comments?

3 projects per year for each country.