Final Evaluation Report

Your Details	
Full Name	Nguyen Van Tan
Project Title	The herpetofauna of Dakrong Nature Reserve, Quang Tri Province, Central Vietnam: Diversity, Ecology and Conservation
Application ID	39897-1
Date of this Report	27 March 2024

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objectives and Key functions	Not achieved	Partially achieved	Fully achieved	Comments
To assess and updated checklist of amphibians and reptiles in Dakrong Nature Reserve (hereafter NR)			■	Five field surveys were conducted in Dakrong during August 2023 and February 2024. This project recorded 40 species of amphibians; additionally, 48 species of reptiles were recorded for Dakorng NR. In particular, this project has for the first time recorded 38 species of amphibians and reptiles for Dakrong NR. The herpetofauna of Dakrong NR contains a high number of conservation concern species, including 12 listed in the IUCN Red List, eight listed in CITES Appendices at the global level, 11 listed in the Vietnam Red Data Book and eight listed in the Governmental Decree No. 06/2019/ND-CP at the national level.
Identification of important and significant sites for conservation			■	Secondary and primary forests from Huc Nghi Village (ca. 16.496°N, 107.044°E), Huc Nghi Commune; A Bung Village (ca. 16.451°N, 107.110°E), A Bung Commune; Ta Lao Village (ca. 16.600°N, 106.967°E), Ta Long Commune were determined as priority areas for protection and suitable as possible release sites for amphibians and reptiles as well as other animals.
To evaluate the threat from poaching, trafficking to the amphibian and reptile species and other wildlife			■	Through field surveys and interviews with local people, the major threats to the populations and habitat of amphibians and reptiles as well as other wildlife in the Dakrong NR are deforestation resulting from agricultural activities (seen in Trieu Nguyen and Ba Long communes), forestry exploitation such as bamboo, and rattan, floods and landslides (seen in Trieu Nguyen [ca. 16.639°N, 107.051°E] and Ta Long communes), the impact of hydroelectric facilities (in A Bung Village).

Training and capacity development of personal during the project				Three field members, five general staff of Dakrong NR, and a 15 local patrol team were trained during field survey of the project. Support was provided to the Dakrong NR on numerous instances to update their collection of amphibians and reptiles for the museum.
Community awareness program instituted with special focus given to amphibian, reptile and wildlife conservation to mitigate threats of endangered wildlife				We conducted five community meetings and school programme within buffer zone villages/area of Dakrong NR. There were around 200 people included Dakrong staff and local residents and students who participated. In the sessions, we shared conservation status, level of protection especially relating to amphibians and reptiles and legislation to handle wildlife crime. Furthermore, education was provided regarding the handling and emergency first aid in the event of a venomous snakebite. In the end, Dakrong's staff and management as well as local residents/students had robust and open discussions regarding the historical-current status of local wildlife and practical solutions to assist the conservation of the corresponding threatened species
Propose recommendation's for a long-term conservation plan				The directorates of Dakrong NR referred to our research results for developing of operational plans for the period 2024-2030 and fundraising for their nature reserve. Priority areas for protection and release were established and mapped based on field data and interview information.

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

a). Previous studies documented 32 species of amphibians and reptiles from Dakrong NR. An updated list of the herpetofauna of Dakrong NR is published (see in Appendix I). Our new findings bring the number of amphibian and reptiles species in Dakrong NR to 88 belonging to 63 genera and 25 families, comprising 40 species of amphibians (24 genera, seven families) and 68 species of reptiles (39 genera, 18 families), with ecological notes for each species. In particular, this project has for the first time recorded 36 species of amphibians and reptiles for Dakrong NR as well as 15 unrecorded species for Quang Tri Province. Futhemore, the Dakrong

NR also records high levels of endemism with seven species (8.0%) being endemic to Vietnam, and 23 species (26.1%) being endemic to the Indochina region (Vietnam, Laos, Cambodia and Thailand). Concerning its herpetofaunal conservation status, Dakrong NR harbours a high number of threatened species: (1) at the global level, 12 species are listed in the IUCN Red List with three categorised as CR, two as EN, five as VU, and two as NT and eight species are listed in CITES Appendices with two species included in Appendix I and six in Appendix II; (2) at the national level, 11 are listed in the Vietnam Red Data Book with two species categorised as CR, five as EN, and four as VU and eight are listed in the Governmental Decree No. 06/2019/ND-CP, with four species included in Group IB and four in Group IIB

b). We identified factors affecting the habitats and populations of endangered amphibians and reptiles at Dakrong NR through field data and interviews. From there, patrol routes and priority protection areas have been established in Huc Nghi, A Bung and Ta Long ccommunes. Specifically, we discussed details with directorates of Dakrong NR about the decline of the turtle populations at Dakrong NR, with specimens being very difficult to encounter and detect in the wild, this requires additional research and improved forest protection in the future.

c). During the fieldwork, we trained three field assistants, five local staff of Dakrong NR, and 15 local community people to collect specimens and capture data regarding reptile and amphibian diversity and ecology in the region. Additionally five training courses were held to raise awareness of local biodiversity conservation, this part of the project reached nearly 200 people included local villagers, residents and students.

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

The terrain of Dakrong NR is particularly tough to navigate with large changes in elevation (ca. 600 to 1,500 m) and steep slopes towards the parks mountainous peaks being highly fragmented by dense valleys this made navigation (and general living conditions) during surveys challenging. The unpredicatble mountainous weather in Dakrong NR led to numerous unexpected flood and storm incidents from September to December being a rather large obstacle our fieldwork, close monitoring of the weather situation forced some changes to planed fieldwork in order to reduce any unnecessary risks.

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

During the research period, 15 local residents (villagers) and five of Dakrong's staff were involved as field guides and local support for the surveys. We provided local participants with general scientific research skills and tools including basic identification of amphibians and reptiles species. We also explained the importance of biodiversity and nature conservation during the interviews and did community training for residents including local peoples and Dakrong's staff, especially related to identifying venomous snakes and emergency management with dealing with snake bites.

Additionally, two assistants (students) from Duy Tan University, Da Nang and the science departments of Dakrong NR in herpetology were instructed and educated about various research methods and techniques in both a field and laboratory setting. They were trained to enable them the ability to work independently as herpetological researchers in the future. Furthermore, the official scientific officer of Dakrong NR will use some of the results of this project in his thesis also related to amphibians of the Dakrong NR in the future.

5. Are there any plans to continue this work?

Yes, we would like to conduct further field surveys focused on the population status, ecological, and threat assessment of the identified threatened species amphibians and reptiles in Dakrong NR, with specific focus on the four species of indigenous turtles, *Platysternon megacephalum* (CR), *Cuora bourreti* (CR), *Cyclemys oldhami* (EN), and *Sacalia quadriocellata* (CR); currently there is very little information about them in Dakrong NR with their population status (population density, population structure), distribution (according to altitude, habitat), micro habitat characteristics being largely unknown. Additionally, we would also continue to analyse the morphology and molecular makeup of the suspected unidentified species collected at Dakrong NR.

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

The research results have been submitted to the management board of Dakrong NR. Responses from management board have indicated that our report is now an essential reference point in preparing operational plans for this protected area as well as support their future tourism development goals and objectives.

Furthermore, the results from this research we have also published two papers as well as four manuscripts that have been submitted to peer-reviewed journals on the work, in order to share the finding from the project part of the the work to others:

1. Poyarkov NA, Nguyen TV, Popov ES, Geissler P, Pawangkhanant P, Neang T, Suwannapoom C, Ananjeva NB, Orlov NL (2023) Recent progress in taxonomic studies, biogeographic analysis and revised checklist of Reptilians in Indochina. *Russian Journal of Herpetology* 30(5): 255-476.
2. Liu S, Nguyen TV, Poyarkov NA, Wang QY, Rao DQ & Li S (2024) The validity of *Rana bannanica* Rao & Yang, 1997 (Anura, Ranidae). *Herpetozoa*, 37: 11–20.
3. Nguyen TV, Liu S, Tran VT, Tran TG, Trofimets AV, Dau VQ, Poyarkov NA (2024) Range extension and expanded description of *Micryletta hekouensis* Liu, Hou, Mo & Rao, 2021 (Amphibia: Anura: Microhylidae), with comments on *Micryletta* of northern Vietnam. *Herpetozoa*, in press.
4. Nguyen TV, Liu S, Wilkinson JA, Tran TG, Tran PN, Dau VQ, Poyarkov NA (2024) Range extension and expanded description of *Rhacophorus napoensis* Li, Liu, Yu & Sun, 2022 (Amphibia: Anura: Rhacophorinae) with the first country record from Vietnam. *Herpetozoa*, in press
5. Nguyen TV, Duong TV, Lam NQ, Nguyen DT, Tran VT (2024). Geographic distribution: *Xenopeltis intermedius*. *Herpetological Review*, in press
6. Idiiatullina SS, Nguyen TV, Bragin AM, Pawangkhanant P, Le DX, Vogel G, David P, Poyarkov NA (2024) A new species of green pitviper of the *Trimeresurus macrops* complex (Reptilia: Serpentes: Viperidae) from South Central Coast Region of Vietnam. *Zootaxa* in press

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

Investigation of the population status, ecological, and threat assessment of endangered turtles in the region, is urgently required in Dakrong NR. All information currently obtained is based only on interview evidence and specimens deposition at the reserve's museum.

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, the Rufford Foundation logo was included in both university presentations at Duy Tan University as well as in all course materials provided during the five community training courses held at Dakrong NR. Furthermore, I also acknowledge Rufford Foundation's financial assistance in the published scientific articles and social media postings (E.g. Facebook posts such as:

https://www.facebook.com/photo?fbid=122117086070144982&set=pcb.122117086328144982 or https://www.facebook.com/groups/sifasv/permalink/1681080908965833) that were used to support this project.

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

Tan Van Nguyen field researcher and principal investigator responsible for reporting, leading the interview surveys, field surveys and communication.

Tang Van Duong field research assistant conducted interview surveys and field surveys, additional support provided in molecular analysis.

Vy The Tran field research assistant conducted interview surveys and field surveys, supported training initiatives for Dakrong staff and local residents/students.

Ngon Quang Lam field research assistant conducted field surveys and interview surveys.

Duc Trong Nguyen field research assistant conducted field surveys and interview surveys.

Dong Van Nguyen, Vinh Van Hoang, Tien Van Nguyen, Dung Van Ho, Buong Ta Ho, Them Van Ho, Hiep Van Ho, Khach Van Ho, Thiep Van Ho, Nhang Van Ho, Nhiem Van Cao, Diu Ngoc Dang, Loi Van Ho, Quy Van Ho, Phien Van Ho who are indigenous and local residents and park staff that conducted the field surveys.

10. Any other comments?

I personally and sincerely would like thank The Rufford Foundation for their kindly support of this valuable and critically needed project to study amphibians and reptiles diversity that has resulted in contributing to biodiversity conservation in Vietnam**.**

This project helps to better understand the important transition zone of the northern Truong Son (Northern Annamite) Range and the central Truong Son (Annamite) Range, a region of great significance for zoogeographic studies and comparisons.

Appendix I. Check list herpetofauna in Dakrong NR, Quang Tri, Vietnam**.**

Notes: (1): Endemic: 1= Endemic for Vietnam, 2= Endemic for Indochina region (Vietnam, Laos, Cambodia, Thailand); **(2) IUCN 2024:** NT= Near Threatened, VU= Vulnerable, EN= Endangered, CR=Critically Endangered; (3) **Vietnam Red Data Book 2007:** VU= Vulnerable, EN= Endangered, CR=Critically Endangered; (4) Governmental Decree No. 06/2019/ND-CP; (5) CITES **Appendices**

Species	(1)	(2)	(3)	(4)	(5)
Amphibia					
Anura					
Bufonidae Gray, 1825					
Duttaphrynus cf. *melanostictus* (Schneider, 1799)					
Ingerophrynus galeatus (Günther, 1864)*			VU		
Dicroglossidae Anderson, 1871					
Fejervarya limnocharis (Gravenhorst, 1829)					
Hoplobatrachus chinensis (Osbeck, 1765)					
Limnonectes cf. *limborgi* (Sclater, 1892)					
Limnonectes cf. *kiziriani* Pham, Le, Ngo, Ziegler & Nguyen, 2018	2				
Limnonectes poilani (Bourret, 1942)	2				
Quasipaa taoi Pham, Hoang, Phan, Nguyen & Ziegler, 2022					
Occidozyga lima (Gravenhorst, 1829)					
Occidozyga cf. *martensii* Peters, 1867					
Megophryidae Bonaparte, 1850					
Leptobrachella cf. *aerea* (Rowley, Stuart, Richards, Phimmachak & Sivongxay, 2010)*	2				
Leptobrachella crocea (Rowley, Hoang, Le, Dau & Cao, 2010)*	1				
Leptobrachium banae Lathrop, Murphy, Orlov & Ho, 1998	2				
Leptobrachium sp.	1				
Ophryophryne gerti Ohler, 2003*	1	EN			
Ophryophryne hansi Ohler, 2003*	2				
Xenophrys truongsonensis Luong, Hoang, Pham, Nguyen, Orlov, Ziegler & Nguyen, 2022	2				
Microhylidae Günther, 1858					
Kaloula pulchra Gray, 1831					
Microhyla berdmorei (Blyth, 1856)*					

Microhyla butleri Boulenger, 1900*			
Microhyla cf. *heymonsi* Vogt, 1911			
Microhyla mukhlesuri Hasan, Islam, Kuramoto, Kurabayashi& Sumida, 2014*			
Microhyla pulchra (Hallowell, 1861)			
Micryletta immaculata Yang & Poyarkov, 2021*			
Nanohyla marmorata (Bain & Nguyen, 2004)	2		
Ranidae Rafinesque, 1814			
Amolops compotrix (Bain, Stuart& Orlov, 2006)*	2		
Amolops spinapectoralis Inger, Orlov& Darevsky, 1999*	2		
Indosylvirana attigua (Inger, Orlov & Darevsky, 1999)*	2	VU	
Odorrana absita (Stuart & Chan-ard, 2005)*	2		
Odorrana morafkai (Bain, Lathrop, Murphy, Orlov& Ho, 2003)*	2		
Sylvirana annamitica Sheridan & Stuart 2018	2		
Rhacophoridae Hoffman, 1932			
Gracixalus supercornutus (Orlov, Ho& Nguyen, 2004)*	2	NT	
Kurixalus banaensis (Bourret, 1939)*	2		
Polypedates megacephalus Hallowell, 1861			
Rhacophorus annamensis Smith, 1924*	2	VU	
Rhacophorus exechopygus Inger, Orlov& Darevsky, 1999*	2		
Rhacophorus orlovi Ziegler & Köhler, 2001	2		
Rhacophorus robertingeri Orlov, Poyarkov, Vassilieva, Ananjeva, Nguyen, Nguyen & Geissler, 2012*	2		
Theloderma albopunctatum (Liu & Hu, 1962)*			
Gymnophiona Müller, 1831			
Ichthyophiidae Taylor, 1968			
Ichthyophis kohtaoensis Taylor, 1960			
Reptilia			
Squamata Oppei, 1811			
Sauria Macartney, 1803			
Agamidae Gray, 1827			
Physignathus cocincinus Cuvier, 1829		VU	VU
Acanthosaura nataliae Orlov, Nguyen & Nguyen, 2006*	2		
Acanthosaura phongdienensis Nguyen, Jin, Vo, Nguyen, Zhou, Che, Murphy & Zhang, 2019	1		
Calotes versicolor (Daudin, 1802)			
Draco cf. *maculatus* (Gray, 1845)			

Anguidae Gray, 1825					
Dopasia sokolovi (Darevsky & Nguyen, 1983)*	2				
Gekkonidae Gray, 1825					
Cyrtodactylus cf. *pseudoquadrivirgatus* Rösler, Nguyen, Vu, Ngo & Ziegler, 2008*	2				
Gehyra mutilata (Wiegmann, 1834)					
Gekko gecko (Linnaeus, 1758)			VU		
Hemidactylus frenatus Duméril & Bibron, 1836					
Lacertidae Oppel, 1811					
Takydromus hani Chou, Truong & Pauwels, 2001*	1				
Takydromus cf. *sexlineatus* Daudin, 1802					
Scincidae Gray, 1825					
Eutropis cf. *macularia* (Blyth, 1853)*					
Eutropis multifasciata (Kuhl, 1820)					
Scincella rufocaudata (Darevsky & Nguyen, 1983)*	2				
Sphenomorphus cf. *indicus* (Gray, 1853)*					
Tropidophorus cocincinensis Duméril & Bibron, 1839*					
Varanidae Gray, 1827					
Varanus nebulosus (Gray, 1831)		NT	EN	Group IB	Appendix I
Serpentes Linnaeus, 1785					
Typhlopidae Oppel, 1811					
Indotyphlops braminus (Daudin, 1803)					
Colubridae Oppel, 1811					
Ahaetulla prasina (Boie, 1827)					
Boiga guangxiensis Wen, 1998*					
Boiga multomaculata (Boie, 1827)*					
Coelognathus radiatus (Boie, 1827)			VU		
Lycodon ruhstrati (Fischer, 1886)*					
Oligodon cinereus (Günther, 1864)					
Ptyas korros (Schlegel, 1837)			EN		
Ptyas mucosa (Linnaeus, 1758)			EN		
Ptyas multicincta (Roux, 1907)*					
Natricidae Bonaparte, 1838					
Amphiesma stolatum (Linnaeus, 1758)					
Fowlea flavipunctata (Hallowell, 1860)					

Rhabdophis siamensis (Mell, 1931)					
Pseudoxenodontidae McDowell, 1987					
Pseudoxenodon macrops (Blyth, 1855)					
Sibynophiidae Dunn, 1928					
Sibynophis collaris (Gray, 1853)*					
Elapdiae Boie, 1827					
Bungarus candidus (Linnaeus, 1758)					
Bungarus bifasciatus Mell, 1929					
Naja cf. *kaouthia* Lesson, 1831			EN	Group IIB	Appendix II
Ophiophagus hannah (Cantor, 1836)		VU	CR	Group IB	Appendix II
Homalopsidae Günther, 1864					
Hypsiscopus wettsteini (Amaral, 1929)					
Pythonidae Fitzinger, 1826					
Python bivittatus Kuhl, 1820		VU	CR	Group IIB	Appendix II
Viperidae Oppel, 1811					
Protobothrops mucrosquamatus (Cantor, 1839)*					
Trimeresurus albolabris (Gray, 1842)					
Trimeresurus vogeli David, Vidal & Pauwels, 2001*					
Xenopeltidae Bonaparte, 1845					
Xenopeltis intermedius Orlov, Snetkov, Ermakov, Nguyen & Ananjeva, 2022*	1				
Xenopeltis unicolor Reinwardt, 1827					
Testudines					
Platysternidae Gray, 1869					
Platysternon cf. *megacephalum* Gray, 1831		CR	EN	Group IB	Appendix I
Geoemydidae Theobald, 1868					
Cuora bourreti Obst & Reimann, 1994	1	CR		Group IB	Appendix II
Cyclemys oldhami Gray, 1863		EN		Group IIB	Appendix II
Sacalia quadriocellata (Siebenrock, 1903)		CR		Group IIB	Appendix II

Some species of amphibians and reptiles in Dakrong NR, Quang Tri, Vietnam

Figure 1. *Ingerophrynus galeatus* **(A),** *Limnonectes* cf. *kiziriani* **(B)** *Occidozyga* cf. *martensii* **(C),** *Leptobrachella* cf. *aerea* **(D),** *L. crocea* **(E),** *Leptobrachium banae* **(F).** Photos by Tan Van Nguyen

Figure 2. *Leptobrachium* sp. **(A),** *Ophryophryne hansi* **(B),** *Xenophrys truongsonensis* **(C),** *Microhyla berdmorei* **(D),** *M. butleri* **(E),** *M. cf. heymonsi* **(F).** Photos by Tan Van Nguyen

Figure 3. *Microhyla mukhlesuri* **(A),** *Micryletta immaculata* **(B),** *Nanohyla marmorata* **(C),** *Amolops compotrix* **(D),** *Odorrana morafkai* **(E)** *Sylvirana annamitica* **(F),** *Kurixalus banaensis* **(G),** *Polypedates megacephalus* **(H),** *Rhacophorus annamensis* **(I).** Photos by Tan Van Nguyen

Figure 4. *Acanthosaura phongdienensis* **(A),** *Dopasia sokolovi* **(B),** *Gekko gecko* **(C),** *Scincella rufocaudata* **(D),** *Sphenomorphus* cf. *indicus* **(E),** *Boiga guangxiensis* **(F).** Photos by Tan Van Nguyen

Figure 5. *Lycodon ruhstrati* **(A),** *Oligodon cinereus* **(B),** *Pseudoxenodon macrops* **(C),** *Protobothrops mucrosquamatus* **(D),** *Trimeresurus vogeli* **(E),** *Xenopeltis intermedius* **(F).** Photos by Tan Van Nguyen