

Final Evaluation Report

Your Details	
Full Name	BÙI VĂN BẮC
Project Title	Assessing the Conservation Status of Dung-Beetle Species in the Genus <i>Synapsis</i> Bates (Coleoptera: Scarabaeidae) in Tropical Karst Ecosystems of Vietnam
Application ID	40205-2
Date of this Report	27/8/2024

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
Evaluate the population status of <i>Synapsis</i> spp. (including recently discovered species)				<p>Findings: Through two field trips between June 2023 and July 2024 in non-karst ecosystems of the Dong Chau – Khe Nuoc Trong Nature Reserve and five distinct karst ecosystems in northern and central Vietnam, we successfully evaluated the population status of seven <i>Synapsis</i> species known to date in Vietnam, including three newly discovered species, within the tropical karst ecosystems of Vietnam.</p> <p>New discoveries: We identified new distributions for five <i>Synapsis</i> species. Notably, <i>Synapsis puluongensis</i>, a newly discovered species, was recorded in previously uncharted locations.</p> <p>Data collected: Population densities were calculated using ecological sampling techniques, baited pitfall traps.</p> <p>Methodologies: direct observation in the pitfall traps to determine population sizes and distributions.</p>
Identify endangered <i>Synapsis</i> species				<p>Criteria used: We applied the IUCN Red List criteria to assess conservation status. Factors such as population size, habitat range, and threats were considered.</p> <p>Species identified: The <i>Synapsis</i> species: <i>Synapsis puluongensis</i> was classified as endangered (EN) due to Area of Occupancy (AOO) small (< 500km²), habitat loss and environmental changes.</p> <p>Conservation status: Recommendations for each endangered species were provided, including habitat protection measures and further research needs to monitor population trends.</p>
Work on				Initiatives: We organized two (02) training

<p>capacity building and raising awareness among local stakeholders about the importance of dung-beetle conservation in karst ecosystems</p>			<p>courses for 50 local people from the Van Kieu ethnic group and park staff. In addition, We guided 30 park staff and members of the local community, and young conservationists for the conservation-focused collection and monitoring of <i>Synapsis</i> species. Moreover, we conducted a presentation on monitoring and conserving <i>Synapsis</i> spp. for 22 international students at the Vietnam National University of Forestry. We presented our research on dung beetles in Vietnam alongside dung-beetle projects funded by the Rufford Foundation to young scholars at the "Training Course on Key Technologies of Insect Diversity Pattern Assessment and Intelligent Monitoring System in the Belt & Road Region," hosted by the Institute of Zoology, Chinese Academy of Sciences (Beijing, China) in September 2023</p> <p>Materials developed: We created educational materials including 200 booklets and presentations that highlight the ecological importance of <i>Synapsis</i> species and their role in karst ecosystems. We also designed and given 50 dung-beetle T-shirts to local people.</p> <p>Impact: Surveys conducted post-workshop showed a significant increase in local knowledge and a positive shift in attitudes towards conservation of dung beetles, particularly large-bodied species as <i>Synapsis</i> spp. Some local stakeholders have initiated habitat protection measures based on our recommendations.</p> <p>Challenges: We encountered initial resistance due to misunderstandings about the role of dung beetles, which was mitigated through targeted educational efforts and demonstrations of the beetles' ecological benefits.</p>
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2. Describe the three most important outcomes of your project.

2.1. Identification and classification of threatened *Synapsis* species

Outcome: We have classified the species *Synapsis puluongensis* as Endangered (EN) according to IUCN criteria. This classification is primarily based on factors such as population size, habitat range, and observed threats.

Significance: This classification is crucial for directing targeted conservation actions. Recognizing *Synapsis puluongensis* as endangered allows us to prioritize protection efforts, secure funding, and implement specific measures to address habitat loss and other threats. Furthermore, this classification enhances our broader understanding of species diversity and conservation needs within karst ecosystems.

Detailed classification of the threatened *Synapsis* species:

a. Taxonomy notes

Scientific Name: *Synapsis puluongensis*

Local Name: Bọ hung Pù Luông

Family: Scarabaeidae

Diagnosis: *Synapsis puluongensis* is categorized within the *S. birmanica* group, and can be distinguished from other members of the group in Vietnam by the following features: the elytral interval 2 is not swollen near the base, the metafemora on the ventral side are densely punctured, and the elytral striae display coarse, closely spaced punctures.



Figure 1. Habitus of *Synapsis puluongensis*
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b. Geographic range

Historical range: This species was initially confined to the primary forests of karst ecosystems within Pu Luong Nature Reserve, Thanh Hoa Province.

Current range: *Synapsis puluongensis* has since been discovered in the primary forests of karst ecosystems within Ngoc Son – Ngo Luong Nature Reserve, Hoa Binh Province. The Area of Occupancy (AOO) is estimated to be 16 km² (Fig.2)

As of now, there are 29 recorded sites for *Synapsis puluongensis*, which include four original sites in Pu Luong, seven new sites in Pu Luong, and 18 new sites in Ngoc Son – Ngo Luong Nature Reserve (Table 1)

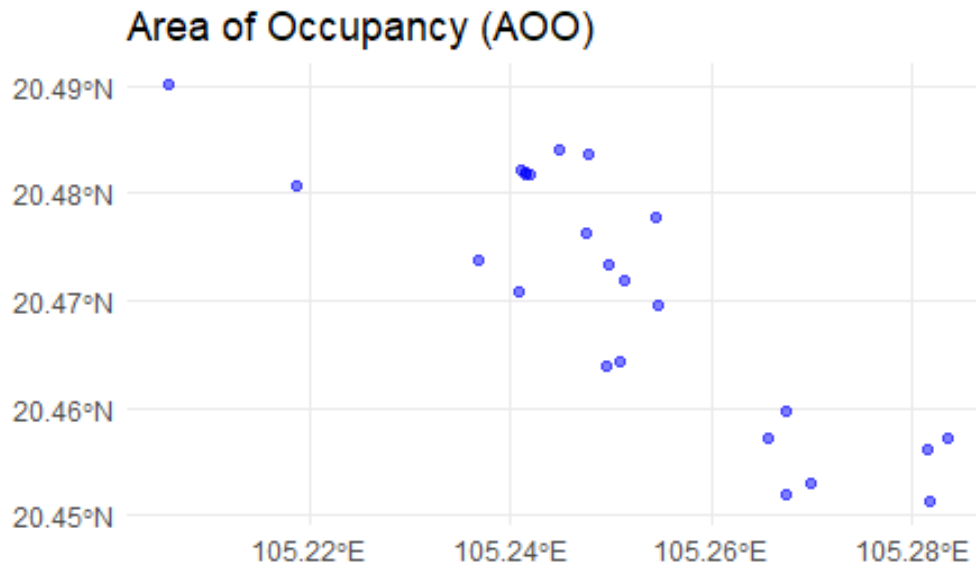


Figure 2. Area of occupancy (AOO) of *Synapsis puluongensis*

Table 1. Coordinates of recorded sites of *Synapsis puluongensis*

Sites	Latitude	Longitude	Locations	Comments
1	20.48167	105.2419	Puluong Nature Reserve	Original site
2	20.48194	105.2414	Puluong Nature Reserve	Original site
3	20.48167	105.2414	Puluong Nature Reserve	Original site
4	20.48222	105.2411	Puluong Nature Reserve	Original site
5	20.47089	105.2407	Puluong Nature Reserve	New site
6	20.4737	105.2367	Puluong Nature Reserve	New site
7	20.46429	105.2509	Puluong Nature Reserve	New site
8	20.48072	105.2187	Puluong Nature Reserve	New site
9	20.49006	105.2059	Puluong Nature Reserve	New site
10	20.49963	105.1917	Puluong Nature Reserve	New site
11	20.46401	105.2496	Puluong Nature Reserve	New site
12	20.47778	105.2544	Ngoc Son – Ngo Luong Nature Reserve	New site
13	20.47191	105.2513	Ngoc Son – Ngo Luong Nature Reserve	New site
14	20.48408	105.2448	Ngoc Son – Ngo Luong Nature Reserve	New site
15	20.47346	105.2497	Ngoc Son – Ngo Luong Nature Reserve	New site
16	20.45979	105.2675	Ngoc Son – Ngo Luong Nature Reserve	New site
17	20.45721	105.2656	Ngoc Son – Ngo Luong Nature Reserve	New site
18	20.4696	105.2546	Ngoc Son – Ngo Luong Nature Reserve	New site

Sites	Latitude	Longitude	Locations	Comments
19	20.48362	105.2478	Ngoc Son – Ngo Luong Nature Reserve	New site
20	20.45306	105.2698	Ngoc Son – Ngo Luong Nature Reserve	New site
21	20.45714	105.2835	Ngoc Son – Ngo Luong Nature Reserve	New site
22	20.47625	105.2476	Ngoc Son – Ngo Luong Nature Reserve	New site
23	20.45612	105.2814	Ngoc Son – Ngo Luong Nature Reserve	New site
24	20.45191	105.2673	Ngoc Son – Ngo Luong Nature Reserve	New site
25	20.45032	105.3019	Ngoc Son – Ngo Luong Nature Reserve	New site
26	20.45126	105.2817	Ngoc Son – Ngo Luong Nature Reserve	New site
27	20.43501	105.3137	Ngoc Son – Ngo Luong Nature Reserve	New site
28	20.42907	105.3292	Ngoc Son – Ngo Luong Nature Reserve	New site
29	20.43719	105.3341	Ngoc Son – Ngo Luong Nature Reserve	New site

c. Population size

First identified in 2018 within the primary forests of Pu Luong Nature Reserve, *Synapsis puluongensis* was initially recorded in low numbers, with only six individuals observed at the following coordinates: 20°28'54"N, 105°14'31"E; 20°28'55"N, 105°14'29"E; 20°28'54"N, 105°14'29"E; and 20°28'56"N, 105°14'28"E. Our follow-up surveys conducted from 2022 to 2024 across six distinct ecosystems surrounding the locality—Phia Oac – Phia Den National Park (PO-PD), Pu Luong Nature Reserve (PL), Huu Lien Nature Reserve (HL), Ngoc Son – Ngo Luong Nature Reserve (NS-NL), Cat Ba National Park (CB), and Dong Chau – Khe Nuoc Trong Nature Reserve—encompassing more than 6,000 trapping sites, have revealed a concerning decline in the species' numbers. Only two (02) individuals were found at the original location, indicating a significant threat to the species' survival in its known habitat. The new recorded locations also showed a very low number of this species with a total of 53 additional individuals recorded.

d. Habitat and ecology

Habitat: *Synapsis puluongensis* has been found only in tropical primary forests over limestone.

Ecological Role: Large-bodied dung beetles like the species *Synapsis puluongensis* play a crucial role in ecosystem functions as they are important contributors to dung removal, with their body size positively correlated with dung removal rate

e. Major threats

Habitat Loss: As *Synapsis puluongensis* has been exclusively found in tropical primary forests within northern Vietnam's karst ecosystems, deforestation and agricultural expansion have reduced its habitat. Ethnic minority communities (such as the Muong, Tay, Mong, and Van Kieu groups), with their traditional practice of burning

forests for slash-and-burn farming, have had a serious impact on both mammals and this dung-beetle species (Fig. 3).

Exploiting: Local exploitation of large-bodied dung beetles for food and trade, primarily targeting species like *Catharsius molossus*, has led to unintentional harm to *Synapsis puluongensis* through baited traps (Fig.4).



Figure 3. The traditional practice of burning forests for slash-and-burn farming

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Figure 4. Exploitation of dung beetles for food and trade

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f. Conservation status

Criteria met for EN by IUCN RED LIST: *Synapsis puluogensis* is classified as Endangered (EN) due to its very small population size (fewer than 250 mature individuals), restricted range (Area of Occupancy (AOO) less than 500 km²), and limited number of locations (fewer than 5).

g. Conservation actions

Protected Areas: Pu Luong Nature Reserve and Ngoc Son – Ngo Luong Nature Reserve are critical for conserving high-altitude tropical forests over limestone. These karst ecosystems are essential habitats for *Synapsis puluogensis* and need strict protection.

Monitoring: Regular population surveys and habitat monitoring are conducted to track the species' status and habitat condition.

h. Recommendations for conservation

Community engagement: Collaborate with local communities to promote the conservation of karst ecosystems and reduce the exploitation of dung beetles.

2.2. Comprehensive evaluation of *Synapsis* population dynamics

Outcome: We completed a detailed evaluation of seven (07) *Synapsis* populations known to date in Vietnam. This provided a comprehensive understanding of population sizes, distribution patterns, and habitat preferences (Table 2).

Significance: Understanding the population dynamics of *Synapsis* spp. enables us to develop effective conservation strategies. By identifying areas of high population density and regions of decline, we can focus our efforts on protecting critical habitats and addressing specific environmental threats. This data-driven approach ensures that conservation measures are both targeted and effective, promoting the long-term survival of these beetle species.

Table 2. The population status of *Synapsis* spp. in spatially separated ecosystems (PL: Pu Luong Nature Reserve, PO-PD: Phia Oac – Phia Den National Park, HL: Huu Lien Nature Reserve, NS-NL: Ngoc Son – Ngo Luong Nature Reserve, CB: Cat Ba National Park, DC-KNT: Dong Chau – Khe nuoc trong Nature Reserve) (Not found NF/ Found F)

Species	Karst ecosystems in spatially separated areas					Non-karst ecosystems	Evaluation of Population status	Comments
	PL	PO-PD	HL	NS-NL	CB	DC-KNT		
<i>Synapsis puluongensis</i>	F	NF	NF	F	NF	NF	The species <i>Synapsis puluongensis</i> indicates a significant decline in its population since its discovery in 2018. Initially recorded in low numbers within Pu Luong Nature Reserve, recent surveys have revealed a troubling decrease, with only two (02) individuals found at the original location and a total of 53 individuals across new sites, suggesting a substantial threat to the species' survival. The restricted Area of Occupancy (16 km ²) and low population numbers underscore the urgent need for targeted conservation efforts.	<i>Synapsis puluongensis</i> meets the criteria for Endangered (EN) status according to IUCN standards.

<i>S. horaki</i>	NF	F	NF	NF	NF	NF	<p>Surveying <i>S. horaki</i> across five distinct karst ecosystems has revealed a limited population, with only four individuals recorded in Phia Oac – Phia Den National Park (coordinates: 22°34'3.6"N, 105°53'3.3"E; 22°34'1.4"N, 105°53'3.3"E; 22°34'3.1"N, 105°53'4.7"E; 22°34'3.1"N, 105°53'4.4"E). The precise coordinates of these sightings indicate a narrow distribution, highlighting the urgent need for ongoing monitoring and targeted conservation efforts.</p>	<p>Previously, this species was known solely from the holotype specimen collected in Tam Dao National Park. The discovery of this species in Phia Oac – Phia Den National Park extends its known range, but the small population size within karst ecosystems underscores its potential vulnerability. To accurately assess the conservation status of this species, it is essential to expand surveys to additional locations, particularly by resurveying the original ecosystems in Tam Dao National Park and its surrounding areas.</p>
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S. yama	F	NF	F	NF	NF	F	<p>Historically, <i>Synopsis yama</i> has been documented in Vietnam and Laos (Balthasar 1963; Kabakov & Napolov 1999; Zidek & Pokorny 2010). Currently, this species is found in both karst and non-karst ecosystems. In karst ecosystems, <i>Synopsis yama</i> has been observed in Pu Luong and Huu Lien Nature Reserves. In Pu Luong, the coordinates are 20°28'31''N, 105°14'43''E and 20°28'37''N, 105°15'13''E. In Huu Lien, the coordinates are 21°38'32''N, 106°23'2''E; 21°40'23''N, 106°23'6''E; 21°42'5''N, 106°21'25''E; and 21°44'44''N, 106°23'29''E. In these karst areas, the population of <i>Synopsis yama</i> is relatively low, with only 10 individuals recorded. In contrast, in non-karst ecosystems, <i>Synopsis yama</i> is present in the Dong Chau – Khe Nuoc Trong Nature Reserve, with coordinates 17°1'10.77''N, 106°41'22.2''E and 17°2'57.13''N, 106°41'18.50''E. The population in these non-karst areas is significantly higher, with a total of 30 individuals recorded.</p>	<p>Conservation efforts should prioritize understanding and addressing the specific challenges faced by <i>Synopsis yama</i> in karst environments. Given the more stable population in non-karst ecosystems, ongoing monitoring and conservation management in these areas are also essential to ensure the species' continued health. Further research is needed to explore the factors affecting population dynamics in both karst and non-karst habitats to develop effective conservation strategies.</p>
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<i>S. simplex</i>	NF	NF	NF	NF	NF	F	<p>Historically, <i>Synopsis simplex</i> has been documented across several regions including China (Yunnan), Myanmar, Thailand, Laos (Xiangkhouang Province), and North Vietnam (Dien Bien Province) (Balthasar 1963; Zidek & Pokorny 2010). In this study, however, the species was recorded solely in the Dong Chau – Khe Nuoc Trong Nature Reserve. Specific coordinates for the recorded individuals are 16°57'27"N, 106°36'30"E; 16°57'49"N, 106°36'47"E; 16°59'11"N, 106°37'50"E; 16°59'29"N, 106°38'8"E; and 17°1'9"N, 106°37'47"E. A total of nine individuals were observed in this non-karst habitat.</p>	<p><i>Synopsis simplex</i> was not recorded in any karst ecosystems during this study. This absence suggests that the species may have specific habitat preferences or requirements that are not met in karst environments. The concentration of observations in the Dong Chau – Khe Nuoc Trong Nature Reserve highlights its importance as a critical habitat for this species. Given the limited number of recorded individuals and the absence from karst areas, conservation efforts should focus on protecting and managing the non-karst habitats where <i>Synopsis simplex</i> is found, while further research could explore the reasons behind its absence in karst ecosystems.</p>
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<i>S. tridens</i>	F	F	F	F	F	F	<p>Historically, <i>Synapsis tridens</i> has been documented across a broad range including India, China, Bengal, Laos, Myanmar, Thailand, and Vietnam (Arrow 1931; Balthasar 1963; Zidek & Pokorny 2010; Bui & Bonkowski 2018). In the current study, <i>Synapsis tridens</i> was recorded in all the investigated ecosystems. Notably, this species was found predominantly in primary forests.</p>	<p>The presence of <i>Synapsis tridens</i> across diverse ecosystems indicates its broad adaptability. However, its strong association with primary forests suggests that these habitats are particularly important for its survival and reproduction. The frequent observation of <i>Synapsis tridens</i> in primary forests highlights the necessity of conserving these areas to maintain the species' populations. While the species' presence in various ecosystems is promising, the preference for primary forests underscores the need to protect these critical habitats from deforestation and other environmental threats. Further research could focus on understanding the specific habitat requirements of <i>Synapsis tridens</i> and the factors influencing its distribution across different ecosystems.</p>
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<i>S. ovalis</i>	NF	NF	NF	NF	NF	F	<p>Historically, <i>Synapsis ovalis</i> has been documented in Laos, Thailand, and Vietnam (Kral 2002; Balthasar 1963; Zidek & Pokorny 2010). In this study, <i>Synapsis ovalis</i> was recorded with only one individual in a primary forest within the non-karst ecosystems of Dong Chau – Khe Nuoc Trong Nature Reserve. The specific coordinates of this observation are 16°59'46"N, 106°38'26"E.</p>	<p>The solitary finding of <i>Synapsis ovalis</i> in this study suggests a very limited and possibly fragile population. Its presence exclusively in primary forest highlights the species' potential reliance on undisturbed, high-quality habitats. The lack of sightings in karst environments suggests that <i>Synapsis ovalis</i> may face constraints in less suitable conditions. Conservation efforts should focus on preserving primary forests within its known range and investigating factors that might affect its distribution and abundance. Further research is needed to better understand the habitat preferences and potential threats to <i>Synapsis ovalis</i> to ensure its continued survival.</p>
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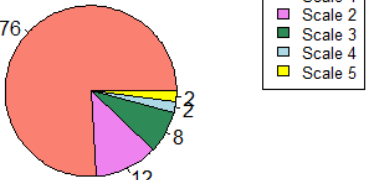
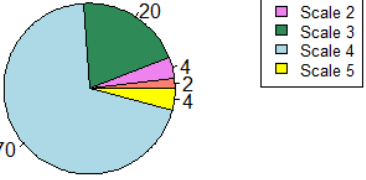
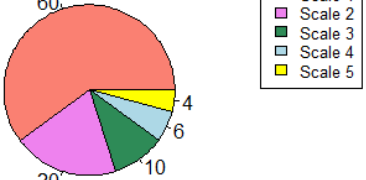
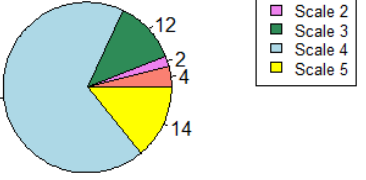
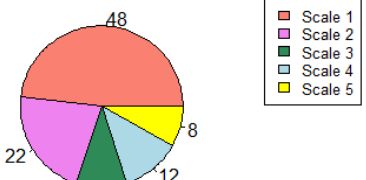
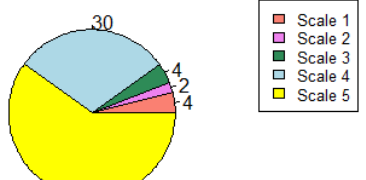
<i>S. strnadi</i>	NF	NF	NF	NF	NF	NF	<p>Historically, <i>Synapsis strnadi</i> has been documented in human excrement collected from forests in Tam Dao National Park (Vinh Phuc Province) and Hoang Lien Son National Park (Lao Cai Province) (Kral 2002). In the current study, however, this species was not recorded during the investigation.</p>	<p>The absence of <i>Synapsis strnadi</i> in the current study suggests that it was either not present in the surveyed areas or that the conditions during the investigation were not conducive to its detection. This could be due to several factors, including changes in habitat conditions, alterations in species behavior, or differences in sampling methods. Given its previous association with human excrement in specific forested areas, it may be important to review the sampling techniques and environmental conditions to better understand the species' current status. Further investigation is needed to confirm its presence or absence and to assess any potential factors affecting its distribution.</p>
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2.3. Increased local awareness and engagement in dung-beetle conservation

Outcome 1: We successfully enhanced local awareness and engagement through seminars, educational materials, and community meetings. Local stakeholders—including members of the Van Kieu ethnic group, park staff, managers, and young conservationists—now have a deeper understanding of the ecological importance of *Synapsis* spp. and have begun to adopt conservation practices. Notable advancements in participants' knowledge levels were observed, as reflected in the training evaluation (Table 3, Figure 5).

- **Pre-Training Assessment:** In the initial assessment, participants were evaluated on their understanding of the ecological role of *Synapsis* spp., their proficiency in surveying and monitoring *Synapsis* spp., their knowledge of habitat preferences and threats, and their competence in conservation practices. The pre-test results showed that 88%, 80%, 70%, and 90% of participants scored at Scale 1 and Scale 2 in these respective categories.
- **Post-Training Assessment:** Following the training, the post-test demonstrated significant progress. Only 6% of participants scored at Scale 1 and Scale 2 across all four evaluation criteria, indicating substantial improvement. The majority of participants achieved scores at Scale 4 and Scale 5 (see Table 3).

Table 3. Results of Pre- and Post-Training Assessment of 50 local participants

Topic	Pre –training course	Post-training courses
Local residents' knowledge regarding the role of dung beetles, particularly large-bodied <i>Synapsis</i> species		
a. Percentage of local people's knowledge levels based on scales where 1 = none and 5 = high proficiency		
Local residents' skills in surveying and monitoring dung-beetle species including <i>Synapsis</i> species		
b. Percentage of local residents' skill levels based on scales where 1 = none and 5 = high proficiency		
Local residents' knowledge regarding habitat preferences and threats to <i>Synapsis</i> spp.		
c. Percentage of local residents' knowledge levels based on scales where 1 = none and 5 = high proficiency		

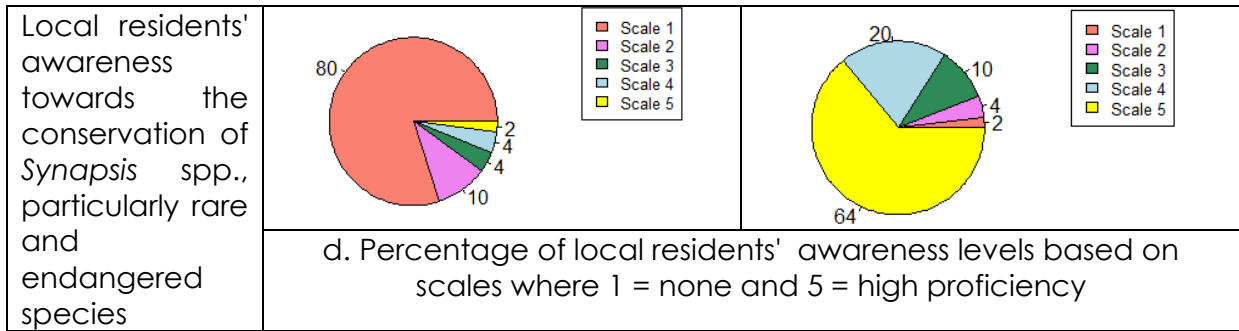


Photo 1. Leaders of the nature reserve share insights on biodiversity conservation during a discussion session



Photo 2. The project leader presents on the diversity, ecological roles, and conservation efforts related to *Synapsis* spp.



Photo 3: Capturing souvenir moments and receiving gifts.

Figure 5: Training courses on the ecological roles, monitoring and conserving *Synapsis* spp.

Significance: The outcome 1 is crucial for ensuring the sustainability of conservation efforts. Engaging and educating local communities creates a supportive environment for conservation initiatives, leading to practical, on-the-ground actions that complement scientific efforts. Increased local involvement helps integrate conservation strategies into daily practices and decision-making processes, which is essential for the long-term success of the project. Specifically, through this community education program, we aim to encourage the local Van Kieu ethnic group to reduce the exploitation of dung beetles for food and trade.

Outcome 2: Enhanced conservation practices through targeted training. We provided specialized training to 30 park staff and local community members on the conservation-focused collection and monitoring of large-bodied dung beetle species. Participants were trained in the use of field equipment, such as GPS devices and cameras, and engaged in evaluating human-induced threats within the Dong Chau – Khe Nuoc Trong Nature Reserve. This training has improved their ability to gather critical data for effective conservation efforts (Fig. 6).

Significance: This outcome is crucial for strengthening local capacity in dung beetle conservation. By equipping park staff and community members with the skills and tools needed for effective monitoring, we enhance the quality of data collection and threat assessment. This directly supports targeted conservation actions and ensures that local efforts are more informed and impactful, contributing to the overall sustainability of the reserve's ecosystem.



Figure 6. Guiding field surveys for park staff and locals

Outcome 3: Increased awareness among young conservationists. We introduced biodiversity monitoring methods, including the use of bio-indicator species such as dung beetles, to students of Vietnam National University of Forestry. Additionally, we delivered a presentation on monitoring and conserving *Synapsis* spp. to international students at the Vietnam National University of Forestry. The audience included 20 students from India and 2 students from Finland. This session aimed to enhance global understanding and interest in dung beetle conservation, fostering international collaboration and knowledge sharing (Figs 7, 8).

Significance: Engaging international students in dung beetle conservation broadens the reach of our efforts and promotes global awareness of the importance of these species. By sharing knowledge with future conservationists from diverse backgrounds, we lay the groundwork for international collaboration and support for conservation initiatives, which can lead to more innovative solutions to conservation practices.



Figure 7. Guiding Students in Using Bio-Indicator Species for Biodiversity Monitoring



Figure 8. Presentation on monitoring and conserving *Synapsis* spp., delivered to international students at Vietnam National University of Forestry

Outcome 4: Knowledge Exchange at International Conference. During the "Training Course on Key Technologies of Insect Diversity Pattern Assessment and Intelligent Monitoring System in the Belt & Road Region," hosted by the Institute of Zoology, Chinese Academy of Sciences (Beijing, China) in September 2023, I presented our research on dung beetles in Vietnam alongside related projects funded by the Rufford Foundation. This opportunity allowed me to share insights with young scholars from various nations and integrate new knowledge into our ongoing *Synapsis* spp. project (Fig. 9).

Significance: Presenting at an international conference and engaging with scholars from various countries enhances the visibility of our research and establishes valuable connections within the global scientific community. This exchange of knowledge not only advances our own project but also contributes to the broader field of insect diversity and conservation. Implementing new insights from the conference further strengthens our conservation strategies and fosters international collaboration.



Figure 9. Introduction of the *Synapsis* dung-beetle project during the training course at the Institute of Zoology, Chinese Academy of Sciences, Beijing

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

a. Limited access to remote survey sites

Difficulty: Our team encountered challenges accessing several remote habitats critical for surveying *Synapsis* spp. due to their rugged terrain and lack of infrastructure.

Solution: We tackled this issue by:

- Engaging Local Knowledge: Collaborated with local guides and community members who had experience navigating these areas.

b. Resistance from local communities

Difficulty: We faced initial resistance from local stakeholders, particularly the Van Kieu and Mong ethnic minority groups. These communities were skeptical about the benefits of dung-beetle conservation and concerned about its impact on their traditional practices. Additionally, the project conflicted with the interests of individuals who harvest dung beetles for sale.

Solution: To address this challenge, we:

- Enhanced communication: Held additional workshops and individual meetings to educate stakeholders on the ecological benefits of dung beetles, such as improved soil fertility and waste reduction. We also engaged local leaders to advocate for the conservation efforts and shared examples of successful conservation projects in similar contexts.
- Incorporated feedback: Adjusted our conservation approaches based on stakeholder input to ensure that our strategies were practical and aligned with local needs.

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

a. Engagement and participation

- Workshops and training sessions: More than 50 local communities were actively engaged through workshops and training sessions. These events focused on educating community members about the ecological importance of dung

beetles and the specific needs of *Synapsis* spp. They provided hands-on training in monitoring techniques and conservation practices.

- Collaborative fieldwork: Thirty (30) local community members participated in field surveys, assisting in navigating difficult terrains and identifying key habitats. Their local knowledge was invaluable in locating beetle populations and understanding local environmental conditions.
- Feedback and input: Throughout the project, we conducted meetings to gather feedback from community members. Their insights helped refine conservation strategies and ensure that the proposed measures were practical and culturally appropriate.

b. Benefits to local communities

- Increased awareness and education: Community members gained a deeper understanding of the role of dung beetles in ecosystem health. This education extended to practical knowledge about how dung beetles contribute to soil fertility and pest control, which can enhance agricultural productivity.
- Improved conservation practices: Local stakeholders adopted new conservation practices, such as creating dung beetle-friendly habitats and reducing pesticide use. These changes have led to better soil health and increased biodiversity in the areas where they farm or live.
- Community empowerment: By involving local leaders and stakeholders in decision-making processes, the project empowered communities to take ownership of conservation efforts. This has led to greater community pride and a stronger commitment to protecting local natural resources.
- Additionally, our project has had long-term impacts on local communities by strengthening local networks. It fostered collaboration between local communities, conservation organizations, and research institutions. These strengthened networks can support future conservation efforts and provide a foundation for addressing other environmental challenges. Furthermore, local leaders who participated in the project have become advocates for conservation and environmental stewardship. Their increased capacity and understanding are likely to influence broader community attitudes and policies related to environmental management

5. Are there any plans to continue this work?

a. Ongoing monitoring and research

Long-Term population monitoring: We are planning to establish a long-term monitoring program to track the population dynamics of *Synapsis* spp. and assess the effectiveness of conservation measures. This includes regular surveys and data collection to detect any changes in population size and distribution.

Further Research: Continue research into the ecology and behavior of newly discovered *Synapsis* species to better understand their specific needs and threats.

b. Expanded conservation efforts

Conservation partnerships: Strengthen partnerships with local organizations, government agencies, and international conservation groups to support ongoing and new conservation projects.

c. Securing funding

Grant applications: We will pursue additional funding opportunities through grants to support continued research and conservation activities.

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

a. Academic publications and reports

Peer-reviewed journals: We will publish comprehensive research findings on the conservation status of *Synapsis* spp. in karst ecosystems of Vietnam in relevant scientific journals.

b. Conferences and workshops

Scientific conferences: We will present the project's findings at the 12th Vietnam National Conference on Entomology, scheduled for 2026.

c. Young conservationists/student engagement and education

University lectures: We will deliver a presentation at the Vietnam National University of Forestry to share the project's outcomes with students.

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

a. Enhance monitoring and research

Long-Term monitoring: We will establish a long-term monitoring program to track changes in the populations of *Synapsis* spp., habitat conditions, and ecosystem health. This will involve setting up permanent monitoring sites and using consistent methodologies for data collection.

Expand research: We will conduct further research on the ecological roles of *Synapsis* spp., their interactions with other species, and their responses to environmental changes. Particularly, we will explore the relationships between larger-bodied dung beetles like *Synapsis* spp. with mammals.

b. Foster community and stakeholder engagement

We will maintain and expand partnerships with local, national, and international organizations to advance conservation efforts for *Synapsis* dung beetles.

c. Secure funding

We will seek diverse funding opportunities, including grants, corporate sponsorships, and donations, to support ongoing and future conservation activities and research on *Synapsis* spp as well as other dung-beetle species.

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?

a. Use The Rufford Foundation logo in materials

Educational materials: The logo was also included in educational materials including 200 booklets distributed to local communities and stakeholders.

Presentations and posters: In presentations at conferences and workshops, and on posters displayed during public events, The Rufford Foundation's logo was featured.

b. Publicity for The Rufford Foundation

Local events: During community events and meeting, The Rufford Foundation's role was acknowledged in speeches, presentations, and printed materials.

Public talks and seminars: At public talks and seminars where project results were shared, The Rufford Foundation was credited for its support.

50 dung-beetle T-shirts with The Rufford Foundation's logo distributed to local people

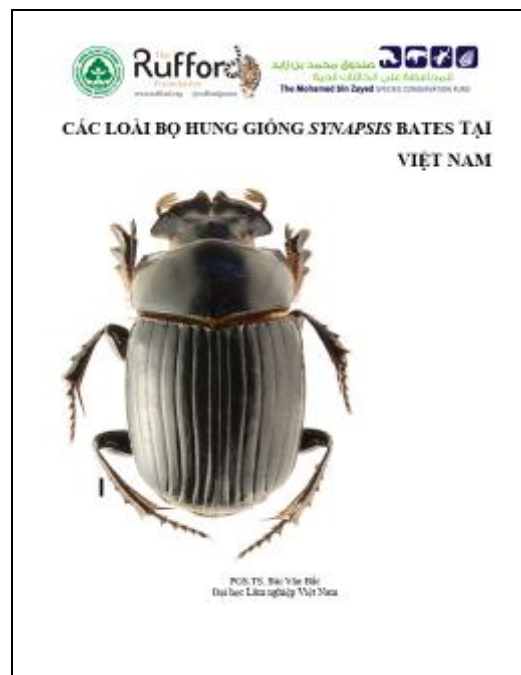


Figure 10. The Rufford Foundation logo in materials and Presentations



Figure 11. The Rufford Foundation logo in poster



Figure 12. Publicity for The Rufford Foundation in Local Events

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

1. Dr. Bui Van Bac – Project lead

- Role: As the project lead, I was responsible for overseeing the entire project, including project planning, execution, and management. I coordinated the team's efforts, ensured milestones were met, and liaised with local stakeholders, manager and conservationists. I also led the field surveys, the analysis of results, and compilation of education materials and final report.

2. Trinh Van Thanh – Team member

- Role: Thanh was responsible for engaging with local communities and stakeholders. He helped to organize workshops, training sessions, and public events to raise awareness about dung-beetle conservation. His responsibilities also included field surveys as maintaining and troubleshooting field equipment, assisting with data collection technologies, and supporting the implementation of remote sensing tools.

3. Le Van Vuong – Team member

- Role: Le Van Vuong provided support in field research and data collection. His duties included assisting with surveys, maintaining field equipment, and contributing to the documentation of research findings. He also helped with data entry and preliminary analysis.

4. Ho Van Vang, local people, conducted field surveys with the team members

5. Cao Ngoc Hai, local people, conducted field surveys with the team members

6. Ho Van Mong, local people, conducted field surveys with the team members

7. Ho Van Thu, local people, conducted field surveys with the team members

8. Ho Van Su, local park ranger, conducted field surveys with the team members



Figure 13. Team members and local people at surveying sites

10. Any other comments?

a. Project achievements and impact

- **Significant findings:** The project has made substantial contributions to understanding the conservation needs of *Synapsis* spp. We successfully identified several endangered species and developed targeted conservation strategies. The data gathered has enriched our knowledge of dung-beetle ecology in karst ecosystems and provided a solid foundation for future research.
- **Community Involvement:** One of the most rewarding aspects of the project was the active involvement of local communities. Their engagement not only enhanced the effectiveness of our conservation efforts but also fostered a sense of ownership and commitment to preserving local biodiversity.

b. Future directions and recommendations

- **Sustainability and longevity:** To ensure the long-term success of our conservation efforts, it will be essential to continue monitoring and adapting our strategies based on ongoing research and community feedback.

c. Acknowledgements

- **Gratitude:** We extend our heartfelt gratitude to The Rufford Foundation for their generous support and belief in the project. Their funding was crucial in enabling our research and conservation efforts. We also thank all the local communities, partners, and stakeholders who contributed their time, knowledge, and resources to make this project a success.