Final Evaluation Report

Your Details	
Full Name	Duong Van Cuong
Project Title	Insect biodiversity in mangrove ecosystem in northern Vietnam
Application ID	42278-1
Date of this Report	25.5.2025

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
Taxonomical achievements			X	An annotated checklist of insect species in the mangrove Ecosystem, with descriptions of 8 newly recorded species in Cat Ba National Park, was presented. Building on these results, we have completed a manuscript summarizing our research and are preparing it for submission to a peer-reviewed journal."
Ecological data achievements		x		We recorded comprehensive data on the distribution and seasonal abundance of insects in the study area, with all measurements taken quantitatively. However, due to the lack of equipment for recording climatic conditions at a microclimatic scale, we were unable to capture environmental variables that may influence insect dynamics. As a result, it is challenging to fully elucidate the temporal and spatial dynamics of the insect community in the mangrove ecosystem.
Educational activities			x	We completed: - A Workshop for training students - A Workshop for National Park members - An exhibition for children - Teaching materials

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

2.1 Provide an annotated insect checklist with new species records for Vietnam fauna in mangrove ecosystem

The project successfully produced a comprehensive annotated checklist of insect species inhabiting the mangrove ecosystem of Cat Ba National Park. This checklist includes taxonomic identifications, ecological notes, and references, contributing a valuable resource for future research and conservation. Notably, eight insect species were newly recorded for the park—an important addition to Vietnam's national biodiversity inventory. Detailed species descriptions and photographic documentation were prepared to support accurate identification and verification by taxonomists and park staff. The results were prepared in a manuscript and was submitted to a peer-reviewed journal named Biodiversitas Journal of Biological Diversity (attached file).

Through several field trips, we able to develop our skill in investigating insects in a special habitat like mangrove (Figure 1, 2).

Figure 1. Mangrove in Xuan Dam, Cat Ba National Park, Vietnam

Figure 2. Mangrove in Phu Long, Cat Ba National Park, Vietnam

Through a series of field trips, we significantly enhanced our skills in investigating insect communities within a unique and challenging habitat such as the mangrove ecosystem. Our main activities included specimen collection, habitat documentation, and macro photography, which enabled us to capture both ecological context and morphological details (Figure 3).

Figure 3. Sampling using different techniques including sweeping net, light traps and yellow pan traps in mangrove forest in Cat Ba National Park.

Additionally, we engaged in specimen sorting and taxonomic identification, which not only helped fulfil the objectives of the project but also strengthened our technical and observational abilities in entomological research (Figure 4). This process was both scientifically rewarding and personally fulfilling, and we look back on these activities with a sense of accomplishment and enthusiasm

Figure 4. Sorting and identifying the samples in the laboratory

2.2 Compilation of Ecological and Biological Information

In-depth field surveys and observations enabled the collection of critical ecological data on each documented insect species. This includes information on distribution, seasonal abundance and how to collect them in the field. These data are essential for understanding ecological dynamics within the mangrove ecosystem and for identifying potential indicator or keystone species that may assist in long-term biodiversity monitoring and conservation planning.

2.3 Capacity Building, Education, and Community Outreach:

The project placed strong emphasis on knowledge transfer and public engagement. Two capacity-building workshops were conducted: one focused on training university students in insect taxonomy, field methods, and biodiversity assessment techniques (Figure 5, 6).

Figure 5. Field work training for students of VNU University of Science, Hanoi in Cat Ba National Park

Figure 6. Lab work training for students in Biological Museum of VNU University of Science, Hanoi

The other tailored to Cat Ba National Park staff, with practical sessions on insect monitoring and conservation applications (Figure 7).

Figure 7. Workshop on insect diversity and conservation for Cat Ba National Park members

Additionally, an interactive exhibition was organized for local children to foster early interest in biodiversity and environmental stewardship (Figure 8).

Figure 8. Free workshop for students in Hanoi for studying the diversity of insects in mangrove ecosystem and raising the awareness of biodiversity conservation

Teaching materials, including photo book and poster, were also developed and distributed to schools and park staff, ensuring lasting educational impact (Figure 9, 10).

Figure 9. Poster of Insect diversity in mangrove forest of Cat Ba National Park

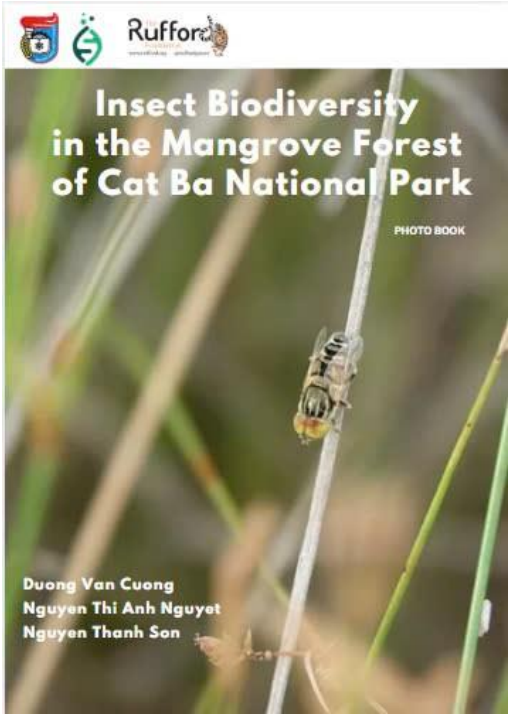


Figure 10. Cover page of the photo book about the insect biodiversity in the mangrove forest of Cat Ba National Park

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

- Challenging field conditions issue:

Issue: Mangrove ecosystems often present harsh and unpredictable field conditions, such as tidal flooding, strong wind at night, muddy substrates, and dense vegetation, making access and prolonged sampling difficult.

Solution: We adjusted fieldwork timing to coincide with low tides. Include other collection methods to increase the chance of collecting insects and reduce the investigators' effort.

- Taxonomic complexity and limited references

Issue: The insect fauna in mangrove habitats is under-documented, and many species lacked proper identification keys, especially for immature stages.

Solution: We partnered with taxonomic experts and institutions to verify morphological identifications to support species-level identification where traditional taxonomy was insufficient.

- Human disturbance and habitat degradation

Issue: Unanticipated human activities such as aquaculture expansion, pollution, and mangrove clearance in some study sites reduced habitat quality and altered insect communities.

Solution: We conducted additional sampling in nearby less-disturbed areas for comparison and incorporated land-use assessments into our analysis to evaluate anthropogenic impacts on biodiversity.

- Equipment and Logistical Constraints

Issue: Equipment malfunction due to high humidity and salinity was a recurring issue, particularly affecting light traps, malaise traps, cameras.

Solution: We implemented regular maintenance routines, used corrosion-resistant materials, and carried backup equipment. Also, we prioritized durable, low-tech sampling methods such as sweeping nets and yellow pan traps when possible. However, the absence of Malaise traps may have limited our ability to effectively collect certain insect groups, such as Diptera. Additionally, using a borrowed camera occasionally posed challenges due to unfamiliarity with the equipment and limitations in operation.

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

Local communities played an essential role throughout the project, particularly in fieldwork support and knowledge exchange. Residents with intimate knowledge of the mangrove landscape assisted in site navigation, tide scheduling, and locating insect-rich microhabitats, which significantly improved the efficiency and accuracy of sampling efforts.

Community members were also engaged through awareness-raising activities, including informal talks and educational sessions on the ecological role of insects and the importance of biodiversity conservation in mangrove ecosystems. This fostered a sense of stewardship and increased local understanding of ecosystem health and its link to sustainable livelihoods.

In the long term, the research outcomes can support ecotourism and sustainable development initiatives by highlighting the unique biodiversity value of the region. These efforts contribute to strengthening the capacity of local communities to participate in and benefit from conservation-related activities.

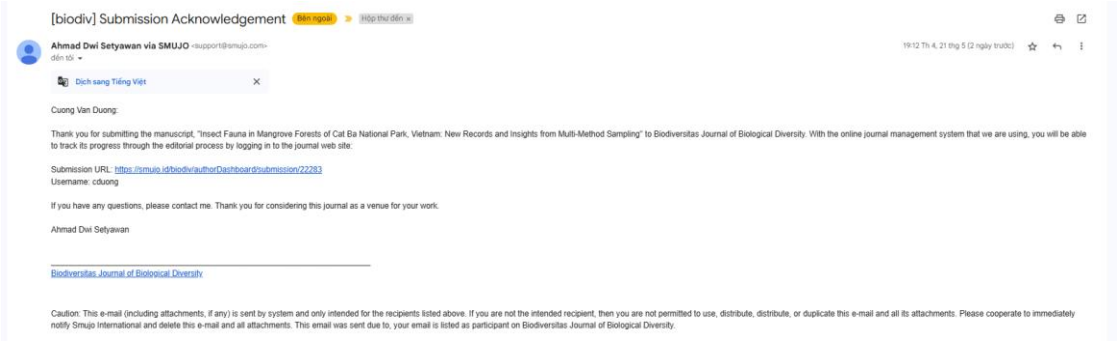
5. Are there any plans to continue this work?

- Long-term monitoring: establishing a permanent monitoring program to track changes in insect biodiversity over time, particularly in response to climate change, sea-level rise, and human activities affecting mangrove ecosystems.
- Expansion of geographic coverage: Future phases of the project aim to include additional mangrove sites across northern Vietnam to capture a more comprehensive picture of regional insect diversity and biogeographic patterns.
- Community-based conservation: Strengthening collaborations with local communities by involving them in citizen science initiatives and biodiversity education programs, promoting sustainable use and conservation of mangrove habitats.

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

To ensure that the findings of this project reach a wide and relevant audience, we plan to share the results through multiple channels:

1. Scientific publications: Key results have been submitted to peer-reviewed journals focusing on entomology, biodiversity, and conservation science, contributing to the global knowledge base on tropical mangrove ecosystems.



[biodiv] Submission Acknowledgement Bên ngoài Hộp thư đến ×

Ahmad Dwi Setyawan via SMUJO <support@smujo.com>
đến tôi

19:12 Th 4, 21 thg 5 (2 ngày trước)

Dịch sang Tiếng Việt

Cuong Van Duong:

Thank you for submitting the manuscript, "Insect Fauna in Mangrove Forests of Cat Ba National Park, Vietnam: New Records and Insights from Multi-Method Sampling" to Biodiversitas Journal of Biological Diversity. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Submission URL: https://smujo.id/biodiv/authorDashboard/submission/22283
Username: cduong

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Ahmad Dwi Setyawan

Biodiversitas Journal of Biological Diversity

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2. Conferences and workshops: We will present findings at national and international conferences related to ecology, entomology, and environmental conservation. The project's results will be presented at the upcoming symposium about "Biodiversity Research: Conservation Potential and Applications" held at VNU University of Science funded by Aus4Skills.
3. Online platforms and open access repositories: Data and findings, including species checklists and georeferenced records, will be shared through institutional websites to ensure open access for researchers and conservation practitioners.

These outreach efforts are intended to maximize the scientific, educational, and conservation value of the project outcomes.

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

- Expanding research on species composition across a broader geographic range

To build a more comprehensive understanding of insect biodiversity in Vietnam's mangrove ecosystems, future work should focus on surveying a wider range of mangrove sites beyond the initial study area. This will help identify regional variations in species composition and uncover potentially endemic or threatened taxa across different coastal regions.

- Establishing long-term monitoring

We aim to establish permanent monitoring plots across representative mangrove sites. This will support early detection of biodiversity loss and inform adaptive conservation strategies.

- Linking biodiversity with environmental drivers

We plan to analyze how factors such as salinity, tidal patterns, vegetation structure, and human disturbance affect insect diversity and composition, using both field data and remote sensing tools.

- Strengthening community participation

Developing community-based biodiversity monitoring programs and integrating local ecological knowledge will be essential for long-term success and sustainability of conservation efforts.

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 all major materials produced in relation to the project, including field banners, presentation slides, and community outreach materials such as posters and brochures. The logo was also displayed in scientific presentations and reports to acknowledge the Foundation's support.

Throughout the project, The Rufford Foundation received recognition and publicity during fieldwork and outreach activities. Local partners and community members were informed about the Foundation's role in supporting biodiversity research and conservation. Additionally, mentions of the Foundation were included in online communications and publications related to the project, helping to raise its visibility among both local stakeholders and the broader research community.

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

No	Name	Project's role
Core team members:		
1	Duong Van Cuong	PI - Led the overall project design, coordination, field work, species identification, consulting with experts for species name confirmation, data analysis, and reporting.
2	Nguyen Thi Anh Nguyet	Conducted insect sampling, species identification

10. Any other comments?

This project has provided valuable insights into the rich but understudied insect biodiversity of northern Vietnam's mangrove ecosystems. Despite various logistical and environmental challenges, the collaborative efforts of researchers, local communities, and supporting organizations have been instrumental to its success.
Moving forward, continued investment in long-term monitoring and broader geographic surveys will be crucial to deepen our understanding and support effective conservation. We also appreciate the support and partnership of funders, local stakeholders, and scientific collaborators, whose contributions have greatly enriched the project outcomes.
We remain committed to fostering local engagement and knowledge exchange to ensure that biodiversity research translates into meaningful conservation and sustainable management of mangrove habitats.