

Final Evaluation Report

Your Details	
Full Name	Jintu S Vijayan
Project Title	Seasonal trends of Rock Bees in South Karnataka: The impact of resource availability and management practices along a forest-agriculture-urban gradient
Application ID	40562-1
Date of this Report	23-Feb-2026

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
<p>Extend the ecological data collection for a year (Stage 1)</p>		✓		<p>As planned, we were able to extend the ecological monitoring of <i>Apis dorsata</i> colonies for another 2 years using the Rufford grant. Over the last 3.5 years (June 2022 to December 2025), we have been tracking <i>A. dorsata</i> bee colonies across three different habitats (forest, agricultural and urban). We have monitored a total of 31 monitoring sites (forest = 11, agriculture = 11, Urban = 9), with an average of ~206 <i>A. dorsata</i> colonies per month.</p> <p>This monitoring has given us a much clearer picture of how the seasonal pattern of bee colonies differs across habitats and how the colonies respond to flowering pulses and rainfall. Having said that, we have also seen a lot of ups and downs in year-on-year <i>A. dorsata</i> colony numbers. These changes seem to be linked to the human-bee conflicts and the overall land-use changes and ecological complexity of the landscapes. Because of these variations, we are planning to continue the monitoring for at least 2 more year (5 years total) to spot any long-term patterns and a better understanding on the drivers behind these variations.</p>
<p>Collection of social research</p>			✓	<p>We were also able to complete the social science part of the project as</p>

<p>data for 6 months (Stage 2)</p>			<p>planned. During July 2025 to December 2025, we were able to conduct the questionnaire interviews among honey harvesters, farmers and urban residents (n=128) and focus group discussions (n=15) in forest, agricultural and urban landscapes. The qualitative data gave us valuable insights on how people perceive and interact with <i>A. dorsata</i> colonies under different ecological and social contexts. The social data that we have collected are currently being analysed and we already noticed some interesting patterns emerging around the local knowledge systems, values and practices towards bee colonies.</p>
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2. Describe the three most important outcomes of your project.

a) Long-term ecological monitoring data of *Apis dorsata* along a forest-agricultural-urban gradient

This is the most important outcome of this project. As of now, in India, there are very few such long-term datasets on a native migratory bee species, especially that tracks the *A. dorsata* colony dynamics across multiple years and landscapes. Our dataset from June 2022 to December 2025 offers a rare window into how the *A. dorsata* colonies respond to different environmental conditions across different seasons and habitats.

What makes this dataset more valuable is the inclusion of urban habitats, a habitat which is always overlooked in *A. dorsata* research. We were able to understand how bee colonies adapt to the flowering pulses, and resource fluctuations in human-dominated landscapes which provided new insights on how wild bee colonies survives in cities.

b) Checklist on the key floral resource of *Apis dorsata* in forest, agricultural and urban habitats

As a part of this project, we compiled a list of all major nectar and pollen sources used by *A. dorsata* in the study region. The list was build using a mixed approach using

vegetation surveys, literature reviews and community knowledge shared by honey harvesters, farmers and local residents.

This list helped us to understand how the flowering time of these plants are aligned with the bee colony movements across landscapes. This link between the flowering plants and bee colony dynamics is critical when we think of supporting the wild bee population using habitat restoration and planning.

c) Insights into the human-bee relationships across forest, agricultural and urban habitats

To learn about how people live alongside *Apis dorsata* colonies on a day-to-day basis, interviews and focus group discussions were conducted among traditional honey harvesters, farmers and urban residents. These conversations helped us to have a deeper understanding on diverse practices and ecological knowledge systems and cultural beliefs that different communities hold about the *Apis dorsata* colonies. It also helped us to learn how individual perceptions, material and institutional support either limit or enhance the coexistence with *Apis dorsata* colonies.

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

- a) **Weather uncertainty and seasonal gaps:** Facing the unpredictable weather was a biggest challenge during data collection, especially the irregular rainfall and extended dry spells. These variations made it difficult for us to observe the consistent seasonal patterns in *A. dorsata* colony dynamics. Some months during the study period, the bee colonies arrived at the nesting sites earlier or stayed longer than expected. Finding a consistent trend over the years under observation was challenging. To deal with this, we have decided to extend our monitoring so that we have a better understanding on the patterns over a longer timeframe and can distinguish the longer-term trends from short term anomalies.
- b) **Data gaps in the monitoring data due to the nest abandonment:** In some of our permanent monitoring sites, the bee colonies unexpectedly abandoned the nests due to human disturbances like demolition of the nesting structures and tree cutting. This has created data gaps and made those monitoring sites unreliable. To maintain the data integrity, we had to drop off these sites from our dataset and focused on most stable nesting sites.
- c) **Local Administrative restrictions:** Few times, we experienced delays in conducting our interviews and focus group discussions especially in schools and government institutions. Local permissions to talk with the students and officials were sometimes difficult to obtain on schedule. We handled this by rescheduling our visits and

building trust with the school administration by explaining the importance of the work and how it can benefit the bee conservation and communities.

- d) **Unexpected Human-bee Conflicts:** In urban sites, we have encountered unexpected instances of human-bee conflicts like chemical sprays to kill the bee colonies. This caused in sudden drop in the number of colonies over some of the months in certain locations. To handle this, we reached out to local residents and authoritative persons to report such incidents so we could have awareness raising discussions during the end of our study.
- e) **Transport Challenges Across Remote Sites:** Reaching some of our monthly monitoring sites in the remote forest sites has been very difficult during monsoon seasons with heavy rainfall, fog and fallen trees blocking the roads. Heavy fog has also affected the visibility to count the bee colonies multiple times. We worked with field collaborators to arrange revisits to these monitoring sites to ensure the data collection continued without disruptions.

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

Local communities played major roles in both ecological and social data collection stages of this project. Through our regular visits to the field sites and informal exchanges, the communities especially in the agricultural and the urban areas began to gain a better understanding on the role of *Apis dorsata* in the pollination and the crop production. Many respondents were surprised to learn how these bees can increase their crop yields.

We also took time to listen and document expertise and knowledge of traditional honey harvesters whose deep understanding on the ecology of the *Apis dorsata* bee colonies shaped by generations of close interaction with these bee colonies.

Most importantly, we directly involved local community members by employing them as field collaborators. They helped us with monthly monitoring, conducting the interviews and group discussions. This project helped to provide them consistent salaries during the whole project duration. They were trained in skills like data recording, questionnaire preparation, and data entry which can support their future opportunities. Beyond this, we also laid the foundation for future collaborations and partnerships in conservation initiatives with the community members through trust, and engagement.

5. Are there any plans to continue this work?

Yes, we plan to continue this work by extending the bee colony monitoring for two more years. Beyond the ecological monitoring of bee colonies, we are also

committed to continue our engagement with local communities. We hope to co-develop sustainable and practical *A. dorsata* management strategies tailored to rural and urban regions.

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

a) **Scientific publications and popular articles:**

We are currently working on two manuscripts, one based on the ecological findings of the study and another on the human-bee relationships. Those will be submitted to peer-reviewed journals in the fields of ecology, conservation and human-nature interactions. We also plan to write popular articles in regional languages to reach public audience.

b) **Conference Presentations**

We have already shared our preliminary findings at major conferences including Association for Tropical Biology and Conservation 2024 and the Entomological Society of America, 2025. These conferences have helped to gather feedbacks from a wider audience.

c) **Community Feedbacks and workshops**

We plan to organize a few feedback sessions and informal discussions with the community members in the study areas to share the findings of the study especially to the honey harvesters and farmers. These sessions will include the translated summaries, charts and simple visuals of the results which can be easily accessible.

d) **Educational Outreach**

We are also developing educational materials such as posters, infographics, and school talks to raise the awareness on native wild bees. Also, we plan to provide training on bee colony management among rural and urban residents to prevent human-bee conflicts and to promote coexistence.

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

- a) **Extending the ecological monitoring:** Continuing the bee colony monitoring for two more years is a priority. This extension will help us to understand the long term trends in the seasonal patterns as well as to identify any colony declines across the habitats.
- b) **Integrate Ecological and Social Insights:** Another important step is to integrate the ecological data with the local community knowledge and social practices. This will help us to co-produce management strategies that can support the bee conservation as well as the livelihood of honey harvesters and farmers.
- c) **Developing outreach programs:** During the fieldwork it became clear that many people in rural and urban regions don't know how to handle the wild bee colonies

around their houses. So we plan to develop training sessions and awareness materials on safe management of *A. dorsata* colonies which can help to reduce the risk of hospitalizations and fatalities related to bee stings and attacks.

- d) **Publishing the Results:** Publishing the key findings as research papers will be also important step to receive feedback from a wider scientific community and to contribute to the pollinator conservation research.

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 was acknowledged as a key supporter of this research in all public facing materials and talks. We have also highlighted the foundation through acknowledgements and logos during the academic talks within host institution as well as conference presentations.

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

1. Ms. Jintu S Vijayan – Principal Investigator of the project. Led the overall field operations for ecological monitoring, social surveys, data analysis, manuscript writing and financial management.

2. Dr. Siddappa Setty – Senior Fellow and centre convener (Ashoka Trust for Research in Ecology and the Environment, Bangalore). He has been involved from the planning phase of the project as a supervisor and provided academic guidance and technical support on data collection, data interpretation, data analysis and manuscript writing.

2. Dr. Soubadra Devy – Senior Fellow (Ashoka Trust for Research in Ecology and the Environment, Bangalore). She has been assisting to plan the monitoring surveys, vegetation surveys, and data analysis.

3. Mr. Kumbegowda - Field Collaborator in Forest Landscape. He assisted with monthly colony monitoring, household interviews and focus group discussions in the forest landscape. He helped to identify the nesting sites of *Apis dorsata*, tree species identification and played a key role in building trust with the community members and local stakeholders.

4. Mr. Mahesha M. - Field coordinator in Urban and Agricultural Landscape. He supported the monthly monitoring in urban sites and peri-urban sites, data recording, and helped to conduct and translate interviews with urban residents and farmers. He has also helped to coordinate access to buildings with nesting colonies.

ANNEX – Financial Report
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