



Leveraging Beekeeper Data for Biodiversity Monitoring, Reporting, and Validation (MRV)

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Keywords: Biodiversity MRV · Honey bees · Plant–pollinator interactions · Ecosystem services · Environmental monitoring

The Challenge

Biodiversity underpins food, water, and ecological stability. Yet, current monitoring methods are either too broad (remote sensing) or too narrow (field assessments).

Our Approach

HiveTracks uses a global network of beekeepers to systematically monitor plant–pollinator interactions. This provides a scalable, ground–truthed model for biodiversity assessment.

Data Collection

Beekeepers collect:

- Apiary locations
- Colony health metrics (population, brood, queen status)
- Harvest data
- Photos of hives, brood patterns, plants & pollinators

Technology Backbone

- Mobile & web apps for data entry and image uploads
- AI–powered species recognition (with metadata: time, location)
- GIS–based sampling strategies to calculate abundance & diversity (e.g., Shannon Diversity Index)

Enriched with External Data

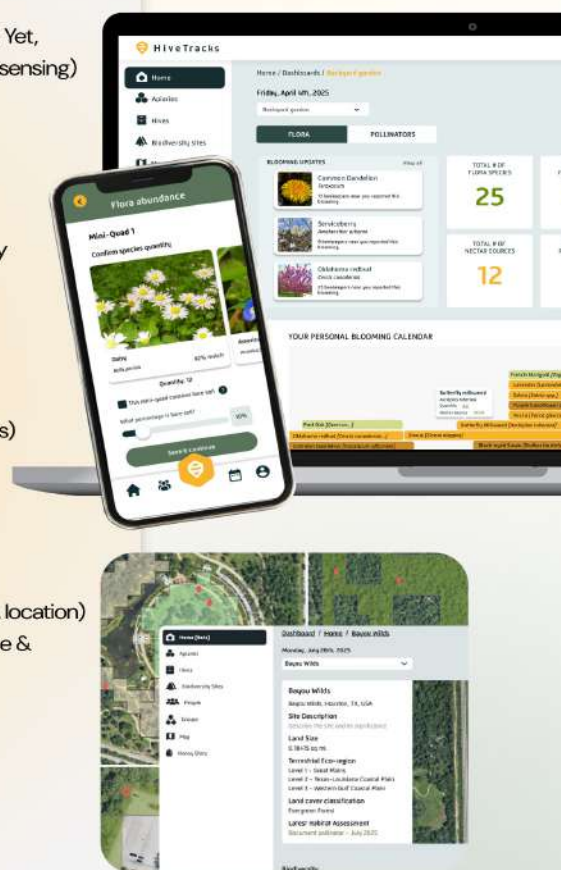
- Land use maps
- Weather & climate data
- Flowering & resource availability datasets

Impact

- Tracks biodiversity trends at local to global scales
- Bridges macro desktop models with ground–truthed field data
- Supports conservation, sustainable land management & policy

Conclusion

HiveTracks' MRV framework empowers beekeepers as biodiversity monitors, delivering robust, scalable, and verifiable data to safeguard ecosystems worldwide.



See our biodiversity impact at
www.hivetracks.com/biodiversity

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PP-590 [Pollination and Bee Flora]
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HiveTracks

Terrestrial biodiversity and the vital ecosystem services it provides are fundamentally interconnected with the complex relationships between plants and their pollinators, including honey bees. These relationships are essential for maintaining ecological balance and ensuring the continued provision of food, clean water, and other essential natural resources. HiveTracks introduces a scalable and innovative model for assessing biodiversity by systematically monitoring these crucial interactions through a global community of beekeepers. This approach leverages the power of beekeeper communities to collect and analyze meaningful amounts of data, providing valuable insights into the state of biodiversity and ecosystem health. The HiveTracks platform facilitates the collection of typical beekeeping data and specialized primary biodiversity metrics, building out structured data collection methodologies for both plants and pollinators to extrapolate abundance and diversity metrics. This approach is powered by a community-based and user-friendly technology platform made up of mobile and web apps to crowdsource images of plants and pollinators and beekeeping data, including apiary locations, colony health metrics, harvest data, and images of hive configurations and brood patterns. Time and location-based metadata from image collection provide context for automated species recognition using AI tools. This data is further aggregated and enriched with third-party sources to generate comprehensive and localized biodiversity assessments. In addition, automated stratified sampling strategies, enabled through GIS-based site assessments, have been developed to allow for the calculation of species abundance and the Shannon diversity index (SDI) at specific sites. By systematically quantifying changes in pollination events, floral resources, and pollinator abundance over time, HiveTracks provides a robust, data-driven approach to tracking biodiversity trends at both local and global scales with participation of beekeepers around the world. The model also bridges the gap between macro-level desktop assessments and ground-truthed field assessments.

The HiveTracks platform and underlying model represents a significant advancement in the field of biodiversity assessment, monitoring, reporting and validation (MRV). The insights generated by HiveTracks can inform conservation efforts, promote sustainable land management practices, and ultimately contribute to the preservation of our planet's precious biodiversity.