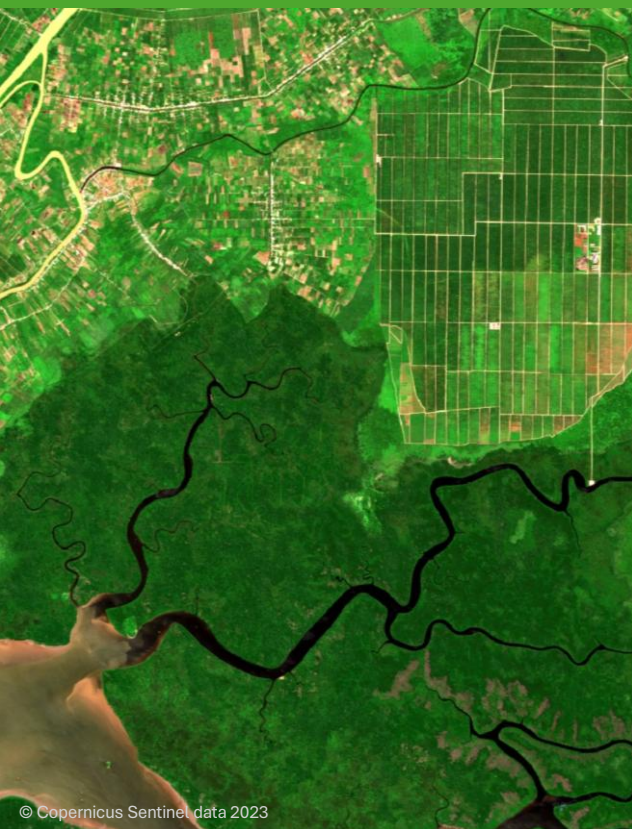


## Further Developments in Operationalizing Remote Sensing to Support Biodiversity Monitoring in Agricultural Landscapes

Jhony Sanchez – GRAS | Fit for Biodiversity: Solutions for the Agri-Food Sector, Brussels, 6–7 October 2026





## Agenda

What we'll cover: the problem, the science, the tool, and what it means for you.

- |                                            |                                                   |
|--------------------------------------------|---------------------------------------------------|
| 1. <b>The Challenge</b>                    | Biodiversity Risk in Agricultural Supply Chains   |
| <hr/>                                      |                                                   |
| 2. <b>Can Satellites See Biodiversity?</b> | What Earth Observation Can (and Can't) Do         |
| <hr/>                                      |                                                   |
| 3. <b>Biodiversity Assessments</b>         | Turning Satellite Data into Biodiversity Insights |
| <hr/>                                      |                                                   |
| 4. <b>Key Take-Aways</b>                   | From Biodiversity Data to Sustainable Decisions   |

# 1. The Challenge



## The Problem

Biodiversity risk is invisible across most agricultural supply chains today.



### Invisible in the supply chain

Companies sourcing agricultural commodities (coffee, cocoa, palm oil, etc.) often have no way to see whether their activities are degrading nature, beyond self-reported or occasional field audits.



### Field audits don't scale

On-the-ground assessments are accurate but slow and expensive, and only cover a fraction of sourcing areas, leaving most of a supply chain effectively unmonitored.



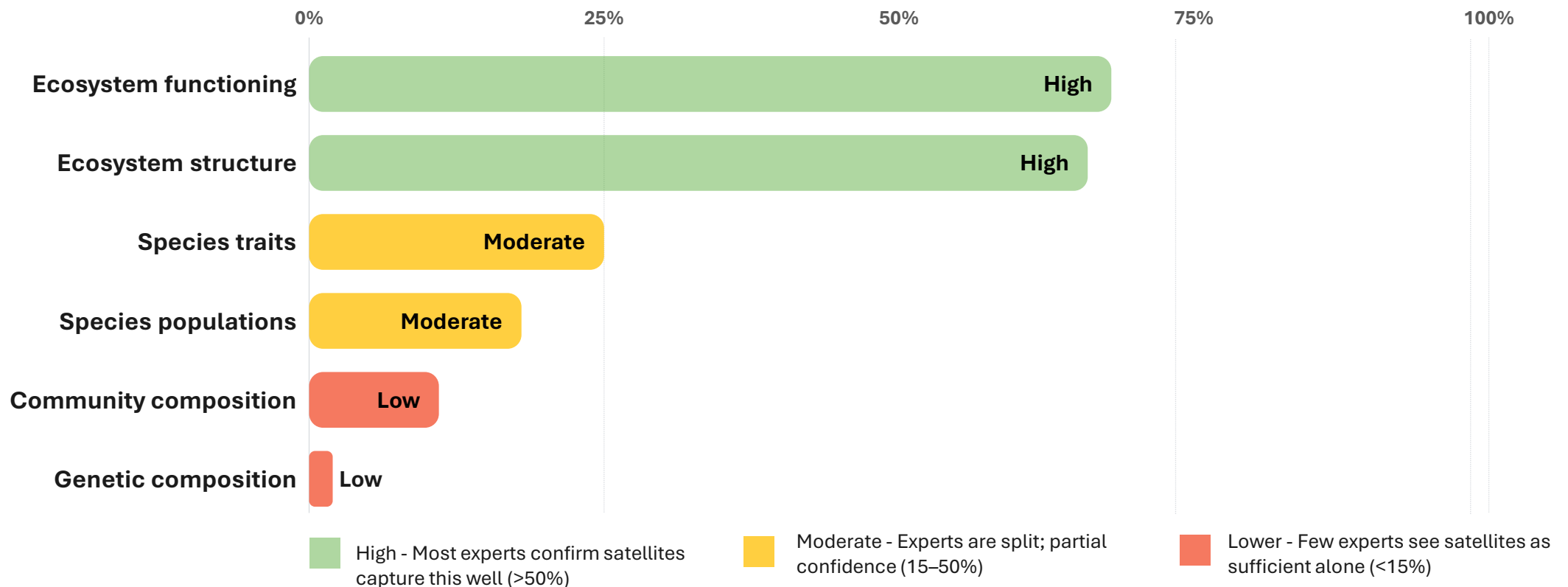
### Reporting demands are rising fast

Frameworks like TNFD, ESRS E4 (CSRD) and SBTN increasingly expect companies to report nature-related risk with real data, not estimates, a gap most agri-food companies aren't yet equipped to close.



## Can Satellites See Biodiversity?

Satellite Earth Observation gives strong, validated evidence on ecosystem extent, structure and function – the physical backbone of a habitat. It's less able to directly see species composition or genetic diversity, which is why EO is best paired with field and citizen-science data, not used alone.



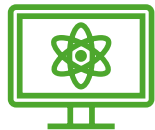
Source: Lumbierres et al. 2025, *Global Ecology and Conservation* 62:e03699 – EU-wide stakeholder survey, n=520 experts, 49 countries (Fig. 2e, “Satellite remote sensing,” “Yes” share only).  
Also see: Oxford Environmental Change Institute, “Satellites are transforming biodiversity monitoring for global nature targets, but major gaps remain” (2025).

## 2. GRAS Biodiversity Risk Assessments



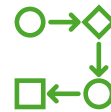
## GRAS Biodiversity Risk Assessments

Satellite data translated into practical, comparable and audit-ready biodiversity indicators.



### Biodiversity Risk

Reflects potential impact of business activities on ecosystems, habitats, species, and ecosystem services, as well as the resulting operational, regulatory, and sustainability risks for organizations.



### How we assess it?

GRAS combines Earth Observation data, environmental indicators, and geospatial analytics to evaluate:  
Habitat condition and ecosystem integrity, ecosystem function trends, species-habitat suitability and diversity proxies, and biodiversity pressures.



### Actionable Risk Insights

Our assessments deliver:

- Comparable biodiversity risk scores
- Site and supply-chain screening
- Biodiversity hotspot identification
- Monitoring and trend analysis
- Audit-ready indicators and reporting support

*GRAS collaborates with the European Space Agency (ESA) to advance the use of Earth Observation data in biodiversity risk screening and assessment.*





# What Remote Sensing Can Measure for Biodiversity

A growing set of free, open satellite missions can already track ecosystem change at scale.

| Category                      | What We Measure                                                                                                                                            | Why It Matters to You                                                                                         |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Habitat & Ecosystem Condition | Habitat extent, vegetation structure, and ecosystem function (e.g. canopy cover, productivity), derived from Sentinel and other open satellite missions.   | Shows the real state of the land at each sourcing site, not a self-reported estimate.                         |
| Pressure & Change Detection   | Habitat conversion, degradation, and environmental stress (e.g. drought, fire), detected by comparing satellite images over time.                          | Flags which sites are actively changing, so risk can be caught early rather than after the damage is done.    |
| Species & Habitat Indicators  | Species occurrence and habitat-suitability patterns, combining open biodiversity records (e.g. GBIF) with the same satellite-derived environmental layers. | Adds a species-level view that complements habitat and change signals, wherever occurrence data is available. |

Scalable

Built on free, open satellite data, so it works across an entire sourcing portfolio - not just a handful of audited sites.

Fast

Farm-level results in minutes, not months of fieldwork.

Audit-ready

Deterministic and versioned, so every score is traceable and maps onto TNFD, ESRS E4 and SBTN reporting.

## Mapping Biodiversity Patterns with Spectral Diversity

Spectral diversity maps provide scalable, objective indicators to prioritize hotspots, screen biodiversity risk, and monitor ecological change over time.

- **$\alpha$ -diversity (local variation)** → *How heterogeneous is this place?*
- **$\beta$ -diversity (dissimilarity)** → *How different is this place from others?*



**High  $\alpha$**  → Complex, heterogeneous habitats (often higher biodiversity value)

**Low  $\alpha$**  → Homogenized, simplified landscapes (potential pressure signal)

**High  $\beta$**  → Strong ecological turnover, unique areas, boundaries

**Rapid change over time** → Disturbance, degradation, or transformation

Féret, J.-B., de Boissieu, F., 2019. *biodivMapR: an R package for  $\alpha$ - and  $\beta$ -diversity mapping using remotely-sensed images*. *Methods Ecol. Evol.* 00:1-7. <https://doi.org/10.1111/2041-210X.13310>

Féret, J.-B., Asner, G.P., 2014. *Mapping tropical forest canopy diversity using high-fidelity imaging spectroscopy*. *Ecol. Appl.* 24, 1289–1296. <https://doi.org/10.1890/13-1824.1>

### 3. Key Take-Aways



## Key Take-Aways

From Biodiversity Data to Sustainable Decisions.

### 1. Biodiversity Risk Made Measurable

GRAS transforms satellite and environmental data into a consistent biodiversity risk assessment, enabling the evaluation of ecosystems, species, habitats, and ecosystem service dependencies across locations and supply chains.

### 2. Scalable Screening for Decision-Making

GRAS supports sourcing, sustainability, certification, and risk management activities by providing comparable insights across farms, sourcing regions, and operational assets.

### 3. Actionable and Transparent Results

Provides clear, comparable biodiversity risk scores across an entire portfolio of sites, helping organizations quickly identify where monitoring, mitigation, sourcing, certification, and sustainability efforts are most needed



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Based in Cologne, Germany, GRAS is part of The Sustainability at Work Group that joins forces to implement sustainability solutions for private and public sector clients.

With over 10 years of experience, we provide environmental and social sustainability solutions.

By combining cutting-edge technologies like satellite imagery, GIS and machine learning, we monitor deforestation-free, sustainable supply chains.



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# Speaker Introduction

## ABOUT YOU

I'm Jhony Sanchez, a remote sensing expert at GRAS, part of The Sustainability at Work Group. I use satellite imagery, GIS and other geospatial technologies to help companies understand their environmental impact and support more sustainable, biodiversity-conscious decision-making.

## YOUR PERSPECTIVE

Why did you want to contribute to this conference?

I wanted to contribute because I believe remote sensing has real potential to help connect industry with biodiversity conservation, turning what we can see from space into practical action on the ground

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