Eyes in the Sky: Leveraging Satellite Data for Sustainable Agriculture and Climate Resilience

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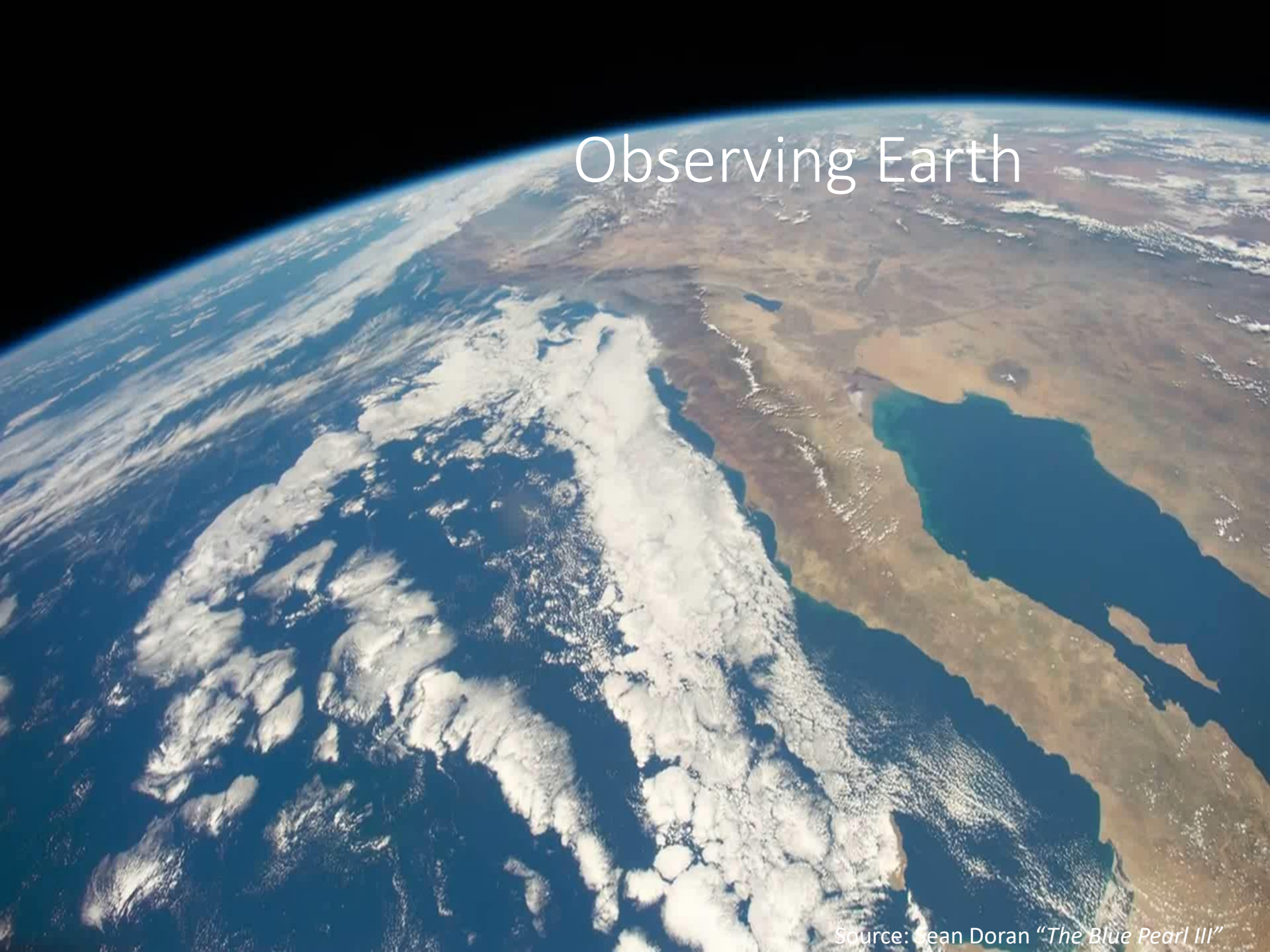
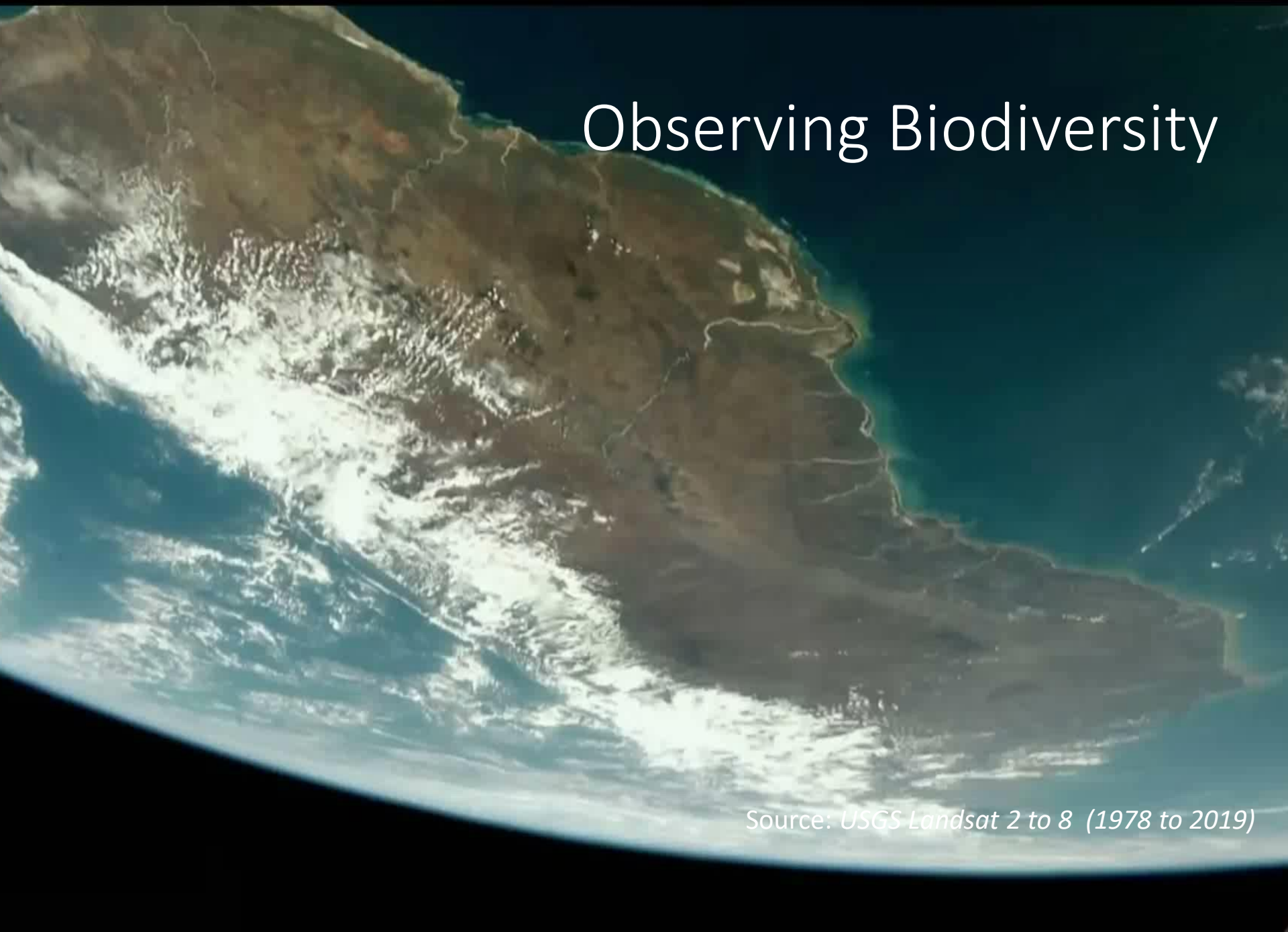
Observing Earth



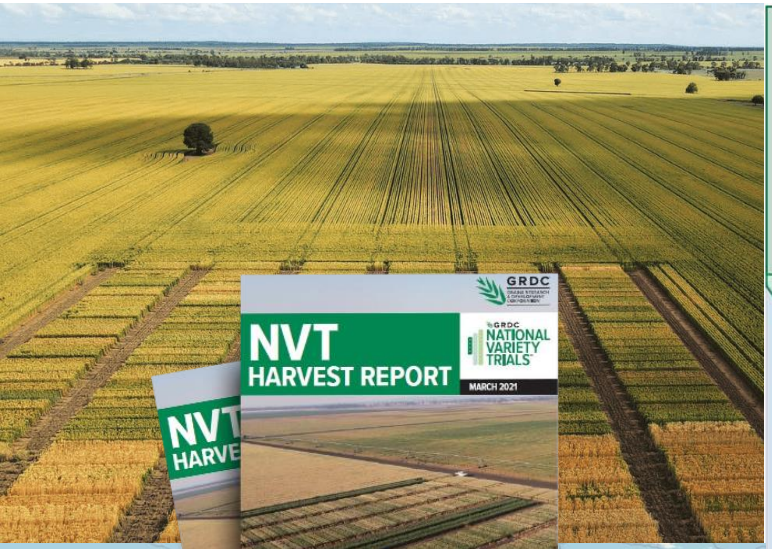
Source: Sean Doran *"The Blue Pearl III"*

Observing Biodiversity



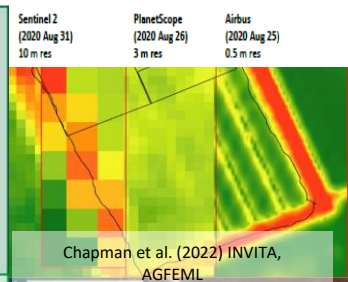
Source: *USGS Landsat 2 to 8 (1978 to 2019)*

Monitoring Climate Feedbacks

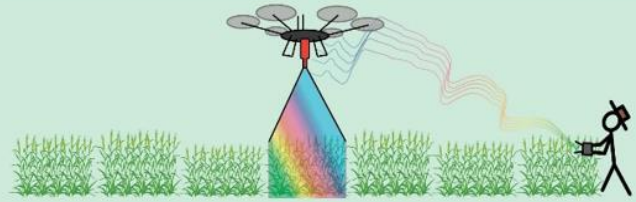


Scafaro, Salter et al. (2025) under review

Landscape scale using satellites

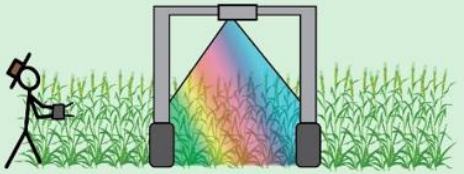


Chapman et al. (2022) INVITA, AGFEML

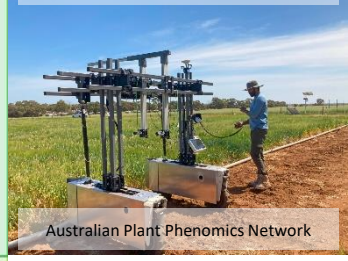


Field trial scale using drones

Chapman et al. (2022) INVITA, AGFEML



Plot scale using ground based platforms

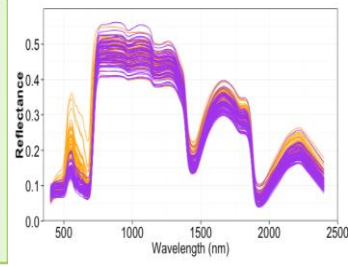


Australian Plant Phenomics Network

Cross cutting themes for success and scalability

- AI data analytics
- Novel sensor technologies
- Cross scale data fusion and validation
- Automation of data collection and analysis
- Characterisation of surrounding environment
- FAIR data and metadata pipelines
- Openly published datasets

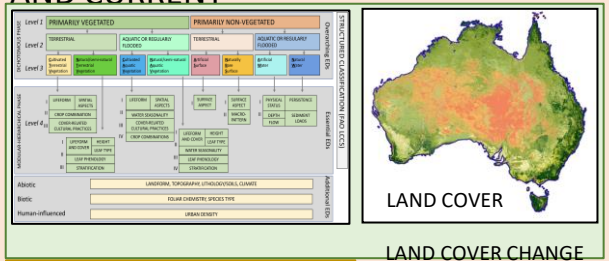
Leaf level using conventional methods



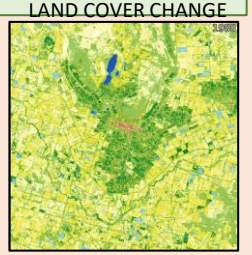
LIVING EARTH: PLANNING FUTURES FOR PEOPLE AND NATURE

PAST AND CURRENT

GLOBAL TAXONOMIES AND FRAMEWORKS

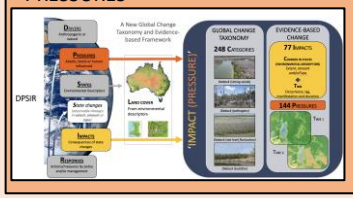


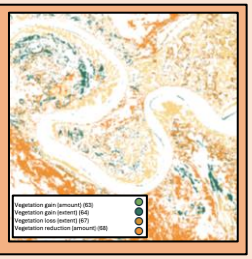
LAND COVER CHANGE



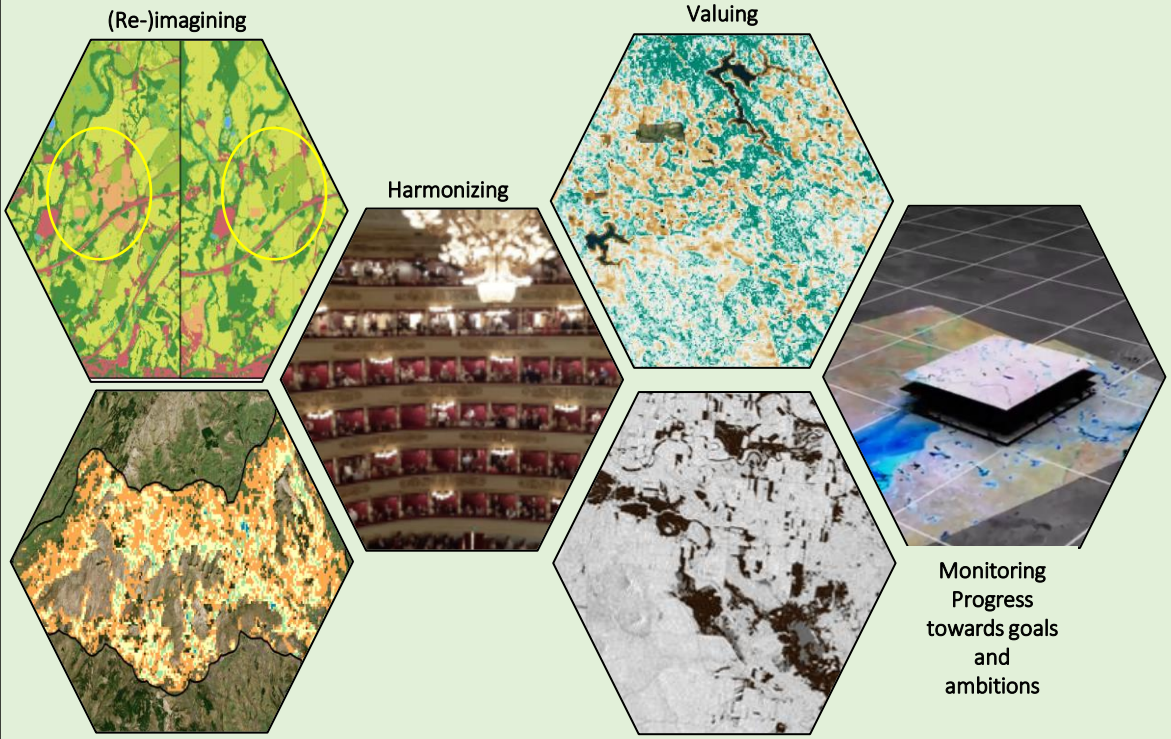
WATER ENVIRONMENTS

CHANGE IMPACTS AND PRESSURES





FUTURES: SUPPORTING STEPS TO ACHIEVEMENT



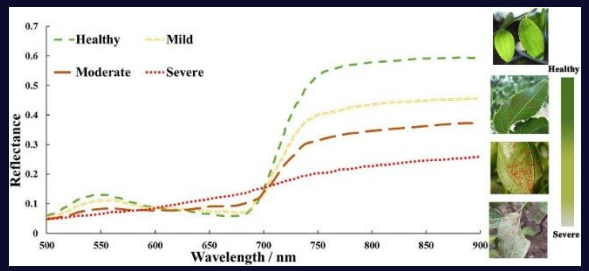
Living Earth constructs land cover classifications according to the Food and Agriculture Organization's (FAO) Land Cover Classification System (LCCS) and from environmental descriptors (EDs) retrieved or classified primarily from Earth observation data. A globally applicable change framework is then used to identify and describe change impacts based on evidence gathered through time-series comparison of the land cover maps and contributing EDs. *Living Coasts* (funded by the UKRI through the EO4Agriclimate program) has developed a complementary aquatic classification that allows connections between land and water. All taxonomies are scalable in space and time because of the use of environmental descriptors with consistent units and categories and can support future planning of landscapes for people and nature.

***Living Earth* has been applied nationally in Australia, the UK (Wales) and Switzerland.**

How EO is Transforming Pest and Disease Detection in Farming

- Direct Pest Assessment
- Biophysical & Biochemical Parameters for Early Detection of Invisible Pest Infections
- Landscape monitoring through EO data and ancillary information

Leaf

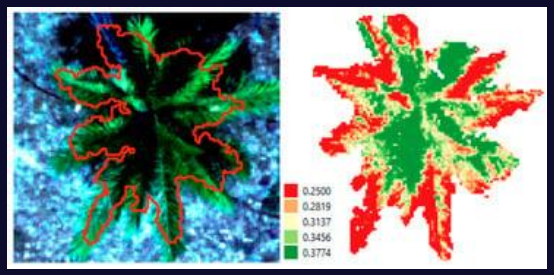


Lu et al., 2022

Preti et al., 2020)

Canopy

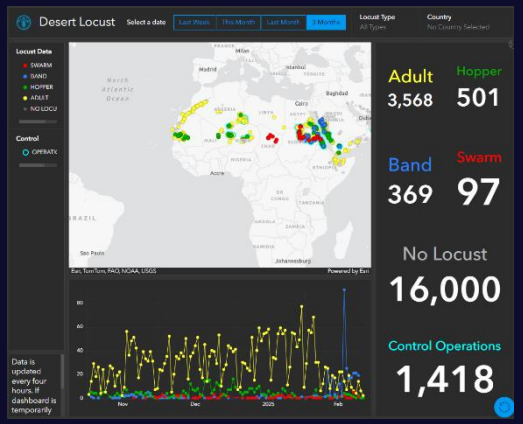
Phytophthora

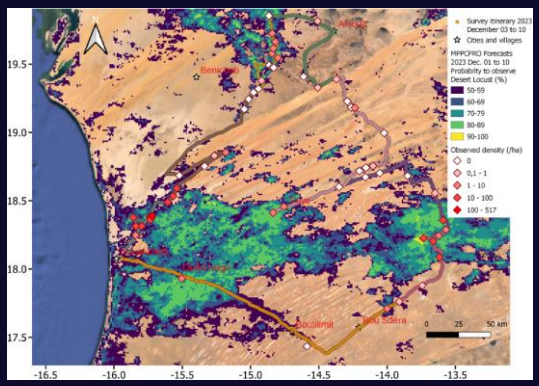


Delalieux et al., 2023

Red Palm Weevil Detection

Landscape



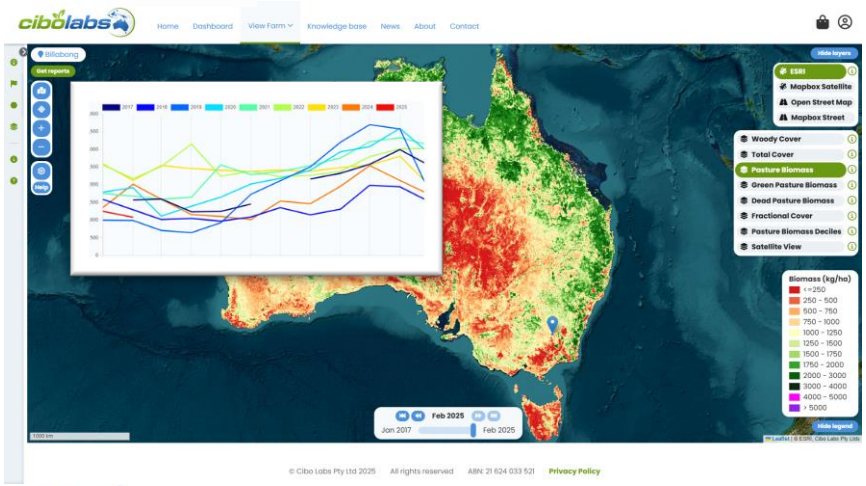


(Marescot, et al., 2025)

Emerging areas

- Species-specific spectral libraries for hyperspectral-based identification
- Specific AI & ML algorithms for pest detection, classification, and population estimation
- Higher spatial resolution and field measurement devices for infected plants
- Building digital-twins, exploring different scenarios, and leveraging the power of EO data

Nation to Paddock Pasture Monitoring for Every Farmer



Implementing the European Union Deforestation Free Regulations