Soil Health
BENCHMARKS

Laura Poggio and Fenny van Egmond on behalf of the project consortium

Frascati, March 2024

ESA SYMPOSIUM ON EARTH OBSERVATION FOR SOIL PROTECTION AND RESTORATION

Funded by the European Union

ID-card of the project

- BENCHMARKS: Building a European Network for the Characterisation and Harmonisation of Monitoring Approaches for Research and Knowledge on Soils
- 5 years (1st January 2023 – 31st December 2027)
- Budget (EU contribution): ~12 M €
- Coordinated by Wageningen University (WU), Prof. Rachel Creamer

Soil Health BENCHMARKS

Building a European Network for the Characterisation and Harmonisation of Monitoring Approaches for Research and Knowledge on Soils

Key objectives

1) Co-develop a coherent Integrated Soil Health Monitoring Framework

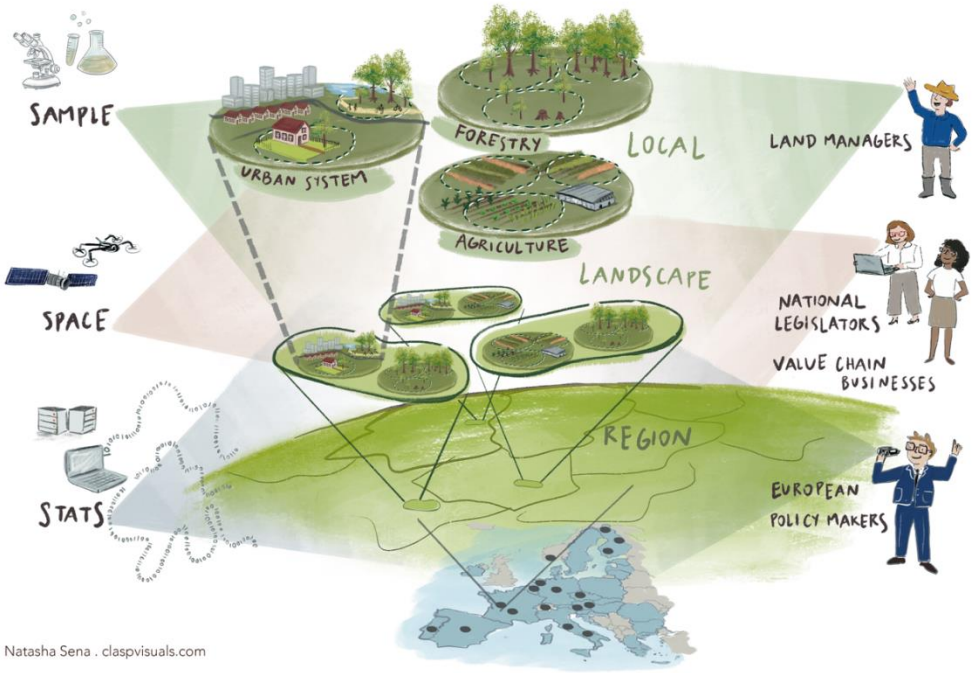
2) Test and validate the SH&F mission indicators and alternative/additional ones for different land uses and for different scales

3) Develop a European broad sampling framework, methodology and protocols, to support relevant EU policy (and global initiatives), regulation and monitoring needs

4) Co-Develop a Soil Health Dashboard with the JRC

Key aspects of the methodology

Working across scales and land uses



BENCHMARKS Monitoring Framework

Context

- **Objective**
- **Soil functions** which support the objective
- **Land use** under consideration
- **Pedo-climatic region** within Europe
- **Scale of assessment** of the application of the indicator measurements
- **User type** the type of information required

Monitoring Metrics

- **Practice** – defines which management practices can be implemented to respond to the objective set out in the context.
- **Result** – are useful to monitor and report a change in the short term as a result of the implementation of a practice/new technology.
- **Outcome** – are useful to monitor and report the extent to which the intervention / initiative has delivered on its goals.

Indicator Measurements

- **Sample** – field and lab based measurement
- **Stats –** existing data on; soils, management practices, socio-economic factors & model derived measurements.
- **Space -** digital technologies, e.g. remote sensing, satellite technology, lidar, drones

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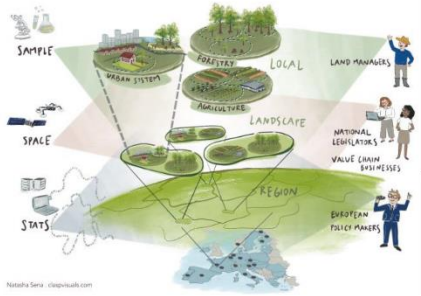
Key exploitable results and outputs

Input

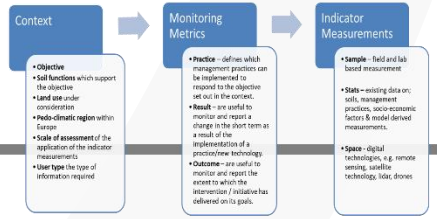
Existing 8 EU Mission indicators and datasets

24 Landscape Case Studies



Co-develop and communicate | WP1
Define indicators | WP2
Integrate data | WP3

Integrated Soil Health Monitoring Framework



Testing and upscaling | WP4
Monitoring, Reporting & Verification | WP5

Key results and outcomes

Dashboard
w/ JRC

- Harmonised indicator selection framework
- Soil Health Assessment and Index
- Management practices for optimisation

Link soil health, functions and ecosystem services

Scientific underpinning of soil health schemes

Key impacts

Scientific:
Framework for soil health in Europe to support soil strategy and SH&F mission

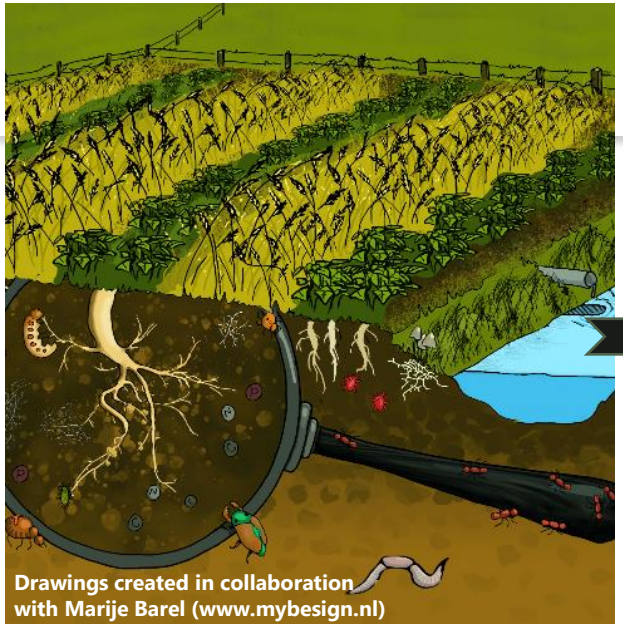
Economic:
Support sustainability strategies for businesses of 24 value-chains

Societal:
480 land managers engaged towards 75% healthy soils by 2030

TRL 2-3

Delivering on Soil Health | WP6

TRL 4-5



How do we monitor soil health?

1. **Identify the objective and contextualization of assessment**
2. Understanding the drivers of soil functioning
3. Soil functions, processes and parameters of interest
4. Select indicator measurements to measure change in time
5. Assess logistical considerations for indicator selection

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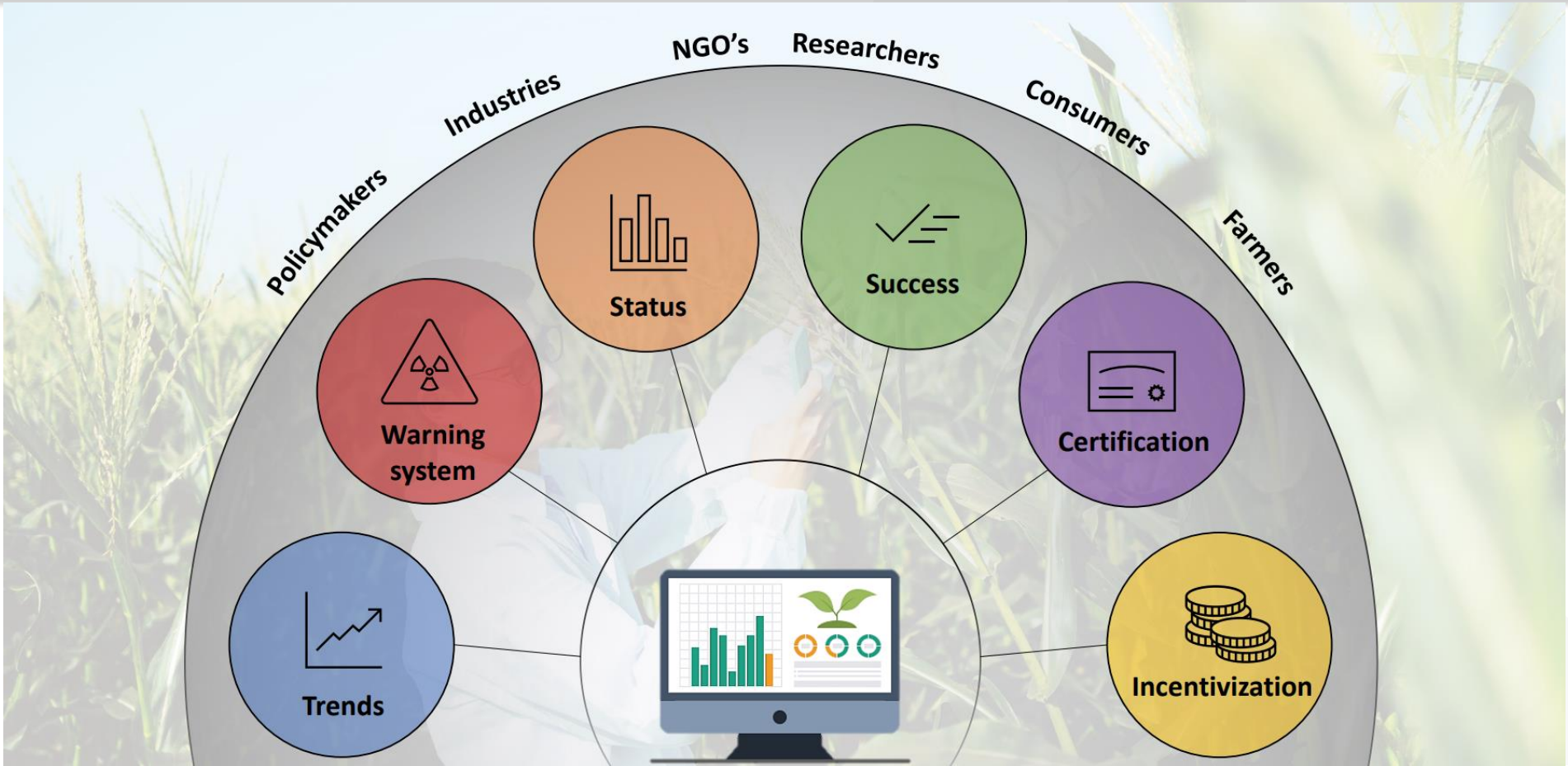
Purpose of Monitoring



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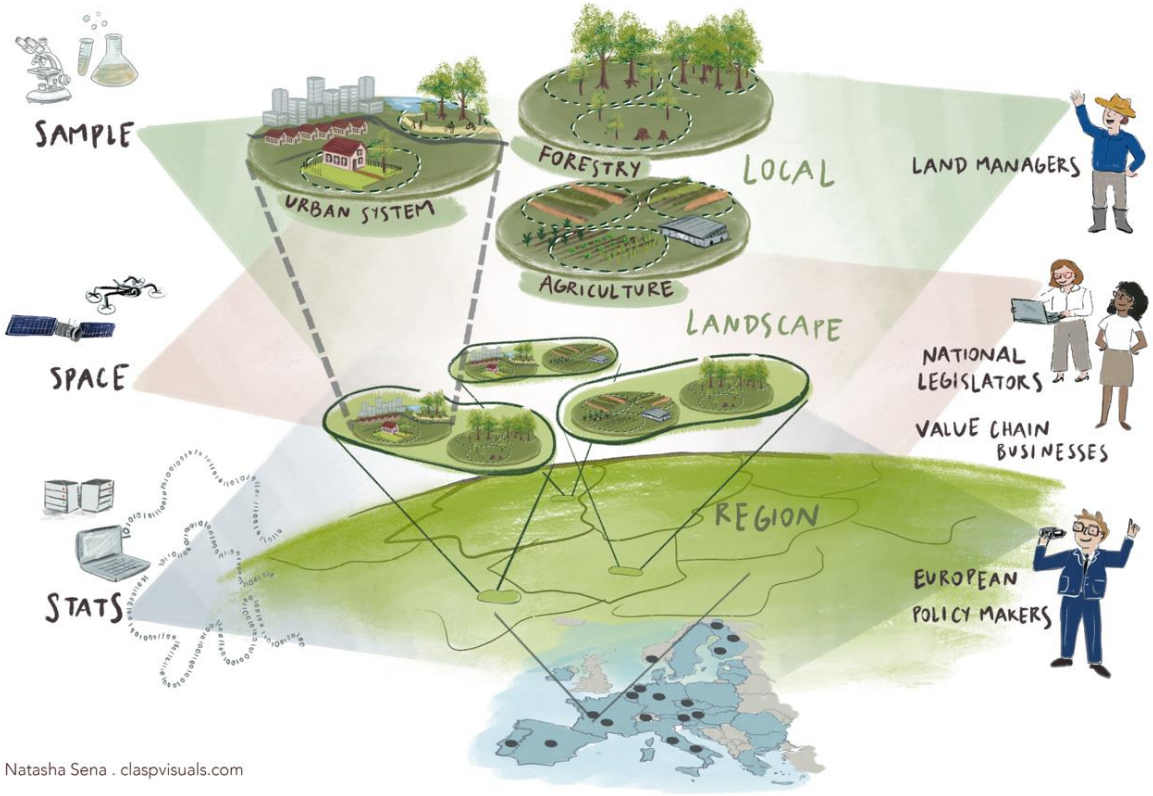
Scale of Assessment



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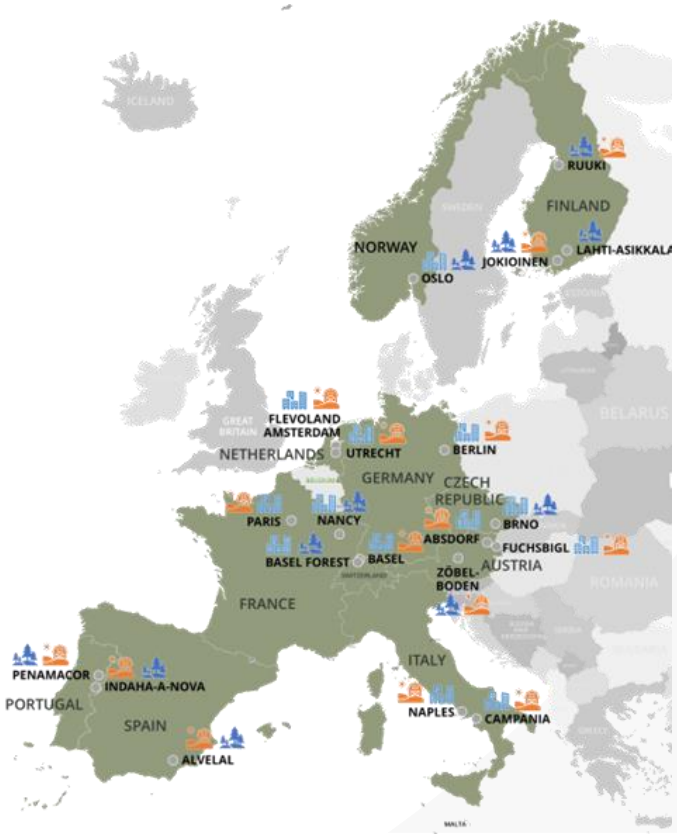
Land Use & Pedo-Climatic Region of Relevance

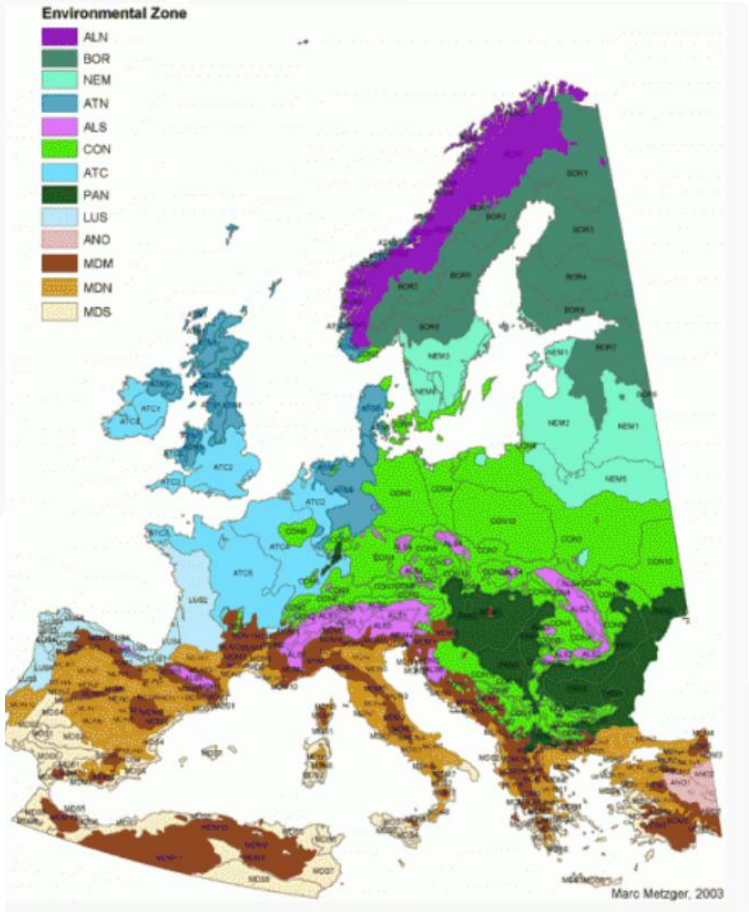
24 Landscape Case Studies



Agriculture
12

Forest
7

Urban
5



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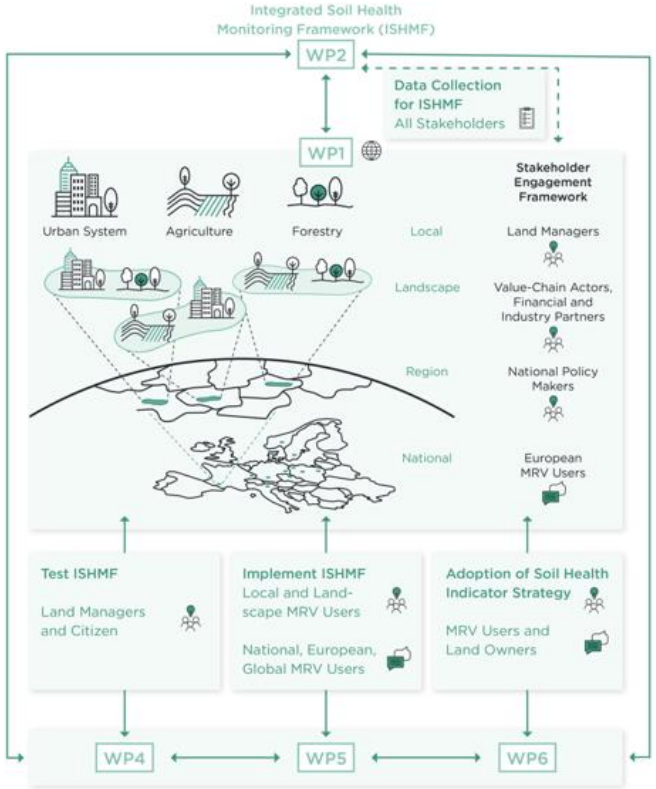
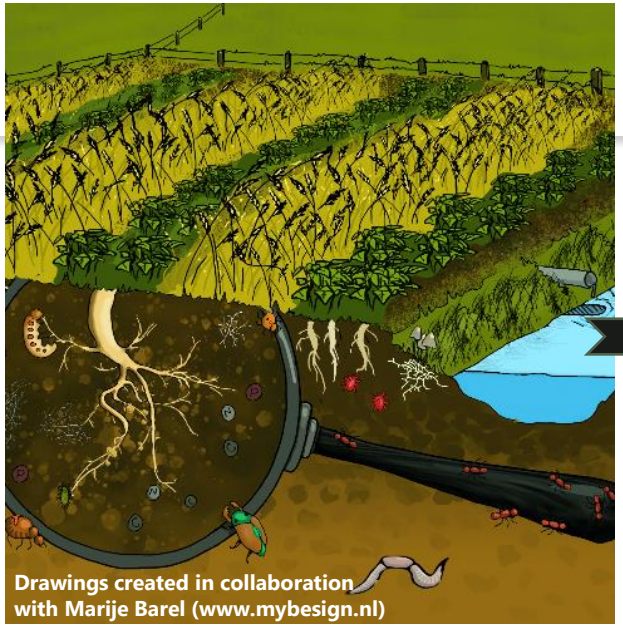
Multi-stakeholder Workshops



Type and Method of Stakeholder Engagement:

- Project Communication - Website, Social Media
- Indirect - Surveys, Questionnaires
- Direct - Meetings, Dialogues, Consultations
- Active - Workshops, Site Visits



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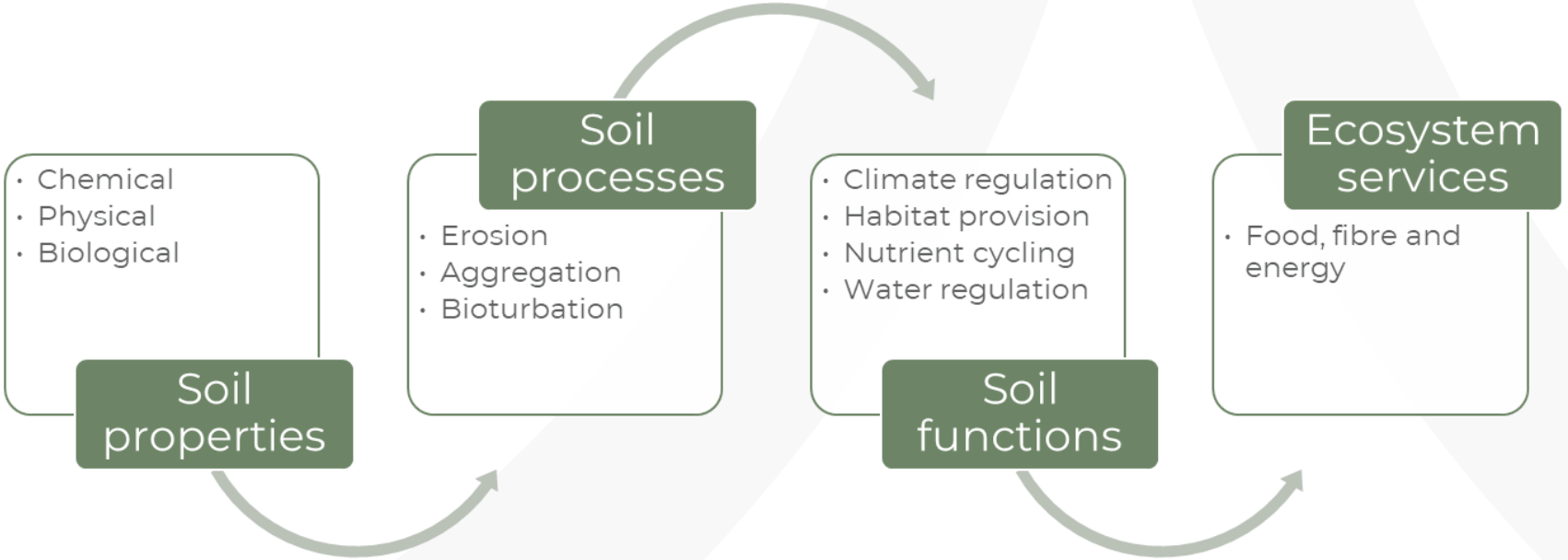
Understanding the drivers of soil functioning

Goal / Objective	i.e. reduce erosion, improve water infiltration, improve yield
Soil functions	Identify functions which support objective



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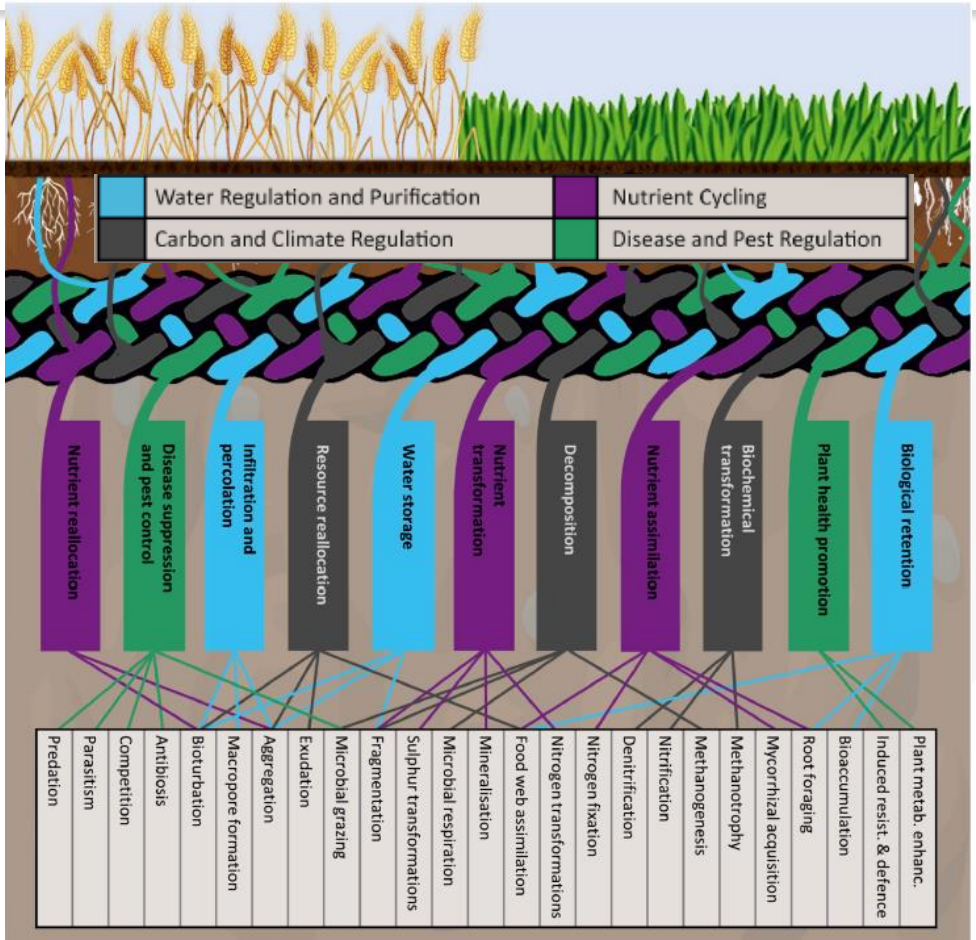
Understanding the drivers of soil functioning

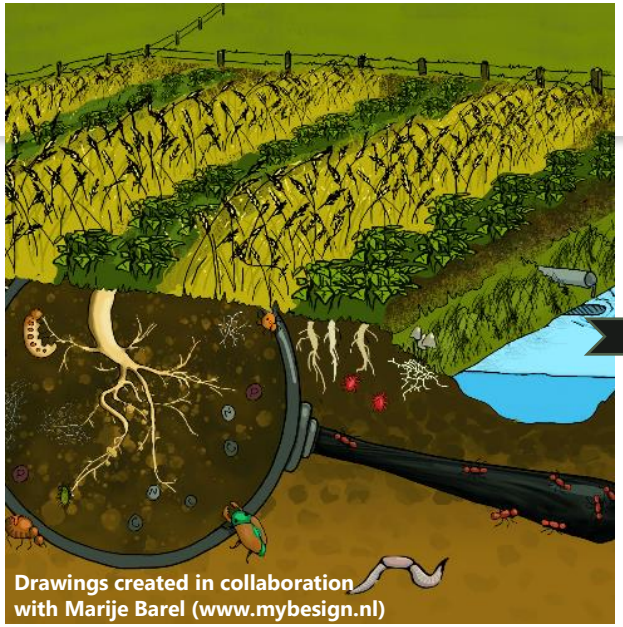


Creamer et al., 2022

The life of soils: Integrating the who and how of multifunctionality

Soil Biology and Biochemistry 166 (108561)

Cognitive models



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Testing of indicators across Europe – sampling campaign starting this week

















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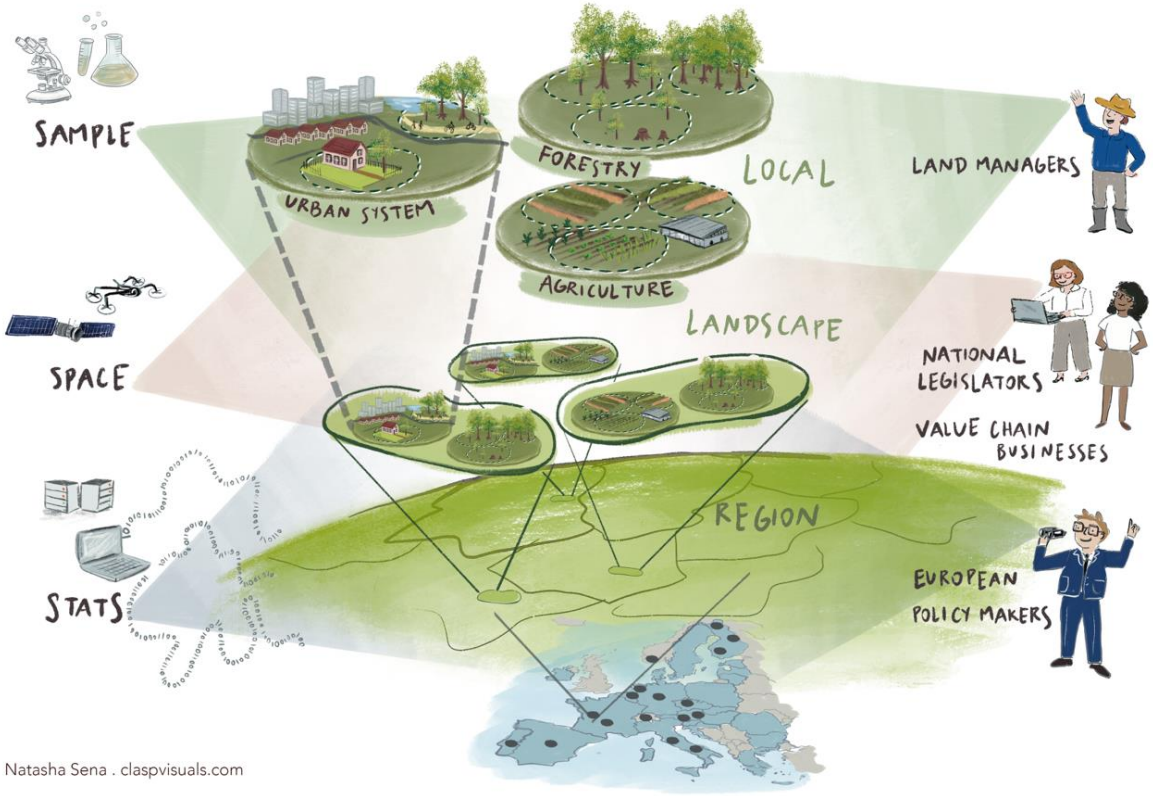
Defining Soil Health across Europe from the Local to European Scale of Assessment



Collaboration with other projects and initiatives

1) AI4SoilHealth
2) Soilwise
3) BioServices
4) SoilGuard
5) others
6) Mission Cluster on Indicators and Monitoring
7) Mission Cluster on Stakeholder Engagement and Communication
8) Mission Cluster on Data Management

BIOSERVICES

AI 4 Soil Health

SOILGUARD

SoilWise
KNOWLEDGE & DATA FLOWS

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Thank you!

Get in contact: Dr. Paolo Di Lonardo, Project Manager
paolo.dilonardo@wur.nl

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