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EUROPEAN MISSION SOIL WEEK

Making the Soil Monitoring Law work: status and prospects

Mirco Barbero

European Commission, DG Environment

Brussels, 12 November 2024

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Healthy soils as key contribution to 4 EGD objectives

Healthy soils for achieving the Union's overarching objectives concerning **climate change mitigation and adaptation** and **biodiversity**

Healthy soils for preventing and mitigating the impacts of **natural disasters** and increasing the **drought resilience**

Healthy soils for increasing/ensuring the EU's **long term capacity** to produce **sufficient, safe and nutritious food**

Healthy soils for protecting the **health** of EU citizens

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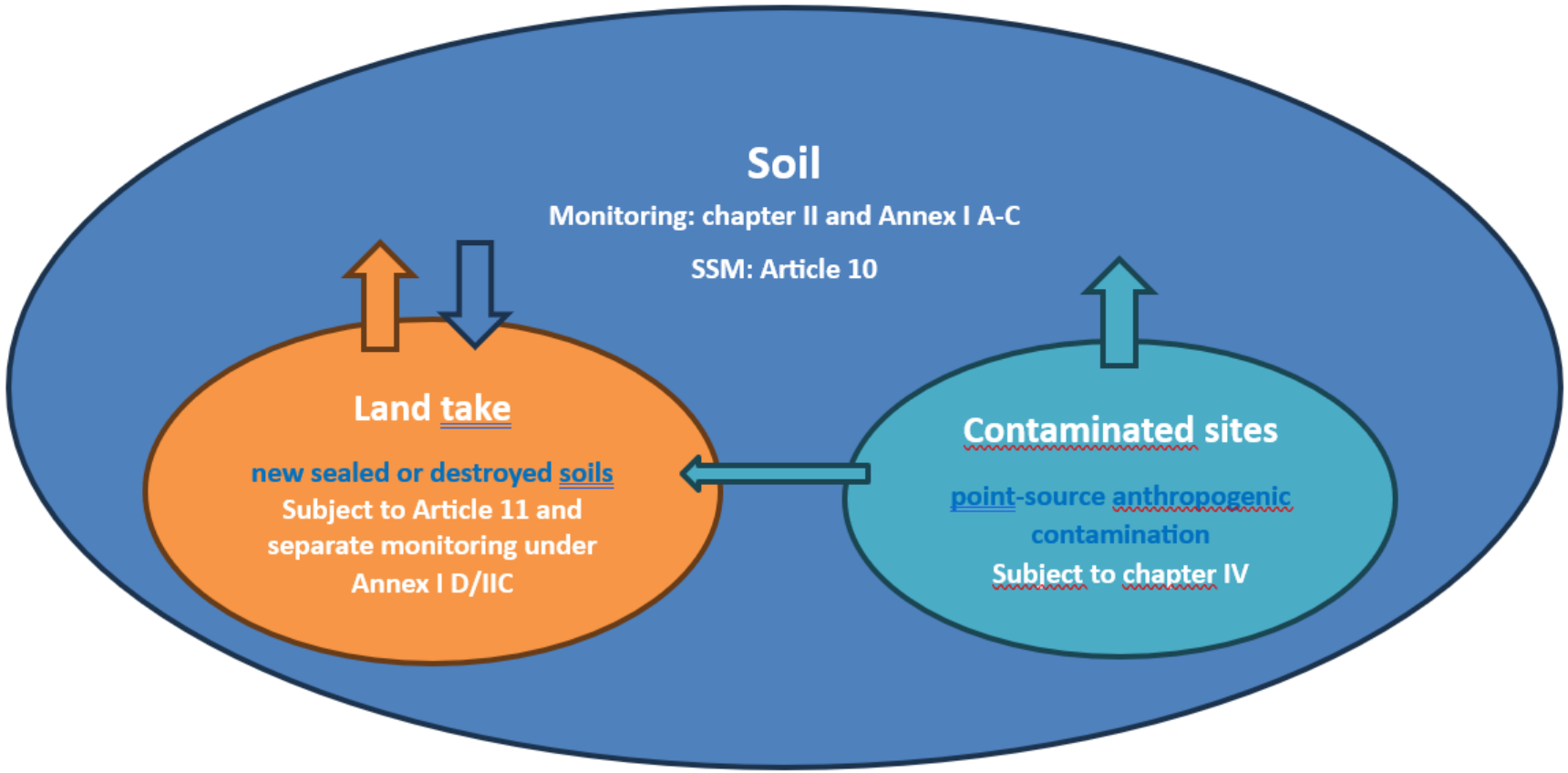
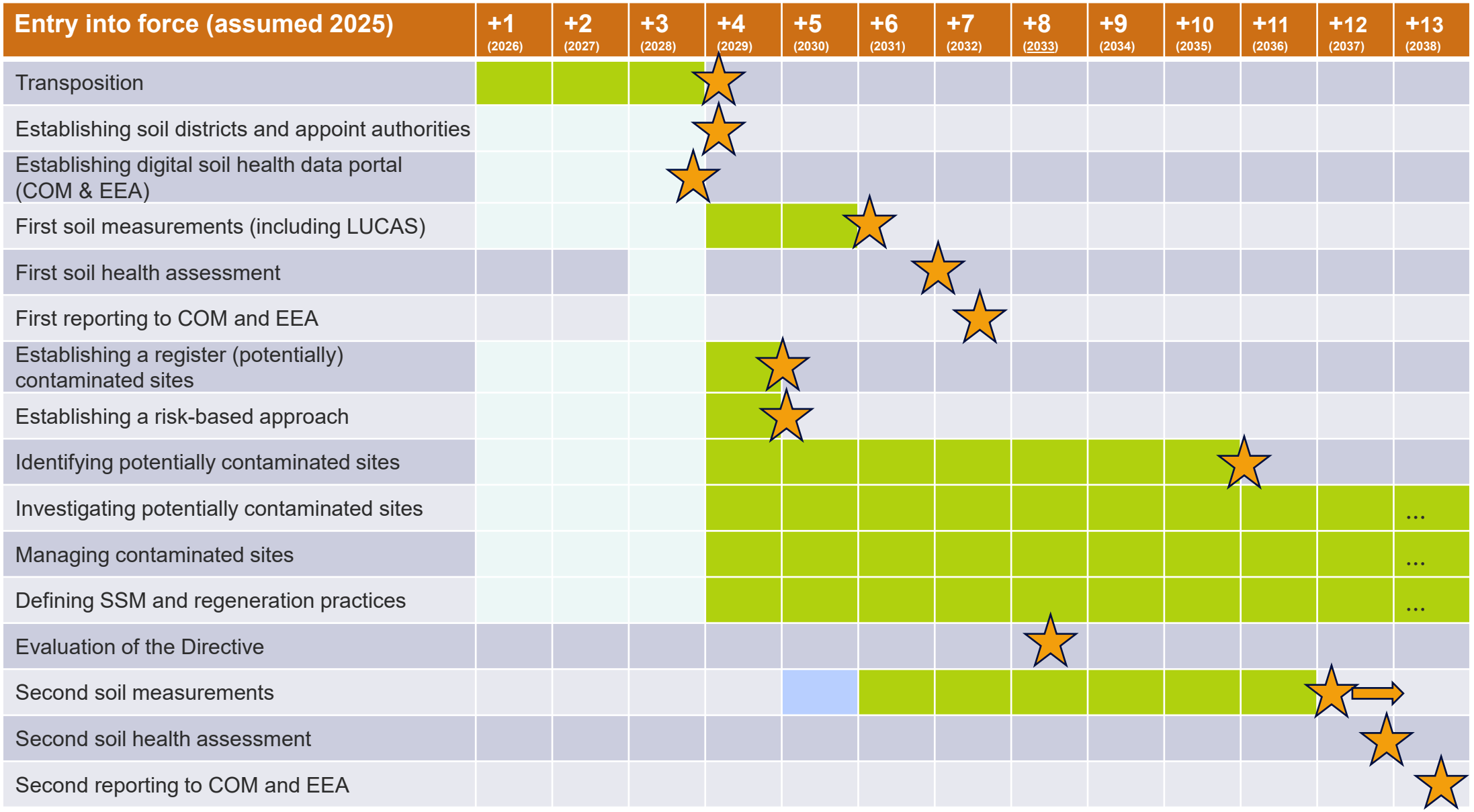
Soil monitoring law proposal – scope of application

based on the Council General approach of 17 June 2024

- All soils are covered by the SML – a flexible approach with general, science-based definitions and tailored regimes.
- Distinct regimes – not overlapping (e.g. Article 8(2) 2nd sentence), but soils can move from one category to another.
- All services provided by soil are recognized and need to be balanced (e.g. recitals 2b, 30e).



Timeline (as modified by the Council)



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Challenges & opportunities for Member States authorities

Esther Goidts

Senior Advisor – DG Agriculture, Natural Resources & Environment (ARNE), Public Service of Wallonia (SPW), Belgium

Brussels, 12 November 2024

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1 – Birth of a dedicated soil legislation

20th century

Contaminated sites management

Protection at work, land planning, environment (industries, wastes)

21st century

Soil management

Agriculture, forests, urban areas, climate, biodiversity, energy, circular economy, health

Soil care?

Healthy soil whatever its use?

22nd century

No soil legislation as such

Soil legislation but focused on soil contamination (point-source)
Co-existence of sectoral policies

Soil legislation based on soil health at the core of the system?

- In Wallonia, 1st trial for soil legislation in 2004, 2nd attempt in 2008, upgrade in 2018, next in 2028?
- At EU level, 1st trial in 2006, 2nd attempt in 2023, if adopted: revision foreseen after 6 / 7.5 yrs

⇒ **Agreeing on a soil legislation takes time and is a long run for public authorities !**

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1 – Birth of a dedicated soil legislation

Towards Soil Health? ⇒ **Widening the scope is challenging !**

'Soil health' means the physical, chemical and biological condition of the soil determining its capacity to function as a vital living system and to provide ecosystem services

Soil health*

physical	chemical	biological
Bulk density, structural stability, saturated hydraulic conductivity, water retention curve,erosion	*Electrical conductivity, SOC (concentration + stock), P, N, pH, contamination*	*Soil biodiversity, biological activity*

* As proposed in the EU Council mandate

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2 – Scattered soil-relevant communities

Researchers, scientists

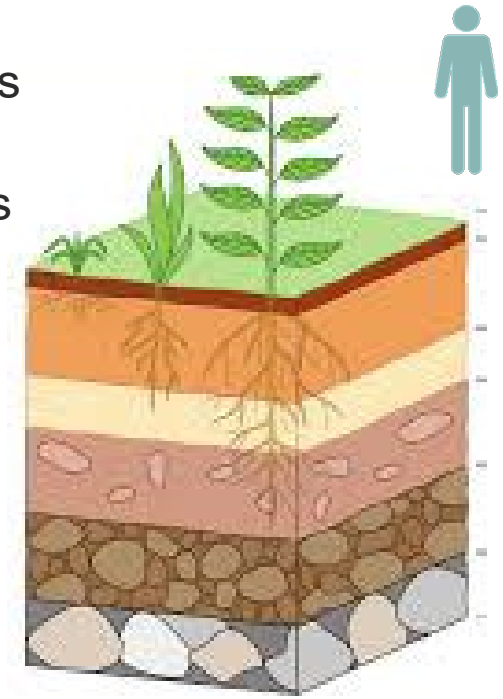
Land owners

Farm & forest managers

Businesses (entreprises, funders, …)

Industries

Citizens, associations, NGO's



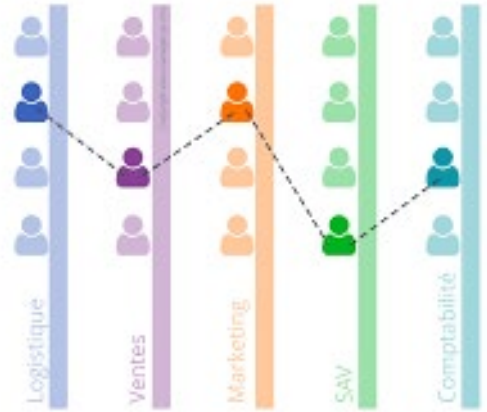
Advisors (public & private)

Scientifical, technical, economical, juridical, social & political background

medical professionals,
architects, lawyers, salers,
computer scientists, geographs,
agronoms, pedologists, chemists,
biologists,
hydrologists, (hydro)geologists,
civil and industrial engineers,
…

Soil and Health?
2D (land ≠ soil)
3D (≠ scales)
Land use (mono vs multi functionality)
Topsoil vs subsoil
In situ / ex-situ
…

Public authorities



⇒ **Common understanding and governance is challenging !**

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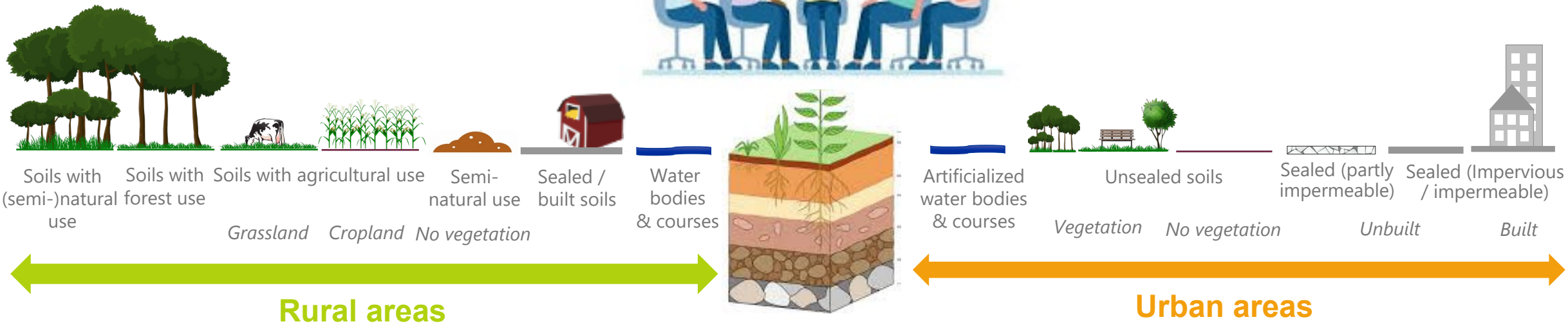
2 – Scattered soil-relevant communities



Land take, erosion, loss of organic carbon, loss of soil biodiversity, compaction, salinization, acidification, excess/depletion of nutrients, reduction of soil water retention and infiltration, …

Point-source contamination (contaminated sites), soil sealing, compaction, reduction of soil water retention and infiltration, …

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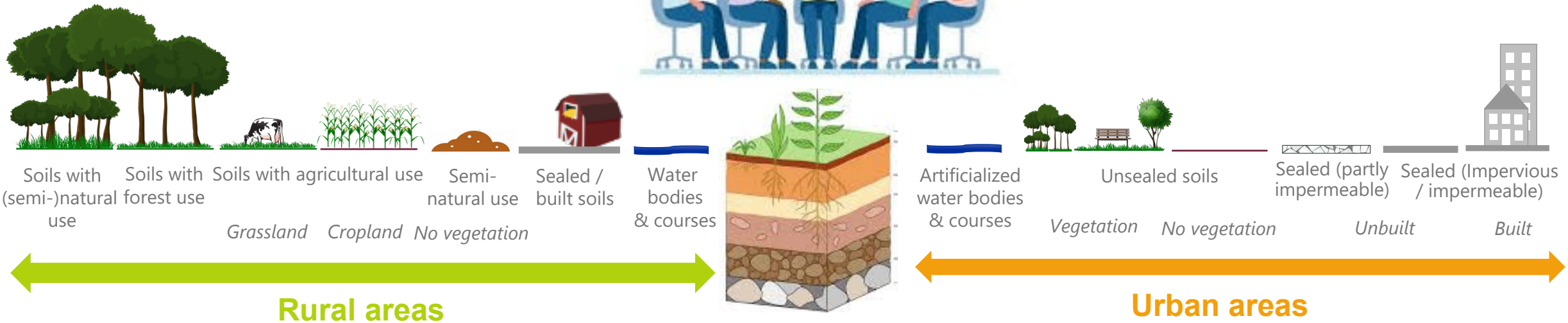
2 – Scattered soil-relevant communities

Diffuse soil contamination?

Soil health?



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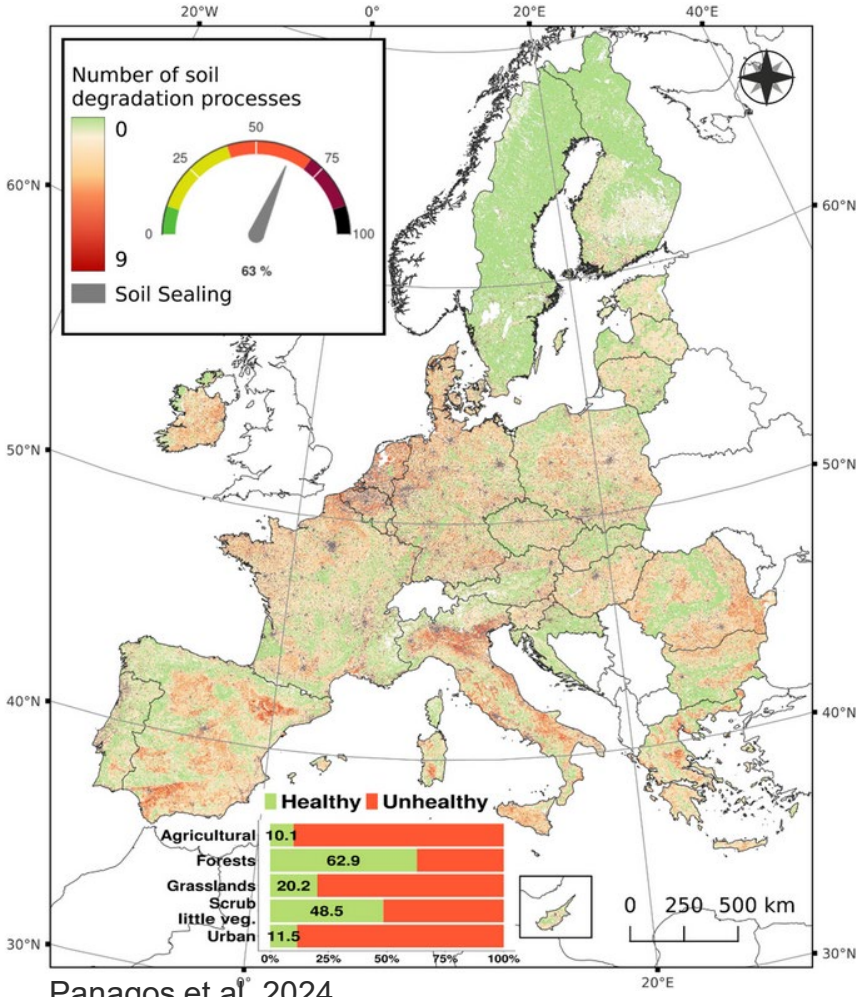
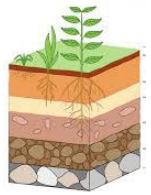
3 – Overlapping of soils degradations



Panagos et al. 2024

Soil health assessment



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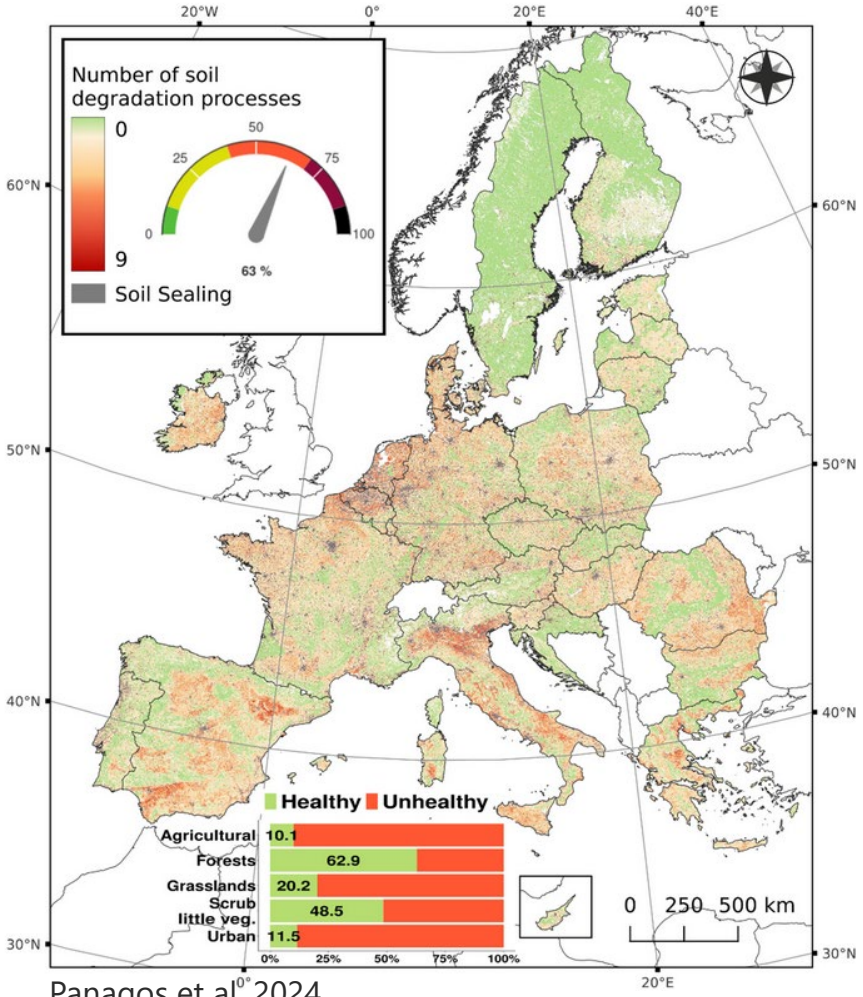
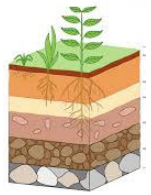


Panagos et al. 2024

For a given area (soil districts made of soil units*) :

* As proposed in the EU Council mandate

Soil health assessment



- Identification of soil descriptors/parameters to monitor & sample
- Integration of (incomplete) existing soil networks & methods
- Determination of sampling points + sampling campain
- Integrated soil health assessment at soil unit level (*one out all out principle difficult -> operational trigger values & sustainable target values*)
- Assessment of the critical loss of ecosystem services
- EU assessment vs MS assessment
- Refinement of scale & data for SSM measures at the relevant level
- …

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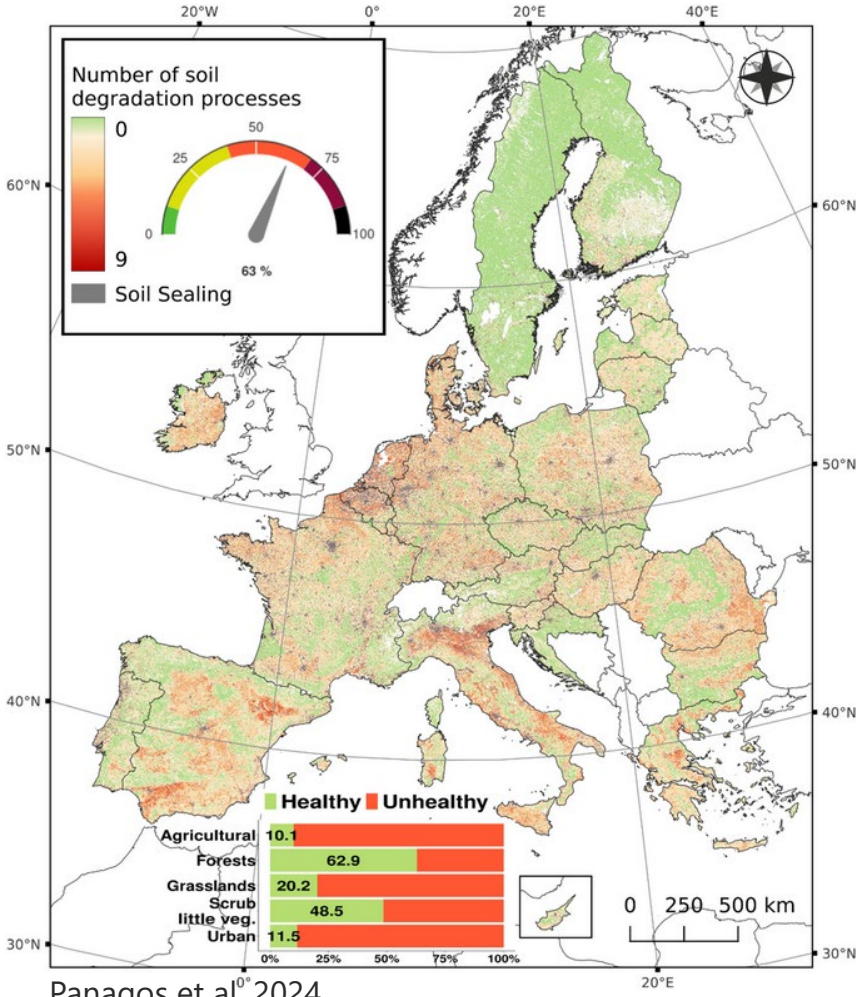

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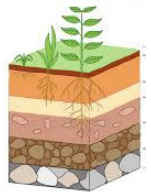

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Soil health management

- Identification of SSM measures
- Integration in existing sectoral plans/strategies/policies
- Scattered advisory system and lack of capacity (laboratories, experts, …)
- Low awareness of stakeholders
- Balance of interests
- …

⇒ **Complex system to run by public authorities (skilled staff & budget) !**

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4 – Overcoming challenges faced by public authorities

✓ A finally adopted EU Soil Monitoring Law to set common objectives and approaches, but leaving enough flexibility to allow implementation

⇒ *Soft and staged harmonisation*
⇒ *Taking into account existing systems*

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4 – Overcoming challenges faced by public authorities

- ✓ A finally adopted EU Soil Monitoring Law to set common objectives and approaches, but leaving enough flexibility to allow implementation
  - ⇒ *Soft and staged harmonisation*
  - ⇒ *Taking into account existing systems*

- ✓ An improved transversality within public authorities and integration between sectoral policies, reinforced exchanges between soil-relevant communities around a common understanding of soil health, and a stronger awareness raising of society
  - ⇒ *Within and among MS, together with EU bodies and relevant partners*
  - ⇒ *Art. 23a para 2 of the Council mandate (exchanges at EU level organised by Commission)*

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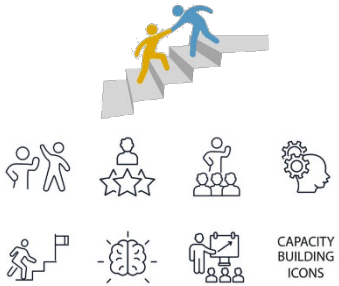

- ✓ An increased support, assistance and capacity building of the sector for assessing and managing soil health (public and private bodies)
  - ⇒ *Set up of the monitoring network (tests during BE Presidency of EU Council, multi-country request for TSI Flagship 2025 Natural resources, …)*
  - ⇒ *Art. 23a para 1 of the Council mandate (support from Commission)*
  - ⇒ *R&D programs around SH assessment and SSM at EU and MS level (Soil Mission, national RRP, …)*
  - ⇒ *Strong advisory sector (laboratories & experts)*
  - ⇒ *Engaged stakeholders*

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The role of the JRC in supporting the implementation of the Soil Monitoring Law

Arwyn Jones

European Commission, Joint Research Centre (JRC)

Brussels, 12 November 2024

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The EU Soil Observatory (EUSO)

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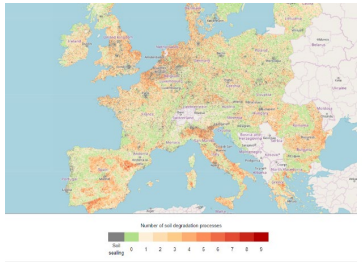
KNOWLEDGE FOR SOIL POLICY

EU-wide soil monitoring

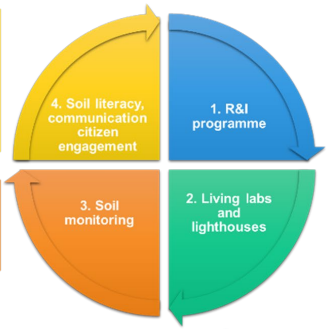


Monitoring soil health and policies

KNOWLEDGE CURATION & CREATION

Soil Mission Building Blocks

- Support to citizen science initiatives for soil monitoring
- Promote self-assessment of soil health by land managers and citizens
- **Building on JRC Awareness and Education WG**



- Support validation of soil health indicators;
- Further develop technologies for soil monitoring
- **EUSO as beneficiary**

- Harmonisation of indicators, measuring and reporting for soil health across Europe;
- **Managed by European Soil Observatory**

A network of real-life sites to
- test and validate novel measuring techniques
- **LL Portal on EUSO**

Research & Innovation

SoilWise
KNOWLEDGE & DATA FLOWS

Stronger European Soil Data Centre (ESDAC)

EUSO Stakeholder Forum

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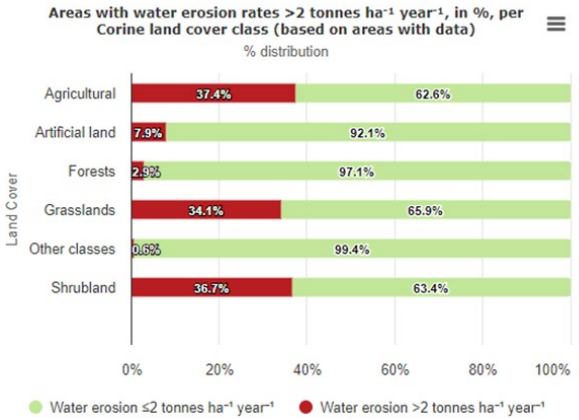
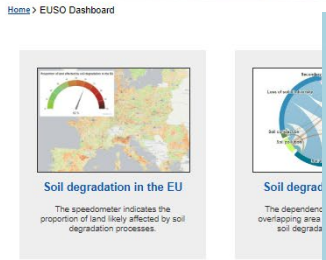
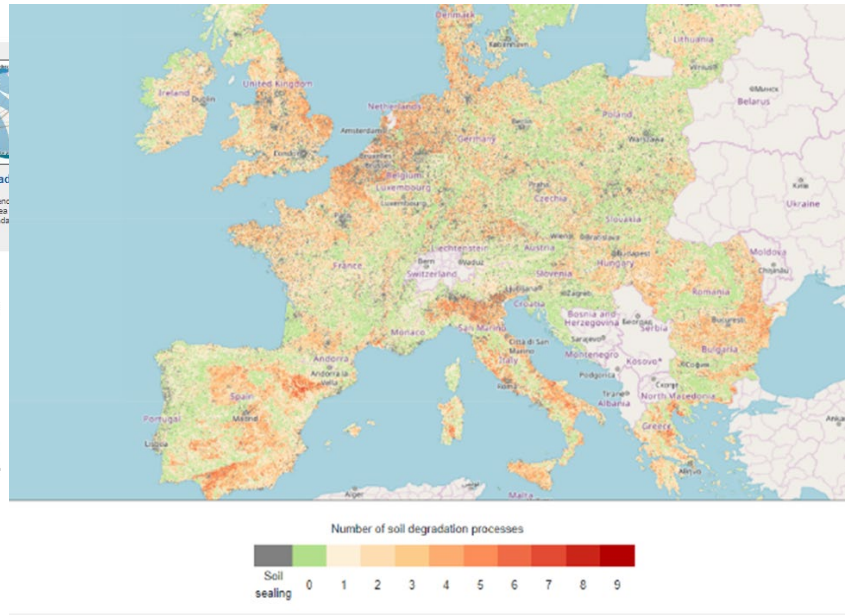
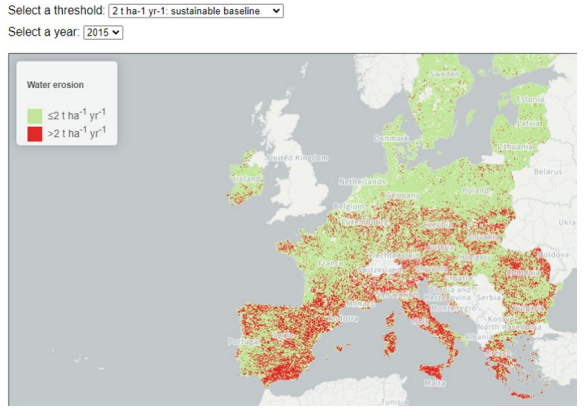
EU Digital Soil Health Data Portal









- Convergence of scientific evidence
- Indicative thresholds
- 63% of EU is likely affected by soil degradation processes
- Lacking key data
- Green areas = ?
- Does not fully reflect SML

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https://esdac.jrc.ec.europa.eu/esdacviewer/euso-dashboard/

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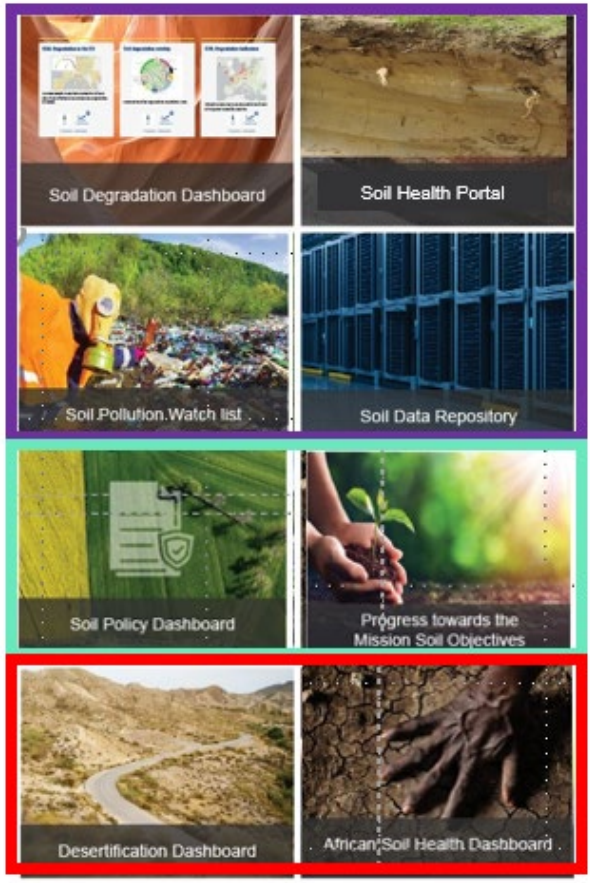
Towards a EU Soil Health Portal

- Outcomes of SML
- diverse policy needs
- Groups a set of dashboards on soil in the EU and beyond (e.g. enlargement, Mediterranean, global soil footprint, etc.)
- Diverse sources/data streams
- Soil health descriptors from SML &LUCAS Soil+
- **Mission projects**/HE
- COPERNICUS
- IACS Data Sharing,…
- Interoperability will be a key factor



Together with EEA

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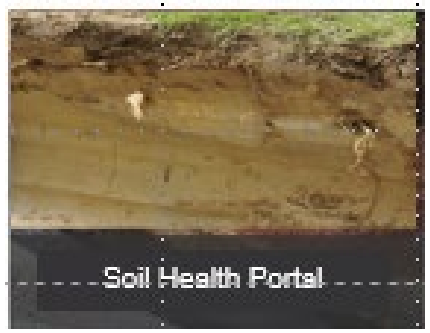
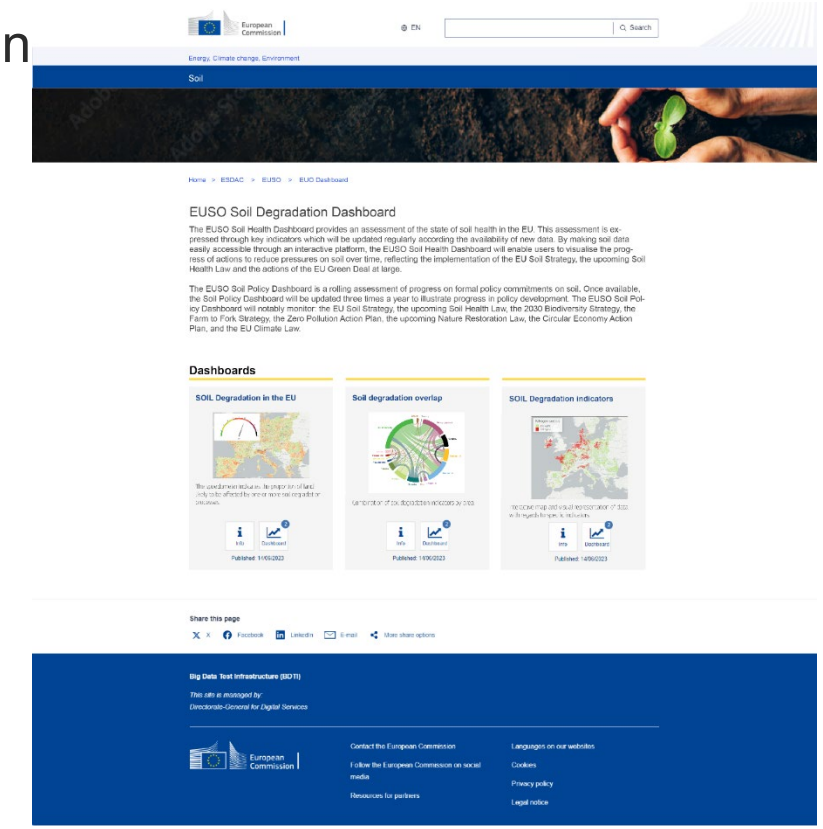
EU Soil Health Portal – Detail

- Level 2: Assessments – similar to the EUSO Soil Degradation Dashboard…
- But providing access to:
- monitoring data, maps, methodologies & transfer functions
- watch list
- optional indicators, remote sensing products, etc.





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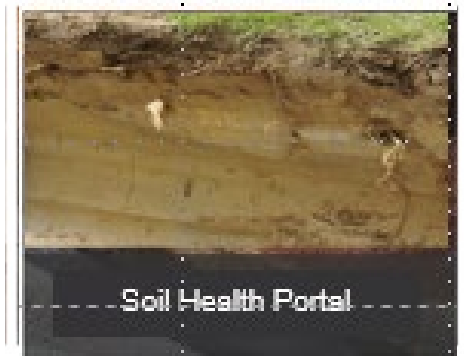
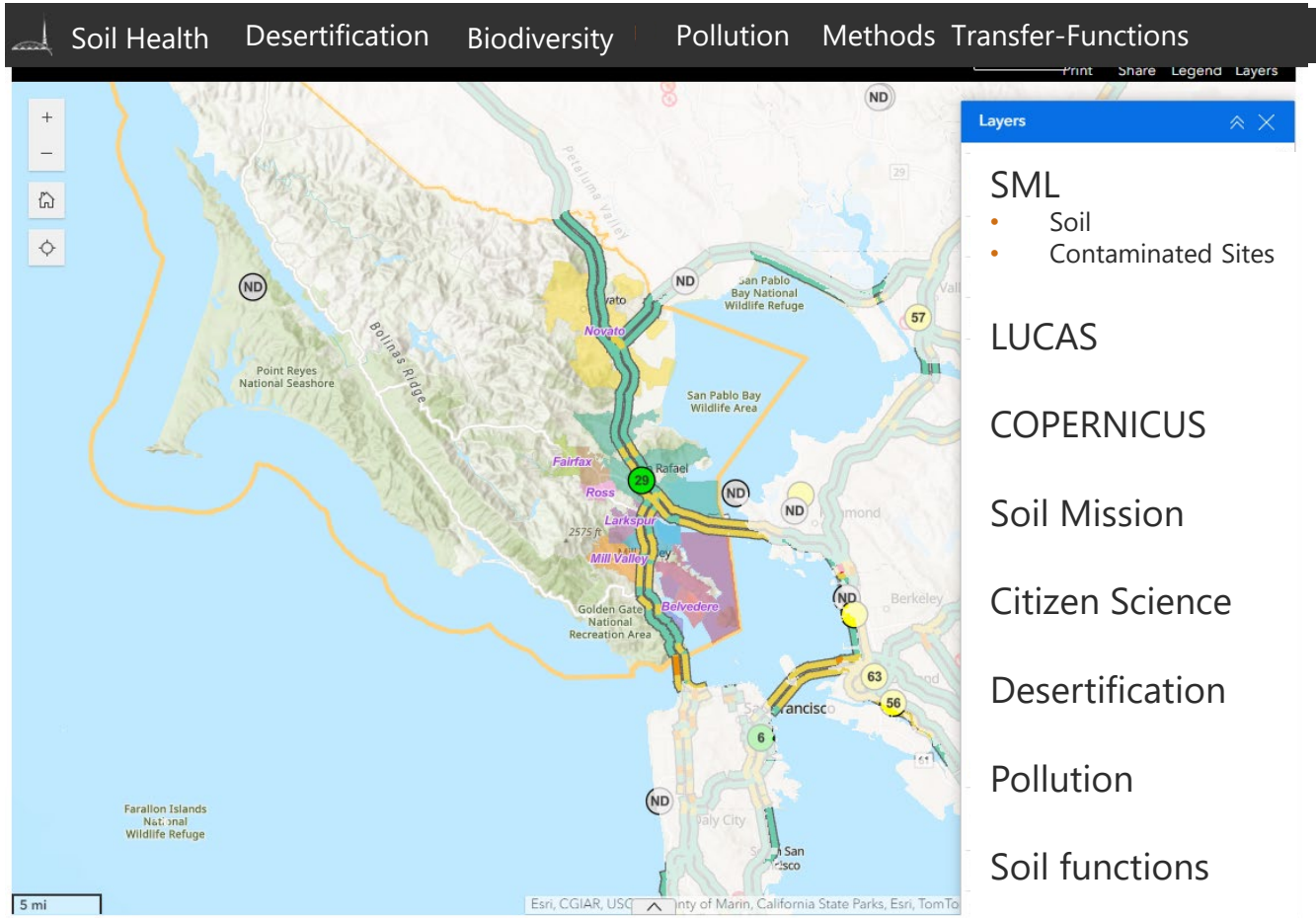
Single point of access for all soil data





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Soil Pollution Dashboard and Watchlist

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Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Full length article

Modeling arsenic in European topsoils with a coupled semiparametric (GAMLSS-RF) model for censored data

Spatial assessment of topsoil zinc concentrations in Europe

Copper distribution in European topsoils: An assessment based on LUCAS soil survey

A spatial assessment of mercury content in the Europe

Cadmium in topsoils of the European Union – topsoil database

Environmental Science and Pollution Research
https://doi.org/10.1007/s11356-024-31835-y

ADVANCES IN ENVIRONMENTAL BIOTECHNOLOGY AND ENGINEERING

Quantitative analysis of the compliance of EU Sewage Sludge Directive by using the heavy metal concentrations from LUCAS topsoil database

Integrated Environmental Assessment and Management — Volume 00, Number 00—pp. 1–15
Received: 9 October 2023 | Revised: 1 February 2024 | Accepted: 7 March 2024

Health & Ecological Risk Assessment

Evaluation of the ecological risk of pesticide residues from the European LUCAS Soil monitoring 2018 survey

Contaminated Sites

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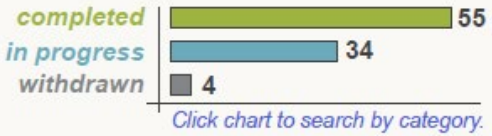
The EU soil strategy for 2030 sets out a framework and concrete measures to **protect and restore soils**, and ensure that soils are used sustainably. It sets a vision and objectives to achieve healthy soils by 2050, with concrete actions by 2030. The **Soil Strategy Policy Tracker** is designed to track the progress of these concrete measures and actions.

There are currently **93** *soil policy actions.*



Policy description and status:

+ 1. Soil for climate change mitigation and adaptation	4/5	1/5	0/5
+ 2. Soil and the circular economy	x/10	x/10	x/10
+ 3. Soil biodiversity for human, animal and plant health	x/6	x/6	x/6
+ 4. Soil for healthy water resources	x/2	x/2	x/2
+ 5. Making sustainable soil management the new normal	x/10	x/10	x/10

- Online End 2024
- Soil in other policies
- Adapted for implementation of SML

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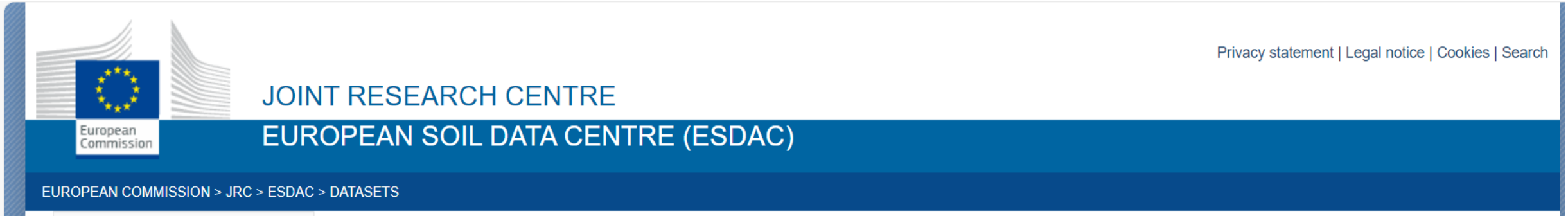
Upgrade European Soil Data Centre (ESDAC)



- European Soil Data Centre (ESDAC) contains large volume of information & 100+ soil datasets
- Most data are at European scale
- Links to regional, national or global datasets where possible
- Source of knowledge
- Vision
  - Knowledge > EUSO Data = ESDAC

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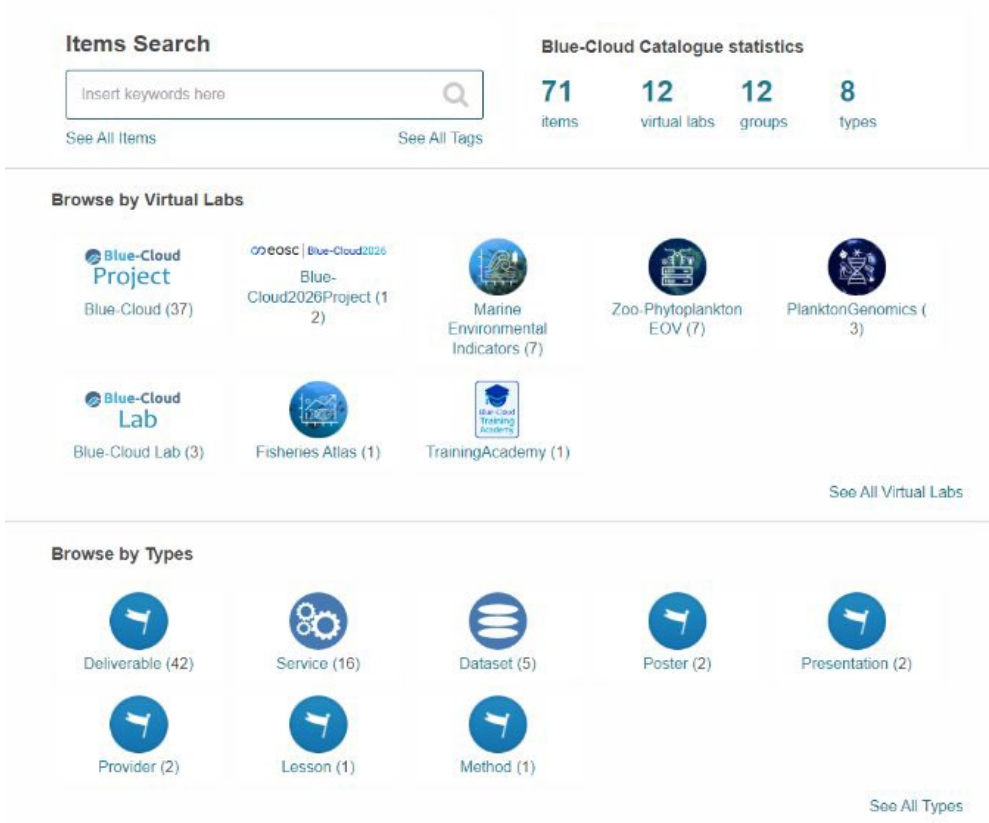
ESDAC 3.0

- Integration of new data flows: MS-SML/LUCAS 2.0
- Catalogue
- Soil Mission projects
  - Citizen Science
  - Living Labs
  - Lighthouse
  - Knowledge

EJP SOIL
European Joint Programme

SoilWise
KNOWLEDGE & DATA FLOWS



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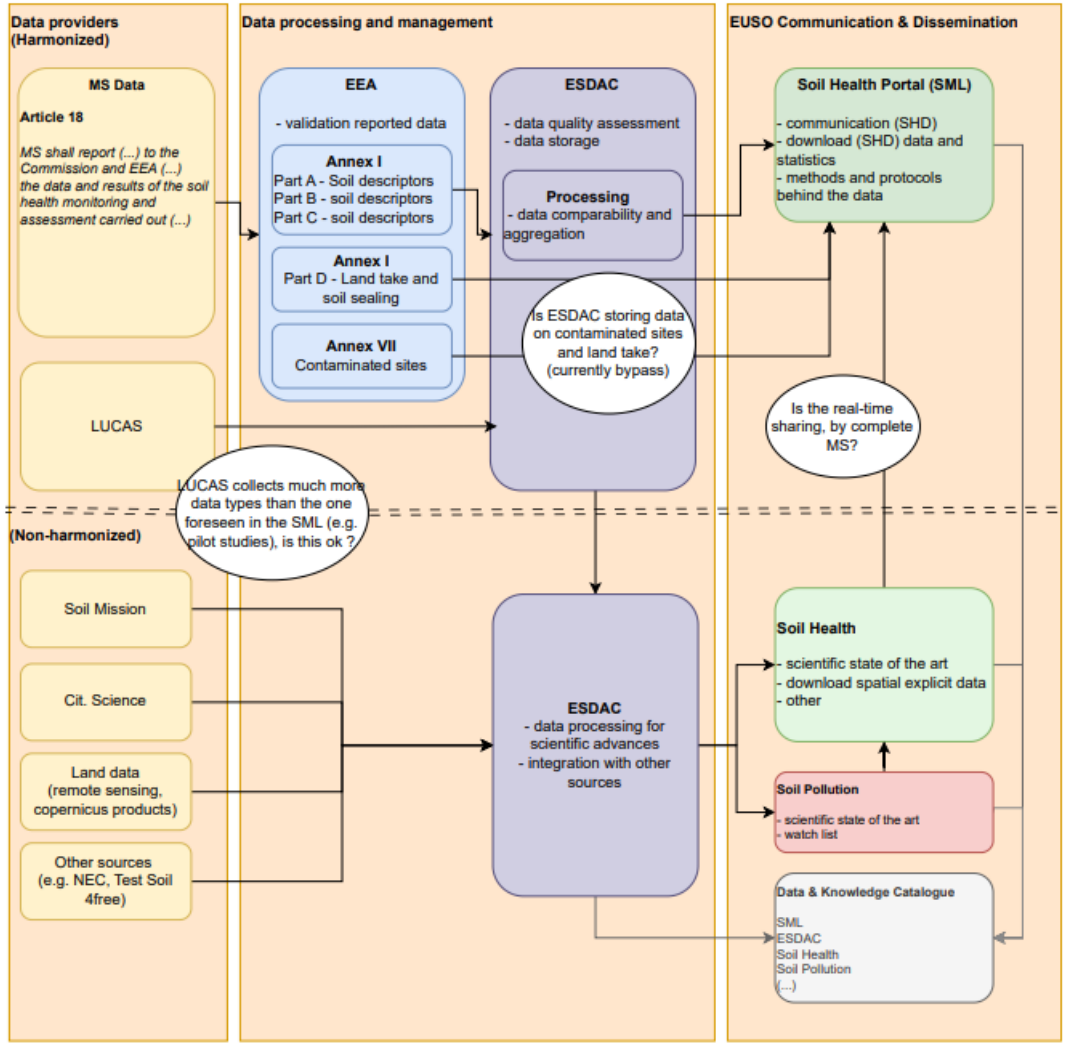
SML portal: data flows?



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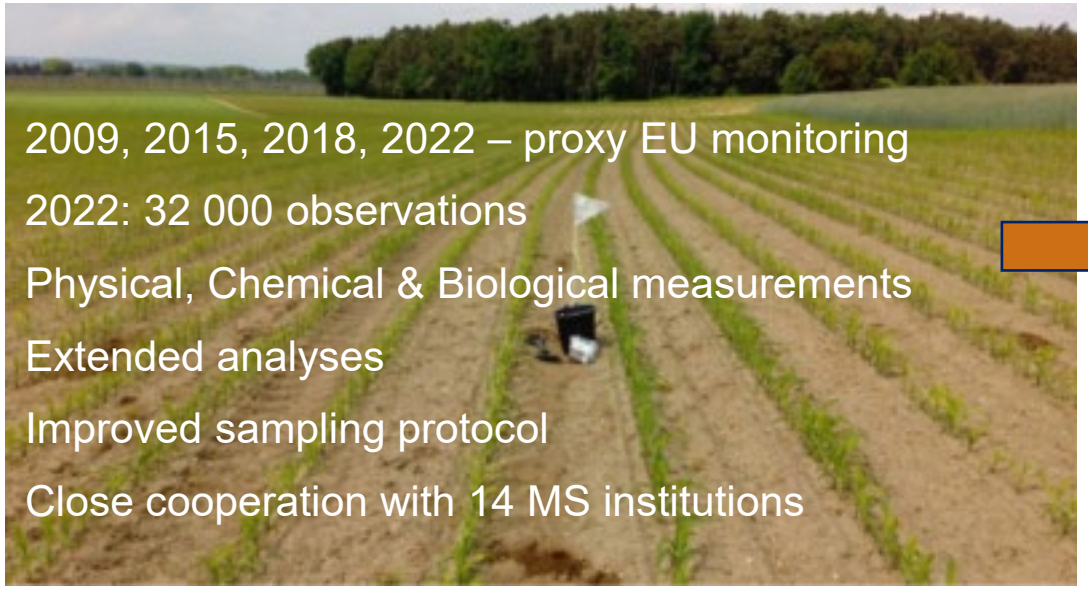
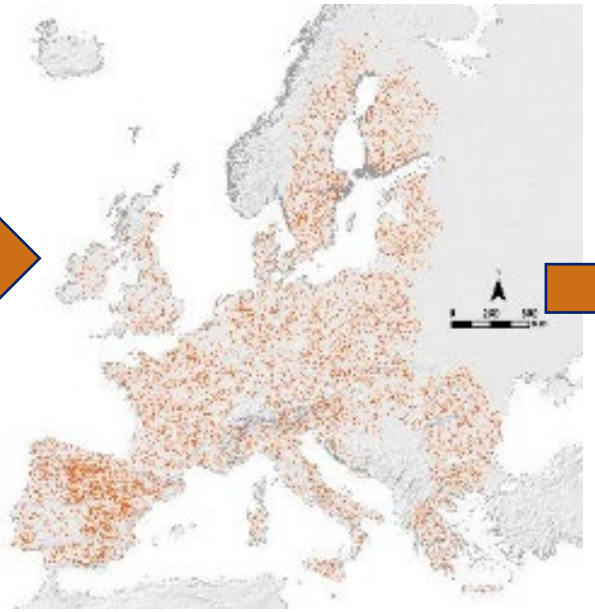
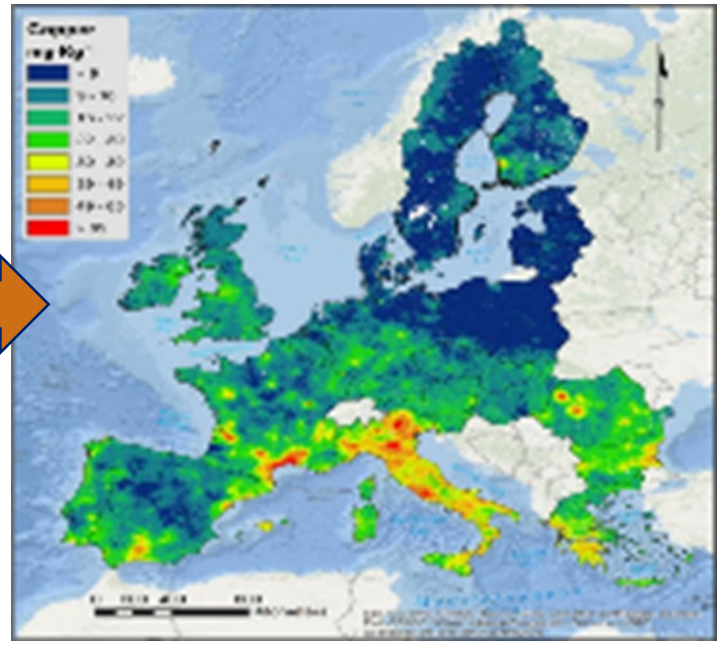
Upgrade LUCAS Soil Module: data to knowledge







- Adapt sampling design to ensure representative coverage
- reducing burden of MS)
- complementing MS
- Maintain link to past surveys (ensure trends are understood)
- New and modified soil descriptors – SML Annex 1
- Develop new sampling and measurement tools
- Guidelines for surveyors
- Review timelines for rapid results

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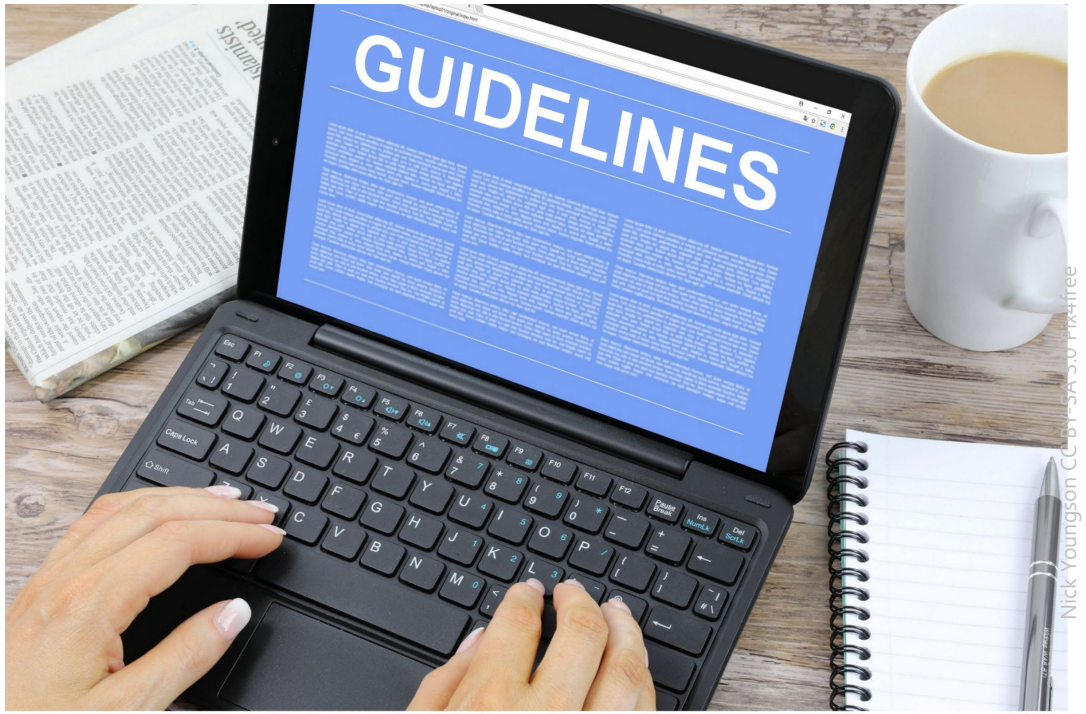
Guidelines for Member States

The Commission shall:

- organize regular exchange of information, experience and best practices between Member States.

- publish recommendations or guidelines of information, experience and best practices on relevant topics to support the implementation of the Soil Monitoring Law.



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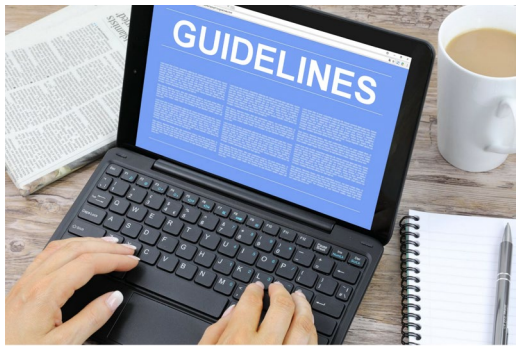
Guidelines

- Soil health monitoring framework and determine the sampling points.
- Sustainable target values and operational trigger values for the soil descriptors.
- List of organic contaminants to be monitored with the possibility to take into account the indicative watch list of soil contaminants.
- In-situ sampling of soil descriptors.
- Methodology for assessing the site-specific risks of contaminated sites.
- Identify the potentially contaminated sites and to lay down a list of potentially contaminating activities.
- Assess the areas not at risk of salinization.
- Determine values of the soil sealing and soil destruction indicators.
- Determine or estimate the values of the soil descriptors.
- Identify and assess the critical loss of ecosystem services due to loss of soil.



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Related activities

Nature Restoration Regulation

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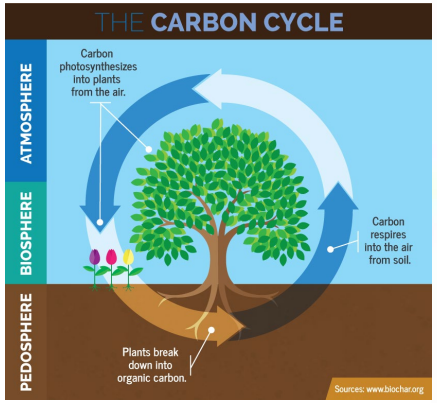

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2030 Global assessment report on biodiversity and ecosystem services

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Thank you!

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