Agroecology for the EU Soil Monitoring Law

Tips for an ambitious transposition and implementation at all levels

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Background

The **Directive (EU) 2025/2360** adopted in Nov 2025 on soil monitoring and resilience (Soil Monitoring Law) establishes the first EU-wide framework for monitoring soil health and resilience across the EU Member States (MS). Its overarching, aspirational goal is to have **all EU soils in a healthy condition by 2050**. To achieve this, it focuses on creating a harmonized monitoring system, providing support for **soil health restoration**[1], and systematically managing contaminated sites.

The adoption of **the Soil Monitoring Law (SML) marks a positive step for agroecology** in Europe, though opportunities for improvement remain - such as defining **intermediary policy milestones** until 2050, providing **independent soil assessment services** to farmers, and enhancing **interoperability between policy datasets** (e.g., CAP and SML). The benefits between SML and Agroecology could be reciprocal. On one hand, the scientific, advisory, and farming and food system communities could leverage public soil data to better understand and act on soil health. With more regular collection and higher resolution, SML indicators could enable **adaptive tools like OASIS or TAPE to confront their findings against harmonized, independent datasets**. On the other hand, agroecology can strengthen the SML itself. It offers a framework for trustworthy public data collection, risk assessments and setting values for indicators without established criteria. Furthermore, it is essential for operationalizing effective soil management practices on the ground.

As result of two **Biodiversity Working Groups** meetings held on 04th October (Malmo Agroecology Forum) and 10th December 2025 (online) with members of Agroecology Europe and invited soil scientists, practitioners and experts, this factsheet outlines **tips for an ambitious transposition** of the SML into national legislations. The factsheet sheds light also on the emerging role of **biodistricts**, as one of the applied examples among the rich and dynamic science, movement and practice that Agroecology can offer for setting up effective governance arrangements and transformational actions at scale.

The SML transposition and implementation in a nutshell

Member States must comply with several core obligations, organized under the directive's main chapters. The table below outlines these key actions and their deadlines.

Table 1 Key actions and deadlines for the SML transposition and implementation

Directive Provisions	Key actions required by the Member States	Deadlines
Governance & Planning	1. **Establish Soil Districts & Units**: Divide their entire territory into administrative "soil districts" and homogeneous "soil units" for monitoring (Art. 4). 2. **Designate Competent Authorities**: Appoint authorities responsible for implementing the directive at an appropriate level (Art. 5).	• By **17 Dec 2028** (Transposition)

[1] To be more consistent with the scope of the SML and being critical of the vague definition and misuse of the term "regeneration" for corporate and greenwashing purposes, this factsheet will refer to "soil health restoration" for any intentional activity aimed at changing the condition of soil from degraded to healthy (Art. 3 Definitions).

Directive Provisions	Key actions required by the Member States	Deadlines
Monitoring & Assessment	3. **Set Up a Monitoring Framework**: Establish a system for regular soil health monitoring based on defined descriptors and indicators (Art. 6). 4. **Conduct Soil Measurements**: Perform first in-situ soil sampling and measurements across the established network of sampling points (Art. 9). 5. **Perform First Soil Health Assessment**: Evaluate the collected data against the criteria for healthy soil condition (Art. 10).	• First measurements by **17 Dec 2030** • First assessment by **17 Dec 2031**
Contaminated Sites Management	6. **Establish a Risk-Based Approach**: Set up a system for identifying, investigating, and managing potentially contaminated and contaminated sites (Art. 13). 7. **Create a Public Register**: Set up and maintain a national, publicly accessible online register of these sites (Art. 17).	• Approach by **17 Dec 2029** • Register by **17 Dec 2029**
Reporting & Public Info	8. **Report to Commission**: Submit data on monitoring results, assessments, and progress on contaminated sites every six years (Art. 19). 9. **Inform the Public**: Make monitoring results and the contaminated sites register publicly available (Art. 20).	First report by June **17 Jun 2032**

Descriptors and indicators for non-binding targets and operational triggers

To monitor and improve soil health, the directive sets up descriptors (i.e. biological, chemical or physical parameter) and indicators classified into four groups (see Table 2). Each indicator shall be linked and monitored by the Member States vis-à-vis **non-binding sustainable target values** (aspirational) and **trigger values** (operational). Trigger values are for setting MS actions in motion to protect or achieve soil health restoration. Trigger values are not all **fixed at EU level**. The MS themselves can fix some trigger values based on their own local conditions and practices, soil use and current policies.

Table 2 Overview of SML indicators

Aspect of Soil Degradation	Indicators	Fixed EU Trigger Value?	Defined by Member State?
Part A: Descriptors with EU-level criteria			
Salinisation	Electrical conductivity	**YES**	No
Loss of Soil Organic Carbon	SOC concentration	**YES**	No
Subsoil Compaction	Bulk density in subsoil	**YES**	No
Part B: Descriptors with Member State-level criteria			

Aspect of Soil Degradation	Indicators	Fixed EU Trigger Value?	Defined by Member State?
Excess Nutrients	Extractable phosphorus	No	**YES** (must set a "maximum value")
Soil Erosion	Soil erosion rate	No	**YES** (MS must set a "maximum value")
Soil Contamination	Concentration of heavy metals & selected organic contaminants	No	**YES** (based on risk assessment)
Reduction of Soil Water Retention	Soil water holding capacity, etc.	No	**YES** (must set "minimal thresholds")
Loss of SOC	SOC stocks (tC ha-1)	No	**YES** (must set "minimum value")
Part C: Descriptors *without* established criteria (monitoring only)			
Excess nutrient content in soil	Total nitrogen content in soil, SOC to nitrogen ratio	No	No
Acidification, Topsoil Compaction, Soil Biodiversity, etc.	pH, biodiversity (eDNA), specific contaminants (PFAS, pesticides)	No	No
Part D: Soil sealing & removal indicators			
Soil sealing and soil removal	Total sealed soil, net sealing, settlement area change	No	No

Agroecology in the EU Soil Monitoring Law

Agroecology is distinguished for its extensive body of science and practices in the field of soil health (Wezel et al., 2014), which is one of the key principles among others. Agroecology is not merely an agricultural practice; it is a **transformative science, movement and set of principles** that can be the **central engine** for the ambitious implementation of SML. Based on the limitations of the SML discussed in our meetings, Agroecology can support the SML in many ways. Here are some examples:

Agroecology offers context and precision to monitoring and risk assessments

Agroecology provides the essential contextual framework to interpret this data meaningfully. More concretely:

- **Perspective beyond point-in-time data**. An agroecological assessment doesn't just measure Soil Organic Carbon (SOC) levels, especially when this measurement is done by financial logics for the sake of selling carbon credits even when verification methods are scientifically weak and raises other socio-economic concerns. Agroecology can measure but also evaluate the practices that drive those levels (e.g.,

cover cropping, agroforestry, organic amendments). This links monitoring results directly to actionable management causes.

- **Defining "healthy" functions without an established criterion**. For indicators like soil biodiversity (Annex I, Part C), agroecology provides the functional benchmarks. It helps answer: Is the microbial and faunal diversity supporting nutrient cycling, disease suppression, and soil structure? This turns raw DNA data into an assessment of living system functionality.
- **Holistic risk assessment**. When setting priorities for investigating potentially contaminated sites (Article 14), an agroecological lens would prioritize sites that threaten agroecosystem functionality and the food chain, ensuring risk assessment protects not just human health but also agricultural resilience.

Agroecology helps setting ambitious national trigger values and districts

Member States must set **Operational Trigger Values** (Article 7) for key descriptors like erosion rate, nutrient excess, and water retention.

- **Science-based, ambitious targets**. Agroecology provides the scientific basis for setting **ambitious, yet achievable, trigger values**. For instance, instead of setting a trigger value for erosion or carbon just to avoid "unacceptable damage," a state informed by agroecology could set a value aligned with achieving **positive soil formation rates**.
- **Informing soil district design (Article 4)**. Agroecological principles encourage designing **soil districts and units** that reflect not just soil type and climate, but also **predominant farming systems and socio-ecological contexts**. This ensures that monitoring and subsequent support are tailored to the real-world agricultural landscape, enhancing relevance and uptake.

Agroecology's core contribution is in soil health restoration and resilience

This is where agroecology shifts from a supporting tool to the **primary implementation strategy**. SML mandates support for soil health (Article 11) but does not prescribe specific methods or soil management practices. Agroecology can offer science- and local knowledge based agronomic practices for soil health restoration (Wezel et al., 2014)

- **Providing the "Toolbox of Practices".** Agroecology directly offers the practices to improve every descriptor in Annex I to the Directive:
  - *Loss of SOC & compaction* can be addressed by cover cropping, reduced tillage, compost application, and agroforestry.
  - *Soil biodiversity loss* can be recovered by crop diversification, extensive livestock, organic inputs, and permanent soil cover.
  - *Water retention & erosion* can be enhanced by increased SOM, pesticide free buffer strips, fallow land, and hedgerows.
  - Excess nutrients & contamination risks can be mitigated by biological nitrogen fixation, agroecological biocontrol, extensive livestock, integrated pest management, and natural nutrient cycling, reducing reliance on synthetic inputs.
- **Enabling the "Support" via AKIS - Agroecological Knowledge and Innovation System (Article 11).** Member States must provide "science-based advice" and "information on suitable measures." **Agroecology is the foundational science for this advice.** National and regional advisory services such as Terrae in Wallonia (Belgium) can build their capacity around agroecological principles to guide farmers effectively.

- **Systemic resilience.** Unlike single-issue solutions, agroecology builds **synergistic resilience**. A farm practicing agroecology simultaneously improves carbon sequestration, water regulation, and biodiversity, making it more resilient to the droughts and extreme weather events the SML aims to mitigate.

Agroecology bridges SML with other EU policies by creating synergies

The SML requires consistency with other EU policies and Member State's plans (e.g., CAP Strategic Plans, Nature Restoration Plans, Water Framework Directive programs).

- **The Integrative Framework.** Agroecology acts as a **synergistic bridge** between these policies. An agroecological transition on a farm contributes simultaneously to meet ambitious statutory management rules (SMR) and good agri-environmental conditions (GAECs) for CAP basic income support. Furthermore, agroecology can help farmers and public authorities to meet SML goals, CAP eco-schemes, nature restoration targets, and water quality objectives, maximizing policy coherence and funding efficiency.

Biodistricts for soil health linked with territorial land governance

The link between SML and biodistricts represents a powerful territorial innovation that could make the SML's implementation more effective, participatory, and agroecologically coherent.

Biodistricts are defined in different ways across the EU. Italy adopted a legal definition in Article 13 of Law No. 228/2001 and Article 13 of Law No. 23/2022. Other countries have gained experience with similar territorial land governance initiatives, such as the *Projet Alimentaire Territorial* (PAT - Territorial Food Project) in France, *Bio-regiões* in Portugal, *Bio-Regions* in Austria and Germany, and similar biodistrict initiatives are emerging also from Greece and Spain. The following tables outline some synergies and potential links between SML and biodistricts.

Feature	EU Soil Monitoring Law (SML)	Biodistricts (e.g., Italian Model)	Synergy potential
Primary goal	• Achieve healthy soils by 2050 through monitoring and support.	• Transition of territories to agroecological and organic principles for sustainability.	• Shared goal of systemic agroecological transition.
Governance Scale	• Based on Soil Districts (administrative) and Soil Units (biophysical).	• Based on bio-geographical and socio-economic coherence, not necessarily administrative borders.	• Biodistricts can act as the ideal "living and bridging governance layer" for implementing the SML at all scales, translating biophysical data into coordinated action.
Key Mechanism	• Harmonized monitoring framework with Member State obligations.	• Mixing bottom-up and harmonized initiatives via participatory governance involving	• Biodistricts can provide the local social capital, trust, and collective agency needed for the SML's support

		farmers, citizens, businesses, municipalities.	measures to be adopted at scale.
Data & Knowledge	• Relies on standardized scientific sampling and remote sensing.	• Integrates local, traditional, and practical knowledge with scientific data.	• Biodistricts can enrich SML data with contextual knowledge, helping interpret monitoring results and define locally appropriate trigger values and solutions.

Based on this preliminary analysis, biodistricts are not just aligned with the SML. They offer the missing "governance and implementation layer" that can bridge the gap between the SML harmonized monitoring framework and the need for bottom-up, socially embedded, landscape-scale action. Integrating them transforms the SML from a technical compliance exercise into a catalyst for vibrant, participatory, and ecologically effective territorial soil stewardship.

>>> For more information on soil health and biodistricts, visit the project: HuMuS-project.eu.

Recommendations for ambitious SML transposition and implementation

The European Commission and Member State aiming for an ambitious transposition of the SML could:

1. **Develop intermediate targets and milestones compared to the long-term, aspirational goal to achieve healthy soils by 2050**
2. **Embed agroecology in official guidance**. Use agroecological principles as the core science for the national legislations, as well as in documents and scientific tools the Commission will develop (Article 24).
3. **Link soil health with equitable land governance frameworks.** Ensure that public soil monitoring efforts deliver services for farmers and are integrated into equitable land governance frameworks promoting systemic transformations, e.g. biodistricts.
4. **Design agroecology-based soil health management and support schemes**. Starting from enhanced SMR and conditionalities, use CAP Strategic Plans and other funds to create robust payments for transition to and maintenance of multiple agroecological practices, including organic farming.
5. **Build agroecological competence in AKIS and authorities**. Train competent authority staff and farm advisors in agroecological monitoring, assessment, and farm system design.
6. **Use living labs and lighthouse farms.** Leverage the EU Mission "A Soil Deal for Europe" to establish agroecological living labs as real-world test and demonstration sites for SML implementation.

In essence, **treating agroecology as the operational framework for the Soil Monitoring Law transforms this directive from a monitoring compliance exercise into a proactive, transformative soil and food system renaissance.**

References

Wezel, A., Casagrande, M., Celette, F., Vian, J. F., Ferrer, A., & Peigné, J. (2014). Agroecological practices for sustainable agriculture. A review. *Agronomy for Sustainable Development*, *34*(1), 1–20. https://doi.org/10.1007/S13593-013-0180-7