

### THE CHALLENGE OF SOIL LITERACY IN EUROPE

#### CONTEXT

Soil underpins carbon sequestration, water regulation, food production and biodiversity. Its degradation carries substantial long-term economic and social costs. The new EU Soil Monitoring Law, adopted in 2025, represents a milestone in a broader policy architecture spanning environmental, agricultural, land-use and climate domains. Its implementation, however, requires coordinated action that goes beyond regulatory compliance — including a societal baseline of soil literacy and stewardship.

#### APPROACH AND METHODOLOGY

LOESS adopted a holistic, multidisciplinary approach combining two research streams: (1) a landscape review of soil health education across five levels (primary, secondary, vocational, higher education, public engagement) in 15 European countries, drawing on desk research, focus groups and interviews; and (2) a large-scale online survey of European teachers assessing their soil knowledge, pedagogical practices, and professional development needs.

#### LOESS: MAIN ACTIVITIES

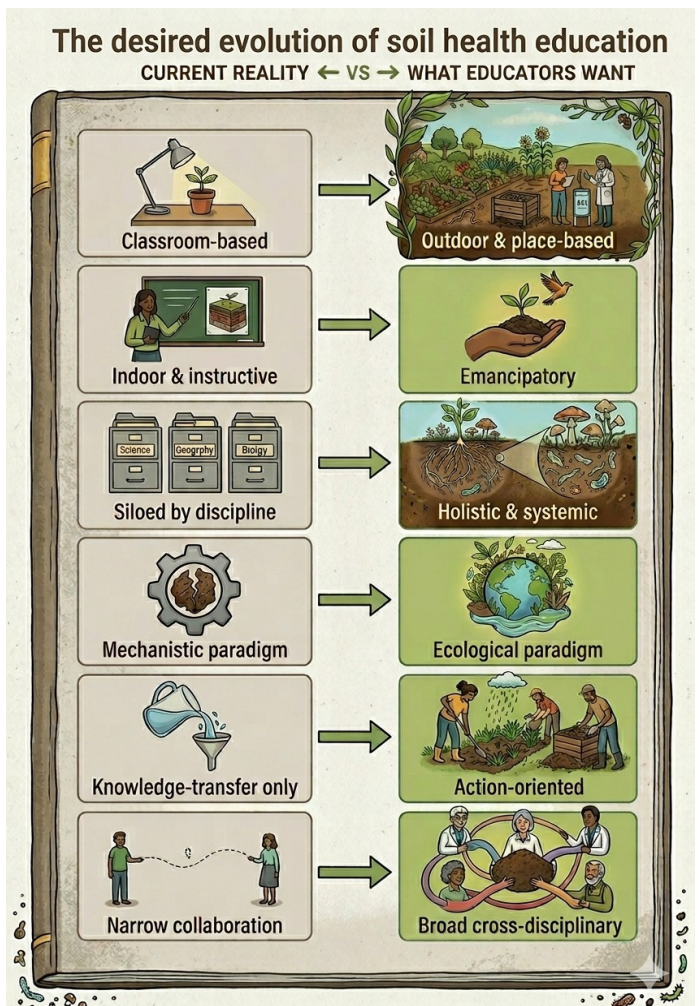
- **MAPPING OF EXISTING SOIL-RELATED MATERIALS AND EDUCATION PROGRAMMES AND IDENTIFICATION OF EDUCATIONAL NEEDS.**
- **DEVELOPMENT OF A TOOLKIT FOR SOIL EDUCATION AND TRAINING MATERIALS AND RESOURCES** based on existing good examples, as well as new resources developed by LOESS.
- **ENGAGEMENT AND CONNECTION OF STAKEHOLDERS IN COMMUNITIES OF PRACTICE** in 15 European countries.
- **The CO-CREATION AND PILOTING OF NEW COURSES, TEACHING MODULES, EDUCATIONAL MATERIALS AND LEARNING TOOLS** for soil education for use in primary and secondary schools, universities and vocational colleges.
- **HANDS-ON ENGAGEMENT ACTIVITIES RELATED TO SOIL EDUCATION** through community projects involving students and local communities; the development of an augmented reality app; and crowdmapping to identify, visualise and address local soil problems.
- **CAMPAIGNS AND DISSEMINATION ACTIVITIES** aimed at schools, universities, decision makers and members of the public.
- **ENGAGEMENT WITH POLICY MAKERS AND LOBBYING** to communicate the advantages of integrating soil-related activities into formal education.

Both streams were co-designed and validated with multi-stakeholder Communities of Practice — networks integrating educators, researchers, farmers, public officials and civil society representatives. This co-research approach, grounded in epistemic pluralism and transdisciplinary collaboration, proved critical both to the quality of the evidence and to the ownership of results among participants.

#### KEY FINDINGS

LOESS identifies a structural gap between the ambitions of European soil policies and the current capacity of education systems to support their implementation. Education continues to be treated as a sectoral priority rather than a cross-cutting enabler of sustainability transitions. This limits its contribution to the EU Green Deal, the Soil Strategy 2030, and the Soil Monitoring Law.

The table in the following page maps each area of concern to its identified need. Detailed recommendations follow.



AREA	KEY FINDING / IDENTIFIED NEED
<b>1. Soil health &amp; education</b>	Soil content in curricula is confined to basic composition and agricultural functions. Ecosystem services, soil health assessment and policy relevance remain marginal. Education systems are not yet equipped to support implementation of the Soil Monitoring Law or the EU Soil Strategy. → <b>Need: Systematic cross-curricular integration of soil health.</b>
<b>2. Pedagogical approaches</b>	Teaching remains predominantly classroom-based and content-driven. Experiential, outdoor and place-based methods are widely recognised as effective but not yet mainstreamed. Institutional and administrative barriers limit adoption. → <b>Need: Promote place-based and experiential learning methodologies.</b>
<b>3. Soil as a systemic issue</b>	Soil is taught through fragmented perspectives with limited connection to climate, biodiversity, food systems and territorial development. Learners lack a systems understanding. → <b>Need: Strengthen coordination across education, environment and agricultural policies.</b>
<b>4. Cross-sectoral collaboration</b>	Collaboration between education, farming, research and civil society remains limited. LOESS demonstrates that Communities of Practice and multi-actor approaches significantly enhance relevance and effectiveness. → <b>Need: Integrate scientific and local knowledge; support stakeholder co-creation.</b>
<b>5. Teacher training</b>	Many educators lack training, resources and policy awareness. Soil education depends on individual initiative rather than systemic support. → <b>Need: Structured, institutionalised teacher training combining content knowledge and innovative pedagogies.</b>
<b>6. Educational resources</b>	Resources are growing but accessibility and long-term institutional uptake remain uneven. Project-based outputs risk marginalisation without integration into stable systems. → <b>Need: Accessible, adaptable resources with stable dissemination infrastructures.</b>
<b>7. Public awareness</b>	Broader societal engagement is needed alongside formal education. Communication must be grounded in scientific integrity and critical sustainability literacy. → <b>Need: Strengthen public understanding of soil as ecological, social and food-system issue.</b>

## POLICY RECOMMENDATIONS

The following recommendations are addressed to three levels of governance. In addressing the European Commission, the term 'support' is used deliberately — encompassing platforms, networking, knowledge exchange and financial instruments — to reflect the full range of EU action beyond funding alone. In all areas, recommendations are designed to be implemented through existing stakeholder participation mechanisms: co-creation with educators, Communities of Practice, civil society and local communities should be built into the design and governance of all relevant frameworks and programmes.

### 1. SOIL HEALTH AND EDUCATION

#### Identified Need — Systematic integration of soil health into educational curricula

Soil health education needs to be structurally embedded across school and higher education systems, through cross-curricular approaches linking soil to climate change, biodiversity, food systems and sustainability transitions.

ADDRESSED TO	RECOMMENDATION
<b>European Commission</b>	Position soil literacy as a strategic enabler of the Green Deal by embedding it within EU education policy frameworks and linking it to dedicated support and programme priorities across education, environment and research.
<b>European agencies and bodies</b>	Develop reference frameworks and curriculum guidance, and support their uptake through pilot actions, peer learning and monitoring mechanisms across Member States.
<b>National Ministries (Agriculture, Environment, Education)</b>	Embed soil health within existing curricula through interdisciplinary approaches, ensuring integration without increasing curriculum overload and securing long-term structural inclusion.

## 2. PEDAGOGICAL APPROACHES AND LEARNING ENVIRONMENTS

### Identified Need – Promoting place-based and experiential learning methodologies

There is a need to move towards experiential, outdoor and community-based learning models. LOESS evidence shows that hands-on activities significantly improve engagement, understanding and long-term learning outcomes.

ADDRESSED TO	RECOMMENDATION
<b>European Commission</b>	Prioritise experiential and outdoor learning within EU programmes by explicitly supporting place-based, community-engaged and citizen science approaches as core components of sustainability education.
<b>European agencies and bodies</b>	Support the development and dissemination of scalable models, and facilitate their promotion through European platforms, teacher networks and communities of practice.
<b>National Ministries (Agriculture, Environment, Education)</b>	Remove administrative and organisational barriers, and introduce regulatory and infrastructural measures that enable schools to systematically implement outdoor, experiential and community-based learning.

## 3. SOIL HEALTH AS A SYSTEMIC ISSUE

### Identified Need – Strengthening coordination between education, environmental and agricultural policies

Soil education must be aligned with environmental, agricultural and climate policies, recognising its role as a cross-cutting element of sustainability transitions.

ADDRESSED TO	RECOMMENDATION
<b>European Commission</b>	Strengthen policy coherence by explicitly integrating soil education across environmental, agricultural and climate frameworks and aligning it with implementation instruments. Cooperation across DGs responsible for education, environment and agriculture is essential.
<b>European agencies and bodies</b>	Develop tools and knowledge frameworks, and translate systems thinking into operational guidance for curricula, teacher training and learning environments.
<b>National Ministries (Agriculture, Environment, Education)</b>	Align soil education with national strategies and ensure coordination mechanisms between education, environment and agriculture authorities.

## 4. CROSS-SECTORAL COLLABORATION AND TERRITORIAL ECOSYSTEMS

### Identified Need – Integrating scientific knowledge and local knowledge through stakeholder co-creation

Effective soil education requires bridging scientific expertise with local and territorial knowledge. LOESS demonstrates that participatory co-creation with diverse stakeholders generates better outcomes and stronger ownership.

ADDRESSED TO	RECOMMENDATION
<b>European Commission</b>	Support multi-actor and territorial approaches by enabling structured partnerships that connect education, research, farming and civil society actors – and ensure that stakeholder participation is built into the design of relevant funding streams and governance mechanisms.
<b>European agencies and bodies</b>	Facilitate platforms for knowledge exchange and institutionalise Communities of Practice as long-term governance and learning structures.
<b>National Ministries (Agriculture, Environment, Education)</b>	Promote partnerships between schools, universities, farmers and local communities; support Community Engaged Research and Learning (CERL) as a structural component of education systems; and strengthen the role of universities in connecting research, education and territorial engagement.



## 5. TEACHERS, EDUCATORS AND IMPLEMENTATION CAPACITY

### Identified Need – Strengthening teacher training and capacity building

There is a need for structured, institutionalised teacher training equipping educators with both content knowledge and innovative pedagogical approaches – moving away from dependence on individual initiative.

ADDRESSED TO	RECOMMENDATION
<b>European Commission</b>	Support large-scale teacher training initiatives by integrating soil literacy into EU-level professional development frameworks and supporting continuous training programmes, including mobility and peer learning.
<b>European agencies and bodies</b>	Develop accessible training modules and facilitate exchanges, mobility and peer learning among educators at European level.
<b>National Ministries (Agriculture, Environment, Education)</b>	Establish continuous professional development systems and embed soil education within mandatory teacher training pathways rather than relying on voluntary engagement.

## 6. EDUCATIONAL MATERIALS, ACCESSIBILITY AND LONG-TERM UPTAKE

### Identified Need – Improving accessibility and use of educational materials

There is a need for accessible, adaptable and reusable educational resources supported by stable dissemination infrastructures. LOESS outputs – including the Glossary and the European Atlas of Soil Education and Training – represent key opportunities in this regard.

Addressed to	Recommendation
<b>European Commission</b>	Support European platforms and infrastructures, and ensure long-term governance of repositories for validated soil education resources.
<b>European agencies and bodies</b>	Ensure interoperability and long-term accessibility of educational materials and promote active use through integration with teacher training and school networks.
<b>National Ministries (Agriculture, Environment, Education)</b>	Integrate validated resources into national education systems, teacher training and curriculum support tools, ensuring their effective use beyond project lifecycles.

## 7. PUBLIC AWARENESS, POLICY CREDIBILITY AND SUSTAINABILITY

### Identified Need – Increasing public awareness of the role of soil

Improving soil literacy requires broader societal engagement alongside formal education. Public communication must be grounded in scientific integrity and support a critical understanding of sustainability – guarding against greenwashing.

Addressed to	Recommendation
<b>European Commission</b>	Promote evidence-based soil literacy and support educational approaches that enable critical understanding of sustainability claims, reducing the risk of greenwashing.
<b>European agencies and bodies</b>	Support public engagement and communication initiatives that frame soil as a societal and ecological issue with direct relevance to food, climate and health.
<b>National Ministries (Agriculture, Environment, Education)</b>	Promote public awareness campaigns and support the long-term institutionalisation of soil literacy through education systems, partnerships and territorial initiatives.

