Common Agricultural Policy: Why it matters for soil health

Agriculture uses roughly half of the land in Europe, and the health of agricultural soils is heavily affected by the farming practices applied. CAP is an EU-wide framework thus enabling it to control farming practices in all member states in a uniform manner. CAP is also amongst the largest EU policies in terms of spending.
For this reason, CAP has both financial and legal power to affect soil health.

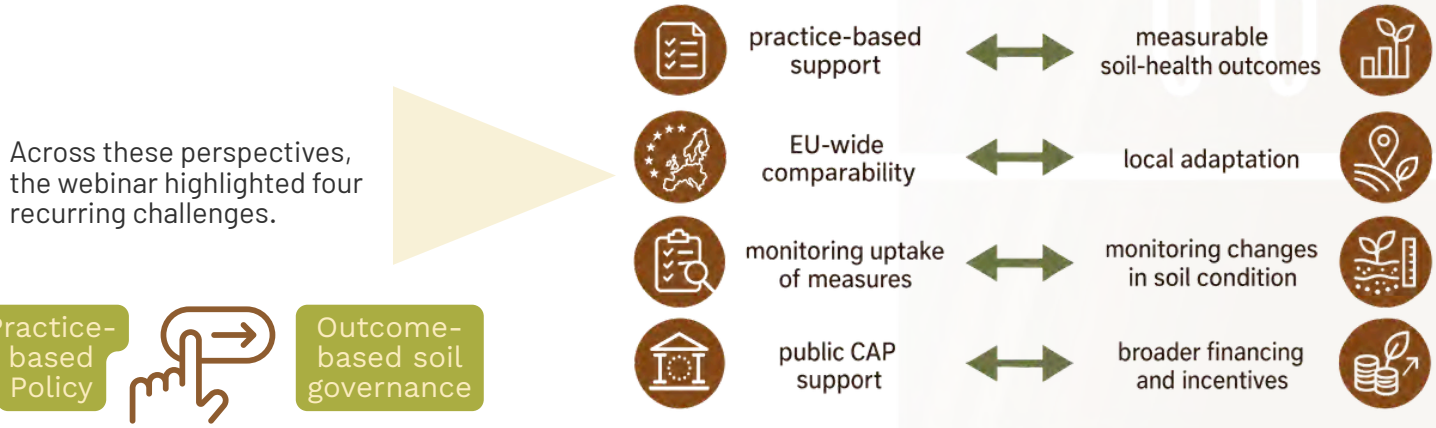


Webinar at a glance: takeaways and recommendations

The second AI4SoilHealth Cross-Policy Soil Dialogue examined how the Common Agricultural Policy (CAP) can contribute more effectively to improving and protecting soil health across Europe. As agriculture covers roughly half of the EU land area and CAP is one of the Union's largest policy and spending frameworks, it has substantial potential to influence soil management through requirements, incentives, advisory support and monitoring.

The dialogue brought together complementary perspectives from **Emmanuel Petel (DG AGRI, European Commission)** on the current CAP environmental framework and post-2027 direction, **Simon Krämer (European Alliance for Regenerative Agriculture - EARA)** on performance-based policy and regenerative agriculture, **Juho Valtiala (Natural Resources Institute Finland - Luke)** on the alignment between CAP soil-health spending and monitored soil pressures, and **Tom Hengl** and **Aditia Kushwaha (OpenGeoHub)** on the Pan-European Soil Health Viewer and the role of harmonised data and AI-supported tools in monitoring and decision-making.

Across these perspectives, the webinar highlighted four recurring challenges.



The cross-cutting theme was a transition from practice-based policy towards outcome-based soil governance, supported by measurable indicators, digital monitoring systems and performance-oriented incentives.

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Key Takeaways

CAP is highly important for overall soil health in Europe. Agricultural soils cover around half of the European soils, and most of the surface is eligible for CAP payments, while roughly one fifth of CAP expenditure is linked directly or indirectly to soil health.

In the current CAP, practices under the result indicator "improving and protecting soils" cover above half of the utilized agricultural area mostly due to eco schemes. The future CAP aims to refine the current conditionality into farm stewardship and split environment and climate actions into management commitments and transition actions. Soil health is an explicit priority of the proposal, which keeps the existing CAP toolbox but aims at simpler, more flexible and more performance-oriented delivery.

Implementation is uneven and not clearly targeted. All CAP Strategic Plans include soil-health measures, but with different combinations of practices, and spending is not clearly aligned with soil-health pressures across Member States.

Policy is moving from practices to outcomes, but monitoring still mostly tracks uptake, which cannot show whether soil conditions improve. Indicators such as soil organic carbon, compaction and erosion are expected to steer the future CAP, and remote-sensing indicators (e.g. GPP, soil cover) and multidimensional tools such as EARA's Regenerating Full Productivity Index make results-based payments increasingly feasible

Harmonised data and AI-supported tools can make outcome monitoring feasible from field to EU level and lower technical barriers for users. The Soil Health Viewer, built on the open Soil Health Data Cube, already exists, but its outputs need continued validation, benchmarking and user testing.

The discussion showed that the CAP already provides a substantial policy and financial framework for soil health, but that future effectiveness will depend increasingly on stronger links between funding, farmer uptake, advisory support, monitoring and measured soil outcomes.

Reliable and accessible data, common but adaptable indicators, and digital tools capable of operating across farm, regional and EU scales can help make more results-based approaches feasible.

Policy Recommendations

Results-based policy should be designed and upscaled, based on measurable soil-health indicators. EARA's Regenerating Full Productivity Index provides an option to start with.

Better align CAP resources with monitored soil-health needs: monitored soil health could be considered as one of the criteria used to define Member States' budget shares.

Data and AI should be broadly utilized in farm planning and performance monitoring. The Soil Health Data Cube (open data via EcoDataCube) and the Soil Health Viewer, with AI functionality, already exist and need further funding for development and upscaling, together with continued validation, benchmarking and user testing.

Include access to relevant knowledge and advisory to interventions. Success in maintaining and improving soil health requires advisory services and adaptation to local conditions.

Funding of good environmental management should not rely solely on CAP and public funding. Private funding is needed and could be linked to environmental outcomes, aligned with the policy design.

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Opening & Framing

ISINNOVA

ISINNOVA research innovation sustainability

"How can CAP support improve and protect soil health while remaining workable for farmers and adaptable to different farming contexts across Europe?"

The second AI4SoilHealth Cross-Policy Soil Dialogue focused on the **relationship between soil health and the Common Agricultural Policy**. The discussion explored how CAP requirements, incentives, advisory systems and monitoring can move from supporting predefined practices towards rewarding measurable environmental performance.

A central science-for-policy question guided the dialogue: *How can CAP support improve and protect soil health while remaining workable for farmers and adaptable to very different farming contexts across Europe?*

The webinar connected policy design, regenerative agriculture, public spending and digital monitoring, showing how better data and indicators can link farm-level management with regional, national and EU objectives.

Scan the QR code or click here to watch the full webinar and listen to the complete contributions from the speakers.

AI4SoilHealth Cross-Policy Soil Dialogues

DIALOGUE 2

SOIL HEALTH AND THE COMMON AGRICULTURAL POLICY



Emmanuel Petel

Policy Officer, DG AGRI European Commission



Simon Kraemer

Political Agroeconomist, Co-Founder and Executive Director of EARA



Juho Valtiala

Research Scientist, Natural Resources Institute Finland (LUKE)



Tomislav Hengl

Technical Director / Vice Chair and Co-Founder of OpenGeoHub



Aditya Kushwaha

Senior Software Engineer, OpenGeoHub

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Policy & Governance



CAP environmental and climate action: current achievements and post-2027 direction

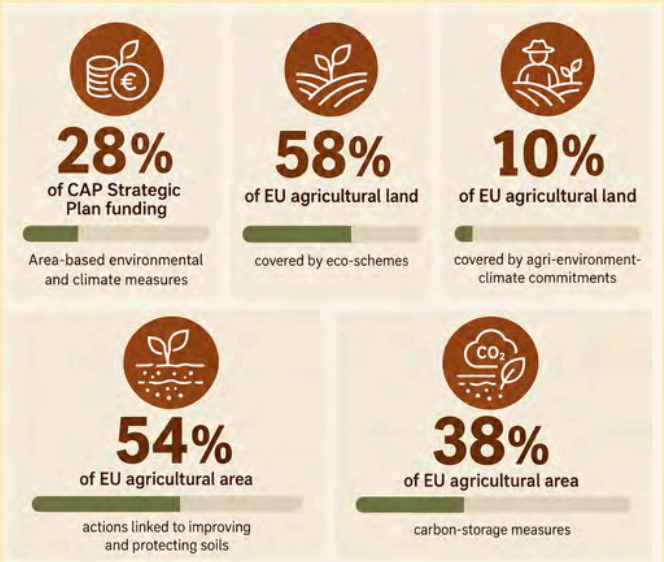
Emmanuel Petel | DG AGRI, European Commission

"Management commitments support specific practices, while transition actions are designed to support broader changes in the production system."

Emmanuel Petel (DG AGRI, European Commission) presented the current CAP environmental framework and the Commission's proposal for the post-2027 CAP.

Petel showed that **environmental and climate action already represents a significant component of the CAP**. Area-based environmental and climate measures account for around 28% of CAP Strategic Plan funding. Eco-schemes cover approximately 58% of EU agricultural land, while agri-environment-climate commitments cover around 10%.

Progress has been particularly strong under result indicators related to soil protection and carbon storage, with actions linked to improving and protecting soils covering around 54% of EU agricultural area and carbon-storage measures covering around 38%.



NOW

CAP

FUTURE

The proposed post-2027 CAP is structured around four objectives: **attractiveness, sustainability, competitiveness and resilience, and fairness**. Within this framework, soil health is explicitly recognised as one of the main environmental and climate priorities alongside climate mitigation and adaptation, biodiversity, pesticide reduction, organic farming and nutrient management. Soil health is therefore presented not only as an environmental objective but also as a contributor to long-term farm resilience and competitiveness.



Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Policy & Governance

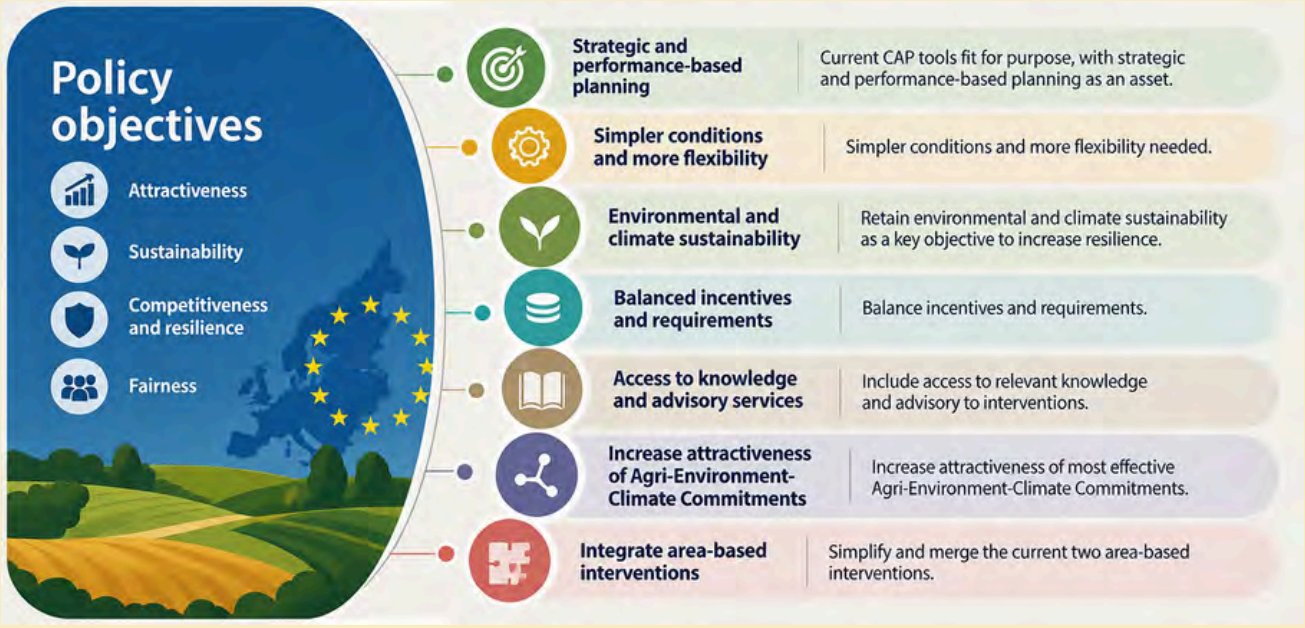


CAP environmental and climate action: current achievements and post-2027 direction

Emmanuel Petel | DG AGRI, European Commission

"Management commitments support specific practices, while transition actions are designed to support broader changes in the production system."

The proposed green architecture would simplify the current system by merging voluntary environmental measures into a single category of agri-environmental and climate actions, while replacing enhanced conditionality with a broader farm stewardship framework. Farm stewardship would combine statutory requirements with protective practices related to soil cover, crop rotation, erosion control and maintenance of soil organic matter. Voluntary support would be delivered through two complementary instruments: management commitments, which reward specific practices, and transition actions, which support whole-farm transformation pathways based on multiannual plans and performance-oriented objectives. This distinction provides a potential **bridge between traditional practice-based support and future performance-based approaches**. The proposal does not replace the existing CAP toolbox, but seeks to improve delivery through simpler instruments, greater flexibility for Member States and stronger links to performance and outcomes.



Another major theme of the presentation was the **growing role of soil-health indicators in CAP governance**. Petel highlighted indicators such as soil organic carbon, soil compaction, water erosion and harvest erosion as examples of metrics that could be used to support future national recommendations and policy steering. Together with the Farm Sustainability Data Network and future farm-level benchmarking initiatives, these indicators reflect a shift towards more targeted monitoring of outcomes rather than broad participation measures alone.

Participants discussed **future co-financing arrangements**, the monitoring of actual uptake versus planned targets, and the challenge of applying common soil-health indicators across diverse farming contexts. Petel confirmed that future agri-environmental and climate actions would require Member State co-financing, unlike current eco-schemes, which are financed entirely through EU funds. He also noted that while the Commission can monitor uptake and broad categories of action, detailed monitoring of specific practices across all Member States remains difficult.

The discussion also highlighted the need to **balance EU-wide comparability with local relevance**. Participants noted that key soil-management practices such as catch crops and green cover are often embedded within broader classifications and may deserve greater visibility. Petel stressed that soil-health indicators should operate at multiple levels, combining common EU frameworks with regional and farm-level adaptation. Overall, the discussion reinforced that effective implementation will depend not only on indicators and performance frameworks, but also on advisory support, national co-financing arrangements and sufficient flexibility to address local soil conditions.

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Regenerative agriculture & incentives



Performance-based policy for healthier soils and productivity

Simon Krämer | European Alliance for Regenerative Agriculture (EARA)

EARA EUROPEAN ALLIANCE FOR REGENERATIVE AGRICULTURE

Farmers are already leading regeneration; the task is to build the policy, finance and market conditions that allow more farmers to join that transition."

Simon Krämer argued that future CAP support should focus more on **measurable agroecological performance** than on the adoption of predefined practices. He emphasized that regenerative farming is already being implemented across Europe, but successful approaches are highly context-specific and depend on local soils, climate and farm characteristics. As a result, policy evaluation should consider multiple dimensions of performance, including productivity, soil cover, photosynthetic activity, input efficiency, soil organic carbon and broader ecosystem outcomes, rather than yields alone.

Krämer illustrated how result-based payments could be designed using indicators such as gross primary productivity (GPP), soil cover or other remotely sensed measures benchmarked against local conditions. He also argued that large-scale transition will require financing beyond CAP payments alone. Future support could **combine public funding with private-sector contributions** from food chains, financial institutions, insurers and other actors, with payments linked to measurable carbon, water or biodiversity outcomes. Overall, he advocated for transition pathways that are measurable, locally adapted and economically viable

EARA's Regenerating Full Productivity Index

EARA's **Regenerating Full Productivity** Index proposes a multidimensional way to assess farm performance beyond yield alone. It compares farms against benchmarks across economic and ecological indicators, including yield and income, input use, water, climate and biodiversity.



Regenerating Full Productivity Index
Europe

	Category	Indicator	Weighing	Relative Difference to Benchmark	Benchmarked Category Results
Economical	Yield and Income	Kcal	x1	-2%	6%
		Protein	x1	-2%	
		Gross Margin	x1	20%	
	Inputs	Fuel	x1	- %	69%
		Nitrogen	x1	61%	
		Phosphor	x1	51%	
		Pesticides	x1	75%	
		Feed	x1	87%	
	Water	Evapotranspiration	x1	1%	1%**
		Avg Surface Temp	x1	1%	
Ecological	Climate	Fuel	x1	- %	37%
		Nitrogen	x1	61%	
		Photosynthesis	x1	25%	
		Soil Cover	x1	24%	
		LSU	x1	- %	
	Biodiversity	Pesticides	x1	75%	35%
		Photosynthesis	x1	25%	
		Soil Cover	x1	24%	
		Plant Diversity	x1	16%	
	Regenerating Full Productivity Performance				**33%***

*Presenting here the average of all single country RFP scores assessed
**Insufficient technological resolutions in Phase 1. Details can be found in the Discussions chapter at the end of the report.

In the results presented, the assessed farms showed an average **33% Regenerating Full Productivity** Performance, with particularly strong differences in input reduction and ecological performance. This approach illustrates how soil-health and regenerative agriculture policies could move towards broader performance metrics that combine productivity, resource efficiency and ecosystem outcomes.

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Monitoring, spending and policy targeting



Soil Health in CAP National Plans: Are Indicators Aligned with Spending?

Juho Valtiala | Natural Resources Institute Finland (Luke)

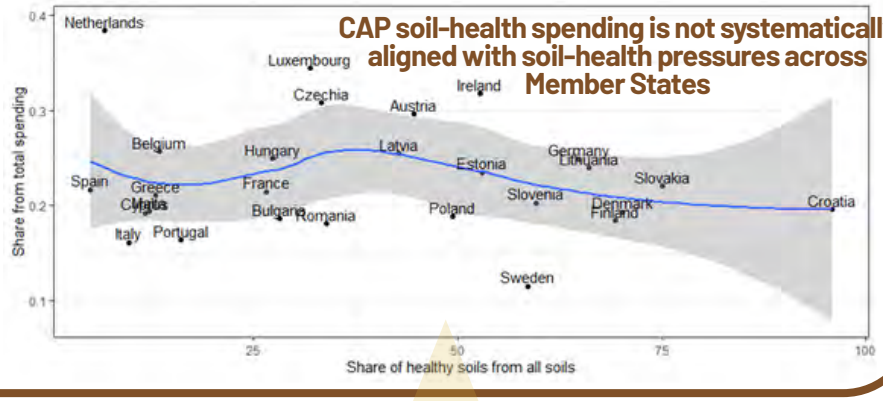
Luke
NATURAL RESOURCES INSTITUTE FINLAND

"The issue is not only whether CAP Strategic Plans include soil-health practices, but whether those practices are aligned with monitored soil-health pressures."

Valtiala examined how soil health is addressed in CAP Strategic Plans and whether CAP spending targeted at soil health corresponds to the severity of soil-health challenges across Member States. Building on the CAP result indicators most directly linked to soils (R.14, R.19, R.22 and R.24), the analysis explored both the types of soil-health practices included in national plans and the distribution of soil-health-related spending. This is important because soil health already represents a major CAP investment: around half of EU agricultural land is covered by soil-health-related support measures, and roughly one fifth of CAP expenditure is linked directly or indirectly to soil health.

The analysis showed that all CAP Strategic Plans include measures relevant to soil health, including crop rotation, soil management, nutrient management, pesticide reduction measures and soil sampling. However, Member States support different combinations of practices, showing that **implementation remains strongly shaped by national choices**. Soil sampling emerged as a particularly positive finding, as it provides farmers with essential information for selecting and targeting appropriate soil-health measures.

The second part of the analysis compared CAP spending related to soil health with indicators of soil degradation, including soil carbon status, compaction, nutrient pressures and pesticide pollution. The results suggested no clear relationship between the severity of soil-health challenges and the level of soil-health-related CAP spending. While this does not demonstrate policy failure or causal relationships, it raises questions about whether support is sufficiently targeted towards the areas where soil-health needs are greatest.

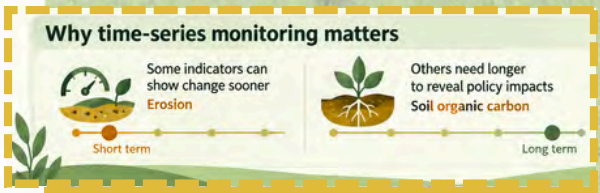


The comparison suggests that countries experiencing greater soil-health challenges do not necessarily allocate more CAP resources to soil-health-related interventions. While this does not imply causality, it raises questions about targeting and policy effectiveness.

"To address misalignment between spending and results, a results-based element could be considered in allocating the CAP budget. Monitored soil health could become one of the criteria used to define Member States' budget shares."

The presentation argued that future CAP reforms should move beyond measuring the uptake of soil-health practices and **pay greater attention to measurable soil-health outcomes**. Uptake indicators alone cannot show whether soil conditions are improving. Better alignment between monitored soil conditions, intervention design and resource allocation could therefore improve both the effectiveness and accountability of CAP spending.





The discussion highlighted the importance of **time-series monitoring**, noting that some indicators, such as erosion, already show improvements, while others, particularly soil organic carbon, require much longer periods before policy impacts become visible.

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Data, monitoring and decision-support tools



Demonstration of the Pan-European Soil Health Viewer

Tom Hengl & Aditia Kushwaha | OpenGeoHub

OpenGeoHUB
Connect · Create · Share · Repeat

"This is not just a map viewer: it is a tool for analysing soil and vegetation dynamics across space and time."

Hengl and Kushwaha presented the Pan-European Soil Health Viewer and the Soil Health Data Cube developed within AI4SoilHealth. Their central argument was that effective soil-health policy requires not only indicators and incentives, but also harmonised and accessible data infrastructure that allows soil conditions to be monitored, analysed and used in practice. This is particularly relevant for outcome-oriented soil policy, where monitoring needs to show not only which measures are adopted, but whether soil conditions are changing over time.

The EcoData Cube platform brings together high-resolution soil, vegetation, climate and land-use datasets into a harmonised European data environment. Through the **Soil Health Viewer**, users can examine soil properties, environmental indicators and temporal trends at multiple scales, ranging from individual locations and fields to regions and countries. The Soil Health Data Cube makes it possible to analyse soil, vegetation, climate and land-use information within a common spatial and temporal framework.

The system combines Earth observation data, soil monitoring products and spatial analytics, making it possible to track indicators such as soil organic carbon, vegetation dynamics and other soil-health related variables over time.



A major innovation is the **integration of AI-assisted tools** that help users identify relevant datasets, perform analyses and interpret results without requiring advanced GIS expertise. By lowering technical barriers, the platform aims to make soil-health information more accessible to farmers, advisors, researchers and public authorities.

The presenters emphasised that the objective is not merely to visualise data but to support practical decision-making and evidence-based soil management. In this sense, **AI can help democratise access to soil information**, provided that outputs remain transparent, validated and open to user feedback

The presentation demonstrated how **digital infrastructures can help bridge the gap** between EU-level monitoring, national policy implementation and farm-level action. As soil-health monitoring requirements expand under European policy initiatives, platforms such as the Soil Health Viewer may become increasingly important for CAP monitoring, advisory services, research, farm-level decision-making and the evaluation of policy outcomes. Reliable interpretation remains essential: AI-assisted tools can improve accessibility, but they **require continued validation**, benchmarking and user testing before they can be used confidently at scale.

Funded by the European Union

AI 4 Soil Health

DIALOGUE 2

Soil Health and the Common Agricultural Policy

Data, monitoring and decision-support tools



Demonstration of the Pan-European Soil Health Viewer

Tom Hengl & Aditia Kushwaha | OpenGeoHub

OpenGeoHUB
Connect · Create · Share · Repeat

"This is not just a map viewer: it is a tool for analysing soil and vegetation dynamics across space and time."

Overall, the contribution showed that digital tools can strengthen results-based approaches by making monitoring and verification more feasible across scales. Improved data infrastructure does not replace policy design, advisory support or local knowledge, but it can make performance-based soil-health policies more operational in the future.

The Pan-European Soil Health Viewer is an online platform developed within AI4SoilHealth to provide access to harmonised soil-health information across Europe. It combines high-resolution soil, climate, vegetation and land-use data with analytical and AI-assisted tools that allow users to explore soil conditions, monitor trends and compare locations over time.

The platform aims to support evidence-based decision-making by farmers, advisors, researchers and public authorities, helping translate large environmental datasets into practical soil-health insights. Its longer-term significance lies in providing a common digital infrastructure that can support soil monitoring, CAP implementation and future performance-based environmental policies.

In short, the Soil Health Data Cube is the underlying open dataset (30 m resolution, from 2000 onwards, linked to eight soil-health indicators), accessible through the EcoDataCube.eu infrastructure; the Soil Health Viewer is the interface that lets users explore, analyse and compare these data.

The platform aims to support evidence-based decision-making by farmers, advisors, researchers and public authorities, helping translate large environmental datasets into practical soil-health insights.

Its longer-term significance lies in providing a common digital infrastructure that can support soil monitoring, CAP implementation and future performance-based environmental policies.

In short, the Soil Health Data Cube is the underlying open dataset (30 m resolution, from 2000 onwards, linked to eight soil-health indicators), accessible through the EcoDataCube.eu infrastructure; the Soil Health Viewer is the interface that lets users explore, analyse and compare these data.



EcoDataCube



EcoDataCube & Soil Health Viewer

Empowering Farmers and Administration through Geospatial Analytics and Conversational Edge AI

Funded by the European Union

AI 4 Soil Health

Scientific and tools references

- Prăvălie, R., Borrelli, P., Panagos, P. et al. (2024). A unifying modelling of multiple land degradation pathways in Europe. Nature Communications, 15, 3862. [link]
- Valtiala, J., Niemi, J. and Arovuori, K. (2026). Vaihtoehtoisten CAP-tukimallien vaikutukset jäsenmaihin ja niiden poliittinen toteuttamiskelpoisuus [Impacts of alternative CAP support models on Member States and their political feasibility; unofficial translation]. Luonnonvara- ja biotalouden tutkimus 33/2026. Natural Resources Institute Finland (Luke).
- Tian, X., de Bruin, S., Simoes, R., Isik, M. S., Minařík, R., Ho, Y.-F., Şahin, M., Herold, M., Consoli, D. and Hengl, T. (2025). Spatiotemporal prediction of soil organic carbon density in Europe (2000–2022) using earth observation and machine learning. PeerJ, 13, e19605. [link]
- Tian, X., Consoli, D., Witjes, M., Schneider, F., Parente, L., Şahin, M., Ho, Y.-F., Minařík, R. and Hengl, T. (2025). Time series of Landsat-based bimonthly and annual spectral indices for continental Europe for 2000–2022. Earth System Science Data, 17, 741–772. [link]
- AI4SoilHealth (n.d.). Soil Health Data Cube. Project output integrating soil, climate and vegetation data into a unified, decision-ready format. [link]
- EcoDataCube (n.d.). EcoDataCube platform. Open geospatial data infrastructure for accessing, querying and analysing environmental datasets, including AI4SoilHealth layers. [link]
- European Alliance for Regenerative Agriculture (EARA) (2025). Regenerating Europe from the Ground Up: Farmer-led Research on Europe's Full Productivity. Full Report, Research Phase 1, Version 1.2, June 2025. [link]
- European Alliance for Regenerative Agriculture (EARA). Farmer-led Research on Europe's Full Productivity — Phase 1. Project page. [link]

Policy and legal references

- Regulation (EU) 2021/2115 of the European Parliament and of the Council of 2 December 2021 establishing rules on support for strategic plans to be drawn up by Member States under the Common Agricultural Policy (CAP Strategic Plans).
- Regulation (EU) 2021/2116 of the European Parliament and of the Council of 2 December 2021 on the financing, management and monitoring of the Common Agricultural Policy.
- Regulation (EU) 2023/2674 of the European Parliament and of the Council of 22 November 2023 amending Council Regulation (EC) No 1217/2009 as regards conversion of the Farm Accountancy Data Network into a Farm Sustainability Data Network.
- European Commission (2025). A Vision for Agriculture and Food: Shaping together an attractive farming and agri-food sector for future generations. COM(2025) 75 final, 19 February 2025.
- European Commission (2025). Proposal for a Regulation of the European Parliament and of the Council establishing the conditions for the implementation of Union support to the Common Agricultural Policy for the period from 2028 to 2034. COM(2025) 560 final, 2025/0241 (COD), 16 July 2025.
- European Commission (2025). Proposal for a Regulation of the European Parliament and of the Council establishing a European Fund for economic, social and territorial cohesion, agriculture and rural, fisheries and maritime, prosperity and security for the period 2028–2034 and amending Regulation (EU) 2023/955 and Regulation (EU, Euratom) 2024/2509. COM(2025) 565 final.
- European Commission. CAP Strategic Plans 2023–2027.
- European Commission. Agri-food Data Portal: CAP 2023–2027 performance indicators.
- Strategic Dialogue on the Future of EU Agriculture (2024). A shared prospect for farming and food in Europe

Editorial note

*This Webinar Insight Brief has been prepared in the framework of the **AI4SoilHealth** Cross-Policy Soil Dialogues, a series of science–policy exchanges conceived and organised by **ISINNOVA** to foster dialogue across policy areas and explore how soil knowledge can better support policy implementation. This brief provides a concise summary of the webinar presentations and discussions, reflecting the main points raised by the speakers rather than providing verbatim records of their contributions.*

The key takeaways, cross-cutting insights and policy recommendations or implications presented in this brief are an interpretative synthesis developed by ISINNOVA, drawing on the webinar contributions and analysed within the project's science-for-policy framework. Unless explicitly attributed, these elements should not be understood as statements, recommendations or endorsements made by individual speakers or their organisations.

Interested in ISINNOVA's participatory processes, expert engagement activities and policy dialogues?
For further information, questions or opportunities for exchange and collaboration, please contact Giovanna Giuffrè (ggiuffre@isinnova.org) or visit www.isinnova.org.

ISINNOVA
research innovation sustainability

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author only and do not necessarily reflect those of the European Union or European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

UK Research and Innovation

This work has received funding from UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee [grant numbers 10053484, 1005216, 1006329].