DEploying Ecosystemic solutions to imProve soil Health and uncOveRing subsoil functIons in the critical ZONe **(DeepHorizon)**

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Life on Earth relies on healthy soils, encompassing both the topsoil and the subsoil. While research to date has primarily focused on the topsoil layer, the subsoil remains relatively underexplored. The **DeepHorizon** project aims to address this gap by engaging key experts and practitioners in efforts to deepen the understanding of the functions of deeper soil layers (subsoil) within the critical zone. These efforts will result in the development of systemic solutions that improve subsoil functionality and overall soil health.

The main objective of **DeepHorizon** is to develop tools enabling practitioners, land managers, and policymakers to access data on subsoil properties, functions, soil health indicators, and financial and economic decision-support tools. These tools will foster sustainable subsoil management. The project employs a **multi-actor approach**, engaging both farmers and policymakers, and its actions focus on:

### Outputs of the DeepHorizon Project:

* **Geodatabase** of subsoil, based on the analysis of 40 key research sites (representing diverse conditions and locations).
* **Integration of subsoil data** into two process-based soil models (BODIUM and ECOSYS) and provision of user-friendly interfaces to support landscape management (B4F and E4M).
* Two sets of **indicators for subsoil health and landscape management**.
* A **smart application (smart-app)** and guidelines for policymakers.
* Establishment of a **Community of Practice (CoP)**, bringing together stakeholders and practitioners involved in subsoil management.

### How the Outputs Will Be Achieved:

The geodatabase will be developed using existing data and the results of new research conducted at 40 key research sites across Europe. These sites represent diverse climatic conditions, soil types, and land uses, ensuring comprehensive insights into subsoil characteristics. Data will be collected using standardized sampling protocols to ensure reliability and comparability.

Subsoil data will be integrated into the BODIUM and ECOSYS models using innovative process-based modeling techniques and advanced data analysis algorithms. These models will simulate subsoil dynamics and their contributions to soil health under various environmental conditions. The integration process will leverage knowledge from project partners, including research institutions and land managers, ensuring practical application of the findings.

The development of subsoil health and landscape management indicators will rely on data analysis from the research sites and the results of process-based modeling. These indicators will be evaluated for their relevance to practitioners and policymakers, allowing adaptation to various soil use conditions and management needs.

The smart application and policy guidelines will be created in collaboration with **Living Labs (LLs)**, where innovative tools and solutions will be co-developed and tested by key stakeholders such as farmers, researchers, and policymakers. The LLs will provide continuous feedback, enabling iterative improvement of the tools and their alignment with real-world needs.

The **Community of Practice (CoP)** will be established based on the consortium's extensive network of over 1,500 land managers and experts across Europe. Drawing on proven collaborative approaches successfully implemented in European projects like **CONSOLE** and **NOVASOIL**, the CoP will facilitate effective knowledge exchange and co-creation within the project.

By engaging a wide range of stakeholders, including end-users and key decision-makers, **DeepHorizon** will promote sustainable soil management practices, EU-level policy incentives, and guidelines. These efforts will enhance subsoil carbon storage and ecosystem services while raising public awareness of the critical role of subsoil.

Through advancing subsoil knowledge and increasing its recognition, **DeepHorizon** will contribute to improved soil health and set new directions for creating a more sustainable and resilient environment in Europe.

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