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SOLO for
• ● ○ Europe



Knowledge Gaps to Guide the EU Soil Mission Funding Priorities



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The Soils for Europe (SOLO) project aims to create a knowledge hub for soil health research and innovation and supports the EU Soil Mission in three strategic ways:



Developing Thematic Research & Innovation Roadmaps

SOLO has established Think Tanks as discussion forums to identify main knowledge gaps related to each EU Soil Mission objectives. They will collaborate and enrich the EU Soil Observatory Forum by providing focus on research priorities.



Developing a 10-year European Research & Innovation Roadmap

SOLO will synthesise the thematic R&I roadmaps to identify European R&I priorities for the next decade. These will be regionalised across different countries via the establishment of regional nodes, in collaboration with the EU project PREPSOIL.



Developing Key Performance Indicators for Research & Innovation

SOLO will contribute to the development of Key Performance Indicators to track and assess EU Soil Mission R&I activities (including funding mechanisms and use of research in policy).



Our work thus far has identified the following knowledge gaps mapped against specific EU Soil Mission objectives, which should be the focus of the next funding call:



SOLO Reduce desertification and land degradation



- Identify the extent and intensity of land degradation across EU Member States, considering multiple sources of degradation and making use of the latest monitoring mechanisms (e.g., EUSO, Copernicus);
- Identify, test and standardise the best practices across land use types to prevent the effects of land degradation and restore healthy soils.



SOLO Conserve soil organic carbon stocks



- Develop new knowledge on long-term trends in European agricultural soils, in particular on mechanistic understanding of the consequences of intensive use and land use change on soil functions and their impact on soil organic carbon stocks;
- Explore conceptual, legal, policy and practical ways of how can soil organic carbon stocks be assessed and quantified in an overall health concept that includes healthy plants, clean water, healthy animals and people in the context of “climate-smart” agriculture, horticulture, and forestry, and practises adaptation to new climatic extremes;
- Produce significant knowledge concerning safe and energy-efficient recycling of waste materials in soil and its impact on soil organic carbon stocks and soil health, in particular, related to soil and ecosystem restoration approaches.



SOLO Stop soil sealing and increase re-use of urban soils

- Investigate what is the degree of soil sealing associated with different land take processes, how it is context driven across EU Member States and what social, economic, and cultural factors drive the decisions of landowners and land managers about soil sealing, including the potential effects on soil health and the implications of current soil literacy;
- Identify urban-specific monitoring methods and essential soil biodiversity variables that allow track not only soil sealing (e.g., in connection to work developed by Copernicus) but also the functional and ecological consequences of the process;
- Explore current governance, legal and policy instruments related to soil sealing, including property rights and how these influence decision-making and the protection of soil resources across Member States.



SOLO Reduce soil pollution and enhance restoration

- Identify the distribution and pollutants composition of critically degraded soils across Europe, including the identification of potentially vulnerable soils;
- Assess soil properties and linkages with other polluting causes and identify feasible approaches to large-scale soil pollution reduction and restoration;
- Explore new innovative compounds that can contribute to more sustainable farming by reducing their persistence in the environment and their contamination effects on multiple (not single organism) soil organisms and their trophic networks.





SOLO Prevent erosion

- Develop a Soil Erosion monitoring system at the farm scale, including a coordinated network of research institutions, practitioners, and farmers who monitor soil erosion at the farm scale to improve the understanding of both natural and anthropogenic soil erosion processes and their interactions;
- Develop research to scale up soil erosion processes and estimate rates in space and time, including exploring the effects of multiple land use and climatic scenarios.



SOLO Improve soil structure to enhance soil biodiversity

- Investigate the importance of the diversity of soil viruses, bacteria, and other soil organisms in relation to land management in the stabilisation of the soil structure and vice versa (e.g., including research on the spatial positive and negative impacts of bioturbation, and a proper representation of soil aggregates stability across European soils);
- Investigate the importance of soil structure and stable aggregates on the soil-plant interface, the consequences for plant production, and for soil multi-functionality.





SOLO Reduce the EU global footprint on soils

- Establishing a baseline for the EU global footprint on soils including the revision of the EU imports of food, feed, fibre, biomass, minerals and other lithological resources;
- Exploring a set of trajectories or vision-positive scenarios towards significant reductions of the EU footprint across sectors, including novel finance and economic mechanisms, the introduction of guidelines or requirements for better food production and more sustainable resource extraction;
- Exploring the social, economic and environmental implications of shifts of product sources to areas with less vulnerable soils, implementation of improved (more sustainable) production systems, but also soil restoration practices that undo past degradation.



SOLO Improve soil literacy in society

- Development and investigation of the consequences of new practical curricula adapted across educational levels which can improve citizen knowledge on soil health and ecology, particularly in citizens' perception of soils, soil needs and social implications of healthy soils;
- Investigate the level of impact of current knowledge, soil protection strategies, and capacity-building programmes on the perception of citizens, practitioners, and policymakers of what constitutes a healthy soil and the main strategies to improve it;
- Investigate current governmental structures across the EU Member States that support soil literacy and identify best practices, improvements and novel approaches in the access to soil information and training for stakeholders, private sector engagement, and educational programs.



SOLO Nature conservation of soil biodiversity

- Identify nature conservation practices that enhance the quality of soil habitats, the protection of soil organisms and the multi-functionality of soils according to different local environmental conditions;
- Investigate the effects of current types of conservation areas on soil organisms and identify adjustments needed to improve soil conservation and restoration across European landscapes and land-use types;
- Explore future scenarios for multiple soil organisms, identify vulnerable taxa of geographic areas that require special attention and establish feasible conservation goals.

While we identify these objective-specific knowledge gaps, many of these can co-exist in one call. Also, many topics require a multidisciplinary consortium and approaches for maximising impact. Therefore, the calls should promote the involvement of practitioners and researchers from disciplines beyond the natural sciences (e.g., law, psychology, political sciences, among others) and the pairing of experimental facilities (to draw mechanistic and causal conclusions) and observational studies (e.g., similar to those of EUSO in the framework of LUCAS).



Consortium

17 partner organisations across
11 EU member states and Norway



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