

Presenting the “Soils for Europe” (SOLO) Land Degradation Think Tank. Knowledge Gaps, Actions & Bottlenecks to Reduce Land Degradation in EU

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Abstract

Life on Earth depends on healthy soils. These rich layers beneath our feet serve as the bedrock of our food systems, they provide clean water and habitats for biodiversity while contributing to climate resilience [1,2]. Moreover, soil supports our cultural heritage and landscapes and is the basis of our economy and prosperity [1,2]. However, European soils face multiple pressures, including climate change, urbanization, pollution, overexploitation, and biodiversity loss. In this light, alarming reports from the European Union Soil Observatory (EUSO) reveal that 60-70% of European soils are affected by at least one soil degradation process (e.g. soil erosion by water), rendering them unhealthy [1, 2]. In response to this urgent call, the European Union has developed the EU Soil Mission: *A Soil Deal for Europe*, a transformative €1 billion programme to achieve soil health by 2030.

The Soils for Europe (SOLO) project operates in direct support of this agenda, co-creating actionable roadmaps for soil health through a series of thematic Think Tanks. Each Think Tank addresses a Mission objective, mobilizing stakeholders to identify knowledge gaps, drivers, bottlenecks, and key actions. This study presents the activities of the SOLO Land Degradation Think Tank, aligned with Specific Objective 1 of the Soil Mission. In particular, land degradation is a dynamic and complex phenomenon impacting soil at both European and global scales. According to the Soil Mission Implementation Plan [1], data from all EU Member States indicate that 83% of agricultural soils contain residual pesticides. Approximately 2.8 million sites are potentially contaminated, with only 65,500 of these sites having been remediated by 2018. Moreover, 24% of EU land is experiencing unsustainable rates of erosion caused by water, 23% of the land is compacted, and 520 million tonnes of soil are excavated and treated as waste, despite most of it not being contaminated. These data highlight the urgency of coordinated research and policy interventions.

To achieve these objectives, the SOLO Land Degradation Think Tank adopted a multi-layered and holistic methodology that combined scientific evidence, stakeholder expertise, and iterative co-creation processes (Figure 1). The first step involved a systematic literature review of more than 200 scientific articles, policy reports, legislations and EU directives, aimed at mapping existing knowledge, identifying critical gaps, and highlighting barriers to soil health. This evidence base was complemented by insights gathered through more than 10 dissemination activities and workshops, ensuring that both academic and practitioner perspectives were integrated. It is noteworthy that the Think Tank currently brings together 25 core stakeholders from diverse scientific, cultural, and societal backgrounds, continuously expanding. These stakeholders played a key role in reviewing the evidence, recommending additional literature, and pinpointing priority areas for deeper exploration. This diversity of expertise ensured that the roadmap addressed ecological, environmental, economic, and social dimensions of land degradation.

Moreover, the methodology was further reinforced by iterative feedback loops. Two major physical meetings, held in the first and second years of the project, convened ~90 stakeholders from across Europe to critically review and refine the roadmap. In addition, complementary insights were incorporated from two EU Soil Week events organized, with ~70 participants contributing perspectives, particularly from Mediterranean regions such as Greece. Lastly, targeted workshops and webinars reached approximately 70 participants, enabling dissemination of preliminary findings and gathering of constructive feedback.