

EGU26-17194, updated on 02 Jun 2026

<https://doi.org/10.5194/egusphere-egu26-17194>

EGU General Assembly 2026

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Advancing Soil Health in Practice: Monitoring and Awareness through Agroecological Living Labs

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Food production is a major contributor to environmental degradation and a key driver of soil health decline across Europe, where an estimated 89% of agricultural soils show signs of degradation (EUSO, 2025). Despite growing awareness, progress toward sustainable soil management remains limited due to uneven access to knowledge, limited capacities, insufficient incentives for land managers and fragmented action across the food system. Policymakers, administrations, advisors, retailers, and consumers often operate in isolation, while soil monitoring remains complex and poorly adapted to real-world farming conditions.

Although many scientific solutions for sustainable soil management already exist, conventional research often addresses isolated system components. In contrast, food systems are highly complex, shaped by strong interactions between ecological, social, economic, and political dimensions. Solutions that work in practice therefore require collaborative spaces where science and stakeholders jointly develop, test, and adapt innovations under real-life conditions. Living Labs provide such spaces.

Living Labs are collaborative, real-world experimental hubs where researchers, farmers, and other stakeholders co-create innovations toward shared objectives. Through co-creation and co-learning, they enhance soil knowledge, improve understanding of soil processes, and motivate food system actors to actively contribute to soil health improvements. By embedding experimentation in operational contexts, Living Labs can support agroecological transitions and support tangible impacts on soil health and governance.

Within this context, the SUNRISE project establishes agroecological Living Labs across ten European countries, engaging multi-actor teams of farmers, advisors, value-chain actors, NGOs, consumer organizations, policymakers, and researchers. A central innovation is an integrated soil health monitoring framework combining a citizen science smartphone app for soil-health assessments, laboratory soil analyses and an agroecological management questionnaire. Together, these tools capture complementary physical, chemical, biological, social, ecological, and economic dimensions of soil health in real-life farming settings and allow monitoring the effects of agroecological innovations across sustainability dimensions.

Applied across 75 farms and 150 plots, this harmonized monitoring approach enables farmers to assess management changes relative to control plots, strengthens soil literacy, and translates

complex data into actionable, locally relevant guidance. By validating field-based indicators against laboratory measurements and setting soil health data into a wider agroecological context SUNRISE demonstrates a robust and holistic soil-health assessment framework that is scientifically sound, practically relevant, and capable of empowering land managers and food system actors to sustain soil health improvements beyond the project duration.

European Commission (2025) *EUSO Soil Degradation Dashboard*. Available at: <https://esdac.jrc.ec.europa.eu/esdacviewer/euso-dashboard/> (Accessed: 08 June 2025).