iCOSHELLs

What is iCOSHELLs?

ISINNOVA – Mario Gualdi

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Co-Creating Innovative Solutions to restore Soil Health across Europe

Programme:
European Union Horizon Europe

Type of Action:
Research and Innovation Action

Consortium:
39 Partners & 2 Affiliated Entities from 8 countries

4 **Years**
Duration

12 **Millions €**
Total Budget

RI. SE Research Institutes of Sweden
Coordinator

Supporting the EU Mission 'A Soil Deal for Europe,' which aims to achieve healthy soils by 2030

iCOSHELLs focuses on three key objectives:

- Reducing **soil pollution** and promoting **restoration**.
- Improving **soil structure** and **biodiversity**.
- Increasing **soil literacy** among society.

With **6 Living Labs** in the Basque Country, Bulgaria, Greece, Italy, Spain, and Sweden, the project brings together **local stakeholders to co-design and test practical solutions for improving soil health.**

6 Living Labs across Europe

Basque Soil Health Living Lab (Basque LL)

Basque Peri-Urban

Bulgarian Viticultural Soil Health Living Lab (BUV LL)

Bulgaria Agriculture

Greek Mine Soil Health Living Lab (Greek LL)

Greece Post-industrial

Italian Soil Health Living Lab (IT LL)

Italy Agriculture

Southeastern Spain Living Lab (SES LL)

Spain Agriculture

SWEdish Soil Health Living Lab (SWE LL)

Sweden Agriculture

The journey

PHASE 1
Setting up of ICOSHELLS process

- Stakeholder mapping. motivations and recruitment
- Baseline and regional ecosystem analysis and definition
- Soil monitoring methodologies, indicators and web application.
- LLs process refinement, set up and stakeholder activation
- LLs and LHS success factors

WP1, WP3

PHASE 2
LL implementation

- Co-creation with stakeholders
- Solution development: refinement of ideas, prototype developments, testing and experimentation
- Open Calls and expansion of the considered solution
- Community awareness and engagement

WP1, WP2, WP4

PHASE 3
LLS Monitoring and assessment

- Training of predictive modelling of soil indicators
- Socio-economic feasibility and environmental assessment of solutions
- Selection of best performing solutions
- Identification of sites that can be transformed into LHS
- Monitoring and assessing the LLs process & drawing operational lessons learned

WP3, WP5

PHASE 4
Best practices, LL long-term sustainability & solutions replication & upscale

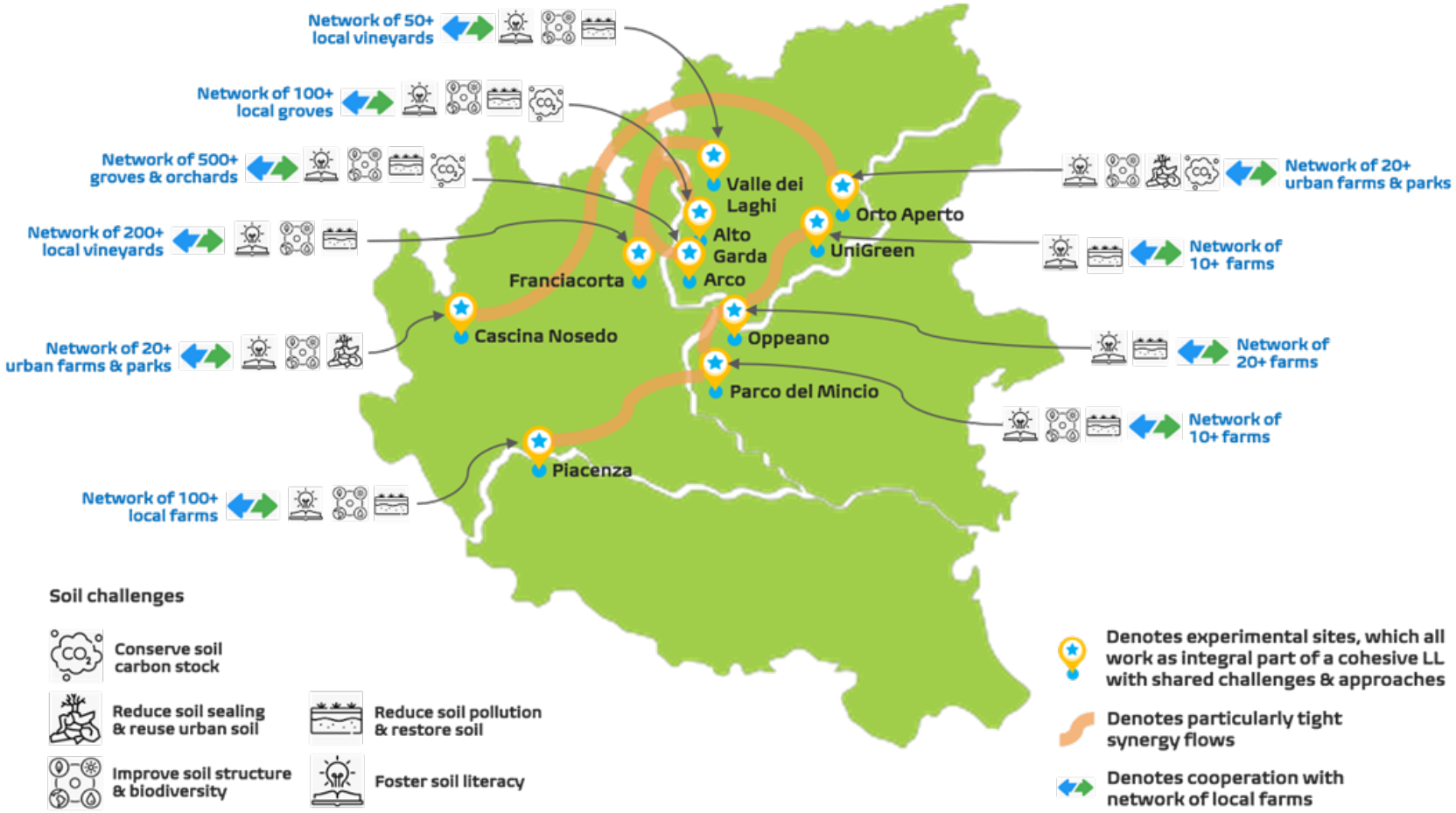
- LLs and LHS best self-sustaining practices
- Replication, scaling up & long-term sustainability of solutions
- Transfer of knowledge and capacity building
- Soil indicators prediction tool

WP5, WP6, WP7

2024 **2028**

iCOSHELLs: the Italian Living Lab

Multi-regional living lab



Diverse experimental sites

Site	Soil	Crop	Challenge	Solution
Alto Garda (Trento, Trentino)	Permanent crops	Vineyards	Erosion and compaction on slopes	Ground-cover vegetation, bio-fertilisation, mulching
Arco (Trento, Trentino)	Permanent crops	Orchards, groves	Low fertility, acidic soils	UAV + LiDAR + SLAM laser scanning, soil and carbon-stock monitoring, bio-fertilisation
Cascina Nosedo (Milan, Lombardy)	Urban, artificial surfaces	Community gardens	Sealed and contaminated urban soils	Phytoremediation and agroforestry
Castagneto (Trento, Trentino)	Permanent crops	Orchards, groves	Low fertility, acidic soils	UAV + LiDAR + SLAM laser scanning, soil and carbon-stock monitoring, bio-fertilisation
Comune di Oppeano (Verona, Veneto)	Arable lands	Maize, wheat, fodder	Compaction, nutrient imbalance	Biochar, cover crops, reduced tillage
Franciacorta (Brescia, Lombardy)	Permanent crops	Vineyards	Improve soil structure and biodiversity	Grassing, compost, precision irrigation
Parco del Mincio (Mantova, Lombardy)	Mixed, wetlands-arable lands-pastures	Cereals, forage systems	Weed plants proliferation, runoff and soil pollution in wetland areas	Compost and bio-fertilisers, buffer strips
Piacenza (Emilia-Romagna)	Arable lands	Rice paddies	Degraded soil and rice quality	Compost, green manure and liming
UniGreen (Trento, Trentino)	Permanent crops	Vineyards	Low organic matter, compaction	Biochar
Valle dei Laghi (Trento, Trentino)	Permanent crops	Orchards, groves	Erosion, carbon loss on terraces	UAV/laser erosion control mapping, soil-biodiversity sensors, biochar

Soil analyses

Experimental sites		4	1	1	2	1	1	2	12
Location		Trentino	Trentino	Veneto	Lombardy	Lombardy	Lombardy	Em-Rom	Total
Soil Analysis	Physical & chemical analysis	64	18	18	24	42	18	144	**328**
	Soi organic matter content	64	18	18	36	14	18	144	**312**
	Metagenomics (DNA analysis)				36				**36**
	Soil biological activity (soil respiration)	32	18	18	24	14	18	144	**268**
	Soil pollution (heavy metals)	16			12	7		36	**71**
	Organic contaminants (Polycyclic Aromatic Hydrocarbons) and residual pesticides								
TOTAL		**176**	**54**	**54**	**132**	**77**	**54**	**468**	**1015**

Team

Name	Description	Role
ISINNOVA	R&I organisation	ITA LL overall coordinator
Università degli Studi di Trento	University	ITA LL scientific coordinator and Trentino/Veneto experimental sites monitor
Comune di Oppeano	Public authority	Oppeano experimental area leader
RUMA srl	SME	Science-driven solutions for Trentino experimental sites
Innovhub	R&I organisation	Lombardy experimental sites monitor
Consorzio Tutela del Franciacorta	Farmers association	Franciacorta experimental area leader
Politecnico di Milano	University	Cascina Nosedo experimental area leader
Parco Regionale del Mincio	Public authority	Parco del Mincio experimental site leader
Università Cattolica Sacro Cuore	University	Piacenza experimental area leader and supplier of laboratory analyses
Università degli Studi di Milano	University	Franciacorta experimental site scientific support

Where we are in the process

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PHASE 2
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WP1, WP2, WP4

- **Co-creation meetings with stakeholders starting in all sites**
- **National launch event upcoming (Franciacorta, end November 2025)**

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WP3, WP5

PHASE 4
Best practices, LL long-term sustainability & solutions replication & upscale

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WP5, WP6, WP7

2024 ··········→ **2028**

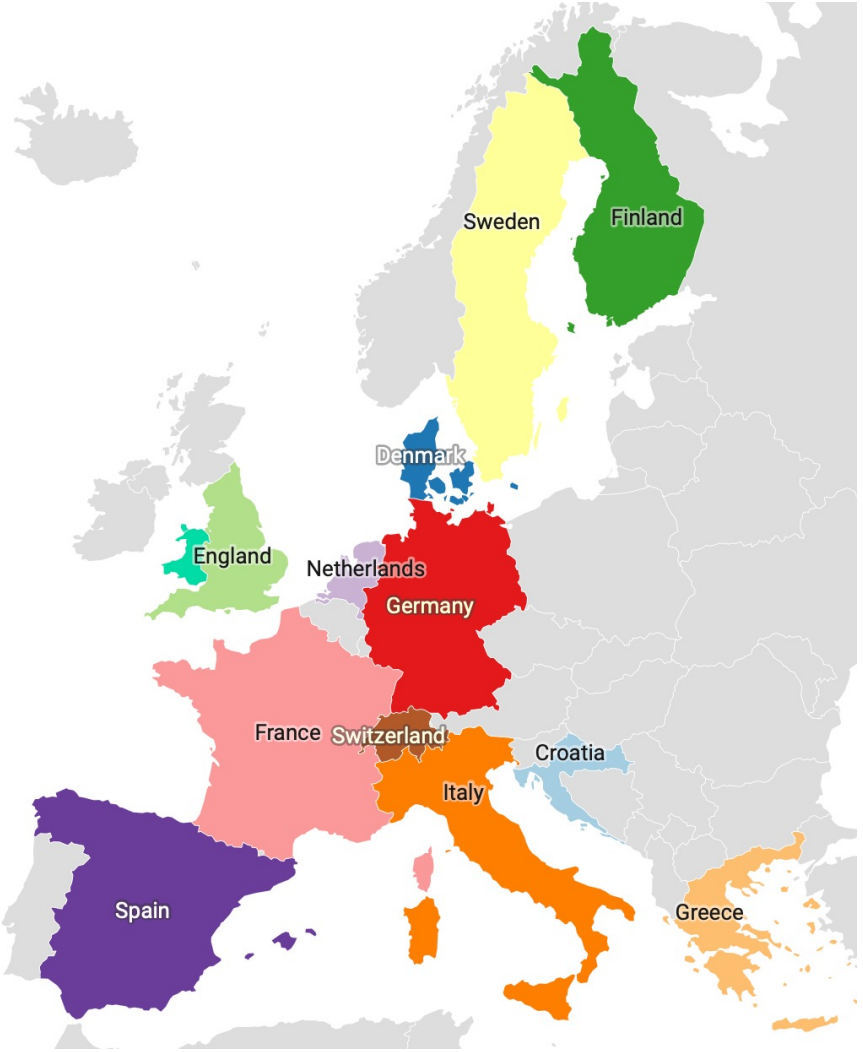
At a glance

Perspective: Knowledge, data, technologies and infrastructures to support soil health
Territorial scope: European
Duration: 2023-2027
Funding: EC Horizon Europe
Consortium: 28 partners representing 11 of the 13 pedo-climatic regions across Europe

- Co-design, build and maintain a **"soil digital twin" infrastructure** enabling continuous monitoring and forecasting of soil health using AI and big data
- Accelerate **soil health measurement** and monitoring in the field (for farmers and land-managers) without reliance on traditional lab testing
- Develop a robust **soil health indicator framework** (and proxies) aligned with the Soil Deal for Europe and the just approved Soil Monitoring Law, supporting policy-makers and practitioners

Main activities and outputs

- Collect data from **13 pilot sites** across Europe and integrate existing national/European soil datasets
- Develop and test **novel measurement tools** (e.g., soil spectroscopy, in-field sensors) and the rapid assessment toolbox for soil health
- Build the **digital infrastructure** (data cube, API, mobile app) and harmonised services so that soil health information is accessible from farm parcel level up to European scale
- Engage **stakeholders** - land-managers, policymakers, farmers – to ensure soil data and AI solutions align with user needs and expectations, blending AI and CI (Collective Intelligence)
- Inform **macro policies** or **strategies** at EU and national scale
- Foster **synergies** tailored to specific regions or communities



Staying in touch with us?

- ISINNOVA is an independent research and consulting institute established in 1971, based in Rome, Italy
- Supports public authorities and private organisations in pursuing sustainable visions, policies and solutions
- Delivered 150+ European R&I and consulting projects
- Key R&I areas:
  - Climate neutral, smart and green cities
  - Renewable energy and ecosystems
  - Healthy soils
  - Sustainable mobility and smart transport systems
  - Public health and welfare
  - Responsible research and innovation
- Key expertise areas:
  - Change, scenario analysis, visioning with participatory foresight
  - Institutional and community governance, stakeholders' engagement
  - Policy analysis and advice, sustainable strategic planning
  - SCBA, impact and replication assessment of policies and solutions
  - Communication, web-stories and online engagement

iCOSHELLs and ISINNOVA contacts

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