

EU AgriResearch

CONFERENCE 2023



European
Commission

EU AgriResearch
CONFERENCE 2023

Sustainably managed natural resources for agricultural production and the EU Mission "A Soil Deal for Europe"

Breakout session 1



#AgriResearch



European
Commission



EU AgriResearch

CONFERENCE 2023

Agenda

- | | |
|--------------|----------------------------|
| 09:15 | Welcome |
| 9:25 | Keynote speech |
| 9:40 | Overview of R&I activities |
| 9:50 | Panel discussion |
| 10:35 | Co-creative discussion |
| 11:45 | Wrap-up and closing |

#AgriResearch

A close-up photograph of a person's hands holding a mound of dark, rich soil. The hands are positioned in the lower half of the frame, with the fingers gently cupping the earth. The background is a soft, out-of-focus landscape under a warm, golden light, suggesting a sunrise or sunset. The overall tone is natural and earthy.

EU AgriResearch
CONFERENCE 2023

Keynote speech

Ing. Martin Kováč
Ministry of Agriculture and
Rural Development of the
Slovak Republic

#AgriResearch

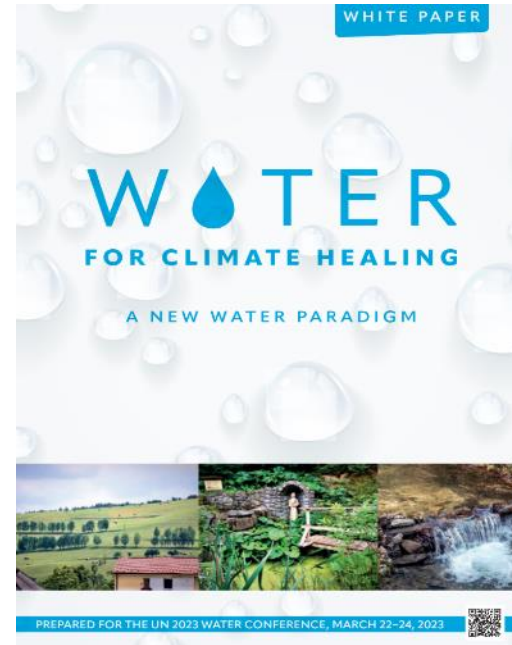




SOIL AND WATER FOR HEALING THE CLIMATE

UN 2023 Water Conference

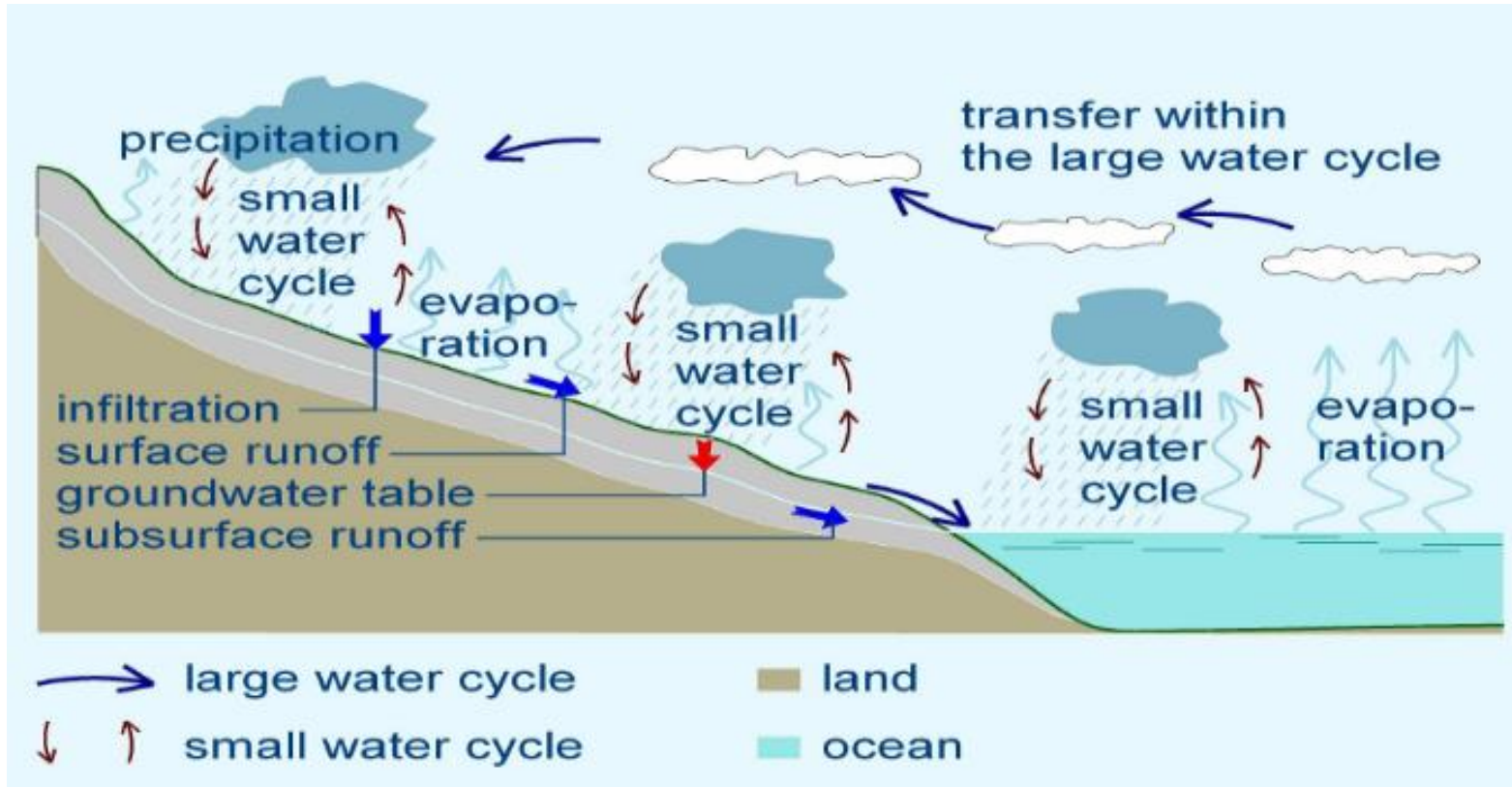
March 22 – 24, 2023, New York



Water cycle has a problem. It is out of balance. Water cycle is common good. We need sustainable water cycles. We may restore small water cycles by sustainable land and rainwater management.

WEFE NEXUS (SDG) - Water (6), Energy (7), Food (2), Ecosystems (15), Climate (13)
Water cycles connect SDG number 2, 6, 7, 13, 15 directly. All other SDG indirectly.

Balance of small and large water cycles



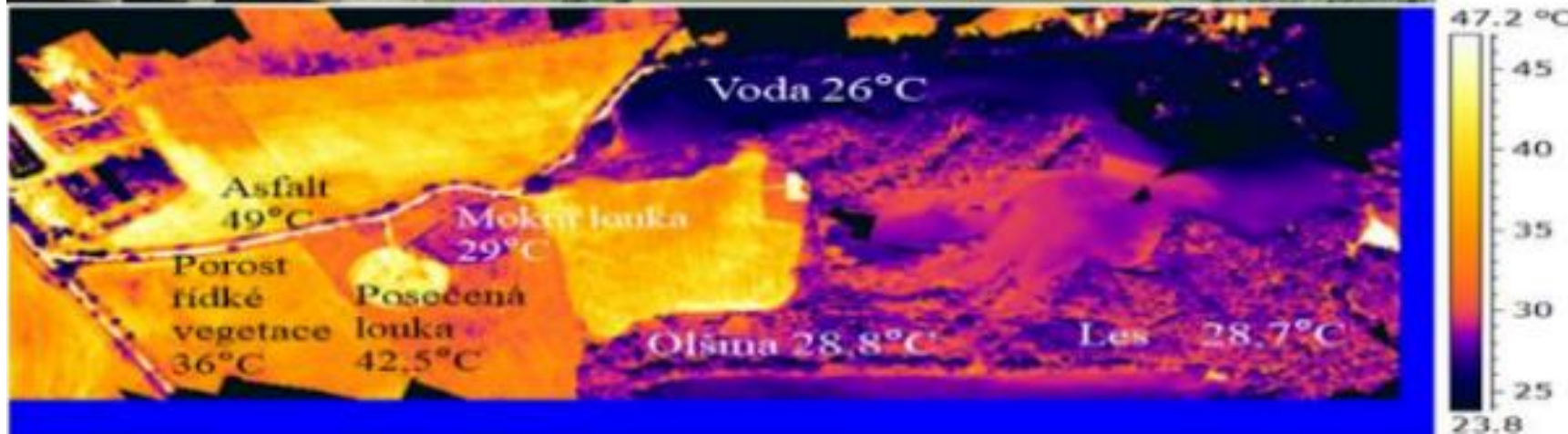
Components of small water cycles:

1. Land plots (m^2)
2. Soil
3. Plants
4. Rainwater

Two important things:

1. We are losing water from small water cycles
2. We reduce water evaporation from the land and more heat remains in the troposphere

Soil, water and plants play a key role in managing and regulating temperatures



Heat impact of various land use is up to 100 times stronger ($150-200 \text{ W.m}^{-2}$) than radiative forcing due rise of CO_2 ($1-3 \text{ W.m}^{-2}$)

Sufficient water in the soil causes the transformation of solar energy into latent heat, which is then transported by water vapor into the colder layers of the atmosphere.

Daily heat transport can reach 6 KWh/m^2 . If the vapor descends, sensible heat accumulates in the lower troposphere.

Complex soil functions – ecosystem services of soil

As reservoir of water and carbon:

- groundwater recharge / carbon and water capture

As a basis for vegetation cover and space for soil biodiversity

- plants holder, ecological stability, food production, cooling effect

As a distributor of sunlight energy and rainwater

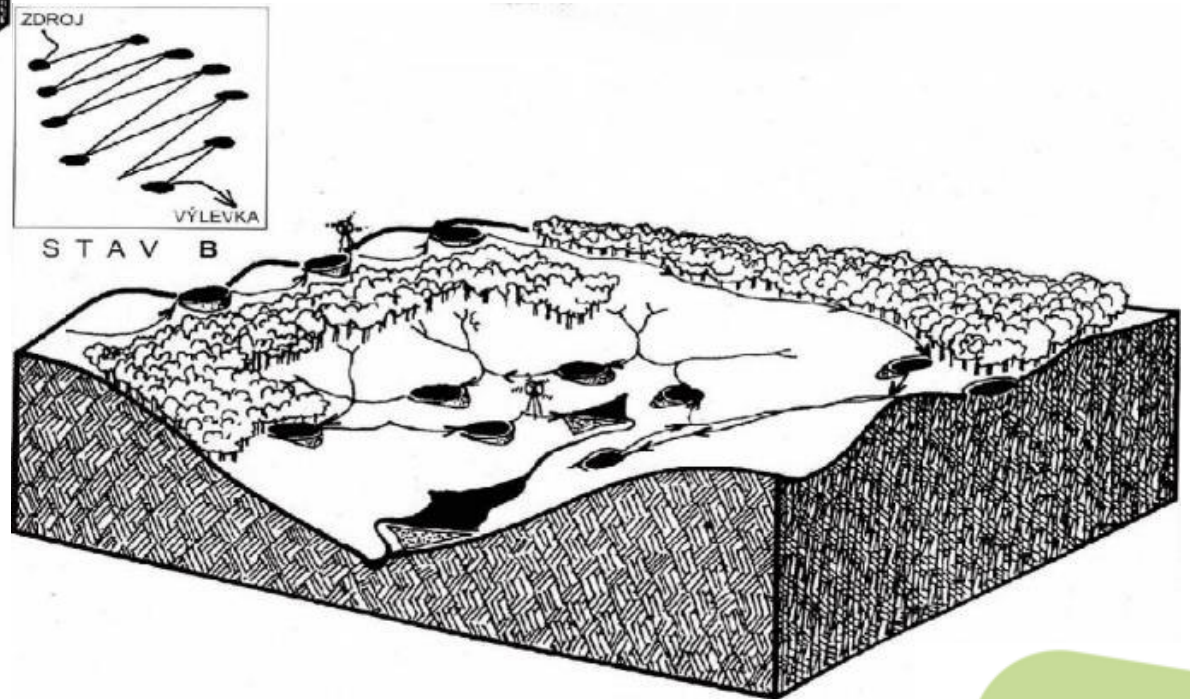
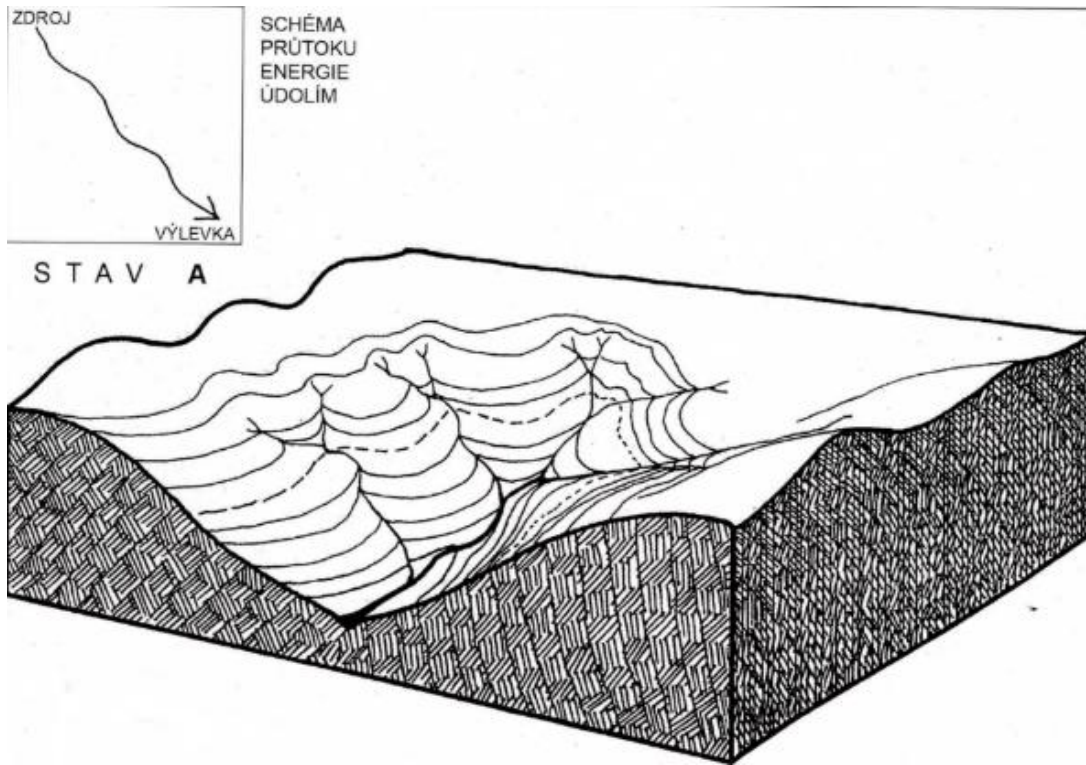
- rainwater and solar energy distribution; green and blue water recharge

As upper layer of plots is part of micro-catchments and catchments

- every land plot is micro river basin and has its size share on the climate stability

SOIL is crucial integration, transformation and distribution layer in systems of sustainable circulation / cycles – water, carbon, nutrients, energy in the country and environmental stability at local, regional, national, continental and global levels.





- **Till 2035 we need to increase water retention capacity of soil and landscape structures!**
- It would support groundwater recharge, food and biomass production.

- **Integrated water and soil planning on local level, good legislation support and rain water budgets!**
- **Every square metre or hectare of soil counts.** It has its share on rise or decline of flood and drought risks.

LENARTOV

Water retention capacity of soil and landscape structures = highly decentralised public good

stabilisation of erosion lines = landscape rehydration



ŤAHANOVCE

Rain water retention in upper parts of watershed is important for agricultural landscape as well !



Pastures on the slopes – rainwater retention case Torysa Community, Slovakia



Rainwater retention and anti-erosion measures case City of Košice, Slovakia



- Each cubic meter of retained rainwater produces around 3 kg of biomass (dry matter) and sequesters 4.2 kg of CO₂ through photosynthesis.
- And it will fertilize the soil by storing 1.2 kg of organic carbon



Adaptation Measures (one time)

Water retention and Anti-erosion measures; wetlands restoration; ponds
River and flood plain restoration, contour line and mosaic landscape structures

Blue and green infrastructure
New landscape features; reforestation

Increase of water retention capacity
of landscape structures

Management measures (all year)

Regenerative agriculture – agroforestry, no-till farming, regenerative pasture, Permaculture, Natural Sequence Farming
Holistic management, **soil structure**, **organic fertilisers** use; **cover crops**
Rain water harvesting, **crops rotation**

Increase of water retention capacity
of soil – soil health improvement

Common signs of sustainable agriculture

Land rehydration; increase of water retention capacity; **soil health improvement**; minimum soil compaction, **diverse and intensive landscape structures**, **diverse production**, carbon balance, ecological connectivity, **morphologically well oriented** blocks of agriculture land

90° - contour line architecture
50 m³/ha – rise of water retention
10 %/ha of land for structures

NO-TILL FARMING

example Krakovany





2014



2015



2021



2014



2022

BIOCLIMATIC PARKS AND FARMS

example DRIENOVÁ, Slovakia

2022

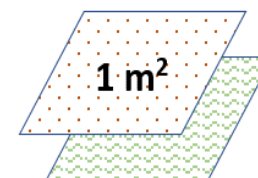


Draft targets of EU countries to increase water retention capacity of landscape structures until 2035

Global	Continental (km ³)		EU
750 km ³	Australia and Oceania	49	23 km ³
	Africa	167	
	America	232	
	Asia	245	
	Europe	57	

Climate landscape
1 m² of land - basic climate unit / pixel

1 m² = 1 CPx
1 000 m² = 1 kCPx
1 000 000 m² = 1 MCPx



– ► CPx MAX = 136 mil. km² = 136 mil. MCPx
share of your land / size of landscape

◀ – production capacity, utility functions
and
◀ – ecosystem services at the same time

27 EU (km³ target of member state)

0,47 - Austria	0,17 - Belgium	0,62 - Bulgaria	0,31 - Croatia	0,05 - Cyprus
0,44 - Czechia	0,24 - Denmark	0,25 - Estonia	1,88 - Finland	3,04 - France
1,98 - Germany	0,73 - Greece	0,52 - Hungary	0,39 - Ireland	1,67 - Italy
0,36 - Lithuania	0,36 - Latvia	0,01 - Luxembourg	0,002 - Malta	0,23 - Netherlands
1,74 - Poland	0,51 - Portugal	1,32 - Romania	0,27 - Slovakia	0,11 - Slovenia
2,81 - Spain	2,50 - Sweden			



Comprehensive recovery of ecosystem services of soil and landscapes structures by rainwater – small water cycles recovery



Košice Region:
6 755 km²
440 villages and towns

Valuing and funding soil and landscape ecosystem services

A new component of state soil policy

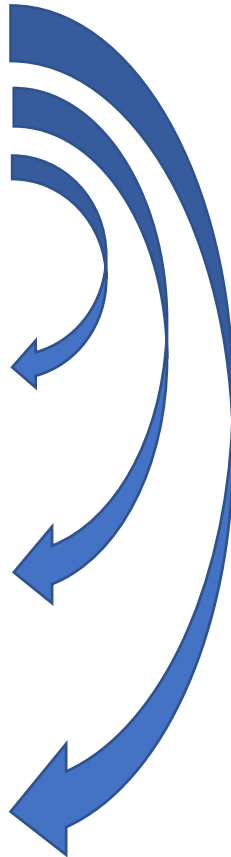
Innovations from Slovakia / AKIS

SOIL – CARBON AND WATER BANK OF THE LANDSCAPES - Slovakia concept of valuation and financing of soil and landscape ecosystem services

1. SOIL - INFORMATION AND MONITORING SYSTEM

2. CARBON AND WATER BANK - certification system

3. CLIMATE FUND FOR SOIL SYSTEM - new financial instrument for support of soil climate actions



Agricultural knowledge base NEXUS:
soil – water –
vegetation –
climate –
food – energy

Research *for integrated NEXUS approach*

- **Integrated water and soil planning** – local level of planning and effective use of data
- Role of plants and water vapor in photosynthesis, for cooling effect and water cycle flow
- **Biotic pump principle** – application for crop production, reforestation and landscaping
- Sustainable water, carbon and nutrition **cycles as a integral part of circular bioeconomy**
- **Assessment methods** of climate and hydrology impacts of land use and land use change
- **Key indicators of soil health and climate stability** – monitoring, assessment of annual changes, cumulative impact of changes, use of data for decision making processes

Innovations in sustainable agriculture

Assessment and funding ecosystem services of soil and landscape • *New task of land users (farmers, forester managers) – water retention and production* • **Assessment of the impact of land use on climate** • *Cooperation of land users for soil health and rainwater management* • **Local water and soil planning** • *CAP after 2027* • **Multilevel integrated information and monitoring system for soil and water**

Thank you for your attention

Martin Kováč, State Secretary



Overview of R&I activities supporting sustainable management of natural resources for agricultural production

Luis Sánchez
European Commission, DG AGRI

Horizon Europe Strategic Plan 2021-2024



Key strategic orientations: **B. RESTORING EUROPE'S ECOSYSTEMS AND BIODIVERSITY, AND MANAGING SUSTAINABLY NATURAL RESOURCES**

Advance **knowledge**, build **capacities** and provide innovative **technologies** and **solutions** to support the state and functioning of ecosystems, to ensure a clean and healthy environment and a **sustainable management of natural resources that provides for our needs and contributes to climate neutrality and adaptation.**

Cluster 6 FOOD, BIOECONOMY, NATURAL RESOURCES, AGRICULTURE & ENVIRONMENT

Climate neutrality and adaptation to climate change

Preservation and restoration of biodiversity and ecosystems

Food and nutrition security for all from **sustainable food systems** from farm to fork

Balanced development of rural, coastal and urban areas



EU Mission: 'A Soil Deal for Europe'

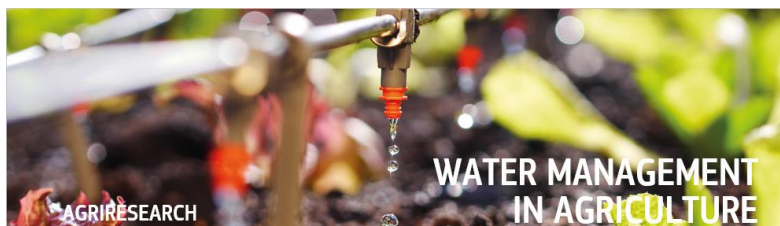
100 living labs and lighthouses to lead the transition towards healthy soils by 2030

Sustainable management of natural resources: Horizon Europe (2021-2022)



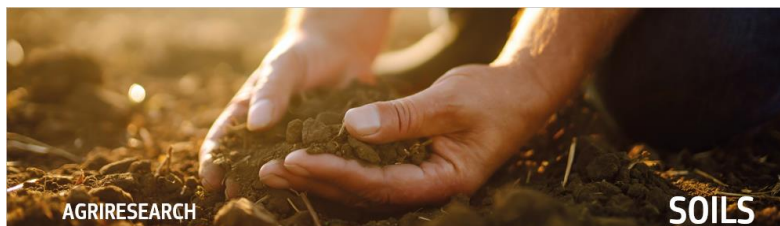
Fertilisers and nutrient management
26 projects € 129 million

Sustainable nutrient management
Alternative bio-based fertilisers
Fertigated crops



Water management in agriculture
34 projects € 145 million

Water use efficiency
Water stress resilience
Water and wastewater reuse

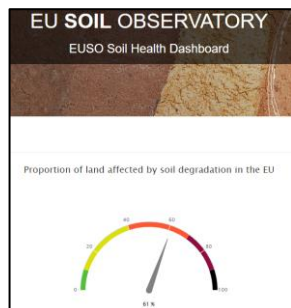


Soils and the EU Mission 'A Soil Deal for Europe'
48 projects € 304 million

Soil biodiversity
Decontamination
Soil health indicators & monitoring
New business models



EU Mission 'A Soil Deal for Europe'



Over 60% of soils in Europe considered unhealthy

Goal of the Mission: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

1. Reduce **desertification**

2. Conserve **soil organic carbon stocks**

3. Stop **soil sealing** and increase re-use of **urban soils**

4. Reduce **soil pollution** and enhance **restoration**

5. Prevent **erosion**

6. Improve soil structure to enhance **soil biodiversity**

7. Reduce the **EU global footprint on soils**

8. Improve **soil literacy** in society

- Objectives apply to **all types of land use and all territories** and are relevant for a **range of sectors**.

Real-life sites in rural or urban areas in which people from various sectors and backgrounds experiment and **test solutions** in a co-creative manner.



Sustainable management of natural resources: Horizon 2020

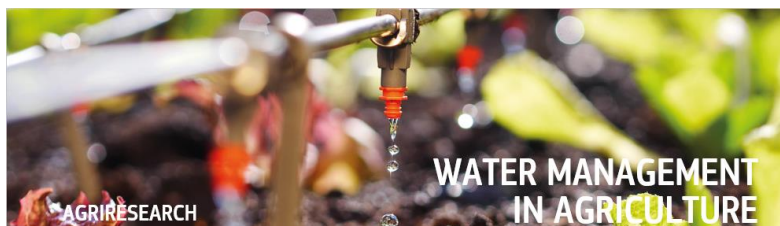


Fertilisers and nutrient management

90 projects

€ 623 million

[CORDIS Results Pack on nutrient management: Innovative research for sustainable fertiliser production and nutrient management](#)



Water management in agriculture

179 projects

€ 420 million

[CORDIS Results Pack on water innovation: innovative technological solutions for ensuring Europe's present and future water security](#)



Soils

59 projects

€ 371 million

[CORDIS Results Pack on soil health: Soil health: Reaping the benefits of healthy soils, for food, people, nature and the climate](#)



Successful projects



Practical solutions to improve current **carbon, nitrogen and phosphorus cycling** in European agro-ecosystems.



Guidelines to enhance the **use of alternative fertilisers**



Innovative technologies and practices for **fertigation of horticultural crops**



Photovoltaic irrigation systems: zero energy, low water consumption



Improving **crop efficiency** for water and nutrient use



Techniques for the **retention and reuse of water and nutrients**



Link between **soil biodiversity and the quality of olive production**



Assesses the use of different **plastic polymers in agricultural systems** the resulting types and concentrations of micro- and nanoplastics (MNPs)



Develops an integrated **soil health monitoring framework** including a soil health dashboard

Instruments to boost sustainable management of natural resources

Research & Innovation



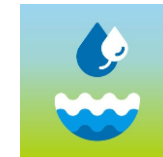
EU co-funded partnerships



Missions



'A Soil Deal for Europe'



'Restore our Ocean and Water'

Innovation & Knowledge exchange



Focus Groups

- Fertiliser efficiency
- Nutrient recycling
- Digital tools for sustainable nutrient management
- Circular Horticulture
- Nature-Based Solutions for water management
- Protecting agricultural soils from contamination
- Soil salinisation
- Water & agriculture: adaptive strategies at farm level



Panel discussion

Dr. Liisa Pietola

The Finnish Innovation Fund Sitra; Member of the Mission Board for the Soil Deal for Europe Mission

Dr. Anna Osann

AgriSat Iberia S.L and Universidad de Castilla-La Mancha, Horizon 2020 Project FATIMA, FaST Navigator

Dr. Shamie Zingore

African Plant Nutrition Institute (APNI)

Dr. Panos Panagos

JRC DDG2.D3 Land Resources and Supply Chain Assessments

EU AgriResearch
CONFERENCE 2023

Co-creative discussion



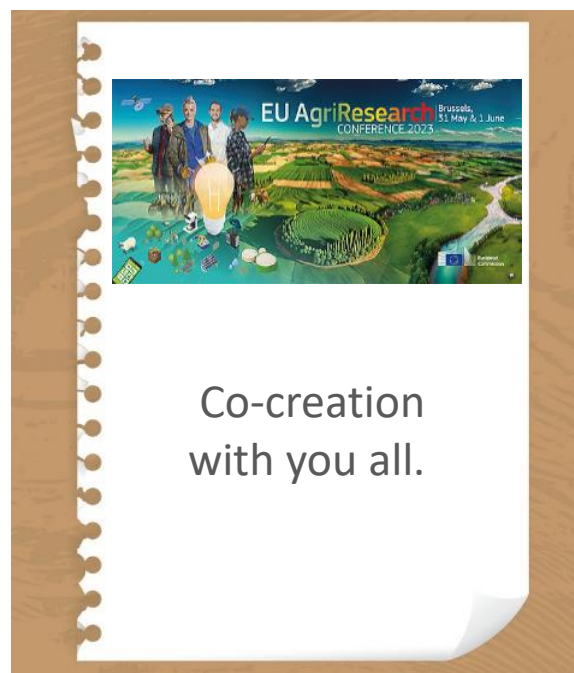
Participants, have your say!

#AgriResearch



Your ideas are essential for Horizon Europe and beyond

HE Cluster 6 Food, Bioeconomy, Natural Resources, Agriculture and Environment and the Mission 'A Soil Deal for Europe'



Strategic Plan 25-27

Work Programme(s)
2025 to 2027

Next EU R&I Programme and CAP
after 2027

EU AgriResearch
CONFERENCE 2023

#AgriResearch



The questions

1) Question 1: What are the research needs in this area?

2) Question 2: How should those needs be delivered through research and innovation?

Meaning of 'how': consider in your reply to question 2 the following elements, *for example*:

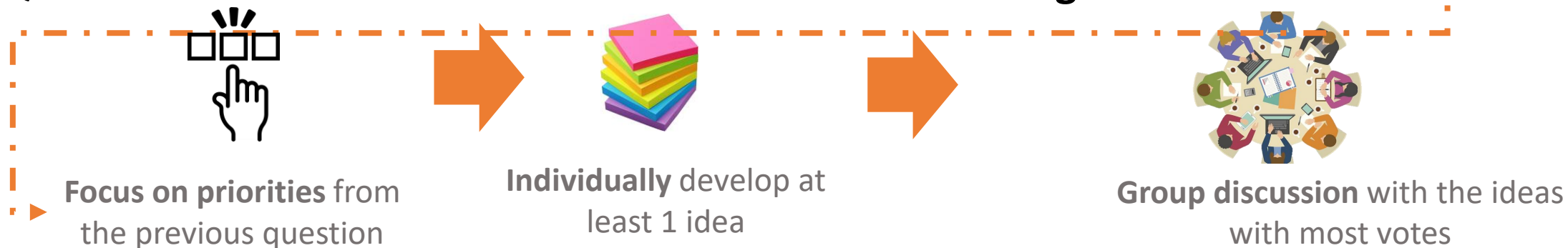
- Basic research, innovation?
- Standardisation, communication and networking, align research agendas?
- If technological developments expected, what level of maturity? Experimental proof of concept, validation/testing in the lab or related real environment, prototyping...
- Involve other actors beyond researchers/innovators? Which ones?
- International collaboration is key and if so with which regions?
- Other major initiatives to be aware of for consideration and/or collaboration?
- New ideas?

Co-creation

Question 1: What are the research needs in this area?



Question 2: How should those needs be delivered through research and innovation?





EU AgriResearch

CONFERENCE 2023

THANK YOU