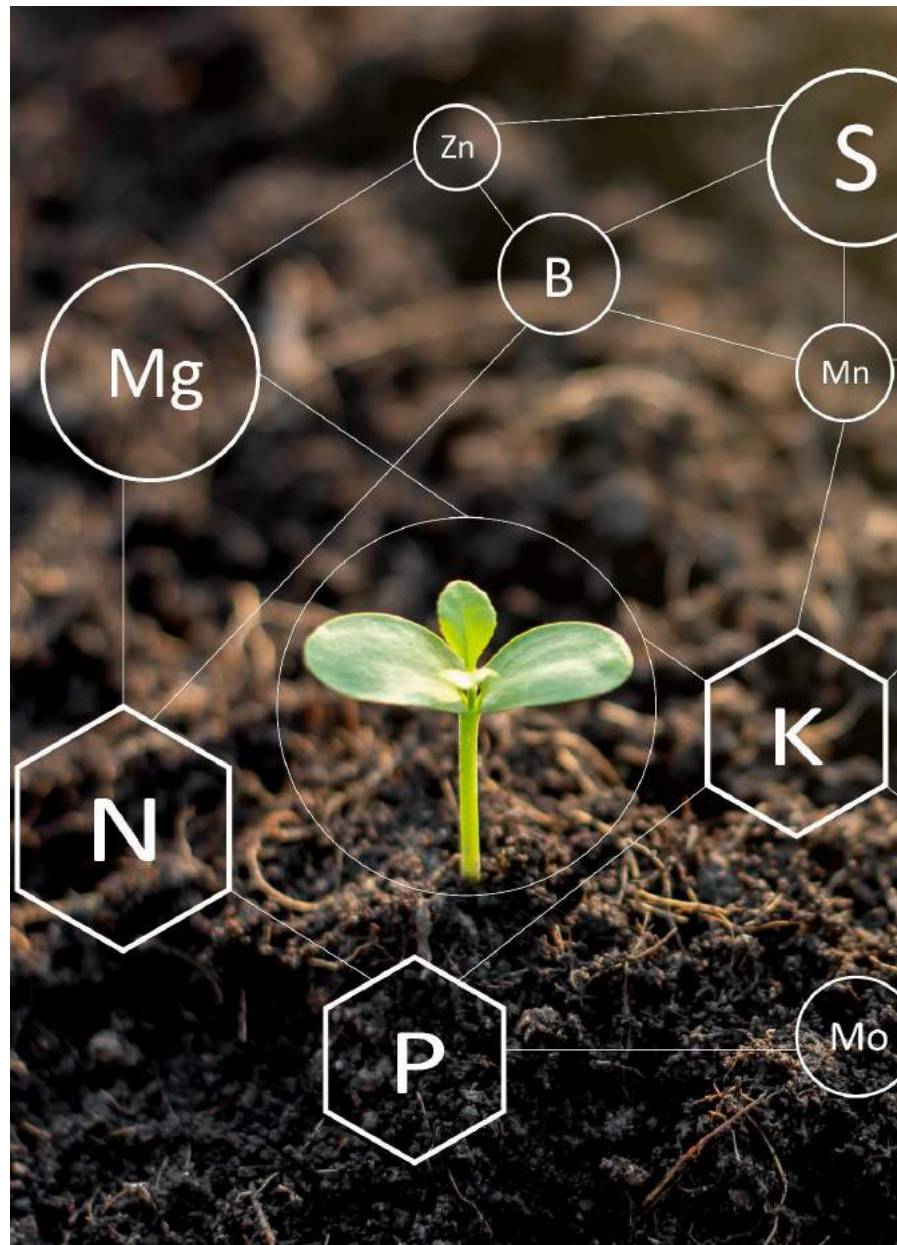


SOIL HEALTH

Strengthening the Water-Soil Nexus for a Resilient Ecosystem and a Circular Society





Table

Introduction

Healthy soils are a crucial element for a Water-Smart Society.

Recommendation

We need to unleash the water-soil nexus to better manage our resources for climate mitigation.

At a glance

Relevant data related to healthy soils.

Best Practice

Examples of best practices from Water Europe's Research and Innovation Programmes.

Water-Soil Nexus in Europe

CREATE A WATER-SMART FRAMEWORK FOR HEALTHY SOILS

Water Europe has set out a blueprint for a Water-Smart Society in which the true value of water is recognized and realized, and all available water sources are managed in such a way that water scarcity and pollution of water are avoided, water and resource loops are largely closed to foster a circular economy and optimal resource efficiency, while the water system is resilient against the impact of climate change events, and all relevant stakeholders are involved in the governance of our water system.



Introduction

Water Europe has set out a blueprint for a Water-Smart Society in which the true value of water is recognized and realized, and all available water sources are managed in such a way that water scarcity and pollution of water are avoided, water and resource loops are largely closed to foster a circular economy and optimal resource efficiency, while the water system is resilient against the impact of climate change events, and all relevant stakeholders are involved in the governance of our water system.

Water Europe welcomes the [public consultation](#) for a Soil Health Law in line with the European Green Deal, the Zero Pollution Action Plan and the Healthy Soils Strategy. Stressing the interdependencies of environmental and economic

sectors, this new law shall provide not only a crucial basis for a resilient ecosystem but also for many other services, such as energy, raw materials, carbon sequestration, water purification and infiltration.

In April 2021, The European Parliament stresses the importance of achieving a so-called 'water-smart society' to support the restoration and protection of soil, as well as of exploring the close relationship between soil health and water pollution; including the use of the relevant digital tools to monitor the status of water and soil and the effectiveness of policy instruments ([European Parliament resolution of 28 April 2021 on soil protection \(2021/2548\(RSP\)\)](#)). Therefore, the European Commission shall include in its legislative proposal:

Unleash

THE WATER-SOIL NEXUS THROUGH AN INCLUSIVE GOVERNANCE

Stricter monitoring and transparency of environmental data are key to sufficiently address soil and land degradation, particularly in the context of co-benefits for the water-soil nexus. Protection of soil health, their sustainable use and their restoration when needed as impact on water quality and quantity. It means:

- **Monitor the parameters of soil texture**, particularly the contaminated sites (unhealthy soils in bad physical and chemical conditions) and the evolution of the texture in the upcoming years (degradation or improvement). 60-70% of soil ecosystems in the EU are estimated to be unhealthy and suffering from continuing degradation resulting in reduced provision of ecosystem services ([European commission, 2022](#))
- **Transparent and accessible data shall be publicly accessible**, through website and land certificate, for instance. With the objective of the digitalization of Europe, digital water and other tools can offer these services (e.g. [Hydrousa](#) project). Moreover, [Water-oriented Living-Labs](#) shall be promoted to ensure the development and deployment of innovative solutions and new businesses while being based on inclusive governance.



Encourage

BETTER WATER QUALITY AND CIRCULAR MATERIALS MANAGEMENT

Improper water management and overexploitation and consumption of natural resources lead to poor texture of soils and consequently unhealthy soils. The Soil Health Law shall look at the value of water and exploiting the value in water to improve water quality and quantity which will have co-benefits for soil management:

- **Better exploit the value in water** such as substances and raw materials (eg. Nitrogen, phosphorus, minerals) to improve texture of soils. Several solutions exist to extract N and P from wastewater flows or to use wastewater for crops irrigation and agricultural fertilization, while contributing to tackle water scarcity ([Water Europe](#)).
- **Encourage legal clarity and harmonisation on the use of building materials based on reused index.** Waste disposal remains the first source of soil contamination with indirect impact on water quality.
- **Encourage water efficiency** to prevent pollution, soils degradation and ensure water availability for all uses, including environmental purposes. Similarly to the [Regulation on minimum requirement for water reuse](#) and the [Circular Economy Action Plan](#), the Soil Health Law should encourage water efficiency and reuse for urban and industrial activities, including mining activities.
- **Support better groundwater and surface water quality.** Paired with monitoring and targets in line with the Water Framework Directive, the soil health law shall ensure reduction of pollution emissions into water, soil and air to reduce the impact on soil health. It shall include targets to remediate contaminated sites.

Mitigate

CLIMATE CHANGE AND POLLUTION WITH ADEQUATE SOLUTIONS

Too much, too little and too polluted water impacts directly soil health via erosion, depletion, droughts, and floods. For instance, in 2017 around 5% of total GHG emissions from EU came from drained peatland ([Joosten \(2009\) The Global Peatland CO2 Picture](#)). As expressed in Water Europe's [policy-related paper](#) on the Healthy Soils Strategy, the Soil Health Law shall:

- **Contaminated soils should be handled according to the most sustainable treatment method, to not affect future generations.** The law shall support the implementation of solutions to mitigate climate change and previous pollution, particularly through nature-based solutions. It will contribute to a stable presence of rich organic soil, avoid an enormous amount of greenhouse gas (GHG) emissions, restore biodiversity, and contribute to water storage and the soil's resilience against wind and water erosion, preventing mudflows and dust storms.
- **Consider the inclusion of the 'technical subsidiarity principle'** in the legal framework for water management to encourage the implementation of green infrastructure facilities ([Water Europe 2021](#)).

Water-Soil Nexus

At Glance

The Water-Soil Nexus will support the restoration and protection of soil in order to achieve a resilient ecosystem.

60-70%

of EU's soil ecosystems are estimated to be unhealthy and suffering from continuing degradation resulting in reduced provision of ecosystem services
([European commission, 2022](#))

in 2017 around

5% of total GHG

emissions from EU came from drained peatland
([Joosten \(2009\) The Global Peatland CO2 Picture](#))

Soil processes underpin several economic activities (such as agriculture, energy production and construction), environmental services (e.g. flood protection, climate change and biodiversity) and many cultural activities (e.g. tourism, leisure)
([JRC](#))

Soil hosts more

than **25%**

of all biodiversity on the planet

Soils will need to feed and filter drinking water fit for consumption for a global population of nearly

10 billion

people by 2050

Best Practice

Investing in research and development to find and deploy technological solutions is key. Below four examples of EU Research projects that demonstrate the feasibility and limits of an ambitious water-soil nexus.

NEXTGEN PROJECT



[NextGen](#) is a project financed by the European Union's Horizon 2020 research and innovation program (agreement No. 776541) which aims to boost sustainability and bring new market dynamics throughout the water cycle in its 10 demo cases and beyond. The project will assess, design and demonstrate a wide range of water-embedded resources, including energy, raw materials and water reuse. The NextGen deployment is paired with the definition and cultivation of a successful framework for involving and engaging citizens or other stakeholders, and also addressing social and governance challenges.

The demo cases cover water reuse and management, resource recovery, nature-based solutions, the energy-water management while decreasing CO2 and greenhouse gas emissions.

In the case of [La Trappe Brewery](#) in the Netherlands, technologies are used to create water for reuse: primarily as irrigation water. Moreover, recovering carbon, nitrogen, and phosphorus materials allows to use them as a plant fertilizer or as microbial protein for various applications.

The different benefits and recommendations of the project are also available in the workshop report of the European Commission - [Water in the circular Economy policy development](#) – which gathers findings from demo cases of six Horizon 2020 projects.



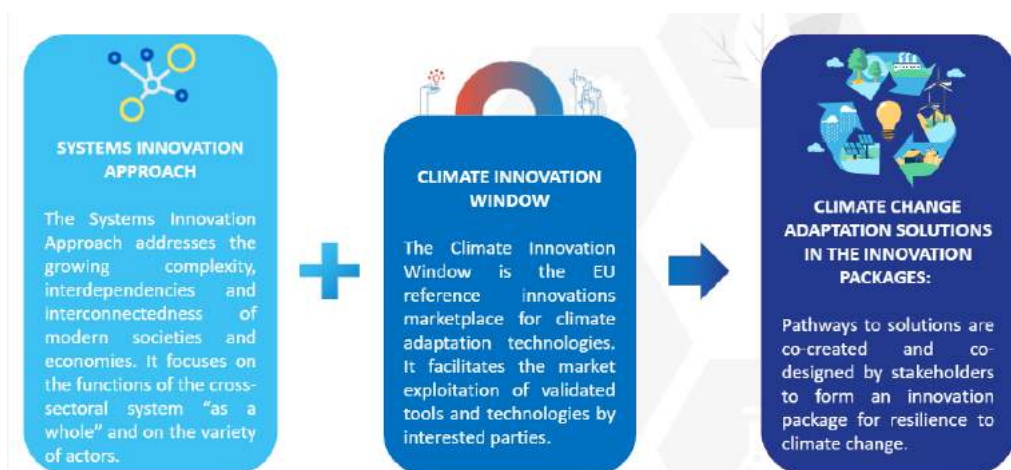
ARSINOE PROJECT

The [ARSINOE](#) project will shape the pathways to resilience by bringing together SIA (Systems Innovation Approach) and CIW (Climate Innovation Window) with the purpose to build an ecosystem for climate change adaptation solutions.

The project aims to facilitate a transformation of economic, social and financial systems for decarbonisation and climate resilience, also by supporting communities and scientists. It offers advanced environmental intelligence services and tools for cooperation and collaboration.

The [case study 6](#), in the black sea area, focuses inter alia on Nature Based Solutions and the evaluation of the resilience of biofiltration bacteria and new farming practices on salted soils, are expected to have significant impact in one of the most important European ecosystems.

The [case study 9](#), in the region of Sardinia in Italy, is working on an innovative use of water, for rainfed extensive crops, coupled with a sustainable land, in order to increase yields and stabilize staple food production in local food chains.



Best Practice

WATER MINING PROJECT



[Water Mining](#) is a project financed by the European Union's Horizon 2020 research and innovation program (agreement No. 869474). The project expects to develop innovative technologies for:

- a more energy-efficient and less polluting desalination process,
- more sustainable techniques for extracting valuable products from urban wastewater residues such as phosphates and other bio-based valuables products, and
- producing pollution-free industrial wastewater through a Zero-Liquid-Discharge loop system.

The project also aims to increase public awareness about water management, promote new circular economy business models within the wastewater cycle, attract public and private funding for the upscaling of the methodologies developed, and develop adequate policy and regulatory measures.

The project involved 38 partners around 6 sector specific case studies. The project partners are considering resource recovery in industrial and urban infrastructures but also related to desalination. It demonstrates that a holistic approach in line with the Water-Smart Society vision is valuable for a comprehensive nutrient management action plan in Europe.



HYDROUSA PROJECT

[HYDROUSA](#) is an international cooperation between 27 partners focusing on innovative and nature-based water management and water treatment solutions. The project is financed by the European union's Horizon 2020 Research and Innovation Programme (Grant agreement No. 776643). HYDROUSA is based on traditional handcraft and ancient technologies combined with modern NBS, ICT connection and automation systems to generate green growth with an existing and demanding market while restoring ecosystems. It shows a perfect combination of building green infrastructures to make use of the plant-bearing benefits, while closing system loops.

The projects aim to solve the water supply and wastewater issue, the biodiversity and nutrient loss as well as the availability of jobs. The whole water value chain will benefit from this approach: e.g., new standardization procedures for technical equipment or organic farming, new methods for decentralized urban farming with wastewater, new business models with leasing of biogas equipment, new open data citizen science activities, farmers utilizing and commercializing new systems, etc. For instance, the [demo case 2 on Lesbos](#), Greece, is focusing on an agroforestry system that is fertigated using reclaimed water with a high nutrient content.



