

SentinelSpringS – Springs as sentinels of climate change and sustainability of aquatic ecosystems

Summary

Springs, often called “windows into the Earth,” are crucial natural groundwater discharge areas that support unique ecosystems and serve as indicators of environmental changes. Despite their significance, research on their aquatic ecosystems and a standardised monitoring methodology is lacking in Europe, leading to fragmented and inaccessible data.

Importance and Challenges of Springs

- **Environmental Indicators:** Springs are sensitive to global climate change, land-use practices, and variations in water quantity and quality. They provide early warnings of environmental degradation.
- **Socio-cultural Significance:** Springs often hold deep socio-cultural value and are vital for sustainable development.
- **Policy Recognition, Research Gaps:** Although the Water Framework and Groundwater Directives acknowledge their importance, there is limited research on spring aquatic ecosystems and their dependent species.
- **Inconsistent Data:** The absence of a standardised methodology for monitoring and assessing springs has led to an inconsistent inventory, classification, and data analysis across Europe. This hinders the development of effective protection strategies.
- **Vulnerable Ecosystems:** Springs act as pivotal gateways between groundwater and aquatic ecosystems and are themselves dynamic and vulnerable, making their quantitative and chemical status vital for the ecological health of connected water bodies.

The SentinelSpringS project proposes an integrated approach to address these challenges, focusing on monitoring springs' water and biodiversity status.

- **Integrated Monitoring:** It combines hydrological and participatory spring monitoring with bioindicators to provide early warning signals of ecosystem health.
- **Cost-Effectiveness:** Monitoring springs can be more cost-effective than relying solely on wells,

especially if participatory monitoring is included.

- **Key Question:** The project aims to identify factors responsible for the sustainability of springs as habitats for unique biodiversity and providers of aquatic ecosystem services.

Scientific Goals:

- Develop consistent terminology, classification, and monitoring methodologies for sustainable spring management.
- Identify and characterise ecosystems dependent on springs.
- Identify major threats to spring sustainability and their aquatic ecosystem services across diverse European habitats.
- Develop management frameworks adaptable to different climate change scenarios.

Strategic Goals:

- Create a standardised framework for spring monitoring.
- Establish an open-access European database for spring data.

Policy Goals:

- Promote the integration of spring quantity, quality, and ecology data into EU and national groundwater assessment and monitoring programs.
- Improve the holistic integration of hydrology and ecology in EU policies and the implementation of the Water Framework Directive.

SentinelSpringS aligns with the European Green Deal, the Biodiversity Strategy, and several UN Sustainable Development Goals (especially 6, 12-15). It contributes to international research on maintaining Earth's viability and assists environmental agencies and working groups involved in ecological status, groundwater, data sharing, and water scarcity. Ultimately, the project seeks to enhance the management and conservation of Europe's vital spring aquatic ecosystems.

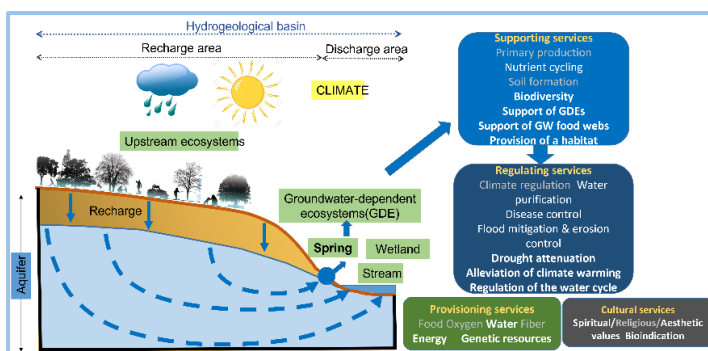


Figure 1. Groundwater pathways and their associated ecosystem services.



Project Reference

Water4All/0010/2023
<https://doi.org/10.54499/Water4All/0010/2023>

Leading Institution

IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal)

Partners

GEUS – Geological Survey of Denmark and Greenland (Denmark), UniTo – University of Turin (Italy), BRGM – Bureau de recherches géologiques et minières (France), EWA – Energy and Water Agency (Malta), TUL – Lodz University of Technology (Poland)

CERIS Principal Investigator

Ana Silva
ana.c.f.silva@tecnico.ulisboa.pt

CERIS Research Team

Maria Teresa Condeso de Melo, João Nascimento, Rodrigo Proença de Oliveira

Funding

FCT – Fundação para a Ciência e a Tecnologia (Water4All 2023 Joint Transnational Call)

Period

2025-2028

Total

1 262 193.00€

CERIS

160 000.00€

Project website

<https://sentinelsprings.eu/>

Project social media

