

Policy Brief: Building a Water- Smart Agriculture – transforming water management for resilience farming.



Rodrigo Sedano *projects@watereurope.eu*

Loic Charpentier *loic.charpentier@watereurope.eu*

The [GEORGIA](#) project aims to demonstrate how integrated water management, soil health, and digital innovation can strengthen the resilience of European agriculture to climate change. Aligned with the European Green Deal, GEORGIA combines circular water use, nature-based solutions, and AI-enabled decision-support tools to improve irrigation efficiency, safeguard soils, and support farm competitiveness. By validating these approaches in real farming conditions, the project provides evidence to inform future agricultural and water policies.

KEY CHALLENGES

European agriculture faces increasing difficulty in securing sufficient water of adequate quality while maintaining soil health under climate pressure. The main challenges include:

- Diffuse pollution of water resources: More than 220,000 tonnes of chemical fertilizers and pesticides used annually in the EU,

contaminating aquifers, threatening fragile ecosystems and driving up the cost of crop production¹.

- Growing water stress and irrigation dependence: 40% of the EU territory is under water stress. Agriculture accounts for 51%² of total water consumption in the EU and consequently require the deployment of irrigation infrastructure to maintain water provision for farming activities.
- Inefficient water use in irrigation: Over 70% of available fresh water is used for crop irrigation with more than 60% of irrigation water lost to overirrigation³.
- Soil degradation linked to irrigation practices: Overirrigation disrupts root-zone aeration and microbial function, increases root and foliar disease risk, and causes deep percolation that leaches nitrogen and other nutrients, all of which reduce soil fertility and long-term productivity.

POLICY CONTEXT

In its Vision for Agriculture and food, the European Commission encourages incentivise and support for farming practices that recover, maintain or improve soil health, such as organic farming and agroecological approaches that increase soil water retention.

In its Water Resilience Strategy, the EU Commission set a batch of actions to:

- prevent and reduce unsustainable land use and management as well as hydro-morphological changes, and structural mismanagement of water.
- Limit the nutrient pollution of aquatic ecosystems deploying solutions based on integrated nutrient management as a means of restoring water quality.

¹ L. Porfirio, D. Newth and J. Finnigan, "Economic shifts in agricultural production and trade due to climate change," Palgrave Communications, vol. 4, p. 111, 2018.

² EU-CAP Network, *Climate risk to resilience: shaping a water-smart Europe, 2025*, https://eu-cap-network.ec.europa.eu/publications/climate-risk-resilience-shaping-water-smart-europe_en

³ "ISO and Water, 2021, <https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100293.pdf>

- Encourage digitalisation and artificial intelligence for better monitoring and decision support to accelerate and simplify sound water management.

In parallel, the Common Agriculture Policy (CAP) and its national Strategic Plans provide financial support and incentives for agricultural practices to improve water efficiency, circularity, and soil water retention, and reduce pollution.

Despite strong policy ambition, implementation remains uneven across Member States due to regulatory complexity, limited advisory capacity and access to digital tools, fragmented digital infrastructure, and high upfront investment costs. GEORGIA responds directly to this implementation gap by testing and demonstrating practical and scalable solutions capable of translating European policy objectives into concrete on-farm and catchment-level action. The project can also contribute to the Digitalisation Action Plan and its potential impact for a water resilient agriculture, by developing digital platform to support water-smart agriculture.

POLICY RECOMMENDATIONS

The recommendations presented below build on evidence generated by the GEORGIA project and on the outcomes of [Water Project Europe](#) session held in October 2025⁴, in cooperation with the EU-funded projects RAINS, UNIVERSWATER and FARMWISE.

These exchanges focused on the role of digital innovation for water management in agriculture, as well as on how resource recovery and water efficiency contribute to sustainable farming practices and summarised in a dedicated White Paper⁵.

ACCELERATE DIGITALISATION FOR WATER-SMART FARMING THROUGH THE DIGITALISATION ACTION PLAN.

GEORGIA welcomes particularly the one-stop shop for Earth observation products in which solutions from GEORGIA could be considered. The project

⁴ Water Project Europe 2025,

⁵ GEORGIA, First White Paper

is encouraging the transformation of farming activities through solutions that blend AI with irrigation practices, combining:

- Advanced data integration and AI-driven irrigation via smart irrigation platform, federated data spaces and human-explainable AI decision⁶.
- Holistic environmental data fusion that combines IoT sensor data with weather and satellite observations to support irrigation, fertilisation and soil-health decisions.
- Multi-source earth observation and geospatial application via satellite data integration and regenerative agriculture support.
- Crop Digital Twins combined with simulation and AI models to represent crop–soil–environment processes dynamically and test management scenarios.

Interoperability between digital platforms should be ensured through common data models and open interfaces, so that farmers can switch providers without losing data or functionality.

The development and implementation of initiatives such as Destination Earth and the EU Digital Twin of the Ocean applications should consider agricultural water use and best practices from the farming sector, ensuring coherence across climate, water and food systems.

The development of such digital tools should ensure technological convergence and a holistic, user-centric approach, so that solutions are accessible, scalable, and aligned with farmers' real operational needs. These requirements will guide the development of the GEORGIA platform⁷.

ENABLE CIRCULAR WATER USE AND NUTRIENT MANAGEMENT BY INCLUDING GEORGIA'S VALIDATED SOLUTIONS IN THE ASSISTANCE TOOLBOX FOR MEMBER STATES.

GEORGIA is developing packages of water-smart solutions for farming activities that promote digital solutions, water efficient solutions as well as

⁶ During Water Project Europe, FARMWISE and UNIVERSEWATER presented their platforms that integrates physics-based modelling and remote sensing with artificial intelligence tools to support decisions on water quantity and quality.

⁷ GEORGIA, *D1.1: Irrigation, soils and crop requirements, drivers, and barriers analysis*, 2025.

optimisation of soil moisture, and enhance local water cycles. Example of these include:

- Wastewater and sludge reuse: Demonstration of safe and efficient irrigation using treated wastewater and biosolids, adapted to local regulatory and agronomic conditions.
- Rainwater harvesting and storage systems: Implementation of small-scale infrastructures to capture and store rainwater for supplementary irrigation during dry periods.
- Atmospheric water condensation technologies: Exploration of emerging approaches to capture atmospheric moisture as an alternative water source.
- BioWAG (biodegradable water-absorbing geocomposites): Innovative soil conditioners designed to improve soil moisture retention and reduce irrigation demand.
- Nature-based Solutions (NBS): Integration of green infrastructure, such as vegetated buffer zones, retention features, and soil health practices, to enhance water retention and reduce runoff.

THE REVIEW OF THE WATER REUSE REGULATIONS SHOULD LOOK AT UNLOCKING EFFECTIVE IMPLEMENTATION OPPORTUNITIES.

GEORGIA welcomes the proactive approach of the European Commission while ensuring water reuse safety. Still some countries do not allow wastewater reuse for agriculture⁸. Unlocking water reuse opportunities within a systemic approach of irrigation should be a priority.

More communication action should be developed to support visibility and connect field evidence to Common Agricultural Policy instruments and national reuse regulations, so that farmers see practical routes to cover CAPEX/OPEX, and authorities see basin-level benefits in quantified form. Financial support should be considered as upfront investment required for advanced irrigation infrastructures, sensors, or water reuse systems is often prohibitive, particularly for small and medium-sized farms.

Regulatory simplification should be also considered around the Water Framework Directive and the EU regulation on minimum requirements for water reuse, particularly looking at permitting.

⁸ GEORGIA, *D6.1 DMP and Pilot planning Details*, 2025

CONTINUE TO INCENTIVISE FARMERS TO IMPROVE THE ENVIRONMENTAL AND CLIMATE PERFORMANCE OF THEIR HOLDINGS, INCLUDING TOWARDS BETTER WATER MANAGEMENT.

The transition towards water-smart agriculture requires not only technological innovation but also favourable economic, regulatory, and social conditions. GEORGIA's integrated approach requires pathways that connect technology providers, farmers, water managers, and policymakers in a common framework. Demonstration cases and participatory engagement activities carried out in GEORGIA show how co-creation builds ownership, trust, and accelerates acceptance of innovation. Deployment of tools like Living Labs instruments should be supported, in line with the Soil Deal for Europe and the Zero Pollution Strategy.

SUPPORT A SOURCE-TO-SEA APPROACH WITHIN GOVERNANCE AROUND WATER-SOIL NEXUS MANAGEMENT.

RAINS has developed a basin-scale hydrological–nutrient–sediment model that adds the landscape perspective, tracing water, nitrogen, phosphorus, and sediments from plots to rivers and aquifers⁹. This connects field-level gains to river-basin outcomes, helping cooperatives and authorities prioritise interventions and align reuse, nutrient, and retention strategies. This approach echoes with the Holistic Irrigation-Fertilization-Soil health optimization layer approach that GEORGIA aims to include in its AI based irrigation-fertilisation-soil health approach.

⁹ Rains EU-funded Project.

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