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Special Issue: Water Resources for Sustainable Agriculture Guest Editorial

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We are pleased to present this special issue of *Economia agro-alimentare/ Food Economy*, entitled *Water Resources for Sustainable Agriculture*, which contains four rigorously peer-reviewed articles, all written in English. This issue focuses on one of the most urgent and complex challenges of our time: the sustainable management of water resources in agriculture and food systems.

Why is addressing water resources crucial? Water is the foundation of life, food security, and agricultural productivity. However, growing pressures from climate change, population growth, and increased agricultural demand are profoundly changing the way societies perceive and manage this vital resource. Droughts, irregular rainfall, and competition between agricultural, industrial, and domestic uses are forcing policymakers, scientists, and farmers to reconsider traditional water management models.

In this context, research plays a vital role in providing evidence-based strategies, technologies, and governance models that can ensure the sustainability, resilience, and equity of water use. This special issue aims to contribute to this debate by presenting innovative studies that explore how different sectors of the agri-food system are adapting to water-related challenges.

The first article, *The contribution of national irrigation investment planning to sustainable water resource management in the Po River district*, by Raffaella Pergamo, Luca Adolfo Folino, Marianna Ferrigno, Marica Furini, Manal Hamam, Veronica Manganiello, Antonio Manzoni, Alessandra Pesce, and Benedetto Rocchi, highlights the fact that safeguarding water resources has become essential for the future of agriculture. Through an ex-post evaluation of irrigation investments in Italy's most irrigated area, the Po River Basin District, the authors propose a set of sustainability indicators that integrate technical, environmental, and social dimensions. The study emphasises the importance of coordinated policies to enhance irrigation efficiency and promote the rational use of water.

The second article, ***Grazing Impacts on Biodiversity, Carbon Cycle, Water Efficiency, and Animal Welfare: A Review***, by Giulia Pastorelli, Ilaria Falconi, Maria Assunta D'Oronzio, and Raffaella Pergamo, explores the complex interrelations between grazing systems and environmental sustainability. By applying the PICO (Population, Intervention, Comparison, Outcome) framework to European studies published between 2010 and 2025, the authors demonstrate that moderate, well-managed grazing can improve biodiversity, enhance water-use efficiency and support soil carbon sequestration. The review also emphasises that animal welfare and ecosystem health can be achieved together through integrated management approaches that combine traditional knowledge and precision technologies.

The third contribution, ***Sustainable water management in viticulture under climate stress: irrigation requirements and potential of controlled water deficit***, by Veronica Manganiello, Silvia Chiappini, Sofia Galeotti, Luigi Tarricone, and Raffaella Pergamo, focuses on Mediterranean viticulture, which is one of the sectors most exposed to climatic variability. The study utilises census data and geospatial analysis to estimate water requirements for vineyards and evaluate the potential of Regulated Deficit Irrigation (RDI) to increase water use efficiency without compromising grape quality. The findings underscore the pressing need for adaptive policies and site-specific technologies to sustain wine production in a warming climate.

The final article, ***Irrigation reuse of urban treated wastewater: a qualitative analysis to support crop production in Campania***, by Marica Furini, Veronica Manganiello, Raffaella Pergamo, Olga Addimanda, Valeria Battaglia, Antonio Manzoni, Sofia Galeotti, Manal Hamam, and Marianna Ferrigno, addresses the potential of reusing treated wastewater in agriculture as a sustainable response to water scarcity. The authors propose an innovative methodological approach to identifying the Utilised Agricultural Area (UAA) that can potentially be irrigated with reclaimed water. This approach focuses on high-value Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI) crops in the Campania region. The study demonstrates how targeted investments in water reuse infrastructure can enhance resilience, safeguard high-quality production, and support regional agricultural competitiveness.

Taken together, these contributions offer a comprehensive overview of how water challenges are reshaping agricultural systems and public policies. They also reaffirm the need for integrated, cross-disciplinary approaches that consider water as a strategic, social, and environmental asset, not merely a physical resource.

This special issue aims to advance the collective understanding of water's role in building a sustainable and resilient food economy by fostering dialogue among economists, agronomists, environmental scientists, and policymakers.