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Editorial

Adapting Water and Soil Management to Climate Change

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Citation: Kourgialas, N.N.; Anastopoulos, I.; Stefanakis, A. Adapting Water and Soil Management to Climate Change. *Sustainability* **2024**, *16*, 2416. https://doi.org/10.3390/su16062416

Received: 1 March 2024
Accepted: 7 March 2024
Published: 14 March 2024

Promising Features

Sustainable agriculture largely depends on the stability of the soil ecosystem and the hydrological cycle dynamics [1]. Thus, the agricultural sector's top concerns are the impact of climate change on soil quality and irrigation water availability and quality [2]. Climate change is already changing the frequency and severity of heat waves, droughts, and floods, which further deteriorate soil and water resources. These concerns are critical considering that agriculture is the largest water consuming sector in the global economy, accounting for more than 70% of water extraction worldwide. Furthermore, good soil quality is essential for maintaining other ecosystem functions including food security. The physical, chemical, and biological characteristics of soil can be directly or indirectly impacted by climate change [1,3]. Changes in temperature, precipitation, and moisture regime are examples of direct effects that may lead to the desertification of previously arid soils. Adaptations including crop rotation adjustments, irrigation, and tillage techniques can have indirect effects [3].

With this in mind, it is imperative that we develop mitigation and sustainability plans that are function in both the short and long term in order to guarantee food security. While mitigation techniques are useful in lowering atmospheric CO_2 concentrations, adaptation measures are crucial for improving soil and water resilience and sustaining productivity in the face of climate change. By comprehending the benefits and drawbacks of suggested adaptation techniques, agricultural water management practices can be improved.

The most effective ways of addressing the problem of water scarcity appear to be reallocating water resources, using technology (such smart irrigation and modeling techniques) to increase water use efficiency, adopting good agronomic practices, introducing climate-resilient crops by altering cropping patterns and proper agronomic practices, and introducing alternative water resources in the local water balance such as treated wastewater effluents. Water demand management, which refers to actions taken to lower the amount of water required, includes adaptation strategies to enable long-term adaptability, enhance water efficiency, and promote sustainable use of local water resources. The assessment of adaptation strategies through top-down impact modeling techniques is a necessary part of managing water demand in response to climate change. However, the convergence of hydrology, agronomy, and water resources management is necessary to develop effective adaptation techniques [4].

On the other hand, short-term adjustments are actions that may be made to enhance crop output without requiring significant systemic changes and that are regarded as the first line of defense against climate change. In order to alter the microclimate of the plant community, short-term adaptation techniques are applied at the field level. One such strategy involves making a straightforward modification to agronomic operations without the need for expensive technology. To modify the factors of climate change at the field level, a variety of soil, water, and crop management-based strategies are covered under short-term adjustments. These include changing the date of sowing, managing nutrients and irrigation, diversifying crops, implementing intercropping or mixed cropping techniques, and implementing different soil moisture conservation techniques such as applying mulch [1,5].

The suitability of the long- and short-term mitigation strategies mentioned above relies on the specific circumstances at the local and regional level; therefore, creating regional adaptation plans must be a top priority. Determining the proper degree of implementation at the national, local/river basin, or farm level for the chosen adaptation methods is also crucial. The confluence of the suggested adaptation solutions' high potential benefits and cheap or moderate implementation costs should also be taken into consideration while choosing them. Stakeholder benefits are often higher, the larger the scale of applicable measures [6].

In line with the above, this Research Topic presents research on new technologies and decision support systems for adapting water and soil management to the conditions of climate change, focusing on the agricultural sector. This multidisciplinary Research Topic includes the MDPI journals *Remote Sensing*, *Sustainability*, *Water*, *Agriculture*, and *Climate*. The main aim of this Topic is to increase our collective scientific knowledge on and understanding of the interactions between water/soil resource management and the impacts of climate change at local, regional, and global levels; this will be a fundamental factor involved in reaching the goal of a sustainable society.

This Research Topic collates 41 articles (1 review, 1 brief report, and 39 research articles) from various countries and extended continental regions all over the world, including tropical and subtropical regions of Asia, Turkey, Sudanian zone of Africa, Kenya, Tunisia, Ethiopia, Uganda, Brazil, Bolivia, Colombia, Portugal, Poland, Czech, Slovakia, Greece, China, Korea, and USA. This Topic covers six main scientific fields:

- Soil (water erosion management approaches, soil infiltration/physicochemical properties, soil moisture, soil salinity and freezing);
- Water (wastewater management, reuse of treated effluents for irrigation, smart irrigation, efficient water use, proper groundwater management);
- Atmosphere (dynamic of rainfall, temperature, precipitation);
- Waste management (compost/biochar applications);
- Modeling, including precision agriculture;
- Mitigation policies and farmers' adoption of them.

Our understanding of the advantages of adjusting soil and water management to our continually and rapidly changing environment has been greatly enhanced by the contributions made to this research topic. We hope that this report will inspire our readers to pursue this important area of study further in the future.

Author Contributions: Conceptualization, N.N.K.; writing—original draft preparation, N.N.K. and I.A.; writing—review and editing, A.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

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