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Editorial

The 5th EWaS International Conference: "Water Security and Safety Management: Emerging Threats or New Challenges? Moving from Therapy and Restoration to Prognosis and Prevention" †

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The United Nations defines Water Security as "the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability".

During the last decades, global climate change has led to more frequent and intense droughts, heat waves, storms and floods, rising sea levels, melting glaciers and warming oceans, directly harming and wreaking chaos on people's livelihood and communities. Moreover, as climate crisis worsens, dangerous weather events are becoming even more frequent and severe.

Water demand is expected to grow by 55 percent within the next thirty years (by 2050), when one in five developing countries will face water shortages (UN's Food and Agriculture Organization). Additionally, as global temperatures rise, harsher droughts are set to further impact supply and access to clean water.

Worldwide, one in ten people do not have access to a clean water source close to their home, which threatens health and pushes communities into poverty. Furthermore, with the global population predicted to increase in the second half of the century, competition for water resources is only going to worsen. Safeguarding the daily water share will become a daily "war" for more people, especially in developing countries.

Water is at the core of sustainable development and is critical for socio-economic development, healthy ecosystems and for human survival itself. It is vital for reducing the global burden of disease and improving the health, welfare, and productivity of populations. However, sustainability also means being resilient and adaptable to extreme weather events that may contribute to issues such as flooding and scarcity.

So, now more than ever, cities, their waterscapes and water sources face the following pressing challenges: water demand is rising, aquifers are being depleted, the threat of extreme weather is increasing and the fear of "water terrorism" is not a science fiction scenario anymore. At the same time, the increased use of real-time control systems and technology—key tools to achieve satisfying levels of efficiency—are themselves vulnerable to disruption.

Urbanization results in a rapidly growing demand for drinking water and sanitation, while increasing the number of impermeable areas that can contribute to flooding.

There is no single effective strategy to achieve water sustainability, safety and security, but many approaches can be undertaken, namely by applying both strategic and best-practice methods. *Water Security and Safety Management may look like emerging threats but at*

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the same time must be faced as new challenges. It is time for the respective decision makers to move from therapy and restoration to prognosis and prevention. It is by far more cost effective and less risky. Worth-living development should be the outmost priority.

The optimization of water resources starts with a good knowledge of assets, system performance and types and levels of usage, in both current and projected scenarios. Combining this information with the knowledge of the system's vulnerabilities, risks and stress points lead to actionable plans that can help water utilities assure greater efficiencies.

Reusing water in a cost-effective and safe way can contribute to water availability considerably and can be crucial to meeting long-term demand. Cities today are treating their own wastewater for reuse, such as for agricultural, industrial and source water replenishment purposes, with the level of treatment dependent on the end use. A circular economy should become the "name of the game" not only at each city's strategic level, but it should also be a responsibility for every citizen in everyday life.

The increasing frequency of extreme rainstorms due to climate change and urbanization are causing huge urban pluvial flood events in many countries in the world; this has driven the development and application of effective and innovative approaches for the design and management of urban stormwater systems. In this context, many cities are implementing green infrastructure projects to manage stormwater issues as an alternative to traditional methods of pipe drainage. Green infrastructure can provide valuable green space and recreation for the residents of a city, reduce the urban heat island effect, and enhance biodiversity and ecological resilience. It is worth noting that the assessment and prediction of the adverse effects of the climate-related events, the estimation of the vulnerability of the affected areas and risk assessment are relevant steps in strategic decision-making procedures for integrated climate change adaptation.

More generally, risk-based asset management approaches are increasingly being used to prioritize capital and operating investments. This means allocating funds to address specific risks and those assets with the highest potential of failure. This also focuses resources against assets whose failure would have the biggest impact on the urban economy, environment, and communities.

In this context, the 5th EWaS (Efficient Water Systems) International Conference on "Water Security and Safety Management: emerging threats or new challenges? Moving from Therapy and Restoration to Prognosis and Prevention" focused on water security and safety management, with the aim of highlighting the different aspects and criticalities, discussing information and suggesting management criteria. EWaS5 was co-organized by the University of Naples Federico II (Italy) and the University of Thessaly, in Naples (Italy) from July 12th to 15th, 2022.

The approved papers were classified into the following themes:

- A: Water security and safety fostering water resilience;
- B: Sustainable water management in circular economy;
- C: Water–Energy–Food nexus;
- D: Internet of Things (IoT) solutions aiding water management;
- E: Innovative methods for urban water cycle management;
- F: Wastewater treatment and water resource recovery facilities;
- G: Non-conventional water resources;
- H: Experimental and computational methods in hydraulic engineering;
- I: Riverine and coastal engineering;
- J: Hydrological response to climate change;
- K: Environmental crisis and hazards;
- L: Groundwater modelling.

The EWaS5 conference also hosted the following five Special Sessions (S.S.):

- S.S. 01 entitled "Water supply and network design, modelling and management in a changing environment", chaired by Prof. Marco Franchini (University of Ferrara—Italy).

- S.S. 02 entitled "Assessing the resilience of critical water infrastructure: planning for the unknown", chaired by Prof. Christos Makropoulos (National Technical University of Athens—Greece) and Prof. Vasilis Kanakoudis (University of Thessaly—Greece).
- S.S. 03 entitled "Impact of climate change on hydrological extremes", chaired by Prof. Salvatore Manfreda and Prof. Luigi Cimorelli (University of Naples Federico II—Italy).
- S.S. 04 entitled "Technological innovation in water networks: digital water, smart control and energy efficiency", chaired by Prof. Helena M. Ramos (University of Lisbon—Portugal).
- S.S. 05 entitled "Novel technologies and approaches for water and wastewater treatment and monitoring: from ideas to results", chaired by Prof. Gregory V. Korshin (University of Washington—USA).

The EWaS5 Organizing Committee (EWaS5 OC) would like to express thanks to the following three keynote speakers for their valuable scientific contributions:

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