XIX World Water Congress, December 2025

Special Session Proposal

Session Title, Theme and Description:

Title: Resilient Communities Through Water-Energy-Food-Health Nexus

Session Description:

This session will explore how the integration of water, energy, food, and health (WEFH) systems enhances community health and resilience. Presentations and discussions will cover the interdependencies and interactions between these sectors, relationship development, modeling approaches, and collaborative efforts with public health partners. The session aligns with the Congress sub-theme of *"Water-Energy-Food-Ecosystems Nexus"* by addressing the interconnectedness of these sectors and their collective impact on community well-being.

Theme: Water-Energy-Food-Ecosystems Nexus (WEFE Nexus)

Organizations Participating in the Session:

Lead Organization: Texas A&M University

Partner Organizations:

- University of California San Diego
- The University of Jordan
- Hashemite University

Session Objectives

The primary objectives of this session are to demonstrate the importance of integrating health considerations into WEF nexus assessments and decision-making, present a quantitative framework for assessing the impact of WEF resource management on public health indicators, showcase case studies that illustrate the practical application of WEFH nexus approaches in enhancing community resilience, foster interdisciplinary collaboration and knowledge exchange among researchers, policymakers, and practitioners in the water, energy, food, and health sectors, and promote the use of predictive modeling and real-time monitoring for improved WEFH nexus management.

Session Justification:

The interdependence of water, energy, food, and health (WEFH) is critical for advancing sustainable communities and human well-being. However, current research often overlooks key interconnections, leading to fragmented decision-making and policy inefficiencies. Existing studies predominantly focus on the Water-Energy-Food (WEF) nexus, with limited integration of health outcomes. Additionally, most models emphasize resource availability and consumption without adequately addressing quality dimensions, feedback loops, or socio-environmental determinants of health.

This special session addresses these gaps by developing a quantitative framework that links WEF inputs to health indicators, integrating both quality and quantity dimensions of resource flows. It will present case studies using a multi-dimensional dataset, including literature coupled with field engineering and epidemiological data, on how resource allocation and governance impact public health. This session examines how predictive modeling, and real-time monitoring can improve decision-making within the WEFH nexus, offering a novel approach to mitigating risks associated with environmental and socio-economic disruptions.

Projected Outcomes:

The session is expected to lead to the development of a comprehensive understanding of the WEFH nexus and its implications for community resilience. Key indicators and metrics for assessing the health impacts of WEF resource management will be identified, best practices and case studies for implementing integrated WEFH nexus approaches will be disseminated, and a network of researchers and practitioners committed to advancing WEFH nexus research and practice will be established. A summary document will be produced that can be used to inform policy makers, and other stakeholders, on the importance of the WEFH nexus, and increase awareness of the importance of health within the WEF nexus, within the water community.

Session Program and Presenters:

- Opening Session- Human Centric Nexus: *Dr. Konstantinos Pappas* (3 minutes)
- Modeling the Water-Energy-Food-Health Nexus: *Dr Rabi Mohtar*/ *Dr Bassel Daher*/ *Rashed Albatayneh* (15 minutes)
  - Introducing the theoretical framework, WEFH modeling, and practical implementation.
- Modeling Evaluation: Enhancing community health through WEF nexus interventions: *Dr. Mohammed Salahat* (7 minutes)
  - Presenting the case study of the GC3WEFH project
- Food Related Health Disparities & Socioeconomic Inequality: *Monijesu Fadamiro* (7 minutes).
  - Highlight the significance of food safety and adequate food availability in reducing healthcare burdens, protecting vulnerable populations, and enhancing community health and resilience.
- Exploring the Health Risks of Nitrate Leaching: The Role of Recharge Pathways and Contamination Modes under Future Climate Scenarios: *Dr Michel Rehbeh* (7 minutes)
  - exploring how contamination mode—whether source-limited or dilution-limited—can significantly influence groundwater quality and public health, especially in vulnerable semi-arid regions.
- Data Challenges in a developing world: *Dr Ilya Zaslavsky* (7 minutes)
  - What challenges can be faced when researching the interconnected WEFH field and how to overcome them
- Discussion and questions (12 minutes)
- Closing Remarks: *Dr. Konstantinos Pappas* (2 minutes)

Financial Resources Needed:

The standard arrangement provided by the World Water Congress is expected to be sufficient to conduct this session.