

Special Issue

Perspectives from the Food–Energy–Water Nexus for Sustainable Natural Ecosystem Development

Message from the Guest Editor

The Food–Energy–Water–Ecosystem (FEWE) nexus provides a formal framework for analyzing the coupled dynamics of natural, economic, and socio-technical systems under increasing resource and environmental constraints. This Special Issue advances a sustainable system transformation approach to the FEWE nexus, emphasizing integrated quantitative modeling, optimization, and empirical analysis to inform coherent policy design. The contributions develop and apply mathematical, econometric, and computational frameworks—including integrated assessment models, dynamic optimization, network and system dynamics models, multi-objective and stochastic optimization, and data-driven decision-support tools—to characterize trade-offs and synergies among food production, energy systems, water resources, and ecosystem services. By synthesizing rigorous analytical methods with policy-relevant applications, this Special Issue aims to advance the formalization and operationalization of the FEWE nexus. It contributes to the development of robust decision frameworks that support efficient and resilient sustainability transitions consistent with long-term climate, biodiversity, and development objectives.

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