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RECEIVED 05 May 2025

ACCEPTED 12 May 2025

PUBLISHED 26 May 2025

## CITATION

Garcia-Chevesich PA, Valdés-Pineda RM,  
Roy T and Valdes J (2025) Editorial: Water  
governance across management scales.  
*Front. Water* 7:1623330.  
doi: 10.3389/frwa.2025.1623330

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# Editorial: Water governance across management scales

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## KEYWORDS

water resources, transboundary water management, climate change, future consumption, water availability

## Editorial on the Research Topic

### Water governance across management scales

The Research Topic “*Water Governance Across Management Scales*” emphasizes the critical role of water governance in shaping sustainable water management strategies over time and across different scales. Large economies, which have historically driven growth by heavily relying on water resources, serve as key examples for developing countries to learn from, both in terms of successes and challenges. However, there’s a global gap in long-term data about how some of these economies have managed water, hindering informed governance in emerging nations. The call was intended for research that analyzes historical patterns and future projections to guide global water governance. Contributions from multidisciplinary teams were encouraged to provide data, insights, and technical solutions that can establish a shared foundation for sustainable water management and security worldwide.

As a result, this Research Topic collected seven empirical studies conducted across Africa, Asia, and Latin America, each addressing diverse aspects of water resource management under conditions of environmental stress and socio-political complexity. Collectively, these studies make a substantial contribution to the scientific literature by deepening our understanding of the interactions between climate change, water availability, infrastructure performance, stakeholder engagement, and governance systems.

A recurring theme was the intensification of water stress due to climate-induced aridity and variability. From the Souss Basin in Morocco to the Western Cape in South Africa, declining precipitation and increased evapotranspiration are altering hydrological balances, exacerbating unmet demand for water in agricultural, urban, and rural contexts. These findings reinforce the urgent need for adaptive and predictive water management strategies in semi-arid and arid regions.

In terms of methodological contributions, the studies showcase the utility of diverse analytical tools, including decision support systems (e.g., ModSim), geospatial modeling (e.g., ArcGIS and SaTScan), and stakeholder analysis frameworks such as the power-interest matrix. These tools enable more nuanced assessments of water system performance, stakeholder dynamics, and spatial inequities in access to water services.

Governance emerges as a central concern, with several studies emphasizing the importance of both formal institutions and non-state actors in shaping water policy outcomes. Particularly in transboundary and multi-stakeholder contexts, such as the Sixaola River Basin or the Hamedan-Bahar Plain, governance challenges are compounded by fragmented authority, limited public sector engagement, and technocratic development approaches. These findings highlight the importance of inclusive, coordinated governance mechanisms that account for power asymmetries and localized needs.

Furthermore, the studies collectively underscore the technological and infrastructural deficits that hinder effective water resource management. For instance, inappropriate drainage designs in Khuzestan and groundwater infiltration into rural sewage systems in Eastern Guangdong exemplify how infrastructure mismanagement can lead to environmental degradation and reduced service efficiency.

The research also draws attention to social inequalities in water access, as seen in the Ethiopian case study, where spatial and socio-economic disparities significantly influence household access to improved drinking water. This highlights the importance of targeted interventions and equity-focused planning in national water strategies.

In conclusion, these studies contribute to a growing body of interdisciplinary research that bridges environmental science, engineering, public policy, and social sciences. They collectively advocate for a paradigm shift toward integrated,

evidence-based, and context-sensitive water governance, which is essential for ensuring long-term sustainability and resilience in the face of climate change and the worldwide growing water demands.

## Author contributions

PG-C: Writing – original draft. RV-P: Writing – review & editing. TR: Writing – review & editing. JV: Writing – review & editing.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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