



Land and Water Governance in Urban Regions

KEY POLICY MESSAGES

- As urbanisation intensifies, good governance must include better integration of shifting boundaries between land and water.
- Effective governance must confront the unique challenges of three distinct land-water frontiers: vertical (concealed interdependencies), horizontal (conflicting uses) and fluid (uncertainty).
- It is necessary to break down the current institutional divide between spatial planning and water management to produce a more united and coherent strategy that carefully balances flexibility and robustness in the management of land and water in urban areas.

■ Urban development along the river Rhine,
© photo by Martin H. Hartmann.

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FRONTIERS OF LAND AND WATER GOVERNANCE

The traditional strategy to manage land and water under separate governance regimes no longer suits the rapidly changing environmental constraints and social construction of these two elements in urban development. Accordingly, there is an urgent need for innovative concepts in these overlapping fields of governance. The claim for more space for rivers, for flood retention and environmental protection, the fragmentation of the drinking water sector, and unsolved upstream-downstream relations illustrate the scope of urban land-water dynamics. These challenges increasingly lead water management into spatial planning governance, catalysing the need for spatial planning to reconsider its notions of water issues.

URBAN REGIONS

In urban regions, technical approaches have reached their limit in addressing the common governance of land and water. The diversity of competing stakeholders generates complex and intensive friction between socio-economic dynamics and environmental constraints of land and water. The special issue of *Water International*, 'Frontiers of land and water governance in urban regions', presents a range of examples highlighting the urgency of adopting innovative approaches for land and water management along distinct governance frontiers.

ENVIRONMENTAL CONSTRAINTS AND NEW GOVERNANCE FRONTIERS

These frontiers emerge along the physical boundaries between land and water: along *horizontal* boundaries on riverfronts and coastlines, along *vertical* boundaries between groundwater or water infrastructure and surface land use, and along *fluid* boundaries in floodplains and areas subject to changing sea levels.

VERTICAL FRONTIERS

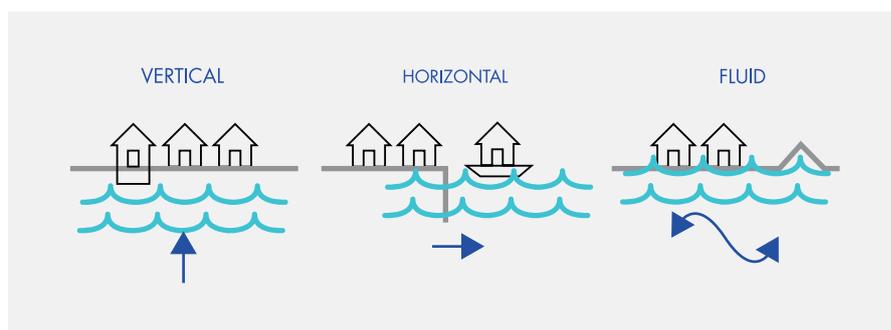
The vertical boundary exists between groundwater and subterranean water infrastructure, and land use above the ground. Often, the interactions between the two – for example, drinking water supply, pipes for freshwater and sewage, or pollution of groundwater – are unseen, concealed by the surface boundary.

The special issue's three contributions in this section point to the increased permeability

■ Riverfront development - attractive sites for building (Ludwigshafen/Mannheim), © photo by Martin H. Hartmann.

BOUNDARIES ARE NOT FRONTIERS

Here, a frontier is not the same thing as a boundary. A boundary sets a limit or extent, while a frontier has multiple meanings. It can be a region that forms the margin of settled territory, the farthestmost limits of knowledge, a division between different or opposed things, or a new field for developmental activity. The frontiers of land and water governance exist where land and water are in opposition but require common governance.



■ Frontiers of land and water governance, © Thomas Hartmann.



■ The fluid frontier of the river Elbe near Dessau (GER) during the flood in 2002, © photo by Thomas Hartmann.

that can occur along the vertical frontier, caused by various and not always obvious interdependencies between above ground land use and below ground water issues. These interconnections have important implications for policy frameworks governing land and water management.

- **Public participation** can enhance sustainable groundwater governance and spatial planning in various ways. Case studies in Australia and Costa Rica, explored by Cuadrado-Quesada, reveal participation is either collaborative, with active facilitation by government agencies; or bottom-up, where persuasive community action creates pressure for improved governance and legislation. Importantly, in both cases, the interconnection between groundwater governance and spatial planning must be adequately understood and sustainability principles must be integrated for effective and sound policy and legislative change.
- **Scientific knowledge** is essential to action. Decision-making needs to incorporate hydrological as well as spatial knowledge. Hartwich et al. show the importance of considering the water yield of landscapes and water efficiency of plants when establishing intensive cropping regimes.
- **Scaling up with supportive networking** is often critical to urban water governance.

Case studies from urban wastewater disposal and water supply in Germany presented by Schmidt, reveal the benefits of moving from municipal governance to an integrated regional approach. Restructuring and professionalising existing collaborations, and providing incentives for greater networking between individual actors, can enhance the sustainability and efficiency of the current municipal urban water arrangements.

HORIZONTAL FRONTIERS

The horizontal boundary of land and water establishes itself along riverfronts and coastlines. In terms of governance, such areas are usually contested terrains: tourism, environmental protection, real estate development, and other issues often vie for consideration, presenting conflicting views regarding the use of land and water along this boundary. Contributions within the special issue provide new approaches on addressing these diverse challenges.

- **Cultural perspectives** strengthen planning and decision-making processes. Levin-Keitel shows how recognising culture as an underlying foundation to urban planning enhances overall understanding of how traditions and values shape planning and policy-making, thus improving land-water management of urban riverscapes.

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- *Recognition of ineffectual path-dependent decision-making* (based on and reinforcing past actions) within current land-water management is required for spatial planners and water managers to abolish lock-in scenarios. Van den Berghe & De Sutter illustrate, through analysis of coastal spatial planning in Belgium, the need for a revised approach that steps outside entrenched courses of action and imagines new pathways for solving land-water challenges.

With sea-level rise, flooding and land reclamation, horizontal frontiers of land and water governance in urban regions are extending, summoning forward-thinking governance schemes with increased intensity and importance. Accordingly, new approaches must consider the economic and ecological functions of waterways and shorelines, and established and emerging socio-economic dynamics.

FLUID FRONTIERS

Fluid frontiers in land and water governance refer to situations where the physical boundary between land and water undergoes either permanent or temporary change (Brown & Damery, 2002; Hartmann & Spit, 2012). This is predominantly encountered in storm surges, floods and sea-level rise, but also evident in the desiccation of lakes, most famously in the case of the Aral Sea. Flooding, however, is the most prominent and common fluid boundary in urban regions, since many urban areas are located on large water bodies. The effects of climate change are also strongly felt

along this frontier, altering the boundaries between land and water and intensifying present challenges.

As discussed in the special issue, fluid boundaries between land and water question existing governance schemes in specific ways and, in light of these challenges, reveal why water management and spatial planning can no longer rely on established and well-rehearsed procedures and institutions.

- *Integrating resilience*, as opposed to resistance, into flood policy harnesses a socio-ecological approach that more adequately adapts to risk. Tempels & Hartmann show the role of resilience in providing an integrated perspective that treats land and water as co-evolving systems.

- *Adaptive planning options*, informed by the socio-economic context and climate change vulnerabilities of a region, need to be embraced by urban planning to adequately protect marginalised urban populations from flood risk, as revealed by Hetz & Bruns in a South African case study.

- *Strengthening parallel governance* in large, transboundary water bodies is needed for coherent and effective management of horizontal governance frontiers to adequately integrate land-water management. According to Norton & Meadows, historical practices and institutional capacities, as the underlying factors responsible for the current divide in land-water management in the Laurentian Great Lakes in North America, must be addressed to move forward with innovative solutions addressing this divide.

GOVERNANCE CHALLENGES FRONTIERS OF LAND AND WATER GOVERNANCE

The distinction of vertical, horizontal, and fluid governance frontiers of land and water reveals different governance challenges. Whereas the vertical frontier has to deal with governance problems that are long term and rather invisible, or at least where causes and effects are not always obvious, the horizontal frontier is one of high socio-economic and environmental dynamism. The governance challenges along the fluid frontier, however, need to overcome entrenched lock-in situations and deal with uncertainty and normativity of flood risk perceptions in a particular way (Hartmann & Needham, 2012). The examples provided here and in the special issue illustrate the scope of these frontiers within the urban landscape and the urgency for a quest for innovative governance approaches to address the challenges faced at these frontiers.

FOR FURTHER INFORMATION

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■ *Sewage and water supply in dynamic urban systems (Radjasthan, India)*, © photo by Thomas Hartmann



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