



Guest Editorial, part of a Special Feature on [Urban Water Governance](#)

## Urban water governance in times of multiple stressors: an editorial

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### INTRODUCTION

Almost 40% of the world's population lives in river basins that experience severe water scarcity during at least one month of the year (Hoekstra et al. 2012). Scarcity, i.e., low available water per capita, is forecast to worsen in many countries in the Middle East and North Africa as well as Mexico, Pakistan, South Africa, and large parts of China and India, which already suffer from acute water scarcity (Burchi et al. 2013). Water scarcity includes not only the physical scarcity of water but also the lack of access to safe drinking water and sanitation (Rijsberman 2006). Some of the reasons commonly cited as contributing to water scarcity include population growth, rising demand brought by increasing incomes, the rapid pace and scale of urbanization, the large share of water used in agriculture, depletion of aquifers, climate change, wasteful use of underpriced resources, pollution from agriculture, industry and human waste, and poor governance of natural resource management (Merrey et al. 2007, Molle et al. 2007, Falkenmark and Molden 2008). However, there is much debate over the relative importance of these reasons, and much debate about the most appropriate instruments and scale of solutions. In relation to developing countries, the Millennium Development Goals of the United Nations (<http://www.unmillenniumproject.org/goals/>) include access to safe and affordable water for populations in all urban and rural areas.

This special feature on “urban water governance” comprises seven case studies from very different settings. They all share the common feature of addressing the problem of water governance in cities and taking into account both environmental and social concerns. In addressing these issues, there is a widespread recognition of the need for integrated approaches to water governance. The term governance emerged as reaction to a previous narrow focus on government as the prime actor in shaping society. Governance implies the recognition that many more actors and structures are at play, and they interact in myriad ways. There is no universally accepted definition of governance but there is wide agreement that governance today goes beyond regulation, public management, and traditional hierarchical state activity (Biermann 2007). In addition to these traditional forms of political steering, governance emphasizes the use of novel instruments, such as voluntary and market-based approaches, and cooperative structures between state and nonstate actors from various sectors of society, including the private sector and civil society. Most often governance implies certain degrees and forms of self-regulation and cooperation among different types of actors and coalitions.

In the water sector, governance includes institutions, organizations, policies, and practices, which shape and manage water resources, including the delivery of water services for diverse populations and industries. Given the breadth of the challenges

and the inherent role of many organizations and stakeholders, modes of cooperation and coordination have been widely identified in the research literature as being essential for improvement of outcomes. In particular, the effectiveness of alignment and coordination between government agencies, the corporate sector, and civil society, as well as the role of leadership in enhancing collaboration across these sectors, has been emphasized in many research studies. Moreover, there have been a historically evolving series of challenges in urban water and sanitation services under different conditions (Brown al. 2009).

Nevertheless, in complex urban systems in both the developing and developed worlds, some of the challenges facing urban water governance include the range of competing interests among different sectors/stakeholders, cooperation across organizations and experts, different interpretations of integrated water management, power dynamics, and lack of capacity building among stakeholders. Therefore the challenges of water governance are enormous when it comes to bureaucratic implementation of water planning and investment, effective involvement of citizens and stakeholders, conflict resolution and power imbalances, sustainable management of water resources, and the efficient and accessible provision of water services. In Europe, North America, and Australasia, policy frameworks for water sustainability and planning have emerged in recent years, including the European Water Framework Directive, which requires each country to develop an integrated approach to sustainable water planning in accordance with some key principles.

### URBAN WATER CRISES: HOW ARE THEY FRAMED AND UNDERSTOOD

Water crises have emerged in different forms and contexts in many nations around the world. The nature and significance of these problems have different meanings for different people and sectors of society. Crises can provide triggers for rethinking the nature of the problems and how to tackle them. Sometimes the key issue is the sufficiency of supply, e.g., water security for a large and diverse population, but the form in which this problem is presented will be different for rich and poor, industry and household sectors, and for those in the central city, the urban/rural fringe, and the water catchment areas.

The various forms of water crisis give rise to a variety of decision responses, sometimes ending in nondecisions and blame games because the problems are too difficult or too expensive to resolve (Boin and Hart 2003). Solutions in one country might be seen to be successful in some aspects that are attractive for decision makers or key stakeholders in other countries. A process of policy convergence may therefore occur over time as a new paradigm is adopted and adapted in other countries. Small-scale pilot studies

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and experiments may be scaled up in response to larger crises. However, the transferability and scalability of solutions is not self-evident, and policy advice requires practical and comparative experience about how different contexts have major impacts on how such ideas are implemented.

### **Cross-cutting themes**

The attempts to address water governance challenges in urban areas have too often been based either on technological and natural-scientific understandings of water issues, e.g. hydrology, engineering, and chemistry, or based on social understandings of the underlying driving forces behind human activities and their impacts on water resources and services, i.e., sociology, economics, law, politics, and ecology. It is increasingly apparent that effective and sustainable water governance requires both natural and social science understandings of water problems, whether these be water scarcity, water quality, public health and sanitation, food production, flood mitigation, the dynamics of rapid urban population growth, urban inequalities, multiple uses of catchments and reservoirs, and so on.

The literature on water policy and governance comprises several key strands and themes, which can shape the further development of a robust research agenda about urban water governance. The analytical frameworks and methodological approaches in this special issue engage with several case examples, which go beyond isolated or fragmented studies. The overarching objective is to develop a more coherent approach that facilitates an integrated understanding of how new and improved modes of urban water governance can contribute to better outcomes across a variety of institutional contexts. The cross-cutting themes below are intended to encourage further comparative analyses on substantial issues around policy settings and choices, regulatory frameworks, planning regimes, knowledge/science/expertise, stakeholder involvement, and impacts upon citizens and stakeholders.

### *Problem framing*

There is much debate about the nature of the problems and the interests at stake. Social and political research has long recognized that policy settings become institutionalized around entrenched ideas about the nature of the problem or challenge (Peters 2005). In other words, problems are framed as having certain features that can be appropriately addressed through certain corresponding solutions. Problem framing is a political process, in which the dynamics of power and persuasion are evident, even when decision makers pretend that the dominant approach is just common sense (Jerneck and Olsson 2011, Cook and Bakker 2012). Different experts and stakeholders may see different parts of the jigsaw, some emphasizing such aspects as equity, affordability, reliability, quality, environmental impact, food security, etc. Particular engineering solutions, e.g., large dams where feasible, desalination plants as an alternative option, and inter-regional pipelines, are sometimes portrayed as the answer to a specific definition of the problem, e.g., insufficient capture of stream run-off to supply rapidly growing populations.

### *Use of scientific evidence*

There is an unpredictable and nonlinear relationship between scientific evidence and decision making. The social and natural sciences do not drive decision makers in a simple or linear fashion. Rather, decisions are made in response to a host of interests, ideas,

and values; and decisions that are made under crisis conditions are often suboptimal. Scientific advice, even when cohesive and convincing, is often overlooked because other economic or political factors are, or are seen to be, more pressing. Nevertheless, evidence-informed policy processes are vital. Further effort and investment is needed for research on key socioeconomic and ecological drivers of sustainability. In some cases, scientific and technological research will contribute parts of the picture, e.g., technical specifications for new equipment, or performance standards for water quality, leaving large gaps concerning how the ecological, economic, and social aspects fit together. Therefore, one of the challenges for social science, and for the quality of the policy process, is to overcome the silos of specialized expert knowledge. A related challenge is to learn about better communication channels and processes for influencing decision makers and the general public.

### *Scales and levels*

Urban water issues are not generic but have specific relevance to geographical and geopolitical scales: e.g., small towns, vast metropolitan sprawl, river basins, regional water resources, national and international scales across various boundaries. Moreover, within a particular country there is likely to be more than one level of government or public authority that is involved in water planning, management, and delivery, e.g., local/municipal government, state/provincial agencies, national agencies, and international agreements. These factors give rise to governance challenges concerning stakeholder involvement, effective flows of information, effective policy, and delivery capacity at each level, and effective coordination in a system of multilevel governance.

### *Justice and fairness*

More than half of the world's population lives in towns and cities (Mitlin and Satterthwaite 2013). This figure is expected to rise to 60% by 2030. Although in many cases the central areas of big cities have access to water and sanitation, the urban poor often lack such access within the poorly serviced fringes of mega-cities in developing countries. Water supply and sanitation services in poor urban areas face major constraints, such as limited financial resources, and inadequate operational or maintenance capacities. This calls for strategic water provision to sustain a healthy environment in cities, particularly in disadvantaged areas, and to meet basic human needs and rights by addressing the issues of water scarcity, water accessibility, affordability, and quality (Nastar 2014a, Satterthwaite and Mitlin 2014). The voices of poor or vulnerable groups need to be adequately represented and articulated.

### *Institutional arrangements*

Existing patterns of policies and programs for urban water management, with their diverse pathways, need to be mapped and understood. How did these arrangements develop in particular ways? How did they identify and respond to key issues, and did such challenges give rise to institutional change or were earlier patterns consolidated? The understanding of failures and risks can help us better appreciate the nature of successful shifts in water paradigms (Ostrom et al. 1961). The institutional arrangements depend on certain structures of authority, incentives, and rewards, whether political or economic or cultural. Institutional arrangements also reflect relationships among

stakeholders and their relative influence. Innovative options require regulatory support, but more research is needed on approaches to balancing risk and innovation. Organizational change has occurred in many countries, sometimes encouraged by international bodies, e.g., to establish corporatized or privatized water utilities, but not always with a solid mandate or responsibility to pursue broad sustainability goals. The capacity of the water system managers and stakeholders to engage in meaningful collaboration, networking, and learning is often difficult to document and difficult to encourage.

#### *Policy choices*

The directions for policies and programs in urban water management are widely debated, with strong advocacy for various specific solutions (Huitema and Meijerink 2010). At one end of the solution spectrum, there are expensively engineered infrastructure options, serving large populations through centralized systems, i.e., large technical organizations that operate dams, trunk pipelines, irrigation networks, desalination plants, etc. At the other end of the spectrum, there are low-cost, decentralized solutions designed to meet local needs both for safe drinking water and for low-water-use sanitation, including a range of water harvesting and reuse schemes, and dry-sanitation options where water is scarce. In addition to this basic polarization of centralized and localized approaches to water security, innovative recent work has sought more integrated approaches to water-sensitive urban design and integrated assessment of the cost-effectiveness of energy and water options, including greenhouse gas emission implications, across a range of scales and technologies. The transition from path-dependent traditional systems toward the adoption of innovative solutions depends on champions of change at every level of the water system.

#### **Case examples in this special issue**

A diverse array of empirical cases is examined in the following articles. These represent a wide range of challenges in urban water governance but they all connect to and exemplify the aspects described above: problem framing, use of science and evidence, scales and levels, justice and fairness, institutional arrangements, and policy choices.

Öberg et al. (2014) discuss the need for radical shifts to more iterative and adaptive solutions in sewage management but note that our ability to achieve such a shift is often painfully slow. Based on two in-depth studies of metropolitan sewage systems being upgraded, in Vancouver and Buenos Aires, they are able to identify obstacles for the uptake of new innovations and draw attention to the suboptimal solutions characterized by an outdated end-of-pipe approach. Their study highlights not only the organizational aspects of urban water governance but also the cognitive roots of how we understand sewage, i.e., the framing of sewage as waste to be disposed of. This framing of sewage becomes the ultimate obstacle to rethink sewage as a useful resource instead of as waste. The solution to this institutional lock-in, they argue, is to be found outside the water and sewage management umbrella and involves a reframing of sewage from waste to energy and nutrients.

Head (2014) examines the quality of decision making under conditions of rapidly evolving urban water crises with examples from Southeast Queensland in Australia. Using resilience theory in combination with governance theories he explains the changing

awareness of urban water crises and the need to embrace more adaptive water governance models to respond to both floods and droughts. The case provides important insights into the interplay between framings of the water issue and the knowledge bases required for planning and decision making. It also highlights the need for more collaborative governance processes for managing complex and rapidly evolving issues, such as water in times of climate change when both floods and droughts are expected to increase.

Nastar (2014b) describes how urban water scarcity can be depoliticized under the heading of governance, particularly in cities with deep and structural inequalities such as Hyderabad in India. She applies the multilevel perspective within transition theory to explore how and explain why low priority areas in the city receive water only for a few hours every second day. The multilevel perspective helps her locate drivers of the unsustainable water provision to the global level and its interactions with national and city-level decision-making bodies. As a response to such a lock-in, she also discusses the potential for bottom-up initiatives to challenge the existing regime of urban water governance. Such a process, however, requires stronger coalitions of social movements and political action to challenge the current regime, strongly supported by powerful international donor organizations.

Morinville and Harris (2014) discuss the merits and problems of a much cherished governance approach, namely public participation. They start by discussing the relationships between several popular concepts in current governance discourses, such as adaptive governance, comanagement, and participatory resource governance. Informed by this theoretical understanding and also from recent debates on panaceas, they engage in an empirical case study of participation in urban water governance in Accra, Ghana. Drawing on interviews, participant observations, and a household survey, they illustrate how participation not only opens but also closes new opportunities for adaptive urban water governance.

Kelly-Quinn et al. (2014) write about a very urgent and widespread problem: how to upgrade existing and inadequate systems for urban water provision in times of multiple stressors. Many cities around the world, in the global North as well as the global South, suffer from similar problems of inadequate catchment sources, ageing infrastructure including treatment facilities and distribution networks, while demands from multiple actors increase and climate change make the future increasingly uncertain. In an empirical case study, they analyze governance processes in relation to the largest water works project ever proposed in Ireland, i.e., a project for long-distance water transfer from the midlands to Dublin. What makes this particularly interesting is that the project is negotiated in the context of new European and national policies, including consideration of ecosystem services, water resources management, water services management, and flood defence principles.

Islar and Boda (2014) provide another example of how water allocation, this time in Turkey, becomes depoliticized in the national aspirations to modernize through large-scale, centralized, technical, and supply-oriented solutions. They show how local communities and environments are impaired under the banner of modernization and ongoing rapid urbanization. They

also show how water scarcity is increasingly framed as a matter of climate change impacts that are beyond the control of the government to shift the focus away from industrial policies, malfunctioning governance, and leaking pipes.

Barbedo et al. (2015) outline another case of an urban water system, the city of Paraty in Brazil, which needs to adapt in the face of unprecedented challenges of multiple origins. The water system, framed as a social-ecological system, is subject to increasing flood risks and there is an urgent need to protect natural and societal assets. Based on existing literature, they develop a heuristic framework for analyzing policy dimensions of land-use change as the most important driver of increasing flood risk. Economic and political power relationships between actors at different levels clearly play an important role here. Their findings suggest that there is a need to acknowledge the politicization of floodplain changes and then bridge the gap between sectors and actors with conflicting interests.

In summary, this special feature is a collection of seven articles illustrating three essential roles of urban water governance: first to manage the environmental dynamics, including climate change to provide water for cities at all times; second to ensure justice and fairness in the distribution and access to water in cities; and third to ensure quality in terms of human health and environmental pollution.

Responses to this article can be read online at:  
<http://www.ecologyandsociety.org/issues/responses.php/7300>

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#### LITERATURE CITED

- Barbedo, J., M. Miguez, D. Van der Horst, P. Carneiro, P. Amis, and A. Ioris. 2015. Policy dimensions of land-use change in peri-urban floodplains: the case of Paraty. *Ecology and Society* 20(1): 5. <http://dx.doi.org/10.5751/ES-07126-200105>
- Biermann, F. 2007. 'Earth system governance' as a crosscutting theme of global change research. *Global Environmental Change* 17(3-4):326-337. <http://dx.doi.org/10.1016/j.gloenvcha.2006.11.010>
- Boin, A., and P. 't. Hart. 2003. Public leadership in times of crisis: mission impossible? *Public Administration Review* 63(5):544-553. <http://dx.doi.org/10.1111/1540-6210.00318>
- Brown, R. R., N. Keath, and T. H. F. Wong. 2009. Urban water management in cities: historical, current and future regimes. *Water Science and Technology* 59(5):847-855. <http://dx.doi.org/10.2166/wst.2009.029>
- Burchi, P., P. Steduto, E. van Beek, P. MacQuarrie, A. Earle, A. Jägerskog, D. Coates, T. Gumbo, K. Leendertse, S. Donkor, C. Canales, A. Jouravlev, G. J. Lloyd, H. Liu, H. Wright, S. Zakaria, A. Aureli, S. Demuth, M. de França Doria, A. Mishra, R. Stephen, J. G. Canuto, A. Magnus, C. Scharp, F. Renaud, J. Kloos, Z. Adeel, H. Bigas, Z. Chociej, M. Qadir, R. Ardakanian, J. Liebe, M. Briggs, L. Lifeng, F. Loures, J.-H. Meng, and M. Symington. 2013. *Water security and the global water agenda*. United Nations University, Tokyo, Japan. [online] URL: <http://unu.edu/publications/policy-briefs/water-security-the-global-water-agenda.html>
- Cook, C., and K. Bakker. 2012. Water security: debating an emerging paradigm. *Global Environmental Change* 22(1):94-102. <http://dx.doi.org/10.1016/j.gloenvcha.2011.10.011>
- Falkenmark, M., and D. Molden. 2008. Wake up to realities of river basin closure. *International Journal of Water Resources Development* 24(2): 201-215. <http://dx.doi.org/10.1080/0790062-0701723570>
- Head, B. W. 2014. Managing urban water crises: adaptive policy responses to drought and flood in Southeast Queensland, Australia. *Ecology and Society* 9(2): 33. <http://dx.doi.org/10.5751/ES-06414-190233>
- Hoekstra, A. Y., M. M. Mekonnen, A. K. Chapagain, R. E. Mathews, and B. D. Richter. 2012. Global monthly water scarcity: blue water footprints versus blue water availability. *PLoS One* 7(2):e32688. <http://dx.doi.org/10.1371/journal.pone.0032688>
- Huitema, D., and S. Meijerink. 2010. Realizing water transitions: the role of policy entrepreneurs in water policy change. *Ecology and Society* 15(2): 26. [online] URL: <http://www.ecologyandsociety.org/vol15/iss2/art26/>
- Islar, M., and C. Boda. 2014. Political ecology of inter-basin water transfers in Turkish water governance. *Ecology and Society* 19(4): 15. <http://dx.doi.org/10.5751/ES-06885-190415>
- Jerneck, A., and L. Olsson. 2011. Breaking out of sustainability impasses: how to apply frame analysis, reframing and transition theory to global health challenges. *Environmental Innovation and Societal Transitions* 1(2):255-271. <http://dx.doi.org/10.1016/j.eist.2011.10.005>
- Kelly-Quinn, M., S. Blacklocke, M. Bruen, R. Earle, E. O'Neill, J. O'Sullivan, and P. Purcell. 2014. Dublin Ireland: a city addressing challenging water supply, management, and governance issues. *Ecology and Society* 19(4): 10. <http://dx.doi.org/10.5751/ES-06921-190410>
- Merrey, D. J., R. Meinzen-Dick, P. P. Mollinga, E. Karar, W. Huppert, J. Rees, J. Vera, K. Wegerich, and P. van der Zaag. 2007. Policy and institutional reform: the art of the possible. Pages 193-231 in D. Molden, editor. *Water for food, water for life: a comprehensive assessment of water management in agriculture*. Earthscan, London, UK. [online] URL: <http://www.fanrpan.org/documents/d00295/>
- Mitlin, D., and D. Satterthwaite. 2013. *Urban poverty in the global south: scale and nature*. Routledge, Oxon, UK.
- Molle, F., P. Wester, P. Hirsch, J. R. Jensen, H. Murray-Rust, V. Paranjpye, S. Pollard, and P. van der Zaag. 2007. River basin

development and management. Pages 585-625 in D. Molden, editor. *Water for food, water for life: a comprehensive assessment of water management in agriculture*. Earthscan, London, UK. [online] URL: <http://www.iwmi.cgiar.org/assessment/Water%20for%20Food%20Water%20for%20Life/Chapters/Chapter%2016%20River%20Basins.pdf>

Morinville, C., and L. M. Harris. 2014. Participation, politics, and panaceas: exploring the possibilities and limits of participatory urban water governance in Accra, Ghana. *Ecology and Society* 19(3): 36. <http://dx.doi.org/10.5751/ES-06623-190336>

Nastar, M. 2014a. The quest to become a world city: implications for access to water. *Cities* 41:1-9. <http://dx.doi.org/10.1016/j.cities.2014.04.007>

Nastar, M. 2014b. What drives the urban water regime? An analysis of water governance arrangements in Hyderabad, India. *Ecology and Society* 19(2): 57. <http://dx.doi.org/10.5751/ES-06570-190257>

Öberg, G., M. G. Merlinsky, A. LaValle, M. Morales, and M. M. Tobias. 2014. The notion of sewage as waste: a study of infrastructure change and institutional inertia in Buenos Aires, Argentina and Vancouver, Canada. *Ecology and Society* 19(2): 19. <http://dx.doi.org/10.5751/ES-06531-190219>

Ostrom, V., C. M. Tiebout, and R. Warren. 1961. The organization of government in metropolitan areas: a theoretical inquiry. *American Political Science Review* 55(4):831-842. <http://dx.doi.org/10.2307/1952530>

Peters, G. B. 2005. The problem of policy problems. *Journal of Comparative Policy Analysis* 7(4):349-370. <http://dx.doi.org/10.1080/13876980500319204>

Rijsberman, F. R. 2006. Water scarcity: fact or fiction? *Agricultural Water Management* 80(1):5-22. <http://dx.doi.org/10.1016/j.agwat.2005.07.001>

Satterthwaite, D., and D. Mitlin. 2014. *Reducing urban poverty in the global South*. Routledge, New York, New York, USA and Oxon, UK.