

URBAN RIVER GOVERNANCE: A pathway for cities to achieve climate goals

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Introduction

Water resilience has become a key agenda for cities today, as most natural and climate-change induced disasters usually manifest through water, such as floods, storms, water-borne disease outbreaks, and droughts. Amid the climate change impacts, it is necessary that cities prioritize on improving the governance of its freshwater systems, including its rivers.

River-related disasters like floods, are increasingly becoming a threat for many cities, often linked to extreme events such as heavy rains, which can be linked to climate change. It is estimated that nearly 80 per cent of the world's population is exposed to water scarcity because of large-scale transformations of water systems like rivers, transformation that may involve land cover change, urbanisation, industrialisation, deforestation, inefficient agricultural practices, overgrazing, hydrologic infrastructure, etc¹. The lack of planning and rapid urban development through infrastructural investments have forced many rivers into artificial structures, removed vegetation, drained wetlands, and dredged rivers, resulting in destroying habitat and river ecosystems.

Moreover, riverine networks surrounding urban landscapes are also becoming a hotspot of increasing carbon emissions. According to the study by Long Ho et al. (2020) ², it is estimated that urban rivers emit four times more greenhouse gases

¹ Vörösmarty, C., McIntyre, P., Gessner, M. et al. Global threats to human water security and river biodiversity. *Nature* 467, 555–561 (2010). <https://doi.org/10.1038/nature09440>

² Ho, L., Jerves-Cobo, R., Barthel, M., Six, J., Bode, S., Boeckx, P., & Goethals, P. (2020). Effects of land use and water quality on greenhouse gas emissions from an urban river system. *Biogeosciences Discussions*, 1-22. <https://doi.org/10.5194/bg-2020-311>, 2020.

(GHGs) compared to rivers in natural sites. The emissions increase when water systems are heavily polluted. Urban rivers are often fed by treated or untreated wastewater, sludge, and their GHG emissions may be substantial. Mismanagement of urban WASH services is one of the main reasons of deteriorating rivers and poor water quality, but also indirect GHG emissions, mainly during wastewater treatment and sludge disposal. ³Although there are evidences that rivers are emitting GHGs, because of lack of studies and data, it has been a challenge to identify the drivers of emission, the patterns and the variability⁴.

In efforts to climate mitigation and adaptation, actions are needed to work with nature and recognizing the values of freshwater systems. This would require enhancing system resilience, functioning ecosystems and enhanced biodiversity, contributing to maximizing the benefits of such systems. Rivers are an integral part of many urban systems, providing an extensive range of services that often form the basis of the economic development of the city and the social wellbeing of its inhabitants (Box 1)⁵. Today, urban river management interventions are focusing on ensuring the revitalization of its basic functions through ecological restoration as well as economic, social, and cultural considerations through waterfront landscape development. As such, the focus of river issues shifted from a largely engineering-based approach for drainage, flood control, and water transport for utilitarian values, to more complex approaches to address also adaptation, ecology, landscape and culture, social and health impacts of 'blue spaces'. With this shift to more holistic approaches, a need for multi-disciplinary governance processes emerged⁶. However, there are limited studies and empirical evidence to understand the governance processes that promote the holistic and sustainable management of urban river systems.

³ Giné-Garriga, R., Grande, G. A. C., Dickin, S., Sandberg, H. G., Kerres, M., Lambiasi, L., ... & Hebart-Coleman, D. Mitigation measures in drinking water and sanitation services, Chapter 5, in Ingemarsson. M. L., Weinberg, J., Rudebeck, T., and Erlandsson. L. W., (eds) *The Essential Drop to Reach Net-Zero: Unpacking Freshwater's Role in Climate Change Mitigation*. Stockholm International Water Institute, Stockholm Resilience Centre, Potsdam Institute of Climate Impact Research, United Nations Development Programme and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. URL: <https://siwi.org/wp-content/uploads/2022/10/the-essential-drop-to-reach-net-zero-chapter-4.pdf>

⁴Ingemarsson. M. L., Weinberg, J., Rudebeck, T., and Erlandsson. L. W., 2022. *The Essential Drop to Reach Net-Zero: Unpacking Freshwater's Role in Climate Change Mitigation*. Stockholm International Water Institute, Stockholm Resilience Centre, Potsdam Institute of Climate Impact Research, United Nations Development Programme and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. URL: https://siwi.org/wp-content/uploads/2022/06/exec-summary_unpacking-freshwaters-role-in-climate-change-mitigation_hi-res-1.pdf

⁵ Veról, A.P.; Bigate Lourenço, I.; Fraga, J.P.R.; Battamarco, B.P.; Linares Merlo, M.; Canedo de Magalhães, P.; Miguez, M.G. River Restoration Integrated with Sustainable Urban Water Management for Resilient Cities. *Sustainability* 2020, 12, 4677. <https://doi.org/10.3390/su12114677>

⁶ Beck, A., & Araujo Cruxen, I. (2019). New uses for old rivers: Rediscovering urban waterways. *Projections*, 14. <https://doi.org/10.1162/00c13b77.d91a08fd>; Veról, A.P.; Bigate Lourenço, I.; Fraga, J.P.R.; Battamarco, B.P.; Linares Merlo, M.; Canedo de Magalhães, P.; Miguez, M.G. River Restoration Integrated with Sustainable Urban Water Management for Resilient Cities. *Sustainability* 2020, 12, 4677. <https://doi.org/10.3390/su12114677>

Box 1 Multiple values of river systems:

- **Flood control and wastewater discharge:** Urban rivers are generally the discharge channel of floods and urban wastewater.
- **Provision of water resources and water security:** Before the era of pollution, an urban river generally served as an important source of drinking water for a city. Today, it still supplies water for domestic use and industrial production.
- **Maintain urban ecosystem functions:** A river and surrounding floodplains, forests, and wetlands have a regulatory function; and the river can support biodiversity by providing habitats for birds, as well as aquatic and amphibious animals. Rivers can also serve as vital green corridors, connecting various habitats through the city.
- **Waterway navigation function:** Rivers have historically provided important connectivity between the city and other trade centres.
- **Land development and agricultural productivity:** River valleys and plains often provide fertile land for crop production, attracting settlements and development activities.
- **Cultural and recreational function:** Rivers provide a range of cultural ecosystem services (CES), with recreational and tourism activities such as river rafting, bird watching, etc, and religious and cultural practices or beliefs associated with rivers.

Key Challenges: Governance gap

Managing urban river systems can be complex. The responsibilities of performing the different governance functions or key processes (e.g., planning, policy and strategy, financing, regulations, monitoring, capacity developments) are spread across scales, from urban to state and national levels. Cities water supply may draw upon larger catchment areas, consisting of one or more connected water basins that extends beyond the urban administrative boundary. These complexities often result in institutional and hydrological mismatch between the boundaries of urban water governance and the wider water systems on which the water system depends, such as a river basin.

Urban water management has traditionally been limited to single-sector approaches, and often it is found that the management of urban rivers does not have a dedicated space in urban governance structures. Advancing to a more complex and integrated approach requires a greater understanding of the different processes of managing urban rivers, including linkages between urban *river* management with urban *water* management and urban planning, that are often missing. There is a need to reduce this

mismatch by implementing a holistic management approach where the connection between cities and rivers is taken into consideration. There is often a lack of coordination between upstream and downstream stakeholders which influences the overall goals and objective to achieve a resilient urban water system. Cities, and their urban planning, water management, together with how they manage the river or aquifer, can also have a considerable impact on downstream communities and environments, not just on the quality of water but also on the quantity. In addition, there exist policy and institutional fragmentations between Water, Sanitation & Hygiene and Water Resources management leading to missed opportunities and can hinder the efficiency and effectiveness of urban water and sanitation services and protection of rivers that the city depends on⁷. Resilient urban WASH services highly depend on the surrounding water resources for a certain quality and quantity of water.

Similarly, ensuring a biodiverse ecosystem will depend on the quantity and quality of wastewater being discharged into the environment and urban river systems from a sanitation service. Thus, addressing these overlapping mandates, and clarity around who does what, at what level, and how those decisions are made and implemented along with improved coordination among the stakeholders involved in this process is necessary to maximize the positive co-benefits, minimize disputes and reduce the negative impacts on the river systems. Other governance gaps that must be addressed include lack of capacity, poor regulatory enforcements, financial gaps, weak monitoring, evaluation, and learning mechanisms⁸.

Policy Recommendation: Accelerating the convergence of urban river governance and climate action

Understanding a city's governance structure and capacity is fundamental for enhancing its institutional arrangement for urban river governance, assessing existing gaps and opportunities, and further achieving climate smart and resilient management for water resources and services. The following steps can assist in the transition towards climate smart and holistic urban river governance:

- **Adopting basin-scale and watershed scale governance approach.** Rather than considering river systems as isolated segments, urban stakeholders must address the complex dynamics of the basin and catchment in the planning.
- **Prioritize water resilience in urban river development plans.** A crucial step is to assess the current capacity to adapt and cope in situations of climate hazards and uncertainties.

⁷ UNDP, SIWI and UNICEF (2023). Cooperation Opportunities for Improved Integration across SDG6. United Nations Development Programme (UNDP), Stockholm International Water Institute (SIWI) and United Nations Children's Fund (UNICEF) on behalf of UN-Water, New York and Stockholm. URL: <https://www.unicef.org/media/134741/file/Cooperation%20Opportunities%20for%20Improved%20Integration%20Across%20SDG6.pdf>

⁸ Panchali Saikia, Katharina Davis, Ruth E. Mathews, Marianne Kjellen, Birgitta Liss Lymer, Swayamprabha Das, Akash Parmar, Robin Ward, Josh Weinberg and Alejandro Jimenez, 2023, Urban River Governance, In (Eds) Shinde, Victor R., Rajiv Ranjan Mishra, Uday Bhone, and Hitesh Vaidya, 2023, Managing Urban Rivers: From Planning to Practice., Elsevier. <https://doi.org/10.1016/C2020-0-02821-5>

- **Map potential heightened risks of floods and other water-related events under climate change.** Review and update spatial/urban planning and land-use planning and building codes, to better address the identified risks.
- **Work with multiple time-scales simultaneously.** Investments in climate resilience should consider both reducing risks from sudden events as well as long-term changes in the river system that may make areas or buildings prone to regular flood events, impacting both insurability and the value of land, as well as in actions towards reducing emissions.
- **Develop disaster risk reduction (DRR) and water resilience capacities** to deal with risks from floods, other urban hazards and uncertainties impacting the water sector.
- **Invest in integrated and intersectoral early warning systems.** These should include strategic coordination between relevant departments, institutions and bodies managing urban rivers, urban water and sanitation service providers.
- **Improve the health of urban rivers through urban water regulation reform.** A coordinated approach towards designing and effective enforcement of economic, environmental and health regulations of the urban water sector to improve efficient use of water resources, improve water quality and protect freshwater ecosystems.
- **Recognize and adopt the potential and use of improved urban river programmes and investments to support effective and sustainable emission reduction strategies.**

About this policy brief

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About UNDP-SIWI Water Governance Facility

The UNDP-SIWI Water Governance Facility (WGF) supports low- and middle-income countries in water reform by providing policy and technical advice and support, developing water governance knowledge and helping to develop institutional capacity.