

The Routledge Handbook of Sustainable Cities and Landscapes in The Pacific Rim

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Chapter 23

Introduction to Section 4

Water

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INTRODUCTION TO SECTION 4

Water

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Water is not an element that can be easily characterized and defined. Though it can be elementally described by the attractions that adhere to its molecular composition, it is omnipresent as force and material, critical in its power in all its forms for shaping landscape while simultaneously supporting all life. These complex characteristics have etched its meaning with intersecting perspectives, values, and motivations that cut across societal and political structures, and are embedded in the historical and contemporary shaping of our built environments. Entire civilizations have grown and subsequently collapsed in response to the availability and quality of water resources. Throughout history, securing a clean and reliable water source and ensuring the quality of those sources is maintained were central to the early location of settlements and the continued densifying of human populations in our contemporary cities (Way, 2018).

Water is as inextricably linked to the city as is life. Urban geographer Matthew Gandy (2014, pp. 1–2) writes, “Water lies at the intersection of landscape and infrastructure, crossing between visible and invisible domains of urban space. Water forms part of the material culture of modernity, ranging from the private spaces of the home to vast technological networks that have enabled the growth of cities, yet it is also powerfully inscribed in the realm of imagination.” It is within this realm of imagination that new management strategies, effective policies, and ethical and equitable design practices must engage to address the complexity and support the sustainability of our communities and landscapes in which we live, work, and play. The chapters provided in this section provide discrete insights into the opportunities and potential already being developed in urban regions of the Pacific Rim to address issues for negotiating the dynamic politics related to water, ensuring equitable access, and improving urban water sustainability.

Of the many pressing global issues the world currently faces, access to clean water is of utmost importance, leading the World Economic Forum to recently claim the water crisis as one of the top 3 risks for human populations across the world (World Economic Forum [WEC], 2019). As global populations continue to grow so does the demand on often limited regional water resources, exacerbating existing social and political inequities. Coupled with environmental uncertainties associated with climate change, increasing land use changes related to urbanization, increasing intensities of water needs for food and energy production as well as industrial and manufacturing processes, the scarcity of water and demand for greater water management in many areas of the Pacific Rim region will only amplify. This has led

some to claim water to be the *next oil* as countries, regions, and communities dispute the availability and distribution of water, potentially influencing geopolitics, diplomacy, and even leading to outright conflict (McGee, 2014). Such effects will drive even greater inequities across global societies severely impacting the health and viability of vulnerable populations.

In addition, as the COVID-19 coronavirus pandemic spread across the globe, public health advice not only called for facial masks to be worn, but to frequently wash hands and maintain a high level of hygiene. Yet, worldwide, roughly 40% of people do not have access to basic hand-washing facilities with soap and clean water. Since 2000, more than 40 million people globally have died due to causes directly related to a lack of access to clean water and basic hygiene with another 40 million projected to die by 2030 related to similar causes (United Nations Children's Fund [UNICEF] and World Health Organization [WHO], 2019). The spread of COVID-19 has exacerbated this trend revealing even more starkly the inequities of global society.

While much is being accomplished to address concerns related to water access, the current resources provided are insufficient. It is within this context that UN-Water – a United Nations interagency coordination program for freshwater and sanitation-related issues – released its 2030 Strategy to focus on accelerating lagging progress toward the targets specific to Sustainable Development Goal (SDG) 6 – Clean Water and Sanitation (UN-Water, 2020). Due to the deep integration of water into everyday life, progress toward these targets will effectively improve opportunities for many of the other 16 SDGs, including, but not limited to, advancements in human health and well-being, technological and industrial innovations, social inequalities, sustainable cities and communities, and aquatic and terrestrial ecosystems.

The focus of APRU's Sustainable Cities and Landscapes research hub complements and extends this work across the Pacific Rim region investigating cross-sectoral and interdisciplinary opportunities in metropolitan regions. The rapid growth and transformation of cities and the immediate needs to address the current and future projections of climate change require innovative research and new approaches to managing water systems from site to basin scales and across near- and longer-term time horizons. For more than a century, cities across the region have relied almost entirely on the expertise of engineers for developing and implementing infrastructures of water supply and sanitation. While advancing much of the contemporary efficiencies in urban water management, the measured and detailed approaches for implementing engineered solutions have been highly criticized for framing and prioritizing risk through capital measures (Pahl-Wostl et al., 2007). Further, this framing extends a simplified, singular approach to meeting immediate and short-term needs of urban areas without comprehensively understanding the discrete and real impacts of such approaches on social equity, human health, and biodiversity (Ahern, 2011). These inadequacies of historical and contemporary management have resulted in professional and academic calls to identify collaborative and cross-sectoral strategies that effectively and equitably negotiate the politics related to water resources, ensuring water access and improving water sustainability (Liao, 2012; Loftus and Sultana, n.d.). Effective strategies in these areas are crucial to addressing this long-standing, yet expanding, global crisis. The chapters provided in this section respond to these calls, engaging practices in planning and design, developing new models of investigation, and providing discrete case studies of potential.

Negotiating water politics

Water is a strategic resource, and the management of this resource is an activity of highly contested geo-political terrain as the hydrologic cycle and surface and subsurface systems of water

frequently transcend political boundaries. The politics of water, also known as hydro-politics, unfolds through trans-national and inter-state negotiations, and can be understood by recognizing the many ways in which societies use and relate to water (Loftus and Sultana, n.d.). These relationships are often played out through a complex range of socio-cultural, ecological, economic, and technical discourses related to scarcity and risk management.

At the metropolitan scale, such political negotiations over the past century of urban development have commonly led to centralized urban water systems and infrastructures that, while efficient in initial investment and hierarchical operations, are often ill-equipped to accommodate necessary system upgrades related to maintenance, physical expansions, and environmental change. This rigidity has focused many municipalities across the Pacific Rim region to seek other more innovative policies and practices for managing water systems to ensure effective and adaptive management capacities while further serving to equitably meet community needs. In their chapter, *Redrawing Our Urban Waters*, Brook Muller and colleagues present opportunities from policy to design that investigate the potential for the extensive integration of decentralized urban water management systems into existing built environments. They call upon the development of new infrastructural investment systems that engage value planning processes prioritizing multi-functional benefits in economics, economy, and environment. In this, they argue for deeper investment in infrastructure policy and planning frameworks emphasizing integrated and distributed approaches challenging contemporary design and technological advancements that require cross-sectoral collaboration.

For such collaborations to be effective in achieving their intentions, urban planners, scientists, and water managers continue to develop new methods and strategies to proactively assess potential scenarios in changing demand for water resources as well as realized and future impacts related to climate change. Scenario planning represents proactive, broad spectrum approaches to managing resources for change as opposed to more traditional reactive planning measures that simply develop focused solutions for immediate need, often only resulting in short-term benefits. Jinyung Chon's chapter, *Resilience-based planning and management of sustainable coastal cities and landscapes using spatial-temporal simulation*, proposes a set of strategies for utilizing simulation and scenario building methodologies to model the change in ecosystem services related single-event and long-term perturbations in weather and climate in the metropolitan region of Busan, Republic of Korea. He proposes this approach and offers analysis tools for projecting long-term planning opportunities for coastal regions currently impacted by a greater frequency of high-intensity storm events and future needs for accommodating sea level rise and securing access to clean and reliable sources of water for future generations.

Ensuring water access

Synonymous with water security, ensuring access to clean and reliable sources of water is of critical importance for improving the health of urban communities. Sustainable urban development across the Pacific Rim region will not be achieved without water security. Deeply embedded in the context of hydro-politics, the political negotiations and agreements on ensuring water access and availability often have far-reaching consequences from impacts challenging the viability of major metropolitan regions to the livelihoods of individuals (Goh, 2019). While these complex negotiations, at times, result in beneficial relationships in regional and trans-boundary trade, for example, they just as often deepen divides and exacerbate long-standing inequities related to water security and access (Greve et al., 2018). Such

negotiations are described in Xiaoxuan Lu's chapter, *Reservoir Urbanism in Shenzhen*, offering an examination of the complex dynamics of political, economic, and physical forces in the creation and continued expansion of the water supply systems of Shenzhen, China since its establishment as a Special Economic Zone in 1980. Through tense geo-political and trans-boundary negotiations to also provide water supply to Hong Kong, the rapid evolution of Shenzhen from a predominantly agricultural region into one of the fastest growing metropolitan areas in the country, Dr. Liu specifically examines the relationships between planned priorities and the continued expansion of the physical components of reservoirs, transfer aqueducts, and pipelines. She argues that while the centralized and hierarchical approaches to infrastructures development have been efficient and reactive to ever growing demand, the process continually displaced long-standing communities and ways of living.

It is within such communities that the inequities of political motivations and contemporary economic structures related to water access are made most clear. In the chapter, *Living on Water*, Leann Andrews and colleagues with InterACTION Labs describe their work with the informal community of Claveritos in Iquitos, Peru – a community defined by water. Located on a floodplain (zonas inundables), the community of homes and connected walkways are considered amphibious, spending the wet season afloat and the remainder of the year grounded in the floodplain. Despite the community's adjacency to the city of Iquitos, as an informal neighborhood, there is no political framework or infrastructure planning to support utilities and services extended to the community. With little to no access to even the most rudimentary of sanitary infrastructure, residents are often forced to pull water for drinking and domestic needs from the very sources that receive their waste. Reliable access to clean water is a daily concern and water-borne diseases are prevalent within the community.

Working closely with the community, the interdisciplinary team of InterACTION Labs identified local approaches and opportunities to improve water quality utilizing aquatic vegetation and promoting behavioral changes to support sustainable water-related disease prevention and health promotion while also enhancing local ecological conditions. It is through such creative practices in planning and design that new opportunities emerge that not only lead contextually specific solutions, but further extend the practices for improving underserved communities and advancing concepts in urban water sustainability.

Improving water sustainability

Emphasizing the need to respond to the global water crisis, the U.N. General Assembly recently launched the Water Action Decade, 2018–2028, to mobilize action-oriented strategies and practices that will help transform how urban regions manage water for sustainable development. Highlighting the phrase “Every Drop Counts,” this initiative engages issues of water across all sectors, emphasizing policies, practices, and infrastructures that engage water issues through a systems-based approach. In urban regions, such an approach certainly not only engages issues related to supply and sanitation, but also recognizes the challenges created by urban flooding and the need to manage and potentially resource stormwater as an effective mitigative practice (Bell, 2018; Yang et al., 2016).

In a call to address needs for new flood management strategies in regions currently experiencing the impacts of greater intensity storms related to changing climate, in their chapter, *The evolving landscape of flood control for the Meinung River*, Kuei-Hsien Liao and Tsz Yan Lee explore the limitations of flood management planning that merely emphasizes the construction of flood control infrastructure and does not take into account the potential benefits

from perspectives of a larger watershed planning framework. They examine the case of the Meinung River which flows through Kaohsiung City in southern Taiwan. Annually beset by extreme rain events and typhoons, local and national flood control responses for the Meinung River have prioritized the channelization and revetment of the river to control flows. Despite mostly continual construction in the channel over the past three decades, the urban core of Kaohsiung City floods regularly, exacerbating concerns over the sustainability of the community in the future. Through this case, they argue for the continued development and local integration of holistic water management strategies that respond to the needs of the river access its floodplains to mitigate the impacts and severity of the flooding. Further, such practices can further enhance the viability of the region's agricultural economy and reduce risks to the communities and the infrastructures that assist in maintaining their way of life.

In the chapter, *Watershed Thinking: Landscape-City Practices*, Nancy Rottle extends this approach, focusing on the potential of integrated strategies for managing urban stormwater. Building on established and emerging practices in water-sensitive urban design and low-impact development, she draws on examples from across the Pacific Rim region. The chapter focuses on the multi-functional capacities of stormwater design practices to not only reduce flooding events and improve urban water quality conditions, but to further enhance the livability and ecological conditions of the city. She argues that to ensure every drop counts, urban regions have the responsibility and opportunities to diversify strategies of water management with the potential to support more sustainable cities and landscapes despite the ever-increasing needs of our urban populations.

With more than 780 million people acutely impacted by the global water crisis, the need to address water issues in the Pacific Rim region is dire and immediate (UN-Water, 2020). The tensions between the real and yet to be actualized impacts of water scarcity enable a rethinking of water management and the infrastructures that facilitate the flow of water through different scales of urban spaces, from individual households to more convoluted urban-scaled negotiations for valuing and prioritizing the distribution of available waters for varied uses ranging from agriculture to industry to environmental conservation and enhancement. Closely linked to the chapters provided in this section, the U.N.-Water's release of its 2030 Plan and the U.N. General Assembly's launch of the Water Action Decade initiative identifies the global water crisis as an urgent interconnected challenge that requires a collective, coordinated response across all sectors and levels of governance, management, and design. The challenges that face us are immense and complex, but they are not beyond the scope of our ingenuity and ability to adapt to changing conditions.

References

- Ahern, J. (2011). From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. *Landscape and Urban Planning*, 100(4), 341–343. <https://doi.org/10.1016/j.landurbplan.2011.02.021>
- Bell, S. (2018). *Urban water sustainability: Constructing infrastructure for cities and nature*. Routledge.
- Gandy, M. (2014). *The fabric of space: Water modernity, and the urban imagination*. The MIT Press.
- Goh, K. (2019). Urban waterscapes: The hydro-politics of flooding in a sinking city: urban waterscapes. *International Journal of Urban and Regional Research*, 43(2), 250–272. <https://doi.org/10.1111/1468-2427.12756>
- Greve, P., Kahil, T., Mochizuki, J., Schinko, T., Satoh, Y., Burek, P., Fischer, G., Tramberend, S., Burtscher, R., Langan, S., & Wada, Y. (2018). Global assessment of water challenges under uncertainty in water scarcity projections. *Nature Sustainability*, 1(9), 486–494. <https://doi.org/10.1038/s41893-018-0134-9>
- Liao, K.-H. (2012). A theory on urban resilience to floods—A basis for alternative planning practices. *Ecology and Society*, 17(4), art48. <https://doi.org/10.5751/ES-05231-170448>
- Loftus, A., & Sultana, F. (n.d.). *Water politics* (1st ed.). Routledge.

- McGee, S. (2014, July 27). Companies proclaim water the next oil in a rush to turn resources into profit. *The Guardian*. <https://www.theguardian.com/money/2014/jul/27/water-nestle-drink-charge-privatize-companies-stocks>
- Pahl-Wostl, C., Craps, M., Dewulf, A., Mostert, E., Tabara, D., & Taillieu, T. (2007). Social learning and water resources management. *Ecology and Society*, 12(2). <https://doi.org/10.5751/ES-02037-120205>
- UN-Water. (2020). *2030 Strategy*. <https://www.unwater.org/publications/un-water-2030-strategy/>
- United Nations Children's Fund & World Health Organization. (2019). *Progress on household drinking water, sanitation and hygiene 2000–2017. Special focus on inequalities*. https://www.who.int/water_sanitation_health/publications/jmp-report-2019/en/
- Way, T. (Ed.). (2018). *River cities: City rivers*. Dumbarton Oaks Research Library and Collection.
- World Economic Forum. (2019). *Global risks 2018, 14th Edition*. <http://wef.ch/risks2019>
- Yang, W., Hyndman, D. W., Winkler, J. A., Viña, A., Deines, J. M., Lupi, F., Luo, L., Li, Y., Basso, B., Zheng, C., Ma, D., Li, S., Liu, X., Zheng, H., Cao, G., Meng, Q., Ouyang, Z., & Liu, J. (2016). Urban water sustainability: Framework and application. *Ecology and Society*, 21(4). <https://www.jstor.org/stable/26270037/>