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Promoting Water Valuation for Urban Sustainable Development in Asia

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Highlights

Water valuation is pivotal for sustainable development in water-scarce regions and high-consumption cities in Asia. It enables efficient design of circular water conservation, including water reuse, to alleviate pressure on scarce water resources and maintain water quality through reduced pollution loads, decentralized treatment solutions and enhanced alignment of water supply with ecological and social priorities.

Recommendations:

- Incorporate water valuation in long-term policies and budgeting for sustainable development in Asia.
- Reflect site-specific and local factors in strategies and policies for reducing wastage and promoting responsible water usage to support circular water conservation.
- Strengthen cross-sectoral collaboration and partnerships between UN agencies and Member States for technology transfer, capacity building and mutual learning on the value of water to accelerate progress on SDG 6.

Water & Urban Sustainable Development in Asia

Urban water systems are complex networks of infrastructure, facilities and processes involved in managing and distributing water. Their components include water supply networks, wastewater collection and treatment systems, stormwater management, landscapes and water reuse systems. They encompass the interconnections and interdependencies within the urban water cycle, comprising water sourcing, treatment, distribution, consumption and disposal.

Across global regions these systems vary significantly due to differences in geography, climate, population density and available water resources. Such variations manifest in differences in water availability and scarcity, water quality, infrastructure limitations, legal and regulatory frameworks, socioeconomic conditions and cultural practices related to water management. Water pollution is not only a health risk; it also places an economic burden on industries, including agriculture and tourism, and on water service providers, which must invest heavily in pollution control and treatment measures. In addition to advancing progress on SDG 6 (clean water & sanitation), improving urban water can also bring co-benefits for several other goals including SDG 3 (good health & well-being) and SDG 11 (sustainable cities & communities).

While Asia has made notable progress in expanding access to safely managed drinking water services, there remains limited coverage in informal settlements, smaller cities and peri-urban zones (WHO/UNICEF 2021). In cities such as Ulaanbaatar, access to piped water and safe sanitation is universal in areas with modern apartment buildings. Residents of peri-urban areas, however, must travel long distances to collect water from water kiosks, wells or surface water bodies, often incurring disproportionately high costs. Sanitation in these areas is typically limited to pit latrines (Karthe et al. 2022). Furthermore, the microbiological and chemical quality of surface water and groundwater in large parts of Asia has deteriorated over the past two decades, primarily due to rapid population growth, urbanization, industrialization and inadequate wastewater treatment.

Addressing water issues requires integrated approaches — frameworks that account for the multifaceted nature of water, linking its ecological, economic and social functions while promoting coordination across sectors, stakeholders and spatial scales. They aim to break down silos in water governance by aligning environmental protection, infrastructure investment and community needs with long-term sustainability goals. Hydro-social approaches to water management help researchers, practitioners and policymakers to better understand and address water-related challenges by delineating the feedback between water resources and society at multiple scales. These models facilitate stakeholder participation in sustainable water management while reflecting the socio-political dynamics underlying exclusion and water insecurity.

Advancing Integrated Approaches Through Water Valuation

While integrated and hydro-social approaches have advanced water governance by addressing ecological and social dimensions, they do not fully capture the diverse values attributed to water. Water valuation refers to the process of recognizing, measuring and incorporating the multiple values of water — economic, environmental, social and cultural — into decision-making. This goes beyond assessing direct monetary costs or benefits, to include understanding trade-offs, opportunity costs and intangible services provided by water systems. Practical applications include cost-benefit analysis for infrastructure, ecosystem services valuation, water pricing reforms and participatory planning that reflects diverse stakeholder priorities (HLPW 2017; Nagabhatla et al. 2022). Water valuation supports fair and environmentally conscientious water management and policy decisions. It involves comparing the costs of preventive measures to avoid water quality degradation (e.g., pollution control or land-use management) with the costs of restoring water quality after degradation has occurred (e.g., treatment of contaminated water bodies). Focusing solely on the economic aspect of water valuation neglects the triple bottom line context — an accounting framework that incorporates the broader social, environmental and economic dimensions. In 2017 the High-Level Panel on Water published a Roadmap for the Valuing Water Initiative (HLPW, 2017) to create a global consensus and establish a common language that will enhance methods for valuing water across the three dimensions.

There are various tools for valuing water, ranging from administrative to market-driven. Administrative approaches are often utilized by governments for water resource planning, including high-level decisions on how to allocate water among competing users and territories, and reviews of investment options for urban water supply and sanitation. Market approaches allow water users to make decisions based on the advantages they obtain from water.

Water quality trading schemes, as implemented in various parts of the United States, illustrate how market-based instruments can be embedded within an integrated water valuation framework. These systems enable public–private collaboration to achieve ecological outcomes by assigning economic value to pollutant reductions. While they improve cost-efficiency, their broader significance lies in recognizing and managing the trade-offs between environmental quality, regulatory compliance and long-term ecosystem health. They reflect a more comprehensive understanding of water valuation — one that incorporates not only monetary costs, but also ecological integrity, social equity and risk reduction over time. Tokyo has incorporated an integrated water valuation approach into the city's environmental plan, and New Zealand has implemented a river rights policy that considers multiple dimensions of water valuation. The World Wildlife Fund (WWF) has developed the Water and Value (WAVE) tool to capture the value of water. However, most international organizations, including UN entities, are yet to embrace integrated water valuation.

Valuing water through an integrated approach can illuminate the importance of diverse water uses and conservation practices, including circular water strategies. For example, assigning economic value to rainwater harvesting or stormwater retention systems reveals their cost-saving and climate resilience potential, which can justify public or private investment. Valuing non-monetary benefits such as biodiversity restoration, social well-being or flood mitigation informs more holistic planning and policy prioritization. By embedding these values into decision-making tools like cost-benefit analysis, land-use planning and environmental impact assessments, governments and stakeholders are better equipped to design and implement conservation. Promoting the value of reused water in economic activities expands the scope of water valuation by internalizing its multiple benefits, such as reducing freshwater demand, lowering treatment costs and enhancing climate resilience (Nagabhatla et al. 2022). Implementing such approaches requires establishing rainwater and stormwater harvesting systems and their decentralized treatment systems, which should be integrated into urban planning and management strategies.

Strengthening Water Valuation Through Regional Partnerships in Asia

Since the value attributed to water varies across societies and cultures, it is important to foster coordination and mutual understanding between stakeholders through knowledge exchange and inclusive dialogue. Regional partnerships, in particular, have potential to enhance water resource management outcomes, as demonstrated by the Asia-Pacific Water Forum (APWF), the ASEAN Working Group on Water Resources Management (AWGWRM) and the Water Environment Partnership in Asia (WEPA). The core objective of the APWF is to value water through integrated water resource management (IWRM), financing and capacity development for sustainable water infrastructure and human development. AWGWRM focuses on the development and management of land, water and other associated assets to equitably maximize social and economic benefits while ensuring the sustainability of key ecosystems, which is reflected in its strategic plan. WEPA aims to enhance water environment governance and identify water environmental solutions in 13 Asian countries, including China, Japan and Nepal, and provides opportunities to share knowledge and best practices between partner countries. For example, at its annual meeting in 2024 participants learned how the Republic of Korea had aligned its legal framework for the basic policy direction of water environmental management with the concept of water valuation. Such regional initiatives play a critical role in promoting sustainable water governance by fostering cross-border collaboration, policy innovation and shared learning between countries for understanding and implementing water valuation.

Policy Recommendations

The following recommendations provide guidance for national and local policymakers on incorporating urban water valuation to alleviate pressure on water resources and maintain water quality in water-scarce regions in Asia.

1. Incorporate water valuation in long-term policies and budgeting for sustainable development in Asia.
When evaluating water resources, it is important to take into account not only financial investments but also the environmental implications. Incorporating the value of reused water to incentivize the implementation of decentralized wastewater systems and encourage water reuse practices can promote and advance the circular economy in Asia. This requires integrating quantitative water reuse targets into national water strategies and offering subsidies or tax incentives for greywater and rainwater systems to intensify circular water reuse. Building codes should also be updated to mandate dual plumbing in new developments, allowing water sourced externally (e.g., city water) and recycled water to be used separately depending on their intended purposes.

Governments should incorporate water valuation in urban development policies, recognizing its importance for future generations, and implement water pricing that reflects the holistic value of water in promoting responsible consumption at the national level. This should be followed by infrastructure investments with resources allocated to improving water treatment and distribution, and water recycling and reuse facilities. Technology for efficient water use must be supported by internationally, nationally and privately funded research and innovation. Incorporating water valuation, as part of an integrated approach, into policy frameworks can help to prioritize investments in technologies that deliver greater environmental and socio-economic returns.

2. Include site-specific and local factors in strategies and policies aimed at reducing water wastage and promoting responsible water usage to support circular water conservation.
Several steps could be taken, such as incorporating green infrastructure into the master plan, developing incentives for developers and property owners, utilizing public space for green infrastructure, fostering public engagement and enhancing awareness. For instance, the strategic environmental assessments (i.e., including green policy) of spatial land-use development plans need to embed SDG objectives and target indicators.

These systems can be systematically embedded within zoning regulations, building codes and urban master plans. Moreover, tools should incorporate water valuation metrics to guide land-use and infrastructure decisions. This shift not only ensures long-term cost savings and risk reduction but also fosters more equitable and adaptive urban environments that internalize water's diverse values.

Policymakers should implement strategies such as incentivizing and promoting green infrastructure, including rain gardens and green roofs as integral elements of urban design. These features capture and store rainwater, mitigate stormwater runoff and reduce the strain on water resources. By linking green infrastructure promotion with integrated water valuation, cities can unlock co-benefits across environmental, economic and social domains. This involves addressing urban water systems as more than mere infrastructure challenges — rather, they are opportunities for regenerative design. For instance, integrating rainwater harvesting and decentralized greywater treatment systems into neighbourhood-scale planning enhances urban resilience while reducing dependence on centralized infrastructure. Recognizing rainwater, stormwater and greywater as valuable resources, rather than waste, can shift investment patterns toward sustainable water reuse. Importantly, they generate quantifiable ecosystem services, such as flood risk reduction, water purification and thermal regulation, which can be valued in economic terms and incorporated into cost-benefit analyses or urban water accounting frameworks.

3. Strengthen cross-sectoral collaboration and partnerships between UN agencies and Member States for technology transfer, capacity building and mutual learning on the value of water to accelerate progress on SDG 6. Country-to-country and public–private partnerships are particularly important for establishing decentralized wastewater systems and promoting water reuse, helping to create a circular economy. They must focus on localized solutions that consider the roles and responsibilities of both the public and private sectors. The United Nations is recognized as a key player in strengthening the transfer of water-related expertise from water-rich regions to water-stressed regions. One example is the two-year Partnership for Urban Water Sustainability in Asia, launched by UNU-IAS in 2023 as part of the SDG Action Platform, which connects academic institutions and the governments of Member States in Asia (China, Japan, Thailand and Viet Nam) to measure the quality of water in cities. This initiative developed the water sustainability index (WSI) — a tool for policymakers to project the progress of water quality improvement and design measures for broader sustainable development. The WSI considers four elements: social, environmental, economic and built capital (Jarzebski et al. 2024).

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