



The IWA Principles for Water Wise Cities

2nd Edition

For Urban Stakeholders to Develop a Shared
Vision and Act towards Sustainable Urban Water
in Resilient and Liveable Cities

The IWA Principles for Water-Wise Cities assist leaders to develop and implement their vision for sustainable urban water. The Principles underlie resilient planning and design for more liveable cities in the face of the dual pressures of climate change and population growth. The ultimate goal of these Principles is to encourage collaborative action, underpinned by a shared vision, so that local governments, urban professionals, and individuals actively engage in addressing and finding solutions for managing all waters of the city, driven by three paradigm shifts:

1. RESOURCES ARE LIMITED: WE NEED TO DO MORE WITH LESS

With increasing numbers of people living in metropolitan areas, water, energy and materials need to be used efficiently reused and renewed.

2. CITY DENSIFICATION IS BOTH AN OPPORTUNITY FOR ECONOMIC GROWTH AND A THREAT TO LIVEABILITY

By 2030, over 6 billion people are expected to live in cities. More populated, denser cities will be required to provide more efficient services. Water is essential for the well-being of citizens, their safety and social inclusion in cities.

3. AN UNCERTAIN FUTURE UNDERLIES THE PLANNING OF OUR CITIES

Historical development pathways are often not appropriate to plan future water systems. Climate change and population growth are uncertainties. Planning these systems with increased modularity and reduced dependencies enable a better reactivity to unforeseen trends and events.

THIS IS A HUGE TASK. As water professionals, we are determined to inspire a new shared vision and implement the recently approved Sustainable Development Goals (SDG), and in particular SDG6¹ and SDG11², and other SDGs that go to the heart of liveability in cities. The SDGs are a bold call for the promotion of sustainable urban water management for safer, more inclusive and resilient cities. To achieve this we need to harness the power of collaboration with adapted governance, engagement of stakeholders and active citizen involvement.

The following Principles establish a framework for transitioning cities to address these paradigm shifts. Where existing and aging assets are in place, the Principles are to be applied at the pace of asset renewal, as dictated by wise asset management strategies. Where assets are to be built, applying the Principles opens opportunities for innovative systems which best address these paradigm shifts.

The Principles are structured along four increasing levels of action (each enabled by the next level), accompanied by five building blocks on which **the urban stakeholders can deliver sustainable urban water, becoming a water-wise community** - see Figure 1.

DEFINITION OF WATER-WISE AND SUSTAINABLE URBAN WATER

'Water-wise' behaviour means that leadership culture, governance arrangements, professional capacity and innovative technology are all aligned with the objective of maximising sustainable urban water outcomes.

Sustainable urban water management means that all water within the city (including reservoir and aquifer water, desalinated water, recycled water and stormwater) is managed in a way that recognises the connection between services, urban design and the basin, with an approach that maximises the achievement of urban liveability outcomes, and resilience to unexpected social, economic or bio-physical shocks, while replenishing the environment.



4 Levels of Action



1 Regenerative Water Services

- Replenish Waterbodies and their Ecosystems
- Reduce the Amount of Water and Energy Used
- Reuse, Recover, Recycle
- Use a Systemic Approach Integrated with Other Services
- Increase the Modularity of Systems and Ensure Multiple Options

2 Water Sensitive Urban Design

- Enable Regenerative Water Services
- Design Urban Spaces to Reduce Flood Risks
- Enhance Liveability with Visible Water
- Modify and Adapt Urban Materials to Minimise Environmental Impact

3 Basin Connected Cities

- Plan to Secure Water Resources and Mitigate Drought
- Protect the Ecological Health of Water Resources
- Prepare for Extreme Events

4 Water-Wise Communities

- Empowered Citizens
- Professionals Aware of Water Co-benefits
- Transdisciplinary Planning Teams
- Policy Makers Enabling Water-Wise Action
- Leaders that Engage and Engender Trust

5 Building Blocks



Vision



Governance



Knowledge & Capacity



Planning Tools



Implementation Tools

Figure 1: The "Principles for Water-Wise Cities" Framework: four Levels of Action and five Building Blocks for urban stakeholders to deliver "Sustainable Urban Water" in their cities

Sustainable urban water is defined in this document as "all urban waters within the city (including reservoir and aquifer water, desalinated water, recycled water and stormwater) that are managed in a way that maximises the achievement of urban liveability outcomes and resilience to unexpected social, economic or bio-physical shocks."

The Five Building Blocks to Deliver Sustainable Urban Water

SHARED VISION

- A shared vision moves stakeholders from defending solutions for their own specialties, to defining a set of common drivers for the greater benefit of the urban community.
- A shared vision is an essential prerequisite for ensuring sustainable reforms and implementation of new policies and strategies.
- A **resilient city vision that incorporates water** enables people to work together at different scales and across disciplines. It supports the political will needed to invest in long-term measures. It provides consistency beyond political cycles.

GOVERNANCE

- Governance and institutions provide the framework for urban stakeholders to work together, working across silos to integrate water in all urban services at the building, neighbourhood, metropolitan and catchment scales.
- Policies provide incentives for urban stakeholders to unlock the synergies across sectors, maximising the benefits of water to cities.

KNOWLEDGE AND CAPACITIES

- Implementing the sustainable urban water vision starts with the existing capacities and competencies of the different urban stakeholders.
- Upgrading existing educational programs with contents related to sustainable management of urban resources and urban resilience, with integrated approach and a balance to both technological and social challenges.
- To fully realize the vision, increased capacities and competencies are needed, through sharing success stories from other cities, learning to work differently with new tools, pooling resources, and opening to other sectors' approaches and methods.

PLANNING TOOLS

- Delivering water wise-cities require planning tools to assess the inter-relationships between land use planning decisions and all components of urban water systems. The tools include models that analyse the bio-physical and socio-economic consequences of different system options, at a range of scales.
- These tools, developed and used by cross-sectoral teams, allow for assessing risks, identifying benefits and co-benefits of projects, defining levels of service, and ensuring ownership by stakeholders and enabling public participation and engagement.

IMPLEMENTATION TOOLS

- Regulations³ can drive innovation and incentives. If based on quality assurance, equity, transparency, accountability and sound financing, they can provide a solid frame for stakeholders to invest in sustainable urban water.
- Financial tools, linked to rigorous asset management plans, enable long lasting improved service levels with a well-maintained infrastructure.
- Financing tools, which value the ability of solutions to adapt to changes or recover from disasters, allow cities to adopt more efficient solutions and transition towards systems requiring

smaller and more frequent investments.

- Integrated services, combined with shorter investment cycles and the valuing of co-benefits, bring new funding opportunities, providing options to overcome the lack of financial capacity for cities.
- Augmenting traditional financing and contracting models with innovative instruments involving private and public financing, including circular economy mechanisms, opens new funding opportunities which promote regenerative water services.

The Four Levels of Action:

The four levels of actions build on the **base principle**, that all citizens have access to water and sanitation services, which requires planning, prioritization, monitoring and reporting of the human rights to water and sanitation.⁴

LEVEL 1 - REGENERATIVE WATER SERVICES FOR ALL

The main goal is to ensure public health while protecting the quality and quantity of water resources for future generations by ensuring the efficient production and use of water, energy and materials. Regenerative water services are an essential component of climate change adaptation and mitigation strategies leading to carbon neutrality in cities. Regenerative water systems are underpinned by five principles:

1.1 REPLENISH water bodies and their ecosystems within the basin by taking from or discharging to them only what can be given or absorbed by the environment. Reduce water abstractions to sustainable levels enabling the environment to maintain its capacity to deliver water. Protect the quality of these same water sources from wastewater and urban run-off to ensure ecosystem health.

1.2 REDUCE the amount of water and energy used per capita. Reduce the demand for water in accordance with storage capacities. Minimise the energy used in moving and treating urban waters, including rain water.

1.3 REUSE and use diverse sources of water with treatment that matches the use, applying the "fit for purpose" water quality approach and Integrated Water Resources Management (IWRM⁵); **RECOVER** energy from water whether through heat, organic energy or hydraulic energy; **RECYCLE** and recognise the value of "upcycled" materials, such as nutrients or organic matter, using these materials within the systemic approach, as explained below;

1.4 Use a **SYSTEMIC APPROACH** integrated with other urban services. Consider the different parts of a water system as one system, and connect water to other services such as health, transport, food production, waste or energy as a whole system, to enable solutions which reduce and reuse while improving services costs efficiently.

1.5 INCREASE THE MODULARITY and ensure there are multiple resource, treatment, storage and conveyance options available throughout the system for ensuring service levels and resilience of urban water systems in the face of either gradual or sudden changes — gradual changes as a result of persistent stresses, sudden changes as a result of shocks to the system and failure to cope any longer with persistent stresses.

LEVEL 2 - WATER SENSITIVE URBAN DESIGN

seeks the integration of urban planning with the management, protection and conservation of the total urban water cycle to produce urban environments that are 'sensitive' to water

sustainability, resilience and liveability co-benefits. This level of action includes four principles:

2.1 PLAN AND IMPLEMENT URBAN DESIGN THAT UNDERPINS REGENERATIVE WATER SERVICES.

Design domestic and industrial precincts and buildings in ways that enables regenerative water services. This can lead to reduced water, energy and carbon footprints at a local scale. It also leads to cleaner waterways, benefiting ecosystems and people, while also improving social and urban amenities. It includes building green infrastructure to capture and treat stormwater for a range of co-benefits.

2.2 DESIGN URBAN SPACES TO REDUCE FLOOD RISKS.

Increase resilience to flood risks by developing improved drainage solutions integrated with urban infrastructure design so that safe flooding spaces are provided and the city acts as a “sponge”, limiting surges and releasing rain water as a resource. Plan vital infrastructure to enable quick disaster recovery.

2.3 ENHANCE LIVEABILITY WITH VISIBLE WATER

from roadside green infrastructure to major blue-green corridors as opportunities for social inclusion: recreation, inclusive public space, economic development and transportation, creating multi-purpose spaces and infrastructure. Urban water services are essential for ensuring sustainable irrigation of parks and gardens, providing habitats for plant and animal species, shade and mitigation of heat islands.

2.4 MODIFY AND ADAPT URBAN MATERIALS TO MINIMISE THEIR IMPACT ON WATER POLLUTION.

The urban materials of roofs, walls, surfaces, roads, and urban furniture ought to be carefully selected to prevent the release of pollutants when exposed to sun and rain.

LEVEL 3 - BASIN CONNECTED CITIES

The city is intrinsically connected and dependent on the water basin it is part of and the surrounding basins. Proactive engagement in managing water resources in the basin aims to secure water, food and energy resources, reduces flood risk and enhances activities contributing to the economic and environmental health of the basin. This third level of action includes three principles:

3.1 SECURE THE WATER RESOURCE using an WRM framework and plan for drought mitigation strategies by sharing between users in the basin, namely ecosystems, agriculture, industry, energy, and other cities who all contribute to the basin's and city's economy.

3.2 PROTECT THE ECOLOGICAL HEALTH of water resources together with the other basin stakeholders, to ensure fit for purpose quality water is achieved with minimal treatment and energy requirements, and to ensure the ecological health of receiving water bodies (rivers and streams, wetlands, groundwater, marine environments) in terms of both the water quality and quantity is enhanced.

3.3 PREPARE FOR AND RESPOND TO EXTREME EVENTS, such as floods and droughts by managing flow regimes in rivers, storage and adequate vegetation in the basin. Invest in coastal storm risks mitigation as well as flood and drought early warning systems.

LEVEL 4 - WATER-WISE COMMUNITIES

The implementation of the previous three sets of Principles

requires a holistic approach and strong partnerships. This fourth level of action is about people building on their existing capacities to govern and plan; professionals becoming more “water-wise” in their area of expertise, so that they can integrate water across sectors, highlighting the co-benefits of integrated solutions to unlock investments. It is also about **people becoming “water-wise” in their behaviours** as citizens. This level of action is where the transition starts; it is where each stakeholder realises the role they have to play to make a difference. It's about inspired people instigating the following five key actors of change to transition to these “water-wise” communities:

4.1. CITIZENS involved in the sustainable urban water vision. Water-wise citizens can drive urban planning and design with their understanding of the risks (flooding, scarcity) and opportunities (the liveability outcomes their community values, resource recovery opportunities, reducing dependency on uncertain future resources, and increased well-being). In working collaboratively to achieve these outcomes, water-wise citizens may also adapt their behaviour. They will develop their acceptance to solutions enabling regenerative water services, and their willingness to pay for such services while mandating their officials to ensure affordability.

4.2. PROFESSIONALS WITH VARIOUS EXPERTISE (FINANCE, TECHNICAL, SOCIAL)

who understand the co-benefits across urban sectors so that they may plan and implement the best solutions for urban dwellers and businesses. Synergies and dependencies exist between water and urban planning, architecture, landscaping, and energy, waste and transport services: water services require energy but conversely urban water can be used to produce energy locally; green urban space requires water that can be provided by collecting rainwater or reusing water from treated effluent to recycle nutrients in vegetated areas. Professionals, realising the market and non-market value of the co-benefits associated to an integrated urban agenda, will enable innovative sustainable solutions.

4.3. TRANSDISCIPLINARY PLANNING AND OPERATION TEAMS

integrating water in city planning. All waters (freshwater supply, rain, rivers, seas and wastewater) are interconnected with each other and other urban systems (parks, roads, energy and waste) so that efficiencies and synergies arise from a coordinated approach. A city planning organisation recognising these inter-relations and bridging over existing individual departments is needed to enable urban professionals to implement sustainable urban water.

4.4. POLICY MAKERS enable the implementation of the Principles for regenerative water services, water sensitive urban design, and basin-connected cities. Water-wise policy makers establish policies and financing mechanisms (tariffs, partnerships, that are responsive and adaptive to future changes) to drive and enable sustainable urban water through incentivising and rewarding innovative solutions. They phase out the existing subsidies and tax advantages that are environmentally harmful. They monitor, evaluate and adjust the policies based on future needs as they change over time.

4.5. LEADERS provide the progressive vision and support a governance structure to coordinate work at four scales (catchment, metro, neighbourhood and building) and across disciplines. The people governing at the national and local levels can enable sustainable urban water through coordination and integration, leveraging “effective and efficient governance

enhancing trust and engagement⁷". Leaders also need to have a constructive culture that drives innovation and collaboration.

Water-wise communities will use the building blocks to put the principles into action. The progressive implementation of the principles at three levels: 1/ regenerative water services for all, 2/ water sensitive cities, and 3/ basin connected cities, will strengthen each of the 5 key actors of change of the city's water-wise communities.

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REFERENCES

¹ SDG6 "Ensure availability and sustainable management of water and sanitation for all" – More details on <https://sustainabledevelopment.un.org/sdg6>

² SDG11 "Make cities and human settlements inclusive, safe, resilient and sustainable" – More details on <https://sustainabledevelopment.un.org/sdg11>

³ Refer to the Lisbon Charter

⁴ Refer to "IWA's manual of the Human Rights to Safe Drinking Water and Sanitation for Practitioners". <http://www.iwapublishing.com/>

⁵ Integrated water Resources Management is a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

⁶ Refer to Basin of the Future Charter (in drafting)

⁷ OECD Principles on Water Governance, 2015



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