



WORLD WATER CITIES FORUM

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World Water Cities Forum 2022
Urban Water Policy Brief



Daegu Metropolitan City and World Water Council

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Contents

I. Key messages	1
II. General Background.....	2
III. Water in the Cities: Safeguarding Clean Water and Adequate Sanitation Services for Cities with Good Governance	3
i. Introduction	3
ii. Governance, Management, and Policy Recommendations.....	3
iii. Highlights of Partner cities.....	4
IV. Digital Water Management: Unlocking Innovative and Advanced Solutions to Urban Water Management Systems through the Interface between Science and Technology	5
i. Introduction	5
ii. Governance, Management, and Policy Recommendations.....	5
iii. Highlights of Partner cities.....	6
V. Securing Water Resources: Enhancing Urban Water & Ecosystems In the Era of Climate Change ...	7
i. Introduction	7
ii. Governance, Management, and Policy Recommendations.....	7
iii. Highlights of Partner cities.....	8
VI. References	9

I. Key messages

Water in the Cities: Safeguarding Clean Water and Adequate Sanitation Services for Cities with Good Governance

- Developing resiliency programs against climate change hazards with the early assessment of risks and strategic planning for water treatment and distribution, and wastewater treatment services
- Financing well-designed programs with good governance, and encouraging public participation in addressing challenges in water and sanitation services in cities
- Monitoring and reassessing laws, regulations, and policies to improve necessary enabling environments for appropriate urban water and sanitation services

Digital Water Management: Unlocking Innovative and Advanced Solutions to Urban Water Management Systems through the Interface between Science and Technology

- Raising public awareness of digital water management with education and encouraging citizen involvement during the digital transformation process
- Enhancing operational efficiency in water resources management through digitalization and providing innovative solutions to challenges in urban water management including non-revenue water
- Facilitating partnerships between developed and developing countries for gaining full benefits of digitalized management in water and other resources

Securing Water Resources: Enhancing Urban Water & Ecosystems In the Era of Climate Change

- Protecting urban water and ecosystems through the encouragement of public participation
- Sharing good management practices and advanced technologies between developed and developing countries
- Introducing Nature-Based Solutions (NBS) for alleviating negative effects of climate change, especially on the urban environment and hydrology

II. General Background

Urbanization has many detrimental effects on water environments in cities since it exacerbates the negative effects of climate change, including extreme weather events such as droughts and flood, diffuse pollution, and groundwater depletion. The increase in population in urban cities has entailed multi-faceted policy challenges such as the lack of clean water and adequate sanitation services, water shortage, and water pollution. While there has been continuous improvement in water use efficiency by preventing water loss, increasing water demand still hinders cities from addressing challenging issues in water resources management in highly urbanized cities.

In the course of the rapid urbanization trend, challenges related to urban water management are inevitable and should be anticipated. Particularly, population growth, water for food and energy, water scarcity, and climate variability and change have been identified as driving forces for water availability challenges in highly urbanized cities (Makarigakis and Jimenez-Cisneros, 2019). Population growth along with the lack of proper urban planning has resulted in a variety of water challenges around the world, including water stress, water pollution, lacking infrastructures for sanitation, and hydro-meteorological problems including drought and flooding. Problems in urban water resources management are interlinked.

The World Water Cities Forum (WWCF) was first held as part of the 7th World Water Forum in 2015 and has continued annually in conjunction with the Korea International Water Week (KIWW) since 2016. The forum has been recognized as the prime venue for sharing urban water solutions among cities. The WWCF 2022 serves as the place for leading global urban water discourses based on professional insights and experiences of different strategic city partners and urban water experts. To address different emerging challenges related to urban water management in the world, the WWCF 2022 focuses on three (3) themes as follows:

- ❖ **Theme A:** Water in the Cities: Safeguarding Clean Water and Adequate Sanitation Services for Cities with Good Governance
- ❖ **Theme B:** Digital Water Management: Unlocking Innovative and Advanced Solutions to Urban Water Management Systems through the Interface between Science and Technology
- ❖ **Theme C:** Securing Water Resources: Enhancing Urban Water & Ecosystems In the era of climate change

III. Water in the Cities: Safeguarding Clean Water and Adequate Sanitation Services for Cities with Good Governance

i. Introduction

Urban water management has been confronted with various problems. The trend of population concentration in many mega-cities has culminated in the creation of problems in urban water management in the 21st century. In 2018, 55% of the world's population lived in urban areas, and this ratio is expected to increase to 68% by 2050 (UNDESA, 2019). Urbanization itself is not a problem since it enhances the people's way of living in the cities. However, without sustainable planning and development, a variety of urban services, i.e., water and sanitation, gas and oil, telecommunications, and public transportation, will not be able to satisfy the needs of urbanites. Urbanization will intensify the effects of climate change that go along with other environmental problems, including inappropriate land zoning that will lead to improper waste management. Population concentration due to urbanization has entailed water scarcity and water pollution in highly urbanized areas. The global communities have recognized the significance of ensuring universal access to clean water and proper sanitation, which is being addressed as one of the major agendas for sustainable development by 2030.

As of 2020, 26% of the world's population still lacked safely managed water services while nearly half of the population is still lacking safely managed sanitation services. While the number of people without safely managed water services decreased by 225 million in rural areas, the number increased by 32 million in urban areas around the world from 2015 to 2020 (World Health Organization and the United Nations Children's Fund, 2021). Water and sanitation problems in urban areas resulted from rapid urbanization and urban population increase without proper urban planning. The urban poor are often marginalized in terms of access to clean water and adequate sanitation services. Proper management of urban water and sanitation services has been highlighted during the challenging times of the COVID-19 pandemic in the world. Presently, approximately half of wastewater is partially treated or untreated and discharged directly into different water bodies (World Health Organization, 2022). Improper sanitation has led to many health-related risks to people and the environment.

Sanitation problems in urban areas go along with problems in water supply and availability. One of the effective ways to solve these problems is a proper allocation of water for residential, commercial, industrial, agricultural, and environmental purposes. In particular, the proper allocation of water can prevent water loss and promote efficient water use for different benefits.

ii. Governance, Management, and Policy Recommendations

➤ *Enhancement of Citizen Awareness and Involvement*

Citizen involvement has always been one of the best ways to handle water challenges, particularly in identifying relevant problems and introducing solutions to bring benefits to consumers and local communities. By implementing programs that will improve citizens' awareness, the problems of urban water and sanitation may be addressed and emphasized to the people. Through these policies and programs, consultation with the citizens may help the policymakers introduce a series of scenarios in water resources management for localities. It is essential to promote collaborations between different stakeholders in urban water management.

➤ *Finding Practical and Sustainable Financing Programs through Public and Private sector Partnership Projects*

Policy implementation should be supported by well-designed programs, and financing the programs is of great importance for the attainment of visions related to urban water and

sanitation services. By introducing practical and sustainable financial mechanisms and providing different financial schemes, diverse innovative programs for addressing a myriad of problems in water and sanitation services will be implemented. Such policy efforts will be promoted through the creation of special funds through public-private partnerships. An adequate financial contribution by consumers is also important for providing revenues to water service providers. Then, the service providers can give good quality of potable water and wastewater treatment services for 24 hours/day and 365 days/year. Adequate water pricing provides an incentive for the sustainable use of water.

➤ ***Implementation, Monitoring, and Reassessment of Necessary Enabling Environments***

One of the best practices in good governance is to monitor and reassess necessary enabling environments, including laws, regulations, and policies, especially in urban water resources management. By monitoring and reassessing urban water and sanitation policies, the policies may be revised for considering the needs of different stakeholders. Key performance indicators in assessing different policies may help demonstrate the accomplishments of the goals of these policies.

➤ ***Adaptation of risk-based management and resilience analysis programs for water treatment, distribution, and sanitation facilities***

Proper assessment of possible climate change hazards and risks helps developing risk-based management resilience programs. The SWOT analysis will be undertaken for studying risks and vulnerabilities to climate hazards for strategic planning and the construction and operation of water treatment, distribution and sanitation facilities. A risk-based water management plan will also help easing the potential threats to water and sanitation management systems.

➤ ***Establishing Partnerships between Government and Non-Governmental Institutions***

Exchanging good management practices and learning between different entities is one of the most efficient ways to address urban water and sanitation issues. While differences in socio-economic and environmental conditions can hinder partner institutions or countries from introducing the same system or technologies, lessons learned from partner institutions or countries accompany invaluable experiences and expertise, which will be useful for experts and practitioners of beneficiaries.

iii. Highlights of Partner cities

- The improvement of sewer systems and sewage treatment plants in Chennai, India will promote water reuse and will support in balancing local water supply management.
- Advanced water treatment technologies facilitated in the enhancement of water quality and the establishment of eco-friendly water bodies in Daegu city.

IV. Digital Water Management: Unlocking Innovative and Advanced Solutions to Urban Water Management Systems through the Interface between Science and Technology

i. Introduction

Information and Communication Technologies (ICT) in water resources management enable the integrated system to identify and address the needs of people in a more efficient way. The revolutionary advancements in ICT, particularly digitalization, have had a positive impact on the better management of water and sanitation service networks, the prediction of flood and drought through big data analyses, and the establishment of a more climate-resilient community. By utilizing the data from ICT, policymakers can implement sensible decision-making related to water and sanitation services. However, even in this digital age, numerous countries lag behind in ICT and digitalization due to the complexity of technologies, and adequate skills and technologies, little training and education, and budget constraints. These challenges are compounded by the fast and continuously changing needs of people, especially in the water sector (Asian Development Bank, 2022).

Digitalization in water resources management has played a pivotal role in helping countries implementing more efficient and sustainable water resources management. Digitalization facilitates a faster analysis of historical data, which helps predict future phenomena and leads to more sustainable water and sanitation services. Real-time, remote, and integrated monitoring and controlling of water and sanitation infrastructures can be conducted more efficiently through diverse digital technologies and platforms.

A diversity of smart meters, sensors, and software programs for water resources management has increasingly been applied for real-time data acquisition. The collection of big data and data analyses has been possible thanks to digitalization in water resources management, and digital water management paves the way to prepare countries against abnormalities triggered by climate change and develop water resources management strategies and plans.

ii. Governance, Management, and Policy Recommendations

➤ *Communication: Information, and Involvement of Users in the Organization and Deployment of Smart Water Management Systems*

Communication with digital water management and implementation plays a bridging role in between users' skills and continuously evolving technologies. Thus, it is necessary for water users in urban areas to be more familiar with digital platforms. City governments are advised to provide a variety of education and training programs for the general public to adjust to digitalized systems for water use.

➤ *Supporting Research and Development in Digital Water Management*

Recognizing the magnitude of research and development in water resources management is one of the crucial ways to achieve a successful digital transformation. Innovative solutions should be developed for reducing undesirable impacts on water and the environment. As such, the utilization of historical water and environmental-related data would be very useful in developing future technologies for digital water management.

➤ *Sharing and Transferring of Knowledge and Technologies for Sustainable Development through International Partnership*

At present, there is a large gap between developed and developing countries in terms of water management technologies. Facilitating collaboration between these countries will result in the

transfer of knowledge and technologies and foster mutual benefits. Such outcomes will be able to link water with other issues, such as energy, food, forest, and other development issues. Digital transformation is an opportunity that will allow developing countries to benefit directly from the latest technologies and to reduce costs.

➤ ***Empowerment of consumers in access to data on water resources management through smart water technologies & grid***

The promotion of consumers' access to data on water resources management is a way of promoting transparent governance and user involvement. The Internet of Things (IoT) has widely been used in this digital age. These new technologies enable the consumers to become more engaged in and to contribute to good water resources management.

iii. Highlights of Partner cities

- Bangkok, Thailand, has introduced digitalization in water resources management to improve its internal operations including business processes and other transactions and to address non-revenue water or leakage challenges in urban water supply networks.
- Smart metering and monitoring are introduced in Ciudad Juarez, Mexico. Such technologies have enhanced operation and maintenance (O&M) and have improved operational efficiency, thereby reducing non-revenue water and extracting less water from the existing water sources.
- Automation and digitalization have enabled Mikkeli, Finland, to optimize its operational processes in water service delivery to its customers. Digital water management data in Mikkeli are available for research and development of start-up and small-medium enterprises.
- PUB, Singapore's National Water Agency, has developed and implemented the Five-Year SMART PUB Roadmap in 2018 to digitalize the entire water system for operational excellence and to meet the future water needs of Singapore.

V. Securing Water Resources: Enhancing Urban Water & Ecosystems In the Era of Climate Change

i. Introduction

Climate change has affected variability in the hydrological cycle which is compounded by the trend of rapid urban development at the global level. Climate change can be regarded as a threat and an opportunity for improving water governance and management. Climate change-driven challenges should be dealt with by multi-disciplinary actions, and policy development through such actions should consider different factors. The effects of climate change are more apparent in urban areas where urban development has given an impact on the hydrological cycle and ecosystems.

In particular, climate change has affected rainfall intensities and has had an impact on the control of run-off in cities where the natural water infiltration to the ground and green spaces was drastically reduced due to urbanization. Policymakers should rethink innovative solutions toward addressing the problems in cities triggered by climate change for preventing its potential impacts on socioeconomic development. Collaboration with international insurance companies regarding climate change must also be taken into consideration.

Nature-Based Solutions (NBS) involve the rehabilitation of natural ecosystems or the creation of natural processes in modified or artificial ecosystems for emulating natural processes in order to improve water resources management (WWAP/UN-Water, 2018). The application of NBS to urban environments has been promoted in different countries, because the NBS approach can bring back the pre-developed hydrologic state of urban areas. In addition, the NBS approach promotes the restoration of urban environments by improving ecosystem services through the utilization of natural processes. It is imperative to reconsider our relations with nature and return to the fundamentals of water resources management based on sobriety and efficiency.

The rehabilitation of rivers, lakes, and wetlands, especially in urban areas, promotes the revival of urban hydrology and blue-green networks which help addressing the negative effects of climate change. In general, the rehabilitation of rivers and lakes is undertaken through the application of buffer zones, which enhances blue-green connectivity, especially for water bodies connected to urban areas. The application of green infrastructures promotes the revival of urban hydrology by offering integrated solutions that utilize natural systems to provide different environmental services.

Rainwater harvesting is one of the oldest practices that address water shortages around the world. Recently, rainwater harvesting has gained more attention in cities, thanks to rising water demands, an increase in water supply costs, and uncertainty in precipitation levels driven by climate change. Rainwater harvesting is one of the water reuse and recycling methodologies, and rainwater may be used for different household purposes. Wastewater reuse has become popular in addressing water shortages and is a way to sustain food production in many different regions around the world. Wastewater has been used for agricultural purposes since it can offset an increase in water supply costs in many countries.

ii. Governance, Management, and Policy Recommendations

➤ *Raising public awareness and participation*

Alleviating the negative effects of climate change requires an integrated approach not only from the policymakers and implementing agencies but also from public and private water companies and ordinary citizens. By raising awareness about the adverse effects of climate change on

ordinary citizens, a multiplier effect may be observed. Ordinary citizens will play a significant role in combatting the effects of climate change by switching their usual household practices for more sustainable practices. Raising public awareness will also increase the effectiveness of early warning systems for hydro-meteorological disasters.

➤ ***Adaptation of best management practices from partner communities and countries***

A good understanding of different climate actions around the world is a good prerequisite for mitigating climate change effects. While many developed countries are well equipped with advanced technologies for coping with the adverse effects of climate change on water and the environment, the negative effects of climate change are felt more seriously in developing countries. An integrated approach to climate change impacts requires sharing good management, adaptation, and mitigation practices. Cross-border cooperation for climate change adaptation should be encouraged.

➤ ***Promotion of the Application Nature-Based Solutions (NBS) for Water in Urban Environments***

Decentralized Nature-Based Solutions (NBS) in developed countries have increased green spaces in urban areas. Since the need for grey infrastructures in the improvement of human settlements is inevitable, the development of nature-based solutions and green infrastructures can reduce negative effects on urban ecosystems. The utilization of NBS will also help attaining net zero emissions.

iii. Highlights of Partner cities

- Indonesia has adopted three main principles in urban water management that include forest city, sponge city, and smart city concepts for developing Nusantara, the new capital city.
- Kobe, Japan, has implemented measures in reservoirs, watersheds, and inflow rivers or tributaries to solve water quality challenges triggered by climate change.
- Lao PDR considers climate resiliency as one of its future management strategies and develops new water resources and infrastructures in its Vision for 2035.

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