



Task Force 6  
Accelerating SDGs: Exploring New  
Pathways to the 2030 Agenda



# FOSTERING WATER-SENSITIVE URBAN PLANNING IN G20 CITIES

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# **Abstract**



Cities, the proverbial engines of economic growth, are grappling with water challenges, such as water security, scarcity, pollution, droughts, and floods. The global urban population is expected to double by 2050, and in the intervening years, the G20 nations will see the most increase. While conventional urban planning has failed to give due importance to urban water systems, several urban water management paradigms have attempted to address the challenges of climate-induced risks and ageing infrastructure,

among others. The concept of water-sensitive cities pioneered in Australia may prove helpful in tackling these issues. It aspires to make cities more liveable, sustainable, resilient and productive. It emphasises adopting a holistic approach through close linkages between community behaviour, spatial-ecological planning, innovative technologies and governance. This policy brief explains the concept and its key enablers in the context of the G20 nations. The recommendations focus on spatial planning and governance aspects.



# The Challenge



# 1



Cities are the proverbial engines of economic growth providing immense job opportunities in secondary and tertiary sectors; they are the knowledge and innovation hubs of the world. They account for over 80 percent of the global GDP (The Economist Intelligence Unit Limited, 2013). While the notion of cities as engines of economic growth is acknowledged worldwide, poorly planned cities fail to capitalise on their optimum potential. Furthermore, cities are coping with the challenges posed by climate change, induced largely by anthropogenic activities. The conventional approach to urban development has proven unsuccessful in planning and managing cities: affordable housing in cities remains a distant dream; traffic congestion is a daily phenomenon; cities are struggling with air, soil and water pollution; and water security concerns as it is sourced from hundreds of miles despite the presence of local water sources.

In November 2022, the global population crossed eight billion (UN-Habitat, 2022). Cities account for more than half the world's population. In 2019, the total urban population was estimated to be

4.2 billion, accounting for 55 percent of the world's population (United Nations, 2019). It has taken merely 12 years to add a billion inhabitants to the global population. Similar trends are observed in the case of cities—a billion inhabitants were added in 13 years. Cities with fewer than 500,000 inhabitants account for 58 percent of the total urban population. The current trends suggest that the urban population shall exceed 6.7 billion by 2050, accounting for more than two-thirds of the global population. This increase in urbanisation shall impose further stress on the rapidly depleting natural resources and lead to new and more complex challenges. The conventional approaches to urban development will fail to address the urban challenges of the future.

Urban water security is critical to the socio-economic and socio-ecological development of a city. Reduced poverty and improved living conditions are among the myriad benefits of a water-secure city (Hoekstra, Buurman and van Ginkel, 2018). Numerous national and international frameworks for urban development have highlighted the importance of water and its multi-dimensional benefits. For example, the UN formulated 17 Sustainable

Development Goals (SDGs) including “clean water and sanitation”, which is SDG-6. The attainment of individual goals will have an impact on the progress made towards achieving other goals, due to the synergies that exist between them (see Figure 1).

Apart from the developmental agendas, there is a need to revisit the existing strategies of urban water management to avoid adverse impacts of climate change in the future.

**Figure 1: Achieving the SDG 6 targets will help achieve other SDG goals**



*Note: Interlinkages identified from the SDG Interlinkages Analysis & Visualisation Tool.*

# The G20's Role

# 2



**T**he G20 countries comprise the largest and most populous cities in the world. They account for more than 60 percent of the global population. Their urban population is estimated at 3 billion inhabitants, approximately two-thirds of the total urban population in the world. Their cities are the global hubs for knowledge, innovation, employment and production. However, the cities are not rising to their true potential. While some are focusing extensively on improving economic productivity at the cost of damaging the natural environment, others have attempted to focus more on preserving the natural environment independent of their output, in terms of economic productivity. Only proper urban planning, which promotes the economic growth of cities while also ensuring sustainable development and resilience to disasters,<sup>a</sup> can further complement the development and productivity of cities.

Cities in the G20 nations have witnessed numerous disasters and calamities in the past. The recent disasters in the last

two decades have had a strong impact owing to their increased intensity. Governments across the G20 nations have taken measures to improve the resilience of cities. A strong skeleton has been developed in many countries through policy initiatives, government programmes and schemes to cope with emerging urban challenges. For example, considering the recent incentives of the Indian government, the Smart Cities Mission and Digital India programme have helped improve data availability in Indian cities. Similarly, initiatives like the PMAY-U<sup>b</sup> and Rajiv Awas Yojana have focused on improving the provisioning of housing; JNNURM and AMRUT have helped in the provision of basic infrastructural services in Indian cities; the National Action Plan for Climate Change acts as an umbrella initiative with various suggestive measures aimed at tackling the challenges across sectors due to climate change. The ‘millenium drought’ in Australia led to drastic measures to tackle the impending water crisis; e.g., research on developing a new approach to managing urban water systems

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a Implying urban planning that promotes the economic growth of cities, while also ensuring sustainable development and resilience to disasters.

b Pradhan Mantri Awas Yojana – Urban (PMAY-U), launched in 2015, is a national government programme to address issues related to urban housing shortage.

towards building water-sensitive cities as well as prioritising the inclusion of various statutory on non-statutory measures within the development mechanisms to combat any such situation in the future.

Australian cities made strategies focused on integrated urban water management to improve their water security. While South African and Indian cities reached the verge of “Day Zero”<sup>c</sup> in the twenty-first century, they attempted to develop a combination of immediate and long-term relief measures to overcome the catastrophe. The Indonesian capital, Jakarta, is witnessing land subsidence due to a combination of factors, including excessive groundwater use. To address this issue, Indonesian authorities have taken steps to improve water security.

The measures taken by these governments are a step in the right direction. However, the success of these initiatives is possible only with active participation from cities and their residing communities. The existing top-down approach, in varied capacities across the G20 countries, shall not be

effective in addressing the emerging challenges - both local and global. An active role must be played by cities—improved urban planning and governance is the need of the hour! The conventional approach to urban planning will not be able to address the complex contemporary issues. A paradigm shift is needed wherein a holistic approach is adopted. However, cities may be unable to find and operationalise innovative approaches, owing to the local agencies’ limited capacities and functions. Support and nudging from the national and provincial governments would be beneficial. For instance, several imitative by the governments of various G20 countries have, over the past two decades attempted to mainstream IT-driven governance, monitoring and implementation mechanisms. Another example is the mainstreaming of sustainable development goals through localised agenda, policies and programmes of the various governments of the G20 nations.

Transforming urban planning will benefit not just the implementing cities but also have a regional and global impact.

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c The day when the city’s taps run dry due to water shortage.



Sustainable and climate development of cities will boost the local economy. This shall have a compounding effect through agglomeration economies, subsequently contributing to national and global economic growth. An

appropriate balance of bottom-up and top-down approaches will also help G20 nations achieve their global commitments like the SDGs, Sendai Framework for Disaster Risk Reduction and the Paris Agreement, among others.



# **Recommendations to the G20**



# **3**

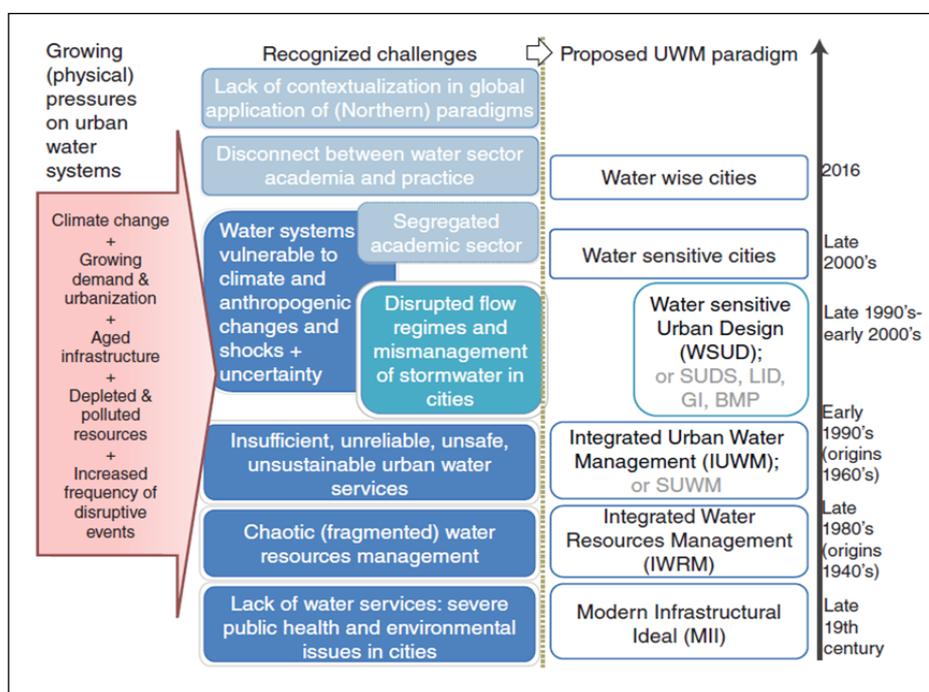


**U**rban water systems form a crucial element of cities. A majority of urban water challenges are due to inappropriate approaches towards finding solutions. The conventional, often techno-bureaucratic approaches, are not always the best fit for cities, especially in middle- and lower-middle-income countries. Various concepts have been proposed to address the emerging water challenges. These concepts have evolved with the changing needs, developmental priorities and increasing knowledge discourses. Bichai and Flamini (2018) have illustrated these evolving concepts called paradigms and the key focus areas that led to their emergence (see Figure 2). The initial concepts, like the nineteenth-century Modern Infrastructure Ideal, were more technocratic and focused on solving the problems of poor drinking water and sanitation conditions in industrial

cities. Gradually, the concepts widened in scope to include the hydrological cycle through Integrated Water Resource Management (IWRM) and Integrated Urban Water Management (IUWM). Next, contemporary concepts emerged, recognising the broader impacts of sustainability and climate change. The focus shifted from highly technocratic structural solutions to softer nature-based solutions through urban design and planning interventions driven by mechanisms of good governance. Water-sensitive cities and water-wise cities are the most recent twenty-first-century concepts in-line with these paradigms.

Thus, drawing upon the current discourses on water-sensitive urban planning and governance to achieve water security, this policy brief puts forth the following recommendations:

**Figure 2: Urban water challenges and emerging paradigms**



Source: Bichai and Flamini (2018)

**Water-sensitive cities approach should be included in the national and provincial urban development policies**

Contemporary approaches to urban water planning and management focus not just on the provisioning of services but on wider aspects, including participatory governance, catchment management and capacity building, among others. Cities in G20 nations have incorporated elements of some of these concepts, in different capacities. For example, numerous IWRM and IUWM projects have been

implemented in various cities of G20 nations. The extent of success of these projects remains a matter of debate. Attempts have been made to address their limitations in more recent concepts like water-sensitive cities and water-wise cities.

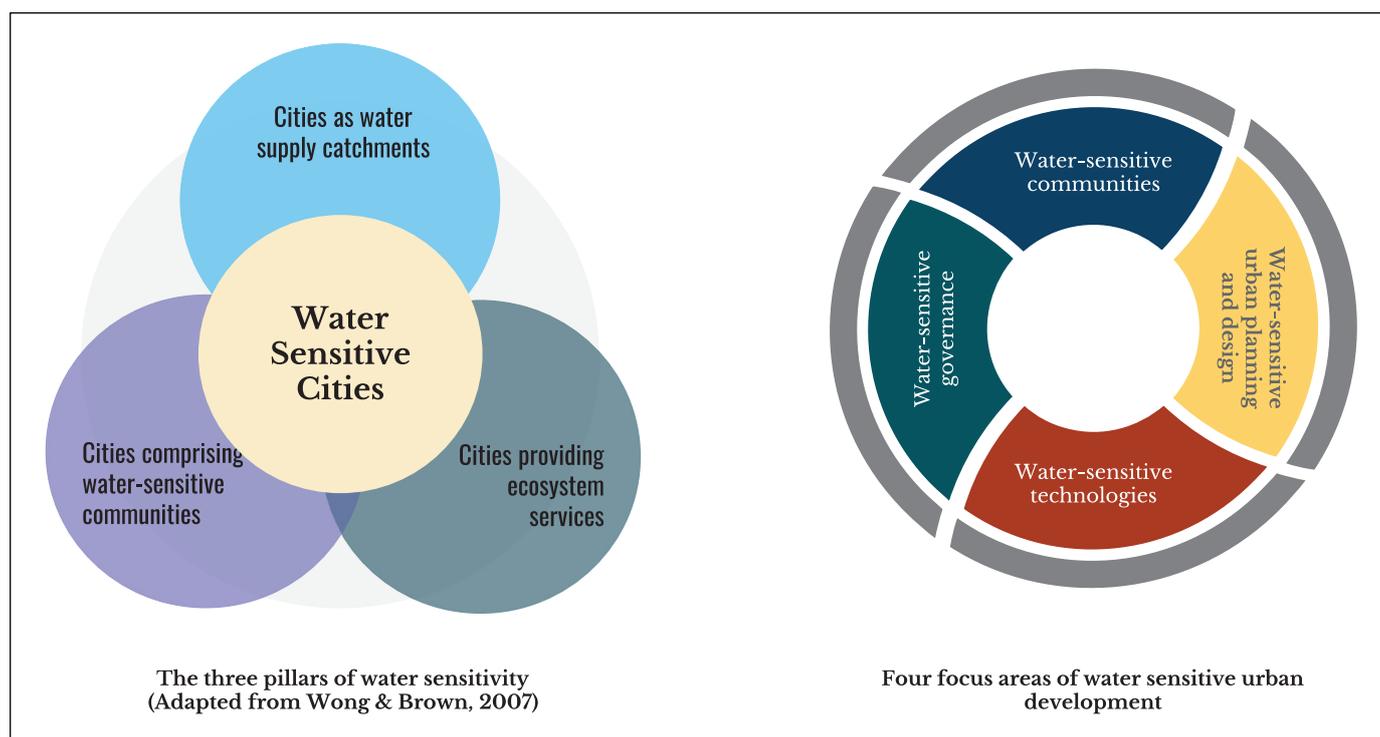
The approach to water-sensitive cities was conceptualised in Australia. Wong and Brown (2009) define three principles for water-sensitive cities, wherein they consider cities as (i) water supply catchments, (ii) providers of ecosystem services and (iii) comprising water-sensitive communities (see Figure 3).

Further, they define water-sensitive cities as ‘liveable, resilient, sustainable and productive’.

However, the concept has primarily been pioneered and applied in a limited number of G20 nations, specifically Australia, with some attempts to implement it in selected cities in both Australia and India. Appreciating the diversity that exists amongst the G20

partner nations, there is a need to mainstream the water-sensitive-cities approach in the urban development agenda. Furthermore, cities of the G20 nations must contextualise the application of such concepts to their local conditions before adopting them. Mere replication of policies, programmes and strategies might not lead appropriate results.

**Figure 3: The three pillars of water sensitivity can be achieved by focusing on four thematic areas**



## **Water-sensitive urban planning and design**

Water-sensitive urban design and planning (WSUD&P) approaches have emerged to mitigate risks such as urban flash flooding, contamination of fresh and marine waters, and water scarcity, such as Day Zero and droughts. WSUD&P practices include site-specific, tailor-made spatial planning and design approaches depending on the local context. These approaches work at multiple scales: catchment, city, neighbourhood and individual. Planning regulations are modified according to different land uses and water-intensive activities in cities or zones within. The G20 nations can leverage from various global case studies that have demonstrated WSUD&P successfully. For example, Adelaide, Australia, has demonstrated simple design initiatives with a focus on demand management and stormwater harvesting for aquifer storage and recovery (Cook et al., 2019). China has been a pioneer in implementing “sponge” city concept to promote large-scale aquifer recharge. In India, greenfield planning of Amravati city is an example of including WSUP principles in planning through the inclusion of rainwater harvesting and

green roofs in building regulations, development of drainage canal for storing stormwater and treated wastewater, and designing multiuse corridors (CRC for Water-sensitive Cities, 2018). All such examples of WSUD&P approaches acknowledge the circularity of the water cycle, similar to the principles of a circular economy, which aims to capture the entire water resource value chain. The G20 nations can support the establishment of planning frameworks for pilot cities that can potentially act as living laboratories for WSUP&D.

## **Improving community awareness of water sensitivity and improving participatory governance**

Local communities, being the primary users, are among the most important stakeholders in the process of urban development planning and management. They use the water being supplied across cities; they act as guardians to the local waterbodies; they are also the most vulnerable to crises and disasters. Communities are the first to respond at the time of a crisis or disaster. Hence, community awareness forms a crucial ingredient



for the success of such initiatives. Moreover, our recent experiences with the COVID-19 pandemic and various other crises are evidence of the significance of community awareness. While governments and authorities can help in mitigation, the impact of a crisis is drastically reduced with the active efforts of the local community. This is possible only through spreading awareness and capacity building to enable participatory action and governance.

Participatory governance mechanisms have been at the forefront of most of the global development agendas to ensure inclusivity in decision making. Attempts to ensure participation from various stakeholders have been made in managing water resources across the G20 countries in different capacities. However, considering the diverse issues associated, engaging with communities must be promoted through context-specific mechanisms to enhance participation. Developing context-specific mechanisms and platforms for participation across G20 nations can help acknowledge the varied capacities of various stakeholders engaging with the process.

### **Promoting interdisciplinary and transdisciplinary research and industry collaborations among the G20 nations**

The current approach to urban development across various G20 countries is significantly different. While several countries have adopted a siloed approach, which means there is limited coordination and collaboration among the different stakeholders, others have attempted to develop coherent approaches. The conventional top-down approach towards planning will not be able to promote water-sensitive development. A mix of bottom-up and top-down approaches will be more effective, wherein all the stakeholders are included in the planning and implementation process. The effectiveness of this approach has been proven in Indian cities like Bengaluru, Pune, Indore and Bhuj. Active involvement of the citizens, civil society and non-governmental organisations yielded positive results; Indore has become and continues to hold the position of the country's cleanest city; Bengaluru's active citizens' groups and NGOs are assisting the authorities in maintaining their waterbodies. Developing a platform to exchange



experience and develop pathways towards holistic interdisciplinary and transdisciplinary research shall foster developing better pathways. Further, each sub-domain—e.g., economics, engineering, management, land use, sociology, water and sanitation services—of urban water management is currently treated as an independent subject; this can also be reflected upon in such platforms. G20 nations host some of the world’s best institutions and organisations, with some cities acting as living labs of good practices in urban development. The wide range of expertise across these institutions must be leveraged to conduct interdisciplinary and transdisciplinary research fostering the development of water-sensitive cities.

### **Promote data-driven urban development**

The (un)availability of data has been cited by various experts and practitioners as a major issue in urban development. Cities comprising populations exceeding 100,000 inhabitants—several are on the verge of touching 10,000,000—and thousands of households, generate

thousands of gigabytes of data each day. An article published by the World Economic Forum states that the daily data generation in 2025 shall exceed 463 exabytes<sup>d</sup> (Desjardins, 2019).

The Indian government’s Smart Cities Mission and Data Smart Cities initiatives are aimed at improving data availability in Indian cities. Real-time monitoring of urban data will help in efficient service delivery. The data repository thus created shall foster applications of big data in urban analytics. This shall help cities develop more precise scenarios, thereby facilitating sustainable development. More avenues for promoting data-driven development can be explored with the help of the proposals of the task force on affordable, accessible and inclusive digital public infrastructure (TF-2).

G20 nations should emphasise on data-driven urban development. Reliable data collection and analysis should become a mandatory element of urban development policies and legislation. Further, safeguarding the privacy of citizens is quintessential. Each G20 nation must ensure that appropriate data privacy legislations are in place.

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d 1 exabyte = 1 billion gigabytes



Technologies like blockchain, quantum computing and artificial intelligence can help cities process the quantum of data generated and processed at the city level. Many cities have even started using the concept of digital twins for scenario-based planning. Such technologies must be promoted by the G20 nations. The G20 can act as a platform to foster collaborations and partnerships among member states towards the promotion of such technologies. Further, G20 nations can act as lighthouses that guide other countries in fostering data-driven urban development.

**Eliminate compartmentalisation and myopic approaches: Adopting a systems-thinking (holistic) approach**

Cities are complex systems comprising a wide variety of elements: buildings, streets, infrastructural networks, vehicles, people, green spaces and vegetation, and waterbodies, among others. The combination of these individual elements creates an ecosystem with a variety of activities. The effective functioning of these elements is the responsibility of various agencies and stakeholders. As

mentioned previously, there is a lack of coordination among these stakeholders. Limited coordination and unavailability of data, combined with other factors, have led to an ad-hoc approach to urban development and governance. Urban development plans are prepared but not implemented successfully. Often, plans do not consider the entire ecosystem of available resources, focusing only on a few selected parts, based on priority or convenience. For example, a strategy may focus on revitalising a lake, or a development plan may only propose buffer zones along the main river of the city, neglecting various minor streams and the larger catchment area. This would subsequently lead to a reduction in the availability of water in the waterbody, thereby rendering the plan ineffective in its objectives.

Thus, the G20 nations must adopt a holistic approach to urban development, wherein the entire “system” is taken into account. They must improve their policies and legislation to mandate a systems-thinking approach while planning and managing cities. Fostering a systems-thinking approach shall require knowledge creation and research as also discussed in the preceding section. Examples of best

practices from various G20 nations must be showcased through publications and events.

### **Formation of an International Water-sensitive Cities Alliance**

Cities across the world are faced with the dire consequences of climate change. Urban flooding, waterlogging due to precipitation, and water-related disasters, which were earlier associated with the Global South, are now common phenomena even in the developed nations. The increasing frequency and intensity of water-related disasters call for increased emphasis on water-

sensitive urban development.

A new alliance must be formed that shall act as an agency for cooperation to foster water-sensitive development in the cities of member states. The primary role of this alliance shall be knowledge creation and sharing among the members. The alliance members would develop knowledge partnerships to contextualise the aforementioned ideas to promote the concept of water-sensitive urban development. A dedicated corpus of funds must be created to promote research, planning and implementation of projects aimed at increasing the water-sensitivity in cities.

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Water4Change is a five-year (2019-2024) research project to help formulate an integrative and fit-for-purpose water-sensitive design framework for secondary Indian cities. Out of the four work packages, CEPT University (Ahmedabad) and the Delft University of Technology in the Netherlands lead the work package on spatial-ecological water sensitive planning and design.

Attribution: Sameer Kumar et al., “Fostering Water-Sensitive Urban Planning in G20 Cities,” *T20 Policy Brief*, July 2023.

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