



**TOWN
+GOWN:
NYC**

Water In and Water Out—Innovative Water Research

Precis

Introduction. Town+Gown’s Water In and Water Out—Innovative Water Research (IWR) working group has been supporting city agencies in connection with the Megacities Alliance for Water and Climate (MAWAC) - European North American Region (ENAR) collaborative research efforts, which began on March 20-21, 2023, with the first MAWAC-ENAR Water Research & Innovation (WRI) Workshop (WRI Workshop 1), held during New York Water Week at the United Nations Headquarters.

The New York City Department of Environmental Protection (NYC DEP) and New York University (NYU), jointly hosted WRI Workshop 1 with invited municipal-based practitioners, water and wastewater utility practitioners, and academic researchers from Los Angeles, Chicago, New York City, Paris and London (the Five Megacities). WRI Workshop 1 provided a forum for these participants to share the climate impacts challenges faced by their Megacity; to present on their experience with adaptation strategies and innovative programs; and, to identify their related research and development (R+D) priority needs.

The goal of WRI Workshop 1 was to explore synergistic opportunities among the participants to leverage experience and resources at each Megacity for collaborative Megacity research in the context of future WRI Workshops that would accelerate the deployment of innovative solutions for urban water-related adaptation needs. While the Five Megacities’ water supply and wastewater operations differ along political and organizational perspectives, experience climate change impacts differently, and operate within different hydrological/environmental, economic, regulatory, and societal conditions, ongoing focused exchanges among the Five Megacities can lead over time to collaborations for the development, demonstration, and integration of innovative solutions.

On the first day of WRI Workshop 1, each Megacity’s participants provided an overview of their priority challenges, experience in climate impact adaptation and related programs, with an assessment of early monitoring of innovative solutions, and R&D priorities. There is a lot of innovative programming and related research happening in all Five Megacities, and commonalities among their operational programs and research activities began to emerge, which suggested the potential for synergistic opportunities for collaboration.

On the second day of WRI Workshop 1, the effort to explore these synergistic opportunities and support collaborative development of inter-Megacity R&D projects to optimize resources and accelerate the adaptation and demonstration of innovative solutions resulted in the creation of a strategic collaborative framework centered around five inter-Megacity thematic working groups:

- Storm Water Management (SWM)
- Integrated Water Ecosystems Management (IWEM)
- Infrastructure Resilience and Assets Management (IRAM)
- Governance, Eco-Management Observatory and Climate Adaptation Policy (GEOCAP)
- Innovation Ecosystems, Stakeholders and Community Engagement (IESCE)

Throughout the following summer, there were many discussions and presentations among the various Megacity participants, further supporting the notion that collaborative research efforts among the Megacities was indeed possible, assuming that funding for such research could be identified and leveraged.

This two-day symposium event for the IWR working group will continue to support future WRI Workshops and any resulting collaborative multi-Megacity research projects involving New York City agencies. This event is intended to keep the knowledge-sharing-and-collaboration ball rolling toward a future WRI Workshop. Many of the presentations at this event include updates of projects presented by researchers at WRI Workshop 1, but this event also includes presentations from researchers new to this effort whose work aligns with the thematic working groups. The format of this event follows the five thematic working groups, with the last two working groups combined into one panel.

At each panel, the researchers will present on their research, and at the end of each panel there will be a facilitated 30-minute discussion aimed at identifying potential collaborations of mutual interest and benefit on specific topics and/or research projects. There will be additional presentations related to funding opportunities as a possible way forward as well as discussion about the next possible WRI Workshop. The results of these discussions will provide input for planning the next WRI Workshop.

Water In and Water Out at the Five Megacities.

About the “Megacity”. The Merriam Webster dictionary defines a megacity as “a thickly settled, highly populated *area*”,¹ while the Oxford dictionary defines a megacity as “a very large *city*, typically one with a population of over ten million people”.² Urban areas are different than cities, from a legal or jurisdictional perspective, and a megacity as an area with multiple jurisdictions within it is quite different from a megacity that is an actual city, which is also referred to as a municipality.

A municipality's capacity to act is established and constrained by superior government laws that create the municipality as a jurisdiction and enumerate its powers and legal responsibilities, which can be broadly defined in some areas and narrowly defined in others.³ No municipality exists independently of

¹ [MEGACITY Synonyms: 21 Similar Words | Merriam-Webster Thesaurus](#) 02-07-24 4:33 p.m. EST

² [megacity | Definition of megacity in English by Oxford Dictionaries \(archive.org\)](#) 02-07-24 4:35 p.m. EST

³ Stephen Hammer, "Capacity to Act: the Critical Determinant of Local Energy Planning and Program Implementation," Working Paper, Columbia University Center for Energy, Marine Transportation and Public Policy. Presented at the World Bank's 5th Urban Research Symposium (Cities and Climate Change), Marseilles, France, June 28-30, 2009, p. 2.

its superior government, and "key attributes of local authority—its institutional structures, its responsibilities, and its power of taxation—are all derived from state or national government allocations of authority." Capacity to act issues limit the impact of the "think globally, act locally" mantra across a variety of environmental issues, including water. Moreover, the higher level of government must authorize the ability of municipalities within a metropolitan or regional area to cooperate with each other in a meaningful way. While some water-related actions are within a municipality's capacity to act, even these are typically constrained by the higher-level authority, which can develop over-arching laws and policies covering its larger geographical area that is more coterminous with the environmental systems being regulated. Water in and water out issues are not contained within any municipality's borders, so the larger the jurisdictional actor that thinks globally, the more efficient and effective the resulting activities may be.

The Megacities Alliance for Water and Climate (MAWAC) is platform for multiple megacity water sector stakeholders "to learn from each other's experience, collaborate with the appropriate technical, academic and financial institutions and implement responses to the challenges of climate change and urban growth."⁴ One year after MAWAC's launch, UNESCO, ARCEAU IdF, and 15 megacities engaged in a study to identify common challenges related to water in and water out in relation to environmental concerns, and produced a report.⁵ The Five Megacities were among the 15 megacities in the 2016 study, and in many respects the WRI Workshop 1, this two-day event, and future WRI Workshops continue implementation of MAWAC's original objectives.

Demographic, Jurisdictional and Operational Perspectives. The term "megacity" has been in usage for several decades, and the 10 million people order of magnitude for defining a megacity has been an international standard measurement for some time.⁶ To get to the 10 million metric, some recognized megacities use a metropolitan area concept to include other municipalities surrounding the central city jurisdiction. "Water in and water out" issues become more complicated from operational and financing perspectives when operations move from a specific city jurisdiction to a regional collection of many cities and towns.

The following brief comparative analysis of the Five Megacities (from west to east) follows as a resource for this two-day symposium event and beyond.⁷

Los Angeles. Los Angeles is a jurisdictional city of approximately 4 million residents (City of Los Angeles), which is also one of 88 cities and unincorporated communities within the larger Los Angeles County,

⁴ [Water and megacities | The UNESCO Courier](#), 4/16/19 02-07-24 5:37 p.m.

⁵ [Water, megacities and global change: portraits of 15 emblematic cities of the world - UNESCO Digital Library](#) 02-07-24 5:29 p.m.

⁶ "Close to half of the world's urban dwellers reside in relatively small settlements of less than 500,000 inhabitants, while around one in eight live in 33 megacities with more than 10 million inhabitants. United Nations Department of Economic and Social Affairs *World Urbanization Prospects, the 2018 Revision*, p. xix ([World Urbanization Prospects The 2018 Revision \(un.org\)](#) 02-07-24 5:18 p.m. EST).

⁷ The source materials for this section are materials prepared by each Megacity after the WRI Workshop 1 for informational purposes; any mistakes in interpretation are the author's.

another jurisdictional entity, with approximately more than 10 million residents. The City of Los Angeles Department of Water and Power (LADWP) is the City of Los Angeles' public water utility, and the City of Los Angeles Department of Sanitation and Environment (LASAN) is its public wastewater utility responsible for both solid waste and stormwater. LASAN provides wastewater services to nearly 30 local agencies in addition to the City of Los Angeles. The Los Angeles County Sanitation Districts (LACSD), which consists of 24 special districts, manages wastewater and solid waste for those districts. The Metropolitan Water District of Southern California (Metropolitan), created by the California State Legislature in 1928, consists of 26 member agencies (14 cities, 11 municipal water districts and one county water authority) and supplies localities within its service area, which includes the City of Los Angeles, with adequate and reliable high-quality water. The City of Los Angeles also receives water from its municipally-owned Los Angeles Aqueduct. Metropolitan and LACSD also are engaged in a regional recycled water program.

Chicago. Chicago is a jurisdictional city of approximately 2.7 million residents (City of Chicago), and the Greater Chicago Metropolitan area includes approximately 9.5 million residents. The City of Chicago Department of Water Management uses Lake Michigan to supply water to the City of Chicago and 125 suburban communities. The Cambrian-Ordovician Sandstone aquifer provides additional ground water supply to other localities. The Metropolitan Water Reclamation District of Greater Chicago (MWRD), a special purpose government agency, created in 1889, treats wastewater and manages stormwater in Cook County, Illinois, which includes the City of Chicago.

New York City. The City of New York is a jurisdictional city of approximately 8.3 million residents (NYC). NYC owns and operates, through NYC DEP, NYC's water supply system consisting of three upstate watersheds and related reservoirs and NYC's wastewater treatment system consisting of a 6,000-mile network of subsurface sewer infrastructure leading to 14 wastewater resource recovery facilities.

London. The Greater London Authority is the regional government body of 33 municipal boroughs, collectively consisting of more than 9 million residents (GLA). The GLA does not own or operate water supply systems or wastewater treatment systems providing services to its residents. The GLA area is served by four private drinking water utilities—Thames Water, Affinity Water, Essex & Suffolk Water and Sutton & East Surrey Water—and two private wastewater management utilities—Thames Water and Anglian Water.

Paris. The City of Paris has a population of approximately 2 million residents and the Greater Paris Region has a population of approximately 7 million people (GPR). The GPR, a métropole created in 2016, covers the City of Paris and approximately 130 other communes in the pre-existing Seine department and all 123 communes in the surrounding inner-suburban departments of the Petite Couronne (Hauts-de-Seine, Seine-Saint-Denis and Val-de-Marne), plus 7 communes in two of the outer-suburban departments (including the communes of Argenteuil in Val-d'Oise, Savigny-sur-Orge, Juvisy-sur-Orge, Viry-Châtillon and Paray-Vieille-Poste in Essonne).⁸ Water supply services across the GPR are

⁸ [Grand Paris - Wikipedia](#), 02-12-24 3:33 p.m.

provided by Service Public de l'Eau (SEDIF), a public utility, for the municipalities or inter-municipalities of 7 departments in the Ile-de-France region; Eau de Paris, a municipal utility for the City of Paris; and Service Société des Eaux de L'Oeust Parisien (SEOP), a designated private utility for 22 communes west of Paris. SEDIF and Eau de Paris use surface water sources, while SEOP uses groundwater sources. Wastewater management services across the GPR are provided by Service Public de l'Assainissement Francilien (SIAPP), a public utility providing wastewater treatment and stormwater services to residents of the City of Paris and other parts of the GPR, and by Assainissement et Service (SEVESC), a designated private utility providing similar services to other parts of the GPR. SIAPP operates a 440-km network of subsurface sewer infrastructure leading to six owned and operated wastewater treatment facilities.

Climate Change Perspectives among the Five Megacities.

<i>Los Angeles</i>	<i>Increasingly frequent and drier "dry" years</i>	<i>Increased spring flooding from warmer temperatures</i>	<i>Need to increase stormwater capture and water recycling</i>			
<i>Chicago</i>		<i>Urban flooding due to extreme stormwater events and combined sewer overflows (CSOs)</i>		<i>Need to maintain surrounding water quality due to stormwater events and CSOs, among other things</i>	<i>Aging infrastructure requires upgrades</i>	
<i>NYC</i>		<i>Similar to above with green infrastructure program (nature-based) solutions</i>		<i>Similar to above</i>	<i>Similar to above</i>	
<i>London</i>		<i>Similar to above</i>		<i>Similar to above</i>	<i>Coordinated infrastructure delivery in connection with "streetworks" involving utility repairs and upgrades</i>	
<i>Paris</i>		<i>Protecting against flooding through Seine River watershed, using nature-based solutions</i>		<i>Increasing water quality in Seine and Marne Rivers, using nature-based solutions</i>		<i>Circular economy focus to increase area resilience</i>