Water Centric City Framework

Water resources are a critical asset for all cities, play an integral role in a city's development, and are an essential element for a sustainable and resilient city.

Milwaukee's Water Centric City Initiative provides a framework for cities to share best practices, indicators, metrics, and guidance for the following: integrated water resource management, water supply and treatment, innovation and technology, water related industry, water education, culture and recreation, and water stewardship.

The Water Centric City Initiative encourages cities to adopt and pursue the basic principles outlined below on their own. Begin the Water Centric journey by taking the pledge.

PRINCIPLE 1: WATER LEADERSHIP

Sustainable supplies of clean drinking water are essential for cities. With continued population growth and globalization, pressure on our limited water supplies is growing. We need leaders at all levels of government and business that understand the importance of water and advocate for smart water policy and stewardship that balances the needs of today with a sustainable future.

Indicator 1.1: Provide a one page summary of city's strategy and qualifiers regarding their intent to be a Water Centric City.

Metrics:
1. Qualitative statement of city's achievements and strategic plans for the future relative to Water Centric City Principles
2. Signed commitment from the mayor
3. Public disclosure on city website
4. Provide evidence of an alternative metric summarizing city's strategy and qualifiers regarding intent to be a Water Centric City

Notes:

Indicator 1.2: Conduct a comprehensive stakeholder analysis regarding city's "Water Centric City" achievements and future plans.

Metric:
1. Prioritized list of shared stakeholder challenges
2. Discussion of future trends and goals
3. Provide evidence of an alternative metric that comprehensive stakeholder analysis has been conducted

Notes:

Indicator 1.3: Define shared stakeholder vision and engage in collective activities to address water-related risks and find solutions.

Metric:
1. Provide evidence of multi-stakeholder meetings
2. Provide evidence of risk analysis
3. Provide analysis of shared risks and opportunities for collective action
4. Provide evidence of an alternative metric that defines shared stakeholder vision and engage in collective activities to address water-related risks and find solutions

Notes:

Indicator 1.4: Include city specific water-related goals & stakeholder shared vision in comprehensive city-wide plan.

Metric:

1. Provide evidence of shared vision, collective action in city plan
2. Provide evidence of water-related SMART targets/goals as they relate to:
    a. Water consumption
    b. Conservation
    c. Urban distribution (infrastructure)
    d. Equity issues
    e. Pollution
    f. Stormwater run-off
    g. Flood management
3. Provide evidence of an alternative metric including city specific water-related goals and stakeholder shared vision in comprehensive city-wide plan

Notes:

Indicator 1.5: Develop strategies for responsible governance around water.

Metric:

1. Evidence of updated codes/ordinances related to:
    a. Water conservation
    b. Water infrastructure (grey and green)
    c. Water quality
    d. Stormwater management
    e. Social Justice including responsiveness and civic engagement
2. Provide evidence of an alternative metric that develops strategies for responsible governance around water

Notes:

Indicator 1.6: Provide city-level economic incentives.

Metric:

1. Provide evidence of:
    a. Rebates
    b. PACE financing
    c. Financial assistance
    d. Tax credits
    e. Property tax abatements
    f. Tax incentives
    g. Water business specific incentives
2. Provide evidence of an alternative metric that shows city-level economic incentives

Notes:

Indicator 1.7: Share lessons learned and best practices that are of value to other cities and communities.
Metric:
1. Publicly disclose best practices for other municipality use
2. Provide evidence of multi-municipality collaboration
3. Provide evidence of an alternative metric illustrating shared lessons learned and best practices that are of value to other cities and communities

Notes:

Indicator 1.8: Public celebration of water as a city.
Metric:
1. Provide evidence of city event celebrating World Water Day
2. Provide evidence of an alternative metric to celebrating water as a city

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of water leadership.

PRINCIPLE 2: ARTS, CULTURE, TALENT & EDUCATION

People enjoy spending time near pristine water bodies. Lakes, rivers, and the oceans can provide scenic views, recreation, and a sense of peace, wonder, and possibility. Cities can create infrastructure to sustain and restore natural water bodies while increasing community access to these assets. Cities that embrace their natural amenities or enhance them with art embody their culture, residents, and history. Natural amenities and art can be powerful educational tools, inspiring citizens to appreciate and connect with their city, stimulating creativity in work and schools, influencing the city's future.

Indicator 2.1: Align the local economy around water.
Metric:
1. Provide evidence of water-related costs and benefits in city budget/city planning discussions
2. Provide analysis demonstrating water-related benefit's impacts on the local economy
3. Provide evidence of an alternative metric demonstrating aligning the local economy around water

Notes:

Indicator 2.2: Promote arts and culture around water
Metric:
1. Provide evidence of existing water-related art
2. Provide evidence of current plans for water-related art installation
3. Provide evidence of grant applications to be used for water-related art
4. Provide evidence of local events pertaining to improved inclusivity/cultural awareness of water
5. Provide evidence of local group(s) working for improved water-related culture, social justice, inclusivity
6. Provide evidence of an alternative metric promoting arts and culture around water

Notes:

Indicator 2.3: Increase public education about water
Metric:
1. Provide evidence of city educational events/initiatives related to water
2. Provide evidence of local groups offering educational opportunities related to water
3. Provide evidence of promotion or offering of "Learn to Swim" programs
4. Provide evidence of an alternative metric demonstrating increased public education about water

Notes:

Indicator 2.4: Increase institutional (classroom) water-related education and talent development opportunities.

Metric:
1. Provide evidence of school programs providing opportunities for children to physically interact with water
2. Provide evidence of water experiences, tours, or demonstrations outside of the classroom to expand learning experience and talent development
3. Provide evidence of water-related topics in K-12 courses and curriculum
4. Provide evidence of water-related topics in university courses and curriculum
5. Provide evidence of water-related 2-year, 4-year, technical, and graduate degrees
6. Provide evidence of internship opportunities, student groups focused on water, and other college level efforts focused on "building the water generation"
7. Provide evidence of an alternative metric demonstrating increased institutional (classroom) water-related education

Notes:

Indicator 2.5: Invest in public water access

Metric:
1. Provide evidence of water front infrastructure that leads to greater public access
2. Promote water-related recreational activities
3. Provide evidence of projects for improved waterfronts and water quality
4. Provide evidence of the number of water access points increasing
5. Provide evidence of access to a smart water feature such as park with xeriscaping or native plants
6. Provide evidence of an alternative metric demonstrating public water access investment

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of increased arts and culture relative to water.

PRINCIPLE 3: WATER TECHNOLOGY

Technology has the power to make life more convenient and connected. It can also help us access, treat, and deliver water more efficiently than ever before. Entrepreneurs, researchers, and businesses can invest their time and creativity in developing and scaling innovative solutions to our 21st century water challenges.

Indicator 3.1: Assure water technology and services are accessible
Metric:
1. Provide evidence of continual communication of new water technologies and practices
2. Provide evidence of an alternative metric assuring water technology and services are accessible

Notes:

Indicator 3.2: Encourage the growth and development of water technology business
Metric:
1. Provide evidence of increased "blue green" jobs on an annual basis
2. Provide evidence of programs designed to train and develop blue green technologies/start-ups/companies
3. Provide evidence of financial assistance for seed funding, pilot programs for new businesses
4. Provide evidence of an alternative metric encouraging the growth and development of water technology business

Notes:

Indicator 3.3: Include the latest research and technology in the continual improvement of water assets
Metric:
1. Provide evidence that new technologies are being piloted or have been implemented to improve water assets
2. Provide evidence that the implemented technologies have provided a tangible benefit
3. Provide evidence of an alternative metric including the latest research and technology in the continual improvement of water assets

Notes:

Indicator 3.4: Increase the widespread adoption of water related technologies across the city—in the residential, commercial, and public building sectors, and at the utility.
Metric:
1. Give an annual award to a "technology adoption champion" for adopting impactful water technologies
2. Provide evidence of facilitated relationship between technology providers and technology adopters
3. Provide evidence of incentive programs specific to implementation of water technologies
4. Provide evidence of an alternative metric increasing the widespread adoption of water related technologies across the city—in the residential, commercial, and public building sectors, and at the utility

Notes:

Indicator 3.5: Support collaborative regional approaches to water management
Metric:
1. Provide evidence of increased utilization of a water standard such as the Alliance for Water Stewardship Standard
2. Provide evidence of other innovative water management approaches like "One Water"
3. Provide evidence of an alternative metric supporting regional, collaborative approaches to water management

Notes:

Indicator 3.6: Encourage implementation of water reuse systems
Metric:
4. Provide evidence of a city plan specific to water reuse
5. Provide evidence of financial incentives for water reuse systems
6. Provide evidence of an alternative metric encouraging the implementation of water reuse systems

Notes:

Indicator 3.7: Encourage implementation of water regeneration systems
Metric:
1. Provide evidence of city water reuse plan's inclusion of water regeneration
2. Provide evidence of financial incentives for regenerative systems
3. Provide evidence of an alternative metric encouraging implementation of water regeneration systems

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of increased water technology or water technology initiatives.

PRINCIPLE 4: GREEN INFRASTRUCTURE & CLIMATE ADAPTATION

The built environment affects water quality and our resilience to extreme storms. Cities with too much "hardscape" in terms impermeable paved surfaces and rooftops disrupt the natural hydrology of rivers, create urban heat islands, and are vulnerable to flooding. Cities that invest in green infrastructure (green roofs, bioswales, rain gardens, etc.) are more pleasant to live in, have better water quality, and are less prone to storm and flood damage.

Indicator 4.1: Promote adoption of green infrastructure
Metric:
1. Provide evidence of city or regional green infrastructure plan
2. Evaluate prohibiting codes/ordinances and provide evidence of eliminated green infrastructure barriers
3. Provide evidence of green infrastructure practices in city planning and permitting
4. Provide continual evidence of green infrastructure implementation
5. Provide evidence of protecting natural and human-made assets that reduce the physical vulnerability of city such as maintain natural systems like wetlands, mangroves and sand dunes or built infrastructure like sea walls or levees
6. Provide evidence of an alternative metric promoting adoption of green infrastructure

Notes:

Indicator 4.2: Evaluate city stormwater management
Metric:
1. Provide evidence of a stormwater management plan including considerations in city planning and permitting such as decreasing impervious surfaces
2. Provide evidence of climate change considerations in stormwater management plan
3. Provide evidence of continual improvement relative to city stormwater challenges
4. Providence evidence of stormwater management
5. Provide evidence of an alternative metric evaluating city stormwater management

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of increased green infrastructure or green infrastructure initiatives.

PRINCIPLE 5: APPLIED WATER RESEARCH & POLICY

Sustainable water policy requires a foundation based in science, research, social science, and the best available data. Ignoring the physical limits of our ecosystems and water supplies to replenish themselves will harm the long-term economies of cities and their residents. Governments serve their residents when they seek to apply the best available science from academic institutions to inform water policy.

Indicator 5.1: Apply and integrate academic knowledge with policy and community activity.
Metric:
1. Identify and establish working relationships between research and policy partners who can utilize the knowledge.
2. Create a Research-use Strategy and make a well-defined plan to integrate researchers and policy makers in the project design, process of project completion, and achievement of outcomes
3. Provide evidence that researchers participate in a variety of stakeholder groups, task forces, and working groups
4. Provide evidence that researchers serve on public panels, public forums, and a variety of public information exchanges
5. Promote reciprocal engagement. Demonstrate that the knowledge exchange is not unidirectional, incorporate feedback from the community into the purpose, design, and implementation of the research
6. *Provide evidence of an alternative metric applying and integrating academic knowledge with policy and community activity.*

Notes:

Indicator 5.2: Promote academic and commercial research that is nonpartisan, nonproprietary, publicly available, and oriented to inform policy.
Metric:
1. Develop collaborative projects and seek multi-sector or multi-disciplinary funding opportunities that do not pre-determine desired outcomes and do not make the fundees beholden to special interests
2. Promote research that provides relevant, timely, and accurate information to policy makers. Prioritize applied research over abstract or theoretical research. Conduct research on issues that are currently being debated and legislated
3. Summarize research findings in a variety of forms and formats that are accessible to range of stakeholders and policy makers at different levels of government
4. Provide evidence of an alternative metric promoting academic and commercial research that is nonpartisan, nonproprietary, publicly available, and oriented to inform policy

Notes:

Indicator 5.3: Provide evidence of the economic, societal, and environmental impact of applied research and policy.

Metric:
1. Conduct a Research Impact Assessment to demonstrate the adoption of research findings or public value of the research using an Impact Assessment toolkit, or publically available tool such as SIAMPI, to conduct an assessment of research outcomes
2. Monitor, evaluate, and adjust policies based on future needs as they change over time
3. Conduct interviews or surveys to inventory the impacts of the research on policy, community, or environment
4. Provide case studies to illustrate the impact of the research on policy, community, or environment, or other concrete benefits
5. Evaluate and implement financing mechanisms such as tariffs and partnerships that are responsive and adaptive to future changes
6. Provide evidence of an alternative metric illustrating economic, societal, and environmental impact of applied research and policy

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of applied research, policy, and the social environmental impact of academic research

PRINCIPLE 6: FISHABLE, SWIMMABLE RIVERS & WATER BODIES

The Clean Water Act established federal policy for restoring our water resources, with a goal of making all U.S. waters fishable and swimmable. Cities have made tremendous progress by first focusing on industrial polluters. Cities are now working on reducing polluted runoff from streets, parking lots, and other forms of pollution.

Indicator 6.1: Make the critical connection between land use and water quality
Metric:
1. Provide evidence of multi-stakeholder discussion including land/water-use planning interests
2. Provide evidence of analysis of comprehensive plans, development plans, and management measures with consideration of how they impact/can improve water quality
3. Provide evidence of analysis of projected water quality impacts from future land use and planned land use
4. Provide evaluation of water quality implications of street sweeping, salt use, and other city maintenance that impacts water quality
5. Provide evidence of an alternative metric making the critical connection between land use and water quality

Notes:

Indicator 6.2: Continue to improve and maintain water quality
Metric:
1. Provide evidence of naturalizing rivers and greenways
2. Modification of urban materials to minimize impact on water quality
3. Provide evidence of strategies to limit stormwater pollution
4. Provide evidence of strategies to limit road salt use
5. Provide evidence of an alternative metric or best practice for improving water quality

Notes:

Indicator 6.3: Improve the biological conditions of water bodies
Metric:
1. Increase number of days where waters are swimmable (decreased beach closures)
2. Increase number of days where waters are fishable (decreased consumption advisories)
3. Increase number of days where waters are safe for secondary recreation
4. Increase number of fish species, evidence of improved fish habitat including connectivity of rivers improved and removing barriers to fish passage

5. Provide evidence of an alternative metric illustrating improvement to the biological conditions of water bodies

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of efforts to make water bodies more swimmable and fishable.

PRINCIPLE 7: SUSTAINABLE WATER SUPPLY

Cities require a sustainable supply or water. Reservoirs, surface water supplies, or aquifers must recharge at rate equal to or greater than the rate of water withdrawal by residents, businesses, and agriculture. Due to the interconnections of underground hydrology, special care must be taken when regulating withdrawals from private wells to ensure sustainability for the broader community. Treating and delivering water can also be energy intensive, so there is increasing focus on this energy-water nexus.

The public deserves and expects clean drinking water. This requires properly treating water at the source and also delivering it safely to the public through both public water mains and private property service lines to the tap. Protecting drinking water also requires limiting or eliminating toxins and pollutants from entering the natural water bodies, particularly those that are difficult to treat with current technology.

Indicator 7.1: Ensure safe drinking water
Metric:
1. Provide evidence that all safe drinking water requirements are met
2. Provide evidence (beyond regulatory restrictions) of increased drinking water requirements
3. Assess current and adopt new minimum requirements for contaminants such as lead, total coliform, and nitrates
4. Provide evidence of an alternative metric ensuring safe drinking water

Notes:

Indicator 7.2: Understand the city water supply and future trends
Metric:
1. Provide analysis of current water supply and future trends
2. Provide evidence of an alternative metric understanding the city water supply and future trends

Notes:

Indicator 7.3: Promote sustainable urban water management
Metric:
1. Provide evidence of drought mitigation strategies
2. Provide evidence of flood mitigation strategies
3. Provide evidence of an alternative metric promoting sustainable urban water management

Notes:

Alternative Indicator

Provide an alternative indicator and metrics to demonstrate evidence of efforts related to sustainable water supply.

Acknowledgements

This framework is intended to be complementary to the U.S. Water Alliance One Water Movement. Please visit uswateralliance.org for additional guidance for complimenting Water Centric City goals.

Framework written and submitted by:

Samantha Katt
Dylan Waldhuetter

Resources

1. 100 Resilient Cities
   www.100resilientcities.org
2. Alliance for Water Stewardship (AWS)
   www.a4ws.org/our-work/aws-system/the-aws-standard
3. Assessment, evaluations, and definitions of research impact
   academic.oup.com/rev/article/23/1/21/2889056
4. Canada Water Network-Blue City
   www.cwn-rce.ca/about-us/blue-economy-initiative/blue-city/
5. City of Milwaukee Water Centric City
   city.milwaukee.gov/WCC/Principles
6. Comparative Analysis of Sustainable Communities
   designactivism.net/wp-content/uploads/2010/06/sustainability-framework-analysis.pdf
7. EPA: Safe Drinking Water Standards
   www.epa.gov/dwstandardsregulations
8. EPA: Moving Towards Sustainability
   www.epa.gov/sustainable-water-infrastructure/moving-toward-sustainability-sustainable-and-effective-practices
9. European Green City Index
   www.siemens.com/entry/cc/features/greencityindex_international/all/en/pdf/report_en.pdf
10. Global Compact Cities Programme
    citiesprogramme.org/our-framework
11. Great Lakes & St. Lawrence Cities Initiative 2014 SMWM Public Evaluation report
    city.milwaukee.gov/ImageLibrary/Groups/cityGreenTeam/Stormwater/SMWM2014Report_MilwaukeeNEWFIN.pdf
12. International Water Association: Cities of the Future
    www.iwa-network.org/programs/cities-of-the-future/
13. International Water Association: Principles for Water-Wise Cities

www.iwa-network.org/projects/water-wise-cities/

14. NRDC Water-Smart Cities
    www.nrdc.org/issues/water-smart-cities
15. Port of Antwerp Sustainability Report www.maritimecsr.com/files/reports/2010/REP-
    1378374099.pdf
16. ReFresh Milwaukee Sustainability Report
    refreshmke.com
17. Rotterdam: The Water City of the Future
    www.waterworld.com/articles/wwi/print/volume-25/issue-5/editorial-focus/rainwater-
    harvesting/rotterdam-the-water-city-of-the-future.html
18. Smart Water, Smart City
    www.smartwatersmartcity.com
19. Stockholm Resilience
    www.stockholmresilience.su.se
20. Water Centric Cities of the Future – Towards Macro Scale Assessment of Sustainability
    www.aquanovallc.com/wp-content/uploads/2012/11/Novotny-and-Novotny_-CM-CH-
    book.pdf