The City Blueprint® Approach

Improving Implementation Capacities of Cities and Regions by sharing best practices on Urban Water Cycle Services



An EIP Water Action Group of the European Commission



1. INTRODUCTION

Approximately 80% of the world's GDP is produced, and 75% of the global energy and material flows are consumed in cities. <u>Cities</u> are concentrated centres of production, consumption, and waste disposal that drive land change and a host of global health and environmental challenges. Cities are highly dependent on other cities and hinterlands to supply materials (including water), energy, and to dispose waste. Urbanization takes place at an unprecedented rate of almost 200,000 people per day and therefore, most of our global challenges, i.e. the <u>Sustainable Development Goals</u> can best be addressed at the level, where these problems will concentrate: in cities.



2. THE CITY BLUEPRINT® APPROACH

The City Blueprint[®] Approach is a diagnosis tool and consists of three complementary frameworks. The main challenges of cities are assessed with the *Trends and Pressures Framework* (**TPF**). How cities are managing their water cycle is done with the *City Blueprint® Framework* (**CBF**). Where cities can improve their water governance is done with the *Governance Capacity Framework* (**GCF**). Two short videos have been made about the City Blueprint Approach (<u>CBA1</u> about the TPF & CBF and <u>CBA2</u> about the GCF). These have been integrated into a <u>MOOC</u>. The GCF is a new framework and has been applied in about 20 cities including <u>Amsterdam</u>, Leicester, Milton Keynes, Taipei (Taiwan), <u>Sabadell</u> (Spain), <u>Quito</u> (Ecuador), <u>Seoul</u> (Korea), Melbourne (Australia), <u>New York City</u> (USA), <u>Ahmedabad</u> (India) and Bandung (Indonesia). Another presentation on video (2019) is available <u>here</u>.



2.1 Short history

These challenges in cities are the reason why we developed the City Blueprint <u>methodology</u>. This has been done in a learning-by-doing fashion. In 2011 we assessed our first city: <u>Rotterdam</u>. The <u>City</u> <u>Blueprint</u> is a baseline assessment of the sustainability of water management in a municipality (or other dominantly urban region). It allows a city to quickly understand how advanced it is in sustainable water management and to compare its status with other cities. This project is part of the <u>European</u> <u>Commission Innovation Partnership on Water</u>. In 2015 we published our first assessment of <u>45</u> <u>municipalities and regions</u> and specific publications are available for many cities including <u>Rotterdam</u>, <u>Dar es Salaam</u>, <u>Hamburg</u>, <u>Istanbul</u>, <u>Ho Chi Minh City</u>, <u>Amsterdam</u>, <u>Melbourne</u>, <u>Quito</u>, <u>Ahmedabad</u>, <u>New</u> <u>York City</u>. Climate adaptation options have been reviewed for the City of <u>Malmö</u>. Recently cities in <u>Asia</u> have been reviewed including many cities in <u>China</u>.

2.2 The TPF and CBF

In 2015, a <u>critical review</u> of the City Blueprint[®] methodology was published. Based on constructive feedback from cities we decided to distinguish a Trends and Pressures Framework (TPF) and the City Blueprint Framework (CBF). Until 2020 all cities were assessed using the 2015 formats. In 2020 we modified and simplified the CBF and TPF further, mainly to include the World Bank governance indicators in the TPF. The TPF now summarizes the main social, environmental, financial and governance aspects on which cities have hardly any influence and is shown below.

The Trends and Pressures Framework (TPF)

Category	TPF Indicators		TPF Indicator number	Score
	Urbanization rate		1	
	Burden of disease		2	
ISOCIAL	Education rate		3	
	Female participation		4	
	Flood risk	Urban drainage flood	5	
		Sea level rise	6	
		River peak discharges	7	
		Land subsidence	8	
		Freshwater scarcity	9	
II ENVIRONMENTAL	Water scarcity	Groundwater scarcity	10	
		Sea water intrusion	11	
	Water quality	Biodiversity	12	
	Heat risk	Heat island	13	
	Air Quality	PM2.5/10	14	
	Economic pressure		15	
	Unemployment rate		16	
III FINANCIAL	Poverty rate		17	
	Investment freedom		18	
	Voice and accountability		19	
	Political Stability		20	
	Government effectiveness		21	
IV GOVERNANCE	Regulatory quality		22	
	Rule of law		23	
	Control of corruption		24	

The CBF provides a clear overview of Integrated Water Resources Management (IWRM) performance and its bottlenecks in municipalities and regions and consists of 24 indicators divided over 7 main categories as shown below.

The prospect of increased urban flooding, water scarcity, heat stress, and pollution (waste water including solid waste) as reported by the European Environment Agency (EEA) and the Organisation for Economic Co-operation and Development (OECD) emphasizes the need for adaptive and reliable urban water infrastructures. According to OECD, water infrastructures are often old and require refurbishment to meet current standards, whereas standards to withstand future conditions of increased storm events and urbanization are often not accounted for. According to the United Nations Environment Programme (UNEP), an estimated US\$ 41 trillion (41×10^{12}) is needed to refurbish the urban infrastructure in the period 2005-2030. Over 50% will be needed to refurbish the water systems. This is roughly 60% more than is spent on infrastructure in the same period until now. In developed countries water infrastructure investments amount to 1% of the GDP every year. For developing countries this is even more substantial, i.e. about 3.5% with extremes up to 6% or more.

The City Blueprint Framework (CBF)

Category	CBF Indicator	CBF Score
	1 Access to drinking water	
I Basic water services	2 Access to sanitation	
	3 Drinking water quality	
	4 Secondary WWT	
II Water Quality	5 Tertiary WWT	
	6 Groundwater quality	
	7 Nutrient recovery	
III Washerwater treatment	8 Energy recovery	
III wastewater treatment	9 Sewage sludge recycling	
	10 WWT energy efficiency	
	11 Stormwater separation	
W Mator infractory sture	12 Average age sewer	
TV water infrastructure	13 Water system leakages	
	14 Operation cost recovery	
	15 MSW collected	
V Solid waste	16 MSW recycled	
	17 MSW energy recovered	
VI Climate adaptation	18 Green space	
	19 Climate adaptation	
	20 Climate-robust buildings	
	21 Management & action plans	
VII Dlang and actions	22 Water efficiency measures	
vii Pians and actions	23 Drinking water consumption	
	24 Attractiveness	

2.3 Results of the TPF and CBF analysis

In this section a summary is provided of our work over the last 10 years, in which 120 municipalities and regions have been assessed in more than 50 countries with the TPF and CBF. Based on a cluster analysis of <u>45 municipalities and regions</u>, mainly in Europe, we arrived at the following IWRM classification of cities:

BCI score	Categorization of IWRM in cities		
0 - 2	Cities lacking basic water services		
	Access to potable drinking water of sufficient quality and access to sanitation facilities are insufficient. Typically, water pollution is high due to a lack of wastewater treatment (WWT). Solid waste production is relatively low but is only partially collected and, if collected, almost exclusively put in landfills. Water consumption is low but water system leakages are high due to serious infrastructure investment deficits. Basic water services cannot be expanded or improved due to rapid urbanization. Improvements are hindered due to governance capacity and funding gaps.		
2 - 4	Wasteful cities		
	Basic water services are largely met but flood risk can be high and WWT is poorly covered.		
	Often, only primary and a small portion of secondary WWT is applied, leading to large scale		

	pollution. Water consumption and infrastructure leakages are high due to the lack of environmental awareness and infrastructure maintenance. Solid waste production is high and waste is almost completely dumped in landfills. Governance is reactive and community
1-6	Motor officient sitios
4-0	Cities implementing centralized, well-known, technological solutions to increase water efficiency and to control pollution. Secondary WWT coverage is high and the share of tertiary WWT is rising. Water efficient technologies are partially applied, infrastructure leakages are substantially reduced but water consumption is still high. Energy recovery from WWT is relatively high while nutrient recovery is limited. Both solid waste recycling and energy recovery are partially applied. These cities are often vulnerable to climate change, e.g. urban heating and drainage flooding, due to poor adaptation strategies, stormwater separation and limited green surface ratios. Governance and community involvement has improved.
6 - 8	Resource efficient and adaptive cities WWT techniques to recover energy and nutrients are often applied. Solid waste recycling and energy recovery are largely covered whereas solid waste production has not yet been reduced. Water efficient techniques are widely applied and water consumption has been reduced. Climate adaptation in urban planning is applied e.g. incorporation of green infrastructures and stormwater separation. Integrative, (de)centralized and long term planning, community involvement, and sustainability initiatives are established to cope with limited resources and climate change.
8 - 10	Water wise cities There is no city scored within this category so far. These cities apply full resource and energy recovery in their WWT and solid waste treatment, fully integrate water planning and urban planning, have multi-functional and adaptive infrastructures, and local communities promote sustainable integrated decision making and behavior. Cities are largely water self-sufficient, attractive, innovative and circular by applying multiple (de)centralized solutions.

Currently (July 2020) more than 120 municipalities and regions in more than 50 countries have been assessed with the City Blueprint Approach.



World Map of cities categorized on the basis of their BCI. Red, orange, black and blue represent municipalities and regions with a geometric BCI between 0-2 (cities lacking basic water services), 2-4 (wasteful cities), 4-6 (water-efficient cities), and 6-8 (resource-efficient and adaptive cities), respectively.

The first 45 assessments have been included in the Urban Water Atlas for Europe:



In 2017, a first copy of the <u>Urban Water Atlas for Europe</u> was presented to Commissioner Karmenu Vella (Commissioner in charge of Environment, Maritime Affairs and Fisheries of the European Union) and to all delegations at the meeting of the Union for the Mediterranean (<u>UFM</u>). The picture above shows from left to right: Richard Elelman (CTM), Bernd Gawlik (JRC), Commissioner Karmenu Vella (COM), Kees van Leeuwen (KWR) and Stef Koop (KWR).

2.4 The Governance Capacity Framework (GCF)

According to the OECD, water governance is the set of rules, practices, and processes through which decisions for the management of water resources and services are taken and implemented, and decision-makers are held accountable. Good water governance is the real challenge. The City Blueprint Approach (TPF+CBF+GCF) is just the first step (the baseline assessment) in a long-term journey of communication and co-operation within and between cities.



A City Blueprint Approach is just the first step (the baseline assessment) on a journey of) communication and cooperation within and between cities (Source: <u>SWITCH</u>)



The OECD Principles on Water governance (Source: OECD)

Development. The list of identified governance gaps, barriers and capacities is seemingly endless and partly overlap or contradict. They are fragmented, case-specific and reflect a disciplinary scope that limit our understanding of more generic underlying processes and our ability to identify transferable lessons. Based on an extensive literature study, we have proposed a *Governance Capacity Framework* that focuses on 5 water-related challenges: 1) flood risk, 2) water scarcity, 3) urban heat islands, 4) waste water treatment and 5) solid waste treatment. These are amongst the most reoccurring issues that will steadily increase in importance due to global trends of climate change and urbanization.

Application. The GCF has been used to assess five water challenges in <u>Amsterdam</u>. We have also used the GCF to assess <u>Quito's drinking water security</u> and <u>New York City</u>, Melbourne, <u>Seoul</u> and <u>Ahmedabad</u> (India) and another 15 cities. The GCF analysis is based on interviews with the main stakeholders in the city. Below we present the empirical results from the city of Amsterdam for the five complex water-related challenges and for Quito's drinking water security.

The GCF shows large potential to provide empirical cross-city comparisons that contributes to the deeper understanding of the most important set of conditions needed to overcome emerging governance barriers. The assessment also provides valuable pragmatic insight to facilitate local decision-makers in finding dynamic solutions to achieve their sustainable development goals.

Dimensions	Condition	Indicators	
Knowing	1 Awareness	1.1 Community knowledge1.2 Local sense of urgency1.3 Behavioural internalization	
	2 Useful knowledge	2.1 Information availability2.2 Information transparency2.3 Knowledge cohesion	
	3 Continuous learning	3.1 Smart monitoring3.2 Evaluation3.3 Cross-stakeholder learning	
Wanting	4 Stakeholder engagement process	4.1 Stakeholder inclusiveness4.2 Protection of core values4.3 Progress and variety of options	
	5 Management ambition	5.1 Ambitious and realistic management5.2 Discourse embedding5.3 Management cohesion	
	6 Agents of change	6.1 Entrepreneurial agents6.2 Collaborative agents6.3 Visionary agents	
Enabling	7 Multi-level network potential	7.1 Room to manoeuver7.2 Clear division of responsibilities7.3 Authority	
	8 Financial viability	8.1 Affordability8.2 Consumer willingness-to-pay8.3 Financial continuation	
	9 Implementing capacity	9.1 Policy instruments9.2 Statutory compliance9.3 Preparedness	



Results of the water-related GCF analysis of Amsterdam. This is the average score for five different governance capacity assessments (flood risk, water scarcity, urban heat islands, waste water treatment and solid waste treatment). Community knowledge, Information transparency, local support and consumer willingness to pay are points of attention for the city of Amsterdam as they have a score of 0 or lower. Published in <u>Water Resources</u> Management



Results of the governance capacity of drinking water security of Quito (Ecuador). It reveals that cooperation between stakeholders, implementing capacity and citizens' awareness are the most important conditions for further development to find adequate solutions for Quito's long-term drinking water security. We also suggest that more attention should be drawn to the TAP-principles (transparency, accountability and participation). Published in <u>Environment, Development and Sustainability</u>.

3. SMARTER CITIES

Ideally, cities should develop a clear set of long-term objectives that should be SMART: Specific (target a specific area for improvement), Measurable (quantify or at least suggest an indicator of progress), Assignable (specify who will do it), Realistic (state what results can realistically be achieved, given

available resources), Time-related (specify when the result(s) can be achieved). Very often clear objectives are not set and - as a result - many cities are neither smart nor future-proof. Cities should realize that the <u>cost of inaction</u> is generally very high. This has been clearly demonstrated by Lykke Leonardsen for the City of <u>Copenhagen</u>.

Smarter cities are:

- Cities with a coherent long-term social, economic and ecological agenda.
- Water-wise cities that implement a <u>circular economy</u>, focus on social innovation and, last but not least, greatly improve on governance.
- Cities that explore co-benefits (winwin's) by cleverly integrating topics such as water, waste water, energy, solid waste, transport, ICT, climate adaptation, biodiversity (blue-green infrastructure), and housing. This saves time and money and makes cities attractive places to live.



4. EIP WATER - EXPLAINED

The European Innovation Partnership on Water (<u>EIP Water</u>) is one of the European Innovation Partnerships of the European Commission. The aim is to promote innovation that contributes to solve social challenges, enhance Europe's competitiveness and create employment and economic growth. EIPs help to pool expertise and resources by bringing together public and private actors at EU, national and regional levels. The overall objective of the EIP Water is to support and facilitate the development and implementation of innovative solutions to deal with the many water related challenges Europe and the World are facing, as well as to promote economic growth by bringing such solutions to the market in Europe and further afield. The <u>City Blueprint Action Group</u> of EIP WATER is coordinated by Kees van Leeuwen (KWR Water Research Institute, the Netherlands) and Richard Elelman (Eurecat-CTM, Spain).



5. GET INVOLVED

All cities are different. Some are advanced in a few or many subject areas. Our research demonstrated positive correlations of the Blue City Index with: (a) the ambitions of the local authorities regarding the sustainability of their IWRM, (b) the Gross Domestic Product (GDP) per person, (c) public participation, (d) climate adaptation, and (e) all governance indicators according to the World Bank. This shows that the variability in IWRM of cities offers great opportunities for short-term and long-term improvements, provided that cities share their best practices. Some cities, especially in developing countries, have much work to do. The goal of the City Blueprint Approach is not to highlight failures, but instead to encourage cities to become smarter in IWRM and Governance by identifying areas for improvement and by sharing their best practices by active participation in learning-alliances, ("winning by twinning").

5.1 What is the commitment for municipalities?

Agreeing to take part in the City Blueprint survey does not commit a city to any further steps. However, taking the right adaptive and preventive measures is often cheaper than inaction. In fact, it is a business case that will work out well for your citizens! Therefore we hope that cities will take action to become more resilient and liveable.

5.2 What is the potential use for consulting and construction companies?

The City Blueprint is the first step in a process to improve the sustainability of cities. It is a tool and process to bring stakeholders together and to develop a long-term strategy on the basis of which cities decide to develop and implement long-term action plans. The focus here is on the integration of water, waste and climate adaptation with other aspects in a city. The co-benefits or <u>win-win's</u> will make cities a more attractive place to live and save time and money too.

5.3 What does the City Blueprint Survey involve?

You will be involved in a survey, where you will be asked to complete the 25 CBF indicators for your municipality or region. We will take care of the TPF indicators. The answers will be reviewed by us and shown on the final radar chart or City Blueprint. So, the city is requested to provide answers and data sources for most of the CBF indicators, while technical experts answer the remaining issues. Each indicator requires some element of data collation and/or research. For each CBF indicator, a simple formula is provided to convert the response to a score between 0 and 10, which can then be plotted on the relevant spoke of the radar chart for which software is available on the Watershare website. We expect 1-3 man-days of time for your municipality or region by an appropriate engineer(s)/employee(s) to coordinate, research and provide the responses. If you would also like an analysis of the Governance Capacity of your municipality or region, that can be organized as well. This is a separate activity for which we will need to select and interview a relevant number of stakeholders. The completion of the GCF analysis will take a couple of weeks. Recently, we also published our <u>Compendium of Best Practices</u>.

Please contact us

The City Blueprint is also one of the tools of <u>Watershare</u>, *Expert Tools for the Water Sector*. We would like cities to develop a long-term coherent strategy based on the completion of our questionnaire. You can contact us, without any obligation, at: <u>city.blueprint@kwrwater.nl</u> or +31 306069649. We, a small group of independent technical experts at KWR Water Research Institute, will review the data, generate the radar chart and prepare a short accompanying report comprising the TPF, CBF and GCF. The technical expert of KWR may visit your city and work with your team for several days. Alternatively, the work can be completed by phone, email, Skype, etc.



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6. FURTHER INFORMATION

http://www.eip-water.eu/City_Blueprints (click on documents to get reports, presentations & publications). http://www.watershare.eu/ http://www.netwerch2o.eu http://www.eip-water.eu/ & http://ec.europa.eu/eip/smartcities/ http://www.bluescities.eu/ http://www.power-h2020.eu/