Ex-ante assessment of the “Water Sensitive City” thematic area under the Urban Agenda for the EU

Final Report

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Author: Birgit Georgi

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List of abbreviations

BMP	Best Management Practice
BWD	Bathing Water Directive
C4T	Cohesions for Transitions
CALM	Coordinators and Action Leaders' Meetings
CCRI	Circular Cities and Regions Initiative
CF	Cohesion Fund
CLLD	Community-Led Local Development
CoR	European Committee of the Regions
CP	Cohesion Policy
DG	Directorate General
DGUM	Director Generals for Urban Matters
DUT	Driving Urban Transitions
EAA	Ex-Ante Assessment
EARFD	European Agricultural Fund for Rural Development
EC	European Commission
EEA	European Environment Agency
EGCA	European Green Capital Award
EGLA	European Green Leaf Award
ELP	Emscher Landscape Plan
ERDF	European Regional Development Fund
ESF	European Social Fund
EU	European Union
EUI	European Urban Initiative
EUKN	European Urban Knowledge Network
FD	EU Flood Directive
GD	Green Deal
GI	Green Infrastructure
GWD	Groundwater Directive
ILI	Infrastructure Leakage Index
ITI	Integrated Territorial Investment
JFT	Just Transition Fund
KIC	Climate-KIC
LAG	Local Action Group
LID	Low Impact Development
MS	Member States
MSFD	Marine Strategy Framework Directive

MaWP	Multiannual Working Programme of the UAEU
NbS	Naturebased Solutions
OFC	Other Forms of Cooperation
p.e.	population equivalent
PSF	Policy Support Facility
RRF	Recovery and Resilience Facility
SDG	Sustainable Development Goal
SECAP	Sustainable Energy and Climate Action Plan
SUA	Small and medium-sized urban areas
SUDS	Sustainable Urban Drainage Systems
SUWM	Urban Water Management
TIA	Territorial Impact Assessment
TP	Thematic Partnership
UAEU	Urban Agenda for the EU
UATPG	Urban Agenda Technical Preparatory Group
UCP	Network of Urban Contact Points
UDG	Urban Development Group
UGP	Urban Greening Plan
UIA	Urban Innovative Action
UWWTD	Urban Waste Water Treatment Directive
WFD	Water Framework Directive
WSC	Water Sensitive City
WSD	Water sensitive design

Executive Summary

The Urban Agenda for the EU (UAEU) is a coordinated approach addressing the urban dimension of EU policies, emphasizing subsidiarity and proportionality. It focuses on better regulation, funding, and knowledge across EU policymaking, established through the Pact of Amsterdam in 2016. Thematic Partnerships under the UAEU address specific urban challenges, with 'Water Sensitive City' (WSC) being a priority theme proposed in the Gijon Agreement. This report offers an Ex-Ante Assessment (EAA) of the WSC theme, analysing its relevance for a Thematic Partnership based on five criteria: multi-level governance, policy environment, regulatory environment, existing identified gaps and recommendations, and trends and evidence about EU cities. Recommendations aim to inform the potential launch of a dedicated UAEU Thematic Partnership for implementing the WSC theme. Assessment methods used include desk research, interviews with thematically relevant Commission services and European organizations, and a focus group meeting with key stakeholders involved in the EEA process and feedback from Member States.

Analysis

The concept **Water Sensitive City** offers an integrated approach to urban water management, vital for tackling existing and new challenges posed by climate change, urbanization and land use trends. By incorporating water sensitive design, cities integrate water cycle management into green and built environments, addressing various risks like stormwater, flooding, and water scarcity. WSC shifts the perspective from seeing water as a problem to rather seeing it as a resource. Achieving WSC involves measures across green, blue, and technical infrastructure, alongside non-engineered approaches like awareness raising, education and incentives.

Water management in cities is intricately linked to various sectors such as climate change adaptation, disaster risk reduction, urban planning, housing, nature, biodiversity, and industry. Cities rely also on water management and land use in their rural surroundings, alongside policies set by regional, national governments, and the EU. Tackling water challenges demands therefore a cross-sectoral and multi-level approach.

This situation underpins the need for a **multi-level governance approach** for implementing Water Sensitive City on a large scale in Europe. Given the wide-ranging variability of local conditions, a tailored, place-based approach becomes imperative. Concurrently, higher-level authorities establish the overarching framework and gauge its level of supportiveness.

Currently, no explicit and comprehensive multi-level governance framework specifically tailored for WSC exists but fragmented elements within sector-specific policies, like the Common Implementation Strategy (CIS) for the Water Framework Directive, the Code of Conduct on Partnership for managing the Cohesion Funds and the Cohesion for Transitions (C4T) Community of Practice, Integrated Territorial Investment (ITI), Community-Led Local Development (CLLD). Multi-level governance for WSC is likely to vary across different EU Member States. Promising examples are the Dutch Delta Programme or the Emscher Landscape Park (ELP) in Germany that can provide learnings and inspiration.

European, international, and national **policies** play crucial roles in providing guidance, funding, knowledge, and capacity building in setting the framework for cities and regions to act. Cohesion

Policy, with its substantial funding under its target “A Greener Europe”, can be pivotal in driving the implementation of a Water Sensitive City using funds for climate change adaptation, sustainable water, and nature protection and biodiversity. Other policies such as Horizon Europe, EU Biodiversity Strategy, EU Adaptation Strategy, and New European Bauhaus can also contribute significantly to advancing WSC. Thematic Partnerships under the UAEU, particularly those focused on greening cities, climate adaptation, sustainable land use, and circular economy, intersect with the WSC theme offering opportunities for knowledge exchange, collaboration, and synergetic action.

Various funding and capacity building programmes, including EU LIFE, European Urban Initiative, URBACT, and Interreg, support policy implementation for WSC, while others, particularly on building renovation and circular economy, appear underutilized. Expanding the adoption of water sensitive designs could not only lead to more water sensitive cities but lead to energy savings and alignment with circular economy principles.

Despite these efforts, policy action may still be fragmented between sectors. Initiatives like the European Commission’s attempt for a Water Resilience Initiative or an EU Blue Deal aim to create a more cohesive approach across policies.

While no specific **regulation** for the Water Sensitive City topic in the EU exist, water-related directives like the Water Framework, Floods, and Urban Wastewater Treatment Directives offer guidance concerning their specific scope and focus such as on parts of integrated water management, cooperation across sectors and governance levels, and the use of nature-based solutions. The proposed Nature Restoration Law (on hold) aligns with the push for more nature in cities. The revision of the Urban Wastewater Treatment Directive with its integrated urban wastewater management plans presents an opportunity to incorporate water sensitive design. Integrating water sensitive design into building regulations and urban planning at the EU level, such as the Energy Performance of Buildings and the Energy Efficiency Directives, is however currently overlooked.

Despite an existing framework, a more coordinated and integrated approach is necessary for WSC. EU directives are implemented by national governments and only then by cities. The degree of city involvement in the implementation process varies; however, across EU Member States, depending on each country's specific framework.

Existing identified gaps and recommendations include knowledge and awareness gaps, with many stakeholders lacking understanding of water ecosystem services and their impacts. Despite numerous technical and nature-based solutions, their systematic adoption by cities is limited due to a fragmented provision of knowledge, a lack of comprehensive data, and lack of capacity with smaller and medium-size cities. Funding challenges may arise from a complex landscape of European funds. Where European Funds are managed by Member States or regions, like Cohesion Funds, the topic of Water Sensitive City needs adequate integration into national programmes.

The built urban environment poses challenges for retrofitting water sensitive designs into existing buildings, infrastructures and spaces and building regulations are not sufficiently used as a tool. The lack of skills and legal ambiguities hinder the adoption of nature-based solutions. Local authorities face challenges in implementing water sensitive strategies due to mismatches between available resources and specific needs.

Water sensitive design, and in particular nature-based solutions, offer cities simultaneously benefits beyond water challenges by enhancing resilience, efficiency, and sustainability. Integration with other urban topics can save costs and yields benefits for nature conservation and community well-being. Effective supporting factors include community engagement, budgetary capacity, long-term political commitment, effective use of knowledge and data, and participation in peer-learning networks. Embracing digitalization and blue tech innovations can propel cities towards a sustainable blue economy, enhance the efficiency of measures and accelerate their implementation and can also fosters economic growth and job creation.

Trends and evidence about EU cities show that they grapple with water management challenges amid climate change and urbanization. They face threats from both excess and scarcity of water, which can also compromise water quality and impact water infrastructure, economy, and public health. Urbanization trends may overload the sewage systems and exacerbate flooding. Competition for water resources with other sectors - agriculture, energy, and industry - may exacerbate water scarcity.

Despite these challenges, cities can draw from existing solutions of water sensitive design and adaptation actions, documented in various platforms, initiatives and projects like the Covenant of Mayors, the Urban Water Atlas for Europe, Climate-ADAPT, OPPLA, UIA, Horizon 2020, or LIFE. The availability of comprehensive and comparable data sets for WSC is limited, which hampers a comprehensive assessment of their implementation and success as well as developing effective local action. This highlights the need for agreed-upon indicators like the City Blueprint or OECD Water Governance Indicator Framework to address this challenge.

Recommendations

The **thematic scope** of Water Sensitive City needs to address the complex interplay between water resources, water quality, urban infrastructure, environmental sustainability, and societal needs within urban areas. A Thematic Partnership (TP) could aim to make water sensitive design the new standard for urban water management. Dealing with the complexity of the subject, the TP could focus on issues of water quantity, including both excess and scarcity, while addressing interconnected topics such as water quality, circular economy principles, and external impacts.

For **multi-level cooperation,** a Thematic Partnership (TP), through flexible decision-making and targeted responses to these urgent urban challenges, would offer an appropriate avenue for the broad and holistic approach and multi-level collaboration that the theme requires. Other Forms of Cooperation (OFC) focus on specific scenarios and would be too narrow in covering the topic appropriately.

Timing for successful implementation and establishing a Thematic Partnership Water Sensitive City is not just suitable but advised due to pressing climate change impacts and urbanization challenges, demanding innovative approaches. Despite its scattered distribution, abundant knowledge on water sensitive urban design, especially nature-based solutions, is available and aligns with available EU policies, funds and regulations, such as the European Green Deal and policies on urban development, water, climate adaptation, nature and biodiversity, or circular economy.

In particular, the just starting negotiations on post-2027 Cohesion Policy offer a prime opportunity to integrate WSC. The recast of the Urban Wastewater Treatment Directive opens another important strategic entry points for establishing WSC. Ongoing initiatives, including the EU Biodiversity Strategy, EU Adaptation Strategy, and EU Directives like the Water Framework and Floods Directives, provide continuous opportunities for integration and advancement of water sensitive design approaches. Additionally, platforms like the New European Bauhaus, Urban Innovative Actions, and URBACT and their calls show avenues for specific projects on WSC in the foreseeable future.

The TP **requires members with expertise** and experience in water sensitive design, including technical knowledge on nature-based solutions, land use, and climate change adaptation. Integration of perspectives from various sectors such as water management, nature conservation, urban and regional planning, and circular economy is essential; furthermore, familiarity with regulations and policy areas, implementation knowledge and tools, stakeholder involvement, innovative funding, social equity considerations, effective communication strategies. Members should be able to embrace intersectionality, inclusivity, and a cross-sectoral, interdisciplinary approach.

Institutions and stakeholders of interest include urban and regional authorities, national authorities responsible for water and urban development, city umbrella organizations, and other urban and spatial planning institutions at the various levels having stake on the topic of Water Sensitive City. Apart from the European Commission other European institutions such as the European Investment Bank could also be involved. Stakeholders should represent diverse regions, city sizes, and levels of expertise. Special attention and efforts need to be made to involve appropriately small and medium-sized cities.

The European Urban Initiative (EUI) Secretariat offers daily **support** in planning, managing and monitoring for the Thematic Partnership as well as access to external experts that can provide specialized knowledge to assist in developing action plans. Financial support is available for small and medium-sized cities to participate in meetings and capacity-building activities.

The **opportunity to launch a partnership** for advancing WSC is significant, as the challenges lie more in implementation and governance than in the shortage of solutions. By leveraging existing knowledge, regulations, and funding opportunities such as the EU Cohesion Funds, there's a chance to integrate WSC principles into ongoing and future policy plans, preventing poorly designed cities from becoming resistant to climate change. A Thematic Partnership (TP) could serve as a central hub for coordinating efforts, bridging gaps, and capitalizing on windows of opportunity presented by delayed policy developments or upcoming initiatives. As a strategic platform it could not only facilitate multi-level governance but also foster a comprehensive approach to establishing sustainable and resilient urban environments.

Territorial Impact Assessments (TIA) as used by the European Committee of the Regions (CoR) can provide insights into the potential unbalanced territorial impacts of EU policies. A TIA on the topic of Water Sensitive City has not been performed so far but could eventually help assessing the variations in impacts due to geophysical differences, climate change, and land use patterns across European regions. This can inform strategies and policies for Water Sensitive City.

Introduction

1.1 Urban Agenda for the EU

The Urban Agenda for the EU (UAEU) was initiated within the framework of intergovernmental cooperation. The Pact of Amsterdam signed on 30 May 2016 at the informal meeting of EU Ministers responsible for Urban Matters, established the Urban Agenda for the EU. It intends to better involve cities in the design and implementation of EU policies. The overall objective is to include the urban dimension in policies and its implementation should lead to better regulation, better funding and better knowledge for cities in Europe.[1]

The UAEU is a multi-level and multi-stakeholder working method and institutional innovation promoting cooperation between Member States, cities, the European Commission and other stakeholders. It is implemented through Partnerships/ involving the European Commission (and ultimately other EU institutions), Member States, cities and stakeholders in a multi-level governance format (Partnership/Other Forms of Cooperation (OFC)) and focus on a theme. While partnerships are the key delivery mechanism of the UAEU, the Multiannual Working Programme (2022-2026) provides OFC as a second option for collaboration. OFCs shall be applied for topics, where a more specific and targeted approach is needed, for example when an urban topic requires a quicker response, targeted delivery or a specific focus on one pillar of the UAEU and/or question/issue.[2]

The first phase has delivered 14 Thematic Partnerships (TP) and action plans in relation to better regulation, funding and knowledge. Through the Ljubljana Agreement (2021) and the Gijon Agreement (2023) six new Thematic Partnerships have been proposed until now (Table 1). Moreover, since 2020, the new Leipzig Charter provides guiding principles on integrated urban development.

Table 1: Thematic Partnerships of the UAEU

First phase partnerships		**Ljubljana Agreement**	**Gijon Agreement**
concluded	**ongoing**		**planned**
Security in Public Space Sustainable Land Use Energy Transition Climate Adaptation Urban Mobility Digital Transition Circular Economy Jobs and Skills in the Local Economy Urban Poverty Housing Air Quality	Culture and Cultural Heritage Innovation and Responsible Public Procurement Inclusion of Migrants and Refugees	Cities of Equality Food Greening Cities Sustainable Tourism	Water sensitive city. Building decarbonisation: Integrated renovation programmes and local heating and cooling plans

1.2 Thematic Partnership Water Sensitive City

Water Sensitive City (WSC) is a topic proposed under the Gijon Agreement in 2023 for a new Thematic Partnership to possibly be established in 2024.

Rapid urbanization in European cities has resulted in considerable expansion of artificial land cover, reducing the ability of rain water to infiltrate the soil and so exacerbating rainwater runoff issues in certain areas. Urbanization also increases the heat island effect, which can be mitigated by having enough large trees[1]. This, coupled with the impacts of climate change, such as more frequent and more intense precipitation interspersed with periods of prolonged drought (due to combination of lack of precipitation and higher evaporation due to higher temperatures), escalates the risk of pluvial and fluvial flooding, as well as prolonged droughts and heat waves. In coastal cities, sea level rise due to climate change, will also escalate the risk of coastal flooding.

Within the EU framework, numerous ongoing urban developments compound the critical challenges of water scarcity and flood management, posing obstacles to achieve sustainable urban development. These include climate change effects, ageing infrastructure, alterations in land use, ineffective water management strategies, and lack of cohesive, integrated approaches.

To tackle these challenges effectively, a multi-sectoral and multi-level governance approach is imperative. The TP will delve into the design aspects required to enhance tools, measures, and governance mechanisms aimed at facilitating the implementation of water sensitive designs, such as sustainable urban drainage systems, water reuse initiatives, stormwater storage systems for conservation, and other pertinent measures. These efforts aim to establish models of water sensitive urban management and advocate for integrated approaches.

Moreover, the Partnership can leverage the groundwork laid by existing collaborations, especially those focused on climate adaptation, circular economy initiatives, sustainable land management, and urban greening, thereby building upon existing knowledge and expertise.

1.3 Purpose of Ex-Ante Assessment

The Ljubljana and Gijon Agreements establish key parameters, notably featuring an Ex-Ante Assessment of future priority themes for launching new partnerships and Operational Frameworks and Commitments as other forms of cooperation (OFC). This addition was prompted by insights from the 2019 Assessment study on the implementation and performance Urban Agenda for the EU, emphasizing the need for proactive evaluation to enhance implementation and performance.

The primary goal of the EAA is to facilitate the implementation of a practical, effective, and results-focused approach that seeks to enhance the impact of future UAEU deliverables. EAA will review the proposal to improve the focus, timing, and activities of multi-level cooperation, ensuring an appropriate level of thematic and procedural expertise among partners. At the same time, it aims to maintain flexibility in the work and decision-making of partnerships in line with the ethos of the

[1] In order to deliver the service of cooling urban areas, the trees are in need of having enough ground water for evaporation.

UAEU.[2] So far, 4 additional partnerships have been launched in 2022-2023 as part of this new phase, after the completion of Ex-Ante Assessments.

The purpose of the Ex-ante Assessment is to help:

- Establish the relevance of the focus on the theme chosen of water sensitive city for future work in a multi-level governance context.
- Secure the suitable level of partner's expertise while accounting for a balanced composition of a Partnership / Other Form of Cooperation.
- Guide multi-level cooperation in preparing a future Orientation Paper (stocktaking and preparatory actions phases)

The Ex-ante Assessment will provide an input for open calls for Partners, inputs/guidelines for drafting the Orientation Paper, and for overall conditions on the required parameters for the successful launching of a multi-stakeholder partnership on the given theme. Besides the first part on the analysis of the listed criteria, it should, in a second part:

- Deliver recommendations to help interpret and focus the thematic scope of the subject.
- Identify the most suitable form of multi-level cooperation.
- Recommend the timing for successful implementation.
- Identify the required type of expertise of the members.
- Identify institutions/stakeholders of interest to be involved in the multi-level cooperation set-up.
- Identify the type of support that will be required for the implementation.
- Provide an assessment on the opportunity to launch a partnership.
- Examine the regulatory environment, whether a Territorial Impact Assessment has been prepared for a specific subject.

1.4 Methodology

Through a thorough desk search, an exhaustive compilation of key publications, documents, websites, initiatives, and case studies pertinent to the topic Water Sensitive City was identified. Following this, a screening process was undertaken to select the most relevant sources at the European level for the core desk research, facilitating the addressing of the research questions.

Nine research questions were formulated based on the topic proposal, the pillars and objectives of the Urban Agenda, and the five general Assessment Criteria (Table 2). These questions not only guided further desk searches but also informed ten interviews conducted with Commission services (DG REGIO, ENV, CLIMA, RTD, JRC, ENER) and other European organizations (EEA, CINEA, DUT, Mission Adaptation) between January and March 2024 (see Annex1) to explore their activities related to the topic within their scope of work and on their perspective on ways how cities and their enablers could progress.

Furthermore, a stakeholder focus group with CEMR, Eurocities, CoR, URBACT, ICLEI, Belgium Presidency and EC DG REGIO has been organised on 27 February 2024 to learn on their perception of challenges and opportunities for the topic Water Sensitive City. Subsequent written feedback was

received from these stakeholders. The insights garnered from both the interviews and stakeholder engagement sessions enriched the information obtained from desk research, offering additional perspectives and depth to the analysis.

Table 2: Research questions

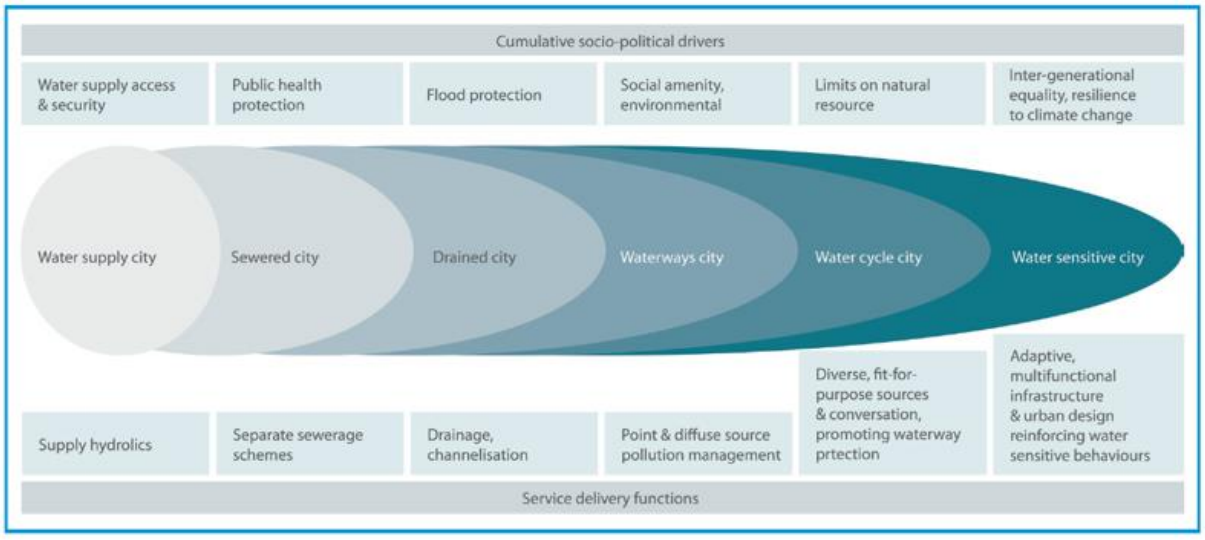
Research questions	Corresponding Assessment Criteria
What defines the concept of Water Sensitive City and what is its thematic scope?	Trends and evidence about EU cities
Why is there a necessity for the topic of Water Sensitive City, and what is the current status and evolution of water sensitive design in EU cities?	
What are the requirements and challenges in planning and implementing a Water Sensitive City?	
What role does multi-level governance play in advancing the concept, and how should it be structured? What solutions and added value does it bring?	Multi-level governance
How does the policy environment at EU, national, regional, and local levels, as well as their interconnections, align with the needs and challenges of planning and implementing a Water Sensitive City?	Policy environment
What are the interconnections and opportunities for mutual support among actions developed or in progress under different Thematic Partnerships related to the new topic Water Sensitive City considering also the cross-cutting issues as outlined in the Gijon Agreements?	
What is the regulatory environment at EU, national, regional, and local levels, and how does it align with the needs and challenges of planning and implementing a Water Sensitive City? How can UAEU's work on this theme contribute to Better Regulations?	Regulatory environment
What knowledge, data, tools, models of water sensitive urban management as well as funding options are currently or will soon be available for the topic of Water Sensitive City? What gaps still exist here?	Existing identified gaps and recommendations
Based on identified gaps for shifting towards more water sensitive cities and the identified options to act in the multi-level governance context of current and evolving EU, national, regional and local policies, what recommendations can be made for the TP Water Sensitive City in supporting Better Regulation, Better Knowledge, Better Funding, and Multi-level Governance?	

A. Analysis

1.5 The concept of Water Sensitive City

Current trends of different driving forces and new challenges show that conventional approaches to urban water management no longer work sufficiently. The role of water in urban areas is increasingly acknowledged as both a challenge and a precious resource. The handling of wastewater, flood control, rain, and surface run-off waters should be approached with integrated solutions that consider the various uses and intrinsic value of water. Cities must transition from relying solely on engineered urban water systems to adopting integrated, adaptive, and climate-resilient water systems (figure 4).[3, 4]

Figure 1: Transition from conventional water supply management to a Water Sensitive City.[4]



Water Sensitive Design (WSD) represents a comprehensive approach to sustainable water management, offering a framework for the development industry, local government, and communities to create more vibrant and healthy urban environments with resilient waterways[5]. Conventional urban development practices often disrupt the natural water cycle, prompting the need for WSD to mitigate these adverse effects by **integrating developments with site's natural features**. This approach promotes the integration of stormwater, water supply, water reuse and sewage management, ultimately minimizing the negative impacts of development on waterways and fostering cooler, greener spaces and healthier communities.[5]

WSD operates by integrating water cycle management **into both the green and built environment** through effective planning and urban design. It treats urban water as a valuable resource, aiming to protect water quality, ecosystems, and address stormwater and flooding risks. Applicable at various scales, from single buildings to entire cities, WSD emphasizes concurrent consideration of all elements of the water cycle in the design and planning process.[3]

The practice of water sensitive urban design encompasses diverse objectives, such as minimizing flooding, impacts on natural features, safeguarding water quality, reducing water supply system

demands, incorporating water treatment and reuse, and enhancing social amenity through green spaces and landscaping. It seeks to add value while minimizing development costs, recognizing the interconnectedness between water use and broader social and resource issues.[6]

Practical steps toward achieving water sensitive urban development involve implementing sustainable urban drainage systems, reusing water, promoting conservation measures, investing in infrastructure upgrades, encouraging circular economy practices for water, and integrating nature-based solutions like green roofs, trees, and rain gardens. By disconnecting water drainages from roofs and streets from the sewer system, and transferring it to newly created basins or small reservoirs to retain rainwater – also allowing it to infiltrate in the soil - , the promotion of permeable pavement, the creation (or restoration) of flood plains alongside streams and rivers in and near cities, and fostering cross-sectoral collaboration are essential components for achieving more sustainable and resilient urban water management.[3] A study comes for example to the result, that implementing greening on approximately 35% of Europe's impervious urban areas could lead to an estimated reduction of around 17.5% in total runoff. This decrease could significantly aid in addressing pollution from European urban areas. Additionally, greened surfaces may also contribute to reducing the frequency of combined sewer overflows by buffering runoff and releasing it at a slower rate compared to impervious surfaces.[7]

A water sensitive city **incorporates both built/technical aspects and management/behavioural considerations**, viewing cities as catchments and aiming to restore the water balance within regions. This concept underscores the importance of ecological services derived from urban water systems, such as flood protection, groundwater recharge, and recreation. It emphasizes collaborative efforts across governance levels for successful implementation.[4]

Synonyms and related concepts include Integrated Urban Water Management (IUWM), Sustainable Urban Water Management (SUWM), Sustainable Urban Drainage Systems (SUDS), Low Impact Development (LID), Green Infrastructure (GI), Best Management Practice (BMP), Water Sensitive Design (WSD), and Sponge City. While these concepts may differ in scope and context, they share the common philosophy of relying on the "activation of natural processes" to manage surface water runoff and mimic the natural hydrological cycle.[8]

Sustainable Urban Drainage Systems (SUDS), a subset of WSUD, involves structures designed to manage surface water runoff by mimicking natural drainage, often incorporating soil and vegetation in otherwise impermeable structures. The WSDU paradigm and SUDS are closely linked with the concepts of **nature-based solutions** (NbS), **ecosystem-based approaches** and **urban green and blue infrastructure** –solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience towards climate changes, by for example mitigating heat waves and urban floods, both at the building scale, and at the city scale when implemented extensively.[3,9] **Sponge cities** are whole urban areas designed to mitigate flooding and enhance water resilience by imitating the natural water absorption capacity of sponges to address urban water management challenges by integrating green infrastructure and sustainable water management practices.[10]

All these solutions collectively contribute to reducing surface runoff, attenuating flood impacts, increasing groundwater recharge, thereby improving water quality and, when complemented with rainwater harvesting for non-potable uses, help meet water efficiency targets. Moreover, they have the potential to reduce heat island impacts in urban areas, improve air quality, restore biodiversity in urban areas, among other benefits.[3]

Scope and elements of a Water sensitive city

A water sensitive city considers water in terms of quantity and water quality, which can be affected by both excessive water where pollutants from surfaces are washed into the sewage system and in surface waters as well as by water scarcity where pollutants then reach higher concentrations. As the status of water is challenged by different drivers, cities need to frequently and, in the future, more often deal with:

- Too much water caused by heavy precipitation, river floods or coastal floods.
- Too little water caused by droughts and water scarcity.
- Decreasing quality of ground, surface and sea water.

Water quantity and quality are driven by, i.e.,

- Natural variation in the different regions.
- Climate change impacts.
- Urbanisation trends, urban sprawl, soil sealing.
- Land use impacting soil quality.
- Water use by households, industry and agriculture depending on economic development, culture and lifestyle.
- Age and maintenance status of water infrastructure.
- Water scarcity that increases the concentration of harmful substances in waterbodies.

Management towards a Water Sensitive City will consider therefore measures of

- Flood and water run-off management.
- Water saving.
- Rainwater harvesting.
- Greywater reuse.
- Water supply.
- Waste water management and protection of water bodies.

Amidst mounting challenges posed by climate change and other factors, including water scarcity and escalating flood risks, a paradigm shift in water management is imperative. Departing from traditional practices of merely keeping water out of urban areas and relying on distant, demand-driven water supplies, there's a growing recognition of the need to view water as a valuable resource, even in times of scarcity. This transformative approach, epitomized by the concept of sponge cities, emphasizes harnessing water within urban landscapes to enhance resilience, reduce flooding, and address water scarcity challenges proactively.

Different types of measures towards a Water Sensitive City can be taken and need to go hand in hand. These comprise:

- Infrastructure measures such as
    - Green and blue infrastructure and nature-based solutions.
    - Technical infrastructure.
    - Household and industrial water appliances.
    - Building and urban space design.
    - Digital solutions and real-time control of infrastructures and consumption.
- Non-engineered (soft) measures such as
    - Building awareness of urban water challenges and solutions.
    - Increase of knowledge and capacity to act.
    - Behaviour changes.
    - Incentives.
    - Funding.
    - Governance.

Progressing towards a Water Sensitive City (WSC) can involve various actions, such as removing obstacles in the planning process, advancing semi-natural and technical planning and design of measures, reviewing the legal framework, creating funding and financing opportunities, and eliminating other barriers to implementation, for example, by empowering stakeholder groups.[11]

Given the cross-sector and multi-level character of water management for cities, governance plays an important role and needs to include these dimensions, identify conflicts as well as synergies. Other sectors to consider are listed in Table 3.

Table 3: Other sectors that link to Water Sensitive City / Design.

Sector	Link to WSC
Climate change adaptation	Includes strategies and measures for water sensitive design (WSD)
Disaster risk reduction	Includes strategies and measures for flood protection and against droughts
Urban planning	Provides the framework for fostering and implementing WSD
Housing and Building design	The places where WSD can be implemented
Nature and Biodiversity	Synergies with nature-based solutions (NbS) for WSD
Land use and Soil protection	WSD is part of sustainable land use
Maritime spatial planning	Ensuring the sustainable coexistence with maritime activities at the coastal areas and open sea
Industry and economic development	Can be important water user (mining, power plants, textile and other industries)

Agriculture and food production	Important water user (irrigation)
Tourism and Recreation	Important water user and impacted by floods as well as droughts
Transport	Depends on water resilient infrastructure. Droughts and floods can affect navigation on waterways and ports
Energy and climate change mitigation	WSD can save energy, e.g. for unnecessary treatment of rainwater that does no longer enter the sewage system; green roofs and other urban green can reduce the demand for cooling energy
Cultural heritage	Could be affected by floods as well as droughts; offers traditional solutions for WSD (e.g., ancient irrigation and planting techniques)
Health	WSC protect against the impacts of flooding, ensure sufficient drinking water, NbS for WSD offer additional health benefits
Social equity	WSC and housing should be accessible for all

This broad intersection with other sectors underscores the fact that addressing most water challenges faced by cities necessitates a broader city and regional approach, emphasizing integration and shared responsibility. For instance, rainwater runoff and floodwater do not adhere to property or district borders, impacting areas downstream. In case of entire river basins also regions in other EU Member States need to be collaborated cross-border. Moreover, developments upstream can influence both the quantity and quality of water reaching downstream cities. Additionally, water demands from agriculture in surrounding regions may compete with urban needs for drinking water. While cities and their various stakeholders can contribute to water management efforts, many challenges require collaboration with regional and national authorities for effective solutions.

At the EU and national levels, governance frameworks provide the necessary structure for cities and regions to enact policies, regulations, standards, and access funding, alongside sharing knowledge and information. Addressing these requirements necessitates a comprehensive, multi-level, and cross-sectoral governance approach, aimed at minimizing potential conflicts and trade-offs while leveraging synergies to maximize benefits and establishing a supportive framework for cities. The subsequent chapters offer insights into the current state of affairs in this regard.

The status of planning and implementing the concept of Water Sensitive City in the EU is assessed along the UAEU criteria for Ex-Ante Assessments to enable identifying the further needs and possible actions that can be developed by the Thematic Partnership.

1.6 Multi-level governance

The concept of "multi-level governance" originated from the EU's Committee of the Regions in 2009 and has since become a fundamental principle.[12] It underscores the importance of coordinated action among the EU, Member States, and local/regional authorities in shaping and implementing policies. This approach ensures alignment between EU and national strategies and their effective

execution at the regional and local level. Documents such as the New Leipzig Charter and The White Paper on European Governance underscore the significance of multi-level governance in promoting sustainable urban development, advocating for principles such as openness, participation, accountability, effectiveness, and coherence in decision-making processes. The principle of partnerships plays a pivotal role in distributing subsidies and involves engagement from various stakeholders. The European code of conduct on partnerships ensures consistency in organizing partnerships for programmes supported by EU Funds.[13] Good governance is vital for sustainable urban development as it fosters transparency, inclusivity, responsiveness, and efficiency in decision-making processes.

The water sector's inherent characteristics make it highly dependent on multi-level governance due to its interconnectedness across sectors, places, people, and scales. Hydrological boundaries often do not align with administrative perimeters, making freshwater management a global and local concern that requires involvement from public, private, and non-profit stakeholders. Addressing future water challenges involves questions of governance structure, stakeholder engagement, regulatory frameworks, information access, and the capacity for integrity and transparency. Effective policy responses must be coherent and supported by well-designed systems and robust stakeholder involvement.[14]

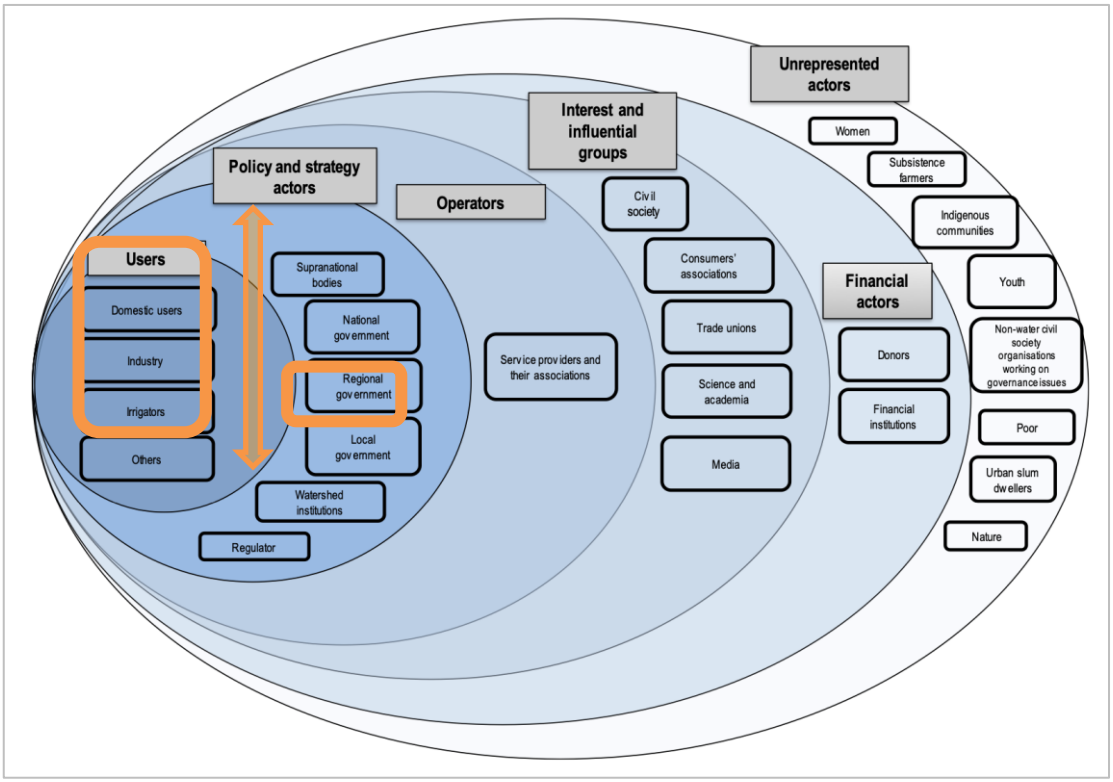
The OECD has established 12 principles on water governance to address identified governance gaps within the water sector's multi-level, cross-sector, and multi-stakeholder context. These principles are designed for application in countries and regions worldwide. However, water sensitive cities play a significant role as local actors in overall water governance, contributing substantially to effective management and sustainable practices (Box 1;
Figure 2). [14,15]

Box 1: Many of the 12 OECD Principles of water governance relate to multi-level governance:

1. Principle 1: Clearly allocate and distinguish roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster co-ordination across these responsible authorities.
2. Principle 2: Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster co-ordination between the different scales.
3. Principle 3: Encourage policy coherence through effective cross-sectoral co-ordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use.

Further principles, such as on the capacity of authorities, data and information, finance, sound regulatory frameworks and innovative forms of water governance and stakeholder participation also exhibit a multi-level governance dimension.[14] (Annex 2: Examples of Water Indicators)

Figure 2: Key stakeholders in water governance following OECD, 2015



Multi-level governance for a Water Sensitive City involves the EU, national, and sub-national governments establishing frameworks that enable cities and regions to take physical and non-physical actions. By this action, cities put higher-level policies into practice. A challenge arises from the intersection of multiple governmental levels with various sectors and stakeholders, complicating effective water management. The situation here can differ between countries, regions and individual cities.

Small and medium-sized cities

Moreover, cities may face different governance challenges depending on their size. Small and medium-sized urban areas (SUA) often lack the government capacities found in larger cities, which hinders their ability to effectively manage sustainable urban development and just green and digital transitions and to engage properly in multi-level governance procedures. Financial challenges arise from weak local resources and a reliance on national funds. SUAs also experience limited human resources due to austerity policies and outsourcing trends, which impact their capacity to adapt to complex tasks and changing environments. This makes efficient collaboration crucial for SUAs because of their limited financial and human resources. On the positive side, they can leverage their smaller size and proximity to citizens to foster participatory democracy. However, while they hold the potential for strong civil engagement, cooperation among neighbouring municipalities and

engagement arrangements remain underdeveloped in many SUAs. To overcome these barriers, creating governance models based on multi-level, multi-stakeholder platforms rooted in local specificities is essential. Additionally, investing in SUAs' financial and human capital resources from regional, national, and European administrations can help facilitate transformative practices in these territories.[16]

Developing multi-level governance to promote the Water Sensitive City concept can leverage existing practices in the water sector and other fields at EU, national, and sub-national levels. These established approaches can serve as a solid foundation for building effective governance strategies.

Examples of multi-level governance in EU water policy

The adoption of the Water Framework Directive brings forth several common technical hurdles for Member States, the Commission, Candidate and EEA Countries, along with stakeholders and NGOs. To tackle these challenges collectively and efficiently, Member States, Norway, and the Commission established a **Common Implementation Strategy (CIS)** specifically for the WFD. The CIS is designed to promote consistent and synchronized implementation of the WFD and its associated directives.[17] The current work programme also considers explicitly the related policies and initiatives of the Green Deal. It is a three-layer organisation, with Water Directors meetings, the Strategic Coordination Group and the different Working Groups including stakeholders from EU and national level.[18]

Under the **EU Water Framework Directive** (WFD) and the **Floods Directive** (FD), rivers, coastal areas and related flood risks are to be managed in entire river basins. This implicates crossing various administrative borders and governance levels and calls for a multi-level governance and multi-stakeholder approach to manage water resources effectively and mitigate flood risks. Under the WFD, EU Member States are obliged to develop River Basin Management Plans (RBMPs) for each river basin district. The development of RBMPs involves a collaborative process that shall engage stakeholders at various levels, including local authorities, water users, environmental organizations, and the public. National governments are responsible for overall coordination and oversight, while regional and local authorities play a crucial role in implementing measures tailored to their specific contexts. This participatory approach and involvement of stakeholders at different levels ensures that diverse perspectives are considered in decision-making and implementation and ensures that RBMPs reflect local priorities and address regional challenges effectively. In a similar way, the Flood Risk Management Plans (FRMPs) of the Floods Directive are developed and implemented. Additionally, cooperation and coordination between neighbouring countries are essential for addressing transboundary flood risks effectively. Hence Several International River Basin Districts have also published River Basin Management Plans: Danube, Elbe, Ems, Finnish-Norwegian International River Basin District, Rhine, Scheldt / l'Escaut, Sava Commission. For coastal cities, sea-basin strategies become instrumental supporting regional cooperation, when addressing common needs and challenges towards a sustainable blue economy.

Examples in the areas of EU Cohesion Policy and other

In the context of the Cohesion Funds, Regulation (EU) No 240/2014, delegated by the Commission, establishes a **Code of Conduct on Partnership**. This code serves to facilitate and support Member States in organizing partnerships for Partnership Agreements and programmes funded by the Cohesion Funds. Member States are encouraged to involve public authorities at national, regional, and local levels, as well as economic and social partners, and representatives from civil society, including environmental organizations, community-based groups, and voluntary organizations. These entities often have a significant influence on or are significantly affected by the implementation of Partnership Agreements and programmes. Additionally, special attention should be given to including groups that may be affected by programmes but face challenges in influencing them. The Code of Conduct outlines the process for identifying partners and delineates guidelines for effective collaboration.[13]

In practice, the **Cohesion for Transitions (C4T) Community of Practice** serves as a platform aimed at supporting EU Member States and regions in maximizing the utilization of EU cohesion funds for sustainability transitions under Policy Objective 2 "Greener Europe". C4T brings together national, regional, and local cohesion and sustainability transitions practitioners to exchange experiences and best practices, forge partnerships, and collaboratively devise solutions. Through these efforts, C4T endeavours to facilitate the allocation of the targeted 8% of the European Regional Development Fund (ERDF) at the national level towards sustainable urban development projects that are supported under Policy Objective 2 "Greener Europe", as well as enhance the integration of water sensitive design principles. **C4T GROUNDWORK** provides technical assistance not only to managing and implementing authorities of EU funds but also to local and regional governments, enabling them to leverage ERDF and Cohesion Fund (CF) resources for the effective implementation of sustainability transitions. Presently, the thematic areas of assistance include water and sustainable water management, climate change adaptation, circular economy initiatives, protection and preservation of nature, biodiversity, green infrastructure as well as energy efficiency and reduction of greenhouse gas emissions and renewable energy .[19]

Territorial tools for multi-level and cross-sector governance are the Integrated Territorial Investment (ITI) and the Community-Led Local Development (CLLD). The **Integrated Territorial Investment (ITI)** is a tool introduced in 2014 under the Common Provision Regulation for Cohesion Funds. ITIs aim to facilitate funding for territorial strategies by promoting local policymaking and integrating funds from various sources. However, assessing ITI effectiveness is complex due to variations in design and implementation across Member States, influenced by factors like urbanization level and administrative capacity. Evaluations highlight benefits such as addressing multifaceted development challenges through coordinated strategies. Capacity building and fostering cooperative cultures are crucial for successful ITI implementation, along with boosting citizen participation for enhanced governance and accountability. Challenges include defining optimal geographic scope and governance arrangements, particularly in reconciling functional and administrative boundaries, which can affect delivery and coordination.[20]

Community-led local development (CLLD) represents a grassroots methodological approach to policy formulation, encouraging residents to establish a Local Action Group (LAG). This partnership is tasked with crafting and executing an inclusive development strategy tailored to their locality.

Originating within the EU LEADER programme, CLLD initially aimed at fostering rural area development with co-funding from the European Agricultural Fund for Rural Development (EAFRD). Its success prompted its expansion into diverse contexts. LAGs pursue local development agendas utilizing individual funds and a blend of up to four EU funds, including the European Social Fund (ESF). While the integration of CLLD was at the discretion of Member States, ESF financing broadened the scope of eligible themes, target demographics, and projects for Local Action Groups. CLLD proved particularly effective at the local level when LAGs possessed prior CLLD experience in other funding streams and/or received additional support from managing authorities.[21]

The **Fit for Future Platform**, comprising a high-level expert group, supports the European Commission in streamlining EU legislation and reducing administrative burdens for citizens and businesses, while ensuring its resilience to future challenges. It consists of a government group and a stakeholder group, bringing together representatives from Member States at various levels, the Committee of the Regions, the European Economic and Social Committee, and expert stakeholder groups. In addition, **RegHub** is a platform which aims to involve key local and regional actors through effective consultations in order to collect their experiences on EU policy implementation. The wider public and stakeholders can contribute to the platforms' work on simplification and burden reduction. Additionally, through the **Have Your Say** portal, citizens and stakeholders can offer feedback on existing laws and propose new EU policies.[22]

Horizon Europe emphasizes a multi-level approach by actively involving local authorities in research projects. Cities now co-create projects with researchers and stakeholders, moving beyond being mere testbeds. For instance, under Horizon Europe, the European partnership on Driving Urban Transitions (DUT) establishes platforms like **AGORA dialogues** for diverse urban stakeholders to collaborate.[23]

Examples from Member States

Also, within Member States, various forms of multi-level governance to tackle the urban water challenges exist. Examples are the **Dutch Delta Programme** which is a collaborative effort between the national government, provincial authorities, municipal authorities, and water boards in the Netherlands. It aims to safeguard the country and future generations from flooding and ensure a reliable supply of freshwater. This initiative addresses three main themes: flood risk management, freshwater supply, and spatial adaptation to climate change. Key actions include upgrading dikes, managing coastal erosion, enhancing river capacity, ensuring freshwater availability, and adapting spatial planning of urban and rural areas to cope with climate impacts. The programme involves various stakeholders, including government agencies, water authorities, and local residents, working together towards a common goal of maintaining the safety and liveability of the Netherlands.[24]

The **Emscher Landscape Park (ELP)** is a collaborative network spanning across the northern Ruhrgebiet in Germany, encompassing approximately 450 km^2. It unites several post-industrial cities in an effort to establish a unified park system and forge a vibrant cultural urban landscape. The governance of the ELP involves collaboration among 20 cities and two districts in Germany's Ruhrgebiet region, overseen by the Ruhr Regional Association. Aimed at revitalizing post-industrial areas, the ELP utilizes the 2010 master plan to guide its development. Extensive consultations with

private and municipal stakeholders ensure broad participation, including citizens and NGOs through workshops and surveys. Guiding principles like the "Productive Park" memorandum drive the park's evolution. Various networks, such as inter-municipal working groups, contribute to the planning process, promoting a collaborative and inclusive approach to ELP's transformation into a cohesive park system and cultural urban landscape.[25]

Conclusions on multi-level governance for Water Sensitive City in the EU

The high complexity of water management in cities with multiple sectors, governmental levels and stakeholders involved underpins the need for a multi-level governance approach for implementing Water Sensitive City (WSC) on a large scale in Europe. Given the wide-ranging variability of local conditions, a tailored, place-based approach becomes imperative. Concurrently, higher-level authorities establish the overarching framework and gauge its level of supportiveness. However, there is currently no explicit and comprehensive multi-level governance framework specifically tailored for WSC. Instead, fragmented elements of such governance can be found within sector-specific policies. Initiatives like, the European Economic and Social Committee's initiative towards a new Blue Deal in the EU and specifically on cities the proposed Thematic Partnership of the UAEU could potentially catalyse a shift in this regard.[26] The implementation of the Water Sensitive City concept and related multi-level governance is likely to vary across different Member States. Utilizing the OECD's Self-Assessment Tool for Water Governance can help explore these variations, identify disparities, and suggest targeted solutions.[15]

1.7 Policy environment

A complex framework of overarching and sector policies at international, EU, national, sub-national and local level and including funding, knowledge and capacity building initiatives is in place that can potentially support The Water Sensitive City concept.

International policy initiatives related to WSC

UN **Sustainable Development Goal (SDG) 6** focuses on ensuring the availability and sustainable management of water and sanitation for all. This includes targets for universal access to safe drinking water and adequate sanitation, addressing the social equity aspect of water management. Further goals aim to reduce pollution, enhance water-use efficiency to alleviate water scarcity, and protect water-related ecosystems. Further targets emphasize integrated water resource management and transboundary cooperation, including capacity building and community participation. These goals align with the concept of the Water Sensitive City. Additional SDGs, such as SDG 11 for inclusive, safe, resilient, and sustainable cities and SDG 13 for urgent climate action, complement SDG 6's objectives.[27]

The **Covenant of Mayors for Climate and Energy** stands out as a significant European and global initiative spearheaded by cities and the Commission to address climate change. With over 10,000 local authority signatories, it pledges to reduce greenhouse gas emissions by 55% by 2030 and adapt to the consequences of climate change. Through their Sustainable Energy and Climate Action Plans (SECAP), cities commit to comprehensive climate mitigation and adaptation measures, encompassing resilience strategies against both excess and scarcity of water.[28]

The EU Green Deal

Various EU policies and regulations establish the framework within which a Water Sensitive City (WSC) can be developed and implemented. The **European Green Deal** serves as the overarching EU policy, comprising a suite of initiatives designed to facilitate the EU's transition to climate neutrality by 2050 while fostering a modern, resource-efficient, and economically competitive carbon-neutral continent (Figure 3). Key elements of the Green Deal, such as enhancing the EU's climate ambition for 2030 and 2050, and preserving and restoring ecosystems and biodiversity, are directly relevant to adapting to climate change and maintaining water-related ecosystem services, which form the foundation of WSC. Furthermore, these efforts are underpinned by a commitment to ensuring that no individual or community is left behind. Among the initiatives outlined in the Green Deal are the new **EU Strategy on adaptation to climate change, the EU Biodiversity Strategy for 2030, the Circular Economy Action Plan, the EU Climate Pact**, and the new **Approach for a Sustainable Blue Economy**, which mobilizes civil society and stakeholders to support and implement the objectives of the Green Deal.[29,30] The **New European Bauhaus** initiative connects the European Green Deal to our daily lives and living spaces. It calls on all Europeans to imagine and build together a sustainable and inclusive future that is beautiful for our eyes, minds, and souls.[31]

Figure 3: Elements of the Green Deal. [30]

EU cohesion policy

The **Cohesion Policy** 2021-2027 can also be considered as an overarching policy in this context. With its Policy Objective of a "Greener Europe" and the urban and territorial dimension provided by Policy

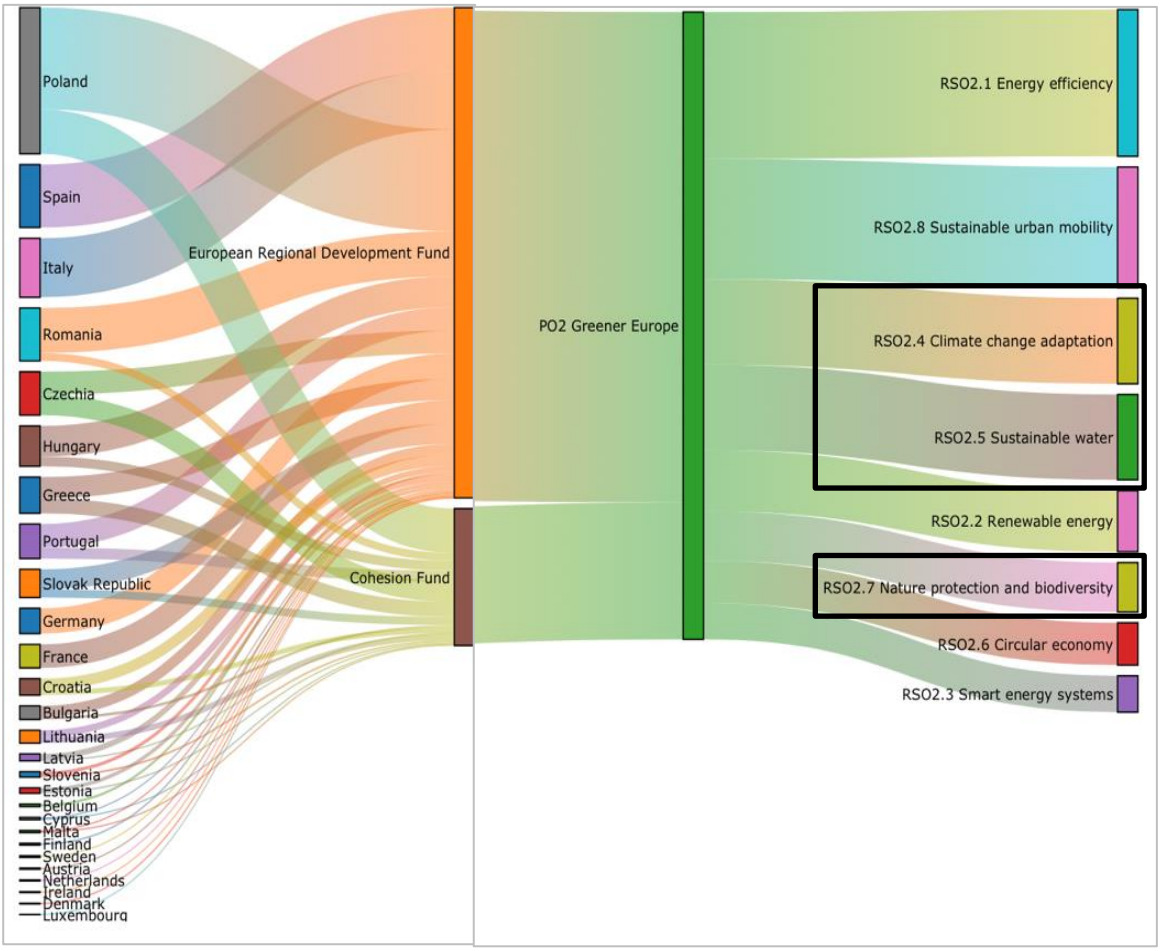
Objective 5 “A Europe closer to citizens” aims to boost the design and implementation of sustainable urban policies, strategies and practices in an integrated and participative way.

In addition, the **European Urban Initiative**, the programmes **URBACT IV** under **Interreg** provide cities knowledge, capacity building, funding and an exchange platform.

For the implementation of infrastructure projects – nature-based solutions as well as technical infrastructure, the **Cohesion Funds** play a decisive role. Funding for developing a greener, low-carbon and resilient Europe is among their priorities. In particular relevant are the **European Regional Development Fund (ERDF),** to invest in the territorial, social and economic development of all EU regions and cities - A minimum of 8% of the ERDF shall be earmarked at national level for an urban dimension; The **Cohesion Fund (CF**), to invest in environment and transport in the less prosperous EU countries; the **Just Transition Fund (JTF)** to support the regions most affected by the transition towards climate neutrality. The management of the funds is the responsibility of national and/or regional Managing Authorities in the Member States. Cities access to these funds depends on the national and regional socioeconomic analysis and how their needs have been taken up in the respective national and regional Operational Programmes.[32]

Regarding Policy Objective 2, 'Greener Europe,' within the Cohesion Policy, there is a Specific Objective 2.5 dedicated to Sustainable Water, which has allocated investments totalling €12.69 billion even if this includes urban and non-urban activities. Additionally, two other Specific Objectives are relevant: 2.4 for Climate Change Adaptation, with €12.73 billion, and 2.7 for Nature Protection and Biodiversity, including green infrastructure, with €7.35 billion. Water-related investments may also fall under the new Policy Objective 5 'A Europe Closer to Citizens' and its Specific Objective 5.1, focusing on Integrated Development in Urban Areas, which has allocated €12.82 billion in total (Figure 4).[33]

Figure 4: 2021-2027: Cohesion Policy Planned EU financing by detailed themes[33]



The **InvestEU Programme** supports sustainable investment, innovation and job creation in Europe. With the EU budget of of €26.2 billion guarantee provided to International and National promotional banks including the European Investment Bank and the Council of the European Development Bank, the programme aims to trigger private investments to high EU policy priority areas. With a focus on projects coming from Central, Eastern and South-Eastern Europe, the Council of Europe Development Bank (CEB) is expected to unlock €500 million of significant investments under the "social investment and skills" and "sustainable infrastructure" windows. This includes also projects on water and wastewater services and flood protection. Local or regional authorities can be among the borrowers. The partner European Investment Bank (EIB) is the long-term lending institution of the European Union owned by its Member States. Under the InvestEU programme, the Bank's investments focus on projects operating in four priority areas: infrastructure, innovation, climate and environment, where also the Water Sensitive City concept fits well. Specific advisory platforms - Climate Adaptation Investment Advisory Platform. The Circular City Centre provide further guidance. They facilitate the deployment of technical and financial expertise to address specific investment and market needs and to accelerate the financing in their area, which both can be relevant for the Water SensitiveCity concept.[34]

The **Just Transition Fund (JTF)** is a key component of the Cohesion Policy 2021-2027 and the primary pillar of the Just Transition Mechanism under the European Green Deal, aimed at achieving EU climate neutrality by 2050. It targets regions most impacted by the transition to climate neutrality, preventing growing regional inequalities in line with EU cohesion policy objectives. The JTF allocates support to environmental rehabilitation, with approximately 9% of funding, totalling around €1.8 billion for the period 2021-2024. This includes activities such as water management, soil rehabilitation, and nature conservation, particularly relevant for regions affected by coal mining and associated water balance issues. In particular, Poland and Germany use funding for water management in their coal mining regions.[35]

The **Recovery and Resilience Facility (RRF)** is a temporary instrument until 31 December 2026 that is the centrepiece of NextGenerationEU -the EU's plan to emerge stronger and more resilient from the current crisis. The Funds are available to Member States, to implement ambitious reforms and investments that make their economies and societies more sustainable, resilient and prepared for the green and digital transitions, in line with the EU's priorities. To benefit from support under the Facility, EU governments have submitted national recovery and resilience plans which could include projects towards implementing the Water Sensitive City concept.[36]

With its urban dimension and substantial funding, Cohesion Policy offers a main instrument at the European level to implement the Water Sensitive City concept on the ground. There is an important potential to even increase that impact, if the topic is prominently considered in the design of the new Cohesion Policy past 2027 and the corresponding Operational Programmes at the national or regional level. The negotiations for the CP past 2027 just started.

EU water policies

European water policies trace back to 2012, marked by the publication of "A Blueprint to Safeguard Europe's Water Resources" by the Commission. This blueprint prioritizes policy actions aimed at enhancing the practical application of existing water legislation and integrating water policy objectives with other policy domains. Building upon initiatives concerning water resource efficiency and sustainable water management within the timeframe of the EU's 2020 Strategy and extending to 2050, the Blueprint outlines a comprehensive strategy for safeguarding Europe's water resources.[37]

Today's water policies encompass a comprehensive framework that acknowledges the necessity of coordinated action at the EU level to safeguard Europe's shared water and marine environments, resources, and ecosystems from various threats, including pollution, over-abstraction, and structural changes. Central to this framework is the **Water Framework Directive** (2000/60/EC) (WFD), which serves as a cornerstone for water protection and management across the EU. Additionally, the WFD is complemented by additional specific water directives outlined in various regulations (see also chapter Regulation).

The **New Approach for a Sustainable Blue Economy in the EU: Transforming the EU's Blue Economy for a Sustainable Future** integrates ocean policy into Europe's new economic framework. The ocean and the 'blue economy' are crucial for the European Green Deal's goals in coastal cities and regions. A sustainable blue economy will create new jobs and businesses by addressing impacts

on oceans and coasts and promoting innovation, a circular economy, and respect for the ocean. Europe's seas are vital allies in tackling climate and biodiversity crises. To protect natural and economic assets, we adaptation to climate change should increasingly use natural solutions rather than conventional 'grey' infrastructure. The green infrastructure will preserve biodiversity, ecosystems, and landscapes, boosting sustainable tourism and the coastal economy. These efforts will form a new sector of the blue economy in its own right.[38]

The Commission has outlined a **Water Resilience Initiative** as part of its 2024 work programme, aiming to implement several immediate measures and initiate a public discourse on enhancing water resilience. This initiative could serve as a foundation for potential new actions in these areas during the subsequent Commission mandate but has been indefinitely postponed.[38] The Committee of the Regions' ENVE Commission advocates for the development of an EU-wide Water Strategy, urging the incorporation of perspectives from cities and regions into the future EU Water Resilience Initiative. Similarly, the European Economic and Social Committee proposes the concept of an **EU Blue Deal**, underlining the need for a broader and more strategic approach to water within the EU framework. This fresh perspective underscores the importance of cohesive measures to tackle water-related issues, with the objective of ensuring access to clean drinking water and sanitation, preserving ecosystems, wetlands, and biodiversity, reducing water consumption across sectors (including agriculture, industry, and households), modernizing water infrastructure, and allocating essential investments to address forthcoming water-related challenges effectively. [26,39]

EU climate change adaptation and disaster risk management policy

Given that both excess and scarcity of water in urban areas are increasingly influenced by climate change, the new **EU Adaptation Strategy**[40] holds significant relevance for water sensitive design (WSD). This strategy offers a comprehensive framework for accelerating adaptation efforts across various sectors, aiming to ensure the availability and sustainability of freshwater through intelligent, sustainable water management practices, including the safe reuse of water. Furthermore, the Commission has introduced the EU Missions on Adaptation to Climate Change under the Horizon Europe programme, which aim to support EU regions, cities, and local authorities in enhancing their resilience to climate change impacts. Moreover, the strategy encourages the exploration of synergies between disaster risk reduction and climate change adaptation, with particular attention to water-related disaster risks and critical infrastructure. The **EU's disaster risk management policy** implementation, anchored in the EU Civil Protection Mechanism, is manifested in various key policy domains, including the Floods Directive and actions addressing water scarcity and drought. [41]

EU environment policies

Nature-based solutions, such as parks, green urban areas, trees, and green roofs and facades, which effectively manage water, align closely with the goals outlined in the **EU Biodiversity Strategy** for 2030. This strategy represents a holistic, ambitious, and far-reaching initiative aimed at safeguarding nature and halting the decline of ecosystems. Specifically, concerning cities with populations exceeding 20,000 inhabitants, the strategy advocates for the development of Urban Greening Plans (UGPs), emphasizing the importance of integrating nature-based solutions into urban environments to enhance biodiversity and ecosystem resilience.[42]

Water is one of the five thematic areas of the **Green City Accord** with the aim is making significant progress in improving the quality of water bodies and the efficiency of water use. Cities provide on a voluntary basis information on the baseline situation, next intended steps, and report on progress The indicator Water includes household water consumption; infrastructure leakage; and the percentage of urban wastewater meeting the requirements of the UWWTD. The **European Green Capital Award** and the **European Green Leaf Award** reward actions of bigger and smaller cities towards a transition to a greener, more sustainable future and include prominently water management as well as climate mitigation and adaptation, biodiversity, green areas, sustainable land use, waste and circular economy.

Sustainable soil management can support the transition to a Water Sensitive City by improving its capacity to hold back more water and provide a clean passage to groundwater. The **EU Soil Strategy for 2030** sets out a framework and concrete measures to protect and restore soils and ensure that they are used sustainably.

EU Research policy

Horizon Europe – the EU's key programme for research and innovation until 2027. It draws on the rich results of innovation and solutions developed in multiple European projects on nature- based solutions and climate adaptation that have been performed under the previous programme Horizon 2020, with cities participating as case studies and pilots. By this, the programme does not only develop new research results and innovation but funds also case studies tackling water sensitive and NbS-related challenges in cities through various call topics in particular under Horizon Europe Cluster 5 and 6 and the related EU-Missions. The Horizon Europe programme includes cities from the start of the project development and co-creating the projects rather than solely being a testbed. Three **EU Missions** are in particular relevant for the topic: **Mission Adaptation to Climate Change** (water resilient cities and regions); **Mission Climate-Neutral and Smart Cities** (climate-neutral water management in cities); **Mission Restore our Ocean and Waters** for coastal cities. These provide substantial capacity building opportunities for cities and regions. Mission Platforms provide the necessary hands-on technical, regulatory and financial assistance to cities to implement their Climate City Contracts under the Mission Climate-Neutral and Smart Cities or regional and local authorities signing the Adaptation Mission Charter and declaring their willingness to cooperate, mobilise resources and develop activities in their respective region and communities to reach their adaptation goals.[43]

Relevant EU policies and initiatives that offer opportunities for WSC are summarised in for their opportunities.

Table 5 lists further EU policies that could offer opportunities to include the Water Sensitive City concept, according to their thematic scope, which is currently not (sufficiently) used.

Table 4: EU policies with opportunities for WSC to further use and extent

Policy	Opportunities
Cohesion Policy	The Cohesion Funds offer various potential opportunities to develop and implement WSD solutions in a local / territorial integrated approach. In the CP post-2027 Water Sensitive City could be integrated more prominently in the design of Partnership agreements, national and regional Operational Programmes.
Horizon Europe	The Horizon Missions, in particular the EU Mission Adaptation to Climate Change, as well as various Horizon partnerships offer opportunities for cities to benefit from research knowledge and technical support. In the co-creation approach cities can also shape the agenda according to their needs, which can in include well WSC.
EU Biodiversity Strategy for 2030	The required Urban Greening Plans (Target 14) offer an excellent opportunity to include NbS for water sensitive design.
New European Bauhaus	Water sensitive design could play a stronger role in future calls, e.g., it could focus on sponge city concepts, that are also aesthetic and inclusive and thus highlighting respective projects, places, practices, and experiences.
Water resilience initiative	The Initiative as part of the Commission Work programme 2024 is currently delayed / postponed but could provide comprehensive guidance for WSC in an overall water sensitive framework.
EU Blue Deal	When call for a new and comprehensive water strategy for Europe (Blue Deal or similar calls) is further pursued, this could be an opportunity to include cities' needs for establishing water sensitive design. .
EU Adaptation Strategy (2021)	Member States can support their cities in, e.g., providing them specific guidance, appropriate funding, removing regulatory or other barriers for a broader implementation of the Water Sensitive City concept, which are part of climate resilient cities / regions.
The New approach to Sustainable Blue economy (2021)	The agenda for the blue economy includes developing green infrastructure in coastal areas, which can coincide with WSC measures.

Table 5: EU policies on topics that offer potentials for WSC but are not yet used in this regard

Policy	Underused opportunities and Gaps
European Pillar of Social Rights (EPSR) (2017)	The policy supports the social component of urban water management in providing fair access to sufficient good quality water and protection against too much water. WSC could make better use of the principles laid out in actively considering the social dimension
Circular Economy Action Plan (2020)	It aims at making circularity work for people, regions and cities, but focusses mainly on industries. Entering action from the perspective of big industries in cities could open up for including also WSC in general more prominently in the Action Plan.
EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil (COM/2021/400 final)	The plan This is translated into key 2030 targets to speed up reducing pollution at source and includes 9 flagship initiatives and 33 actions, among them the revision of the Urban Waste Water Treatment Directive and other water directives. While Member States are responsible for action, cities will experience direct effects from the implementation and can play an active role in multi-level governance by developing and executing measures.
The Renovation Wave for Europe strategy (2020)	Renovating buildings presents a prime opportunity to integrate water sensitive design, which can enhance energy efficiency in public and private buildings as part of the Green Deal. While boosting energy efficiency, this approach could also address water-related challenges. However, the current strategy lacks that perspective.
EU Mission: Climate-Neutral and Smart Cities	The Mission aims to deliver 100 climate-neutral and smart cities by 2030 and ensure that these cities act as experimentation and innovation hubs to enable all European cities to follow suit by 2050. The promotion of water sensitive design could also save energy for (drinking) water supply and water treatment. It is not sufficiently included yet.
European Digital Strategy	Cities are not directly addressed in the strategy nor is water sensitive design. Using digital infrastructure could, however, support sustainable water management technologies as well as data management in cities.

Capacity building and further funding opportunities at EU level

Within the framework of these policies, further funding and support for capacity building is offered.

Horizon Europe's EU Missions' Platforms boards play a vital role in assisting European regional and local authorities. For instance, the **MIP4Adapt** within the Adaptation Mission aids them in developing and strategizing their climate resilience adaptation pathways. It provides technical

assistance and facilitates a Community of Practice to foster collaboration. Similarly, the **NetZeroCities Board**, part of the Mission on Climate-Neutral and Smart Cities, offers twinning Learning Programmes to support local authorities. **TRAMI**, the TRAnsnational cooperation on the MIssions approach, is an EU-funded initiative aimed at enhancing the effectiveness of EU Missions. Through Communities of Practice, knowledge exchange, and mutual learning, TRAMI supports the implementation of EU Missions by facilitating: the European Mission Network EMiN for sharing best practices; mapping of mission-oriented policy initiatives and actors to understand diverse implementation approaches; knowledge exchange events to engage regional and local actors; and communication efforts to raise awareness and mobilize stakeholders and citizens.[44]

Horizon Europe also co-funds several partnerships that build capacities on the thematic topics as well as multi-level governance. For example, The **Driving Urban Transition partnership (DUT)** is a European Partnership committed to supporting specifically cities in their journey to become sustainable, resilient, and inclusive. One of the transition pathways is Circular Urban Economies Transition Pathway (CUE TP) that aims to support cities to become more resource efficient and reduce their impact on the planet. This pathway targets explicitly water as part of the key areas of the roadmap, which are, i.e., urban planning, design & sustainable land-use and with the overarching items nature-based solutions, regenerative planning & design, recycling & re-use, and equity.[23] The **Water4All partnership** aims at enabling water security for all by boosting systemic transformations and fostering the matchmaking between problem owners and solution providers – both in and outside cities. It brings together 90 partners from 33 countries in the European Union and beyond.[45] In the **Sustainable Blue Economy Partnership,** partners from 25 countries and the European Commission pool research and innovation investments and align national programmes at pan-European scale. It takes into consideration the research and innovation agendas of the sea basins (Mediterranean, Black Sea, Baltic and North Sea) and the Atlantic Ocean.[46] The partnership **Biodiversa+** gathers research and innovation partners from 40 countries, i.e., aiming to expand and improve the evidence base, accelerate development and wide deployment of Nature-based Solutions (NbS), and assess the efficiency and cost-effectiveness of NbS.[47] The **Circular Cities and Regions Initiative (CCRI)** assists stakeholders across Europe's cities and regions, including regional and local authorities, industry representatives, research and technology organisations and civil society. With its multi-stakeholder collaboration and support scheme, it aims to share replicable best practices to help cities and regions find concrete Circular Systemic Solutions (CSS) that suit their own needs and also provide financial and technical support. Aspects of water management are included in general in a few projects so far.[48] **EIT Climate-KIC** is a Knowledge and Innovation Community (KIC), working to bridge the gap between climate commitments and current reality. It supports innovation that helps society mitigate and adapt to climate change by bringing together partners in the worlds of business, academia, and the public and non-profit sectors to create networks of expertise, through which innovative products, services and systems can be developed, brought to market and scaled-up for impact.[49] The different partnerships inform and consult each other regularly in informal and more formalised ways to discuss the overlapping and the cross-partnership topics.

The **EU LIFE** programme is the EU's funding instrument for the environment and climate action. It includes four sub-programmes with regular calls out of which three are relevant for the topic Water Sensitive City: Climate change mitigation and adaptation, Circular economy and quality of life, and

Nature and biodiversity. Cities can be among the beneficiaries and receive co-founding.[50] An example of a successful LIFE-projects is , e.g., LIFE UrbanStorm that aimed for the development of sustainable and climate resilient urban storm water management systems for Nordic municipalities by developing and testing sustainable urban drainage systems (SUDS) and nature-based solutions. Thereby, it has identified legal barriers and local policy solutions.

The **European Urban Initiative** (EUI) has started its activities in 2022 to support sustainable urban development in the EU with an initial budget of EUR 450 million from the European Regional Development Fund for the 2021-2027 period. The EUI provides an integrated set of services to support innovation, capacity and knowledge building, policy development and communication on sustainable urban development within Cohesion policy. The EUI also provides support to the Urban Agenda for the EU and may support the intergovernmental cooperation on urban matters.[51–53] **City-to-city exchange** calls are designed to facilitate collaboration between urban authorities facing specific implementation challenges related to Sustainable Urban Development (SUD) and those from different EU Member States with relevant expertise ('the peer'). **Peer Reviews** involve workshops where cities undergo assessment by their counterparts and relevant stakeholders, while Capacity Building Events encompass diverse formats such as workshops and seminars.

Under the European Urban Initiative, a **Portico Community** was introduced as part of the **Portico Knowledge Sharing Platform** designed to unite urban practitioners, policymakers, and experts from across the EU. This platform will enable users to establish their own collaborative spaces and connect with peers to exchange ideas, access information about upcoming events, and engage in thematic discussions focused on sustainable urban development.

Interreg is one of the key instruments of the European Union (EU) and Cohesion Policy supporting cooperation across borders through project funding. Following the priorities of the EU Cohesion Policy 2021-2027 promoting green transitions is a key area of funding.[54] Multiple projects related to the topic of Water Sensitive City, such as WRC - Water Resilient Cities: Increasing urban resilience to climate change through improved storm water management; Gov4Water - Smart, Efficient and Adaptive Water resource management; MAURICE - Management of urban water resources in Central Europe facing climate change, developed transnational knowledge and cross-border cooperation.

Since 2002, **URBACT** as a capacity and knowledge building programme has been driving change all over Europe by enabling the cooperation and idea exchange amongst cities within thematic networks, by building the skills of local stakeholders in the design and implementation of integrated and participatory policies, and by sharing knowledge and good city practices. For the period 2021-2027, URBACT IV includes even more opportunities for cities to make positive change and integrates the crosscutting EU priorities of digital, green and gender-equal policymaking into its activities. Although water isn't a primary focus, projects on nature, health, and circular economy indirectly intersect with water-related topics. The programme is co-financed by the European Regional Development Fund (ERDF).[55]

The 2021 EU Adaptation Strategy underscores the critical role of local action in climate adaptation. In response, the European Commission launched the **Policy Support Facility (PSF) under the Covenant of Mayors Europe** to assist local and regional authorities in implementing climate

adaptation measures, with a strong focus on transitioning from planning to implementation. Over a two-year period from 2022 to 2023, the PSF worked closely with cities across Europe through workshops, peer exchanges, and technical expertise, helping them develop and implement tailored adaptation measures. It also revealed that Enabling a supportive financial environment is crucial for local adaptation action. Many cities and regions are now assessing, selecting, and implementing climate adaptation measures and have strengthened the capacity of individuals and communities to respond effectively to climate change. However, the programme showed also that many local authorities in Europe are still extremely weak when it comes to implementing environmental measures, which is why, multi-level support and capacity building is needed. National governments play an essential role in empowering local action, and are also best placed to provide essential financial and technical capacity.[56],[57]

EU-level initiatives by Member States related to WSC

Other European level policies or initiatives are relevant for WSC due to their focus on sustainable urban development in general or climate change.

The **New Leipzig Charter**, adopted in November 2020 during the German EU-Presidency, serves as a pivotal policy framework for fostering sustainable urban development across Europe, closely harmonized with the Cohesion Policy. It underscores the necessity for cities to craft comprehensive strategies for sustainable urban development, ensuring integrated implementation within urban contexts. Member States have committed to integrating the Charter into their respective national or regional urban policies. The Charter advocates green cities also considering water resources and quality. Public authorities should act in the interest of public welfare, providing services and infrastructure for the common good including water supply, quality of public spaces including green and blue infrastructure.[58]

The **Territorial Agenda 2030** is a strategic framework adopted by Ministers responsible for spatial planning, territorial development and/or territorial cohesion in 2020. It provides orientation for strategic spatial planning and calls for strengthening the territorial dimension of sector policies at all governance levels. Promoting an inclusive and sustainable future for all places and helping achieve Sustainable Development Goals in Europe contributes to key European objectives of a Just and Green Europe.[59] As a Water Sensitive City in full can only be developed in a regional approach ensuring water sensitive spatial development, this initiative is relevant for steering water management in an urban-rural or regional approach.

The **Urban Agenda for the EU** was launched in May 2016 with the **Pact of Amsterdam** and reconfirmed as a valuable initiative in November 2021, with the **Ljubljana Agreement**. It represents a new multi-level working method, for urban policy and practice, promoting cooperation between Member States, cities, the European Commission, and other stakeholders. The Pact of Amsterdam aims to realise the full potential of urban areas; establishing an integrated approach and contribute to territorial cohesion; and involving urban authorities in the design of policies. The Urban Agenda's scope is on better regulation, better funding, and better knowledge. Among the 20 concluded, ongoing or planned Thematic Partnerships several cross-link to the topic of WSC, in particular but

not exclusively the TPs on Climate adaptation; Sustainable land use; Greening cities; Circular economy (Tables Table 6 and
Table 7). The activities presented provide potential synergies with the work on WSC. Chapter C.1 on Recommendations describes in which perspective these can be explored for making progress on WSC.

Table 6: Agreed actions of other Thematic Partnerships relevant for Water Sensitive City

Action (most relevant in bold)		Relevance
TP Climate adaptation		
CA01	**Analysis of national multi-level urban development and planning regulations with focus on climate adaptation**	Water sensitivity is part of climate adaptation, and national urban development and planning regulations provide the framework for cities to act in.
CA02	Guidelines and toolkit for the economic analysis of adaptation projects	
CA03	**Including recommendations for the OPs of the ERDF in order to improve its accessibility for municipalities**	Highly relevant as the new Cohesion Policy post-2027 has just started to be discussed.
CA04	A new LIFE for urban adaptation projects	
CA06	**Enhancing the local content of Climate-ADAPT**	Climate-ADAPT could be an appropriate platform to centralise information and make it better accessible.
CA07	Political training on climate adaptation	
CA08	**Enhancing stakeholder involvement at regional and local levels.**	Multiple stakeholders need to be involved in building a Water Sensitive City.
CA09	**Promote open access of insurance data for climate risk management**	Insurance data on floods and extreme precipitation can be a valuable source of data.
TP Sustainable land use		
SLU02	Funding and Financing guide for brownfield redevelopment	
SLU06	**Better Regulation to boost nature-based solutions (NbS) at European, National and Local Levels**	NbS are a highly important part of the solution for WSC. Better regulations, financing and awareness raising could provide a boost in their application.
SLU07	**Better Financing for NBS**	

SLU08	**Awareness Raising in the areas of NBS and the sustainable use of land**	
SLU09	**Agreeing on Common Targets and indicators for NbS, Urban Green Infrastructure, Biodiversity and Ecosystem Services in Cities**	Implementing WSC and monitoring the progress needs appropriate indicators and targets. The ones on NbS related to water can be relevant for WSC too.
TP Circular economy		
CE01	Mainstreaming the circular economy as an eligible area into the post 2020 Cohesion Policy and corresponding Funds	
CE02	Prepare a Circular City Funding Guide to assist cities in accessing funding for circular economy projects	
CE03	Prepare a blueprint for a Circular City Portal	
CE07	**Help make water legislation support the circular economy in cities**	Water is often overlooked in circular economy efforts. Linking to water legislation can help WSC integrate water into these initiatives and establish a circular approach to water.
CE08	Develop a Circular Resource Management Roadmap for cities	
CE10	**Develop City Indicators for a Circular Economy**	Implementing WSC requires indicators and targets for progress. Circular economy indicators may be useful if they relate to water or can be adapted.
TP Public procurement		
PP03	**Recommendation(s) for funding for procurement of innovation, strategic procurement, joint cross-border procurement**	WSC needs a transitional approach to water management with new, innovative, and cross-border solutions. Procurement should support and enable these solutions.
PP04	Innovation procurement brokerage	
PP05	Legal Framework on Legal issues of procurement of innovation	
PP06	A flexible concept for setting up and further development of Local Cooperation Centres for innovative and sustainable procurement	
TP Jobs and skills		

JS05	Long Term Investments	
TP Culture/Cultural Heritage		
CCH08	**Guiding Principles for Resilience and Integrated Approaches in Risk and Heritage Management in European Cities**	Cities inhabit important cultural heritage in form of buildings and places as well as intangible cultures related to water management. The guiding principles should then be considered in WSC.

Table 7: Relevant topics of ongoing/starting Thematic Partnerships

Selected proposed action or topic	Relevance
Greening Cities (ongoing)	
# 1 Need for Green: Methodology for quantifying the demand for green infrastructure at local level	GI for fulfilment of climate adaptation needs and water sensitive design; collecting evidence on the benefits
#2 Indicator System for Evaluating Urban Nature Plans	Making sure that NbS for water sensitive design is included and monitored
#3 Reaching Meaningful Urban Greening Targets	Steadily increase the amount of GI and thus NbS for WSC
#4 Strengthening Structural Funding for Urban Green Infrastructure	Supportive to include funding of NbS for WSC
#5 Enhancing the Use of Innovative Funding by Urban Authorities to Green Cities	Innovative funding will also be needed for NbS for ESC
Sustainable Tourism (ongoing)	
#1 Guidelines for Enabling Climate-Friendly and Resilient Urban Destinations	In cities with high rates of tourism and in combination with water scarcity, tourism can be a high pressure on water resources.
Food (starting)	
Ensure food system resilience	The food system is a major user of water, and the impacts of water scarcity and pollution on food production and security are important.
Cities of Equality (starting)	
Create environments for equality	The supply of water in good quality and the protection against floods are basic services by local authorities. These services must be equally accessible by all population groups in a WSC.

National and sub-national policies

These European level policies and initiatives are supplemented by numerous **national and sub-national policies and action** in EU Member States. Some are mandatory for each Member State like the National Adaptation Strategies[60], others are individual, like for example the National Water Strategy for Germany.[11] If they include sufficient action towards creating a supportive framework for WSC cannot therefore not be assessed systematically here.

The status report of reported national adaptation actions in 2021 finds for example that in many Member States, institutionalized coordination mechanisms and national advisory bodies have been enhanced to strengthen adaptation policies: There is increased diversity in institutional arrangements for steering adaptation policies across various levels and sectors, including transnational, national, and sub-national levels. These developments largely depend on each country's governance structure. Legal requirements enforcing horizontal policy integration and vertical governance frameworks are however only present in only a minority of Member States. Only even countries reported the adoption of Regional Adaptation Plans (Spain, Sweden, Belgium, Portugal, Greece, Hungary, Ireland). Soft, collaboration-based approaches between governance levels and supportive frameworks at sub-national levels are more prevalent than top-down, regulatory methods. Multi-level governance arrangements at the sub-national level have expanded in several countries relying on networks and collaborative mechanisms among sub-national governments to be effective. These networks and collaborations play a vital role in assisting local governments in developing and implementing their adaptation strategies and plans. Furthermore, EU funding instruments, macro-regional strategies, international conventions, and transboundary cooperation bodies significantly facilitate transnational adaptation efforts and have directly supported national adaptation policy processes in various Member States, showcasing diverse forms and modes of transnational cooperation.[61]

Capacity building initiatives of other stakeholders

City networks provide valuable opportunities to enhance local capacities and can serve as allies in supporting national governments and the EU in aiding cities. For instance, EUROCITIES has a dedicated working group on water, CEMR a task force on urban waste water, while ICLEI Europe collaborates with the EEA to organize the annual European Urban Resilience Forum, bringing together practitioners and experts. Additionally, C40 hosts the Water Security Network, offering further resources and collaboration avenues for cities seeking to address water-related challenges.

An example at local and regional level is the **Berlin Rainwater Agency**, established as part of the Berlin Senate's commitment to decentralized rainwater management, aims to alleviate strain on the sewer system, bolster water protection, and address climate change challenges. The agency facilitates the creation and implementation of a Berlin rainwater concept and the 1000 Green Roofs programme, engaging both public and private stakeholders. It serves as a platform for networking, connecting initiatives, projects, and solutions, and fosters collaboration between citizens, urban planners, administrations, companies, and housing associations. Moreover, it provides free services, including consultation on rainwater management, technical support for urban planning processes, dialogue facilitation, and a specialized training programme, to enhance capacity building and promote water sensitive practices in Berlin.[62]

Conclusions on the policy environment for WSC

European and international policies and initiatives, along with those in Member States and regions, provide direction, funding, knowledge, and capacity building for the Water Sensitive City concept (WSC). Existing programmes like Cohesion Funds support WSC measures, along with various funds and initiatives for innovation and capacity building. Table 4Table 5 highlight different opportunities.

Cohesion Policy (CP), with its significant funding, can play a key role in implementing the Water Sensitive City concept within sustainable urban development by including greener urban development, creating transferable and scalable innovative solutions to urban challenges, and designing and implementing sustainable urban policies, strategies, and practices in an integrated, participative way. Additionally, CP promotes knowledge sharing and capitalisation for urban policymakers and practitioners. The just starting negotiations on post-2027 Cohesion Policy offer a prime opportunity to integrate WSC into future initiatives.

Moreover, various Thematic Partnerships of the UAEU intersect with the topic of Water Sensitive City as outlined in Table 6 Table 7. Leveraging the tools and outcomes of completed partnerships and ongoing initiatives offers a strong opportunity to coordinate with the recently launched Thematic Partnerships under the Ljubljana Agreement, notably the Greening Cities TP. This collaboration can amplify efforts, maximize synergies, and enhance the impact of actions while conserving resources.

The potential of certain EU policies, particularly in building renovation and the circular economy, remains however underutilized. There is significant opportunity to expand the adoption of water sensitive design as part of a circular economy approach, which can also lead to energy savings.

European-level funds complement national and regional funding for the Water Sensitive City topic, emphasizing the need for a coordinated approach to maximize synergies and efficiency. Accessing EU funds can be challenging for cities, which often depend on national and regional priorities like Cohesion Funds. While it's uncertain whether funding is sufficient for all EU cities to become water sensitive, cities need capacity to navigate funding, apply for grants, and manage projects. Platforms like EU Mission Platforms and the EIB's advisory services can support this. Despite the potential of many funds for water sensitive projects, their actual utilization and the concept of Water Sensitive City need further exploration and promotion.

Various policies and initiatives provide multiple avenues to advance this topic through stronger mainstreaming of WSC . However, action may remain scattered and disconnected. Ongoing efforts such as the Commission's water resilience initiative and an EU Blue Deal could create a more cohesive and integrated approach across policies, enhancing their effectiveness and bridging existing gaps. It's crucial to ensure that the city perspective is adequately represented in these strategies. Here, a Thematic Partnership Water Sensitive City could take a lead.

1.8 Regulatory Environment

The Ljubljana Agreement emphasizes the Better Regulation pillar for strengthening a better alignment of UAEU priorities with the EU regulatory landscape and policy cycles in order to ensure effective and timely actions and to establish close links to the Better Regulation Agenda. In this regard EU regulations related to Water Sensitive City are identified and their opportunities to align these and the potential TP Water Sensitive City.

Water management with regional partners

Concerning European level regulations, in particular the **Water Framework Directive** (2000/60/EC) (WFD) and subsequent water regulations are of high relevance for WSC. The WFD establishes a framework for the assessment, management, protection and improvement of the status of surface and groundwater bodies within river basin districts, across the European Union. Although its primary focus is Member States rather than urban authorities, it recognizes the considerable influence urban areas wield over water quality and quantity. Hence, it advocates for an integrated water management approach, fostering cooperation among various sectors such as urban planning, agriculture, and industry. The Directive requires from Member States that all river basins in Europe should be managed using a River Basin Management Plan. In addition to the WFD several water directives to ensure the good status of Europe's waters. Of particular relevance for WSC are the **Floods Directive** (2007/60/EC), the **Urban Wastewater Treatment Directive** (91/271/EEC) – currently under recast. Further associated Directives - Drinking Water Directive (2020/2184/EU), Bathing Water Directive (2006/7/EC), Environmental Quality Standards Directive (2008/105/EC), and the Groundwater Directive (2006/118/EC) deliver cities arguments for backing their efforts to reduce pollution in run-off and from other urban sources.

The **Floods Directive** (2007/60/EC) aims to establish a comprehensive framework for assessing and managing flood risks across the European Union, with the goal of mitigating the adverse impacts of flooding on human health, economic activities, the environment, and cultural heritage. It mandates Member States to conduct Flood Risk Assessments and develop Flood Risk Management Plans for river basins, recognizing that flood characteristics can vary significantly between regions.[63] Consequently, objectives for flood risk management should be tailored by Member States based on local and regional conditions. Article 2 of the Directive defines floods as the temporary inundation of land not typically submerged by water, encompassing floods from rivers, mountain torrents, Mediterranean ephemeral water courses, and coastal inundation, while potentially excluding sewerage floods due to its focus on Member States and regional levels.

Urban waste water management

On the other hand, the **Urban Waste Water Treatment Directive** (91/271/EEC) (UWWTD) primarily addresses pollution by regulating the collection, treatment, and discharge of domestic wastewater and wastewater from specific industrial sectors. It mandates the collection and treatment of wastewater in all urban settlements (agglomerations) with populations exceeding 2,000, with tertiary treatment required for agglomerations surpassing 10,000 in designated Sensitive Areas and their catchments. Furthermore, the Directive classifies rainwater runoff as urban wastewater, necessitating treatment to prevent pollution.

Currently, the UWWTD is undergoing a revision process - procedure 2022/0345 (COD) - aimed at addressing three primary challenges. Firstly, there is a need to address remaining pollution from urban sources, including emerging pollutants such as micro-plastics and micro-pollutants. Secondly, the revision aims to align the Directive with the objectives outlined in the European Green Deal. Finally, it seeks to tackle issues related to governance, including the insufficient and uneven level of governance across Member States.[64, 65]

In periods of rainfall, the overflow of stormwater and urban runoff stands as a significant residual contributor to pollution released into the environment. These emissions are anticipated to rise as a result of both urbanization and the gradual alteration of rainfall patterns associated with climate change. Addressing this pollution source requires tailored solutions at the local level, considering the unique conditions of each locality. Therefore, the new rules will require Member States to establish **integrated urban wastewater management plans** in large cities over 100,000 inhabitants initially, as well as later for cities from 10,000 inhabitants, where storm water overflow or urban runoff poses a risk to the environment or human health. Priority shall be given to preventive measures including green infrastructures and to optimisation of the existing collecting, storage and treatment systems by better using digitalisation based on clearly defined standards and specifications. As compared to green, new grey infrastructures should only be envisaged where absolutely necessary. The indicative content of the plans, as well as their indicative objectives to be adjusted to local circumstances, is based on the best practices in place and is detailed in Annex V.[64]

While the Directive and its requirement of establishing integrated urban wastewater management plans targets pollution and water quality, the proposed elements and measures contribute to managing water quantities and to climate change adaptation. The analysis of flows of urban runoff, managing urban runoff storage capacities use of nature-based solutions, natural retention, reuse of treated wastewater, as well as avoiding the entry of unpolluted rainwater into collecting systems can contribute to managing high urban runoffs as well as water scarcity situations. These integrated urban wastewater management plans provide therefore a good potential to integrate and support WSC.

In terms of water quality, the revision of the UWWTD will serve as a key component of the **EU Action Plan "Towards a Zero Pollution for Air, Water, and Soil."** Additionally, with regards to climate mitigation, the revision aims to establish a national objective of energy neutrality by 2040 for all wastewater facilities serving populations exceeding 10,000, aligning with the objectives of the European Green Deal. By reducing pollution discharges from urban sources, the UWWTD revision directly intersects with the revision of pollutant lists under the **Environmental Quality Standards Directive** (2008/105/EC) and the **Groundwater Directive** (2006/118/EC) (GWD), thereby positively influencing future reviews of the **Marine Strategy Framework Directive (MSFD)** and the **Bathing Water Directive** (2006/7/EC) (BWD). Furthermore, it aligns with the **Circular Economy Action Plan's** call for enhanced integration of the urban wastewater sector. The revised directive will also mandate Member States to systematically promote the reuse of treated wastewater from all urban wastewater treatment plants. Additionally, nature-based solutions for managing urban runoff and stormwater overflow can contribute to the creation of greener cities and support biodiversity conservation efforts, aligning with initiatives such as the Nature Restoration Law proposal. Moreover, these solutions offer opportunities for improved water management in urban areas,

thereby contributing to climate adaptation measures.[64] **Water Reuse Regulation** (2020/74/EU) could also be of interest for circular water management in cities, but to date the regulation concerns minimum requirements for water reuse for agricultural irrigation only.

Other sector's regulation

The possibility of a new **Nature Restoration Law** presents a significant opportunity for advancing nature-based solutions within a Water Sensitive City (WSC) but is currently postponed. This law would encompass various ecosystems, including urban areas, with Article 6 specifically targeting the restoration of urban ecosystems by Member States. The law mandates that Member States ensure there is no net loss of the total national area of urban green space and of urban tree canopy cover in cities and towns. They shall achieve thereafter an increasing trend in the total national area of urban green space, including through integration of urban green space into buildings and infrastructure until a satisfactory level is reached.[66] Member States will have the autonomy to determine specific measures within their territories and will formulate national restoration plans tailored to local contexts, engaging local communities and civil society in the process.[67]

Mandatory **building regulations** mandating water-saving design and equipment, as well as provisions for water reuse, could serve as crucial tools for promoting water sensitive design solutions. While current EU building regulations, such as the Energy Performance of Buildings Directive (EU/2010/31) and the Energy Efficiency Directive (EU/2023/1791), focus solely on energy efficiency, it's important to recognize that water conservation measures, including the use of harvested rainwater and greywater reuse, can also yield significant energy savings. Building regulations, urban planning guidelines, and technical standards are essential frameworks at both national and sub-national levels for advancing water sensitive design practices. For instance, German municipalities have the authority to incorporate legally binding requirements for land use, allowing for the integration of nature-based solutions for water management within local urban plans. However, the adoption of such requirements ultimately depends on achieving political consensus within the municipality.

Conclusions on the regulatory environment for WSC

Currently, there is no unified EU regulation specifically tailored to foster the development of the Water Sensitive City (WSC) thematic area. However, various individual water-related EU regulations support certain aspects of WSC, such as the Water Framework Directive, Floods Directive, and Urban Wastewater Treatment Directive. These directives emphasize the importance of an integrated approach to water management, particularly in urban areas, by encouraging cooperation among sectors such as urban planning, agriculture, and industry, and requiring the creation of River Basin Management Plans and integrated urban wastewater management plans. The regulations increasingly emphasize the potential of nature-based solutions for managing urban runoff and stormwater overflow, contributing to greener cities and biodiversity conservation. The proposed Nature Restoration Law supports this approach.

The recast and subsequent implementation of the Urban Wastewater Treatment Directive present an opportunity to include water sensitive design in integrated wastewater management plans that

need to be developed in the future. Guidance on this would be helpful. Another opportunity is learning from the Water Framework Directive and the Floods Directive about organizing a regional approach to water management, with active participation from cities. These learnings can be transferred to other regional water management approaches.
At the EU level, an underutilized opportunity is the integration of water sensitive design into building regulations and urban planning. This could improve water management and promote energy savings but is currently absent in the Energy Performance of Buildings Directive (EU/2010/31) and the Energy Efficiency Directive.
Overall, while existing EU directives offer some support for WSC, a more unified and integrated approach is needed to fully harness the potential of WSC in achieving environmental and climate objectives across urban areas, as discussed in the previous chapter on the policy environment. Additionally, EU directives are implemented by national governments, not cities. Therefore, the degree of city involvement in the implementation process varies across EU Member States, depending on each country's specific circumstances.

1.9 Existing identified gaps and recommendations

Complexity

A major challenge for the topic of Water Sensitive City is its highly complex nature. It is a multi-level, multi-stakeholder and a cross-sector topic, which requires complex yet manageable forms of governance. While numerous policies, initiatives and regulations address the topic, none of it does reflect the full complexity. There is a lack of a concerted holistic approach to the Water Sensitive City concept that serves mainstreaming and integration in the existing framework.

Knowledge and awareness

Many stakeholders often assume a consistent supply of clean drinking water without acknowledging the ecosystem services that provide it. **Transparent information on individual or sector water consumption and its impact is often lacking**. Urbanization and climate change heighten awareness of water challenges, emphasizing the need to treat water as a limited resource in a circular economy. Stakeholders outside urban water management may be unaware of how their practices impact urban water balance or the potential benefits of water sensitive design for their areas.

The **dispersion of knowledge** across different levels—European, national, and regional—poses a significant challenge for cities in sourcing tailored solutions efficiently. While numerous technical and nature-based solutions exist for a Water Sensitive City, the main hurdle lies in their widespread and systematic adoption by urban areas. Additionally, there's a limited grasp of the costs and benefits of nature-based solutions. While costs are clear, the multifaceted benefits like biodiversity promotion and public health enhancement are often only partially quantified. This incomplete understanding might deter the preference for nature-based solutions. Hence, there's a pressing need for targeted information to address these gaps effectively. Some efforts, like synthesizing estimated environmental benefits and impacts of NbS are undertaken, for example in Network Nature Evaluating the impact of nature-based solutions.[68]

Various European, national, and subnational programmes and initiatives such as FP7, Horizon 2020, Horizon Europe, LIFE, Interreg, UIA, and URBACT have contributed valuable insights into designing a Water Sensitive City. This knowledge encompasses technological and nature-based solutions, as well as governance strategies for water management in urban areas. However, this wealth of information is often fragmented and presented within the context of specific initiatives, making it challenging for stakeholders to access and synthesize. To address this, relevant portals and platforms have been established to facilitate the sharing of knowledge and experiences in the realm of the Water Sensitive City concept (Box 2).

Box 2: Examples of European level information and knowledge platforms

Climate-ADAPT, the European Climate Adaptation Platform, is dedicated to aiding Europe's adaptation to climate change by facilitating access to and sharing of crucial data and information. This includes insights into expected climate change impacts, current and future vulnerabilities across regions and sectors, EU, national, and transnational adaptation strategies, case studies, and potential adaptation options. The platform encompasses perspectives from cities as well. Managed through a partnership between the European Commission and the European Environment Agency, Climate-ADAPT serves as a comprehensive resource for adaptation planning.[41]

WISE, the Water Information System for Europe, serves as a repository of information and data on the condition of Europe's water bodies, including rivers, lakes, and groundwater, as well as the state of Europe's seas. It offers insights into the pressures impacting these water systems, the measures taken to protect and conserve them, and the actions implemented to safeguard aquatic and marine environments. Hosted by the European Environment Agency, WISE plays a vital role in promoting sustainable water management practices across Europe.[69]

Oppla serves as the EU Repository of Nature-based solutions, offering a knowledge marketplace that brings together the latest insights on natural capital, ecosystem services, and nature-based solutions. It acts as an open platform for sharing, accessing, and generating knowledge from science, policy, and practice, drawing extensively from projects funded by the European Commission's FP7 and Horizon programmes.[70]

Similarly, **NetworkNature** fosters collaboration within the nature-based solutions community, supporting local, regional, and international cooperation to maximize impact and dissemination. Both initiatives provide valuable information relevant to the city level.[71]

The **Urban Nature Platform**, another Commission initiative, aims to guide and support towns and cities in enhancing and restoring their urban nature and biodiversity, while also connecting them with other relevant EU policies and initiatives, notably Urban Nature Plans within the EU Biodiversity Strategy.[72]

Portico's Knowledge Hub, part of the European Urban Initiative (EUI) and supported by the European Union, serves as a pivotal European urban knowledge platform. It facilitates the formulation and execution of urban policies and strategies by connecting stakeholders with

essential knowledge, individuals, good practices, and endeavours for sustainable urban development, including initiatives related to the Water Sensitive City concept. The hub that is being progressively built offers a wide range of resources from partners involved in EU Cohesion Policy and beyond, fostering dialogue and exchange among peers. Additionally, it integrates resources from projects under the former Urban Innovative Action Initiative (UIA)), the URBACT programme, the International Urban and Regional Cooperation Programme, and the Urban Agenda for the EU.[73]

The **European Urban Knowledge Network (EUKN)** serves as a strategic hub, uniting European national governments to advance sustainable urban development by bridging policy, research, and practice. As the sole independent, Member State-driven network in European urban policy, research, and practice, it collaborates with national and regional governments to promote sustainability. Offering expertise, tailored events, and fostering collaboration, EUKN strives to cultivate just, green, productive, and digitized cities for the future.[74]

The **Urban Governance Atlas** within the Interlace Hub showcases over 250 exemplary urban governance practices, encompassing legislative, regulatory, and strategic instruments, as well as economic, fiscal, agreement-based, cooperative, and knowledge-focused approaches. Notably, policy instruments supporting nature-based solutions and ecosystem restoration also address urban water management.[75]

The **EEA report 01/2021 Nature-based solutions in Europe** lists and describes further knowledge portals in its Annex 5.[9] Continuous advancements in knowledge for sustainable urban development, including the Water Sensitive City concept, are ongoing. Initiatives such as Horizon Europe partnerships, Innovative Actions under the European Urban Initiative, URBACT, Interreg, the LIFE programme and others continually yield scientific insights and practical experiences, driving the implementation and testing of novel approaches in urban development.

Apart from knowledge, designing, implementing, and evaluating the performance of a Water Sensitive City requires comprehensive and **reliable data** from various sectors to be collected and integrated. The rise in data volumes necessitates extensive efforts in data collection, processing, and sharing, along with ensuring data quality and conducting thorough evaluations. These demands present significant challenges for water administrations. Additionally, technical and legal barriers often hinder the seamless exchange of data and information.[11]

Capacities

Bringing together various knowledge platforms and facilitating access for local stakeholders is indeed crucial, but it alone may not be adequate to effectively apply this knowledge locally and scale up actions across European cities. Further support in the form of capacity building for a Water Sensitive City is needed **to transfer and apply the available knowledge** as well as funding opportunities.

The transition of urban water management demands a **diverse skill set compared to traditional practices**. This includes technical proficiency for implementing water sensitive designs and navigating new governance structures. the Water Sensitive City concept requires broader collaboration across sectors and stakeholders, including regional actors. However, in some countries, water authorities face understaffing challenges in effectively managing this complexity.[11]

Funding

In addition to capacity building, securing funding presents a significant challenge for cities implementing water sensitive initiatives. Despite numerous European funding options with a considerable number of calls published centrally on the Funding and Tenders portal, complemented by national support in some Member States, cities struggle to identify and access appropriate funding. Limited staff resources, capacities, and skills may hinder municipalities in navigating the complex funding landscape. Support units and advisory services could help address this challenge.[57]

Some European Funds, like the Cohesion Funds, hold particular relevance for the Water Sensitive City concept, but their management lies with the Managing Authorities in Member States. If the notion of Water Sensitive City isn't adequately integrated into national programmes, cities miss out on accessing this funding. The substantial investment needed to modernize water management infrastructure in cities, driven by directives such as the Urban Waste Water Treatment Directive (UWWTD), climate adaptation plans, or urban greening initiatives, poses a significant financial challenge. Hence, exploring alternative funding models becomes crucial to complement traditional approaches.

New forms of collaboration

The concept of a Water Sensitive City **necessitates novel collaborations, both horizontally and vertically**, involving stakeholders beyond the traditional scope, including those from the health sector, land use, and nature conservation. Exploring synergies among these stakeholders could enhance the efficiency of urban water management. However, this collaborative approach may also entail conflicts and trade-offs for individual sectors or stakeholders, indicating that there may not be a single optimal solution. Consequently, existing governance structures may need to be re-evaluated to accommodate multi-level and cross-sectoral collaboration. The development of a Water Sensitive City requires the active involvement of all city stakeholders, recognizing that each entity is a water user to some extent. This underscores the need for innovative forms of collaboration between public and private entities, as well as increased citizen participation.

Moreover, the urban water system is often intertwined with a broader catchment area. Intensive urban development has gradually diminished natural water systems, adversely affecting the surrounding region. Conversely, **water management in cities relies on the peri-urban and rural areas**, where drinking water is often sourced. Cities also contend with other water users such as agriculture, energy production, and floodwater discharge. Additionally, upstream land use practices can contribute to flooding within urban areas. Addressing these complexities requires effective urban-rural governance mechanisms.

The concept of Water Sensitive City holds significance not only for the water sector but also for numerous other sectors. As a result, funding, regulations, research, and guidance related to water, as well as those pertaining to areas such as climate adaptation, circular economy, biodiversity, and land use, present multiple potential avenues for advancing water sensitive initiatives. However, the analysis at the EU level indicates that there is still room for improvement in systematically **incorporating the Water Sensitive City concept** and leveraging the full potential of available instruments. Achieving this necessitates increasing the visibility of various options and fostering better exchange and collaboration among different initiatives to harness synergies effectively.

Dealing with the existing urban envelope

Much of European **cities are already built**, making it relatively straightforward to implement water sensitive designs in new urban developments. However, retrofitting or reconstructing existing buildings and neighbourhoods can pose technical challenges and require significant financial investment. Consequently, planning processes and solutions for existing and new developments must be approached differently.

Building regulations present a crucial opportunity for integrating water sensitive design into both new urban developments and renovation projects, yet this approach is not uniformly implemented across Member States. Concerns related to hygiene, environmental impact, and unclear regulations may deter the reuse or infiltration of water for purposes other than agriculture. Determining whether runoff from specific areas is suitable for temporary storage, infiltration into green spaces, or harvesting for irrigation purposes depends on the characteristics of the collection areas rather than universal standards. This uncertainty may leave local authorities feeling hesitant and in need of guidance.

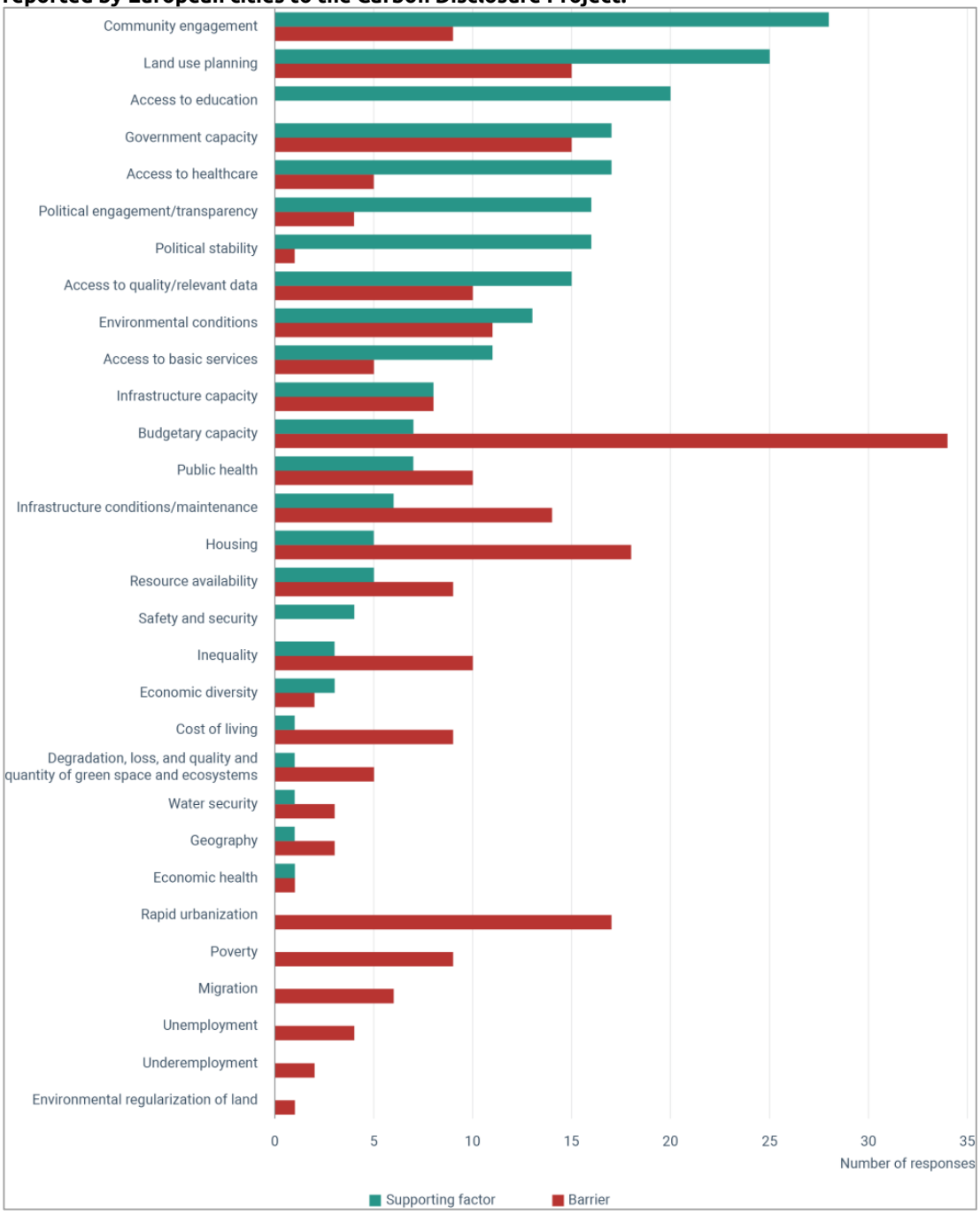
Local authorities' needs

Organizations at both national and EU levels may **lack precise insight into the specific needs of cities**, leading to a mismatch between available resources and actual requirements. The legislative, political, and supportive frameworks established by these entities may not always align with the diverse and evolving needs of urban areas. Thereby the needs in terms of solutions and governance of smaller and middle-size cities may be different from bigger ones. As a result, cities of different types and sizes may face various challenges in effectively addressing their unique circumstances and implementing tailored solutions.

Figure 5 demonstrates challenges identified by cities regarding climate change adaptation, which are likely to resonate with the Water Sensitive City concept. Key obstacles include budgetary constraints, housing issues, rapid urbanization, infrastructure conditions and maintenance, as well as challenges related to land use planning and government capacity.[76] Research within the scope of the LIFE UrbanStorm project has identified several common barriers to implementing sustainable urban drainage systems in cities, including challenges related to legislation and guidelines, financial constraints, institutional inexperience and collaboration issues, public resistance, maintenance concerns, and technical obstacles.[53]

Issues for the use of nature-based solutions in water sensitive design solutions persist due to inconsistent regulations and institutional barriers, including a lack of incentives and suitable legislation as well as a lack of clear legal definitions for retention facilities. Legal ambiguities, i.e., due to safe water quality standards lead to disputes over interpretation, causing inconsistencies across various administrative authorities and judicial decisions. Clear definitions and guidance may increase public confidence and reduce administrative recognition.[77]

Figure 5: Factors supporting and challenging the implementation of adaptation actions, as reported by European cities to the Carbon Disclosure Project. [76]



Recommendations

Moving towards water sensitive design presents cities with a myriad of opportunities that extend beyond addressing immediate water challenges. Embracing more sustainable water management practices and exploring alternative water sources not only enhances resilience but also promotes resource efficiency and environmental sustainability. By tapping into synergies between water sensitive design and other urban initiatives, cities can achieve long-term cost savings while reaping additional benefits such as improved nature conservation, community well-being, and enhanced recreational opportunities.

Thematic Partnerships under the UAEU, particularly those focused on greening cities, climate adaptation, sustainable land use, and circular economy, intersect with the WSC theme offering opportunities for knowledge exchange, collaboration, and synergetic action. The options are summarised and prioritised in Table 6 earlier.

According to the EEA report on Urban adaptation in Europe, several supporting factors are key to the effective implementation of adaptation actions, including water sensitive design, at the local level. These factors include community engagement, budgetary capacity, long-term political commitment, effective use of knowledge and data, and participation in peer-learning networks (Figure 5: Factors supporting and challenging the implementation of adaptation actions, as reported by European cities to the Carbon Disclosure Project. [76]).[76] Furthermore, embracing digitalization and blue tech innovations can propel cities towards a sustainable blue economy. Leveraging smart and digital tools for water resource management, monitoring water pollution, and optimizing maritime industries not only enhances efficiency but also fosters economic growth and job creation.

By embracing a holistic and integrated approach to water sensitive design and aligning with sustainable blue economy principles, cities can position themselves as leaders in urban innovation while ensuring the long-term well-being of their communities and ecosystems. Here for example Rotterdam stands out for its comprehensive, citywide approach to becoming water sensitive, integrating diverse activities to manage water sustainably. The city's strategy involves implementing various initiatives, including blue-green roofs, water plazas, and sponge gardens, on a large scale. What distinguishes Rotterdam is its high level of collaboration and integration among stakeholders, including residents, businesses, universities, and government agencies. This inclusive approach ensures that innovative solutions are co-created and implemented effectively.[78,79]

1.10 Trends and evidence about EU cities

Having enough water of good quality is indispensable in cities, serving myriad purposes such as providing drinking water, sanitation, industrial processes, supporting vegetation in green spaces, urban agriculture, sustaining ecosystems, supporting biodiversity, supporting recreation and facilitating inland water transportation. Nevertheless, nearly all European cities grapple with the dual challenge of either excess or scarcity of water (of good quality) at certain times of the year. This underscores the reality that extremes in water availability poses significant threats, while having

enough water of good quality during the year is key for having a good environment, good services and a good economy in cities.[4]

Excess of water

Excessive rainfall, cloud bursts as well as long periods of intensive rainfall, triggers pluvial and fluvial **floods** and **landslides**. Where such fluvial flood water in river deltas meets high tides and/or storm surges, also coastal floods are possible. A rising sea level aggravates not only this situation but also the impact of storm surges for coastal cities. It heightens their level and increasesg the risk of coastal areas to be flooded. Around 10% of Europe's urban population resides in flood-prone areas along river valleys and is threatened. Floods are deadly and economically impactful. They have caused over 4,300 deaths and €170 billion in damages between 1980 and 2017. [81]

The occurrence of hazardous floods following intense precipitation is influenced not only by climatic factors but also by various non-climatic elements, including land use patterns, alterations to river basins, and modifications to natural water flow dynamics. These modifications encompass the construction of barriers, channelling of rivers and other changes in riverbeds as well as surface sealing and urban sprawl.[82]

Within urban areas, the extensive coverage of sealed surfaces, such as roofs, streets and places, impedes **stormwater** from these areas from percolating into the ground, diverting it instead to sewer systems and causing sewer overflows. Besides exacerbating flooding, this phenomenon presents significant pollution challenges as the run-off accumulates pollutants from washed surfaces, thereby straining water treatment facilities. In case there is a mixed sewer system such an overflow will lead to the discharge of untreated wastewater from households and industry in basements, on streets, public and private areas and surface waters, which will cause pollution - toxic compounds, of bacteria as well as oxygen depletion. This poses then a direct risk to public health. It's worth noting that **pluvial floods** can occur in any city, regardless of proximity to rivers. Cities located in coastal regions face additional threats from flooding and coastal erosion, particularly during storm surges. These events pose significant risks to both infrastructure and human settlements.

Water scarcity

Cities can be challenged by water scarcity and prolonged droughts too. Water stress already affects 20% of the European territory and 30% of the European population on average every year.[83,84] High levels of aridity, which refers to the prolonged, average dryness of a region, resulting in limited or low water content in the soil, are currently observed in the southernmost regions of Europe, gradually diminishing towards the north.[85] In addition to natural aridity, prolonged droughts can affect all regions in Europe, but the south is especially vulnerable because of the generally drier conditions in the baseline climate. Droughts can persist for weeks to several years.

For cities with a high number of inhabitants per area compared to rural areas, sufficient supply of drinking water is both existential and often a challenge. The over-abstraction of water for drinking water but also for irrigation, swimming pools and industrial uses will result in human-made water scarcity. In a situation of water scarcity provoked by over-abstraction or droughts, cities compete for

water with other sectors such as agriculture, forestry, energy generation, industrial production, or nature conservation. Drinking water and agricultural irrigation in the 27 EU Member States (EU-27) heavily rely on groundwater. 65% of drinking water and 25% of irrigation water is supplied from groundwater. Excessive extraction is exerting considerable pressure on groundwater. As indicated by the Member States' second river basin management plans in 2016, 9% of the overall groundwater body area was reported to have poor quantitative status in the EU-27.[83,84]

The scarcity of water can also pose challenges to green infrastructure and nature-based solutions within cities. The escalation of dry periods resulting from climate change presents a formidable obstacle to green infrastructure, particularly when it's not adequately adapted to drier conditions. This is particularly concerning for long-lived vegetation, such as trees, which cannot be easily replaced or naturally adapt to abrupt changes in water availability.

Water quality

Widespread pollution and excessive water extraction are exerting considerable pressure on groundwater. As indicated by the Member States' second river basin management plans in 2016, 24% of the overall groundwater body area was reported to have poor chemical status in the EU-27. A combined evaluation of chemical and quantitative status reveals that 29% of the total groundwater body area lacks sufficient capacity to meet the needs of ecosystems and people.[83,84]

Concerning urban wastewater, the Urban Wastewater Treatment Directive has achieved a significant reduction of domestic pollutant releases into the environment. 98% of EU waste waters are adequately collected and 92% adequately treated, even if a limited number of MS have still difficulties to reach full compliance. However, less attention has been given to other sources of urban pollution (smaller agglomerations, non-centralised treatment facilities or heavy rains) for which the requirements were kept more generic. Pollution due to heavy rains (storm water overflows and urban runoff) represents a sizeable remaining source of loads sent to the environment.[86]

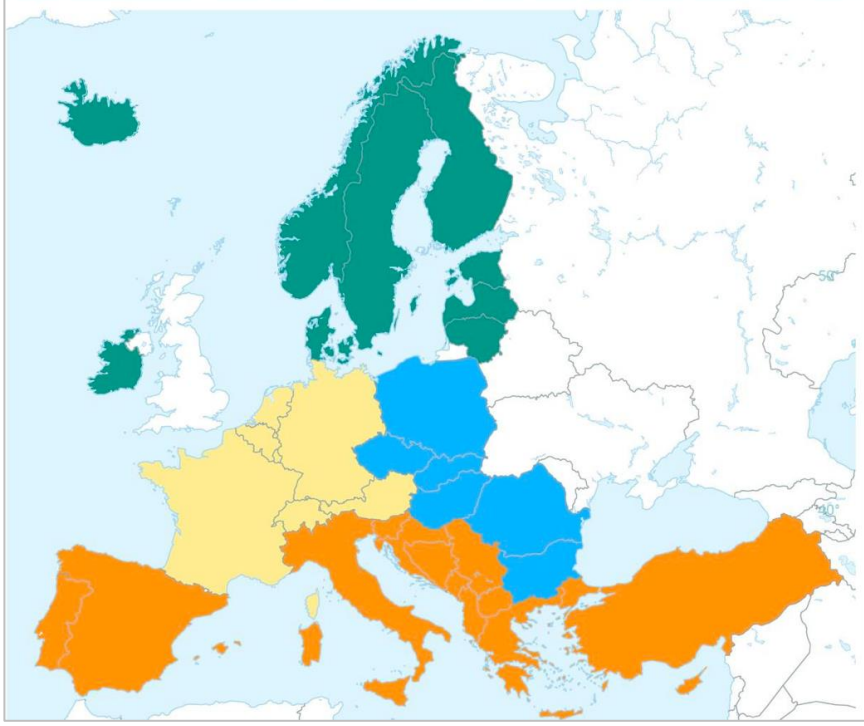
Water quantity and quality are inherently interconnected. Excessive runoff can introduce elevated levels of pollutants into sewage systems and overwhelm wastewater treatment plants with higher volumes of wastewater than they can manage. Conversely, inadequate water levels and discharges can result in the concentration of pollutants in water bodies, exacerbating environmental contamination.

Climate change

Figure 6: Observed and projected trends in key climatic risk drivers in different European regions.[87]

Land regions	Northern Europe			Western Europe			Central-Eastern Europe			Southern Europe		
	Past	Future		Past	Future		Past	Future		Past	Future	
		Low	High		Low	High		Low	High		Low	High
Mean temperature	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Heat wave days	□(*)	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Total precipitation	↗	↗	↗	↗	⟋	↘	↗	↗	⟋	↘	↘	↘
Heavy precipitation	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Drought	↗	↘	↘	↗	⟋	↗	↗	⟋	↗	↗	↗	↗

European regional seas	Past	Future
Sea surface temperature	↗	↗
Sea level	↗	↗



Legend

- ↗ Increase
- ↗ Increase (limited agreement between models, datasets or indices)
- ↘ Decrease
- ↘ Decrease (limited agreement between models, datasets or indices)
- ⟋ Low confidence in direction of change
- □ No change

Note

(*) Other heatwave indices show an increase for the past

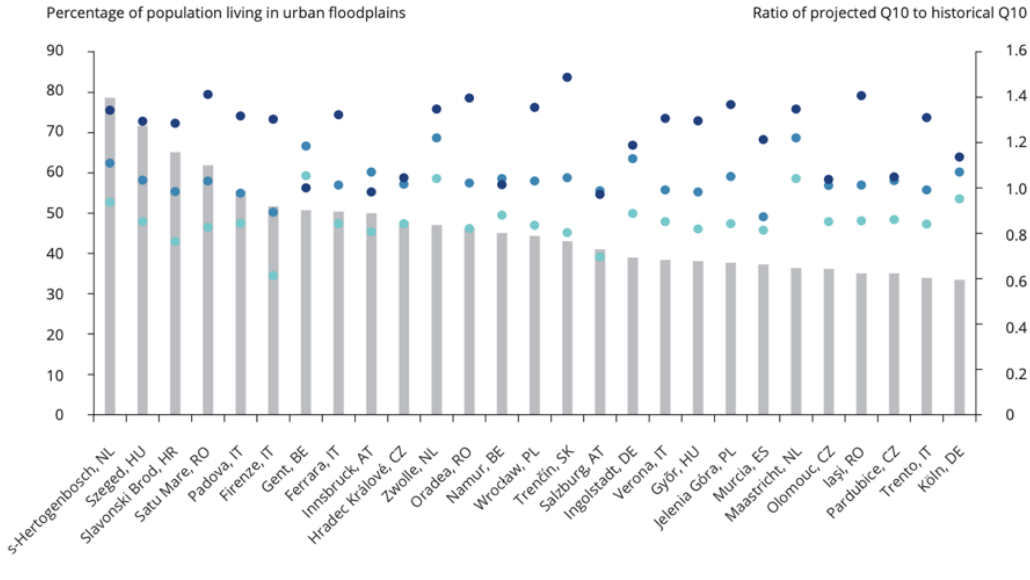
Temperatures across Europe are on the rise, surpassing the global average, thereby intensifying the impacts of climate change on European cities.[87] This trend towards higher temperatures is expected to amplify the water cycle's intensity, resulting in more frequent and severe extreme weather events. Anticipated variations in annual precipitation patterns are set to distinguish between wet and dry conditions. In northern Europe, projections suggest an increase in annual precipitation and heavy rainfall, potentially reducing the occurrence of droughts. However, changes in summer rainfall, flooding events, aridity, and fire risks are likely to exhibit mixed trends. Central Europe is forecasted to experience diminished summer rainfall alongside heightened occurrences of severe weather events such as heavy precipitation, river floods, droughts, and increased fire hazards. Changes in annual precipitation and aridity are expected to vary. Conversely, southern Europe is

expected to witness a decrease in both annual precipitation and summer rainfall, coupled with an escalation in aridity, droughts, and fire risks. Heavy precipitation and river floods are anticipated to undergo varied changes.[88]

While the duration of dry spells has shown relatively stable patterns across Europe thus far, future projections suggest significant increases in southern Europe, moderate increases in central Europe, and no notable changes or even decreases in northern Europe.[87,88] The duration of meteorological droughts in Europe has demonstrated no discernible trends since the 1960s, aside from a minor decrease in northern Europe that is expected to persist. Under scenarios of high emissions, central Europe may experience prolonged droughts, while southern regions are likely to face such conditions under both high- and medium-emission scenarios.[85] Climate change may impact groundwater quality due to the complex interplay between pollution and over-abstraction.

The anticipation of climate change suggests a rise in the demand for irrigation water across Europe. For instance, rising temperatures could potentially facilitate the expansion of agricultural operations in northern latitudes, consequently heightening the need for irrigation water in this area. It underscores the crucial importance of integrated water demand management at the river basin level to mitigate unsustainable over-abstraction in regions facing water stress.[83,84]

Figure 7: Cities with the highest percentages of population (> 33 %) living in potential floodplains and the projected (2051-2100) increase in 10-year high river flow.[82]



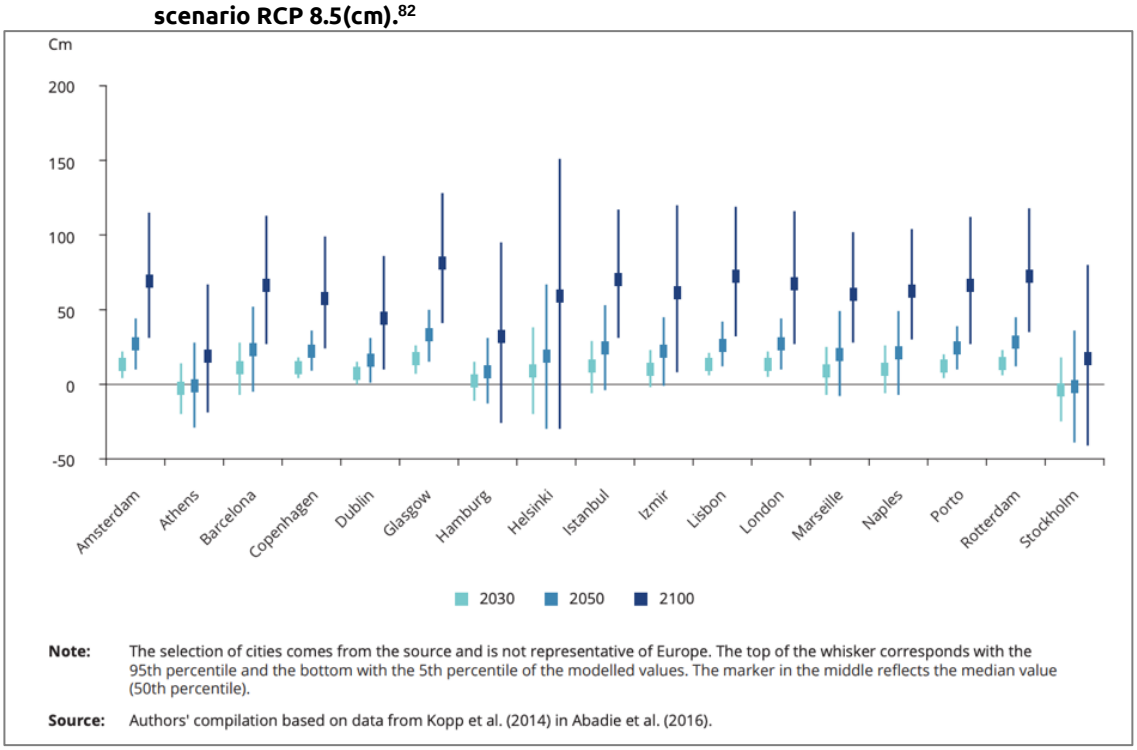
Note: The projected change in the 10-year high river flow (Q10) is the ratio of the projected one in 10-year return period of annual maximum discharge to the one in 10-year annual maximum discharge in the historical period (1951-2000). Q10 is presented for three possible futures: 10th, 50th and 90th percentiles.

Source: Authors' own compilation based on Guerreiro et al. (2018) and analysis of population in urban floodplains by the European Topic Centre on Urban, Land and Soil Systems (ETC/ULS).

The majority of coastal regions across Europe are expected to witness further elevation in both mean and extreme sea levels, which is expected to continue for many years even if the rise of the

annual temperatures comes to a halt. A notable exception is the northern Baltic Sea, where land levels continue to rise due to the lost weight of the former icesheet from the last ice age.[88] Projections indicate a significant rise in global mean sea levels during the 21st century, ranging from 0.29 to 1.10 meters under low-emission scenarios and 0.61 to 1.10 meters under high-emission scenarios, posing considerable risks. Without adaptation measures, coastal floods are anticipated to escalate substantially. Approximately one-fifth of Europe's coastline is threatened by coastal erosion, with particular vulnerability observed in the Mediterranean and North Sea regions. Figure 8 illustrates the projected magnitude of sea level rise for selected European cities.[82] Coastal flooding in the EU-27 currently causes already €1 billion in damages annually, affecting around 72,000 people each year. If coastal protection is not increased, damages are projected to rise significantly with global warming, reaching up to €137 billion to €814 billion annually by 2100, depending on greenhouse gas emission scenarios.

Figure 8: Future sea level rise projections for 17 coastal cities in Europe under the high emission scenario RCP 8.5(cm).[82]



Note: The selection of cities comes from the source and is not representative of Europe. The top of the whisker corresponds with the 95th percentile and the bottom with the 5th percentile of the modelled values. The marker in the middle reflects the median value (50th percentile).

Source: Authors' compilation based on data from Kopp et al. (2014) in Abadie et al. (2016).

Urbanisation pattern

The prevailing urbanization trend exacerbates issues associated with both excessive and inadequate water management. Urban sprawl between 2012 and 2018 occurred on 35 km^2 of floodplains, thereby jeopardizing urban infrastructure and diminishing available space for water drainage and temporary storage. Short-term interests often take precedence over long-term flood risk management, as evidenced by industrial growth in the Po Valley, which has heightened vulnerability to flooding since the 1950s.[82]

Urbanization exacerbates the intensity of flooding through the occupation of floodplains, the straightening of channels, and the prevalence of impermeable surfaces that convert precipitation into runoff. Despite artificial surfaces covering less than 5% of the total area in EEA member

countries, approximately 16,600 km2 became sealed between 2000 and 2018. The rate of increase in artificial surface areas appears to be slowing down, transitioning from 1,086 km^2 per year (2000-2006) to 711 km^2 per year (2012-2018).[82]

Data from the Copernicus Imperviousness High Resolution Layer reveals that the average surface sealing in administrative areas of Urban Audit cities was approximately 19.5% in 2015 (up from 19.1% in 2006), while in the urban morphological zone (UMZ, which is a set of urban areas less than 200 m apart approximating the 'real' city form, which often does not correspond to the administrative delineation), it reached 35.6% (up from 34.9% in 2006). Urban Audit is a project for statistical monitoring of major European cities, ongoing since 2003 at the initiative, and with the financial support, of the European Commission and Eurostat. Urban Audit covers 1 007 cities (as of May 2020). However, the extent of surface sealing varies across European cities. The combination of high soil sealing, and increased precipitation may heighten the risk of pluvial flooding, particularly in north-western Europe.[82] Runoff from these sealed areas can flow into unsealed areas or overwhelm the sewage system, posing pollution risks.

Artificial or sealed surfaces are prevalent in urban areas, with their overall share increasing by over 6% since 2000. An estimated 57.9% of urban areas also experienced an uptick in the proportion of the population living within floodplains between 2011 and 2021.[89]

Status of urban water infrastructure

The risk of pluvial flooding is aside from the morphological situation in which a city is nestled and its level of impervious surfaces influenced by the condition and capacity of stormwater drainage systems in cities. The Urban Water Atlas for Europe[90] reveals an average sewer age of 40 years for 36 cities, ranging from 10 in Reykjavik to 90 in London. This prompts concerns about whether the relatively aged sewer network infrastructure in European cities can effectively handle increased rainwater volumes during intense precipitation periods if not renewed and properly maintained where necessary. Urban areas as well as the degree of imperviousness has increased over the last decades in most cities resulting in even more run-off from these areas. There is a need to enhance urban drainage systems' capacity to manage additional surface runoff in response to climate change and the growing surface sealing in cities.[82] Expanding sewage systems to handle changing climate conditions is often wished for but not the only option. A more effective approach is replacing mixed sewer systems with separate ones to prevent sewage overflow and protect surface waters from pollution. Another promising measure is redirecting water from roofs and paved areas (like streets) to urban green spaces for temporary storage or infiltration into the soil. This approach reduces the risk of sewer overflow and helps replenish depleted groundwater levels in cities.

The distribution systems for drinking water supply, often span extensive lengths of pipework, transport water from treatment plants through large transmission pipes that branch into smaller pipes serving various areas, streets, and properties. While a small portion of leakage is unavoidable, even in new and well-managed water distribution networks, depending on the length of the network and operating pressure, these older systems are susceptible to leaks, commonly occurring at joints or in corroded sections, particularly in older European cities where infrastructure is aging. Leakage management poses a significant challenge, with leaks falling into three main categories: reported leaks, which are noticeable and quickly identified; unreported leaks, larger leaks detected only

through dedicated surveys and potentially remain unnoticed for extended periods; and background leakage, comprising small leaks and seepages that are difficult to detect individually. Addressing leakage requires costly infrastructure upgrades and pressure management.[90] Data on leakage rates are inconsistently available for individual cities, making cross-city comparisons difficult. Members of the Green City Accord, and applicant cities for the European Green Capital & Leaf Award are required to submit data regarding this indicator, and even have frequently mentioned leakage rates above 30% or as high as 50% in some instances.

Other sectors' demand

As many cities continue to grow, and the water consumption of different sectors might evolve, the overall demand for fresh water is increasing. Moreover, where cities face high and increasing numbers of tourists these put additional pressure on water situation by the consumption for showering, swimming pools and spas and washing. At the same time, due to climate change, many areas are confronted with less water availability. This presents cities with complex challenges, where urban centres must navigate a landscape where water resources are increasingly shared among diverse sectors, including agriculture, energy production, and industry. With agriculture requiring more irrigation, energy production demanding cooling water, and industrial processes reliant on water, cities find themselves in a competitive arena for access to limited water supplies. This competition underscores the urgent need for strategic water management approaches, fostering collaboration and innovation to ensure equitable and sustainable water distribution amidst evolving demands and pressures.

Lack of integrated management approaches

As European cities grapple with increasing rainfall, floods, and coastal challenges urgent adaptive actions, comprehensive land-use planning, and resilient infrastructure are imperative for sustainable urban development in the face of a changing climate. Cross-sector management of flood and storm water as well as of scarce water resources are needed both inside city borders and the city region up to whole river basins.[91] This recalls the need for a multi-level management approach as the problems of excess of water as well as water scarcity cannot be solved on cities' territory alone, although water sensitive design of cities offers a huge potential.

Cities leading the way

In 2022, Covenant of Mayors signatories reported over 19,000 adaptation actions, focusing on sectors like Water (17%), Buildings (13.6%), Environment (11.7%), Land (10.8%), Agriculture (9.3%), and Health (7.6%). While cities commonly prioritize physical and technological measures, nature-based solutions and governance measures are also essential.[89] However, integrating various adaptation measures is crucial due to their interdependence and the need to optimize efficacy. The Urban Water Atlas for Europe, exemplified by Amsterdam's City Blueprint, demonstrates that cities don't need to start from scratch, as many already implement elements of water sensitive design.[90] For instance, Copenhagen's Cloudburst Plan, developed after a 2011 flooding event, integrates 300 projects on water retention and drainage over 20 years, combining grey and green infrastructure holistically to address flooding.

A wealth of city examples can be found in case studies across various platforms and projects like Climate-ADAPT, OPPLA, UIA, Horizon 2020 and Horizon Europe, and LIFE (see also Annex 3: Sources for projects and case studies on).

Data and indicators

For a systematic local level monitoring of state and progress some datasets at the European level related to the Water Sensitive City concept are available, alongside data held locally, regionally, and nationally. Examples include the European Commission's Urban Data Platform Plus[92] and City Statistics at Eurostat[93], which offer widely harmonized data but may lack coverage on certain water sensitive issues, such as leakage rates. Additionally, resources like the Urban Atlas and high-resolution layers on tree cover and on imperviousness from the EU Copernicus Programme provide valuable data on land use.[94] The Urban Data Platform of JRC offers two indicators – total use of water and population connected top drinking water systems – to report in regard to the SDG 6 Clean water and sanitation.[92] National reporting on EU directives related to water, as well as initiatives like Climate-ADAPT and ESPON, offer further insights. Initiatives such as the Green Cities Accord, European Green Capital Award, and Green Leaf Award also contribute detailed urban data on participating cities.

However, these datasets focus on singular aspects and may not reflect the high complexity of the topic. They do not provide a comprehensive overview of what constitutes a water sensitive city. This may hamper cities' and regions' action to select the most effective water sensitive design and to measure its success. Higher-level governments and other organizations face challenges in assessing the effectiveness of their support frameworks and measures. There is a need for an agreed indicator set and target values to effectively measure the degree of water sensitivity, considering various components like land use, buildings, and nature. The City Blueprint, as outlined in the Urban Water Atlas for Europe, offers a broader array of indicators and represents an interesting attempt at addressing this challenge.[90] Also the Water Governance Indicator Framework with 36 water governance indicators and a checklist containing more than 100 questions on water governance can provide a use-full tool to assess the governance aspect of water in a comprehensive manner. It does not specifically address cities but considers them as part of a multi-level governance approach.[15]

B. Recommendations

This chapter summarises the findings of the analysis and provides recommendations with regard to the following elements as specified in the ToR and the Multiannual Working Programme for the UAEU:

- Thematic scope of the subject
- Form of multi-level cooperation
- Timing for successful implementation
- Required type of expertise of the members
- Institutions/stakeholders of interest
- Support required for the implementation
- Opportunity to launch a partnership
- Territorial Impact Assessment.

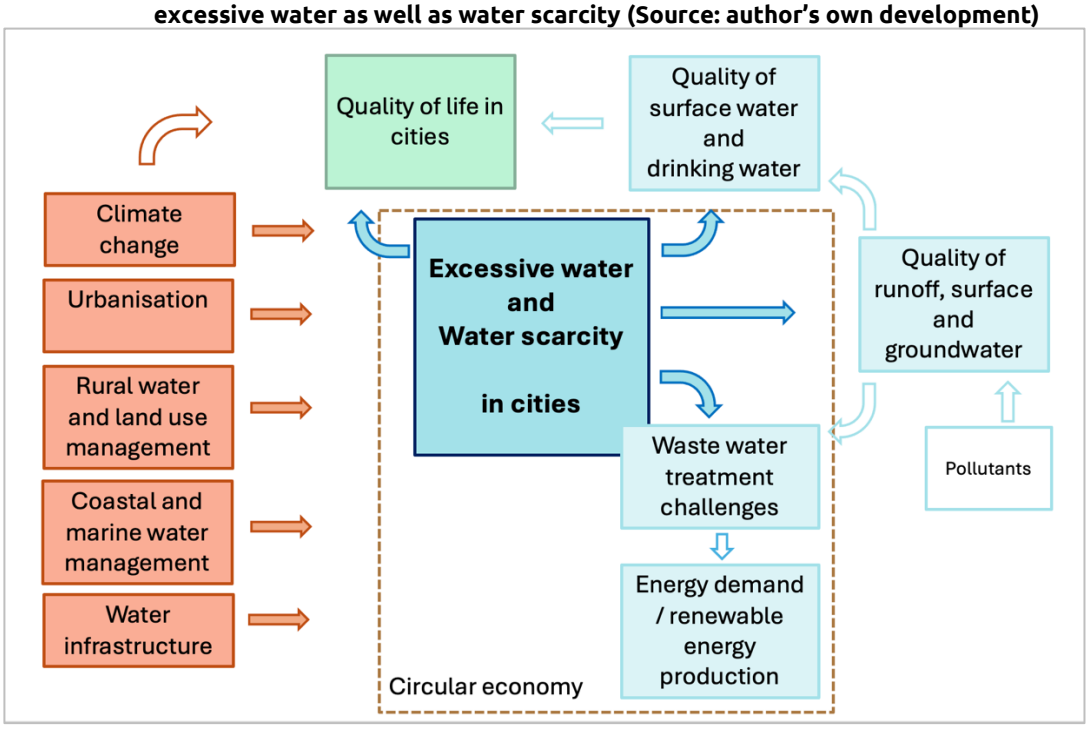
1.11 Thematic Scope of the subject

Defining the perspective on the topic of Water Sensitive City

The water nexus in cities refers to the intricate interconnection between water resources, urban infrastructure, environmental sustainability, and societal needs within urban areas. It encompasses various aspects of water management, including supply, distribution, consumption, treatment, and disposal, as well as their relationships with energy, food, behaviour and lifestyle, urbanisation and climate change. By addressing these interconnected issues within the water nexus, cities can develop holistic approaches to water management that promote resilience, sustainability, and equitable access to this vital resource.

The TP could aim to make that Water sensitive design becomes the new business as usual model for water management in cities, with its scope and elements described earlier. Given the complexity of the matter, it is advisable to focus on the topic for the TP's work to ensure manageability. Since emerging most pressing challenges primarily and substantially affect water quantity—whether it is excessive water or scarcity — this perspective could guide a TP Water Sensitive City. However, it's crucial not to overlook the interconnected topics. Actions could prioritize water quantity, while also addressing its relationship with water quality, treatment, urban quality of life, circular economy principles, and external impacts (Figure 9). This approach ensures then at the same time a comprehensive understanding of the issues at hand and facilitates effective strategies for sustainable water management in cities.

Figure 9: Proposed perspective for the TP Water Sensitive City centred around water quantity – excessive water as well as water scarcity (Source: author's own development)



Recommended areas for action of the TP

To advance the future direction of the topic Water Sensitive City, this EAA assessment has identified, initially mapped, and analysed key challenges in legal and policy work (across EU, MS, and city levels) from literature and as reported by stakeholders. Under three UAEU pillars Better Regulation, Better Funding, and Better Knowledge, the needs and opportunities for action have been clustered under sub-themes and outlined in the following three tables (Tables 8, 9 and 10). Thereby, the focus is on a more effective and coherent implementation of existing policies, legislation, and instruments rather than proposing new ones. By the TP providing informal contributions to the design of future and revision of existing regulations it offers the potential to make these more effective, timely and avoid potential bottlenecks and minimise administrative burdens for urban authorities.

Table 8: Potential Sub-themes for Better Regulation

Sub-theme	Reasoning / Relevant Regulation
1. Refine Mapping of relevant EU regulations for mainstreaming WSC	The topic of Water Sensitive City (WSC) extends beyond the scope of water and urban policies, encompassing various other policy domains such as climate change adaptation and mitigation, disaster risk management, nature and biodiversity conservation, land use and soil management, rural development, agriculture, food production, and circular economy initiatives. However, even within closely related water and urban policies, the holistic concept of WSC remains inadequately integrated, often hindered by prevailing sector-specific perspectives.

	Following the initial mapping of relevant policies, regulations, and funding mechanisms in this EAA, the TP could refine this to identify concrete entry points for introducing / improving water sensitive action. This may concern regulation that is currently under negotiation / in implementation (see sub-theme 2) as well as mapping regulations and areas of regulation where the potential is not yet used but WSC could be introduced in the long-term (see sub-theme 3).
2. Mainstream the WSC topic into existing and ongoing EU policies, regulations and funding	Explore opportunities to mainstream WSC considerations across diverse EU policy frameworks and instruments and their consecutive implementation in MS. Key areas of engagement include: • Post 2027-Cohesion Policy: placing WSC in the negotiation process and the development of Operational Programmes (MS) for the EU Cohesion Funds • Development of guidance for the Integrated water plans according to the recast of the Urban Waste Water Treatment Directive to be implemented in MS • Support the integration in the development and implementation of Urban Greening plans of EU Biodiversity Strategy for 2030 by cities • Making WSC a focus in the calls of the New European Bauhaus, Urban Innovative Action of the European Urban Initiative, URBACT and similar. Depending on their adoption: • The Commissions Water resilience initiative • Implementation process of the planned Nature Restoration Law Other TP's actions / topics to consider thereby: • CA01: Analysis of national multi-level urban development and planning regulations with focus on climate adaptation • SLU06: Better Regulation to boost nature-based solutions (NbS) at European, National and Local Levels • Greening Cities: Integration of Green and Blue Infrastructure into Other Sectoral Policies.
3. Develop strategies to include WSC in further policy areas in the long-term	Explore opportunities to mainstream WSC considerations in further relevant areas of policy and regulation as identified under sub-theme 1 for providing input and lobbying the inclusion of WSC in the long-term. Key areas of engagement include: • Circular Economy • The Renovation Wave for Europe • Building regulations • European Pillar of Social Rights (EPSR) Other TP's actions / topics to consider thereby: • CE07 - Help make water legislation support the circular economy in cities, • Food: ensure food system resilience,

	• CCH08 - Guiding Principles for Resilience and Integrated Approaches in Risk and Heritage Management in European Cities.
4. Exchange practice on multi-level and territorial approaches to build WSC	Water Sensitive City necessitate a multi-level approach due to the interconnected nature of water systems transcending administrative boundaries. In a water stewardship approach, collaborations can take multiple forms. Exchanging of experience and knowledge on successful practice in Member States, identify their success factors, potential pit falls and solutions to overcome barriers. Of particular relevance is experience from: • River Basin Management Plans of the EU Water Framework Directive • Flood Risk Management Plans of the EU Flood Directive.

Table 9: Potential Sub-themes for Better Funding

Sub-theme	Reasoning / Funding Programme
5. Analyse the options for a better use of existing funding for investments in WSC	Transitioning to a Water Sensitive City requires substantial local and regional-level investment, including maintaining and enhancing existing water infrastructure. Thereby, funding options related to the water sector as well as others could be useful, such as funding for nature-based solutions, climate adaptation, urban development. Different EU funding options can be analysed on how they can be better used (and eventually better shaped) for supporting implementing the Water Sensitive City concept – in particular easing the access for small and medium-size cities. These include: • different objectives of the Cohesion Funds (Sustainable Water, Climate Change Adaptation, Nature Protection and Biodiversity, Integrated Development in Urban Areas) • InvestEU Programme • Just Transition Fund • Recovery and Resilience Facility • LIFE Programme Other TP's actions / topics to consider thereby: • CA03: Including recommendations for the OPs of the ERDF in order to improve its accessibility for municipalities, • Greening Cities proposed action #4 Strengthening Structural Funding for Urban Green Infrastructure
6. Collect practice on innovative financing for WSC	Leveraging funding beyond conventional investment funding for water infrastructure could speed up the transition to WSC. Such could be through diverse sources and innovative methods like water taxes and multi-stakeholder co-design and co-implementation. Examples from Member States can be collected and analysed concerning their success factors and their barriers. Recommendations for transfer and upscaling, for capacity building as well as necessary adjustments in national and the EU policy and legal framework can be developed. Other TP's actions / topics to consider thereby:

	• SLU07 -Better Financing for NBS, • Greening Cities proposed action #5 Enhancing the Use of Innovative Funding to Enhance Urban Authorities to Green Cities • PP03 and others - Recommendation(s) for funding for procurement of innovation, strategic procurement, joint cross-border procurement.

Table 10: Potential Sub-themes for Better Knowledge

Sub-theme	Reasoning
7. Create cross-sector awareness for the opportunities of WSC	The transition to a Water Sensitive City (WSC) is vital for sustainable practices but often underestimated. WSC engages diverse sectors and stakeholders, offering benefits like improved water management, urban spaces, and biodiversity. Boosting awareness by creating targeted materials explaining the WSC concept, benefits, and relevance to various sectors would be helpful. This may involve mapping stakeholders, exploring areas such as smart cities, and coordinating with different governance levels and initiatives. As the most important sectors can be considered: climate change adaptation, nature and biodiversity, land use and soil, urban planning, housing. Other TP's actions / topics to consider thereby: • SLU08: Awareness Raising in the areas of NBS and the sustainable use of land, • Sustainable tourism: The environmental impact of the tourism industry in cities and
8. Improve the access to knowledge on WSC design and implementation	There is a need to consolidate the scattered information on building a Water Sensitive City for better use of existing knowledge. Guidance is needed on what a water sensitive city is and how to achieve it in different local contexts. Available information sources and specific city needs could be explored, including technologies, governance, and capacity-building. Centralizing information around the Water Sensitive City concept can happen on existing platforms like Climate-ADAPT rather than creating a new platform could improve accessibility and effectiveness. The TP Circular Economy's Action CE03 - Prepare a blueprint for a Circular City Portal - could offer inspiration for integrating or linking WSC.
9. Exchange good practice at national and regional level to enable cities becoming a WSC	Cities work under EU legislation and policies implemented by national and sub-national governments. Local authority support depends on the effectiveness of national and sub-national frameworks, with Member States using various tools to support cities. Collecting best practices for cities' transition to water sensitivity and promoting knowledge exchange among national and sub-national authorities would be supportive. Specific processes worth investigating include: • The successful inclusion of cities and their concerns in the development and implementation of River Basin Management Plans of the WFD and the Flood Risk Management Plans of the FD • The promotion of the uptake of WSC projects when managing the Cohesion Funds

	• Supporting national and sub-national legislation, incentives and pricing, capacity building programmes, knowledge and information activities, and funding programmes Other TP's actions / topics to consider thereby: • CA01 - Analysis of national multi-level urban development and planning regulations with focus on climate adaptation, • SLU06 - Better Regulation to boost NBS at European, National and Local Levels.
10. Capacity building for cities	Providing information only is not sufficient; additional capacity-building efforts, like training sessions, webinars, and city-to-city learning exchanges, are crucial for its widespread adoption. Leveraging existing funding and research programmes such as EUI, URBACT, Interreg, Horizon Europe Missions, and others can support water sensitive city initiatives. The partnership could assess whether cities need region-specific information, as strategies for the Water Sensitive City concept vary across different environments. Cross-regional exchanges can offer valuable insights and foster innovation, with Southern cities providing experience in arid conditions that can benefit Western cities facing more droughts. Lessons from smart specialisation in S3 Communities of Practice could also play a key role.
11. Improve data and indicators for assessing the state and progress of WSC	Presently, there are some available data points for WSC, although they are somewhat limited in scope. The Urban Audit Database offers data on water consumption, and cities in the Green City Accord report on water use, infrastructure leakage, and wastewater treatment. Defining sufficient water sensitivity or resilience is complex, with questions like "How much green infrastructure is necessary?" lacking clear answers. A framework to measure water sensitivity in cities is needed to assess achievements. The City Blueprint provides a range of indicators, while flood risk maps and data from the Urban Atlas and Copernicus programme offer insights into risks and land use. The OECD provides an indicator framework for water governance. The TP could assess the adequacy of existing data sources for measuring water sensitivity and their practicality for local, national, and European assessments. This is crucial for developing a method to measure and improve water sensitivity in cities. Other TP's actions / topics to consider thereby: • SLU09: Agreeing on Common Targets and indicators, for NBS, Urban Green Infrastructure, Biodiversity and Ecosystem Services in Cities • CE10: Develop City Indicators for a Circular Economy • CA09: Promote open access of insurance data for climate risk management. • Greening Cities proposed action #2: Indicator System for Evaluating Urban Nature Plans

1.12 Form of multi-level cooperation

Partnerships remain central to the Urban Agenda for the European Union (UAEU) as outlined in the Pact of Amsterdam. Enhancements to the Partnership's working method aim to foster a pragmatic, effective, and results-oriented approach, amplifying the impact of future UAEU deliverables. While ensuring flexibility in decision-making, targeted responses to urgent urban challenges may be pursued through alternative multi-level and multi-stakeholder cooperation mechanisms.[95]

In addition to partnerships, the Multiannual Working Programme for the UAEU offers the option to explore Other Forms of Cooperation (OFC) in specific scenarios. For instance, when a more targeted and swift response is required for an urban issue, or when focusing on a specific pillar or question within the UAEU framework. The scope of OFC should be defined by a particular issue, UAEU pillar, cluster of themes, or cross-cutting issue, linking actions across EU, national, regional, or local levels to underscore the benefits of multi-level cooperation.

However, after analysing the topic of Water Sensitive City, it's concluded that OFC may not be suitable for this topic. The topic is timely but there is no pressure to act immediately as indicated in chapter 1.13. The topic is highly complex with a myriad of interlinkages between sectors, stakeholders and governmental levels and the need to consider the topic in a holistic way. Moreover, the shift from a traditional water supply and sewered city to a water sensitive city presents a significant challenge that cities cannot address alone. Therefore, proposing a TP Water Sensitive City seems more appropriate. This form of cooperation offers opportunities to connect various Commission and other initiatives dedicated to the Water Sensitive City concept or parts of this topic, ensuring a balanced representation of governance levels to complement each other. Multi-level cooperation is well-suited for enhancing integrated efforts, such as implementing EU regulations at regional and local level, improving national implementation of the EU Green Deal, and other EU sector policies such as on urban development, water, climate change adaptation and nature and biodiversity. At the same time, other sectors can benefit from the implementation of water sensitive design solutions – in particular nature-based solutions - as these often hold valuable additional benefits.

The Thematic Partnership can, moreover, serve as a knowledge exchange hub and facilitate coordination among relevant EU, national and other stakeholders' initiatives, optimising the impact by combining and supplementing available resources, funding, and knowledge for cities.

1.13 Timing for successful implementation

The timing for establishing a Thematic Partnership couldn't be more opportune. On one hand, the pressing issues of climate change and rapid urbanization exert immense pressure on cities' water resources and challenges, necessitating innovative approaches beyond traditional methods. The imperative for a transformative shift towards creating water sensitive cities has never been more pronounced.

On the other hand, there's a wealth of knowledge available regarding solutions for water sensitive urban design, in particular nature-based solutions. Moreover, substantial EU funds are available, and EU regulations such as the policy package of the European Green Deal and sector policies such as on nature and biodiversity, water, climate adaptation, and circular economy provide different strategic opportunities for advancing the Water Sensitive City implementation. At the same time, there's a clear lack of and consequently a need for a thorough and unified policy focused on the topic of Water Sensitive City.

Ongoing policy developments and implementation processes offer a well appropriate timing for a Thematic Partnership Water Sensitive City

Cohesion Policy post-2027: Both the negotiations of the Partnership Agreement and the Regional/National Operational Programmes offer highly relevant opportunities to better shape funding for Water Sensitive City with a particular focus on 'how to invest the funds' rather than 'spending the money'. The Partnership Agreement between MS and EC will provide the basic framework document on the needs and funding objectives for all Cohesion Funds and on how to spend the money. If pushed by the TP, the regional and national Operational Programmes could aside from strong urban dimension include a funding focus for projects to make cities water sensitive. The following timeline and points of intervention can be expected:

Table 11: Timeline of Cohesion Policy (CP) post-2027 and intervention opportunities for WSC

Timeline	CP Action	Potential contribution by the TP
Spring 2025	EC endorses and releases new proposals for CP regulations	No impact, since TP will only start to work
2025 - approximately early 2028	Co-Legislators: European Parliament draft report, Council elaborates position, both followed by informal trialogue. negotiation and agreements expected in 2027/2028	TP activities might overlap with the negotiation process, opportunities to integrate WSC within the regulations - Input to the drafting or national/regional Operational Programmes might be possible (even for Partnership Agreement)
2027 – 2029	Elaboration and negotiation of Partnership Agreement and Operational Programmes	Recommendations, best practices, guidance on how to implement funding for Water Sensitive City effectively
From 2028/2029 onwards	First Regions / Member States start to implement OP	

Urban Waste Water Treatment Directive (recast): On 29th January 2024, Council and Parliament reached a provisional agreement on the new Urban Wastewater Treatment Directive. The co-legislators will now vote on the text. Once the new text has been adopted, it will be published in the

Official Journal of the European Union and consequently enters into force. The integrated management plans for storm water overflows and urban runoff (rain waters) have to be in place by

2030 for agglomerations of more than 100.000 p.e. and areas at risk identified,
2035 for agglomerations between 10.000 and 100.000 p.e. at risk, and
2040 for all agglomerations more than 10.000 p.e..

This offers the opportunity for the TP to integrate the needs of water sensitive design by going beyond the focus on pollution but managing water quantities in general. Guidance could be developed.

EU Biodiversity Strategy for 2030: The development of Urban Greening Plans has just started with the target year 2030. This offers opportunities to integrate nature-based solutions specifically targeting the needs of a Water Sensitive City.

The **Water Resilience Initiative** (Commission Work Programme 2024) aims to provide a holistic and integrated framework for water resilience and water sensitive cities, which could be used as a support tool to implement measures as well as knowledge sharing and capacity building. The Initiative is drafted by the Commission, but the further process is delayed. The EESC's call for a **Blue Deal** aligns with it, which may allow the TP to integrate WSC in its design.

Water Framework Directive and **Floods Directive (FD)**: The implementation of the WFD presents several shared technical challenges for Member States, the Commission, Candidate and EEA countries, and other stakeholders, including NGOs. To address these challenges collaboratively, the Member States, Norway, and the Commission established a Common Implementation Strategy (CIS) for the Water Framework Directive. The CIS is designed to ensure consistent and unified application of the WFD and its related directives. This ongoing process could be used to integrate the challenges related to the Water Sensitive City concept at the river basin-level planning.

Both directives follow a six-year cycle. The WFD is in the process of adapting the 3rd river basin management plans, with some countries having already fully reported and others being in the process. For the FD, Member States are in the third cycle from 2022-2027 to establish the flood risk management plans. There are continuous opportunities to integrate the topic of water sensitive design then.

New European Bauhaus, Urban Innovative Action of the European Urban Initiative, URBACT: Frequent calls present opportunities to include specific projects on the Water Sensitive City concept in the coming years.

1.14 Required type of expertise of the members

Due to the complexity of the topic 'Water Sensitive City', it's challenging to prescribe a one-size-fits-all expertise for members. While a broad understanding, expertise and experience on water sensitive design for cities is necessary, also detailed knowledge on the single sub-topics will be necessary. Most probably, applicants won't be able to draw in expertise in all of these, thus the partnership

needs to aim for a balanced set of members that cover all together the necessary expertise and experience.

Applications should demonstrate a strong link between the specific expertise of the applicant (potential member) and the particular issues driving their interest in joining the partnership. Selection criteria may include:

- **Motivation** to become a member and contribute to one or more sub-themes and issues, thereby enhancing EU policy, regulation, and knowledge relevant to the theme and offering valuable input at the city level.
- **Proven expertise** and experience, including qualifications in:
    - technical knowledge on water sensitive design at building level, neighbourhood and whole city level, such as sponge cities, including knowledge on related issues such as nature-based solutions, land use and urban planning, climate change adaptation.
    - integrate perspectives on WSC from different sector angles such as water and flood risk management, nature-based solutions, greening of cities, urban and regional planning, building design, climate change adaptation, disaster risk management, circular economy, the social dimension of managing water in cities, health, financing, procurement. Developing and co-implementing WSC as part of broader regional plans, such as River Basin Management Plans, Flood Risk Management Plans, Regional climate adaptation strategies and similar
    - Regulations concerning WSC including linked policy areas at different governmental levels
    - Further implementation knowledge and tools such as on data, monitoring, incentives etc.
    - Involvement of multiple stakeholders in the planning and implementation towards WSC – public and private actors and citizens
    - Innovative funding and implementation of WSC
    - Ensuring strategies and measures that ensure that nobody is left behind – social equity
    - Effective communication of strategies and measures related to the Water Sensitive City concept and capacity building
- **Willingness** to work across disciplines and embrace intersectionality (ensuring inclusivity) to tackle the implementation of WSC with an integrated and holistic perspective and in a cross-sectorial way within the partnership.

Applicants considered for the coordination role may need additional qualifications, such as:

- Experience and expertise in **managing multi-level, international partnerships**, with sufficient **commitment of human and financial resources,**
- A demonstrated **commitment to a cross-sectoral, interdisciplinary approach,**
- **Outreach to relevant stakeholders** and participation in an EU and/or international **networks** focused on the Water Sensitive City topic in a broad sense.

1.15 Institutions/stakeholders of interest

One key criterion for the selection is a demonstrated high motivation and sufficient capacity to work on the topic collaboratively.

For the TP Water Sensitive City of particular interest as potential members could be:

Urban / regional level

- Local authorities – frontrunners on WSC as well as cities seriously interested to advance WSC, metropolitan cities as well as small and medium-size cities
- Regional / metropolitan authorities
- Other local or regional entities related to WSC, such as water authorities, water boards, River basin districts and similar

National Authorities responsible for the areas of Water, Urban, Regional development, Nature, Environment, Climate Adaptation or similar

- National ministries
- Other national authorities
- National associations representing local governments, in particular smaller and medium-sized cities

European/ national city umbrella organisation

- Council of European Municipalities and Regions (CEMR)
- Eurocities
- ICLEI
- Eurotowns
- Covenant of Mayors
- URBACT

Other stakeholders

- European Economic and Social Committee
- Horizon Europe partnerships and Missions, such as water4all partnership or Mission Adaptation
- EUKN
- Other urban and spatial planning institutions dealing with WSC
- academia and research institutions, in particular dealing with the topic of WSC
- Other TPs, in particular Greening Cities

European institutions

- European Commission (DG REGIO, DG ENV, DG CLIMA, DG RTD, CoR)
- European Investment Bank (EIB)

In selecting members, it's crucial to maintain a balance, particularly addressing two key considerations:

Special attention and efforts are needed to involve **small and medium-sized cities**, acknowledging their specific issues and lower administrative capacity. Encouraging their participation can ensure they benefit from and contribute to the partnership's outcomes.

Expertise should extend to the **different European regions** (see Figure 6) represented by potential members, as water challenges vary across regions and may require region-specific solutions for place-based approaches. However, a balanced regional composition enables cross-regional exchange and learning; for example, Southern European cities' experience in managing water scarcity can inform Northern and Western European cities facing similar challenges.

1.16 Type of support required for the implementation

The Thematic Partnership is specifically supported by the EUI Secretariat. The Thematic Partnership Officer offers daily guidance and support in planning, managing, and monitoring. This includes organizing meetings and workshops, providing advice on communication and dissemination, and assisting with reporting.

During the launch phase of the partnership, the EUI Secretariat provides initiation meetings and support materials covering the UAEU governance structure and involved key actors, milestones, outputs, principles, and timelines for developing and implementing Action Plans. These meetings take place in the first three months.

In the implementation phase, each partnership can access expert days annually for three years. External experts bring specialized knowledge to assist in developing Action Plans and specific actions but are not involved in writing the plans themselves. Financial support is available for small and medium-sized cities to participate in UAEU Thematic Partnership meetings and Coordinators and Action Leaders' Meetings (CALM).

The EUI Secretariat fosters collaboration between UAEU Thematic Partnerships and other EUI work streams to create synergies by organising CALM for coordinators and action leaders to discuss implementation and related events. It also monitors UAEU development and implementation in collaboration with partnerships, integrating monitoring and reporting of past and present partnerships.

The EUI Secretariat supports the dissemination of results by facilitating synergies and organizing CALM for coordinators and action leaders to exchange information on Thematic Partnership implementation and related events. It also monitors UAEU development and integrates reporting from ongoing and future partnerships.

Apart from the specific EUI support for the Urban Agenda. The EUI offers **city-to-city exchanges** under capacity-building activities, providing short-term peer learning opportunities. Cities can define up to three visits within five months, selecting either outgoing or incoming visits based on their

needs. These can also be used by the city members of the partnership or serve as an additional information source.

Moreover, the **Network of Urban Contact Points (UCP)** provides valuable support for the partnership by offering a single network of contact points in each Member State, operating in the national language(s). Established by the European Urban Initiative, the UCP aims to engage more urban policymakers and practitioners at local, regional, and national levels in the activities of the EUI and the UAEU while strengthening connections across EU, national, regional, and local levels. While UCPs do not serve as direct partners in the Thematic Partnerships, they assist with the communication efforts of the UAEU TP and help promote and disseminate the results achieved.

Knowledge exchange and capacity building by URBACT and other EU and national initiatives could be highly supportive. In addition to European also national funding streams could help implementing certain WSC actions proposed by the TP.

1.17 Opportunity to launch a partnership

While comprehensive knowledge on possible solutions is available and different EU and national policies, initiatives and regulations offer already various opportunities for implementing WSC a broad implementation in particular at city scale remains a challenge for cities. The magnitude of the task cannot be understated. Effecting a paradigm shift, especially in already established urban settings, poses significant implementation challenges. It requires a concerted effort involving multi-level governance to empower cities to adopt measures conducive to water sensitive design. Bridging the gap between vision and implementation demands a comprehensive approach that connects disparate elements and fills in the necessary gaps. This entails concerted multi-level action, leveraging diverse resources and expertise.

The challenges in transitioning towards becoming a Water Sensitive City appear to be rather problems with putting solutions into action and governance than a shortage of solutions themselves. Therefore, it is time to direct efforts towards harnessing the potential of available resources in terms of knowledge on multiple technical solutions, actively using and extending existing regulations and funding. The EU Cohesion Funds provide funding across various specific policy objectives, with discussions on Cohesion Policy post-2027 and other cross-sector and sector policies and initiatives presenting opportunities to advance the development of water sensitive cities. It is crucial to integrate cities' needs for becoming more water sensitive into these ongoing and future policy plans. By doing so, we can ensure that these concepts are not only recognized but also actively implemented within urban planning frameworks. This approach is vital to prevent poorly designed cities from becoming challenging to change in the future.

Simultaneously, the TP can play a significant role in organizing the various opportunities and avenues for implementing the Water Sensitive City concept by framing them within a holistic perspective. This approach offers a foundation for systematically addressing any remaining gaps. With this comprehensive outlook, the TP can serve as a central hub for cities and their supporters, simplifying

access to the topic. This will also enhance the effectiveness and efficiency of efforts to promote the Water Sensitive City concept across Europe.

In addition, being proactive in identifying and capitalizing on "windows of opportunity" is crucial. This necessitates foresight and preparedness to seize moments when political, economic, or social conditions align favourably for advancing the agenda on Water Sensitive City. This concerns the policy developments delayed or on hold like the Nature Restoration Law, the Water resilience initiative of the EC as well as preparing the ground for entering and supporting upcoming initiatives like for a Blue Deal or eventual windows of opportunities to integrate water sensitivity into building regulations or circular economy approaches.

In essence, establishing a Thematic Partnership could offer a strategic platform for coordinating efforts, closing gaps, and advancing a comprehensive approach to a Water Sensitive City. This initiative goes beyond recognizing the need for change to actively pursue a sustainable and resilient urban future.

1.18 Territorial Impact Assessment

Since 2013, the European Committee of the Regions (CoR) has utilized Territorial Impact Assessments (TIA) to analyse potential asymmetric territorial impacts of EU policies and legislative proposals. The Territorial Impact Assessment Strategy of 2023 focuses on two main objectives: (a) providing CoR rapporteurs with pertinent analysis and information to enhance the territorial perspective of CoR opinions. (b) Promoting TIA across European institutions as a key component of Better Regulation. The CoR's TIA initiatives are overseen by the COTER secretariat in close collaboration with other commission secretariats.[96]

Promoting Water Sensitive City implementation addresses shared challenges, albeit with their distinct variations, such as the geophysical differences in water balance across European regions, the impacts of climate change, and variations in land use patterns. Anticipated significant impacts encompass infrastructure, health and safety, as well as natural hazards. The impacts of EU policies may vary for different cities depending on their underlying territorial differences.

So far, no Territorial Impact Assessment (TIA) on the specific topic Water Sensitive City in Europe has been conducted. One TIA “Urban Impact Assessment - Implementation of the 2030 Agenda; The influence of SDG 11.3 on urban development through spatial planning” from June 2018 touches however one aspect of the Water Sensitive City concept. In this assessment, "urban flood risk" has been selected as the safety-related indicator depicting potential territorial impacts. Experts debated the impact of SDG 11.3 on flood risk in urban areas. Six experts saw a strong positive influence, three saw a weak positive influence, five saw a weak negative effect, and two saw no impact. Sensitivity to flood risk is considered natural exposure and city vulnerability. Regions with higher flood risk were expected to be more responsive to flood policies. Given the split in expert opinions, no trend map was provided.[97]

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Annex 1: Interviews Commission Services

Organisation	Name	Interview date
European Commission DG REGIO	Inclusive Growth, Urban and Territorial Development	12/01/2024
European Commission DG ENV	Clean Air & Urban Policy	29/02/2024
European Commission DG RTD	Strategy, Policy Coordination & Urban Transitions	28/02/2024
European Commission DG CLIMA	Climate Adaptation, Mission Adaptation secretariate	12/01/2024
European Commission DG JRC	Ocean and Water unit	10/01/2024
European Commission DG CLIMA	Climate Adaptation	12/01/2024
European Commission DG ENER	Energy transition and local governance	09/01/2024
European Environment Agency	Urban adaptation to climate change	12/03/2024
CINEA, LIFE		03/01/2024
Driving Urban Transitions Partnership	Transition Pathway „Circular Urban Economies"	06/03/2024

Guiding questions used in the interviews with Commission Services

Based on the research questions listed in Table 2, the questions for the interviews have been tailored:

1. How do your organisation's / your unit's tasks relate to the topic of Water Sensitive City? How does that support cities?
2. In your unit / organisation, what are ongoing relevant key processes, activities (regulation, policies, funding, capacity building …)? What are your strategic priorities for the future in this regard?
3. How do you collaborate across the different topics related to water sensitive design with other DGs and organisations?
4. How do the activities connect to national, regional and local level action in this field? Do you have a method for multi-level coordination?
5. Can you name examples of good practice supporting or implementing water sensitive design in cities at national and/or local level?
6. Where do you see (further) challenges in effectively supporting cities? What could be actions to tackle these, in particular, what role could the up-coming Thematic Partnership of the Urban Agenda Water Sensitive City play?
7. Which key processes, documents, tools, data should the Ex-Ante Assessment consider? Which other organisations, initiatives or persons would you recommend consulting?

Annex 2: Examples of Water Indicators

1.19 OECD water governance

OECD Principles of water governance

1. Clearly allocate and distinguish roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster co-ordination across these responsible authorities.
2. Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions, and foster co-ordination between the different scales.
3. Encourage policy coherence through effective cross-sectoral co-ordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use
4. Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met, and to the set of competencies required to carry out their duties
5. Produce, update, and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy
6. Ensure that governance arrangements help mobilise water finance and allocate financial resources in an efficient, transparent and timely manner
7. Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest
8. Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders
9. Mainstream integrity and transparency practices across water policies, water institutions and water governance frameworks for greater accountability and trust in decision-making
10. Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation
11. Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations
12. Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments when needed[14]

OECD Water Governance Indicator Framework

The Water Governance Indicator Framework of OECD is composed of a **Traffic light system** of 36 water governance indicators (input and process) and a **Checklist** containing 100+questions on water governance. [15]

Principle	Indicators
Principle 1: Roles and responsibilities	**Indicator 1.a:** Existence and level of implementation of a water law **Indicator 1.b:** Existence and functioning of ministry, line ministry, central agency with core water-related responsibilities for policy making **Indicator 1.c:** Existence and implementation of mechanisms to review roles and responsibilities, to diagnose gaps and adjust when need be
Principle 2: Appropriate scale(s)	**Indicator 2.a:** Existence and level of implementation of integrated water resources management policies and strategies **Indicator 2.b:** Existence and functioning of institutions managing water at the hydrographic scale **Indicator 2.c:** Existence and level of implementation of co-operation mechanisms for the management of water resources across water-related users and levels of government from local to basin, regional, national and upper scales
Principle 3: Policy coherence	**Indicator 3.a:** Existence and level of implementation of cross-sectoral policies and strategies promoting policy coherence between water and key related areas, in particular environment, health, energy, agriculture, land use and spatial planning **Indicator 3.b:** Existence and functioning of an inter-ministerial body or institutions for horizontal co-ordination across water-related policies **Indicator 3.c:** Existence and level of implementation of mechanisms to review barriers to policy coherence and/or areas where water and related practices, policies or regulations are misaligned
Principle 4: Capacity	**Indicator 4.a:** Existence and level of implementation of hiring policies based on a merit-based and transparent professional and recruitment process of water professionals independent from political cycles **Indicator 4.b:** Existence and functioning of mechanisms to identify and address capacity gaps in water institutions **Indicator 4.c:** Existence and level of implementation of educational and training programmes for water professionals
Principle 5: Data and information	**Indicator 5.a:** Existence and functioning of updated, timely shared, consistent and comparable water information systems **Indicator 5.b:** Existence and functioning of public institutions, organisations and agencies in charge of producing, co-ordinating and disclosing standardised, harmonised and official water-related statistics **Indicator 5.c:** Existence and level of implementation of mechanisms to identify and review data gaps, overlaps and unnecessary overload
Principle 6: Finance	**Indicator 6.a:** Existence and level of implementation of governance arrangements that help water institutions collect the necessary revenues to meet their mandates and drive water-sustainable and efficient behaviours **Indicator 6.b:** Existence and functioning of dedicated institutions in charge of collecting water revenues and allocating them at the appropriate scale **Indicator 6.c:** Existence and level of implementation of mechanisms to assess short-, medium- and long-term investment and operational needs and ensure the availability and sustainability of such finance
Principle 7: Regulatory frameworks	**Indicator 7.a:** Existence and level of implementation of a sound water management regulatory framework to foster enforcement and compliance, achieve regulatory objectives in a cost-effective way, and protect the public interest **Indicator 7.b:** Existence and functioning of dedicated public institutions responsible for ensuring key regulatory functions for water services and resources management **Indicator 7.c:** Existence and level of implementation of regulatory tools to foster the quality of regulatory processes for water management at all levels
Principle 8: Innovative water governance practices	**Indicator 8.a:** Existence and level of implementation of policy frameworks and incentives fostering innovation in water management practices and processes **Indicator 8.b:** Existence and functioning of institutions encouraging bottom-up initiatives, dialogue and social learning as well as experimentation in water management at different levels **Indicator 8.c:** Existence and level of implementation of knowledge and experience-sharing mechanisms to bridge the divide between science, policy and practice
Principle 9: Integrity and transparency	**Indicator 9.a:** Existence and level of implementation of legal and institutional frameworks (not necessarily water-specific) on integrity and transparency which also apply to water management at large **Indicator 9.b:** Existence and functioning of independent courts (not necessarily water-specific) and supreme audit institutions that can investigate water-related infringements and safeguard the public interest **Indicator 9.c:** Existence and level of implementation of mechanisms (not necessarily water-specific) to identify potential drivers of corruption and risks in all water-related institutions at different levels, as well as other water integrity and transparency gaps
Principle 10: Stakeholder engagement	**Indicator 10.a:** Existence and level of implementation of legal frameworks to engage stakeholders in the design and implementation of water-related decisions, policies and projects **Indicator 10.b:** Existence and functioning of organisational structures and responsible authorities to engage stakeholders in water-related policies and decisions **Indicator 10.c:** Existence and level of implementation of mechanisms to diagnose and review stakeholder engagement challenges, processes and outcomes
Principle 11: Trade-offs across water users, rural and urban areas, and generations	**Indicator 11.a:** Existence and level of implementation of formal provisions or legal frameworks fostering equity across water users, rural and urban areas, and generations **Indicator 11.b:** Existence and functioning of an Ombudsman or institution(s) to protect water users, including vulnerable groups **Indicator 11.c:** Existence and level of implementation of mechanisms or platforms to manage trade-offs across users, territories and/or over time in a non-discriminatory, transparent and evidence-based manner
Principle 12: Monitoring and evaluation	**Indicator 12.a:** Existence and level of implementation of policy frameworks promoting regular monitoring and evaluation of water policy and governance **Indicator 12.b:** Existence and functioning of institutions in charge of monitoring and evaluation of water policies and practices and able to help adjust where need be **Indicator 12.c:** Existence and level of implementation of monitoring and evaluation mechanisms to measure to what extent water policy fulfils the intended outcomes and water governance frameworks are fit-for-purpose

1.20 European Water Atlas Indicators

Indicator 1 – Secondary WWT Waste Water Treatment (WWT)
Indicator 2 – Tertiary Waste Water Treatment (WWT)
Indicator 3 - Groundwater quality
Indicator 4 - Solid waste collected
Indicator 5 - Solid waste recycled
Indicator 6 - Solid waste energy recovered
Indicator 7 - Access to drinking water
Indicator 8 - Access to sanitation
Indicator 9 - Drinking water quality
Indicator 10 - Nutrient recovery (from Wastewater Treatment):
Indicator 11 - Energy recovery
Indicator 12 - Sewage sludge recycling
Indicator 13 - Energy efficiency Waste Water Treatment (WWT)
Indicator 14 – Average age sewer
Indicator 15 - Operating cost recovery
Indicator 16 - Water system leakages
Indicator 17 - Stormwater separation
Indicator 18 - Green space
Indicator 19 - Climate adaptation
Indicator 20 - Drinking water consumption
Indicator 21 - Climate-robust buildings
Indicator 22 – Management and action plans (of integrated water resources management
Indicator 23 - Public participation (in voluntary organisations and societies of all types)
Indicator 24 - Water-efficiency measures
Indicator 25 – Attractiveness (the use of water elements in the creation of the urban landscape [90]

Annex 3: Sources for projects and case studies on Water Sensitive City

Source	Explanation
Climate -ADAPT	The European Climate Adaptation Platform Climate-ADAPT is a partnership between the European Commission and the European Environment Agency (EEA).Climate-ADAPT is a comprehensive platform to support Europe in adapting to climate change helping users to access and share data and information. https://climate-adapt.eea.europa.eu/en
OPPLA	Oppla is the EU Repository of Nature-Based Solutions. It provides a knowledge marketplace, where the latest thinking on natural capital, ecosystem services and nature-based solutions is brought together. https://oppla.eu/
Network Nature	NetworkNature is a resource for the Nature-based Solutions (NbS) community, creating opportunities for local, regional and international cooperation to maximise the impact and spread of Nature-based Solutions. https://networknature.eu/
Urban Governance Atlas	The Urban Governance Atlas is a collection of more than 250 good practice policy instruments supporting nature-based solutions and ecosystem restoration. https://interlace-hub.com/urban-governance-atlas
UIA	Urban Innovative Actions has supported urban authorities to experiment with bold and innovative solutions to urban challenges. Check here the selected projects. Among the thematic topics have been climate adaptation, circular economy, sustainable land use and nature-based solutions. https://www.uia-initiative.eu/en/uia-cities
Portico / EUI	Portico is the European urban knowledge platform developed by the European Urban Initiative (EUI) and funded by the European Union, to support better urban policy and strategy design, implementation, and mainstreaming. https://portico.urban-initiative.eu/

URBACT	An URBACT network brings together EU cities willing to exchange ideas and produce integrated local policies. Among the networks' topics are climate action, circular economy and urban planning and urban design. https://urbact.eu/
LIFE	The LIFE Programme is the EU's funding instrument for the environment and climate action. The database includes projects on climate adaptation, circular economy and nature and biodiversity https://cinea.ec.europa.eu/our-projects_en
Horizon 2020	Horizon 2020 was the EU's research and innovation funding programme from 2014-2020 and included projects and case studies on nature-based solutions, climate change, water management, sustainable urban development and other topics related to WSC. Projects can be searched at CORDIS or OPPLA. https://cordis.europa.eu/
Horizon Europe	Horizon Europe is the EU's key funding programme for research and innovation. It tackles climate change, helps to achieve the UN's Sustainable Development Goals and boosts the EU's competitiveness and growth. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en