



**RIVER UNIVERSITY**

11 - 15 July 2022

Estonia

# CLIMATE CHANGE AND URBAN WATER INFRASTRUCTURE: CHALLENGES AND SOLUTIONS

*Coalition  
Clean Baltic*

Co-organized by



EESTI VEEÜHING  
ESTONIAN WATER ASSOCIATION

Funded by



**Dr. MARIA FALALEEVA**

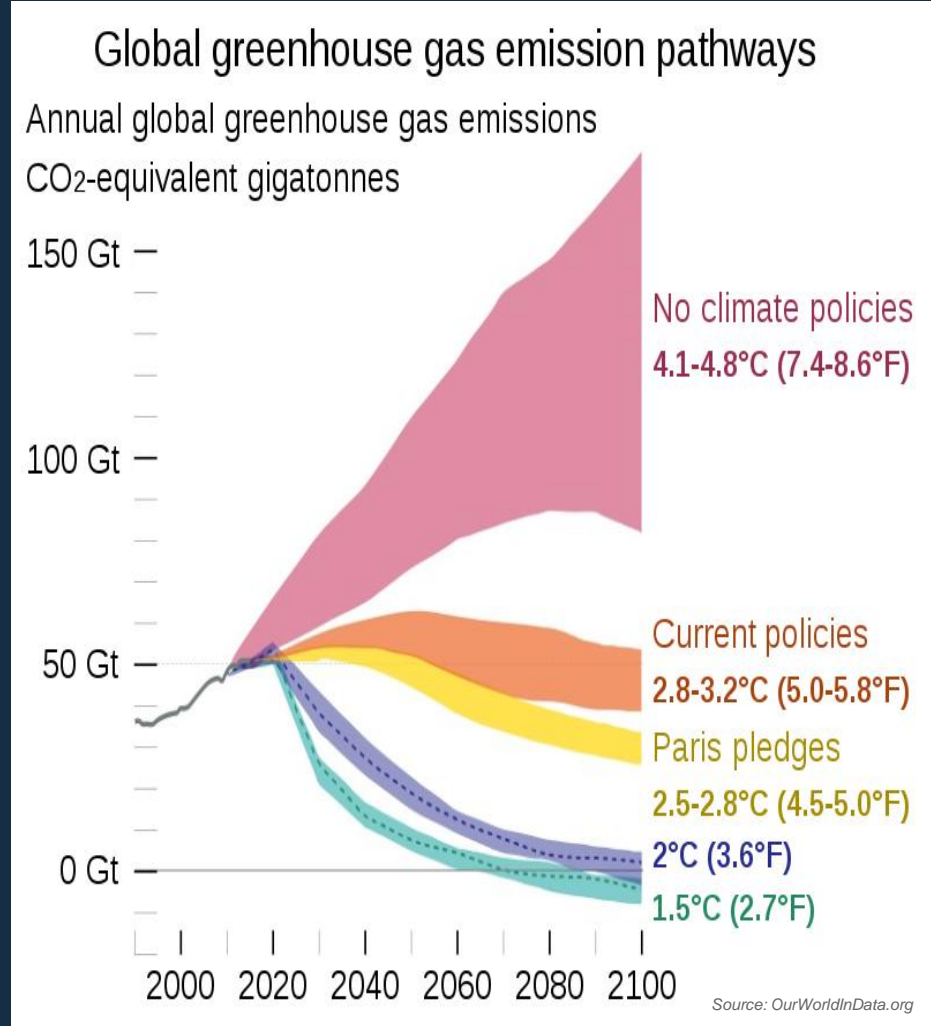
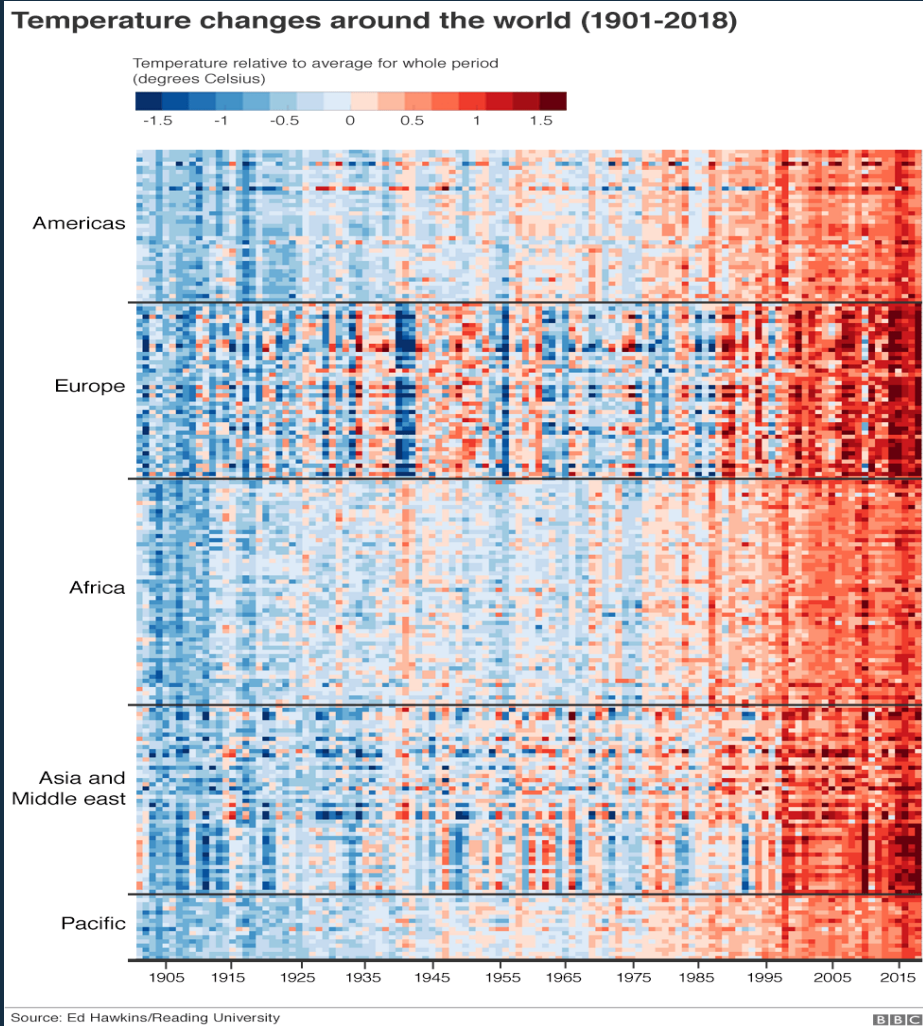
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# Water in the City: where is it in SDGs?



*Please, write relevant SDG(s) in the chat box*

Climate change is on-going process and important risk.  
 So far, we do not meet “relatively safe” GHG emission reduction target for +1.5°/+ 2° C in 2100.



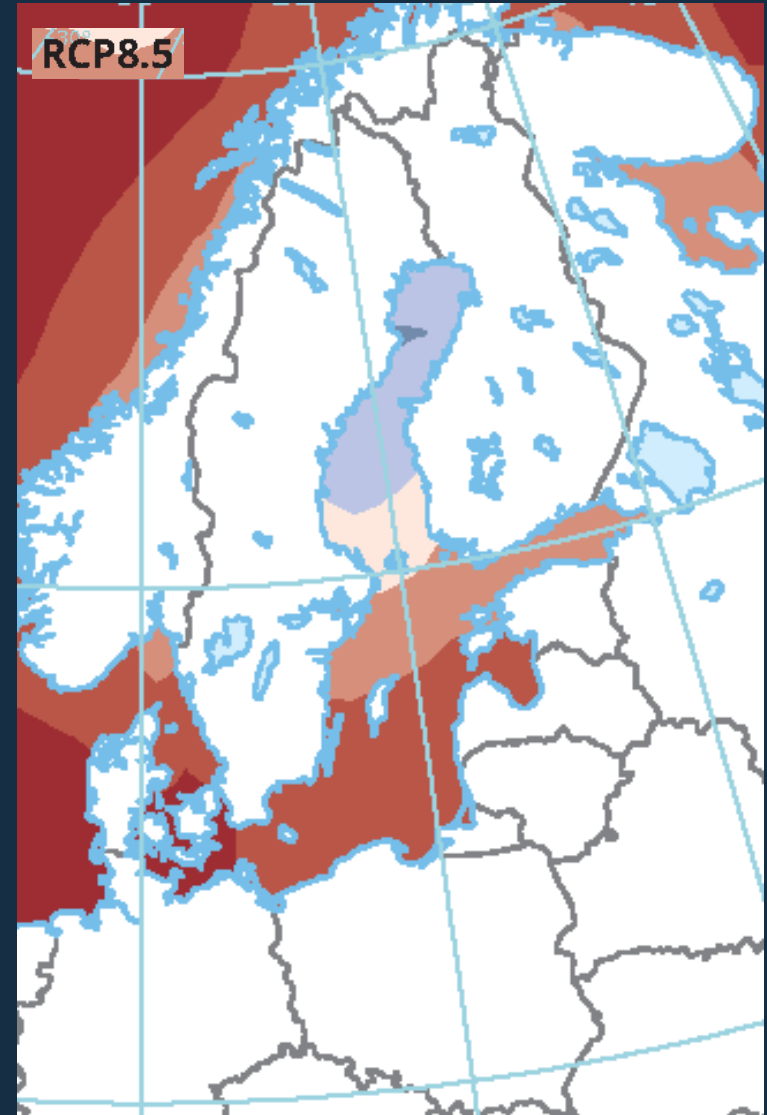
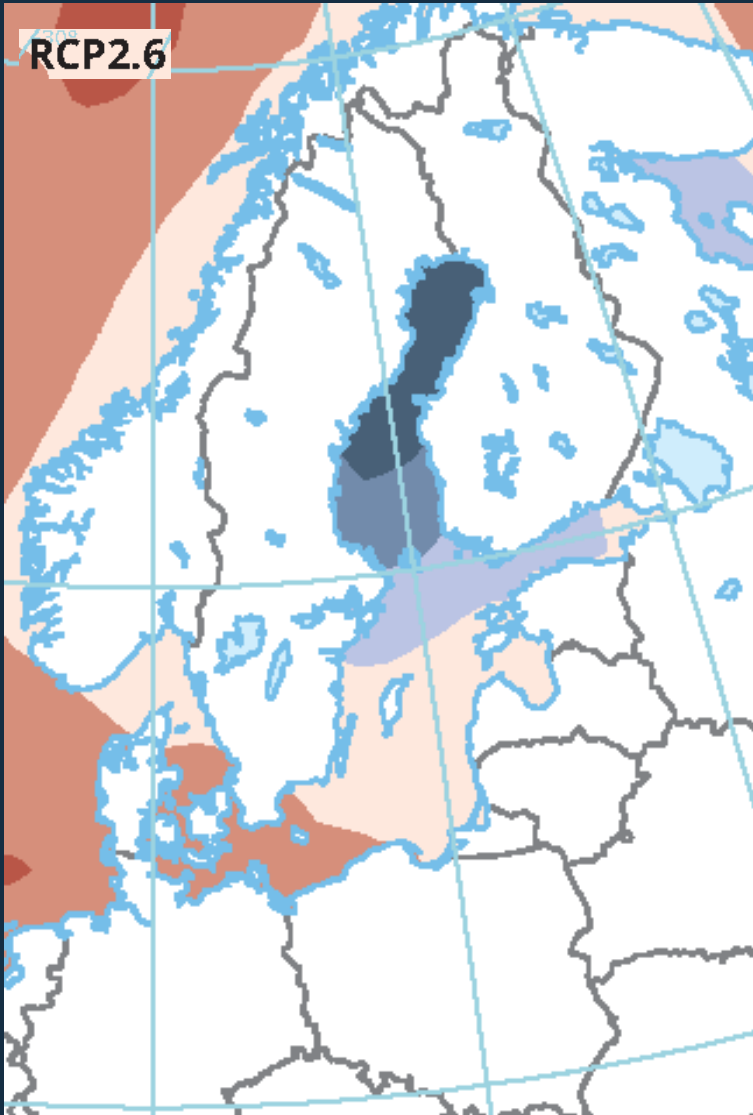
1.

# Baltic Sea Region

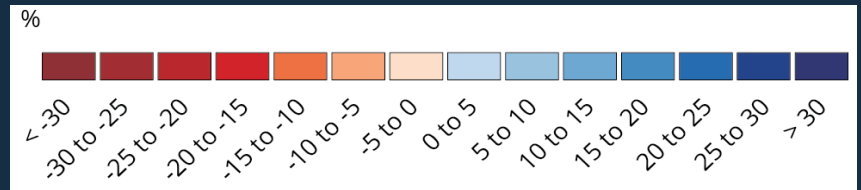
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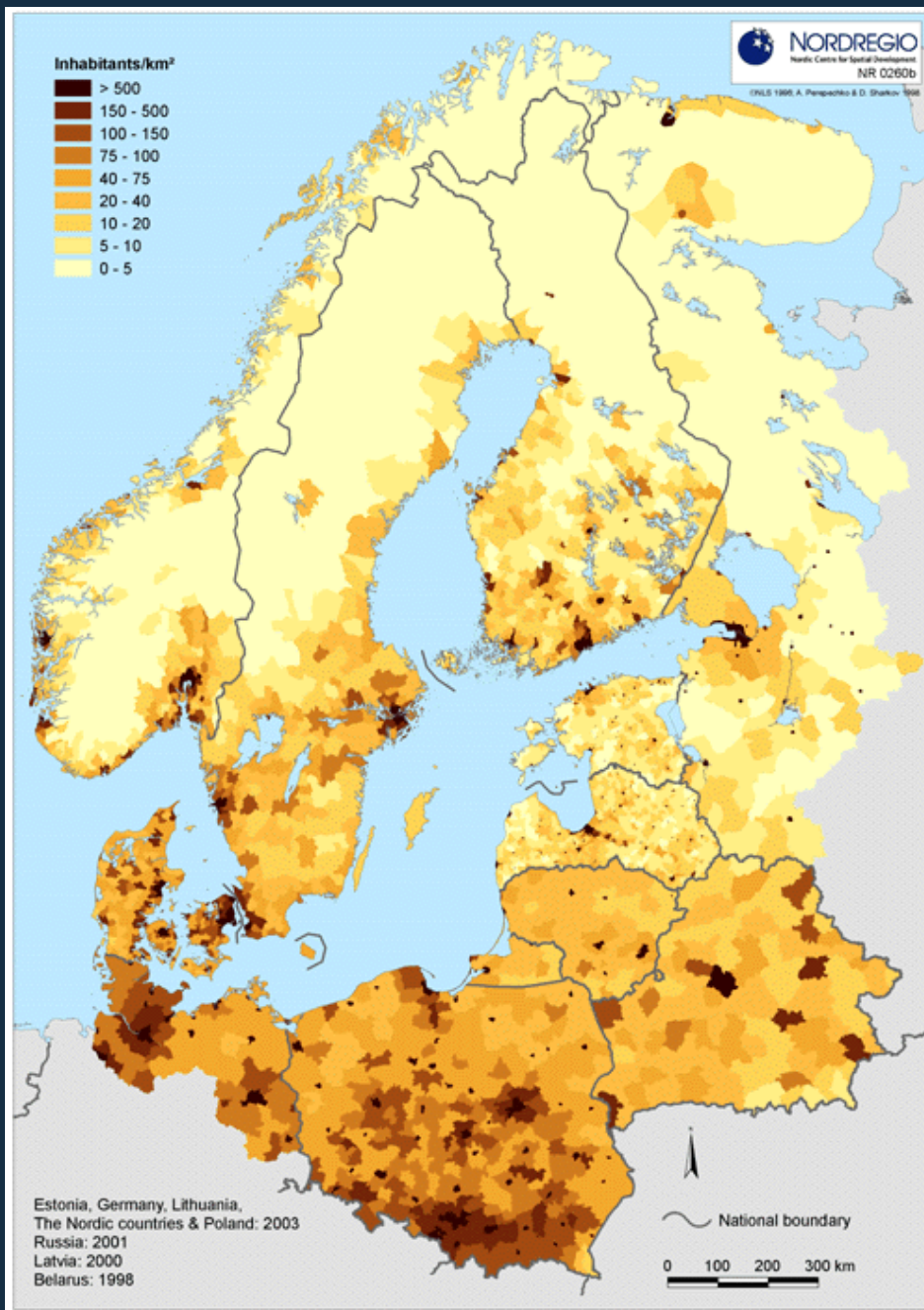


Projected relative  
**sea level change for 2081–2100**  
for two scenarios of global warming, *EEA 2019*



Projected change in maximum 100-year  
**daily river discharge**  
for two scenarios of global warming, *EEA 2019*





## POPULATION DENSITY and URBAN AREAS

63% in urban areas (50k+ population)

Urbanisation and a rapidly shrinking rural areas

Distribution of the urban areas in BSR (coastal, in-land) and geographical conditions causes variety of impacts

Most of the urban areas in the countries / regions of BSR with access to the coast are coastal cities



*How BSR cities can respond to uncertain and controversial changes and become **climate resilient** and water-wise?*



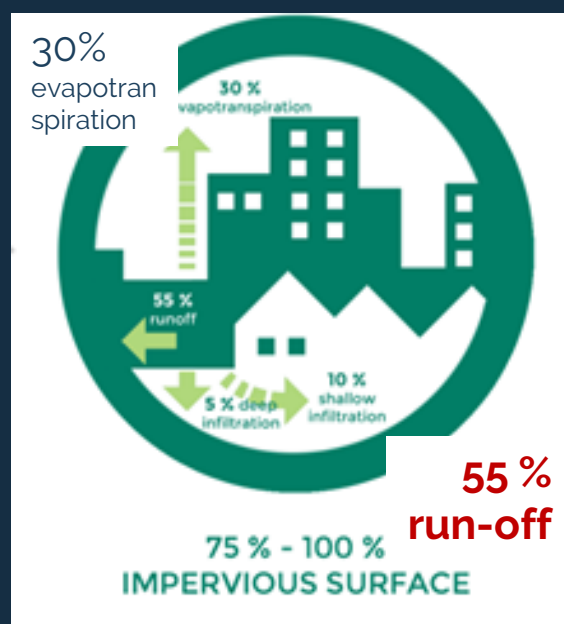
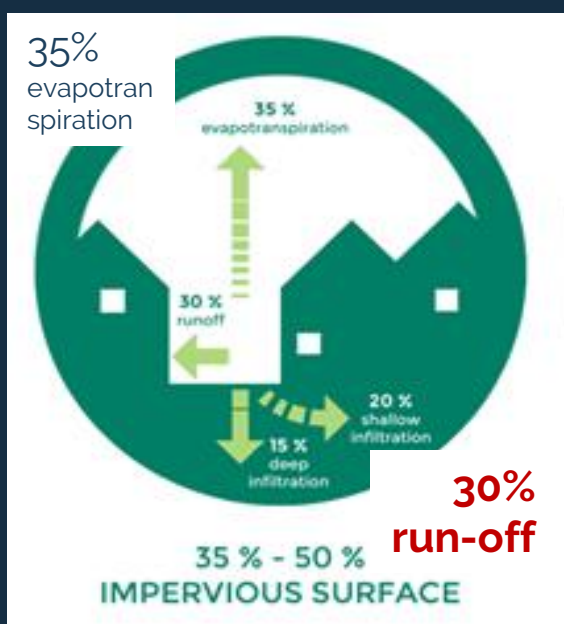
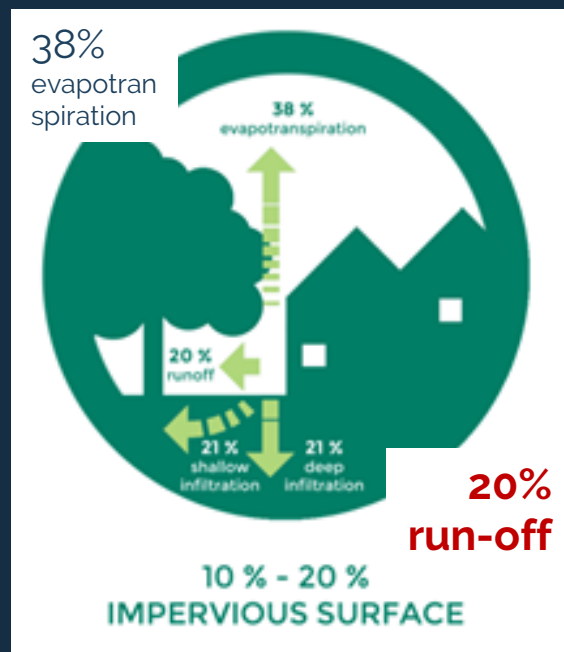
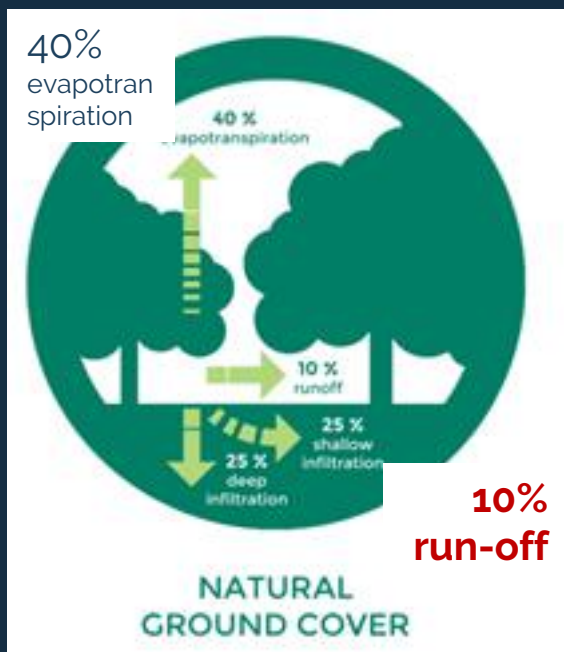
2.

CLIMATE IMPACTS ON  
URBAN WATER  
INFRASTRUCTURE

 Too little water

 Too much water

 Water quality



Resilience and effectiveness of water infrastructure

- ▷ Climate
- ▷ Location
- ▷ Urban structure
- ▷ Urban surface
- ▷ Urban development
- ▷ Water management

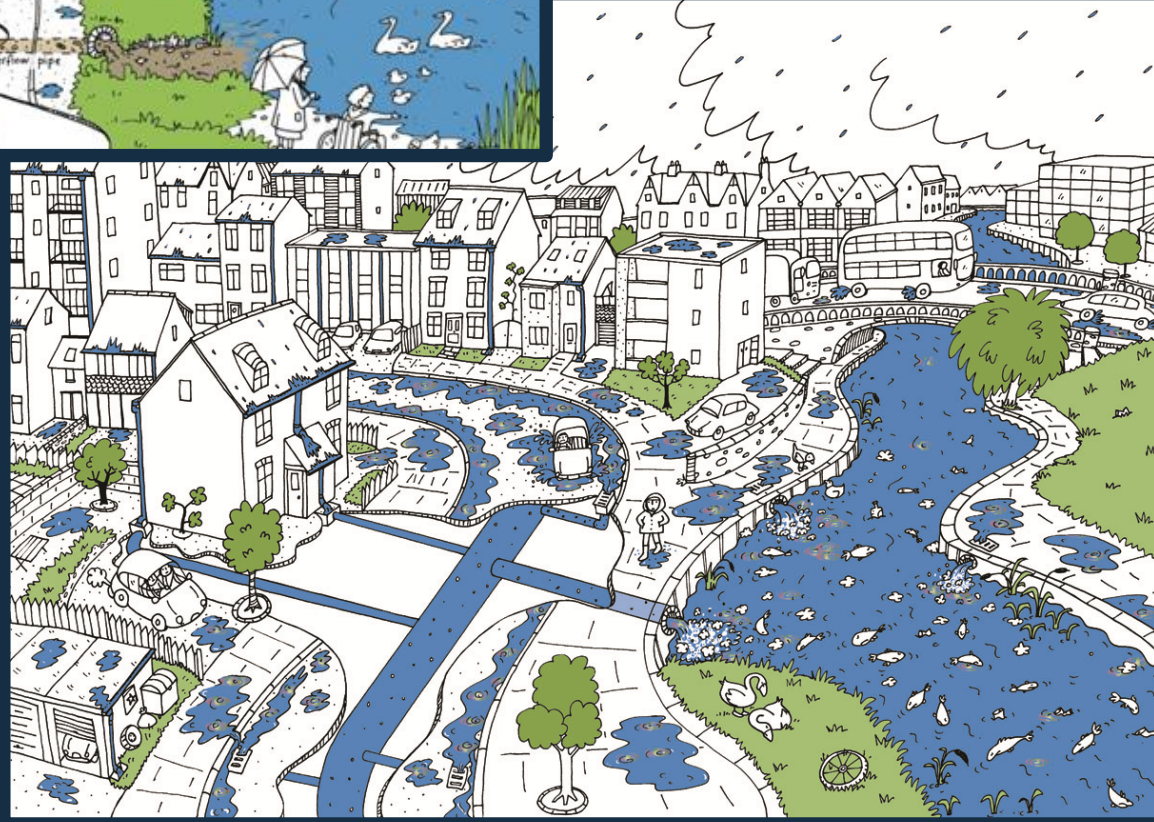


Direct run-off of storm water may cause flood and pollution

The most significant floods in cities are due to:

combination of factors (e.g. coastal surge and heavy rains)

deficiencies of sewage system (urban floods)



# Water infrastructure

About 4% of the global energy

conveyance,  
treatment, purification

**Methane**

34 x effect of CO<sub>2</sub>

waster water  
treatment, untreated  
sewage

**Nitrogen Oxide**

298 x effect of CO<sub>2</sub>

waster water  
treatment, untreated  
discharge in rivers



Carbon Emissions  
from non-optimised  
wastewater  
management

Carbon Emissions  
from energy when  
produced from  
fossil fuels

Energy requirements  
for conveyance,  
treatment,  
heating

**Business as usual aggravating the impacts of climate change**

We need to

**adapt** to new conditions while  
increasing water quality for growing  
number of people

**mitigate** effects of climate  
change by reducing GHG emission

3.

SOLUTIONS

# Integrity and complexity in water management

- ▷ (not) too little + (not) too much + water quality
- ▷ climate adaptation + climate mitigation
- ▷ gray + green + soft measures
- ▷ urban development + climate resilience
- ▷ local knowledge + innovation
- ▷ city administration + public + business + ...



# Sustainable Urban Drainage Systems (SUDS)

Nature-Based Solution (NBS) / Ecosystem Services



Rain gardens

Rain water harvesting

Temporary flooded spaces

Permeable surfaces

Green roofs



# GHG emission reduction



**Improve energy efficiency**

up to - 40% GHG

**Improve water efficiency**

up to - 50% GHG

**Reuse nutrients**

up to - 20% GHG

**Recover energy**

up to - 90% GHG

**Treat more wastewater**

up to - 100% GHG

# Water-wise cities



5 Building Blocks

Vision	Governance	Knowledge & Capacity	Planning Tools	Implementation Tools



### 1 Regenerative Water Services

- Replenish Waterbodies and their Ecosystems
- Reduce the Amount of Water and Energy Used
- Reuse and Use Diverse Sources of Water
- Apply a Systems Approach for Integration with Other Services
- Increase the Modularity of Systems for Multiple Options

### 2 Water Sensitive Urban Design

- Enable Regenerative Water Services
- Design Urban Space to Reduce Flood Risk
- Enhance Livability with Visible Water
- Modify and Adapt Urban Materials to Minimise Environmental Impact

### 3 Basin Connected Cities

- Secure Water Resources and Plan for Drought Mitigation
- Protect the Quality of Water Resources
- Plan for Extreme Events

### 4 Water Wise Communities

- Empowered Citizens
- Incentivized Professionals
- Transdisciplinary Planning Teams
- Progressive Policy Makers
- Leaders that Engage and Engender Trust

4.

EXAMPLES

# Green and blue corridor in Skanste neighbourhood of Riga city

2021-2021

6 274 000 EUR

“The **multi-functional green-and-blue corridor**, having roughly the same costs, offers much greater benefits compared with the traditional sewer systems”

<https://www.balticwaterhub.net/good-practice/green-blue-corridor-skanste>



# Stormwater management in Stockholm city Surface water for trees

2009-2017

- 3 layers in the ground: pavement, geotextile, crush rock for infiltration of surface water and for airing the soil and granite stones
- system for collecting water from pavements and conveying it to trees

<https://www.balticwaterhub.net/good-practice/stormwater-management-stockholm>

<https://www.ikt.de/wp-content/uploads/2014/10/16-05-almem-embren-trees-stormwater-management-stockholm.pdf>





**Solutions from your city?**



**Challenges for your city?**



**Insights for your city?**



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MORE INFORMATION:

BALTIC  
SMART  
WATER HUB

<https://www.balticwaterhub.net>

PLATFORM  
BSR WATER

<http://www.bsrwater.eu>



**New City for New Climate  
Disource, 2020**