From barriers to benefits: clustering grey, green and blue

Bruges climate adaptation plan

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3 April 2019
Water Resilient Cities

BRUGGE

west-vlaanderen
de gedreven provincie

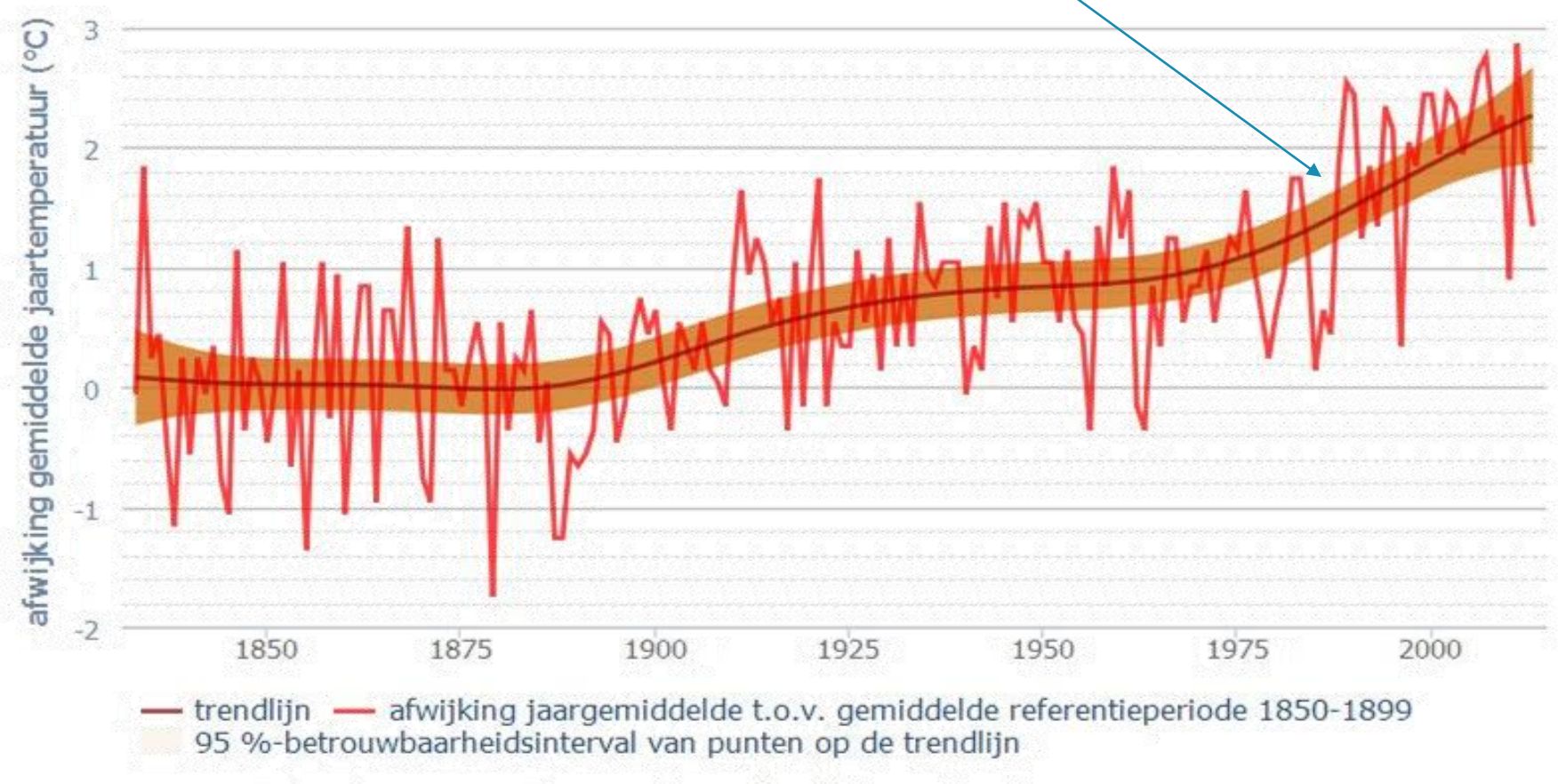
Interreg
2 Seas Mers Zeeën
Water Resilient Cities
European Regional Development Fund

Sumaqua

Our climate is becoming more extreme…

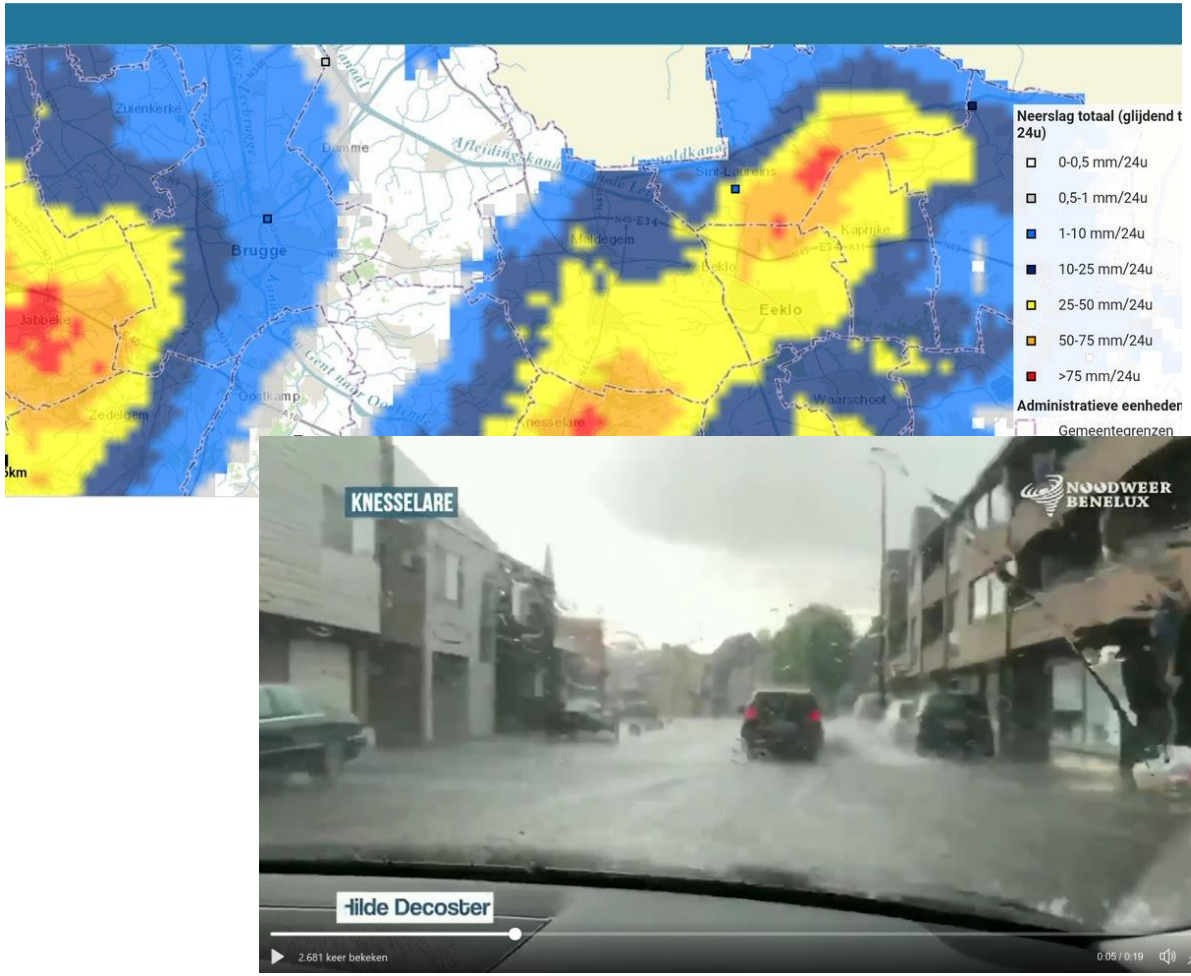
Historical analysis: it's getting warmer

The average temperature in Uccle has increased with ~2°C since 1900



More frequent and extreme storms

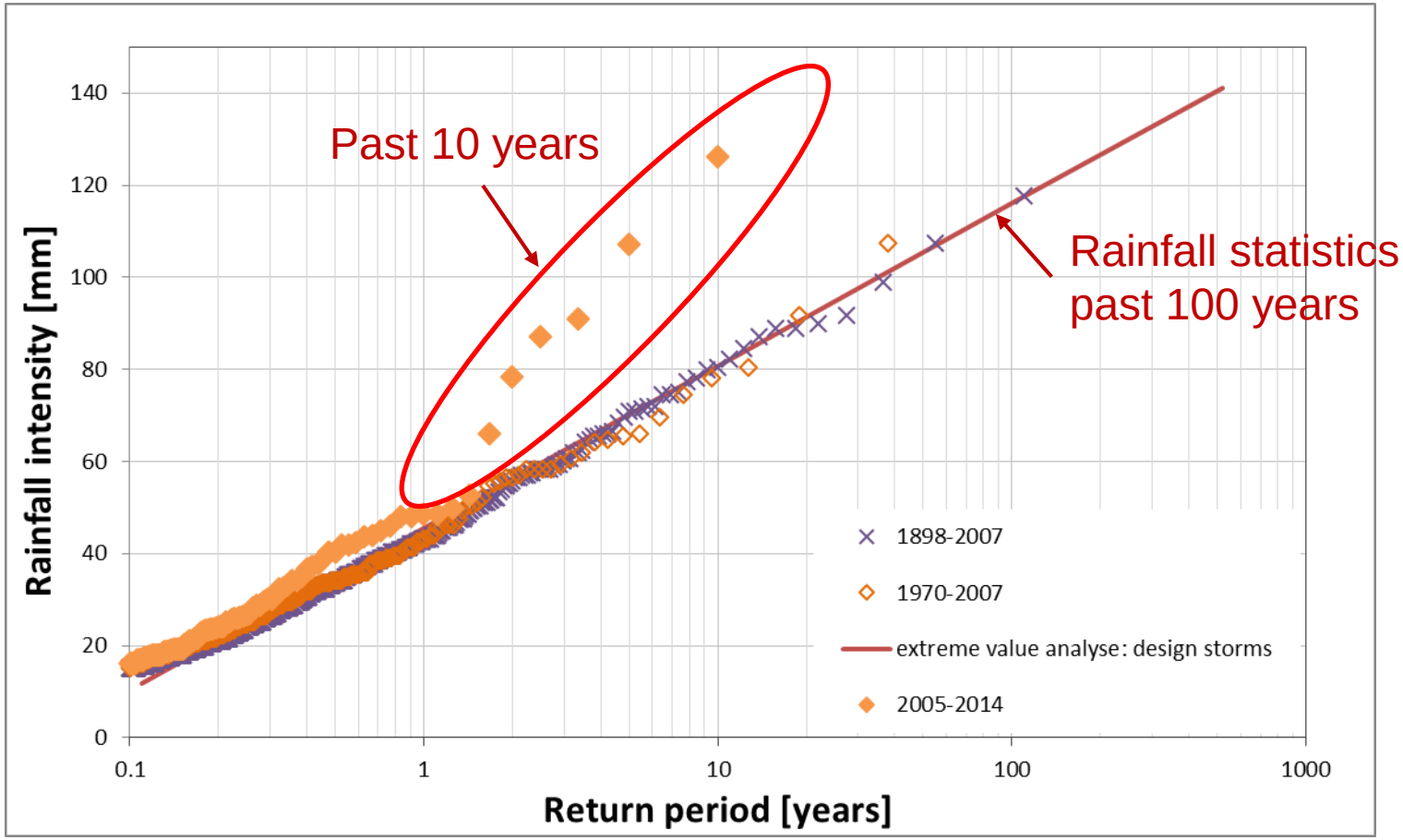
Knesselare & Sint-Laureins, 27 May 2018, >75 mm



Aalter, 24 mei 2018, 85 mm in 90 min.

More frequent and extreme storms

Uccle rain gauge (Brussels): 10-minutes rainfall extremes since 1898:

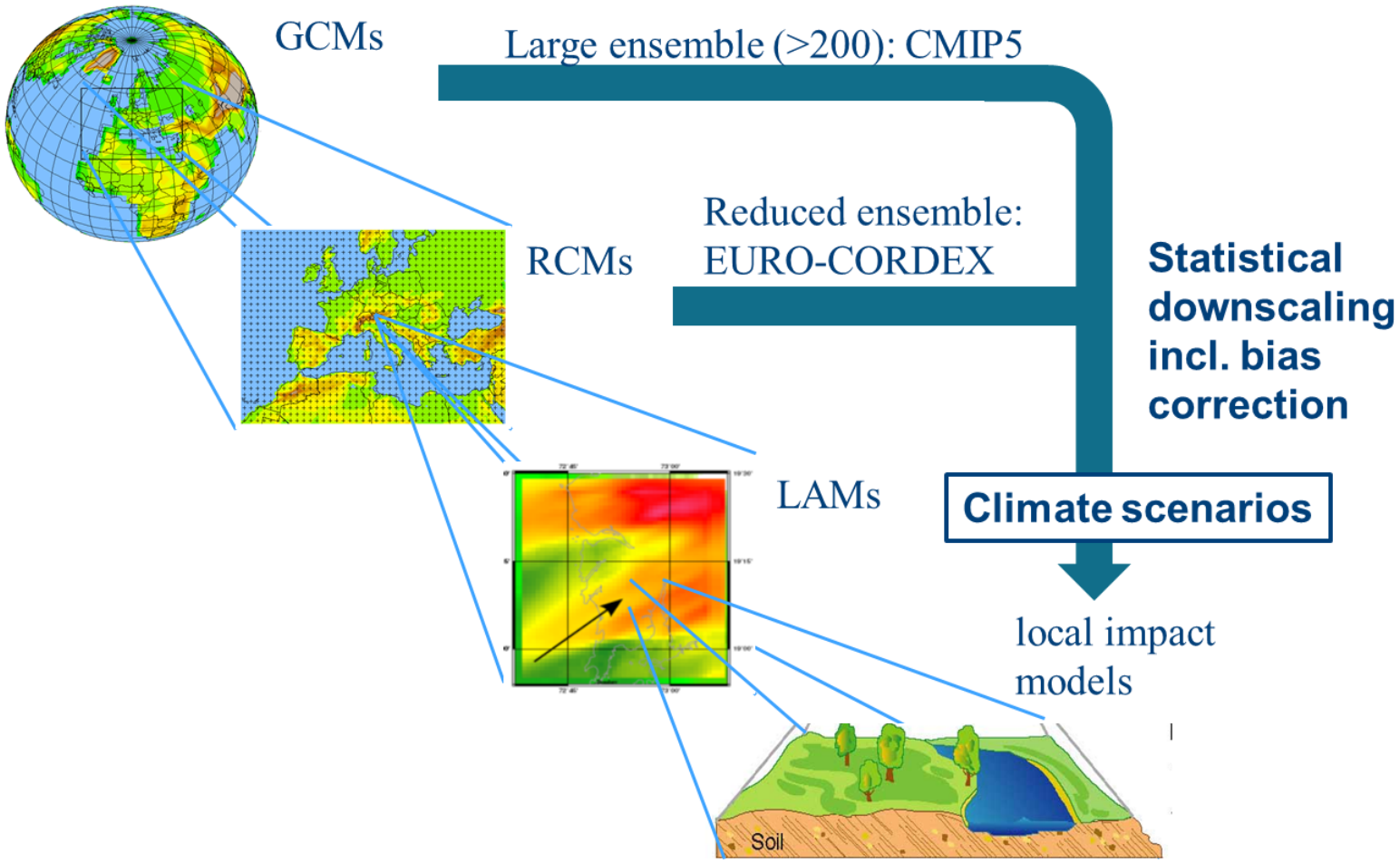


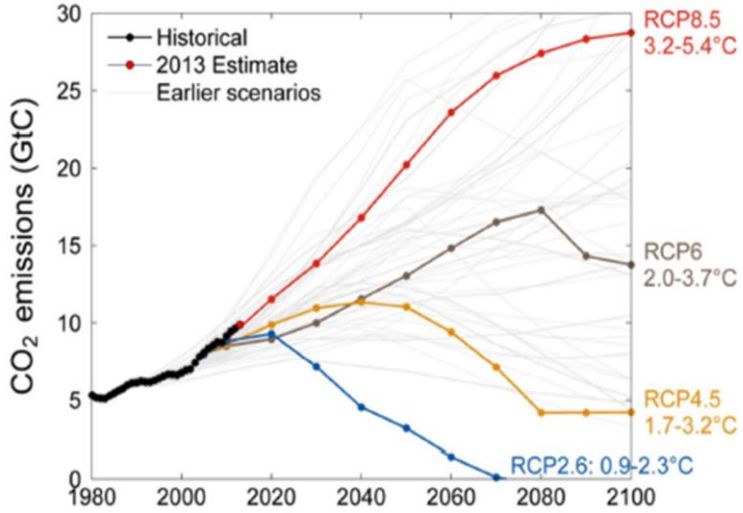
Drought and heat have impact the historical center of Bruges

- Blue-green algae in canals
- Ban on swimming in the canals
- Significant decrease of population of native crab species
- …

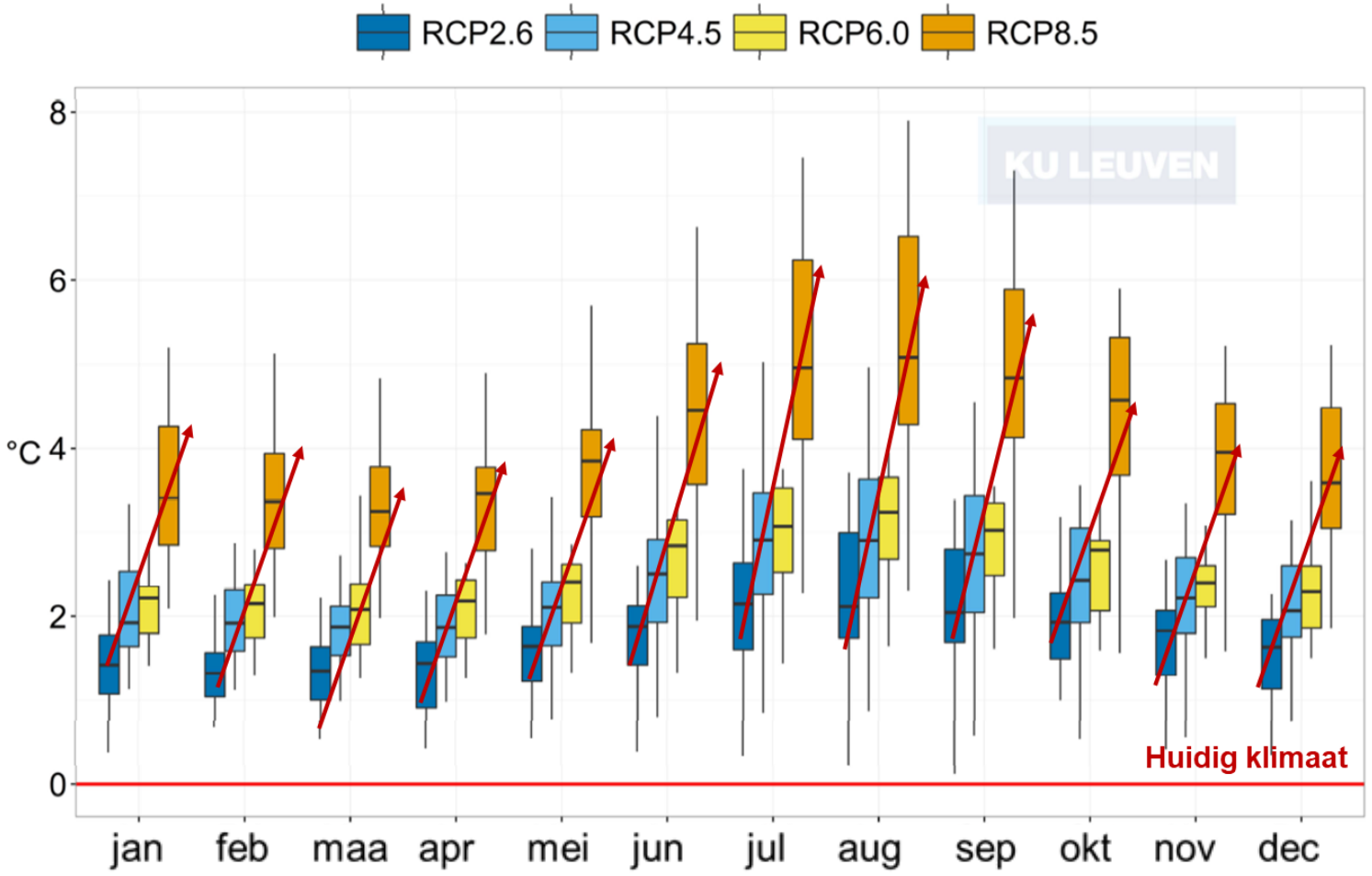
What does the future hold?

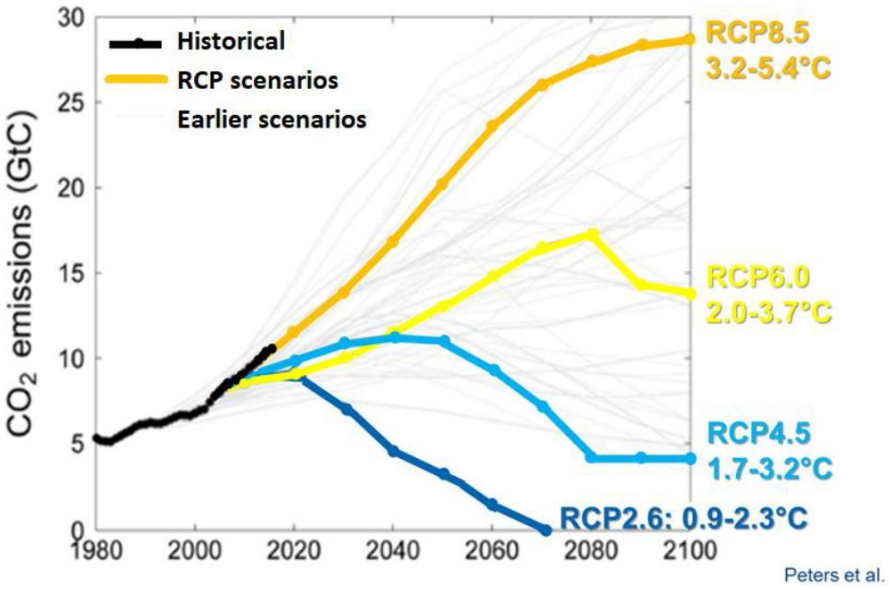
Models to forecast the future



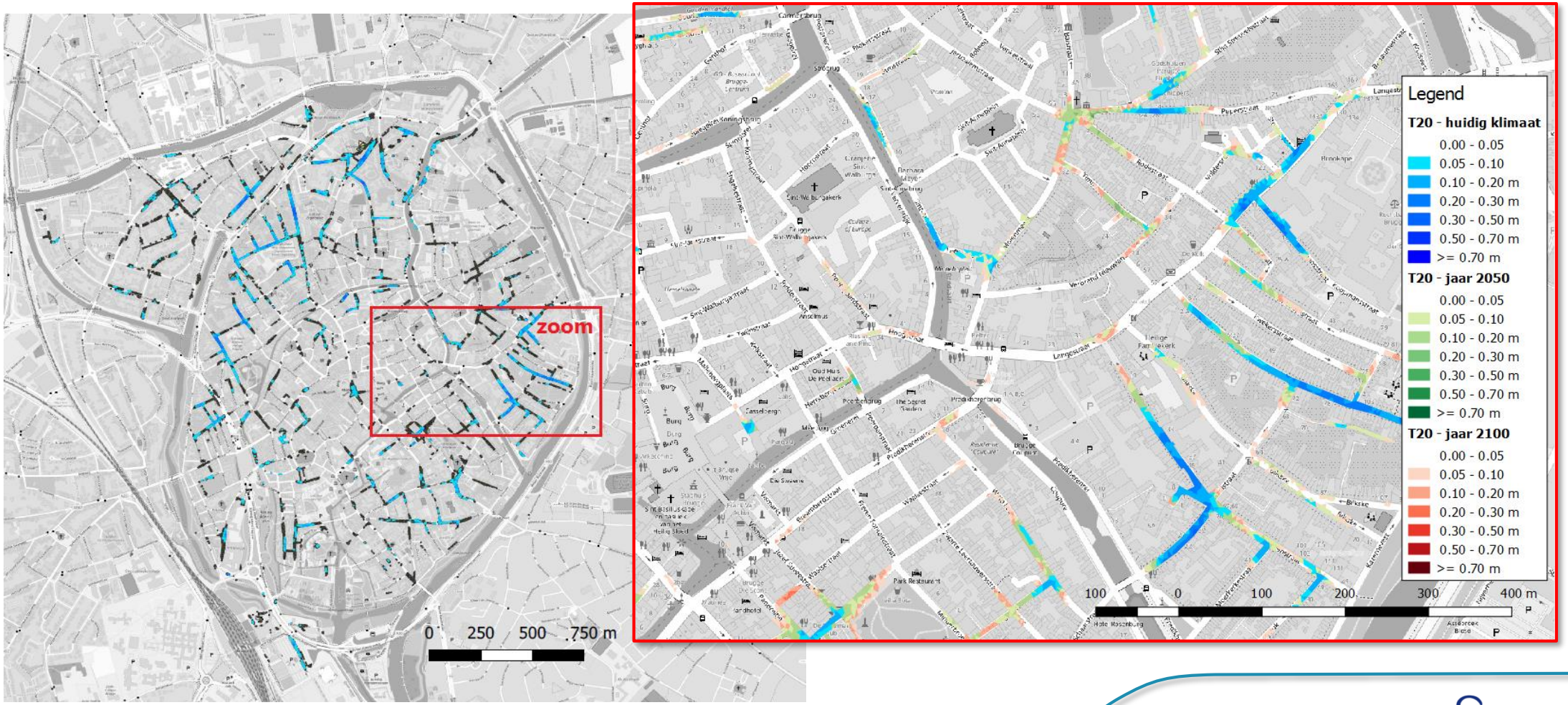


Increase in temperature: up to +6°C in summer





Quantified flood risks: current & future climate



Biggest risks for the historical center

Heat stress

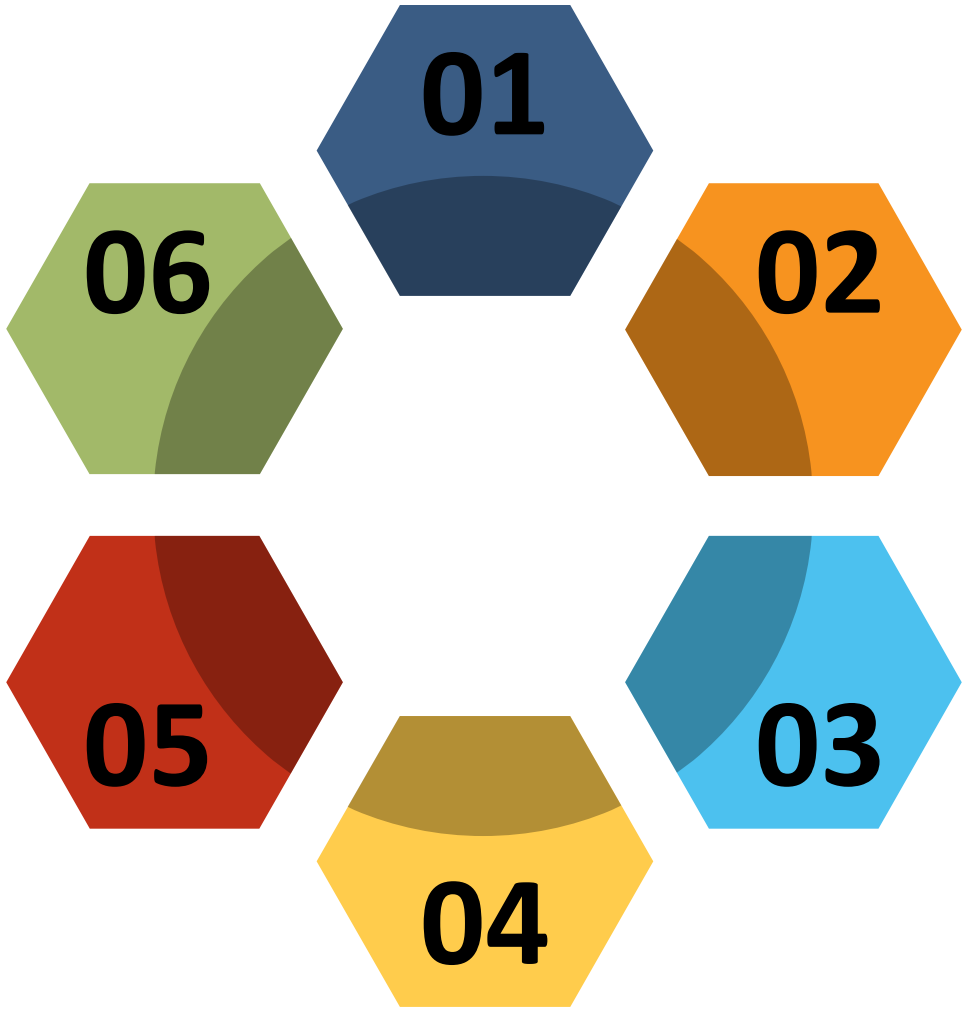
Due to higher temperatures in summer.

Loss of biodiversity

Decrease in biodiversity due to changing circumstances and the advance of exotic species.

Receding ground water levels

Due to a decrease in the amounts of precipitation and increasing hardening in Flanders lead to a decrease in groundwater reserves (in Flanders).



Urban floods

Floods in the urban environment due to the increase in extreme showers, with greater damage as a result

Water quality loss in the canals

Deterioration of water quality on the canals due to an increase in the number of overflows, stagnant water and higher temperatures. Leads to, among other things, algal blooms.

Water shortages

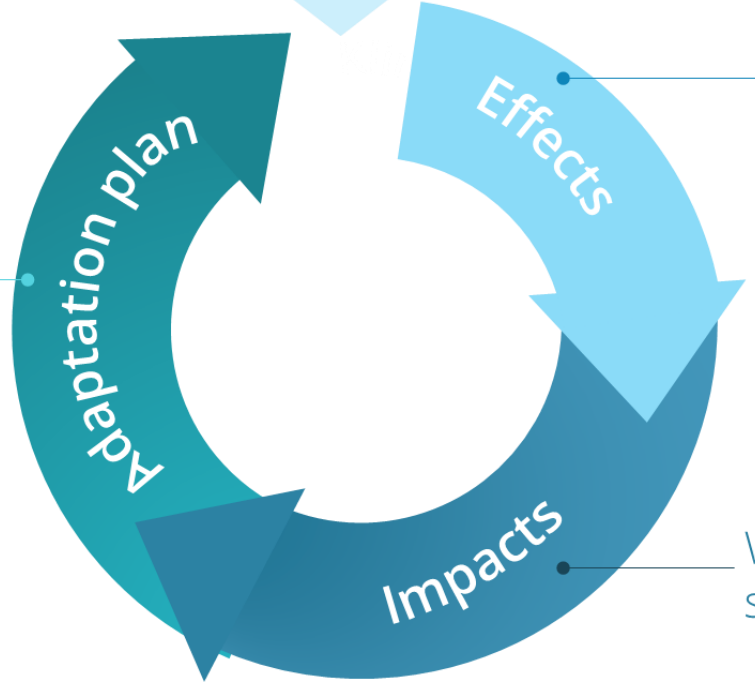
Decrease in the amount of precipitation and incoming flows in the summer. Hindered water intake from canals due to poor water quality.

Climate adaptation planning

Strategy to make a tailored and effective climate adaptation plan

How are temperature, rainfall, wind, … going to change in Bruges?

Climate states



What floods to expect? And how about city heat stress, droughts, salinization, …?

What are the impacts on society, economy, nature, …?

Prepare for climate change impacts

Go for the co-benefit projects

Cover all relevant sectors

Combine (small and bigger) climate adaptation concepts

Future proofing Bruges' waters

01 INTEGRATED WATER SYSTEM

- ✓Disconnect pavement from sewers
- ✓Align SUDS effectively
- ✓Build with nature, and renew sewers

➔ **The "bigger picture"**

02 INDIVIDUAL DESIGNS

- ✓Capture and reuse rainwater
- ✓Infiltrate rainwater
- ✓Make creative and yet practical designs

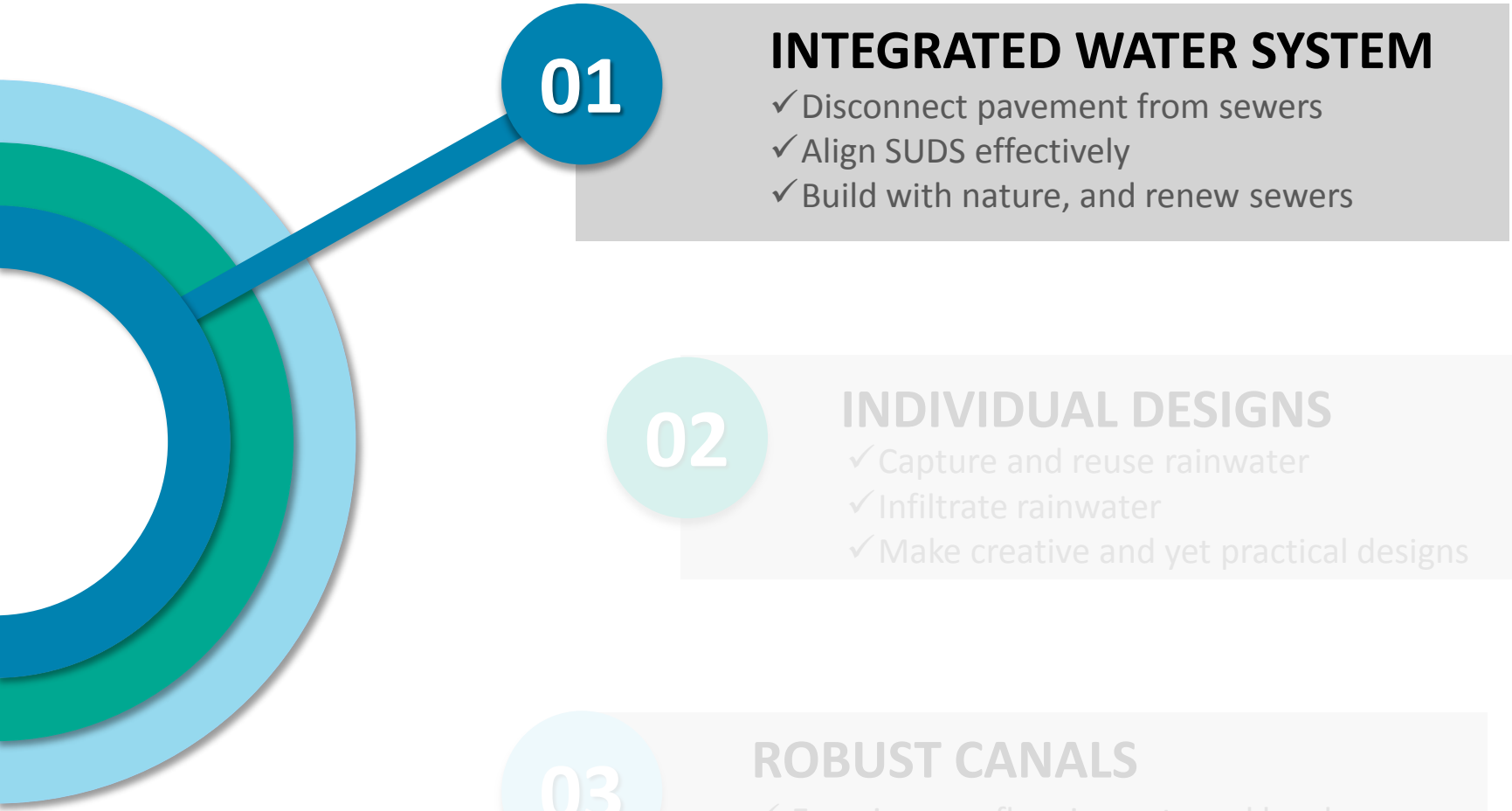
➔ **Zoom to project level**

03 ROBUST CANALS

- ✓ Examine overflow impacts and levels
- ✓Increase the canals' water availability
- ✓Intelligent control

➔ **How to future proof the canals?**

Future proofing Bruges' waters



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Scenario development

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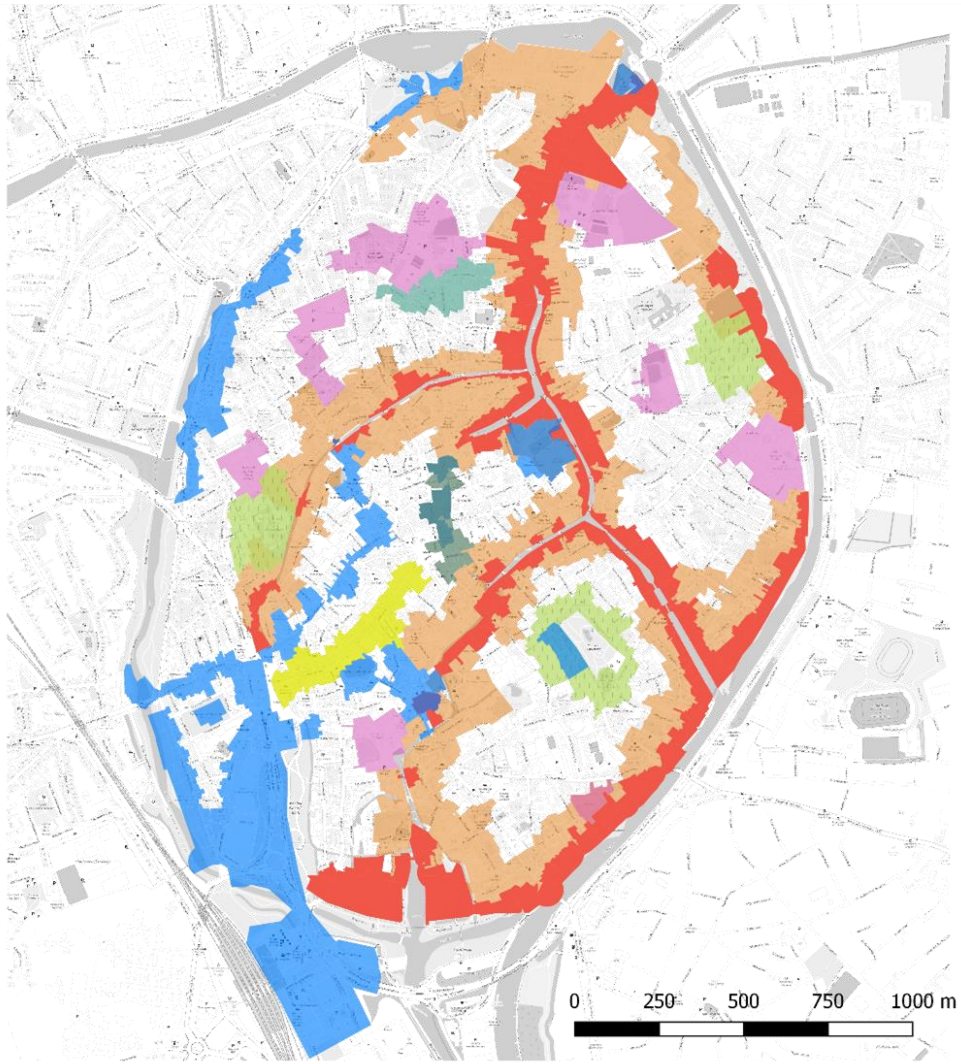

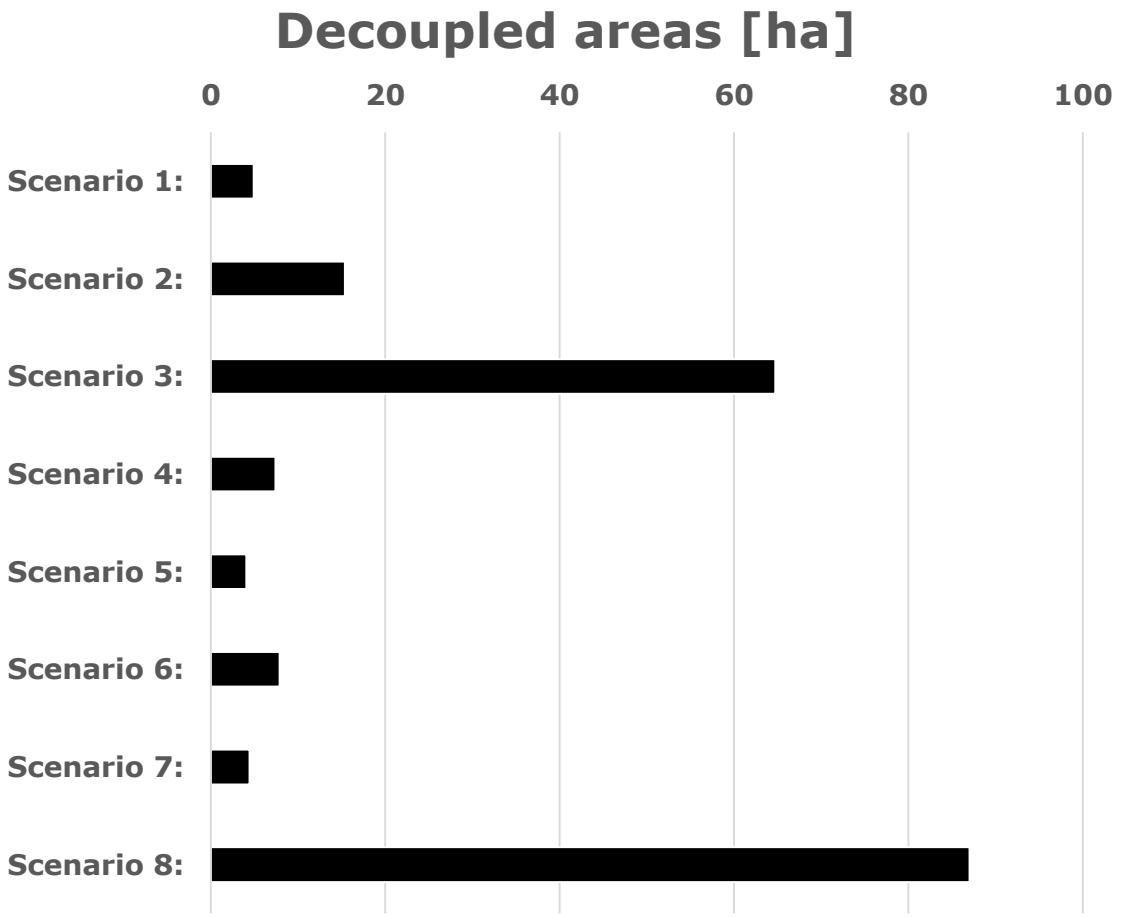

Quantify the impacts

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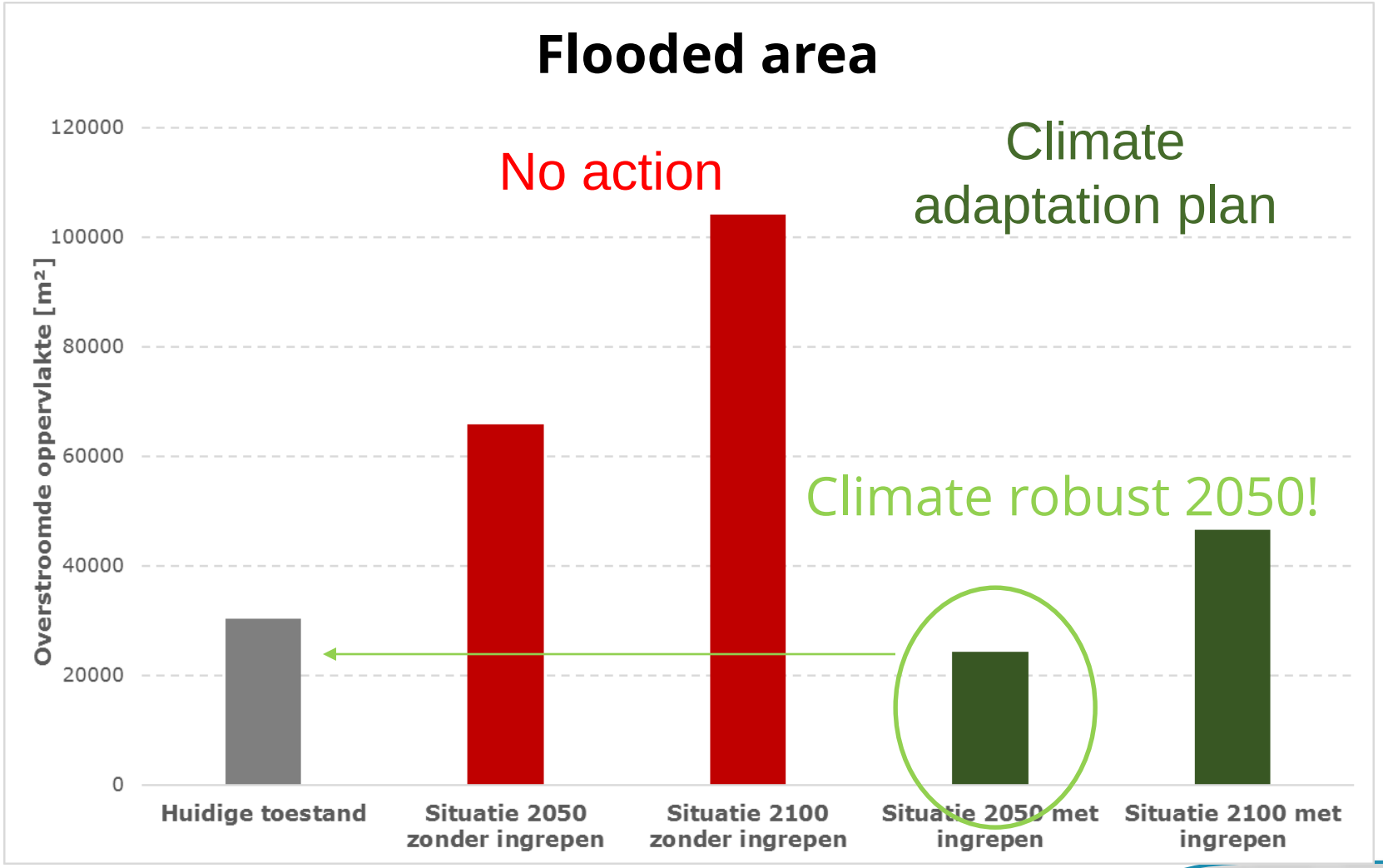

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Design individual SUDS

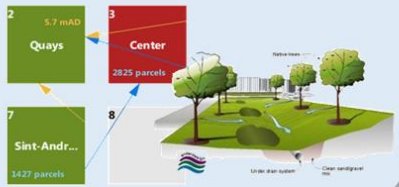
What? Fast and easy to use integrated water model of a city and catchment

SCAN

Aim? Policy making and decision support.

Local refinements

Sirio



Aim? Optimize hydraulic designs through simulations. Quantify the impact of climate change.

Upscaling

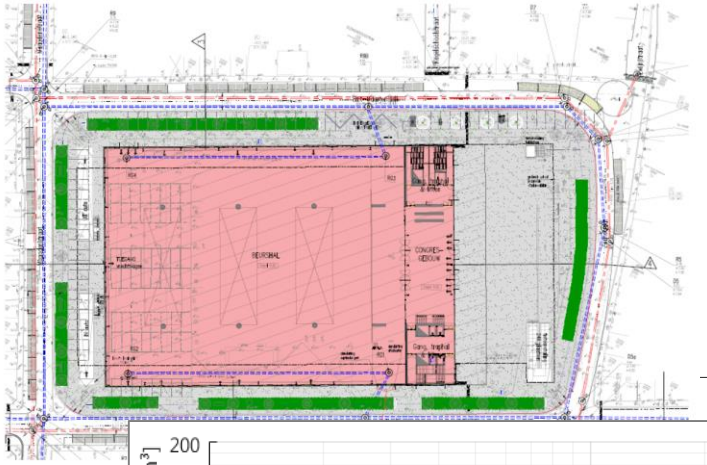
Wat? User friendly software for the design of SUDS.

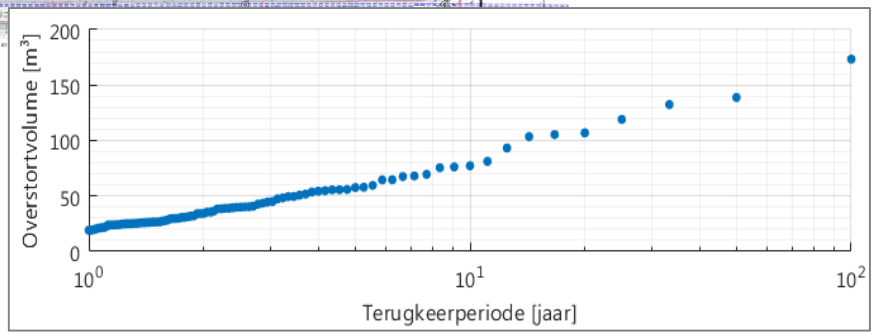
Sirio

Future-proof individual projects

Congress building

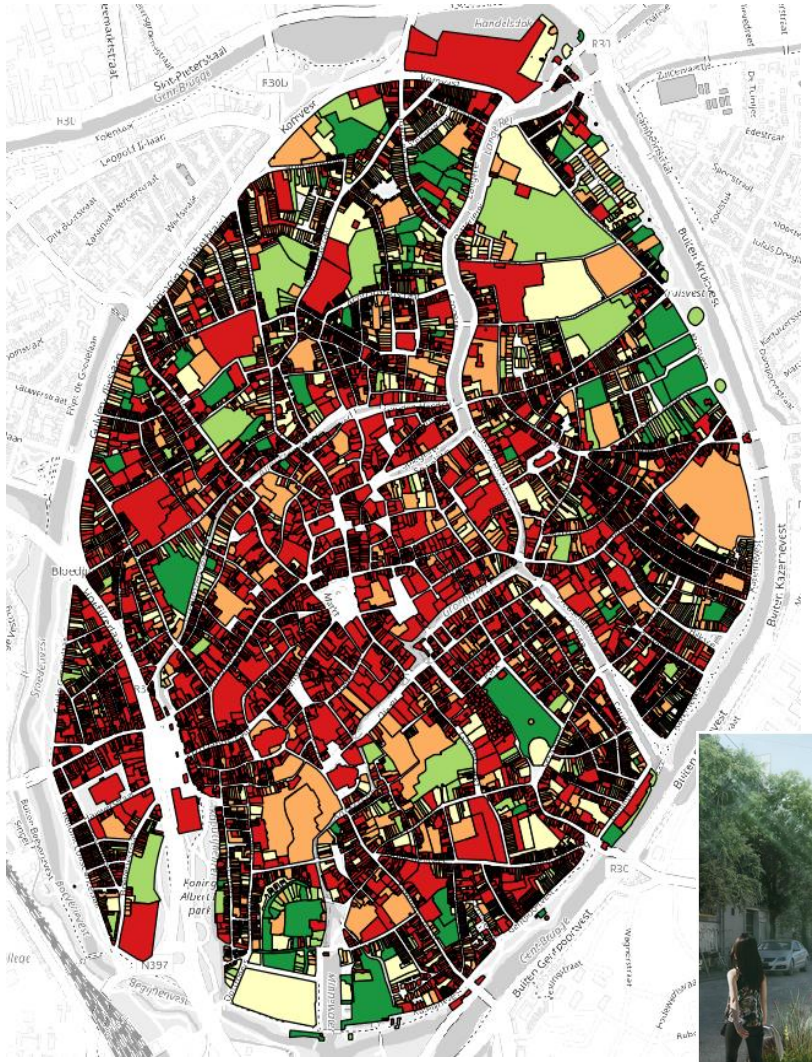
SUDS design through Sirio





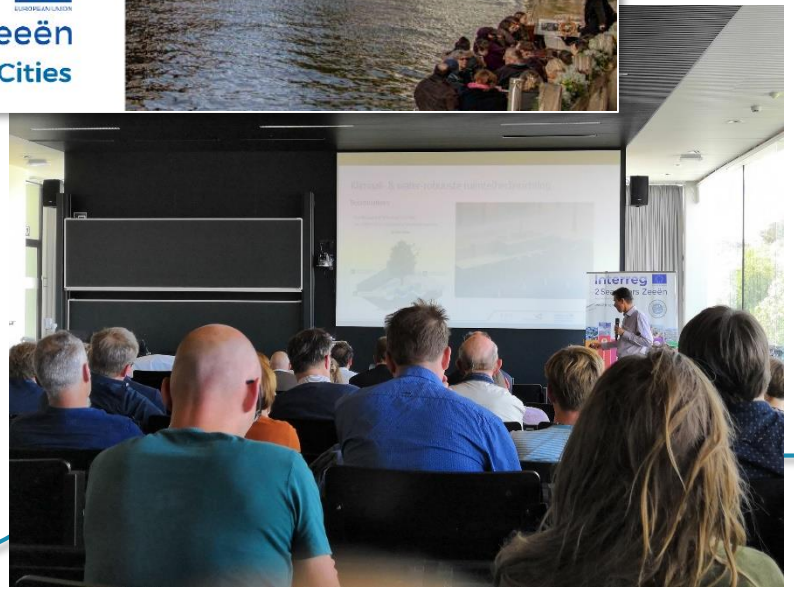
Align with the sewer system

Identify and use opportunities



Time for action!

Workshops: from strategies to actions



58 actions

Pillar 1:

Policy & administration

Pillar 2:

Communication & sensitization

Pillar 3:

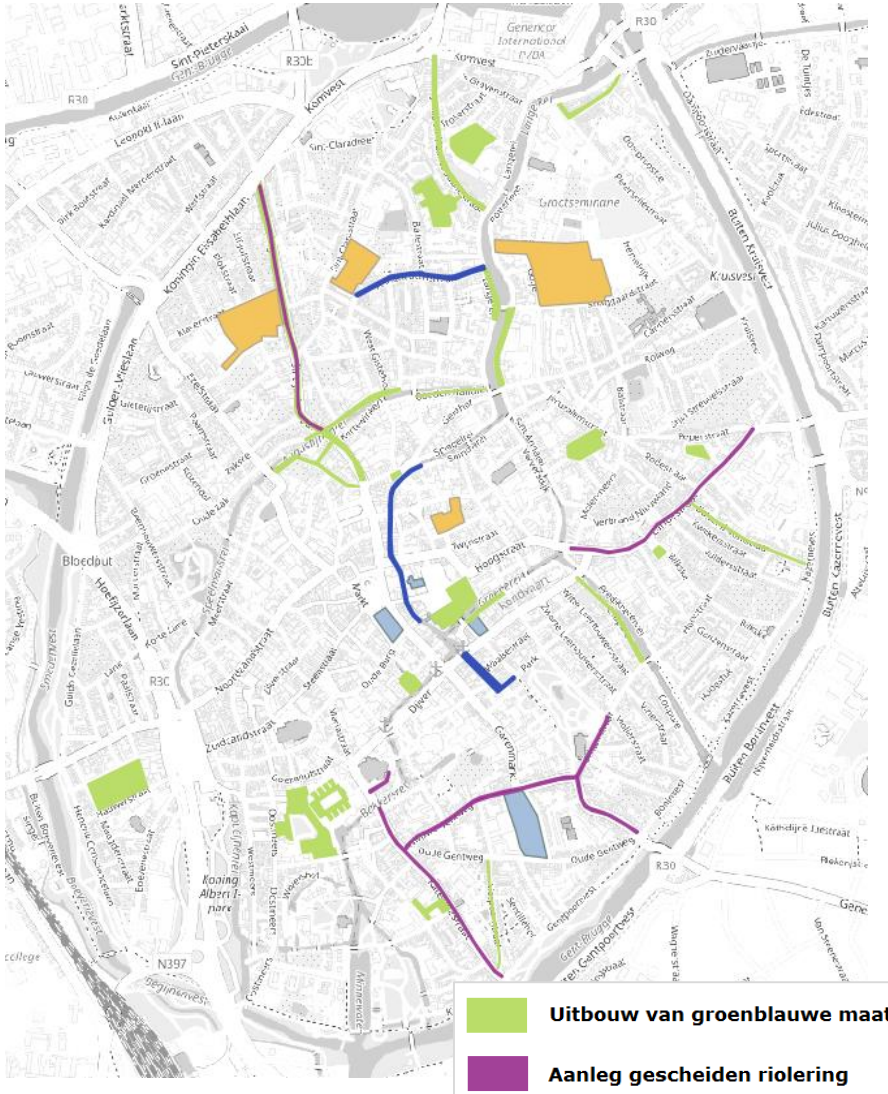
Knowledge building

Pillar 4:

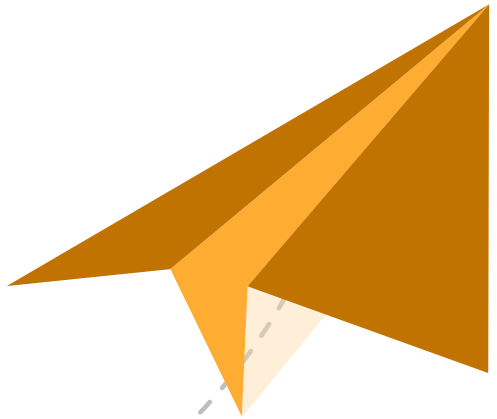
Implementation

Pillar 5:

Partnerships



Next steps



1

Local climate adaptation plan

Climate risk analysis: what's coming? How can we future-proof the city?

2

Step-by-step plan, incl. citizen participation

Allocate budgets and resources. Involve citizens.

3

Water Resilient Bruges

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