Source control measures as climate adaptation tools

Designing and controlling SuDS

KU LEUVEN

Sumaqua

dr. ir. Vincent Wolfs

University spin-out

Independent high-tech company, originating from the University of Leuven, Belgium

Mission

Delivering tailored solutions for water management by translating the latest technology to practice.

Consultancy services

Climate adaptation
Water resources modelling
Intelligent control
Risk analyses & policy making
Innovation

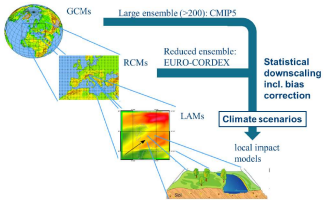
Software development

Sirio
SCAN
RainBrain

Sumaqua

Climate change Flanders

Climate model downscaling



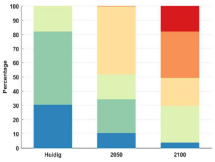
1900 - present: **+2,4 °C**
Present - 2100: **+7,2 °C**

1950 - present:
rainfall extremes: x2

Possible changes 2100:
Winter: **+38%**
Summer: **-50%**
More extremes

Challenges for cities and urban water managers

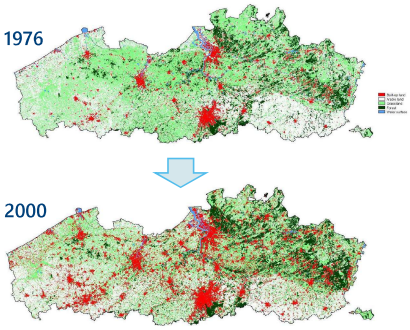
More floods



More city heat stress

Longer periods of droughts

Flanders becomes one big city



Percentage paved

1976: **5%**
2000: **10%**
2018: **14,5%**

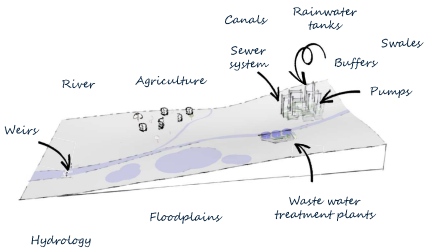
SuDS & source control as climate adaptation tools

Adopted from Climate-KIC water smart cities

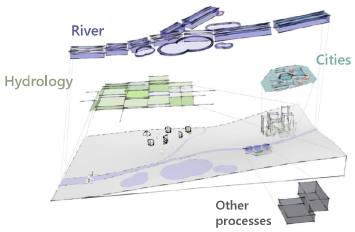
From drained cities to "water smart" cities, but...

- How to design effective SuDS?
- How to align decentralized source control measures?
- How to control all assets (through IoT)?

SCAN: Big Data modelling of the integrated water scale



SCAN: Big Data modelling of the integrated water scale



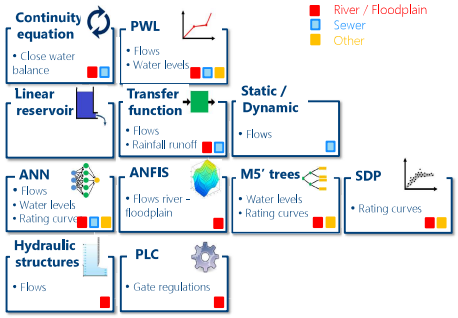
What?

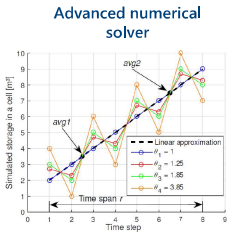
- ✓ Integrated hydrological – hydraulic model at catchment scale
- ✓ Combining classical modelling techniques with machine learning and sensor integration
- ✓ Ultra fast simulations
- ✓ Built-in calibration algorithms to copy existing models

Applications

- ✓ Scenario analyses
- ✓ Climate adaptation
- ✓ Early warning systems
- ✓ Intelligent control
- ✓ ...

Core of Big Data models: artificial intelligence

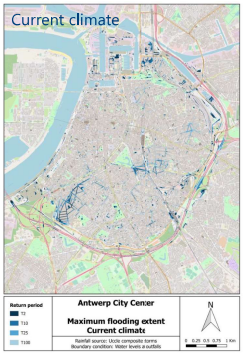


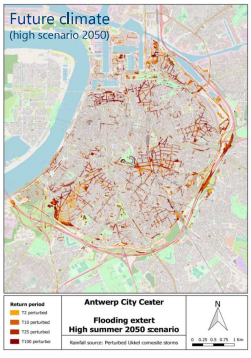


Applications

Applications

Urban flood risk analyses

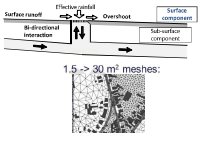




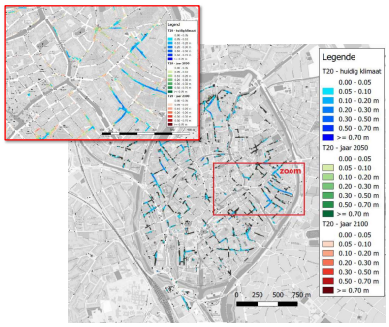
City of Antwerp

HORIZON 2020

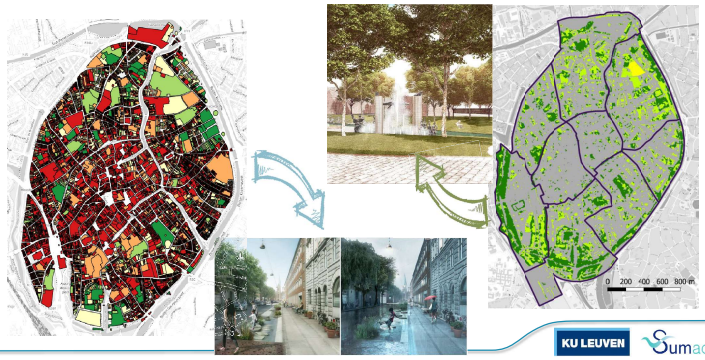
°Climate -fit.city Experience the benefits of climate services



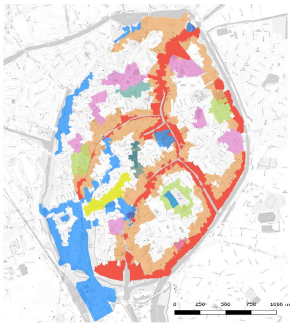
Urban flood risk analyses

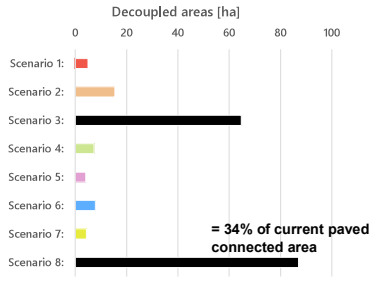


Scenario development: opportunities & long term vision

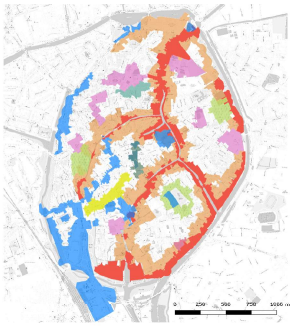


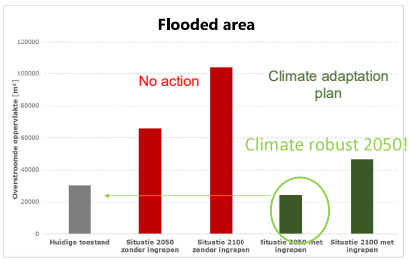
Tailored adaptation strategies





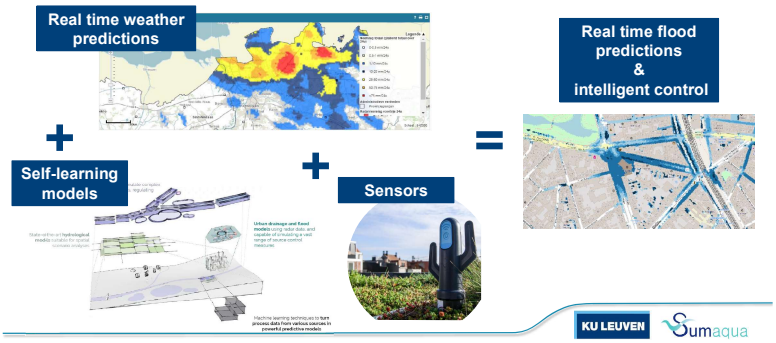
Tailored adaptation strategies





Applications

Real time forecasting & intelligent control



RainBrain

The smart blue-green roof

Healthier green roofs
- RainBrain **monitors and predicts the vegetation's health**
- **Waters vegetation automatically** when needed

The best of IoT and analytics combined
- **Vegetation sensors**, solar panel and LoRaWAN
- Weather data, **machine learning and modeling**
- RainBrain insights and controls through a **mobile app**

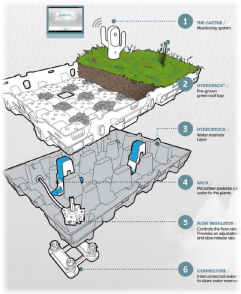
Optimized water availability
- RainBrain analyses the current and future water availability
- **Anticipates on extreme weather**: stores water to survive droughts, empties buffers to prevent floods

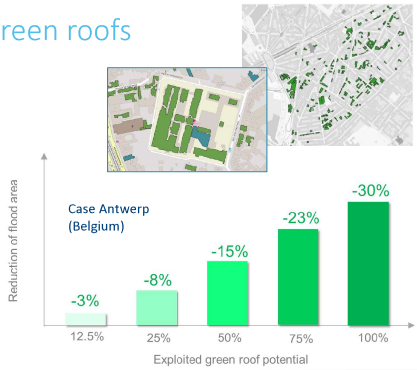
Developed by: Sumaqua, AGILIS, GREENBEAT

Piloting in: Antwerp (Belgium), Eindhoven (Netherlands)

Funded by: SYNCHRONICITY, synchronicity-iot.eu/

Impact of intelligent green roofs





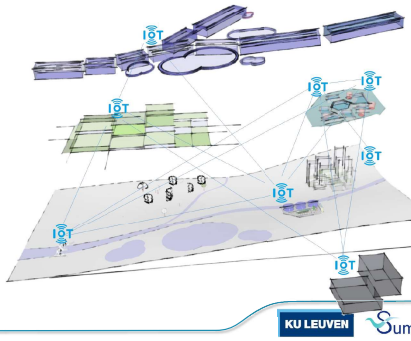
KU LEUVEN Sumaqua

Towards the water management of the future

SCAN

Big Data modelling

- **Unlock new applications**
  Climate adaptation planning, early warning systems, intelligent control, asset management, ...
- **Include the entire water cycle**
  Both private and public source control measures, sewers, rivers, WWTP, ...
- **Be in control**
  Intelligent and pro-active control through rapid simulations and MPC-GA optimization algorithms



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Sirio:
software to design individual source control measures

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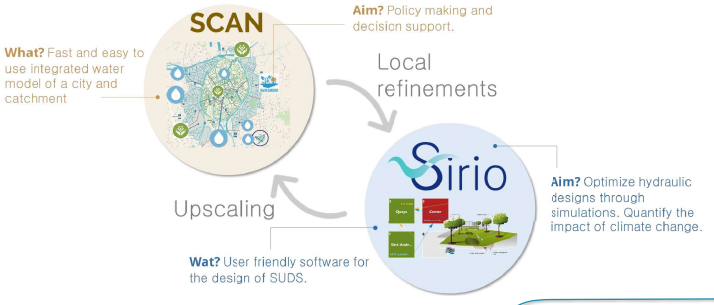
Design individual SUDS



KU LEUVEN Sumaqua

Cities: Sustainable Urban Drainage Systems

- ✓ Software to design SUDS
- ✓ Concept = long term simulations (100 years) + statistical analysis
- ✓ Standard tool in Flanders for rainwater design

Sirio

Free demo on www.sumaqua.be/sirio

KU LEUVEN Sumaqua

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