



EINDHOVEN DEMOS

Water cycle safety planning for integrated risk management

To meet the needs of Eindhoven and similar cities, the Eindhoven team is testing a water cycle safety plan (WCSP) framework. The framework aims to identify risks in all parts of the water cycle in an integrated approach. Current developments in the region allow for innovative cooperation between local stakeholders. The WCSP clarifies the interdependencies between the various urban water sub-systems and provides a common platform for stakeholders to make the total urban water system resilient to climate change. Undesired transitions of risk from one sub-system to another can be prevented, and an optimal solution from the viewpoint of the total water cycle will be sought.

PREPARED develops tools to facilitate the process of water cycle safety planning. A hazard database is developed as a checklist of risks to the urban water cycle that are affected by climate change. During the WCSP process the stakeholders can build their own risk event trees from these building blocks. The database collects hazards from the PREPARED cities and builds on previous European projects. Eindhoven assists in building this database from its own experiences to aid other cities.

Risk reduction options that can reduce or eliminate identified risks are also made available in a database. This includes the costs and benefits of options and their efficacy to reduce risks. Thus cities can learn from successes and failures of other cities that have already faced similar risks.

To support decisions, a more quantitative analysis of climate change risks is needed. Eindhoven performs quantitative risk assessment (QRA) in case studies.

Climate change risks generally have a strong geographical component. PREPARED partners use and develop GIS tools that aid the WCSP process in various ways, such as risk identification, risk assessment, risk communication and risk reduction.

EINDHOVEN: RESILIENT FOR CLIMATE CHANGE

Over the past 15 years Eindhoven has undertaken actions to improve the urban water system by re-opening and connecting water courses, increasing WWTP capacity, disconnecting storm water from combined sewers, reducing combined sewer overflow (CSO) impacts and active groundwater control. Although these actions have improved the water system, it is not yet resilient for climate change. Making further improvements with the same technologies will be less cost-effective, therefore new innovative and integral solutions are sought.

Active monitoring and control of water quality can make more sustainable use of surplus ground and surface water possible. On-line monitoring and control of sewage and storm water can prevent CSOs and overloading WWTP capacity. Combined with intelligent systems for retention and infiltration of rainwater, both desiccation of nature areas and high groundwater levels in urban areas can be prevented. The stakeholders explore these options in an integrated assessment of the urban water system to reach an optimal solution for a resilient water system in Eindhoven.

SUCCESS STORIES

WCSP stimulates cooperation:

The Eindhoven sessions for the WCSP served as a catalyst for better understanding between partners. The water system is divided between 3 utilities: municipality, regional water board and drinking water supply company. They jointly work on the WCSP to provide more information on useful connections and solutions for the future.

Sharing knowledge:

Uniting all water system utilities also means collecting and sharing all information on present and future situations. Combining the modeling and monitoring data of all 3 utilities helps to find better climate proof solutions.



Model predicting water on street: red areas indicate water levels above threshold of houses.

CHALLENGES

Flooding:

Due to its historical development, flooding as a result of heavy rainfall, either by inundation from surface water or by water on the street, is quite common in Eindhoven. Storm water capacity is very limited (85% of sewers are combined sewers), and there is lack of retention in the surface water system.

Groundwater management

About 25% of the urban area is vulnerable to problems caused by high ground water tables. This means houses have ground water entering basements in winter periods. Problems are caused by building on lower areas, such as former wetlands, without taking into account fluctuation of ground water tables, combined with a reduction of ground water extraction for industrial processes.

Surface water quality:

Dry weather discharge of the surface water system is very limited. The WWTP effluent discharges up to 40% of dry weather discharge. Around 30 CSO's contribute to poor water quality after rainfall periods..

PARTNERS

