

## **Climate change impacts on hydrological extremes along rivers and urban drainage systems in Belgium**

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Based on the most recent data and climate modelling results, the climate change impact on the risk of hydrological extremes along rivers and urban drainage systems in Belgium has been studied in a detailed objective way. For rivers, the risk of both floods and low flows has been considered. For urban drainage systems, the impact on sewer flood and overflow frequencies were analyzed. The study required the simulation results from global and regional climate models (GCMs and RCMs) to be downscaled to the time and space scale necessary for the hydrological impact analysis. The modelling approach was based on ensemble modelling and probabilistic analysis of simulation results, enabling the uncertainty on the climate model-based results to be taken into account. The climate change scenarios furthermore were to be compared / verified with the results from a statistical analysis on the present and past climate and flow records. This research task aimed to bring together the two separate science domains of physically-based climate modelling and statistical hydrology.

The research consisted of two main phases. In Phase 1, climate change scenarios were being developed after statistical analysis of trends and cycles in long-term series of historical rainfall, evapotranspiration and river flow, and after the analysis and statistical downscaling of climate model simulation results. Phase 2 focused on the impact modelling towards flood risks and low flows risk along rivers, and flood risks along urban drainage systems, making use of hydrological and hydrodynamic models.