

KLIMZUG Sub-project T2.2

Quantification of the effectiveness of adaptation measures in storm water management and flood protection in urban areas

Description and objectives

The past years showed that Hamburg is insufficiently protected for floods derived after heavy rainfall and due to climate change, an increase in heavy rains -both in intensity and in frequency- is expected. Inner city sewer lines, canals and water networks are not designed for draining an amount of water derived after such extreme events. The consequences are an increase in flooding of properties and an increase in urban flooding due to channel congestion.

The objectives of this project are:

- Integrated spatial and temporal simulation of the hydrological cycle in the city of Hamburg for various scenarios of climate change and expected socio-economic changes.
- Quantification of increased flood risk and the impact on urban development and economic structure of the city. Evidence of the effectiveness of appropriate mitigation measures for the compensation of climate change impacts.
- Effective detection of suitable adaptation measures to mitigate the consequences caused by climate change to the constructions. Comparison of the hydrological and hydraulic verification procedures applied by the different project partners in Hamburg

Methodology and approach

The project is divided into five work packages (WP):

WP 1: Analysis of the impacts derived by climate change and future urban development on the land based hydrological water cycle in the metropolitan region of Hamburg

For the pilot area of the Wandse catchment, the expected trend in the overloading of the storm water systems and the backwater effect in the Wandse river should be demonstrated. Therefore a parallel application and comparison of hydrological and hydraulic models applied at the TUHH, the LSBG and HSE is required.

WP 2: Quantification of the expected increase in risk for society and urban development and infrastructure

With GIS-based flood damage models for the investigated extreme events, the expected damage are quantified as a result of climate change and socio-economic change.

WP 3: Evidence of appropriate mitigation measures to compensate the impacts of climate change

The parameterization technique will be enhanced for modelling decentralized storm water management measures and the controlled drainage of exceeding surface runoff. Furthermore, scenarios of different mitigation measures are derived in TP 2.4, which shall be analysed within TP2.2 for the urban catchment area of the Wandse to quantify the effectiveness of these measures.

WP 4: Development and impact analysis of appropriate adaptation measures (receptor adaptation).

Enhancement of the existing flood damage model Kalysorisk for the calculation of indirect damages - in collaboration with TP 1.4. Developing scenarios of adaptation for climate change from the work in TP 2.4 and calculating the potential reduction of damage.

Cooperation

Required information and model data for the hydrologic and hydraulic simulations are provided by the BSU and LSBG. The Institute of River and Coastal Engineering at the TUHH will carry out the modelling with the software product Kalypso. In parallel, the HSE will carry out the simulations in the storm sewer network with the software HYSTEM / Extran . The results from both models allow for the first time for the city of Hamburg, a comparison of the hydrological and hydraulic design parameters. At the same time, a comparison of the results from the climate scenarios with the existing design criteria of HSE and BSU / LSBG is possible. The design of mitigation and adaptation measures will be provided from the TP2.1, 2.4 and 2.5.

Further information: <http://klimzug-nord.de/>

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