XV IWRA World Water Congress, 25th-29th May 2015, Edinburgh

Flood risk management: towards a holistic approach of urban flood risk assessment – the conceptualisation

Abstract

Introduction:
Across the UK, people and properties are at risk from flooding. Particularly in densely populated urban areas, susceptible to floods from multiple sources (i.e. pluvial, fluvial, sewer, coastal), flood risk management and the assessment of flood risk imposes large challenges on the stakeholders involved. Furthermore, the current situation of flood risk is expected to intensify due to factors such as an expected growth of population, effects of climate change and other socio-economic drivers. Additionally an increasing number of national and international frameworks and legal requirements imposed highlight the importance to make flood risk in urban areas more efficient and effective to protect people and properties from floods now and in the future. This work aims to develop a decision making support methodology for Scottish Water based on a more holistic strategy of flood risk assessment and management. Consequently the work intends to help understanding the situation, providing information and support the decision making and strategic asset planning of Scottish Water and other stakeholders in the development of sustainable flood mitigation schemes. This paper presents the thoughts and conceptualisation of a four year STREAM-IDC, EngD in collaboration between Newcastle University and Scottish Water.

Methods:
The work considers a set of technical and theoretical components. Latter ones outline the context of the project and act as a framework for the project, the development of new tools and their application - also for the time after the project. It takes into account the relevant aspects required aiming towards a holistic approach. The main components considered herein are: the issues of hydrodynamic modelling in the complex environment of urban areas, the different needs of stakeholders involved in the flood risk management and the communication of flood risk. The focus of the technical aspect of the project lies on the implementation of CityCAT (City Catchment Analysis tool) into the flood risk assessment work of Scottish Water. CityCAT represent a 1D/2D hydrodynamic modelling software in development at Newcastle University, School of Civil Engineering and Geoscience (Glenis et al. 2013). Based on efficient numerical schemes and the ability to be deployed on the cloud CityCAT enables users to simulate large areas and multiple sources of floods. The implementation of CityCAT into Scottish Water follows a set of case studies covering benchmark studies, existing flood risk assessment studies and the validation of simulation outcomes using flood observation documents.

Results:
Since this project follows a new flood risk assessment approach, the current, early stage is focusing on the conceptual outline of the project. Hence, the first set of outputs presented, consider the investigations conducted in terms of setting the boundaries of the project. This includes a presentation of both the theoretical and technical components which are thought to be most relevant moving towards a holistic approach of flood risk assessment. Initial examples show potential areas of application of the strategy outlined by comparing the flooding situation on different spatial scales and analysing and visualising the outputs using various tools in GIS.

Conclusion:
A changing environment requires adapted concepts to assess current and future flood risk in urban areas to provide information for planners to develop sustainable flood mitigation schemes. Based on a more holistic approach of flood risk assessment, this work aims to develop a methodology for Scottish Water and other stakeholders supporting their decision making and strategic asset planning. The work incorporates theoretical components in form of new strategies and routines as well as technical ones. Latter ones includes the implementation and application of CityCAT together with advanced computational resources such as cloud computing.