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Flood Resilient Systems and their Application for Flood Resilient Planning

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Following the paradigm shift in flood management from traditional to more integrated approaches, and considering the uncertainties of future development due to drivers such as climate change, one of the main emerging tasks of flood managers becomes the development of (flood) resilient cities. It can be achieved by application of non-structural – flood resilience measures, summarised in the 4As: assistance, alleviation, awareness and avoidance (FIAC, 2007). As a part of this strategy, the key aspect of development of resilient cities - resilient built environment can be reached by efficient application of Flood Resilience Technology (FReT) and its meaningful combination into flood resilient systems (FRS). FRS are given as [an interconnecting network of FReT which facilitates resilience (including both restorative and adaptive capacity) to flooding, addressing physical and social systems and considering different flood typologies] (SMARTeST, http://www.floodresilience.eu/). Applying the system approach (e.g. Zevenbergen, 2008), FRS can be developed at different scales from the building to the city level. Still, a matter of research is a method to define and systematise different FRS crossing those scales.
Further, the decision on which resilient system is to be applied for the given conditions and given scale is a complex task, calling for utilisation of decision support tools. This process of decision-making should follow the steps of flood risk assessment (1) and development of a flood resilience plan (2) (Manojlovic et al, 2009). The key problem in (2) is how to match the input parameters that describe physical&social system and flood typology to the appropriate flood resilient system. Additionally, an open issue is how to integrate the advances in FReT and findings on its efficiency into decision support tools.
This paper presents a way to define, systematise and make decisions on FRS at different scales of an urban system developed within the 7th FP Project SMARTeST. A web based three tier advisory system FLORETO-KALYPSO (http://floreto.wb.tu-harburg.de/, Manojlovic et al, 2009) devoted to support decision-making process at the building level has been further developed to support multi-scale decision making on resilient systems, improving the existing data mining algorithms of the Business Logic tier. Further tuning of the algorithms is to be performed based on the new developments and findings in applicability and efficiency of different FRe Technology for different flood typologies.
The first results obtained at the case studies in Greater Hamburg, Germany indicate the potential of this approach to contribute to the multiscale resilient planning on the road to flood resilient cities.
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Zevenbergen C. et al (2008) “Challenges in urban flood management: travelling across spatial and temporal scales”, Journal of FRM Volume 1 Issue 2, p 81-88
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