



Modelling Climate Change and Urbanization Impacts on Urban Stormwater and Adaptation Capacity

Linmei Nie¹, Pingju Li², Vegard Nilsen³, Lars John Hem¹, Sveinung Sægrov⁴

¹ SINTEF Building and Infrastructure Research, Forskningsveien 3b, 0314 Oslo, Norway

² Resonator AS, 1396 Billingstad, Norway

³ Norwegian University of Life Science, P.O. Box 5003, 1432 Aas, Norway

⁴ Norwegian University of Science and Technology, SP Andersensv.5, 7491 Trondheim Norway

ABSTRACT

Climate change and urbanization are two major changing drivers that cause increasing of urban runoff and sewer surcharge. Typical problems are flooding and pollution to recipients due to combined sewer overflows (CSOs). Goals of the paper are to develop an integrated approach to estimate climate change and urbanization impacts on urban runoff and urban drainage systems and evaluate the effectiveness of different adaptation measures. Climate change scenarios are decided based on Regional Climate Model (RCM) in combination with a Delta-Change Mode (DCM) approach. Four different adaptation measures of (1) disconnecting building roofs, (2) Swale infiltration, (3) Water saving and reduction of leakage, (4) increasing sewer detention capacity are evaluated individually and simultaneously. Of the three simulation storylines, 21 simulations were run for design rains with return period of 2, 20 and 100 years for current climate and change scenario A2 and B2 in combination with the corresponding changes in society and the sewer systems. The simulation results found that (1) disconnecting building roofs is the most efficient option to reduce peak runoff and other consequences; (2) the adaptive capacity of a single measure is limited; combination of different measures is significant and suggested.

KEYWORDS

Adaptation, climate change, CSO, flooding, modelling, urban drainage systems