Modeling Climate Change Impacts on Storm Water Overflow using Simulated Precipitation Time Series

David Bendel[1] , Ferdinand Beck[2], Ulrich Dittmer[3]

[1] Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart, Bandtaele 2, 70569 Stuttgart, Germany, david.bendel@iswa.uni-stuttgart.de
[2] Institute for Modelling Hydraulic and Environmental Systems, University of Stuttgart, Pfaffenwaldring 61, 70569 Stuttgart, Germany, ferdinand.beck@iws.uni-stuttgart.de
[3] Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Stuttgart, Bandtaele 2, 70569 Stuttgart, Germany, ulrich.dittmer@iswa.uni-stuttgart.de

ABSTRACT

This paper presents results of a simulation study that uses stochastically generated rainfall time series (generator: NiedSim-Klima) that consider the impact of climate change on precipitation patterns. Data was generated for various locations across Baden-Wuerttemberg, Germany, to account for different typical precipitation patterns. The influence of climate change on the overflow characteristic of an ideal drainage system is investigated using NiedSim-Klima precipitation data in long-term urban drainage simulations by comparing the simulation results of the past (1961-1990) and future (2025-2034, 2041-2050). It was found that until 2050 there is an increase of up to 2 % in the total annual amount of precipitation and a shift of the frequency distributions towards lower intensities.

The results for the considered periods indicate moderate changes in emissions (volume and COD load) for the project area. For combined sewer overflow (CSO) storage tanks the overflow volume and COD load generally decrease while they increase for CSOs. However, there is a wide variation among the results of different precipitation series (representative for different locations).

KEYWORDS

Climate Change, Urban Drainage, Modeling, NiedSim-Klima