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Multi-objective optimization of stormwater networks considering the concept of decentralization

Storm sewers are vital urban infrastructures, which directly influence the public economy, health, and welfare. Traditional stormwater management systems rely on centrally organized infrastructure. To deal with forthcoming challenges such as climate change, the rapid growth and shrinking of cities and water scarcity, water infrastructure needs to be more flexible, adaptable and sustainable.

New concepts for decentralized solutions accompanying the new technological advances in decentralization open up a variety of alternatives to deal with the mentioned challenges. A number of restrictions make the implementation of fully decentralized systems difficult especially in urban centers and in developing countries. Recent literature suggests hybrid solutions, which combine the advantages of centralized and decentralized systems, as the most practical solution for cities in future. Therefore, there is a need for robust methodologies to assess the performance of all systems: decentralized, hybrid and centralized. The transition of traditional urban water systems towards decentralized solutions has significant effects on the remaining central water networks. This needs to be included in a comprehensive assessment.

However, in developing countries, where centralized infrastructures do not yet exist, there is also a chance to ‚leapfrog' that centralized step directly to hybrid solutions. Leapfrogging theory proposes that developing countries may be able to skip older versions of technology and avoid developed countries' path to industrialization with its environmentally degrading legacy-

The aim of the this project is to develop a simulation-optimization framework to investigate the optimum solution for stormwater management, particularly in developing countries using the notion of decentralization in connection with the economic, environmental aspects and resilience of the system.

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