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Challenges for Stormwater Infiltration in Urban Areas

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ABSTRACT

Urban densification leads to a constant growth of sealed surfaces in cities. This causes an increase of stormwater runoff compared to natural, vegetated areas where water would infiltrate directly into the soil. Due to Climate Change extreme rain events are expected to happen more frequently in the future which will intensify the amount of stormwater runoff that is generated and exert a great pressure on the sewer systems (1).
Providing sustainable urban drainage systems (SUDS) in the cities can stand as an economical alternative to an enlargement of the existing sewer system. Not only do SUDS provide an efficient on site management of stormwater runoff but also do they have the potential to increase the biodiversity and to add a recreational value for the inhabitants (2).
Whether or not an area is suitable for stormwater infiltration depends on various factors like the depth to the groundwater table and the hydraulic conductivity of the soil. In Denmark most cities are located on heterogeneous clay rich deposits with a general low hydraulic conductivity. However various high permeable structures such as fractures, sand lenses and biopores may facilitate hydraulic avenues for infiltration of stormwater (3; 4).
The Danish innovation consortium "Cities in Water balance" is investigating the potential for stormwater infiltration in clayey soils. Our hypothesis is that infiltration rates can be enhanced by the exploitation of the site specific geological variability in order to identify optimal locations for stormwater infiltration, and by the development of more advanced technologies to stimulate the hydraulic performance of the subsurface. In that way the work-efficiency of SUDS may increase significantly. First experiments returned up to eight times higher hydraulic conductivities in infiltration designs installed based on geological knowledge.

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