Accounting for multiple functions in environmental life cycle assessment of storm water management solutions

The wide range of approaches to handle storm water runoff have varying effects on the environment. Local stormwater control measures for retention and treatment are increasingly used components in urban climate adaptation plans. Often, these solutions modify the multiple functions of urban environments by adding green and blue elements, and they change the water balance compared to traditional, underground approaches. Additionally, different implementation and maintenance processes are required. All of these transformations affect the environmental impacts of urban storm water management (SWM) systems, which can be quantified using Life Cycle Assessment (LCA). This study aims to define the multiple functions provided by a SWM system at sub-catchment scale, and to assess the environmental impacts arising from fulfilling these functions. The approach is tested using the Nørrebro catchment in Copenhagen, Denmark, where extensive implementation of green infrastructure is planned to mitigate the adverse effects of climate change. This « green » scenario is compared to a traditional « grey » solution, utilizing pipes and basins. The environmental impacts, which are dominated by material production in both scenarios, are significantly lower for the « green » solution (35% down to 8% of the “grey” impacts). The allocation of impacts shows that the various functions of the SWM systems cause different impacts.

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