Mitigating heat and heavy rain events via urban green infrastructure: a comparative assessment at the micro-scale

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Cities are especially vulnerable to climatic extreme events like heat and heavy rain. Those impacts are projected to increase in magnitude and frequency under future climate change. To cope with, urban planning needs to foster adaptation measures. Traditional, hard infrastructure measures are often perceived as expensive and inflexible. In addition, competition for urban space makes it difficult to introduce new infrastructure that serves only single objectives of risk reduction. Therefore, urban green infrastructure (UGI) has gained increasing attention as a nature-based solution to climate change adaptation that provides multiple benefits. However, UGI's adaptation potentials still lack quantitative assessments, particularly, when it comes to the provision of multiple adaptation benefits. The paper addresses this gap by investigating the mitigating potential of UGI to heat as well as heavy rain events. Scenarios of trees and green roofs are modelled by two simulation approaches, a microclimatic and a hydrological one, for a densely built-up inner city area in Munich, Germany. The scenarios' effects on outdoor thermal comfort of pedestrians and the regulation of surface runoff are compared to each other. Finally, synergies and trade-offs between the mitigation of heat and heavy rain are discussed to support urban planners in decision-making for effective climate change adaptation.

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