

Urban Greening Dynamics under Heat Adaptation and Socio-Economic Conditions – Evidence from Germany

Urban heat intensification increases climate-related health risks, particularly in densely populated urban areas, while access to effective adaptation measures remains uneven across socio-economic groups. At the same time, many municipalities face financial constraints that limit their capacity to expand green infrastructure, and growing urban populations create development pressures that can lead to additional land sealing. Most studies concentrate on the distribution of existing green spaces or the consequences of elevated temperatures for socio-economic groups. The present study seeks to analyze the recent urban greening dynamics and their spatial distribution in 153 German cities between 2018 and 2023. Greening and sealing are measured using CORINE Land Cover Plus Backbone data at both city and 1 km grid levels, and compared with spatial indicators of heat exposure, socio-economic disadvantage, demographic structure, fiscal capacity, and local political characteristics to assess their spatial alignment. The descriptive analysis finds that, overall, German cities have experienced more sealing than greening between 2018 and 2023, with only seven cities showing a net increase in green space. Patterns at the city level further suggest that fiscal conditions are associated with greening dynamics, as municipalities characterized by higher debt levels, greater recourse to liquidity-alleviating loans, and lower net trade tax revenue per capita tend to exhibit stronger declines in green space. We do not find evidence that a city adopting a heat action or climate adaptation plan is linked to increased greening. We also do not find greening efforts to be concentrated in areas with higher heat exposure or greater socio-economic disadvantage at the spatial grid level, and thus cannot discern an alignment between observed greening patterns and indicators of vulnerability in our data.