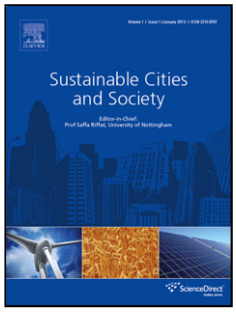

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THE IMPACT OF URBAN PLANNING STRATEGIES ON HEAT STRESS IN A CLIMATE-CHANGE PERSPECTIVE

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Abstract
Spatial and temporal characteristics of outdoor heat stress for a redevelopment area in Gothenburg, Sweden, in a climate change perspective, using mean radiant temperature (T_{mrt}) as a proxy for heat stress are presented. The impact of climate change on T_{mrt} was evaluated using statistically downscaled data from a regional climate model. The simulated average T_{mrt} for the future scenarios was not higher than for today's climate, because the increased longwave radiation fluxes caused by higher temperatures were offset by reduced shortwave radiation fluxes caused by increased cloudiness. The spatial pattern of T_{mrt} in the study area during warm and clear weather is primarily governed by the shadow patterns of buildings and vegetation. The highest average-daytime T_{mrt} was found at open locations, but because open areas also have the highest frequency of sunlit occasions, this does not necessarily imply that open areas are most prone to heat-stress. When considering only occasions during clear and warm weather situations, the highest T_{mrt} were usually found close to sun-exposed, south-facing walls. Under these criteria, denser urban environments have lower heat stress than more open urban environments. The warmest areas were also found to be the warmest areas in the future as well. Tree-shadows are an effective measure to reduce daytime T_{mrt}. Trees was found to have the largest impact on T_{mrt} in open areas where vegetation is sparse, especially when the distance to the nearest "cool" place is used as a measure of heat-stress.

Keywords: Göteborg, Sweden, Vegetation, statistical downscaling, spatial variability, mean radiant temperature

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