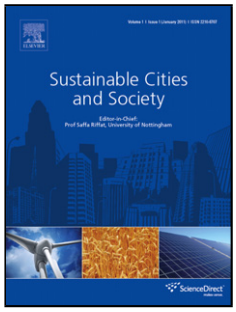

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Do water bodies play an important role in the relationship between urban form and land surface temperature?

Do water bodies play an important role on the relationship between urban form and land surface temperature?

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Highlights

- The cooling effect of water bodies can reach one kilometer.
- Water bodies have a great impact on the relationship between the urban form factors and LST.
- The water bodies' cooling effect shows a decreasing trend as the DIST increases.
- Correlations between four urban form factors and the LST gradually increased as the DIST increased.

Abstract

Water bodies are considered an effective factor in mitigating urban heat island (UHI) effects in large cities. In Chongqing, the largest city in western China, using Landsat 8 data obtained in the daytime during the summer, we analyzed the potential influence of the cooling effects of water bodies on the urban land surface temperature (LST) based on the gradient of the distance to the water bodies (DIST). The results indicate that the cooling effect of water bodies can reach one kilometer (horizontal distance) and have a great impact on the relationship between the urban form factors and LST, particularly at a DIST less than 500 meters. The sampling was performed in a 250 m × 250 m grid size, and correlations between four urban form factors (i.e., sky view factor, building density, mean building height and floor area ratio) and the LST gradually increased as the DIST increased. According to the multiple linear regression model, the DIST is an important independent variable at a DIST less than 500 meters. This study may help researchers better understand the influence of urban form factors on thermal comfort considering water bodies.

Keywords

Urban form; Land surface temperature; Urban heat island; Water bodies; Cooling effect

1 Introduction

Due to rapid urbanization, 69% of the global population will live in cities by the end of 2050 (UN-DESA, 2010). The increasing amount and intensity of human activity and the

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