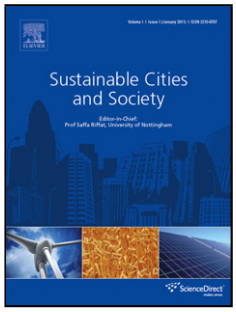

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Outdoor thermal comfort under subarctic climate of north Sweden – a pilot study in Umeå

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HIGHLIGHTS

- High solar radiation preference was observed even under slightly warm TSV.
- Local persons are more adapted to subarctic climate than non-local persons.
- Females are slightly more sensitive to air dry bulb temperature changes.
- Slope terrain should be created at south oriented and upwind side.

ABSTRACT

Outdoor microclimate is important to determine the quality of outdoor spaces. Swedish people cherish summer period and prefer more outdoor activities in summer because of long winter with harsh outdoor environments. People in urban areas use parks for recreation and outdoor activities frequently in summer. Under subarctic climate, limited studies have been performed to explore the effect of microclimate environments on usage of outdoor spaces such as parks. The study explored the relationship of microclimate environments, park use and human behavioral patterns in urban area of Umeå, Sweden, which is under subarctic climate. Observations of naturally occurring behavior were recorded. Structured interviews, based on specially designed questionnaires, were performed during July to August in 2015. Measurements of objective parameters for microclimate environments, including air dry bulb temperature, relative humidity, wind speed, solar radiation and globe temperature, were performed. Human subjective responses from the questionnaire survey were compared with objectively measured results. 49% of local persons still prefer higher solar radiation even under "slightly warm" Thermal Sensation Vote (TSV), which reflects their high expectation to solar radiation. Local persons in Umeå, who expose themselves to a wider climate, are more adapted to subarctic climate than non-local persons.

Practical implications

The pilot study demonstrated that wind attenuation together with strong sunshine can improve Thermal Sensation Vote (TSV), which could be realized by specially designed hump terrain for attenuating wind without shading effects. The results will be used for optimizing design of urban outdoor environments such as parks under subarctic or arctic climate.