



## Trees reduce city temperatures

**In light of global climate change**, temperature control should be an important consideration in the design of the urban environment as a public health measure. New research shows how different urban land cover types, such as concrete and grass, affect the air temperature in cities. The study could help planners reduce the effects of hot summers.

**High temperatures in cities**, during heat-waves, have been linked to increased mortality rates and exacerbation of health problems such as respiratory disease. With extremes of temperature projected to increase under a changing climate, ways of reducing temperature need to be identified. Changing the design of a city could be one way of achieving this.

Local climate in a city differs considerably from the climate of its surrounding environment. Even within a city itself, air temperature can vary quite dramatically depending on the type of ground cover and the time of day. These variations need to be characterised in order to understand the impact they have on air pollution and heat retention in urban environments and to inform decision making processes in urban planning.

Previous studies have shown that temperature can vary substantially across an urban environment. For example, a study in Gothenburg, Sweden<sup>1</sup>, demonstrated that an area of parkland was, on average, 4 °C cooler than the built-up city centre. However, both this and other existing studies into 'heat islands' were conducted during the winter. Now Chinese researchers working in Nanjing have published a detailed study of daily temperature variation in the city during the hot season. The research may be useful in helping planners to design or re-design urban environments.

The research takes into account differences in temperatures at two levels - differences between four sites within the city and, within these sites, variations between four different land cover types. The four types of land cover studied were urban wood, grass, water and bare concrete. The researchers carried out detailed statistical analyses comparing air temperatures, at around head-height, between the sites and between land cover types on twelve days between July and September.

Of the four land cover types, bare concrete generated the highest air temperature. This is because evaporative cooling does not occur on these surfaces. Areas covered in grass produced the next highest temperatures, followed by water and then woods or tree shade. At the peak of the day, between 12pm and 2pm, the average temperature difference between concrete and tree shade could vary by as much as 5.3 °C. At night, concrete was much cooler than it was during the day, whereas areas covered by grass or trees maintained a more constant temperature.

The researchers say their study reinforces the importance of providing vegetation as shade to reduce air temperatures in urban areas, particularly in cities known for their hot climates. Temperatures in Nanjing, as in some southern regions of Europe, can reach 40 degrees Celsius during the summer months. As global temperatures rise in response to climate change, city planners will need to take into consideration the effects of surfaces on local temperature.

1. Eliasson, I. (1996). Urban nocturnal temperatures, street geometry and land use. *Atmospheric Environment*. 30(3):379-392.

**Source:** Huang, L., Li, J., Zhao, D. and Zhu, J. (2008). A fieldwork study on the diurnal changes of urban microclimate in four types of ground cover and urban heat island of Nanjing, China. *Building and Environment*. 43: 7-17.

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