Urban microclimate and urban design: the effects of landscaping and vegetation on pedestrian thermal comfort

lecture abstract

Vegetation is a key component in pedestrian-friendly urban design. The presence of vegetation in a built-up area has many benefits, not least of which are a contribution to aesthetics and a reflection of the passing of the seasons. Vegetation is also claimed to enhance air quality and to mitigate the urban heat island. Finally, vegetation is expected to improve pedestrian thermal comfort.

The talk will present an analysis of the energy balance of a person outdoors, and how the presence of vegetation may be expected to modify each of its components. Based on detailed measurements in a pair of adjacent courtyards, it will demonstrate that the effect of vegetation on air temperature and humidity, while measurable, contributes far less to pedestrian thermal sensation in warm conditions than the modification of radiant exchange – both short wave and long wave. The contributions of trees and grass are examined, both separately and in conjunction. Finally, the thermal effects of different types of ground cover plants are explored, comparing grass with succulents, as well as artificial lawn. Finally, a means of assessing the benefits of each of the landscaping treatments in terms of their respective irrigation requirements is proposed – an essential consideration in hot dry climates.

The talk will conclude with a discussion of application of climatology in the design of urban spaces. There is a gap between climatologists and the planning community (primarily architects and landscape architects) that reflects different academic training and different thought processes. Systematic analysis by geographers and better communication with planners are essential for successful integration of research insights into urban design. However, some of the recent research on urban microclimate, much of which focuses on air temperature, may result in misleading recommendations to the planning community.