

Science for Environment Policy

Even small urban green spaces can help tackle the heat island effect

Green spaces in cities can have a cooling influence which helps reduce the 'urban heat island effect'. New research from Portugal has demonstrated that even a small community garden can provide a significant cooling impact that can help efforts to adapt to climate change.

Climate change is expected to cause hotter and drier summers in many locations, increasing the 'urban heat island effect' where built-up areas become hotter than their rural surroundings. Studies of [urban](#) green spaces of a few hectares or more frequently demonstrate cooling effects. This study set out to explore whether smaller green spaces might also provide notable cooling benefits. A case study was undertaken of a neighbourhood garden in Lisbon of only 0.24 hectares.

Garden Teofilo de Braga is situated in central Lisbon, a densely populated area. The garden is mainly used by the elderly and young, age groups that are particularly vulnerable to heat stress. The park is most used during the afternoon when the sun is high. In summer, a variety of trees provide canopy coverage of 96.5%.

Data were recorded both within and beyond the garden over six hot summer days, three of which saw temperatures exceed 32°C, the threshold above which mortalities have been observed to increase. Both maximum and average temperatures were recorded, and an index assessing the impact of temperature on human biology, the 'Physiologically Equivalent Temperature', which takes into account the biological effect of air temperature, long and short wave radiation, humidity, wind speed, and even people's clothing.

Temperatures within the garden were often significantly cooler than nearby locations. The cooling effect was most marked on the hottest day, in which the garden's highest temperature was a 6.9°C cooler than surrounding locations. Mean temperatures and the impact on human physiology were also significantly lower within and close to the garden.

The study demonstrated that small green spaces in cities can have a valuable cooling effect that may extend for some distance beyond the park – 200 metres in this study, and several hundred metres in another study of a 3 hectare garden in Japan.

However, factors other than vegetation shading were recognised as important. The dry Mediterranean climate of Lisbon was thought to cause more cooling from evaporation than comparable studies of gardens in more humid climates. Buildings and design of the surrounding areas, the amount of shade and wind speeds, for example, can also affect temperatures both within and beyond green spaces.

In this study, a street with north-south orientation (and therefore receiving minimal sunshine) and high shading by buildings and trees showed similar temperatures to those within the garden. Such findings illustrate the value of using local data to better appreciate the potential cooling impacts in a given climate and urban form, and the factors which might encourage cooling.



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