



Trees need water to cool the city

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Urban trees are often seen as natural allies in fighting summer heat waves. But how much they actually help to cool their surroundings depends heavily on how moist the soil is. This is the main finding of a new study, led by environmental engineers at ETH Zurich and Eawag, which investigated several urban neighbourhoods in Zurich.

The research team wanted to understand how well trees can cool cities and what trees need to do so. The conclusion is clear: water is essential. Only when the soil around the trees is sufficiently moist can the trees noticeably lower the surrounding air temperature. The study also shows that evaporation from the ground itself plays a crucial role, cooling the air in a similar way to a damp sponge slowly drying out.

In Zurich's less densely built neighbourhoods, where there is more space for greenery, watered trees can create areas largely free from heat stress. In more compact districts, however, even extensive greening reaches its limits – especially on very hot days. The cooling potential of urban greenery depends on both the availability of space for vegetation and the trees' water supply.

Another finding from the study was that shade is a primary cooling mechanism for thermal comfort, making trees more effective than shrubs and irrigated grass. Irrigation strengthens this effect by sustaining evaporative cooling, and the researchers suggest automated systems that adjust to weather forecasts to keep soils moist during prolonged heat.

Cities need broader heat management plans

The study's findings can help cities plan and maintain green spaces more effectively, while also understanding their limitations. Planting trees is not sufficient – they must also be watered, especially in locations where they can have the greatest cooling impact. The researchers also recommend further

investigation into factors such as tree species, soil type and tree age to better understand and optimise the cooling potential of urban greenery.

Yet, even with irrigation and strategic tree planting planning, the study shows that trees alone cannot fully offset heat stress during extreme summer days. "On heatwave days in Zurich, it will not be possible to create heat shelters that fully solve heat by only using trees and water", explains Lucas Gobatti, first author and doctoral student at ETH Zurich's Department of Civil, Environmental and Geomatic Engineering and at the aquatic research institute Eawag. "The city should also consider improving heat adaptation plans, following examples such as Barcelona, where citizens are given access to public buildings to cool down, rehydrate and reduce heat exhaustion during heatwaves."

Cover picture: A tree with little space for collecting rainwater from the street will suffer from water deficit, reducing its capacity to cool down its surroundings. (Photo: Lucas Gobatti)

Original publication

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