Urban greening 'not a panacea' for dealing with extreme weather, study finds

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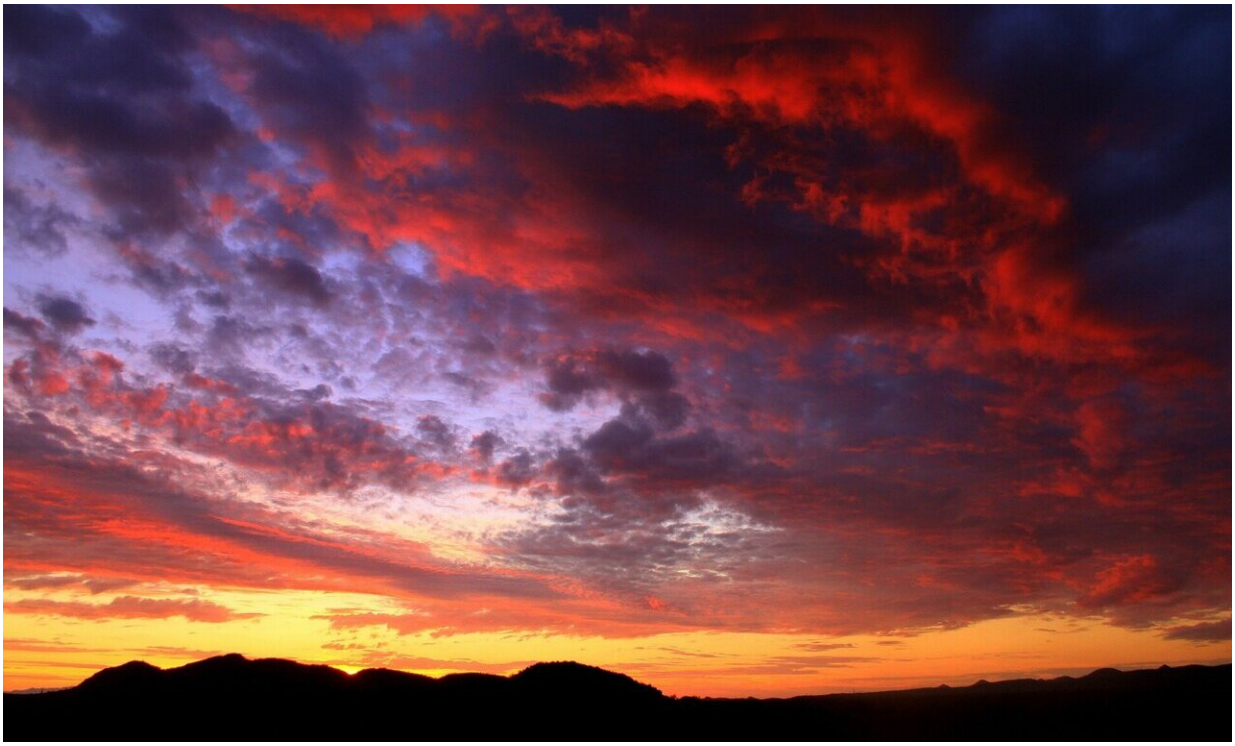

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Urban greening is unlikely to provide a single fix for tackling extreme weather events brought on by climate change, scientists have suggested.

A team led by researchers from Cardiff University has shown that the majority of cities around the world will not be able to reduce instances

of heatwaves and flooding at the same time through the introduction of strategies such as green roofs, living walls, vegetated urban spaces and parks.

Publishing their findings today in the journal *Nature Communications,* the team show that the cooling or flood-reducing potential of green urban spaces depends strongly on the prevailing climate of the city in question, with flood protection likely to be more successful in arid environments, whilst a cooling effect more likely in more humid climates.

Urban areas each have unique climates that pose significant risks, even more so as climate change increases the likelihood and severity of extreme weather events in the future.

Heatwaves within our cities can be attributed to the urban heat island effect (UHI), caused by the predominance of concrete and steel that absorb and retain heat, and the lack of cooling by water evaporating from plants. Flooding is part of the urban stream syndrome (USS), whereby city structures and systems negatively affect the natural runoff of rainwater back into the environment.

To tackle these problems, a commonly proposed strategy is to implement urban greening in our cities in the form of green roofs, living walls, vegetated urban spaces or parks.

Not only can these measures reduce the UHI and USS effects in our cities, they can also support local wildlife, reduce pollution and improve the general wellbeing of local populations.

In their study, the team used global climate model outputs and weather information from 175 cities around the world spanning 15 years of daily observations, from 2000 to 2015.

This data was used in conjunction with theories taken from soil science to calculate water infiltration into soils, which act like a sponge to reduce rainwater runoff, and the evaporation of water from plants, which can induce the desired cooling effect.

"Our research found that the ability of urban greening to mitigate local flooding and excess heat is not automatic nor, in some areas, even possible," said lead author of study Dr. Mark Cuthbert, from Cardiff University's School of Earth and Environmental Sciences.

"Local and regional climatic conditions significantly impact the capacity of urban soils and plant growth to simultaneously defend against flooding and extreme heating. In fact, our findings indicate that in many, possibly the majority, of global cities, urban greening will not be able to mitigate cooling and flooding at the same time."

The team also found that increasing variability in rainfall patterns due to climate change may reduce the performance of thinner green structures, such as green roofs, more quickly compared to larger greened areas with thicker soils and root systems.

They say these things must be considered by urban planners in order to find the best solution for each individual city, with a balance needed between performance, cost and viability.

"While urban greening may not be a panacea, our results show what's possible in designing the cities of the future," Dr. Cuthbert concluded.

The research was led by Cardiff University in conjunction with scientists at the University of New South Wales, Karlsruhe Institute of Technology and Nottingham Trent University.

Provided by Cardiff University

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