Making Hotter Augusts Not Quite as Hot in D.C. Wx and the City

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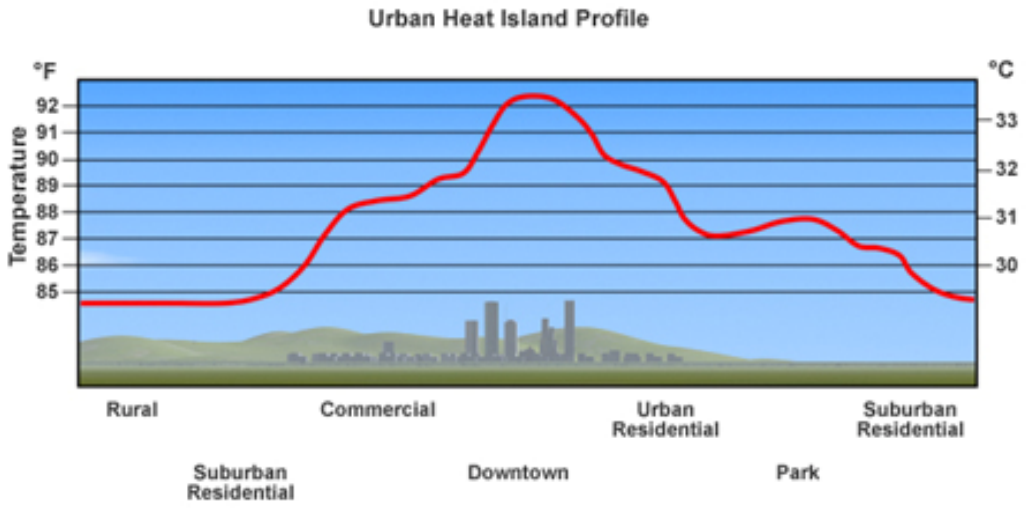


The abundance of paved surfaces in urban areas often leads to temperatures several degrees warmer than in nearby rural locations. The so-called Urban Heat Island effect could exacerbate the impacts of climate change. Courtesy UCAR/EPA.

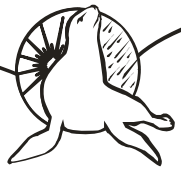
Last week, Andrew Freedman's article brought up a critical issue for residents of the D.C. metro area: the potential for increasingly hotter Augusts. In the comments section, he posed the question: "Does anyone have any ideas for practical ways to minimize the impacts of extreme heat in the future, short of following Congress' lead and getting out of town?"

Bombojea47 and *meteoscott* responded with two suggestions: more green space and painting our rooftops white. They were right. Besides escaping to the countryside, most solutions boil down to one simple principle: Less concrete = less heat.

Adapting to hotter summers in the future involves reducing the existing Urban Heat Island (UHI) effect by increasing our vegetation and use of lighter-colored pavement.

Keep reading for more on the Urban Heat Island effect and what can be done to minimize its impact...

The UHI is just like it sounds: Cities act like islands that produce and trap their own heat, leading to ambient air temperatures that are often warmer than in nearby rural areas. We can feel the effect of UHI on our feet and faces when we walk across a paved parking lot or street in the evening after it has been baking in the summer sun all afternoon and is emanating heat.



Cities are built with an abundance of dark, paved surfaces like buildings, streets and roofs that have a low albedo, or ability to reflect the sun's radiation. Thus, paved surfaces absorb and retain more heat than grassy fields or forested parks, and likewise emit more heat into the air immediately above them, a process that continues long after the sun goes down. This surplus heat can leave temperatures in cities several degrees warmer than surrounding areas, especially at night.

Typical urban development also includes loss of tree cover (meaning less shade and less evaporation of water into the atmosphere by plants -- both natural cooling processes), tall buildings that trap heat and reduce air flow, and a lot of vehicles that release hot gases. All of these activities contribute to warmer temperatures which, in turn, affect our health, energy use, weather, wildlife habitat, and quality of air and water.

Most paved surfaces and buildings serve essential roles in our communities. The good news is that the impact of UHI can be reduced by increasing natural sources of cooling and using lighter-colored building materials. Here's a breakdown of some "cool" solutions that are being implemented in D.C., Maryland, Virginia and other urban areas around the country:

Urban Tree Canopy and Vegetation

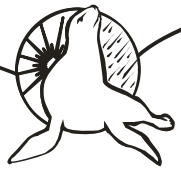
Ten years ago, the Washington Post published two NASA Landsat satellite images from an American Forests report that showed the Washington metro area's recent loss of tree canopy. Between 1973 and 1997, the metro area lost over 70,000 acres of heavy tree cover (the District alone experienced a 64 percent loss of its area of heavy tree cover) as a result of more impervious surfaces (concrete, asphalt, buildings and other non-porous surfaces). Today, 35 percent of the District's land area is covered by tree canopy; over 40 percent of its land area is covered in impervious surface (source and maps).

Shade trees planted along streets and on the east and west sides of houses are especially effective at cooling. According to the U.S. Department of Agriculture, "the net cooling effect of a young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day" (source). Casey Trees, a nonprofit in the District, operates an interactive tree calculator to help you calculate the ecological and economic benefits of trees on your property. If trees are not feasible, other types of vegetation can be planted - they do not provide as much cooling as trees, but are certainly an improvement over plain pavement.

Green Roofs

Temperatures on a dark-colored asphalt rooftop in the city can reach 150 to 175 degrees Fahrenheit on a hot summer day. After installing a green roof, these temperatures can drop by as much as 40 to 50 degrees. Green roofs consist of layers of waterproof lining, insulation, gravel, soil and sun-loving plants (take a virtual tour). The District's "20-20-20" vision is to install 20 million square feet of green roofs, or about 20% of the roof area of all city buildings over 10,000 square feet, by 2025. District government is offering a pilot green roof subsidy program for residents. For residential properties, green roofs remain a more expensive cooling option. But, they are extremely effective in cooling the air, reducing home energy use and reducing stormwater runoff.

Cool Roofs and Cool Pavement



Dark-colored asphalt rooftops both absorb and retain a lot of heat. Cool roofs that make use of new technologies in roof design and lighter-colored paint reflect rather than absorb the sun's rays, leading to temperatures 50 to 60 degrees Farenheit cooler than those above dark-colored roofs. Secretary of Energy Steven Chu recently suggested cool roofs as a means to reduce global temperatures.

According to the Environmental Protection Agency, reflective "cool" roofing materials are often comparable in cost, or even less expensive, than traditional roofing materials, plus they reduce energy use on hot summer days (you can calculate energy savings you would receive if you replaced your current roof with a cool one). Like cool roofs, cool pavements are made of materials that better reflect sunlight.

No doubt, if projections for warmer summers were to come to fruition, the impacts would be exacerbated by UHI and changes in the urban landscape. Increasing our green space, avoiding paving when it is not needed, driving less and cooling our rooftops are practical solutions to minimize impacts of future warming. Plus, they'll make us and our environment healthier in the process.

To have a significant impact, these initiatives need to happen on a city-wide (and nationwide) scale. The District's plan to minimize UHI impact is to increase tree canopy. Northern Virginia's focuses on planting trees and other vegetation, as well as increasing the area's number of cool roofs and green roofs. Maryland's plan includes all of these solutions and more.

Where and when do you notice the Urban Heat Island effect? Do you plan to implement any of the above solutions on your own property or in your neighborhood? Let us know with a comment below.