

Science for Environment Policy

Rivers can help reduce the Urban Heat Island effect

Heat waves are predicted to become more frequent under climate change, and are likely to be particularly severe in cities and towns due to the Urban Heat Island effect (UHI). A recent UK study of UHI mitigation strategies has demonstrated that even a small urban river can result in a cooling effect of 1°C during temperatures higher than 20°C, and that these cooling effects can be improved by careful urban design of the surrounding areas.

The UHI effect describes the relatively higher temperatures found in urban areas compared with rural surroundings, and is the result of several different factors. Building materials that absorb heat, the loss of moisture in the air due to reduced vegetation and paving over soil, as well as sources of heat, such as traffic, can all contribute to the UHI. Previous studies in tropical areas have demonstrated that the cooling effect of rivers can alleviate the UHI. However, data regarding the possible role of rivers as a cooling strategy in European countries are limited.

In this study, researchers recorded temperature and humidity between April and August at 12 sites located at different distances from a small river running through the city of Sheffield, UK. Sites were located in areas of different 'urban form'; either in an open square, an open street, a closed street or completely enclosed by buildings. To quantify the effect of the river on temperatures, these measurements were compared with another site, which was distant from the river but similar in all other properties except that of altitude, which was accounted for in the analysis.

The study demonstrated that the river did have a significant cooling effect, especially at higher ambient air temperatures. It led to an average reduction of 1°C during temperatures higher than 20°C. Cooling only occurred during the daytime and ranged from 0.25 to 1.82°C. The effect was also greater in May (between 1.01-1.82°C), rather than June (between 0.25-0.98°C), which was thought to be a result of higher water temperatures in the summer months.

The cooling effect did not extend beyond 30 metres from the river and was negligible at 40 metres. However, at shorter distances, the amount of cooling was significantly affected by urban form. Streets which were open to the river, combined with river banks with more vegetation, led to more effective cooling, which was sustained over a greater distance. For example, in an open street cooling was 1.2°C greater than a closed street.

The researchers conclude that rivers do have cooling effects and that future policies to uncover underground rivers could be of value in urban environments where high temperatures can have a negative effect on health and wellbeing. However, they stress that urban form surrounding the river corridor is more important than the simple presence or absence of a river and that cooling effects can be greatly enhanced by careful consideration of urban design.

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