

Urban heat islands

The world is warming and more people live in cities than ever before. While these two facts may seem completely unrelated, they have an important connection due to a phenomenon called the urban heat island.

The Met Office is working to better understand the cumulative impacts of increasing temperatures and urban growth, and how these might affect the lives of city-dwellers today and in the future. Dr Mark McCarthy, Climate Research Scientist, explains:

What are urban heat islands?

Put simply, an urban heat island is a man-made area that's significantly warmer than the surrounding countryside — especially at night. The term stemmed from the analogy of an urban heat island as a 'warm island' in a 'cool sea' of the surrounding natural environment.

Heat islands exist because the land surface in towns and cities, which is made of materials like Tarmac and stone, absorbs and stores heat. That, coupled with concentrated energy use and less ventilation than in rural areas, creates a heating effect.



Do cities automatically classify as urban heat islands?

As a general rule, urban areas are warmer than their surroundings — but not always. During the daytime, some towns and cities, particularly in arid and Mediterranean climates, are cooler because the buildings keep the Sun away from street level and are built from materials that don't warm as rapidly as the surrounding environment. Compare, for instance, the traditional architecture of Mediterranean towns that are designed to help people stay comfortable in the heat, with buildings in northern Europe.

In other climates, urban heat islands can keep cities warmer in winter and reduce heating costs, providing residents with a potential benefit. But for many cities, the additional warmth created by the urban heat island can cause problems.

How do urban heat islands affect human beings?

Currently, about half of the world's population live in urban areas. By 2050 it will be closer to two-thirds. Even where urban heat islands are not a major problem now, they could exacerbate some of the projected impacts of climate change such as heatwaves and hot summer spells.

During the summer, higher night-time temperatures can already lead to nocturnal heat-stress and disrupted sleep for city residents in some parts of the world, posing a bigger risk during a heatwave. During the day, roads, walls and roofs exposed to the Sun can become very hot, resulting in even greater discomfort. In 2003, the heatwave across Europe (recorded as the hottest summer on record) is estimated to have resulted in an additional 35,000 deaths, many of them in major towns and cities.

What research has the Met Office been doing into urban heat islands?

It's too early to say exactly how urban heat islands may have contributed to the impacts of the 2003 heatwave, but it is not too soon to have a strategy in place for managing their known effects. At the Met Office, we look at possible

future scenarios — such as how existing settlements may grow or where new ones might be built — before analysing the possible consequences they will face. This work brings together scientists and academics in climate research, the built environment, social science and the health sector.

Managing the urban micro-climate can influence many areas of urban planning. For example, city planners could insist on new buildings being designed to maintain consistent temperatures indoors. Or investments could be made in green infrastructure, as more vegetation and trees help to cool cities down.

How is research into urban heat islands being used?

It's our job to get useful information to governments in the UK and around the world so they can take action to ensure our towns and cities are comfortable and

safe places to live, now and in the future. Exactly what that means for your street is down to your local authority. We are working closely with key stakeholders in local authority and government on a number of projects to make sense of this rapidly developing field of research.

Our work also helps to shape the national policies devised by the Department for Environment, Food and Rural Affairs (Defra) and the Department of Energy and Climate Change. Most recently we contributed to Defra's UK Climate Change Risk Assessment 2012 that presents the latest evidence on the risks (and opportunities) of climate change for the UK to 2100. Importantly, we're also inputting to the Fifth Assessment Report (AR5) from the Intergovernmental Panel on Climate Change (IPCC) due to be published in 2014. The AR5 will, for the first time, include a chapter that specifically considers climate impacts and adaptation in urban areas.



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