

Cities must protect people from extreme heat

North America's heatwave highlights the need for urban planners to target extreme heat when designing climate-adaptation strategies.

Last month's heatwave shattered temperature records across the western United States and Canada. On 29 June, the Canadian village of Lytton hit nearly 50 °C – an astonishing increase of almost 5 °C on the previous national high. A day later, fire burnt most of Lytton to the ground, killing two people. Elsewhere, the cities of Vancouver, Portland and Seattle saw hundreds of people die during the same three-day heatwave.

As global temperatures rise, the risks from extreme heat – defined as periods when a region's temperatures are abnormally high compared with the average – are also rising (see page 349). Heat has always posed a threat to urban living, with heat-absorbing surfaces such as asphalt sending the mercury soaring. But climate change means that heatwaves now happen more frequently and are more intense than in the past. This is one of the most underappreciated hazards of climate change. Researchers say that the Pacific Northwest heatwave, for instance, would have been “virtually impossible” in the absence of human-induced global warming (see go.nature.com/3xatcgw).

And although heat can kill anywhere, the risk is greater in cities. One study presented at a conference last December estimates that people's exposure to extreme heat in more than 13,000 cities more than doubled between 1983 and 2016. Another study published last year estimated that air temperatures in two cities – Jacobabad in southern Pakistan and Ras Al-Khaimah in the United Arab Emirates – have already passed the human body's limits of survivability on their hottest and most humid days (C. Raymond *et al. Sci. Adv.* **6**, eaaw1838; 2020).

Climate researchers have long warned that global warming makes heatwaves such as that seen in North America this year much more likely. This means that urban planners must work harder to incorporate extreme heat into climate-adaptation strategies.

Some city authorities have been preparing for such a scenario. Take Ahmedabad in western India. After a devastating heatwave in 2010, the city developed an action plan with three elements: raising awareness about how people can protect themselves from extreme heat; creating an early warning system for when meteorologists forecast a heatwave; and training medical staff to better recognize and treat people suffering from extreme heat. One estimate suggests that the programme has saved 1,190 lives a year,

and a similar approach has been rolled out for more than a dozen other cities across India.

Another idea known as ‘cool roofs’, which are painted white or covered with energy-reflecting materials that absorb less heat, can reduce temperatures inside buildings by 2–5 °C when compared with conventional roofing.

But such climate solutions need to be implemented effectively and efficiently on a city-wide scale for them to have any significant impact. And for that to happen, governments need to require the construction industry to incorporate heat mitigation into their building projects through green building-certification programmes. The provision of subsidies for green buildings is also an option. In Barcelona, Spain, for example, the authorities are subsidizing 75% of the costs of 10 new green-roof projects in the city.

At the same time, cities must target heat-mitigation efforts at those most affected by the heat. That includes people in lower-income neighbourhoods, which have, historically, often been deprived of parks, tree-lined streets and other green spaces that are a common component of wealthier areas. Scientists have also found shocking correlations between race and heat exposure in cities in the United States. Studies show that historical urban policies have left communities of colour at higher risk of heat-related illness or death than people in predominantly white neighbourhoods.

Cool corridors

One pioneer in this concept of ‘heat equity’ is Paris, where officials are building a city-wide network of ‘cooling islands’ – which include spaces such as parks and pools – linked by cool walkways. Meanwhile, Medellín in Colombia has targeted low-income areas of the city for tree planting; more than 10,000 trees have been planted along 36 ‘green corridors’, resulting in a 2 °C reduction in surface temperatures. Government officials must continue to track the results of such experiments and make use of the best available evidence to green their cities.

This week, the mayors of 31 cities in the C40 global network of cities working to fight climate change have committed to ensuring that, by 2030, 70% of city residents can get to a green or blue public space with no more than a 15-minute walk or bicycle ride. Annual accountability check-ins must ensure that true progress is made on this ambitious goal.

In all cases, city and regional governments must better organize their heat-fighting efforts. It's not feasible to react to heat after the fact – by the time hospitals are overcrowded with people affected by heat stroke, electrical grids have crashed under the weight of demand for air conditioning, and coroners are counting the bodies, it's too late. Every death from heat is preventable if a person can access shade, water or other means of cooling.

As we face a future with longer, hotter and more frequent heatwaves, cities must escalate their planning for extreme heat. It needs to be on a par with preparations for other disasters such as earthquakes, floods and hurricanes. That applies not only to tropical cities but also to those in temperate climes. Who, after all, would

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have flagged heat as a major risk factor for Vancouver, at a latitude of more than 49 degrees north? Yet, after June's deadly heatwave, the city's officials are now working to incorporate extreme heat into their emergency plans. It is the only way forwards.

Food science faces its 'IPCC' moment

Any plan to create an intergovernmental scientific panel on food research and policy must protect its independence.

Later this year, politicians and policymakers are due to meet to make crucial decisions on protecting biodiversity, mitigating climate change and ending hunger – all part of the United Nations Sustainable Development Goals. Delegates at two of these meetings – on biodiversity and climate – benefit from the advice of organizations in which thousands of scientists periodically review research in the field. There is no analogous system of scientific advice informing policymaking in food and agriculture. But that might be about to change.

September sees the UN Food Systems Summit. 'Food systems' incorporates the processes and the people involved in catching and growing, processing, transporting and eating food. Delegates will discuss how to strengthen scientific advice, possibly by creating an intergovernmental panel of scientists, who would review relevant research, for example on improving diet and nutrition, or on how to raise standards of living for small farmers – enabling policymakers to make evidence-based decisions.

It's an idea inspired by the Intergovernmental Panel on Climate Change (IPCC), whose reports inform conferences of world leaders – such as the UN climate convention, which will meet in Glasgow, UK, in November. IPCC reports led to the 2015 Paris agreement to keep average global temperature rise to within 2 °C of pre-industrial levels, and to the 1997 Kyoto Protocol on reducing emissions.

There are hundreds of food systems researchers advising various organs of the UN, including the Food and Agriculture Organization and the Committee on World Food Security, both in Rome. But the Sustainable Development Goals overall have no political body of world leaders similar to the UN climate convention, and most of the individual goals – including ending hunger – lack an intergovernmental scientific panel with the budget and profile of the IPCC or the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

The UN has appointed a scientific group to channel research input into the Food Systems Summit. Last week, the group held two days of talks, where many researchers

voiced frustration at their inability to break through to decision makers. They say that boosting the profile of the science-to-policy process is more urgent now than ever. More than 800 million people go hungry every day. Even before the coronavirus pandemic, the Sustainable Development Goal to end hunger by 2030 was out of reach.

The idea of creating an intergovernmental panel of scientists in food systems isn't new. And as talks to develop it get under way, at least two things need to happen. First, it will be important to review existing and previous efforts to organize scientific advice related to food systems. Second, those charged with developing any new science-to-policy process must study and learn from the IPCC and IPBES: how they are structured and governed; how they are starting to work together; how they navigate topics that, like food systems, are both deeply political, and must take into account the voices of industry, non-governmental organizations, farmers, Indigenous people and others. And, crucially, how they are reaching out to under-represented groups, incorporating their knowledge, and protecting their interests. Between them, the IPCC, IPBES, experts advising the Committee on Food Security, and UN environment conventions have a reservoir of experience.

Integrity and independence

One overarching lesson from both the IPCC and IPBES is the need to maintain integrity in the research-review process. This is not easy. It requires a high degree of trust between the participants, and the governments that fund the panels must protect the independence of the processes.

For much of the 1990s, lobby groups representing governments and businesses with fossil-fuel interests tried hard to interfere with the IPCC's work. They came closest in the mid-1990s, when researchers concluded that humans are warming the planet. The stakes were high because this finding effectively signalled the beginning of the end of the fossil-fuel age. Instead of accepting it and leading the necessary energy transformation, some governments and corporations challenged the findings and criticized the scientists involved, both during the review process and after the IPCC's second assessment report was issued in 1995. Fortunately, the IPCC's leaders stood firm and the conclusions were not changed; it was only because of the body's design that they were able to do so.

The world of the Sustainable Development Goals has many of the same stakeholders as climate change. And an intergovernmental scientific body for today must value the knowledge and perspectives of small family farmers, artisanal fishers and large numbers of Indigenous people – whose knowledge and needs have long been neglected by science and in policy.

Hunger – along with biodiversity loss and climate change – is an existential threat facing much of humanity. Scientists advocating stronger science-policy links need to do their due diligence. Whether the outcome is a new intergovernmental science-to-policy process, or more powers for existing ones, a stronger partnership between scientists, key stakeholders and politicians is now needed more than ever.

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