

Summers up in smoke



This season's wildfires have wreaked havoc for local communities, summer tourists and densely populated cities more than 1,000 km away. International cooperation is urgently needed to ensure humans' sustainable future with increasing wildfires.

Wildfires are in the headlines across the globe nearly every day. Apart from the devastating wildfires on the island of Maui in the U.S. state of Hawaii this month, fires have burned large tracks of land from Tunisia and Greece in the Mediterranean to more temperate climates in Scotland, eastern Canada and Siberia, resulting in widespread property damage, evacuations and even deaths. With summer temperatures soaring across the globe, creating ideal conditions for wildfires to break out, large, frequent and potentially harmful fires are likely to be an increasing presence in our lives. The Mediterranean, where wildfires have grabbed headlines for several summers in a row, is projected to see a further 40% increase in burned area even if the Paris Agreement target of 1.5 °C warming is met¹. These fires have serious health and economic impacts for the surrounding communities and for seasonal visitors. However, the wildfires in Canada in June 2023, which caused massive smoke and air pollution events across eastern and central North America, have now made it clear that the impacts of wildfires on society, health and infrastructure are not only confined to traditionally fire-prone regions.

Exposure to wildfire smoke can have serious health consequences. Respiratory and cardiac illness are the most common detrimental outcomes, but recent research suggests that PM_{2.5} exposure from wildfires may have an effect on human cognition. In a study of US students between 8 and 14 years of age, Stanford researchers found that wildfire smoke exposure corresponded to lower test scores and reduced future income. These consequences disproportionately affected students from already disadvantaged backgrounds². The adverse health impacts of wildfire exposure are projected to increase under likely future



Thick smoke from wildfires in eastern Canada blanketed New York City and much of the US East Coast for days in June 2023.

climate change scenarios³. The economic effects of ongoing and intensifying wildfires are also far-reaching. In a study of the 2018 wildfire season in California, including the deadly Camp Fire, it was found that of an estimated US\$148.5 billion in economic damages, the majority were indirect losses (for example, affecting the industrial sector), over 50% of which were in other states⁴. Wildfires close roads and down powerlines, and the exposure of critical infrastructure to damaging burn areas is increasing across the contiguous United States⁵. The green energy sector, critical to reducing our dependence on fossil fuels and mitigating future climate change, is also affected; smoke days witness on average an ~8% decrease in the output of solar photovoltaics⁶. Without effective response and management, wildfires pose a critical challenge to our sustainable future.

Increasing exposure to wildfire is not only a matter of climate change. While climate change is increasing the probability of 'fire weather', ignition is required to turn a hot, dry landscape into a burning one. Humans and human activity are a major ignition source for many of the fires we see in the news. Agricultural burns that get out of control, faulty

power lines, arson and other human activities are all major sources of wildfire ignition. In the western United States, the incidence of wildfires doubles on 4 July, thanks to coast-to-coast pyrotechnics. It is tempting to blame the increase in exposure and in human-ignited fires on expanding development farther into fire-prone wildland ecosystems. The wildland–urban interface is increasing, and new estimates suggest that half of the planet's human population resides in this transitional space⁷. However, recent research from Boise State University found that while an increase in the wildland–urban interface accounted for approximately a quarter of the increase in wildfire exposure in the contiguous United States between 2000 and 2019, the majority was caused by larger burn areas encroaching into existing communities⁵.

So, what can we do? To live sustainably with wildfires, we need to develop effective, flexible and agile management and response systems. Some of that will need to be in managing wildfire outbreaks and burns, including controlling anthropogenic ignition sources alongside controlled and cultural burns to reduce the likelihood of large, uncontrollable fires.

But our ability to control fires is limited, and there is now an urgent need to build resilient communities, robust lines of communication and holistic response plans – from managing respiratory illness to managing trauma. This will require concrete adaptations such as equipping schools, care facilities and other critical municipal buildings with proper filtration to protect vulnerable communities from smoke-induced air pollution. However, true resilience will also require building less tangible infrastructure. Before the next wildfire crisis unfolds, relevant management and **disaster response agencies must develop communities of trust** that can be relied upon when

time is of the essence. Research suggests that vague objectives, lack of alternative planning and on-the-spot decision-making waste precious time during a crisis and that **it is critical to establish and agree upon clear objectives and alternatives in concrete language** before dangerous wildfires break out. As evidenced by the far-field impacts of this year's Canadian wildfire season, building this response infrastructure only on local, regional or national levels will not be sufficient; transboundary and international cooperation is required to rapidly disseminate critical information to both proximal and distal communities at risk of exposure and to coordinate effective

response plans. The time to prepare for next year's fire season and those of the years following is now, before all our summers go up in smoke.

Published online: 21 August 2023

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