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## A World of Fire and Floods Demands New Architecture New designs can help mitigate climate change.

By Elisabeth Braw, a columnist at Foreign Policy and a fellow at the American Enterprise Institute.

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The “world’s factory” is slowing production, a victim of drought that has forced much of China to shut down. Global heat waves don’t respect authoritarian authority, and the drought hitting southern China has left rivers dry—and a hydropower-dependent country struggling to keep the lights on. China’s misfortunes put an urgent issue into sharp relief: How can countries climate-proof their architecture and infrastructure? In an era of sudden shocks and climate disasters, economies can’t survive with the old norms—and adapting for resilience could help them reduce their carbon dioxide emissions too.

This month, a relentless drought on the British Isles caused water companies to impose hosepipe bans on large parts of the country. That’s bad news for gardeners and somewhat good news for farmers, who had been facing a devastating harvest loss. As I pointed out in a previous Foreign Policy piece, a continental drought has caused the Rhine’s water levels to drop to a degree that makes shipping difficult or impossible, which will harm German manufacturing.

These drought contingencies, though, are small compared to the drought now damaging China. Hydropower reservoirs have dropped by half, and electricity demand is soaring as people seek refuge from the heat. And it doesn’t stop at citizen comfort or even farmers’ livelihoods. So grave is the heat wave that it has caused parts of the Yangtze River to dry up and is destroying both manufacturing and shipping. Authorities have resorted to desperate measures, pouring nearly a billion cubic meters of water into the Yangtze and attempting to use rain seeding techniques to irrigate crops. Across the border in Pakistan, violent flash floods have killed more than 1,000 people this month, left hundreds of thousands of people homeless, and wreaked indescribable havoc on local communities.

Extreme weather is not new. Legends of great floods span Eurasia, from Noah’s Ark to Yu the Great’s taming of the wild waters. Droughts and earthquakes have shaped the course of rivers—and of history. But architects and designers were once, at least, able to look to historic norms. Amsterdam expected flooding, Japan expected earthquakes, and Australia expected droughts. Today, with countries more densely populated than ever before and climate change exacerbating extreme weather events, the world has to retrofit its architecture and infrastructure for the unexpected. Making buildings, cities, and even agriculture resilient to extreme weather is indispensable to have a chance at living with climate change—while reducing emissions and buying humanity a chance at a less catastrophic future.

In 2014, while a visiting fellow at the University of Oxford’s Green Templeton College, I had a fascinating conversation with another visiting fellow who happened to be sitting next to me in the dining hall. This academic, an engineer, was working on new ways to build houses on stilts, the way houses in many cities will need to be built as climate change leads to rising sea levels and more flooding. Houses on stilts have been built for generations by Filipinos and other Southeast Asians residing in lowlands, but now, European countries will need them too. So will the United States’ East Coast and perhaps West Coast. In Miami, wealthy residents are already paying architects to raise their homes one story above the ground. The similarly low-lying Swedish town of Kristianstad has put its nature museum on stilts. But it’s expensive. The engineering academic was working on models that would allow larger-scale production of buildings on stilt.

The other option is, of course, to live on the water itself and rise with it: Amsterdam and Rotterdam, the Netherlands, are almost a decade into building floating neighborhoods. Copenhagen, in turn, is

building “cloudburst boulevards”—ordinary streets that are made convex and will allow flash floods to quickly move toward the harbor. The Danish capital is also creating what city planners call pocket parks and sunken gardens, which can act as flood reservoirs. It’s even working on a climate-adapted neighborhood. This innovative architecture is easy on the eye: Imagine parks devoid of concrete but with trees and green elevations that just happen to be suited for reservoir duties. The future is blue-green, as they say in Copenhagen.

But Pakistanis living on less than a dollar a day are simply never going to have access to enough homes on sturdy stilts or Dutch-style floating neighborhoods. Climate-adapted neighborhoods will also do little to help the permanently drought-stricken Horn of Africa, and they’re quite obviously going to do nothing for the water levels along the Yangtze or Rhine. Architecture needs to not just live with the problem but help solve it.

That’s already happening, though not nearly fast enough. All over the world, so-called passive houses are being built, completely normal one-family and multifamily houses set apart only by their extreme energy efficiency. Despite costing little more to build than regular homes and offices, passive houses require almost no heating or cooling. Imagine what passive houses could achieve in the Persian Gulf states or in the United States, where air conditioning is spewing a large and steady stream of carbon dioxide into the atmosphere (117 million metric tons of it from the United States alone).

Elsewhere, companies and individual enthusiasts are pursuing hydroponic farming, water-based plant farming that can be done vertically and requires no soil. It’s more expensive to set up than traditional farms, but it requires far less space. The booming sector is attracting considerable support; between 2019 and 2020, investment in the United States doubled to nearly \$1 billion. American cooking guru Martha Stewart has invested in the start-up AppHarvest, which is building 11 hydroponic farms in Appalachia. The United States’ largest hydroponic farm, Bowery, counts singer Justin Timberlake and actress Natalie Portman among its investors.

Vertical farming faces a bright commercial future as traditional farming is wildly altered by climate shifts. “Hydroponic production is not growing because it produces healthier food. It’s growing because of the money,” Vermont organic farmer Dave Chapman told the New York Times last year. “Anyone who frames this as food for the people or the environment is just lying.” But pursuing hydroponic farming would also allow countries to reforest more land and thus absorb more carbon emissions.

Elsewhere, more and more companies and institutions are planting green roofs on their buildings. The roofs give office workers and visitors a rare opportunity to experience nature, but they also absorb heat and stormwater, help their buildings reduce energy consumption, and enhance biodiversity. Even the U.S. government, hardly known as an eco-innovator, now has green roofs on some buildings, including Boston’s John W. McCormack Post Office and Court House building, whose roof, the National Park Service notes, “is accessible to building users, and due to its location it is visible from many floors of the building, providing a pleasant view for office occupants to look down upon.”

Imagine if the Chinese government launched a hydroponic farming strategic plan. Fewer farmers would lose their livelihoods when the next extreme weather hits, and extreme weather events would be less likely altogether because the land made available could be planted with carbon dioxide-absorbing trees. Indeed, with hydroponic farming, China would be better able to feed its population and wouldn’t need to buy fertile land off African countries. Imagine if all new homes and office buildings had to be built in passive house style, which surely nobody would object to since it reduces energy bills. Imagine if such buildings were better able to withstand flooding too. Imagine if all offices and institutions planted green roofs, which similarly would allow them to cut their energy bills while increasing their attractiveness to staff and visitors.

Actually, the world shouldn’t imagine—companies, institutions, and individuals should just get on with it. Imagination was permissible a decade ago. Today, extreme weather devastating the planet makes retrofitting its architecture and infrastructure a moral and logistical imperative.

**Elisabeth Braw is a columnist at Foreign Policy and a fellow at the American Enterprise Institute, where she focuses on defense against emerging national security challenges, such as hybrid and gray-zone threats. She is also a member of the U.K. National Preparedness Commission. Twitter: @elisabethbraw**

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