

# 'Sponge city' failures show holes in current climate change defence

Deadly floods, forest fires expose adaptation methods as inadequate and needing urgent updating. Meanwhile, the root cause goes largely unaddressed.

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The pace of climate change is playing havoc with one of the key approaches to dealing with it – that of adaptation, where societies try to adjust to the impact of changing weather patterns and other harmful effects of a warming planet.

The intensity of the recent devastating rain in China, northern Italy and Pakistan, plus raging forest fires in Hawaii's Maui and Canada, overwhelmed the capacity of authorities and emergency services – as well as businesses and households – to mount an adequate response.

Climate adaptation signifies ways and means to cope with the fallout from climate change, for

example, by constructing more resilient infrastructure and ensuring better urban planning.

Since global warming is partly the result of carbon that has already accumulated in the atmosphere and will stay there for decades, even if climate measures are taken, it is essential that countries invest in climate adaptation – one of four main areas highlighted (along with a loss and damage fund, climate finance and climate mitigation) at the United Nations' COP27 climate summit in Egypt in 2022.

All countries need more and better efforts in adapting to an inevitably disaster-prone future.

Adaptation in the face of floods and storms as well as heatwaves, fires and droughts is a primary climate concern. It includes the "sponge city" approach to addressing storms and floods, just as it includes building coastal embankments and better drainage systems. Similarly, smart forest management, for example by building fire breaks, would seek to minimise forest fires.

These adaptation techniques do not really mitigate climate change or address the root causes of excessive greenhouse gas

emissions, but they ameliorate the impact of the disasters.

A few steps, however, both mitigate and adapt, such as protecting mangroves that help to absorb carbon emissions while also slowing the fury of storms.

A sponge city is a new urban model for flood management first suggested by Chinese researchers in 2000 to combat the concrete and asphalt that prevent drainage. It makes the most of natural "sponges" such as trees, lakes and parks that absorb water and let it drain away safely.

Cities that have embraced this approach to some degree include Shanghai, New York and Cardiff, with their inner-city gardens, better river drainage and planted footpaths.

Singapore, too, has incorporated principles of a sponge city in its adaptation efforts, particularly integrating rainwater into city functions. The Republic's 2030 Green Plan includes elements of permeable or porous sidewalks, wetland parks and underground storage tanks.

However, unrelenting downpours starting on July 29 that inundated cities in northern China put into sharp relief the

limitations of the country's innovative "sponge city" measures amid relentless global warming.

## THE CASE OF CHINA'S SPONGE CITY

The deluge wreaked havoc in the Beijing-Tianjin-Hebei region, unleashing over 260mm of rain water by the morning of Aug 1. Rivers swelled, bridges crumbled and flash floods ravaged communities, exposing the fragility of infrastructure. By Aug 8, 33 lives were lost, 18 individuals were missing and nearly 300,000 people were left reeling from the impact in Beijing alone.

Vice-Mayor Xia Linmao described it as "historically rare torrential rains", with 60 per cent of the annual average rainfall descending within just 83 hours.

It was exactly the scenario the sponge city concept was intended to tackle – but couldn't.

The background: China is home to 16 of the 20 global regions considered most vulnerable to climate change. It is for this reason China invested substantially in recent years to fortify climate defences. The devastating 2012 Beijing flood that claimed 79 lives spurred President Xi Jinping to champion sponge cities.

In April 2015, 16 cities were identified as inaugural sponge city pilot projects. A target was set for key features of the programme in urban built-up areas: exceeding 20 per cent by 2020 and surpassing 80 per cent by 2030. Performance evaluation reports in 2019 showed impressive progress, with 920 sq km of sponge city construction across 30 pilot cities and an investment exceeding 160 billion yuan (\$29.6 billion).

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# Need for more sustainable growth model

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These water management designs, however, were predicated on rainfall patterns three decades before 2014. They are grossly inadequate for today's amplified impacts of climate change.

In Beijing's Mentougou district, for instance, efforts centred on controlling 75 per cent of annual run-off since 2018. This equates to rainfall of just 25.9 mm within 24 hours. Yet, the recent heavy rainfall in Beijing reached an astounding 270.2mm, highlighting that the current sponge city blueprint is ill-suited for climate change-driven weather extremes.

## WHAT HAPPENED IN CANADA, MAUI

The limitations of the current sponge city approach also put the spotlight on the limitations of other adaptation measures, too.

Take the deadly fires in Canada and Hawaii's Maui, for example. With more than double the previous annual record for emissions from wildfires, and the release of 300 million tonnes of carbon into the air, 2023 could easily be the worst year for forest fires in Canada's history.

The scale of devastation in Maui, from the historic district to schools and homes, is tough to fathom.

The proximate reasons for these wildfires could be lightning, the careless lighting of a match, or a campfire, but the underlying reason is unusually warm weather and lack of precipitation driven by human-caused climate change.

And regarding adaptation, there were serious managerial and engineering lapses too.

The lack of preparedness for wildfires in Canada has been known for some time, especially as disaster management agencies faced budget and staff constraints and cuts.

In Maui, there were serious gaps in early warning systems and the local capacity to get people out of harm's way.

## REVIEW OF CURRENT MEASURES IS NEEDED

The cascade of unprecedented floods and storms on the one side, and deadly heatwaves and forest fires on the other, sounds alarm bells on two fronts.

For one thing, adaptation measures need to be constantly reviewed to ensure that their engineering specifications are up to date.

The second is the realisation that all the adaptation efforts will have little effect on the loss of lives and livelihoods caused by climate change unless the root cause of global warming is addressed – carbon emissions that continue to be pumped into the atmosphere at record rates using fossil fuels.

All the adaptation efforts, including sponge cities, will fall short unless major emitters like China, the United States, India, Japan and Russia transition successfully to a low-carbon economy.

When fires decimate Maui, the Greek islands, or Northern Canada, it is natural that all the attention is on local causes,



Unrelenting downpours starting on July 29 that inundated cities in northern China put into sharp relief the limitations of the country's innovative "sponge city" measures amid relentless global warming. PHOTO: REUTERS

everything from the lighting of a match to the mismanagement of escape routes. But common to all is the extreme heat and bone-dry vegetation caused by global warming resulting directly from excessive carbon emissions that trap atmospheric heat.

Effecting a meaningful shift to a low-carbon growth trajectory requires substantial resource reallocation and technological advancement, particularly in energy production and consumption.

The reality is economic and political pressures everywhere in

the world prioritise disaster relief and recovery way over preventative measures. Financial incentives are also tilted to favour any means of advancing short-term economic growth at the expense of environmental and disaster protection, especially at provincial or state levels across the world.

Correcting these misplaced priorities calls for astute top-level signals and policy design, coupled with an education campaign and changed incentives aligned to the requisites of a more sustainable growth pattern.

There is great urgency in investing more financial and staff resources and revising sponge city engineering design specifications, for example, to adapt and cope better with extreme floods and storms. There is also a need to look at the big picture of mitigation and prevention.

That calls for bold policy decisions that go beyond responding to immediate risks even during a crisis, and tailoring adaptability to an escalating climatic catastrophe.

While this transition to the new

reality of climate change entails financial costs, it is worth remembering that the benefits – ranging from mitigating climate-related damages to fostering sustainable green development – are vastly larger.

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