

of a large earthquake striking the Pacific Northwest. The result was a shock. A series of geological studies revealed that enormous earthquakes and tsunamis had repeatedly ravaged the coast, most recently in January 1700.

Although earthquake risk in the region — known as Cascadia — is well known, what to do about it is still undecided. With a few exceptions, politicians have been slow to embrace emergency preparedness. Local governments are only just starting to get ready for the consequences of a catastrophic tsunami, such as moving schools out of inundation zones.

Some of the most forward-looking work is the result of private money. The co-founder of technology company Intel, Gordon Moore, lives on Hawaii's coast and is well aware of the threat of tsunamis. His foundation supports natural-disaster preparedness along the US west coast. This includes funding an April workshop that explored options to install monitoring instruments on the sea floor off Cascadia, some of them developed by a Seattle inventor and philanthropist with a keen interest in disaster mitigation (see page 466).

The Gordon and Betty Moore Foundation also supported the early development of ShakeAlert, an earthquake early-warning system led by the US Geological Survey (USGS), that is currently being tested along the US west coast. It relies on a network of seismometers on land. When the ShakeAlert instruments detect an earthquake, they send immediate warnings, which arrive before the tremors cause damage. The plan is that the seconds to several minutes of notice can allow trains to slow to a halt, surgeons to pull their scalpels out of patients and children to climb beneath desks.

The foundation's funding made sense when ShakeAlert was getting under way — private money is appropriate to jump-start experimental projects. But it is time for the federal government to commit.

Although the USGS has overseen ShakeAlert from the start, President Donald Trump has proposed cutting federal support for the system next fiscal year. The amount is US\$8.2 million — a puny sum for investing in such a seismically active region. The consequences of not being prepared are expensive: the Federal Emergency Management Agency has estimated that the seismic risk in California, Oregon and Washington could lead to average yearly losses of \$4.1 billion.

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To ensure the safety of US citizens is the most basic responsibility of the federal government. ShakeAlert is at a crucial time in its development: it has just enough momentum behind it to turn it into a reality. Organizers hope to have real-time alerts flowing to the public next year. The existing federal funds are a tiny investment with enormous public-safety benefits.

It is a challenge of disaster risk management to get anyone to care about an event that may or may not happen during a politician's tenure. But other nations have done it. Japan's much-vaunted earthquake early-warning system has had minor glitches, but overall has been tremendously successful in saving lives. Mexico's government has installed seismometer networks for real-time alerts throughout Mexico City. Romania has a similar system for a nuclear research facility.

Fortunately for the United States, Trump can only propose a budget. It is up to members of Congress to reverse this proposed cut and fully fund ShakeAlert. All the bluster coming out of Washington can't hold a candle to the next epic battle of Thunderbird and Whale. ■

Mercury rising

Future generations will fear, rather than fend for, the environment.

Scott Pruitt achieved something of a political first last week. The controversial head of the US Environmental Protection Agency (EPA) was grilled by the officials who control his budget and told that he had asked for too little cash. In fact, the officials insisted, they were determined to give his agency more than he had requested.

"I can assure you, you're going to be the first EPA administrator that's come before this committee in eight years that actually gets more money than they asked for," said Oklahoma congressman Tom Cole, a member of the US House of Representatives Committee on Appropriations who, as a Republican, is nominally on the same side as Pruitt. In a gruelling session, Pruitt was left in no doubt of what the committee members thought of proposals from Donald Trump's administration to slash both the spending and the remit of the EPA.

"I'll get straight to it. The fiscal year 2018 budget request for EPA is a disaster," said Nita Lowey, a Democratic representative for New York who sits on the committee. The intended cuts of US\$2.4 billion to the agency budget, she said, would "surely impact EPA's ability to fulfil its critical mission of protecting the air we breathe and the water we drink".

Not so, Pruitt stated. With less money and fewer staff, the agency would do a better job and be able to focus more on its core mission. What's more, President Trump's high-profile exit from the Paris agreement on climate change, he has promised, does not undermine US leadership on and engagement with the problem.

Meanwhile on planet Earth the heat is rising. Britain was hit by a heatwave at the weekend that forecasters say could last for weeks, and

temperatures in California are predicted to reach record levels in a few days' time. The world is cooking and we should anticipate more of the same.

From extreme rainfall to rising sea levels, global warming is expected to wreak havoc on human lives. Sometimes, the most straightforward impact — the warming itself — is overlooked. Yet heat kills. The body, after all, has evolved to work in a fairly narrow temperature range. Our sweat-based cooling mechanism is crude; beyond a certain combination of high temperature and humidity, it fails. To be outside and exposed to such an environment for any length of time soon becomes a death sentence.

And that environment is spreading. A death zone is creeping over the surface of Earth, gaining a little more ground each year. As an analysis published this week in *Nature Climate Change* shows, since 1980, these temporary hells on Earth have opened up hundreds of times to take life (C. Mora *et al.* *Nature Clim. Change* <http://dx.doi.org/10.1038/nclimate3322>; 2017). At present, roughly one-third of the world's population lives for about three weeks a year under such conditions. If greenhouse-gas emissions continue to rise unchecked, that figure could climb, exposing almost three-quarters of the population by the end of the century.

The analysis also reveals that even aggressive reductions in emissions will lead the number of deadly heatwaves to soar in the coming decades. Cities including London, New York, Tokyo and Sydney have all seen citizens die from the effects of excessive heat. By 2100, people in the tropics could be living in these death zones for entire summers. It's true that warmer winters will save lives further north. And those living in urban environments may find ways to adapt to the new norm of extreme heat. But, if the researchers are correct, the politics of Pruitt and those who try to hold him to account will seem quaint and anachronistic to our grandchildren. For they will live in a world in which most will see the environment less as something to protect, and more as something to protect themselves and their families from. ■