

A photograph showing a white sedan partially submerged in floodwater on a city street. The water is dark and reflects the surrounding environment. In the background, there are green trees, a building, and various street signs, including a red and white arrow sign and a green sign with a white bird logo. The scene is captured in a cinematic style with soft lighting.

## Flooded cities

**68,000** – average deaths per year from natural disasters

**150 million** – combined populations of the ten most ‘at risk cities’ globally

# Flooded cities

The vast majority of our cities are not prepared for flooding. Many districts and households can no longer get flood insurance and are in jeopardy. It's going to get worse before it gets better.

2015 was the warmest year on record and, arguably, with many natural disasters. The Nepal earthquake, the worst flooding for 100 years in Chennai, a long heat wave in India that claimed 2,000 lives, huge monsoon rains in Myanmar, Bangladesh and India, massive flooding in Mozambique and Malawi, another drought in Ethiopia. Add to that flooding in Europe, the US and South America - and many are getting ready for more of the same; the occurrence of a strong El Nino in 2015/16 warmed the Pacific and therefore led to heavy rainfall, flooding in the US as well as more storms, poorer harvests and more flooding in South America.

However, in all, only 23,000 people were killed in 2015, many in the Nepal earthquake in April, more than the 7,700 deaths the previous year, but well below the 10-year average of 68,000. Insurers say that though the overall cost of natural catastrophes dropped to its lowest level since 2009, and claims fell to \$27 billion, looking ahead, demand for cover will double in high-growth markets and rise by around 50% in mature markets by 2020. So are things getting better or worse?

The consensus today is that climate change is here and we need to do something about it. As some have suggested, since 2000 we have been in The Anthropocene – the epoch that begins when human activities started to have a significant global impact on Earth's ecosystems. What we have done in the past and are still doing now is having potentially irreversible long-term effect on the planet. While ocean acidification, the nitrogen cycle and biodiversity loss are often highlighted as the most significant of these, there is little doubt that it is in the area of climate change where there is greatest political attention.

With the recent agreements in Paris at COP21 now being worked through, some hope that actions to be taken will mean that overall global warming can be kept down to 1.5C or 2C. Others are less confident and see that our actions to date have already contributed to at least this and that, within this century, we are more likely to see 3C or even 4C of global warming.

There has to be not only significant change in the energy system but also in our behaviours. In the UK, the energy consumed in just driving cars each day is greater than what can be conceivably be supplied domestically from all three renewable options of wind, solar and wave. Add in heating, air-travel, manufacturing and electricity for all our devices, and we are using way more than can be provided from existing green technologies. With current consumer behaviours, few countries can deliver a carbon neutral energy supply and, as such, without a growth in nuclear or solar energy coupled with hyper-efficient batteries, preventing the 2,3 or 4C rise in average temperatures is a big ask.

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## Our habitat



No one really knows exactly what this means, but the Met Office has created one map of likely consequences based on the IPCC Assessment Report. Alongside further melting of the Arctic and Antarctic ice sheets, this shows desertification in the Amazon, South West USA, Southern China and large parts of Africa. However, although drought and hurricanes are going to increase in frequency and strength and seasons will shift, the biggest issue that we need to prepare for seems to be flooding. Either directly from rising sea levels and more heavy rainfalls or as a by-product of more unstable weather patterns, dealing with more water than our systems were designed for is the top risk in many regions.

As most of us live in cities and most of the largest of these are on the coast, the numbers likely to be affected are huge. New York, Miami and Boston, alongside Guangzhou, Mumbai, Kolkata, Shenzhen and Jakarta are among the most vulnerable. The ten most 'at risk cities' globally already have combined populations of over 150m and are projected by the

UN to have grown by a further 50%, adding another 75m by 2025. 22 of the top 50 wealthiest cities are prone to serious flooding that will also impact housing, poverty, cost of energy and social breakdown. By 2070, the total asset exposure could rise more than tenfold from today, reaching \$35 trillion, more than 9% of projected annual global economic output. In the longer term, experts estimate that globally up to 1 billion people will have to migrate inland or north as a consequence of climate change.

On the upside, we are seeing success in the development of salt-water tolerant and more drought resistant crops, and Canada and Siberia will both be warmer and able to accommodate more people. However for the majority, unable to move, dealing with the impact of climate change will become the biggest priority. Over the past decades, many of us have consistently built where we should not and in many regions flood plains have not been respected. Moreover, other than in the Netherlands, few buildings have been designed to accommodate regular flooding. Learning visits to the Netherlands and Belgium are frequent but as yet, few tangible schemes have been proposed.

*22 of the top 50 wealthiest cities are prone to serious flooding.*

## Flooded cities

The opportunity is to rethink infrastructure in terms of resilience, and not just rebuild it. In a few cities more effort is being put into building new infrastructure similar to the Thames barrier in London. Designed in the 1960s and operational since 1982, this helps to defend London from high tides. Originally planned to only be used once or twice a year, in 2014 it was closed 48 times. Sustainable flood-risk management schemes are being discussed and planned for areas like the Pearl River Delta in China where currently the practice is to deliberately flood rural areas in order to protect the cities.

Nobody is expecting people to stop migrating to cities or for cities to voluntarily relocate any time soon, but with insurance being withdrawn from some and more regular flooding occurring in many, the need for action to occur will be evermore visible over the next decade. If global warming plays out as many expect, attitudes to flooding will shift considerably and a more prevalent view around better preparing for resilience will become clear.

*The opportunity is to rethink infrastructure of resilience and not just to rebuild it.*

### Related insights

#### Accelerating displacement



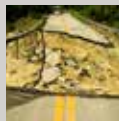
Climate change, conflict, resource shortages, inequality and political elites unable or unwilling to bring about necessary change all trigger unprecedented migration to the North. Over the next 50 years, as many as 1 billion people could be on the move.

#### Deeper collaboration



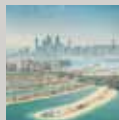
Partnerships shift to become more dynamic, long-term, democratised, multi-party collaborations. Competitor alliances and wider public participation drive regulators to create new legal frameworks for open, empathetic collaboration.

#### Infrastructure deficit



Infrastructure again becomes a source of competitive advantage. Emerging economies invest in new railroads and highways for more effective movement of people and goods, while developed nations suffer from poor legacy.

#### Intra city collaboration



Increasing competition between cities overrides national boundaries and drives change. They compete to attract the best but also collaborate to avoid the downside of success – over-crowding, under-resourcing and pollution.