

Extreme weather events and climate change

Extreme weather, from flooding to super-storms and heat-waves, is being experienced by people across the world. It's becoming ever-clearer that some of the events are underpinned by man-made climate change. We can protect ourselves from this extreme weather to some extent through greater preparedness, such as by building stronger flood defences. But this will only go so far, we also need to arrest the pace of climate change – stopping the burning of fossil fuels and bringing emissions under control.

This year the World Meteorological Organisation published a report called [‘The Global Climate 2001-2010: a decade of climate extremes’](#)¹. In it they pointed to a twenty per cent increase in lives lost in extreme weather events compared to a decade earlier. Over 350,000 lives were lost globally due to extreme weather over the ten year period. They also pointed out that the 2001-2010 decade was easily the warmest decade on record. The two decades before then were also record breakers.

The report was very clear extreme weather can happen with or without climate change, but that there is “evidence that human influence has substantially increased the likelihood of some events occurring.”

Since the report was published [new research](#)² has been published which demonstrated that half of twelve extreme weather events of 2012 could be linked to climate change. The US heat-waves, Superstorm Sandy, shrinking Arctic sea ice, drought in Europe's Iberian Peninsula and extreme rainfall in Australia and New Zealand were given as examples.

That some forms of extreme weather are more likely with climate change is now well known. A 2011 [study](#)³, for example, found that man-made climate change may have almost doubled the risk of the extremely wet weather that caused the big UK floods in the year 2000. An Intergovernmental Panel on Climate Change (IPCC) [report on extreme weather](#)⁴, published in 2012, said “changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events.”

The IPCC report said that for the future:

- It is virtually certain that increases in the frequency and magnitude of warm daily temperature extremes and decreases in cold extremes will occur in the 21st century at the global scale.
- It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase in the 21st century over many areas of the globe. There is medium confidence that projected increases in heavy rainfall would contribute to increases in local flooding in some catchments or regions.

They also said “vulnerability is often concentrated in lower-income countries or groups, although higher-income countries or groups can also be vulnerable to climate extremes”. In other words it’s the poorest who will be hit hardest but nobody is immune to extreme weather.

Response

The number of deaths as a result of extreme weather is reduced by early warning systems and preparedness, such as adequate flood defences. This is important. However, to prevent ever-increasing extreme weather events it is also vital to tackle man-made climate change. This requires the rapid decarbonisation of economies, leaving the vast majority of fossil fuel reserves in the ground and not developing new reserves through, for example, fracking for shale gas.

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- The year 2012 was the warmest on record in the United States. The summer heat was associated with one of the most severe droughts on record. A suite of impacts has been ascribed to the drought and associated summer heat, including low (or even zero) crop yields, low livestock inventory, sharp increases in commodity prices, and at least 123 direct human deaths. Researchers found that this extreme weather is four times more likely than in periods before man-made climate change⁵.
- In September 2012 the Arctic sea ice reached a new record of 3.4 million square kilometres. Climate change was found to be primarily responsible, due equally to the thinning sea ice and warm atmospheric conditions⁶.
- The heavy rainfall in eastern Australia at the end of summer 2012 across eastern Australia led to swollen rivers and widespread flooding that swamped agricultural land, caused loss of life, and forced tens of thousands of people to evacuate their homes. Summer 2012 was largely connected to a La Niña episode—long associated with wetter-than-normal conditions in Australia— but sea-surface temperatures north of Australia driven by global warming are thought to increase the chances of above-average rainfall by as much as 5-15% in the future⁷.
- The year 2000 floods in the UK, which the UK occurred during the wettest autumn in England and Wales since records began in 1766, these floods damaged nearly 10,000 properties, disrupted services severely, and caused insured losses estimated at £1.3 billion. Researchers suggested that that man-made climate change may have almost doubled the risk of this event³.

¹ World Meteorological Office(2013), the global climate 2001–2010, a decade of climate extremes, summary report

² American Meteorological Society (AMO) (2013), Explaining extreme events of 2012 from a climate perspective

³ Pall et al (2011) Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000, *Nature*, 382, Vol 470, p 382-386, 17 February 2011

⁴ IPCC (2012) Summary for Policymakers. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 1-19.

⁵ Diffenbaugh and Scherer (2010) Likelihood of July 2012 US Temperatures in pre-industrial and current forcing regimes, in AMO (2013), op cit

⁶ Guemas (2013), September 2012 Arctic sea minimum: discriminating between sea ice memory, the August 2012 extreme storm and prevailing warm conditions, In AMO (2013), op cit

⁷ Christidi et al (2013), An attribution study of the heavy rainfall over eastern Australia in March 2012, in AMO (2013), op cit