The Impact of Climate Change: International Evidence and Experience

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What is the link between recent extreme weather events and man-made climate change or natural climate variability?

Irish storms, Winter 2013/2014

Cold winters, 2009, 2010

Heat wave, Summer 2015

Flooding in Ireland, Winter 2015/16

UK Flooding, January 2014

Do we need to adapt to a greater or lesser frequency of such events in future?

How can we avoid the worst effects of climate change?
Recent wet winters
“It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century.”

Source: IPCC AR5, WGI
Explaining the probability of daily temperature

(a) Increase in mean

Fewer cold extremes

More hot extremes

(Source: IPCC AR5 WGI, CH1, Fig 1.8)
European Heatwave 2003

“Human influence has very likely at least doubled the risk of European summer temperatures as hot as 2003” 
Stott et al, Nature, 2004

10 years on and heatwaves in Europe are becoming increasingly likely.
Christidis et al, Nature 2014
Storms in Winter 2013/14 link to climate change?

Under the same weather pattern (a persistent westerly flow), extreme rainfall over 10 consecutive winter days is now seven times more likely than in a world without man-made greenhouse gas emissions (Christidis et al 2015).
Sea level rise of 3.4 mm per year

Source: climate.nasa.gov
Thermodynamic changes and Dynamic changes

- Warmer atmosphere means:
  - Greater chance of extreme temperatures
  - More moisture in the air
  - More energy to drive storms
  - Greater potential for heavy rainfall

- Changes in storm tracks and ocean currents:
  - Can lead to enhanced or reduced risks of extreme weather in a particular place
  - Are very variable and may or may not be linked with global warming
Climate risks

- When storms do form they are more likely to be more extreme.
- With sea level rise there is an increased risk of storm surges and coastal inundation.
Increasing chance of temperature and rainfall extremes

(Source: Fischer and Knutti, 2015)
Avoiding the impacts of dangerous climate change

With sustained effort up to and beyond 2030, the pledges made in the Paris Agreement will limit the severity of key impacts on people and society.

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<tr>
<th>Impact</th>
<th>No mitigation</th>
<th>Emissions capped at INDC level</th>
<th>Strong further action to meet 2°C target</th>
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<tbody>
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<td>Heatwaves</td>
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<td>Cropland decline</td>
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<td>Water stress</td>
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Avoided impacts: -89% -41% -76% -26%
Summary

• The climate is warming

• There is a greater risk of heatwaves and heavy rainfall

• Not all extreme weather is due to climate change

• But taking action to limit climate change will significantly reduce the severity of key impacts on people and society