Resilience to extreme weather

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Why extreme weather?

And why now?

- Extreme weather has a huge impact on society – globally, we have a **resilience deficit now.**

- 2015 offers a **unique opportunity** to build global resilience.

This report looks at:

- the impact of extreme weather; *coastal flooding, river flooding, droughts and heatwaves*
- how impact might change in future
- how best to build resilience.

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The problem

- People are **not resilient** to extreme weather now.
- **Impact is not uniform** - it is felt in both developed and developing countries.
- **The problem is going to get worse** - demographic and climate changes will increase the number of people exposed to extreme weather.
- The report contains maps which **combine future climate and demographic change** with vulnerability indicators.

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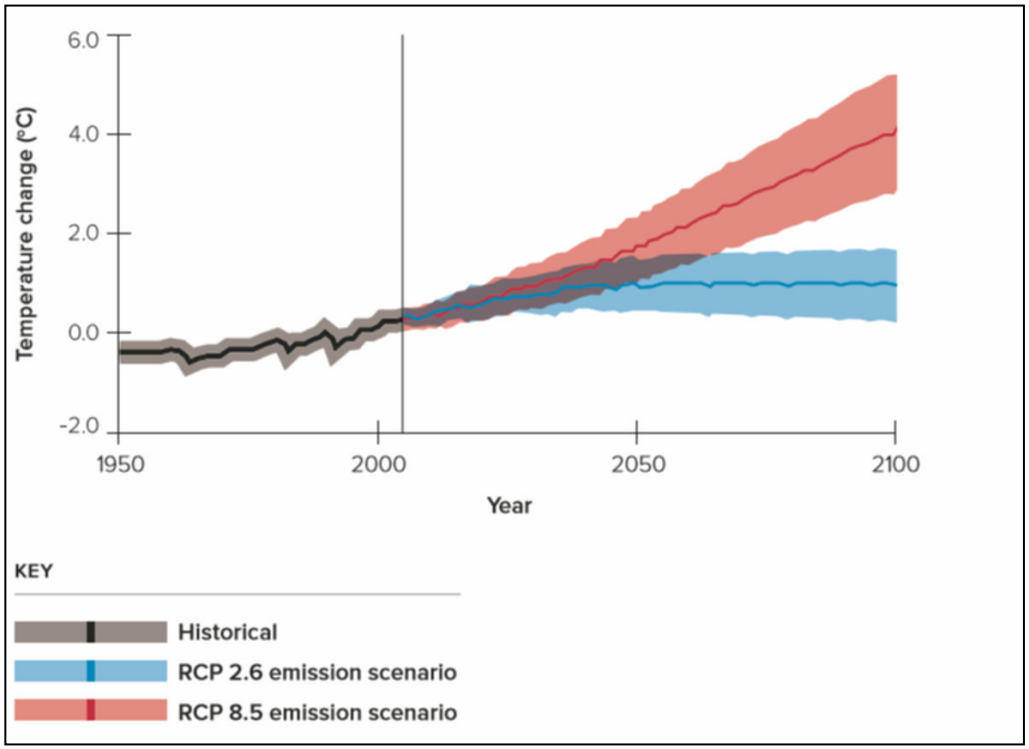
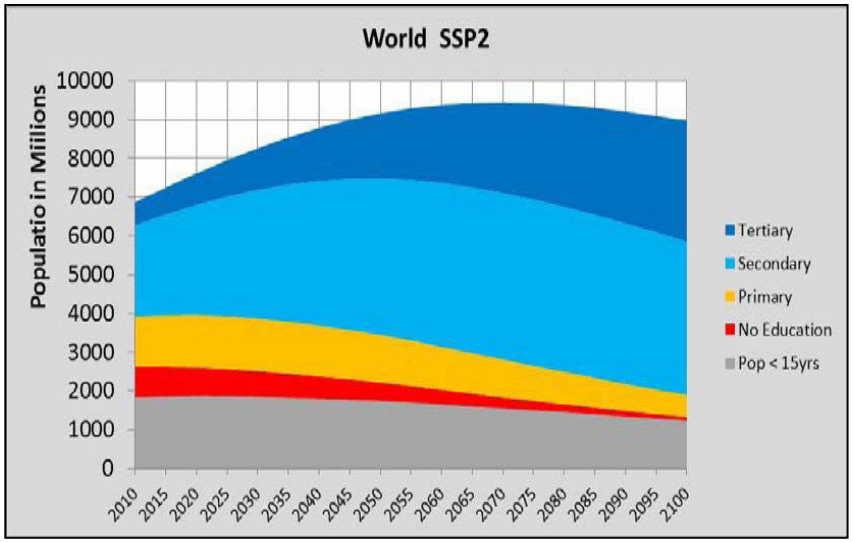
Climate Scenario



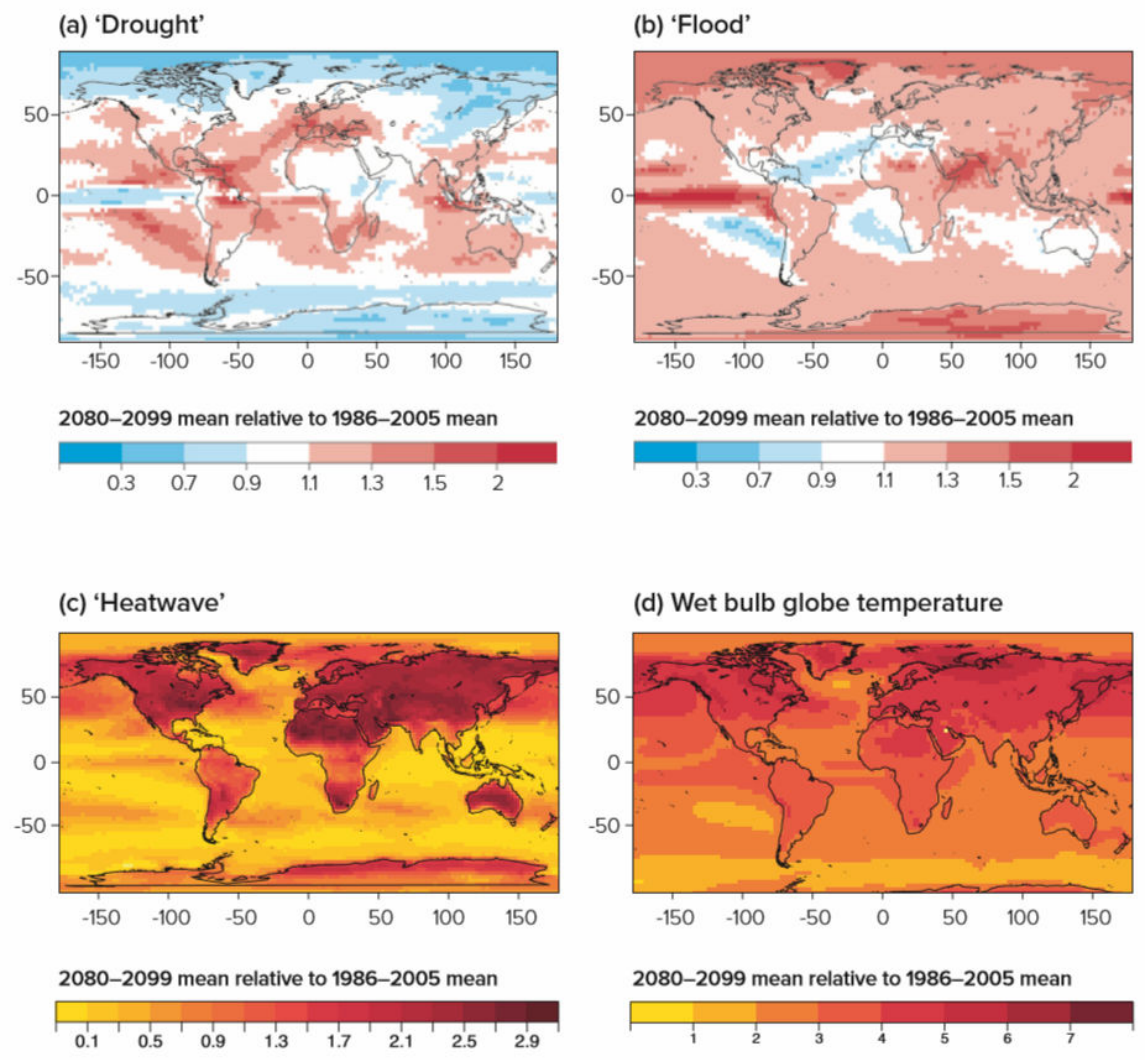
Climate Projections based on RCP8.5 from more than 30 climate models

Central "Business as Usual" Population scenario

Population Scenario



Projections of Climate Extremes



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Risk measurement includes climate and the affected population

Number of Exposure Events (per year)

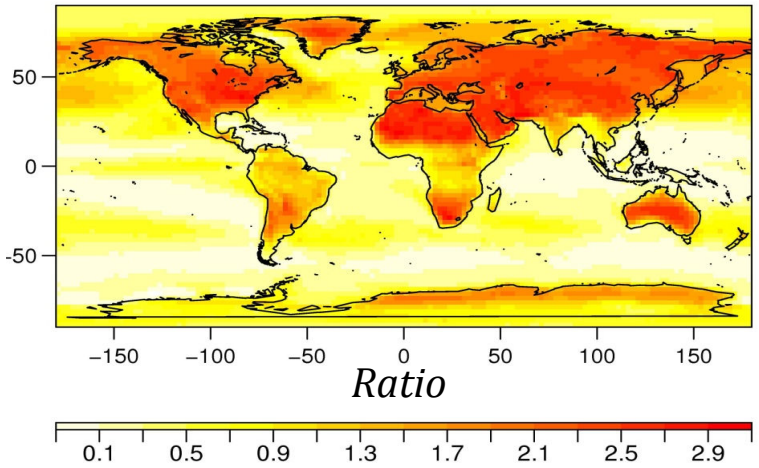
=

Frequency of Climatic Extreme (per year)

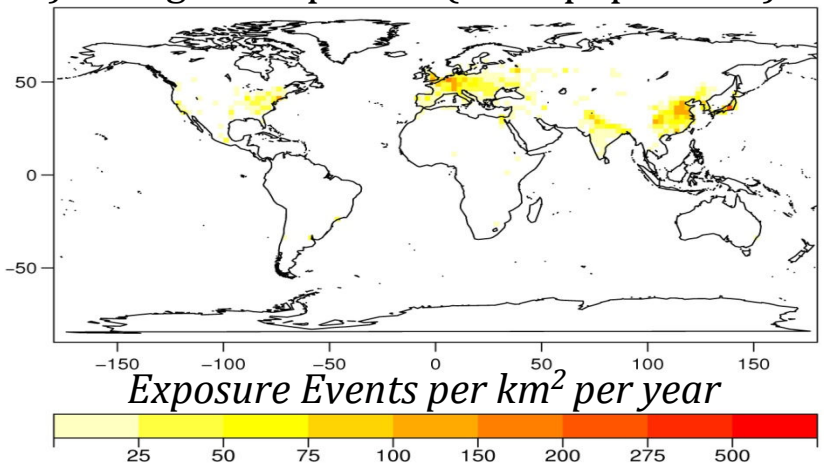
x

Number of Vulnerable People that experience that Climatic Extreme

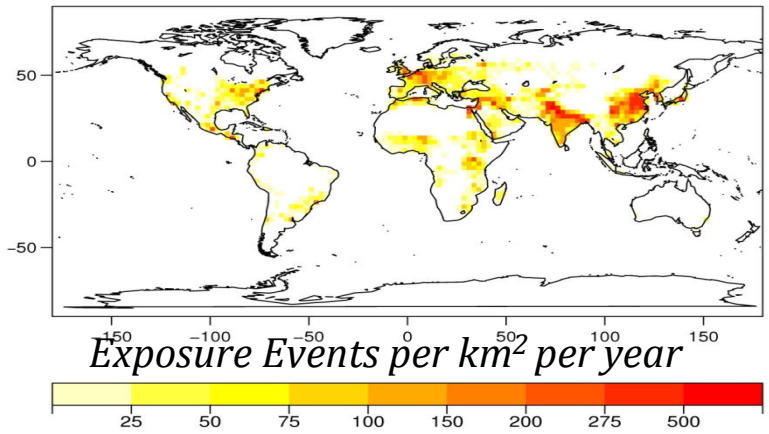
a) Change in Heat-wave Frequency (2090-1995)



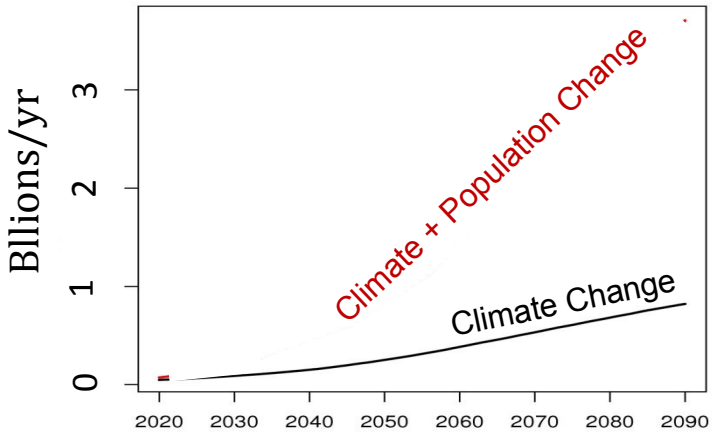
b) Change in Exposure (2010 population)



c) Change in Exposure (2090 population)



d) Time-series of Exposure Events



Amplification of Exposure
(2090s relative to 1990s)

	Climate	Population	Total
Heatwave	3	4	12

The problem - summary

- Climate change will increase the frequency of heatwaves, and rainfall extremes associated with floods and droughts.
- Projected changes in population, such as population size and aging, will increase the number of people exposed to these extremes.
- The impacts will be geographically uneven, and include areas with little resilience currently.
- The case for building resilience to climate extremes, both now and in the future, is strong.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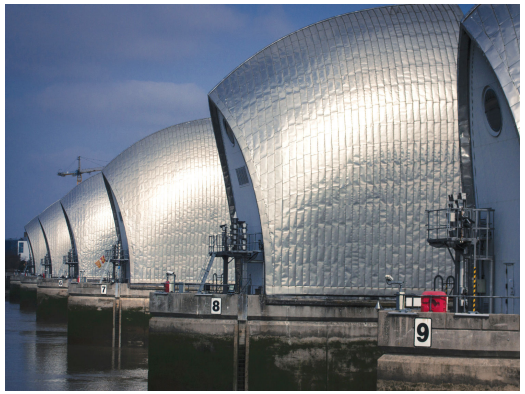
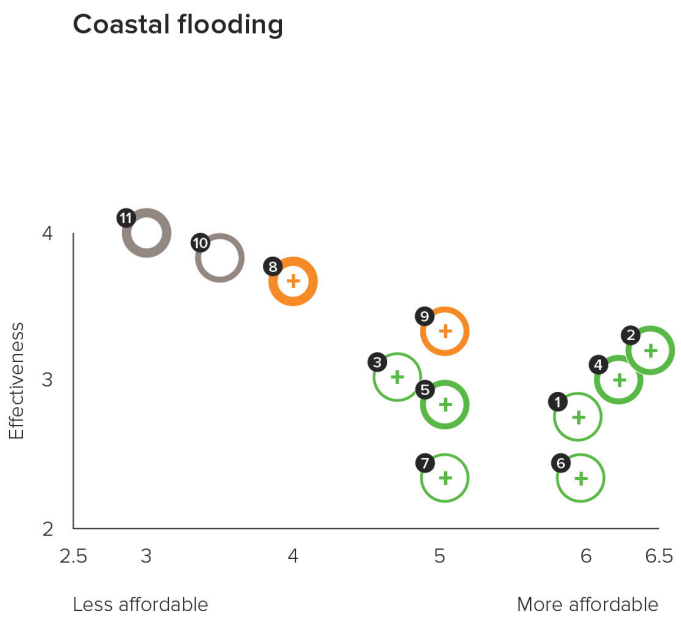
Solutions

defensive measures

- Physical defences against extreme weather can be:
  a. **Engineered**
  b. **Ecosystem based**
  c. A **hybrid** of the two



Solutions defensive measures



1 Maintenance of natural reefs (coral/oyster)
2 Maintenance of mangroves
3 Mangrove planting and re-establishment
4 Maintenance of saltmarsh, wetlands, inter-tidal ecosystems
5 Creation of saltmarsh, wetlands, inter-tidal ecosystems
6 Maintenance of other coastal vegetation, forest and ecosystems
7 Coastal re-vegetation/afforestation (above inter-tidal zone)
8 Beach and dune nourishment
9 Artificial reefs (and/or substrates for reef replenishment)
10 Dykes, levees
11 Coastal barrages

Category of option

Ecosystem-based | Hybrid | Engineering

Strength of evidence

Weaker | Stronger

Additional consequences

Overall positive | Overall negative | Approximately neutral

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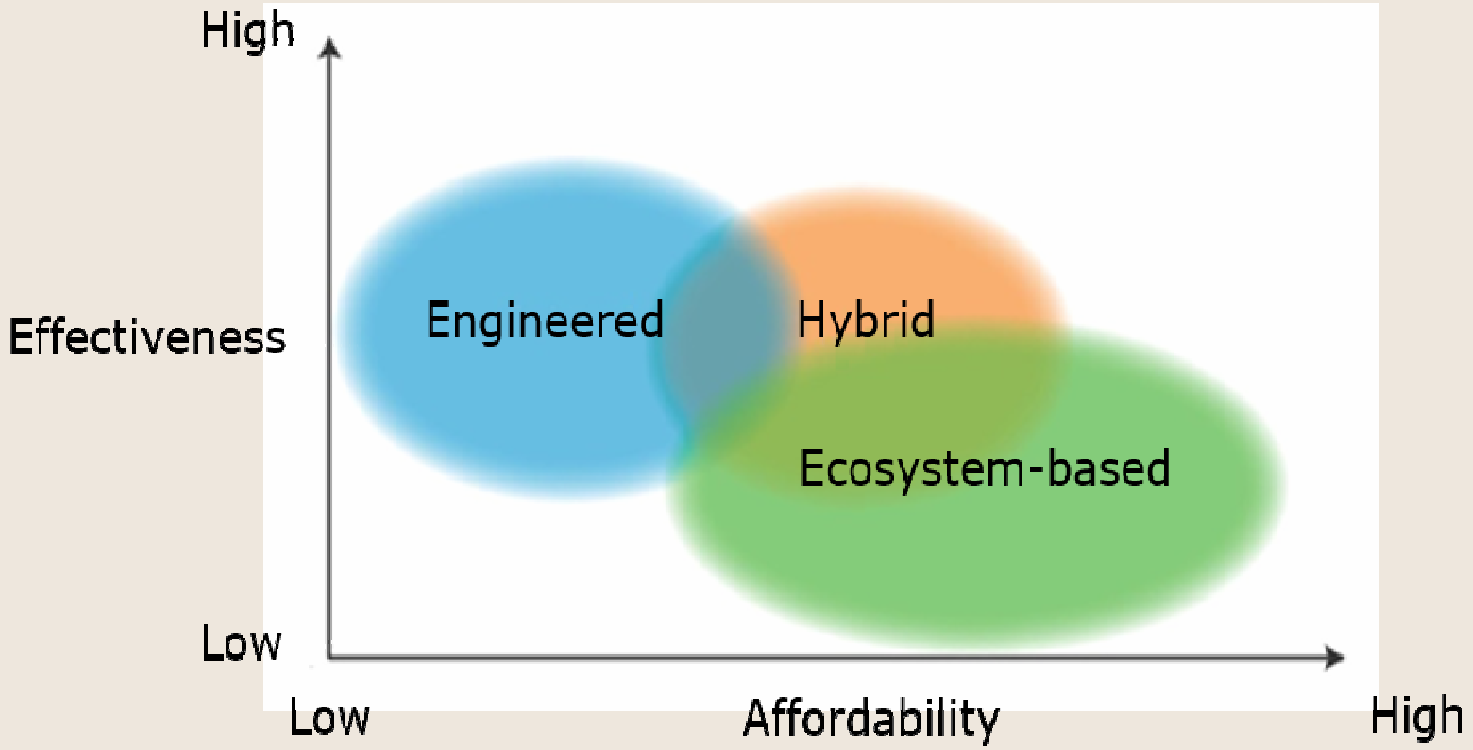
Solutions
defensive measures



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Solutions
defensive measures

Analysis suggests defensive strategies should:

a. Be based on portfolio of measures

b. Look beyond traditional engineering approaches

c. Be monitored and evaluated.

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Solutions
national governance

Develop and resource resilience strategies; which will be most effective when

- They minimise consequences of infrastructure failure rather than avoiding failure completely
- Incorporate resilience-building into all policies
- Consider the whole system likely to be impacted
- Use a range of expertise
- Support and enable local action

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Solutions
Financial system and research

- Risks need to be better accounted for in the wider financial system
- Organisations to report financial exposure to extreme weather at a minimum of **1 in 100 (1%) per year risk levels**
- Research to improve the **analysis of extreme weather and its impacts**

Thank you for listening.

The report, maps and more detailed analysis can be found at:

https://royalsociety.org/policy/projects/resilience-extreme-weather/

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