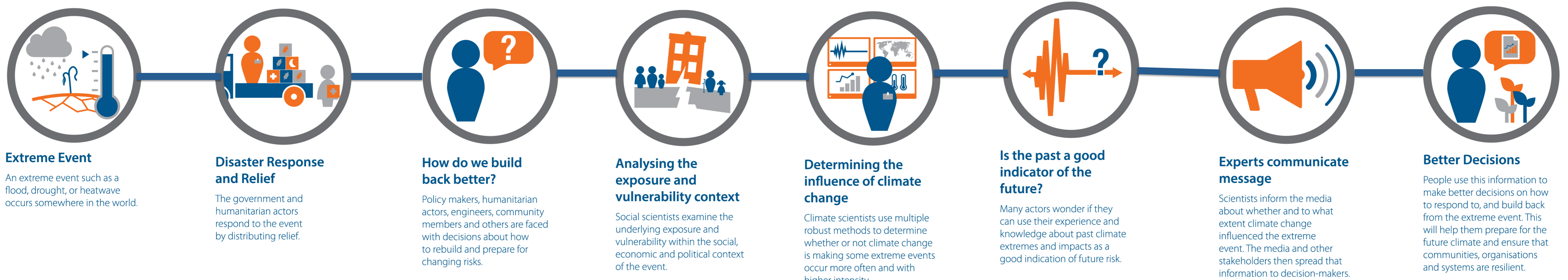# Raising Risk Awareness

Extreme event attribution for improved long-term decision making

Raising Risk Awareness brings together scientists, vulnerability experts and knowledge brokers to understand the role of climate change in extreme weather events and help prepare for future ones.

Extreme Event
An extreme event such as a flood, drought, or heatwave occurs somewhere in the world.

Disaster Response and Relief
The government and humanitarian actors respond to the event by distributing relief.

How do we build back better?
Policy makers, humanitarian actors, engineers, community members and others are faced with decisions about how to rebuild and prepare for changing risks.

Analysing the exposure and vulnerability context
Social scientists examine the underlying exposure and vulnerability within the social, economic and political context of the event.

Determining the influence of climate change
Climate scientists use multiple robust methods to determine whether or not climate change is making some extreme events occur more often and with higher intensity.

Is the past a good indicator of the future?
Many actors wonder if they can use their experience and knowledge about past climate extremes and impacts as a good indication of future risk.

Experts communicate message
Scientists inform the media about whether and to what extent climate change influenced the extreme event. The media and other stakeholders then spread that information to decision-makers.

Better Decisions
People use this information to make better decisions on how to respond to, and build back from the extreme event. This will help them prepare for the future climate and ensure that communities, organisations and systems are resilient.

2016 India Heatwave

On Thursday 19 May 2016, India experienced an all-time record high temperature for any calendar day. The high temperature reached 51°C in the city of Phalodi in the Jodhpur district of the state of Rajasthan.
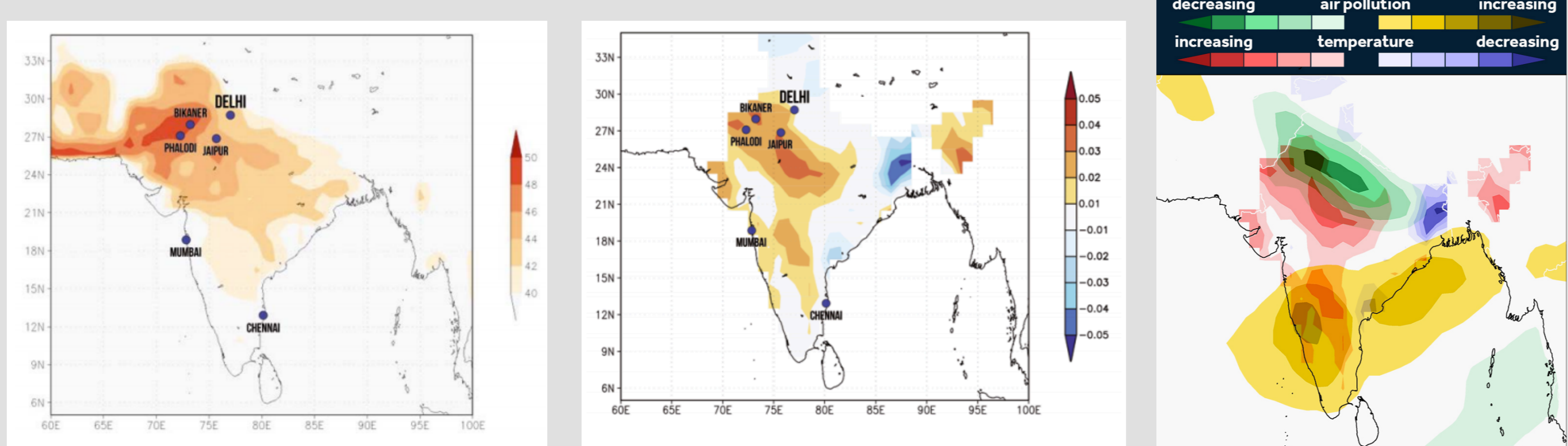

Highest daily maximum T of the Year up to September 2016

Trend in the maximum T of the hottest day of the year for 1971 - 2012

Change in aerosol optical depth over India

- Consistent with human-caused climate change, annual mean temperatures across India are increasing. Heat waves in a relatively small area of India are becoming more frequent and more intense, but this is not true for most of the country.
- **The analysis did not find that human-induced climate change played a role in these individual heat waves. This runs counter to studies done on similar extreme heat events in other parts of the world.**
- Aerosol optical depth is decreasing over the areas where maximum temperatures are generally increasing. The lack of a detectable climate change trend may be due to the masking effect of aerosols on warming, and on irrigation use.
- Policy implications: pollution regulation and disaster management, heat + pollution effects.

Road melting during a heatwave in India
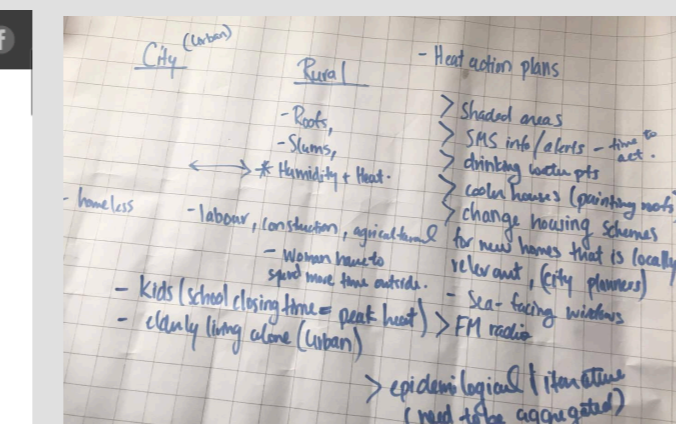
Heatwave vulnerability and exposure in India

2015 Chennai Floods

Record rainfall in a 24-hour period led to catastrophic flooding in Chennai, India. The city was declared a disaster zone. The downpour occurred during the 2015 rainy season, which coincided with a strong El Niño, record warm global surface temperatures and high Indian Ocean temperatures.
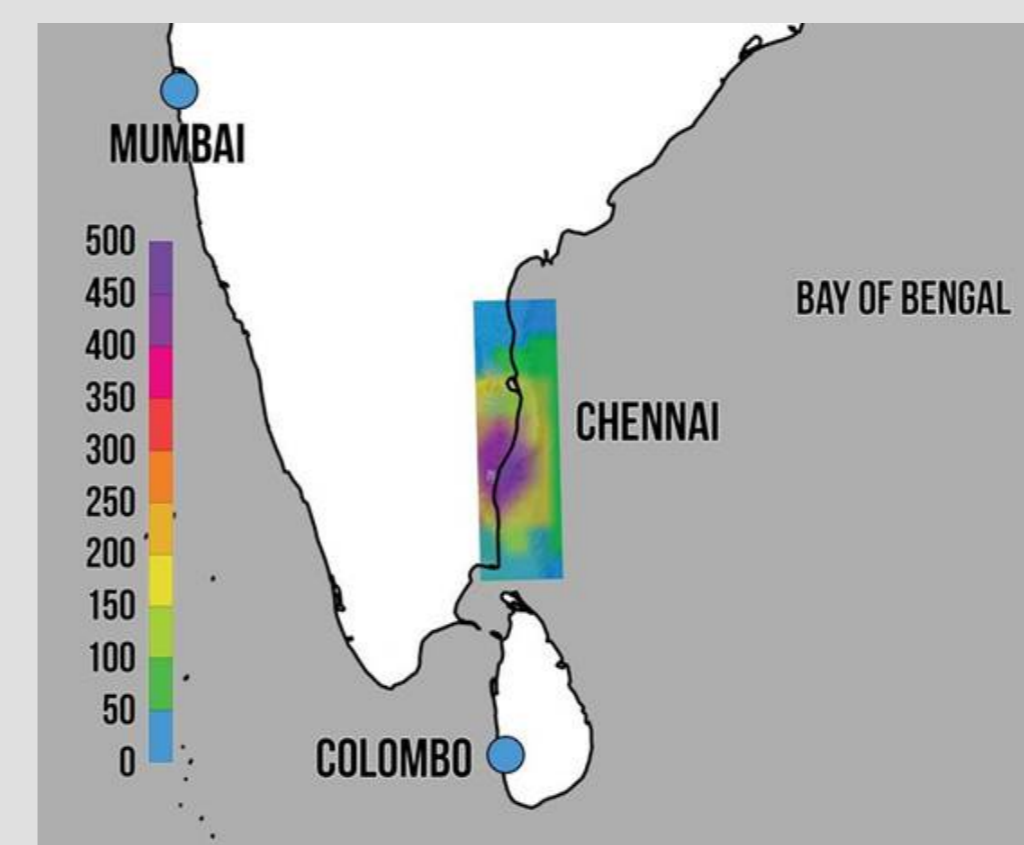
Rain gauge observations from 08:30 on 1 December to 08:30 2 December 2015

- Very high levels of aerosol pollution exist over much of India, including the area around Chennai. Aerosols counteract the warming effects of greenhouse gases.
- The World Weather Attribution group used a multi-method approach including climate models and observational weather data to look at the role of climate change
- **No measurable effect of human-caused emissions was detected in the extreme one-day rainfall in Chennai on 1 December 2015, likely because of the masking effects of aerosol pollution.**
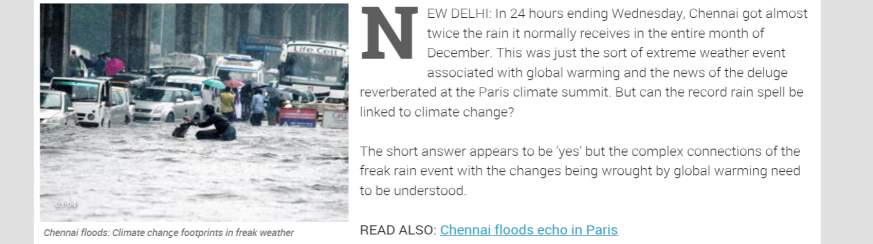
Vulnerability and Exposure

Factors contributing to Chennai's high vulnerability and exposure to floods include:
- land-use issues such as decreased natural areas
- loss of water bodies
- encroachment of river and streams and other drainage channels
- uncontrolled multiplication of built-up areas

Impacts of 1 December 2015 rain in downtown Chennai, India

Attribution as a Climate Service?

Immediately after a disaster, we have a chance to strengthen resilience
- Attribution analyses allow scientists to make quantitative statements about how climate change has altered the risk of extreme weather events occurring.
- This can help decision-makers and the public to prioritise adaptation solutions and reduce vulnerability.

Open Questions

1. Extreme event attribution in service of whom/what?
2. What does the value chain look like?
3. What are the risks?

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