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Foreseeable Risk

Climate Change and Human Health

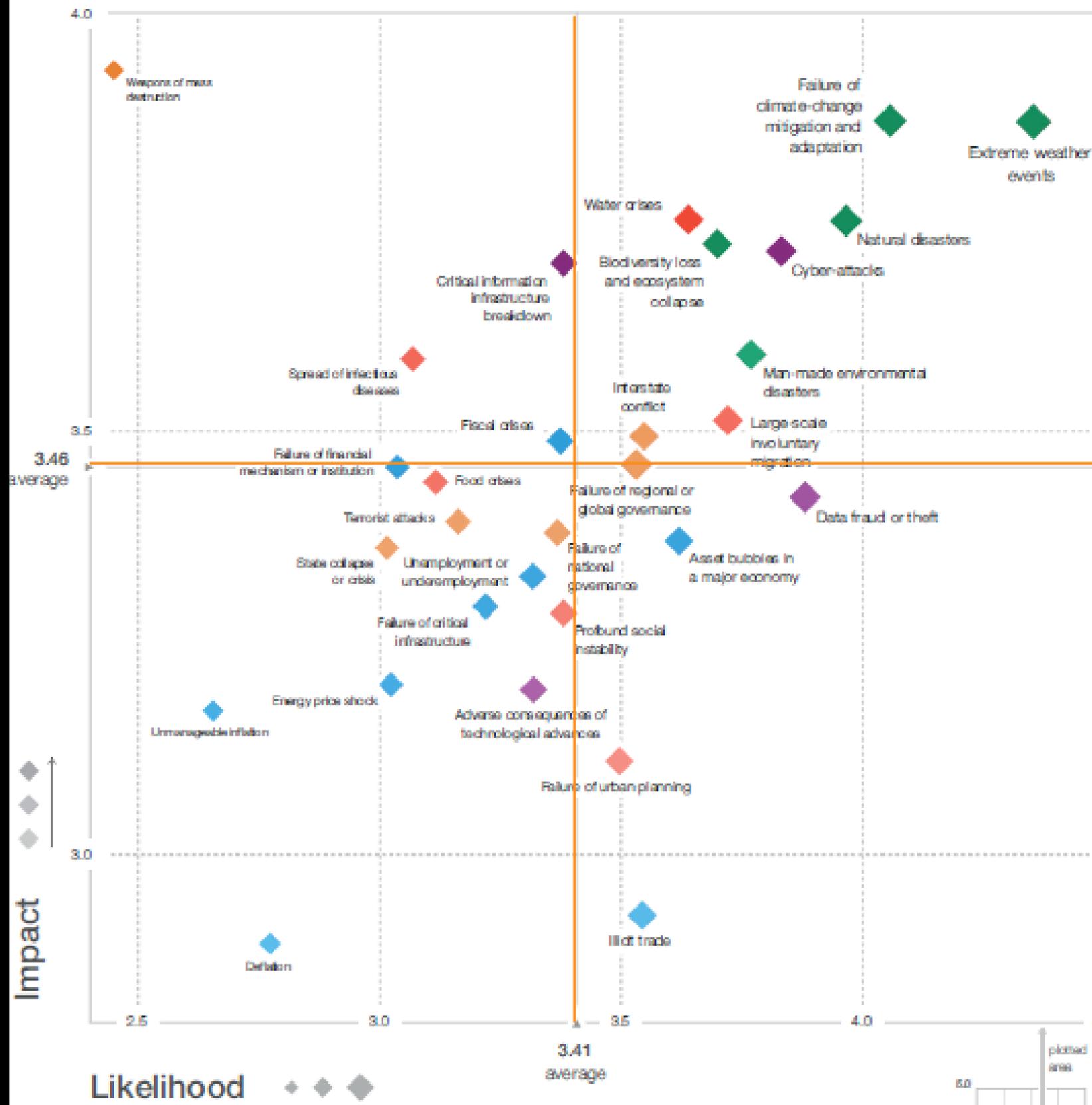
Phil Johnson

October 2019

FORESEEABLE RISK:

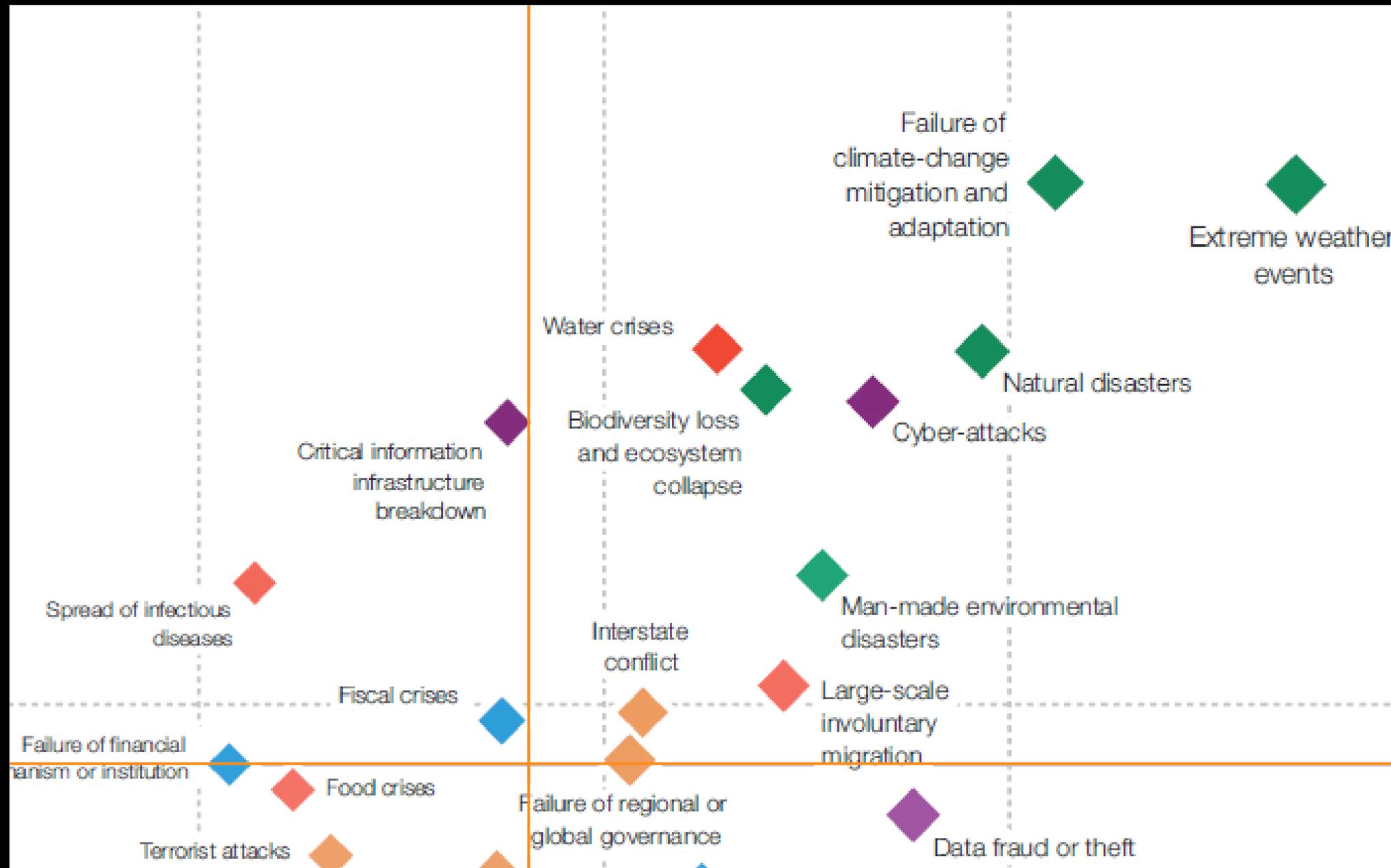
**Possible Liability Exposure
From Failing To Anticipate Risks to Human Health
Arising From Extreme Weather Events,
Including Heat Waves**

(n) Foreseeable risk is the anticipated danger expected by a person of reasonable senses, based on their knowledge, experience or assumptions, as the result or outcome of an action.

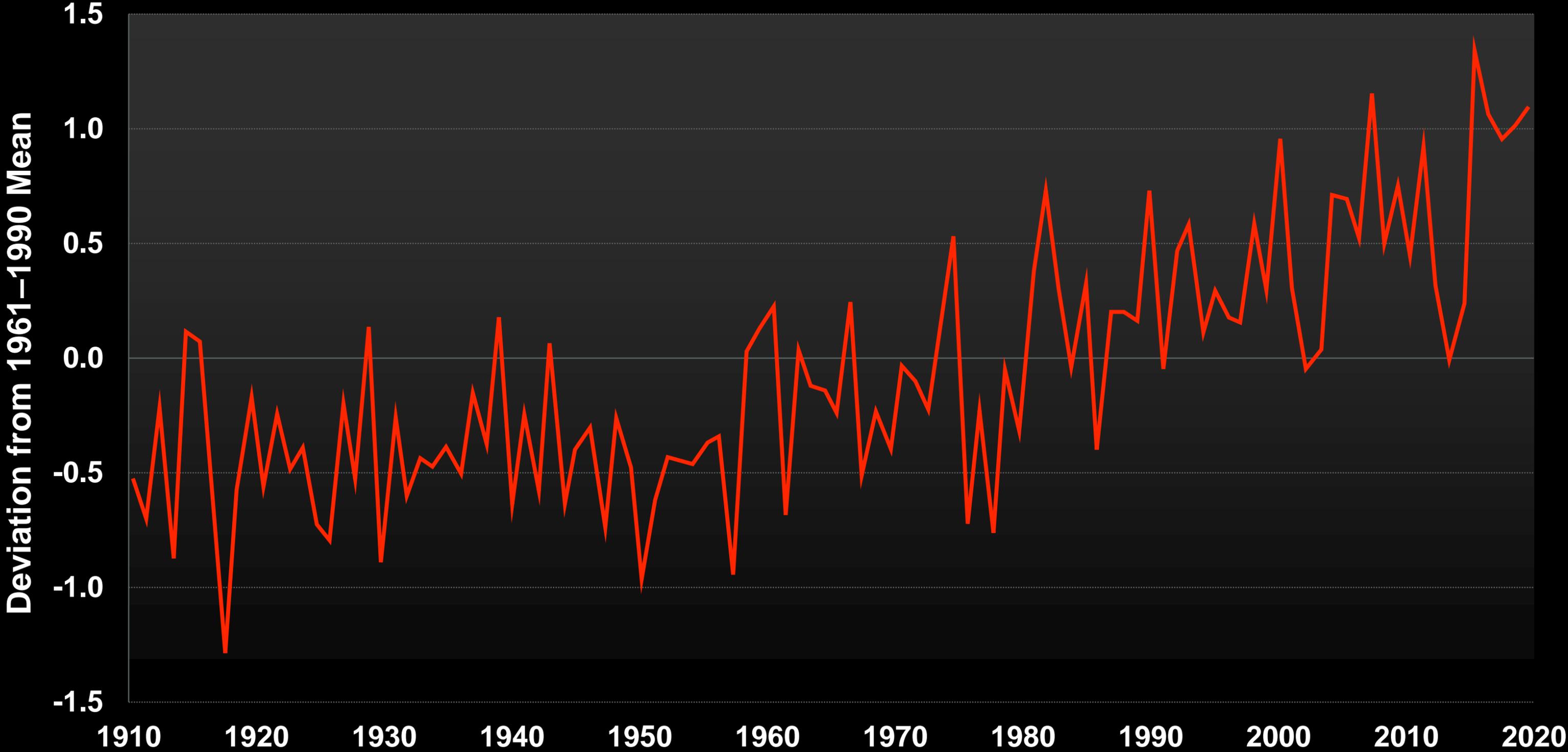


World Economic Forum Global Risks Report 2019

Impact

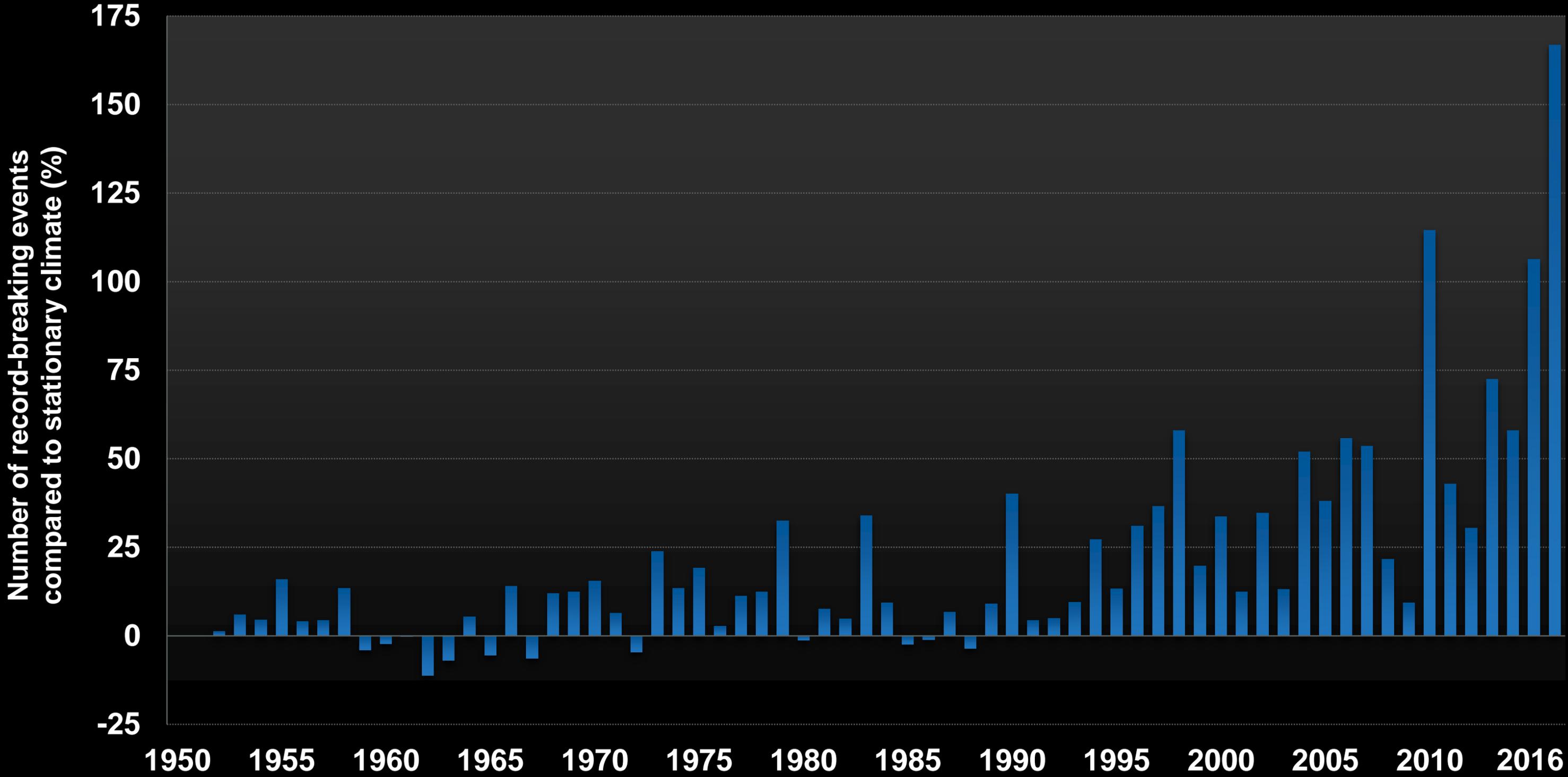


Australia's Annual Temperature Anomaly



Data: Australia Bureau of Meteorology

Global Record-Breaking Precipitation Anomalies



Data: Jascha Lehmann, Potsdam Institute for Climate Impact Research

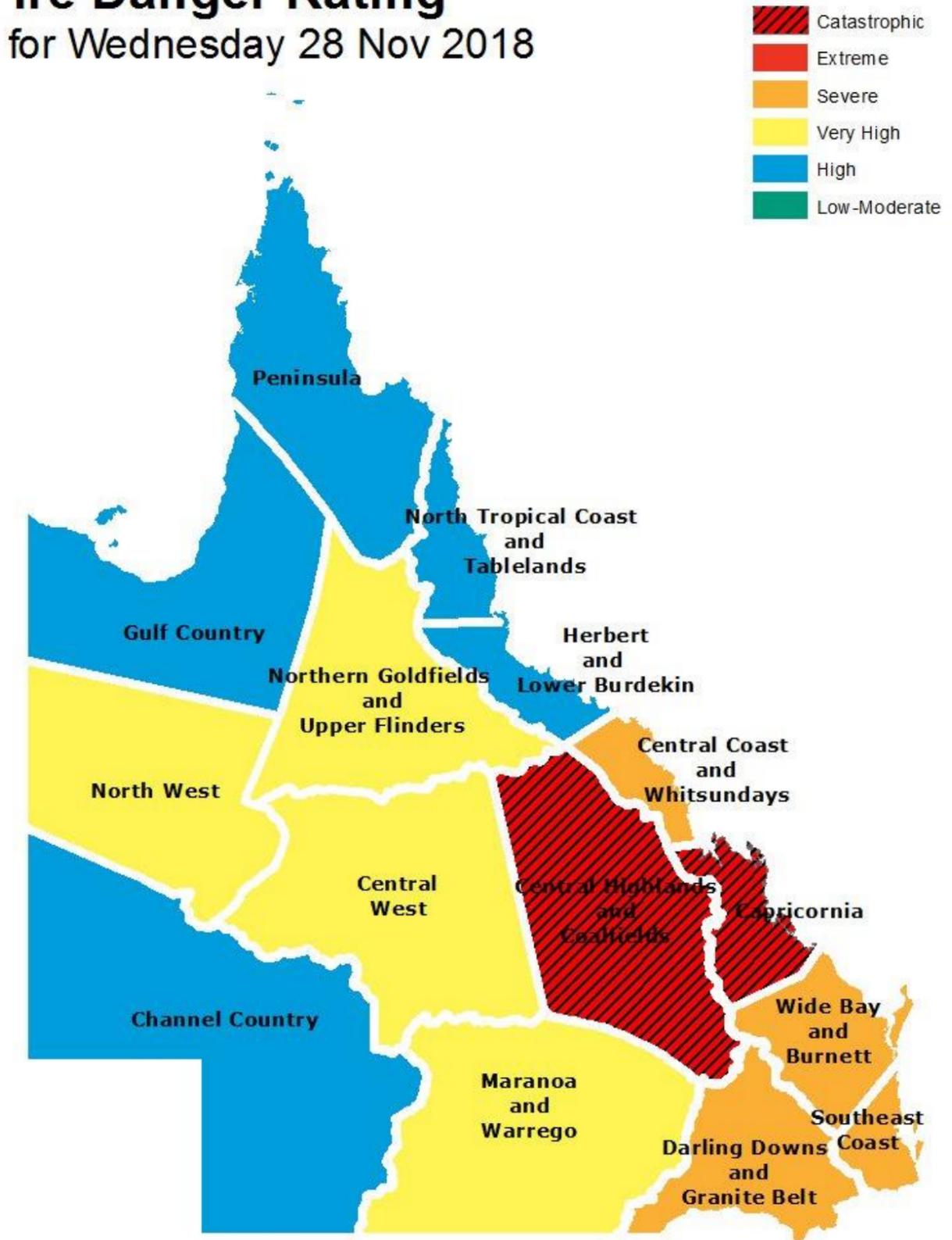
Mexican city of Guadalajara – 30 June 2019



**In parts of Queensland,
the fire danger rating
reached “catastrophic”
levels for the first time
on November 28, 2018.**

Fire Danger Rating

for Wednesday 28 Nov 2018



Produced at: 28/11/2018 2:04:21 PM

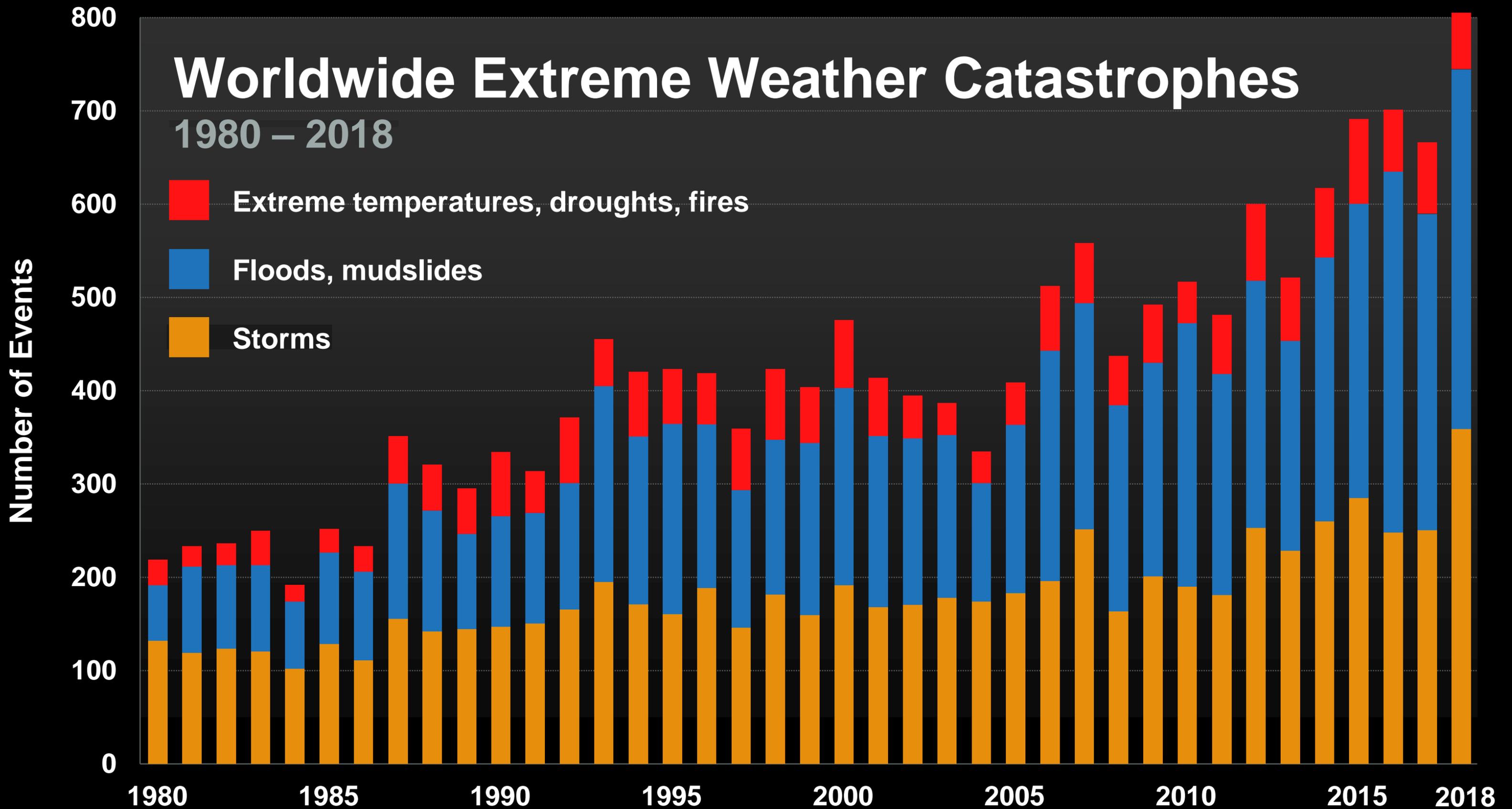
© Bureau of Meteorology

Disclaimer
This data has been prepared for Public Safety Business Agency and Queensland Fire and Emergency Services.
Other users must satisfy themselves it is accurate and suitable for their purpose. PSBA and QFES do not accept any liability for any loss or damage that may arise from the use of or reliance on this data.

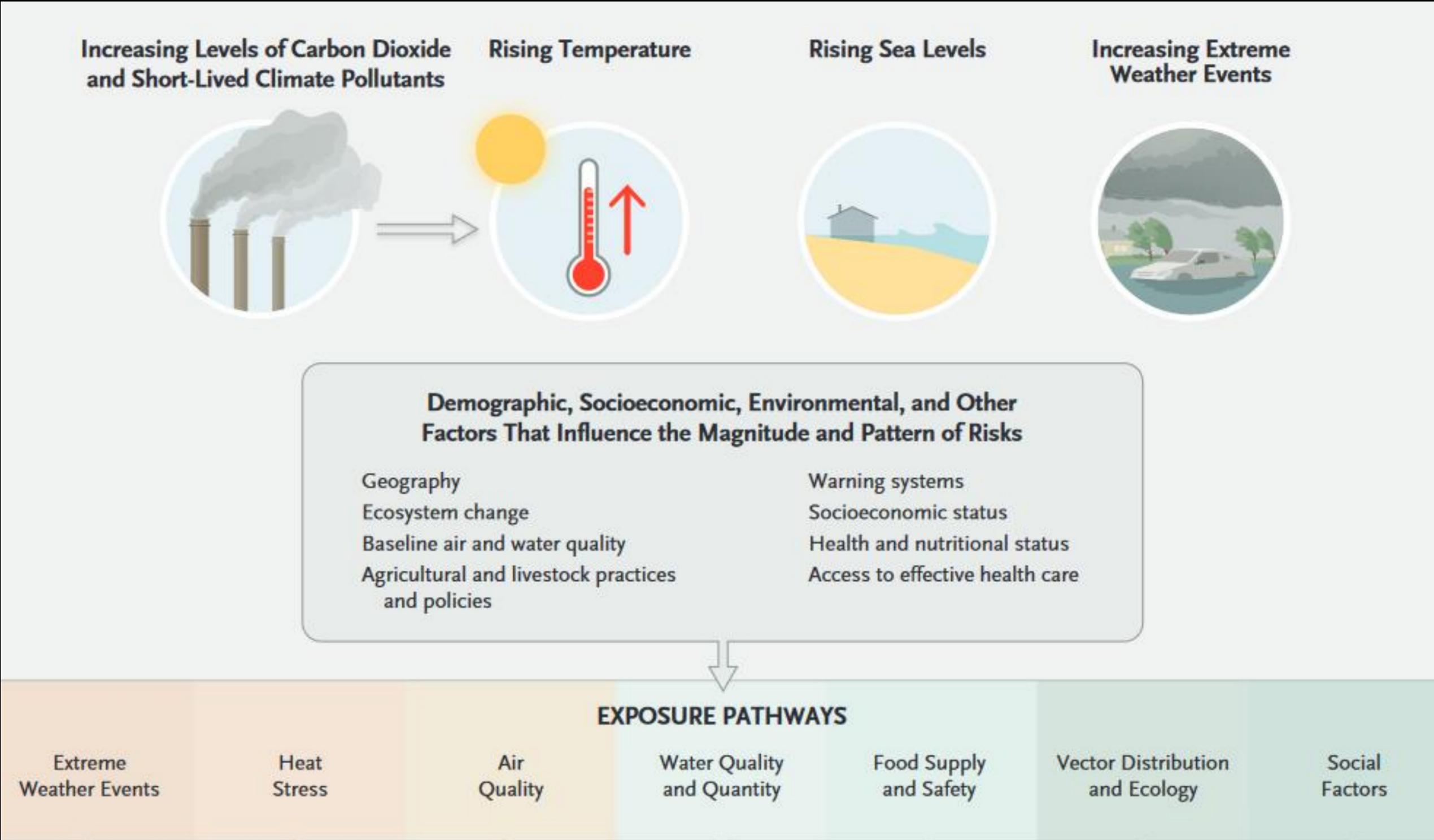


Worldwide Extreme Weather Catastrophes

1980 – 2018



Data: 2017 Munich Re, Geo Risks Research, NatCatSERVICE. As of January 2018.



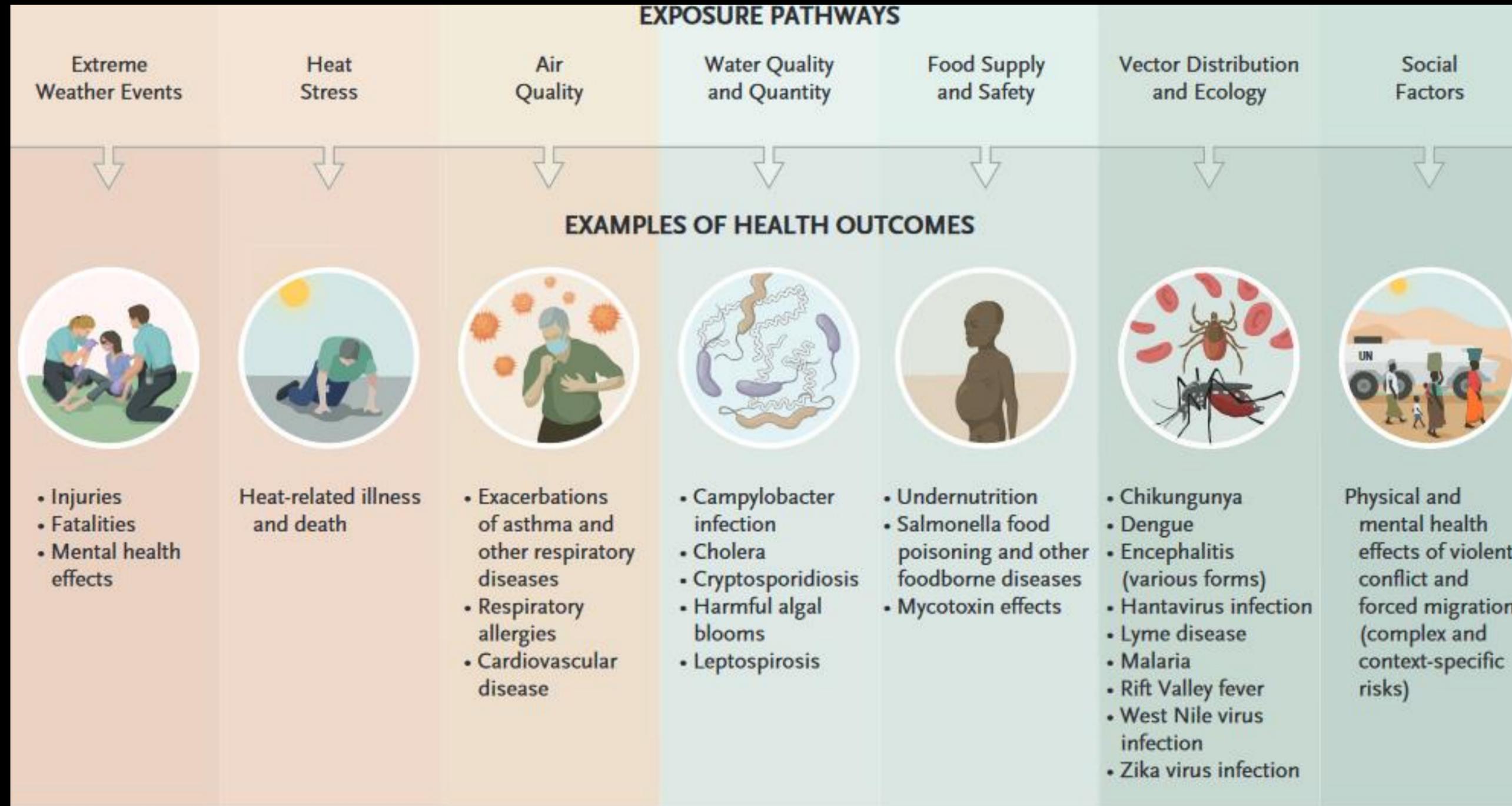


Figure 3. Major Health Risks Associated with Climate Change.

Vulnerability to extremes of heat (2000 – 2017):

- 157 million more people exposed in 2017 (compared to 2000) to heatwave events

For national economies and household budgets:

- 153 billion hours of labour were lost in 2017 because of heat, up from 90 billion hours in 2000
- Significant vector borne disease incidences

Climate change causing:

- injuries, illnesses, and deaths,
- risks projected to increase substantially with additional climate change, threatening the health of many millions of people
- **if there are not rapid increases in investments in adaptation and mitigation.**

- Warmest five-year period on record (2015-19 on track)
- Sea-level rise is accelerating
- Continued decrease of sea ice and ice mass
- Intense heatwaves and wild-fires
- Costly tropical cyclones
- Food insecurity increasing
- Overall risk of climate-related illness/death increasing
- GDP falling - higher temperatures (developing countries)
- Fossil CO2 emissions increasing

Climate impacts are hitting harder and sooner

Cities are particularly vulnerable to impacts – heat stress etc

Strategies for mitigation and upscaling adaptive risk management are necessary

Temperature change (annual mean temperature):

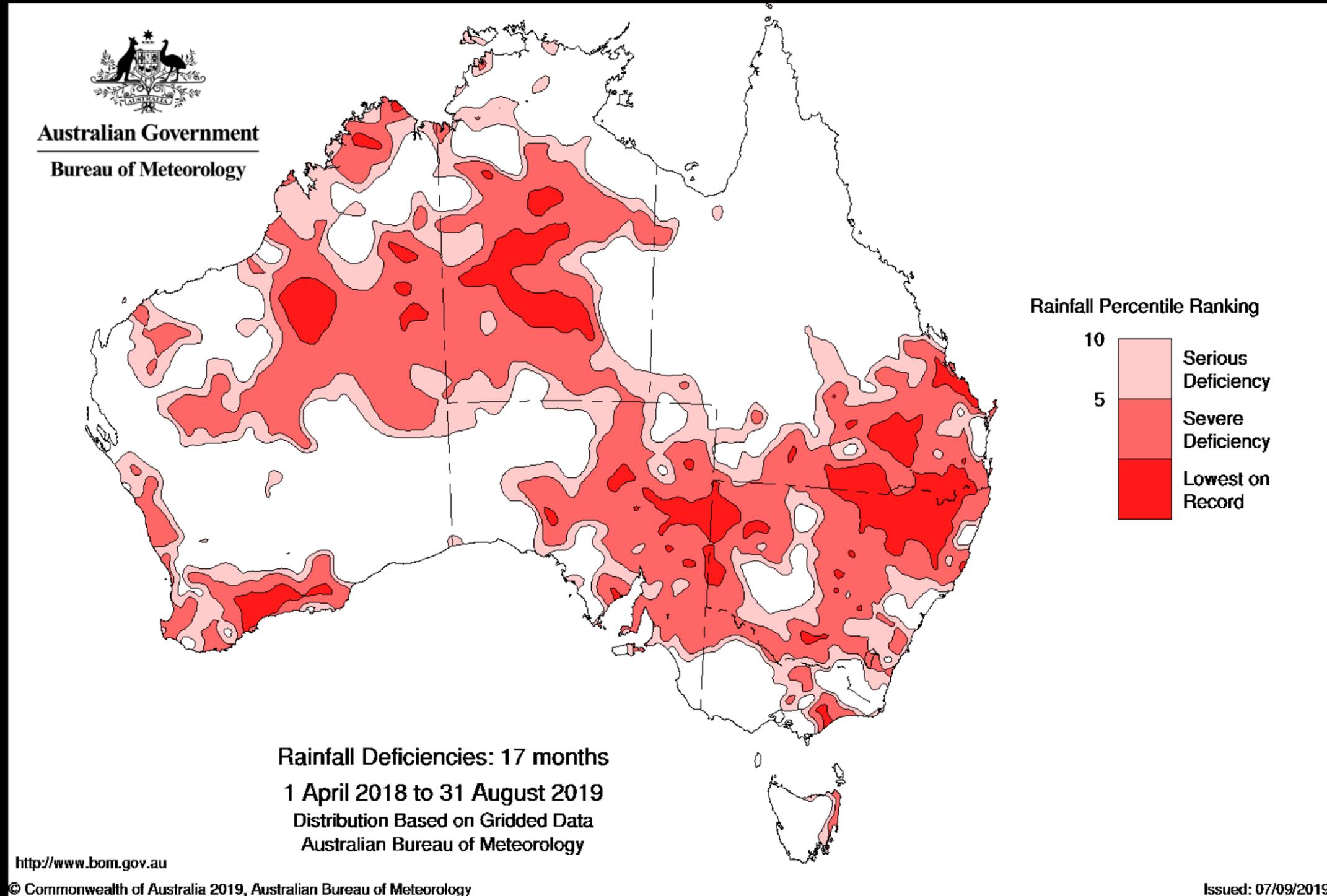
- 2030 = +1.05°C Moderate confidence level (already at 0.9)
- 2090 = +3.95°C Moderate confidence level

Rainfall change (annual):

- 2030 = - 8.1% Moderate confidence level
- 2090 = - 22.0% Moderate confidence level

(NB - this decrease in annual rainfall comes with a projected 11% increase in the frequency of extreme rainfall events)

Rainfall Deficiencies - BOM



Wind speed (annual):

- 2030 = +5.4% Moderate confidence level
- 2090 = +9.2% Moderate confidence level

Evapotranspiration (annual):

- 2030 = +4.1% Moderate confidence level
- 2090 = +14.5% Moderate confidence level

Time in drought (annual):

- 2030 = +47% Moderate confidence level
- 2090 = +110% Moderate confidence level

What challenges do these projected changes in the climate mean for you – and your buildings, staff, clients, community and others?

Do you know what the modelling shows for your region?

What is **your** risk?

Climate change declared a "health emergency" by the Australian Medical Association.

- heat-related illness,
- severe weather events,
- declining food production
- poor mental health
- vector borne disease – and more

Natural disasters - anywhere, any time, with increasing frequency and impact:

- Devastation
- Threatens long-term development, growth and poverty reduction (particularly poorest countries)

Good planning/preparation can limit the scale of impacts.

Planning and risk management saves lives and enables growth and sustainable development.

Climate change is affecting human health:

Directly:

- physiological effects of extreme weather events

Indirectly through altered human behaviours - e.g.

- environmentally induced migration,
- more time spent outdoors,
- increased transmission of food or vector-borne diseases,
- other effects of climate change, such as flooding.

The IPCC AR5 concluded there is *high to very high confidence* that climate change will lead to greater risks of:

- injuries, disease and death,
- owing to more intense heatwaves and fires,
- increased risks of undernutrition, and
- reduced labour productivity in vulnerable populations.

Specified risks to human health:

- Temperature-related morbidity and mortality
- Occupational health
- Air quality
- Malaria
- Aedes – dengue fever, Zika and more
- Other vector borne diseases

Urban areas:

“... climate change and its differential impacts on and risks for infrastructure sectors – energy, water, transport and buildings – and vulnerable populations, including those living in informal settlements”.

Who is responsible for energy, water, transport and buildings – and protecting vulnerable populations?

Adaptation options in the health sector are expected to reduce morbidity and mortality.

Are we seeing these adaptation developments?

Institutions are better equipped to improve risk management and reduce adverse health outcomes:

- share information,
- detecting climate-sensitive diseases,
- improved provision of basic health care services, and
- coordination with other sectors

Who is responsible and/or will be held accountable?

- **Financial Services Board - Task Force on Climate Related Financial Disclosures 2015**
- **UK Prudential Regulation Authority (PRA) 2015**
- **Institute of Directors of South Africa: King IV report 2016**
- **Australian Institute of Company Directors 2016 (Minter Ellison) – and again 2019 (update)**
- **Australian Prudential Regulation Authority 2017**

Project Climate Ready - series of scenarios
(Department of Defence and Department of
Environment and Energy) – March 2017

Actual scenarios developed remain secret – however:

*“... include modelling a spring at 10 degrees (Celsius)
above average” and*

*“relate to concurrent extreme weather events,
legal liability, national security or health”.*

Australian Government – “Project Climate Ready”
From March 2017 – no follow through

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Project Climate Ready (cont)

"Scenarios explored ... including health, infrastructure and energy."

"Public sector agencies own and manage large assets, employ staff in locations and provide or support services that are at risk of extreme weather events, which are (risks) becoming greater because of climate change."

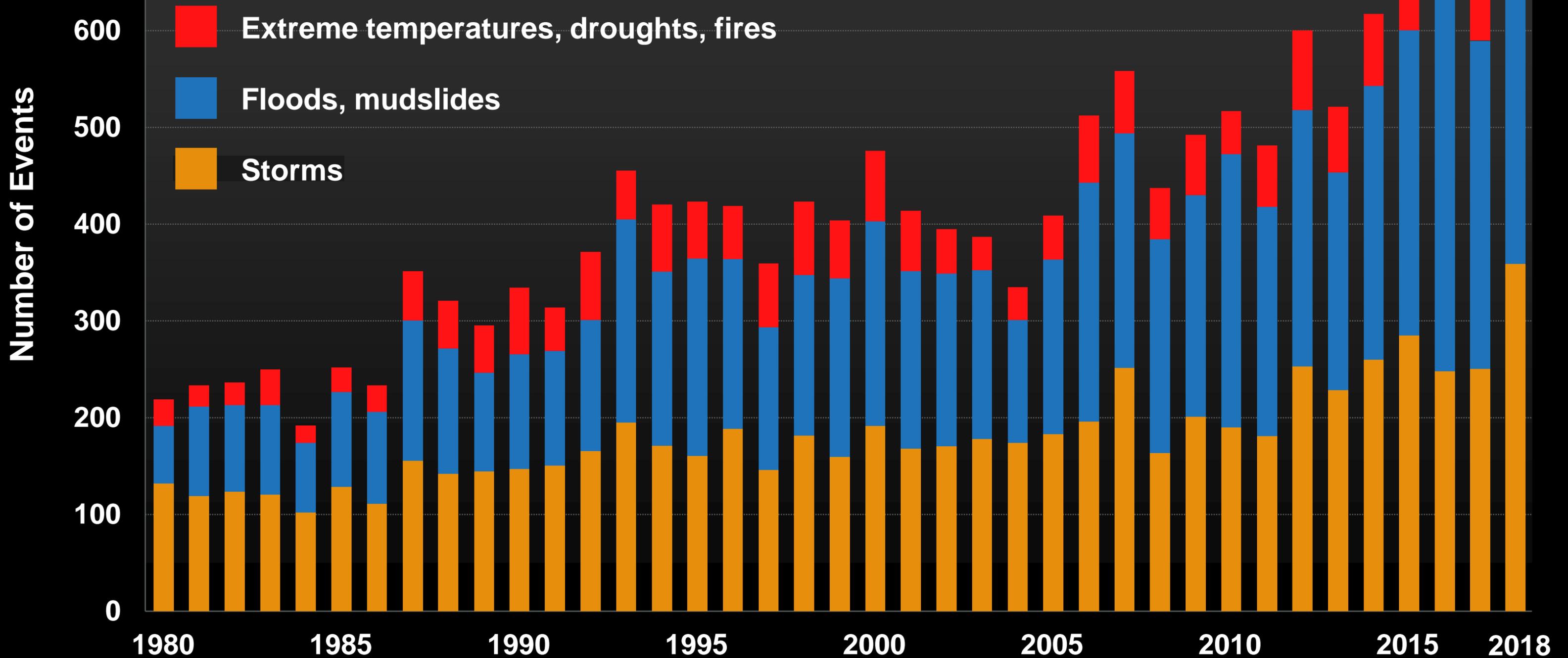
“Losses due to weather related events have increased nearly ten-fold over the past 40 years, ...

USD 12 billion in 1980 to USD 199 billion today (Sept 2019)”

(10x cost increase for a 4x increase in extreme events frequency)

Worldwide Extreme Weather Catastrophes

1980 – 2018



Data: 2017 Munich Re, Geo Risks Research, NatCatSERVICE. As of January 2018.

Investments that enhance the climate resilience of assets:

- Resilient features in new infrastructure
- Upgrading and modifying existing infrastructure
- Added spare capacity (infrastructure)
- Relocating “at-risk” infrastructure
- Multi-asset, multi-action adaptation projects
- Climate resilient options (crops etc)

Investments by sector – increasing climate resilience:

- Water – extreme precipitation, drought, flood defence etc
- Buildings – extreme precipitation, temperatures etc
- Forestry - extreme temperatures, fire weather
- Energy – cyclones etc (grid resilience, back-up)
- ICT - extreme precipitation, temperatures, cyclones
- Health – extreme temperatures (+ vector borne disease etc)

“Buildings are currently responsible for 39% of **global energy related carbon emissions:**

- 28% from operational emissions, from energy needed to heat, cool and power them,
- remaining 11% from materials and construction.”

**New York City passes landmark bill to cut
carbon emissions of big buildings by 80%
... over the next 30 years**

22 April 2019

“... adaptation funding ... are estimated at USD 280–500 billion per annum by 2050 under a 2°C warming scenario in developing countries.”

(N.B. in the literature, funding needs are described in terms of mitigation and adaptation, not climate resilience).

Despite this carbon footprint:

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- Low client appetite for funding and building truly climate change resilient buildings
- Economic (current) challenges continue to take precedence over “future” building function

What priorities do projects give to foreseeable risks?

What carbon reduction investments?

“Given Australia's particularly vulnerable position ...

adoption of a reliable and transparent climate disclosure framework will be a central element to its smooth transition to a low carbon economy ...”

Recommendations of the Task Force on Climate-related Financial Disclosures Review of Local Relevance for AUSTRALIA 2017

Key findings of the report were:

- 17% of listed companies ... climate risk a material risk;
- general risk disclosure is not useful;
- the majority of the ASX 100 companies had ... considered climate risk to the company's business; and

ASIC – climate risk disclosures:

- Should be specific
- Should be comprehensive, and
- “General” risk disclosures are not useful.

Some climate-related risk management initiatives:

- improved due diligence;
- integrating climate change considerations into models;
- implementing stress testing and scenario analysis;
- **assigning responsibilities to key individuals;** and
- producing regular board and management reports on climate-related risks.

" Climate Change: Liability Risks for Businesses, Directors and Officers – The Coming Wave of Litigation"

A new report by Clyde & Co law firm, UK
July 2019

“... it will become increasingly important for **directors and officers** to demonstrate that:

- risks have been considered
- actions ... taken to mitigate them where necessary, and
- asset values are represented fairly on balance sheets.

Clyde & Co law firm, UK - July 2019

Canada has begun ... to develop decision support tools, including codes, guides and models ...

- for the design of resilient new buildings and CPI and
- rehabilitation of existing buildings and CPI ...

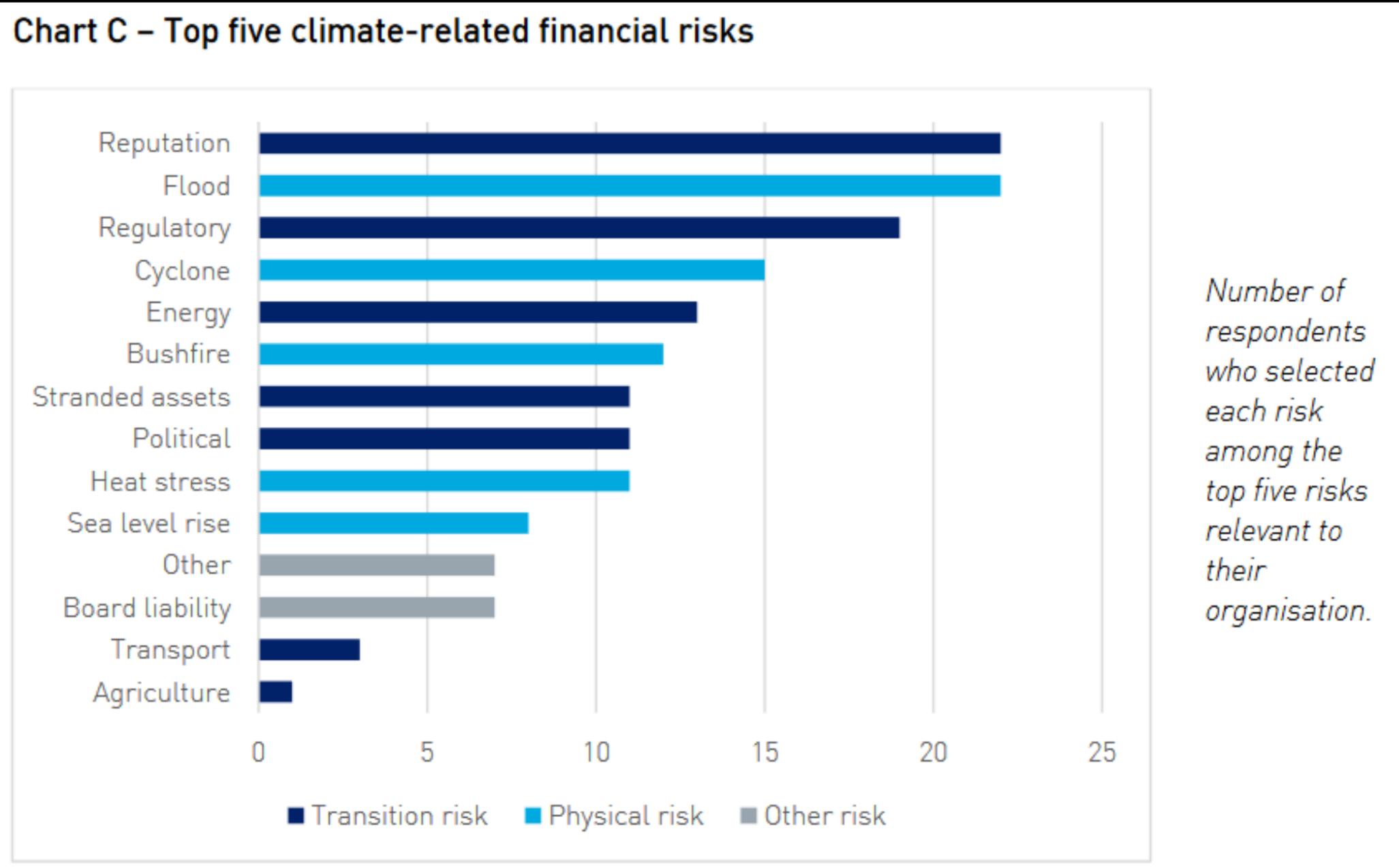
to ensure that existing and future climate change and extreme weather events are addressed”

Climate Change can cause existing buildings and CPI:

- Increased risk of asset/services failure
- Shorter service life of CPI
- Increased risk of potential liability associated with existing standards and codes, and
- **Increased risk of loss of life, injuries, illnesses (due to CPI failure)**

Climate Change – Awareness to Action on Investment - Australia

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Global emissions are not estimated to peak by 2030,
let alone by 2020.

Implementing current unconditional NDCs (national
emissions commitments)

= a global mean temperature rise between
2.9°C and 3.4°C by 2100

relative to pre-industrial levels,

and continuing thereafter

“By 2100, average temperatures could rise
7.0 degrees Celsius
above pre-industrial levels
if carbon emissions continue unabated

(from separate models from two leading research
centres in France)

"Infrastructure,
currently designed for historical climate conditions,
is more vulnerable to future weather extremes
and climate change ..."

"Forward looking design informs investment
in reliable infrastructure
that can withstand
ongoing and future climate risks."

**Institutions, government and public infrastructure services
are at the front line
of climate related foreseeable risks,
and the front line is
rapidly closing in from multiple fronts.
What is your own liability exposure?
And can you afford it?**

1991/2017: Nordhaus = $< -1\%$ of GDP (global) @ 3°C

2002: Tol for 1°C warming = $+2\%$ to -3% GDP

2016: Stern - current modeling may seriously underestimate the impacts

2018: Global Humanitarian Forum - already 300,000 deaths and US\$125 billion in economic losses annually

2019: Moody's = -0.69% in 2048 @ $+4^{\circ}\text{C}$

2019: Keen = -35% of GDP @ $+3^{\circ}\text{C}$

Stern (2016) identified two key weaknesses of the current class of economic models:

- limited spatial coverage (too simplistic)
- unreasonable assumptions on the discount rate,

(benefiting economic activity and investment today at the expense of future economic activity)

“Economic assessments of the potential future risks of climate change have been omitting or grossly underestimating many of the most serious consequences.”

“... we’ve reached an important inflection point
in how views of climate risk impacts are shifting
to acknowledge
the potentially massive economic costs.”

“A detailed analysis by researchers at Stanford University concluded that the current trajectory—which would see global temperatures rise by up to 4°C by 2100—would result in 30% lower per capita GDP than a scenario without additional warming.”

Climate Change and GDP – Boston Consulting Group Sept 2019

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Economic Impact of Unchecked Warming Dwarfs the Cost of Taking Action

IMPACT OF CLIMATE CHANGE

Devastating for all

Loss of 30% or more

in GDP per capita in 2100

(globally, in case of unchecked warming)



±1% in GDP

per capita impact in 2050

(depending on country, for a 2°C path)

IMPACT OF CLIMATE ACTION

Positive for many

Sources: Burke et al., “Large potential reduction in economic damages under UN mitigation targets” (May 2018); BCG analysis.

“... the number of “uninsurable” addresses in Australia is projected to double by the turn of the century to nearly 720,000 — or one in 20 — if nothing is done to address escalating risk from extreme weather and climate change.”

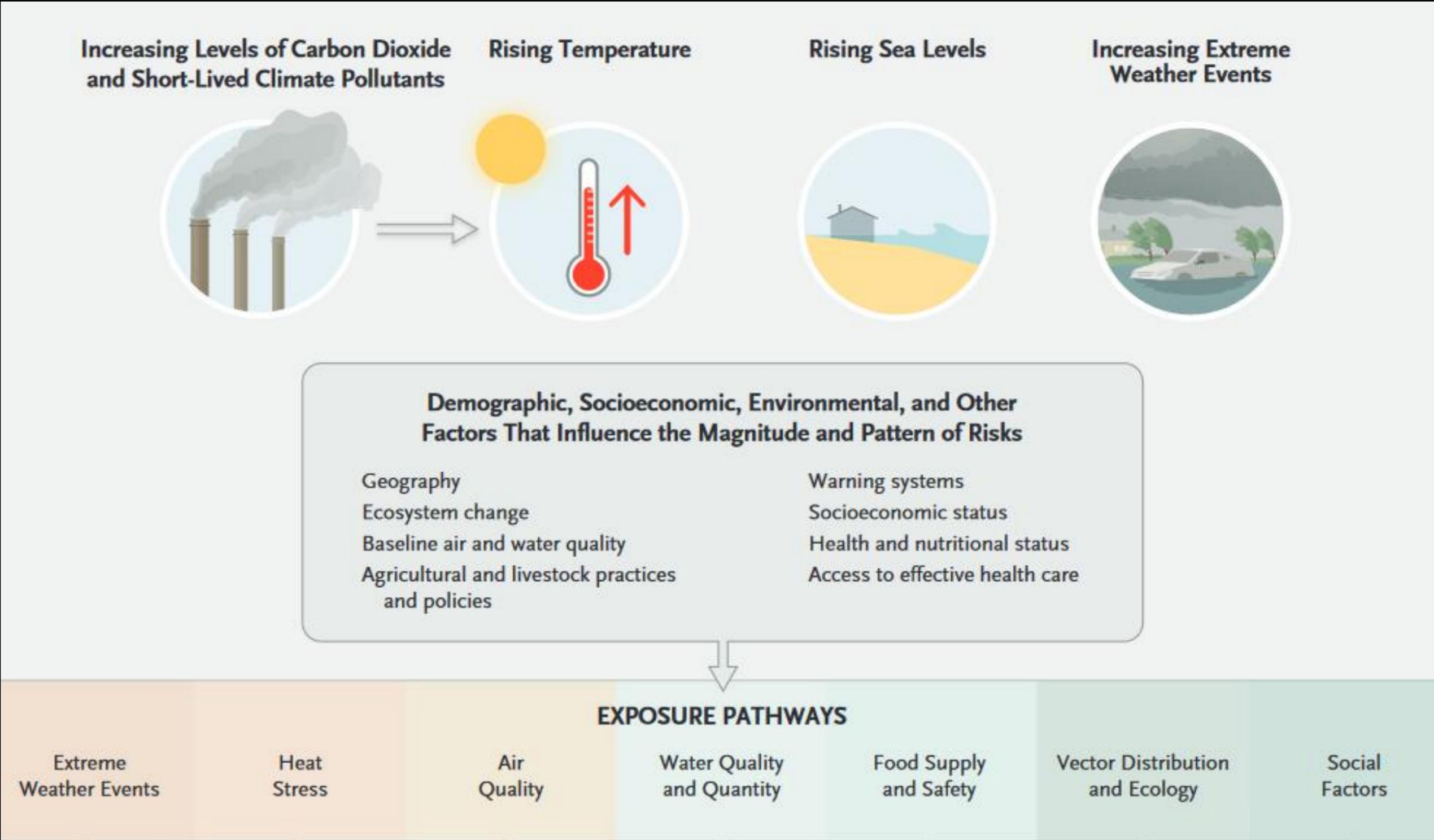
Noosa Heads (Qld)

In Noosa Heads, 17.3% — or 1,127 of 6,503 addresses — will be potentially 'uninsurable' by 2050.

This will rise to 24.1% — or 1,566 addresses — by 2100.

Climate-related risk management:

- Who responsible/accountable for risk management?
- financial risks in risk registers (? GDP decline)
- considerations in existing policies
- due diligence re climate-related risks
- extreme event disaster plans
- business continuity planning
- regular climate risk reporting (board/stakeholders)
- health risks for staff and for the public



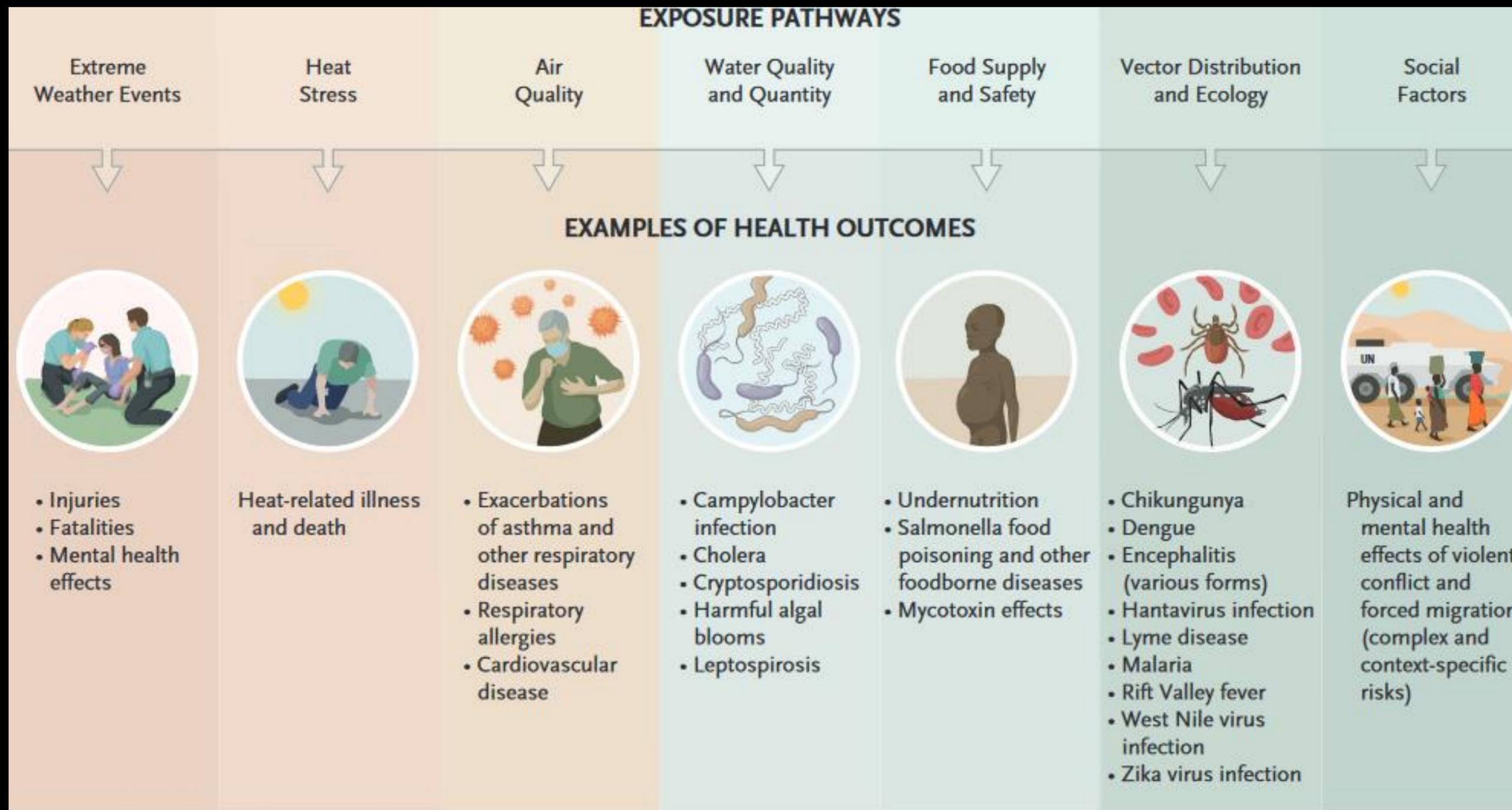


Figure 3. Major Health Risks Associated with Climate Change.

Climate change – not only a foreseeable risk.

It is our physical reality.

Reality for the economy, CPI
and the future of human health – how we live.

Who is responsible/may be held accountable in your
organisation?

Are you prepared, do you have a plan?

Viridis – advice and professional services:

Climate risk exposure

Building design/advice - Energy, Air, Light, Water, Waste

Indoor environment monitoring

Occupational exposure monitoring

Building assessment and ratings

Future relevant resilient, adaptable and safe living spaces