Insight summaries

Insight #6: Playing with Fire – Is Global Warming an Existential Threat?

Since publishing Insight #6 in July 2023, global warming and climate change have wrought more havoc across the globe, especially with wildfires, but also with heatwaves, flooding and other extreme events.

Canada continues to experience its worst-ever fire season, with emergency evacuations of several towns, and fire smoke causing a serious health hazard across the region and deep into the US. But perhaps the most graphic disaster was the destruction of the Hawaiian town of Lahaina on Maui's west coast on 8 August, with over 1700 buildings consumed by wildfire, at least 114 dead and many more missing – America's most deadly fire in more than a century.

What are the climate links?

These catastrophic climate events have coincided with record global surface temperatures. July 2023 was 0.24°C warmer than any July since 1880, recording a mean global surface temperature of 17.2°C, exceeding 17°C for the first time. July also set a record for the highest monthly sea surface temperature anomaly of +0.99°C, whilst Antarctica had its third-consecutive month of record-low sea ice extent. These extraordinary events and figures are striking panic across societies worldwide, especially as the World Meteorological Organisation has declared an El Niño year which can increase global temperatures by up to 0.3°C.

How serious is global warming and climate change already?

Insight #6 showed that global warming and climate change are already well advanced and ramping up quickly. The Sixth Assessment Reports (AR6) of the Intergovernmental Panel on Climate Change (IPCC), published between 2021-23, confirmed humans are unequivocally increasing greenhouse gas emissions to record levels, resulting in global warming now reaching 1.1°C above pre-industrial levels, and likely to reach 1.5°C in the next decades. AR6 found current warming has driven widespread and rapid global changes, including glacier and ice sheet melt, sea level rise and climate extremes – resulting in extensive harm to human lives and livelihoods, as well as to natural systems and biodiversity.

AR6 HAS IDENTIFIED SOME ALARMING ESCALATIONS:

- Climate change is intensifying faster than previously predicted.
- Extreme weather events linked to climate change are hitting humans and other species much harder than previous assessments indicated.
- Global warming is already pushing some vulnerable communities and ecosystems beyond their abilities to adapt.
- Climate system tipping points (leading to dramatic and irreversible changes) will be crossed at much lower temperature increases than previously thought, with some perhaps already triggered.

The latest IPCC climate model projections to 2100 offer a wide range of warming possibilities – from 1-5.7°C for the Shared Socio-economic Pathways scenarios that represent the spectrum of future global greenhouse gas emissions this century. Whilst our emissions since 2015 have dropped below the highest warming IPCC scenario, we are seeing some alarming trends in key climate indicators.

Global warming has affected 80% of the world's land area, with at least 85% of the global population experiencing weather events made worse by climate change. Alarmingly, concentrations of the most important greenhouse gases in the atmosphere, carbon dioxide, methane and nitrous oxide, are all accelerating, elevating the mean global planet surface temperature. Other concerning trends include accelerating ocean warming, sea-level rise, and ice melt, as well as more extreme and frequent land and marine heatwaves.

How is climate change impacting people and ecosystems?

- Growing numbers of people are dying from heat stress in all regions.
- Mental health challenges are increasing.
- Vector-borne disease is more widespread.
- Around 3.5 billion people are highly vulnerable to climate change, with an annual average 21.5 million forcibly displaced since 2008.
- More species are facing a high risk of extinction in all ecosystems.
- Desertification and extreme droughts are creating food and water insecurity.
- Ocean warming and acidification are compromising coral reef systems, affecting biodiversity, livelihoods and fisheries.

What are the remaining climate uncertainties?

Whilst the science of climate change has progressed dramatically, and climate predictions since the 1970s have largely played out, there are still some uncertainties in the science that may lead to worse outcomes. The wide range of IPCC global warming projections to 2100 is largely because of uncertainty around the emissions pathway society will follow. Other uncertainties include the climate's sensitivity to carbon dioxide increase, how the carbon cycle will respond to further warming, and which and when climate system tipping points are crossed. Recent research suggests that we are close to or have already triggered Greenland and West Antarctic ice sheet collapses, tropical coral reef die-off, and a northern permafrost thaw. Other critical tipping points could potentially be crossed this century.

How well are we mitigating future global warming?

In 2015, world leaders legislated the Paris Agreement to substantially reduce global greenhouse emissions to limit the global temperature increase to 1.5-2°C this century. While the rate of increase in estimated greenhouse gas emissions has slowed since 2015, emissions from fossil fuels and cement reached a new peak in 2022. To keep warming within 2°C above pre-industrial levels, global greenhouse gas emissions must decline by around 25% by 2030 (IPCC) – which seems highly unlikely based on current trends. Even if we stopped emitting greenhouse gases today, we have already built in an additional 0.5°C of global warming, meaning even worse climate change impacts are unavoidable in the next decade or two.

IS GLOBAL WARMING & CLIMATE CHANGE AN EXISTENTIAL THREAT?

We conclude that global warming is an existential threat to humanity for the following reasons:

- We have emitted 125% more carbon dioxide since 1990 than all previous human history. It is uncertain whether countries will cut greenhouse gas emissions deep and fast enough to stabilise the climate at a level where major societal disruption is avoided.

- There are several 'super risks' that could dramatically worsen climate outcomes - including abrupt climate change, simultaneous and compounding climate events, triggering of numerous tipping points with a cascading domino effect towards a 'Hothouse Earth', and various forms of runaway climate change.

- There are many unknowns and uncertainties in the science, such as climate sensitivity, carbon cycle response to global warming, and the physics of hot moist atmospheres, meaning high temperature scenarios cannot be excluded.

- Global warming is a threat multiplier, increasing the likelihood of conflict from ecosystem collapse, water and food crises, heat stress and people displacement, potentially culminating in a nuclear war.

An existential threat could eliminate all of humanity or leave the surviving population with insufficient means to rebuild society. Whilst there is still room for optimism, the dangers are growing by the day.

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This summary was authored by Prof Nick Schofield. Please refer to Insight 6 for author details, caveat, references, further reading, and glossary. Design by Trish Dalby.