

CLIMATE SCIENCE INSIGHT

# WHY RESILIENCE STARTS WITH UNDERSTANDING EXTREMES

[Dr Sophie Lewis](#), Chief Scientist - Engagement

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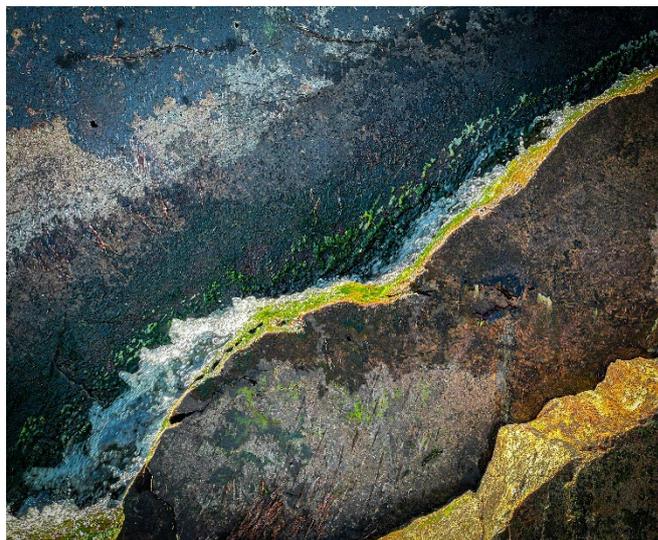


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We engage with listed companies and investors globally, enabling and facilitating active stewardship. Our research team undertakes company-focused research into the climate transition plans of listed companies, offering analysis, research and insights to assist global institutional capital understand investment risks and opportunities during the energy transition.



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# CLIMATE SCIENCE INSIGHT: WHY RESILIENCE STARTS WITH UNDERSTANDING EXTREMES

The topic front of mind for investors in recent conversations is how to approach physical climate risk when assessing future portfolio resilience.

Two questions I've been consistently asked in investor meetings are: what level of future warming is most likely? And what sort of climate shocks should we expect in this scenario?

From the climate science perspective, we can't tackle meaningful climate risk planning without thinking about the risks of high-impact, low-probability events. In complex systems characterised by uncertain tipping points that will bring irreversible change, it is the tail that drives the risk, not the average.

If we start by exploring the most likely warming scenarios and assessing the most likely impacts, we risk overlooking high-impact events that are critical to understanding asset, company, industry, economic and portfolio resilience.

Instead of thinking about the most likely future climate outcomes, the question we should first ask is: what happens if the tail materialises, and are we robust to it?

## The physical risks we should be considering in our climate risk assessments

This broad concept of tail risks – the rarest, most extreme events – will be familiar to all of us. Within the climate science community, unprecedented weather events, a compounding series of events, as well as tipping points are all regarded as tail events.

Tail risks play a larger role in the climate risk envelope than their low likelihoods might suggest because of their disproportionately costly impacts. In recent decades, we've seen these risks change as global temperatures increase. With any increase in future warming – whether we reach 1.5°C, 2°C, or 3°C – many types of events that we used to consider tail risks will become more common, and future tail risks will become even more extreme.

The chart below depicts this concept. A flood event that was 'extreme' in 1980 is moving into the realm of 'likely' today, and as temperatures rise further, more frequent and severe floods are expected.

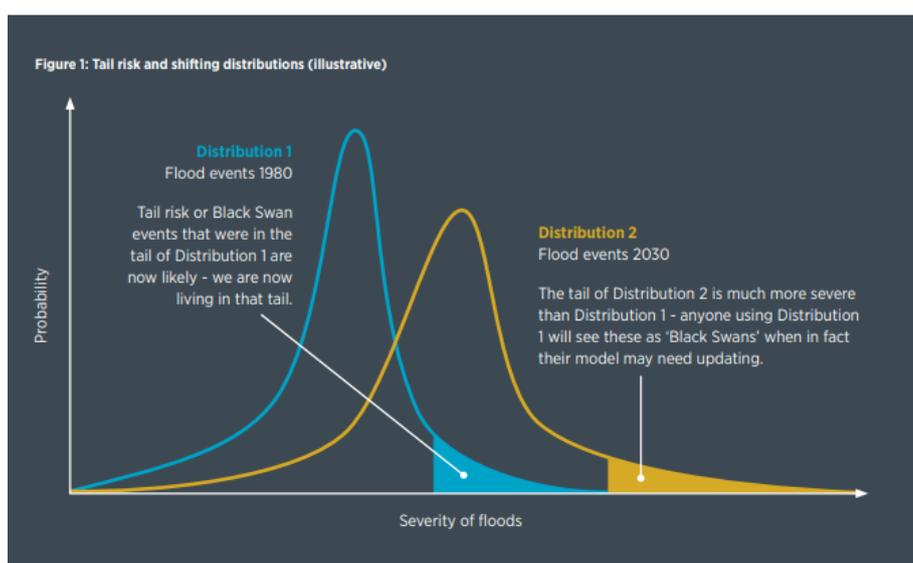


Figure 1: If we look at the changing intensity and likelihood of flood events over recent decades with climate change, we often see very large changes in the tail. Source: [Institute and Faculty of Actuaries](#).

Working through the variety of climate risks that we can consider tail events, I'll start with three recent examples of record-breaking tail events, or Black Swans:

1. The [2025 Los Angeles wildfires](#) – the city's most destructive ever – were driven by the combination of record low winter rainfall, record amounts of flammable vegetation and extremely strong Santa Ana winds.

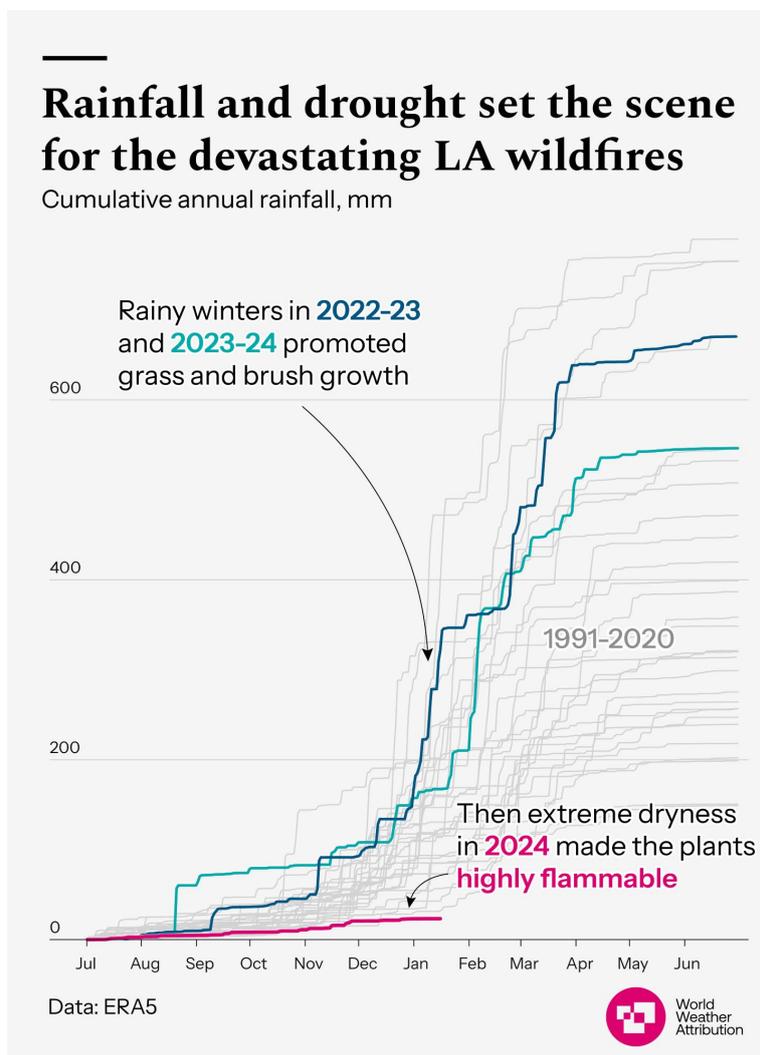


Figure 2: The LA fires followed a ‘climate whiplash’ event, involving two wet winters followed by an extremely dry one, resulting in huge amounts of flammable vegetation. Source: [World Weather Attribution](#).

2. A crippling heat wave hit the Pacific Northwest and Southwest Canada in June 2021. Temperature records were shattered in many places. A new all-time Canadian temperature record of 49.6°C (121.3°F) in the village of Lytton was recorded, breaking the previous 1937 record of 45°C (113°F).
3. Hurricane Sandy (2012) was the largest Atlantic hurricane ever recorded, and its unusual path up the US East Coast resulted in devastating storm surge that caused extensive flooding across 24 states.

Back-to-back or simultaneous weather events – known as compound events – can be particularly impactful. Examples include an extreme heatwave followed by bushfires, or being hit by a series of damaging storms, as occurred in Spain, Portugal and Morocco during January and February, with [nine named storms](#) in 32 days.

Compound events can push beyond the design limits of buildings, roads, energy systems, and other infrastructure are built to withstand, and result in cascading system failures. Increasing global temperatures is loading the climate dice, making compound events and cascading, systemic climate risks more likely with every fraction of a degree of warming.

Tipping points are well known tail risks. When critical thresholds in the climate system are breached, abrupt and often irreversible changes can occur. Once a threshold is passed, systems like ice sheets, the Atlantic oceanic circulation or Amazon rainforest can be pushed into and remain in a new state, even if warming halts.

[December 2025's newsletter](#) detailed that we have already crossed the tipping point for coral reef systems and that without a significant, rapid reduction of greenhouse gas emissions, many more systems risk tipping into a dangerous state. The expected impacts of tipping points include massive sea level rise, extreme cold in Europe, more destructive hurricanes and abrupt carbon release from permafrost.

Today, a country or city might be able to cope with an occasional tail event through strong adaptation and resilience planning. However, as warming continues, tail events in many regions will become so extreme that some systems will no longer be able to keep up.

### **The physical climate risk questions we should be asking**

Instead of focusing on the 'most likely' levels of warming and the 'most likely' impacts, we need to start by thinking about tail risks and what happens if they materialise. Applying this full risk spectrum approach to physical climate risks means a broader set of questions in risk assessments is required. Questions include:

1. What high end temperature projections are possible for 2100 based on emissions pathways and modelled climate responses to greenhouse gas trajectories?
2. What are the high-impact, low-probability events modelled for these higher warming levels?
3. What are the high-impact, low-probability events [projected](#) for 2.6°C, the level of warming modelled for this century from current emission reduction commitments?
4. Can the asset or institution cope with these 'how bad can it get' scenarios? Are questions like 'what climate events can his asset withstand?' being asked in the design phase of large projects?

By expanding our consideration of physical climate risks, we can better assess resilience to future warming and whether portfolio companies are resilient to high-impact climate risks.

In my next Climate Science Insight, I'll discuss how a narrow focus on direct climate risks can cause us to miss the biggest climate risk: systemic risk. Direct risks of climate change – such as floods damaging a factory, sea level rise eroding coastal roads, or droughts affecting water supplies – are often just one part of the total risk envelope that needs to be considered. A larger concern is systemic climate risks, where impacts cascade and compound across systems and regions, causing widespread supply chain disruptions and ripple effects.

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