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Natural catastrophes in 2025: the persistent rise of wildfire and storm risk

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Executive summary

Insured natural catastrophe losses were below-trend USD 107bn in 2025 due to the absence of a major US hurricane landfall.

Natural catastrophe insured losses reached USD 107 billion in 2025. Secondary perils dominated, accounting for an all-time high of 92% of insured losses globally. Wildfires set a new loss record after the Palisades and Eaton fires in Los Angeles in January created combined insured losses of USD 40 billion, and severe convective storm (SCS)[1] losses stayed elevated. While USD 107 billion is high by historical standards, it was well below the USD 140 billion implied by the long-term growth trend due to the absence of a major US hurricane landfall. This was a favourable draw rather than a reduction in risk. Year-to-year loss volatility reflects natural weather variability and hazard dynamics, but the upward trend in insured losses is structural as exposure keeps building. It is therefore critical to identify the risk drivers to manage and reduce risks before losses occur.

The long-term trend implies a 2026 loss of USD 148bn, or of USD 320bn in a peak-loss scenario.

Despite one below-trend year, insured losses are still rising by 5–7% annually on average in real terms. If 2026 reflects the long-run trend, insured losses could be USD 148 billion, and reach USD 186 billion by 2030. Most years sit below the long-term trend and only a handful of active seasons determine peak years, driven by hurricanes or earthquakes in areas of high insurance penetration. These occasional events create the peak losses. We estimate that if a peak year loss scenario occurs this year,[2] insured losses could reach USD 320 billion. In 2030, as exposure accumulates, a peak loss year could cause about USD 400 billion global insured losses, more than double the last actual peak year (2017).

The key driver of fast-growing insured losses from secondary perils is rapid exposure growth into high-risk areas.

Secondary perils are the fastest-growing segment of natural catastrophe insured losses of the past 55 years. SCS, wildfires and floods account for about two thirds of insured loss growth.[3] At global level, exposure growth contributes more than 80% of the uptrend in weather-related insured losses. Yet when viewed by region and peril, insured losses from North American wildfires and European SCS are growing twice as fast as exposure. Hazard intensification and vulnerability effects, amplified by asset expansion into high-risk areas, are creating loss trends above economic growth – a challenge for economies and the re/insurance industry. Sustained investment in modelling secondary perils is a prerequisite, including efforts to improve data quality, and regular model updates, to ensure premiums and capital stay commensurate with the evolving underlying risk.

Catastrophe models remain the industry's best tool for assessing current risk, especially secondary perils.

Catastrophe models enable a more complete assessment of current risk by extending beyond the observed historical record and simulating a broader range of plausible events. This is particularly important for secondary perils, where historical hazard data is sparse and often insufficient to capture the full risk landscape. Overcoming data limitations of secondary perils is key to better modelling these fast-growing losses. At the same time, adaptation and mitigation measures are crucial to reducing loss potential and maintaining insurability in highly exposed regions. As exposure grows, understanding which adaptation measures are most effective is vital.

Narrowing large protection gaps is a key priority; adaptation measures can help.

Natural catastrophe protection gaps, despite some progress, remain large, particularly in emerging economies where 80–90% of losses are still uninsured. Major advanced economies also face significant underinsurance for low-frequency high-impact risks such as earthquakes. Adaptation measures can stabilise the loss trajectory and ease some of the cost pressures, evidence shows. For example, in the US, where catastrophe losses are now the largest share of personal property insurance claims, targeted physical adaptation at homeowner level can reduce insured losses. New construction practices can also create vulnerabilities, so exposure data and building standards benefit from being frequently updated. An integrated approach that combines insurance coverage with risk-adaptation measures in exposed areas, can narrow natural catastrophe protection gaps.
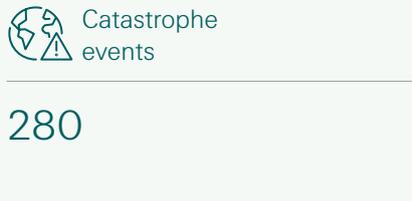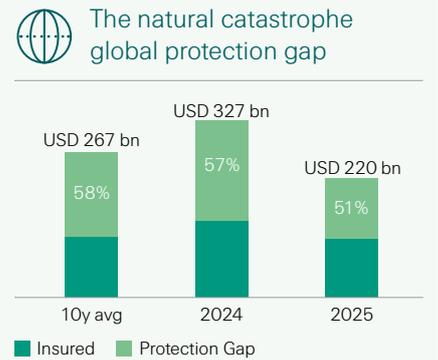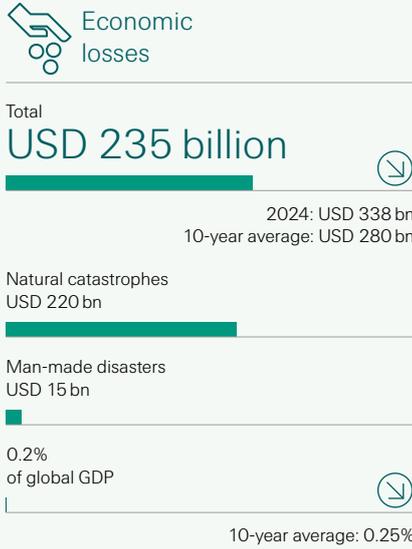
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[1] Severe convective storm (SCS) is an umbrella term for a range of hazards including tornadic and straight-line winds, and large hailstones. See the Appendix for more information.

[2] We define a peak year loss scenario as one in which the natural catastrophe insured loss exceeds trend by at least one standard deviation. We estimate that an annual loss of this magnitude has a 10% chance of occurrence, based on our proprietary risk models.

[3] We focus on inland floods and exclude tropical cyclone-generated flooding such as storm surges and storm-induced rainfall.
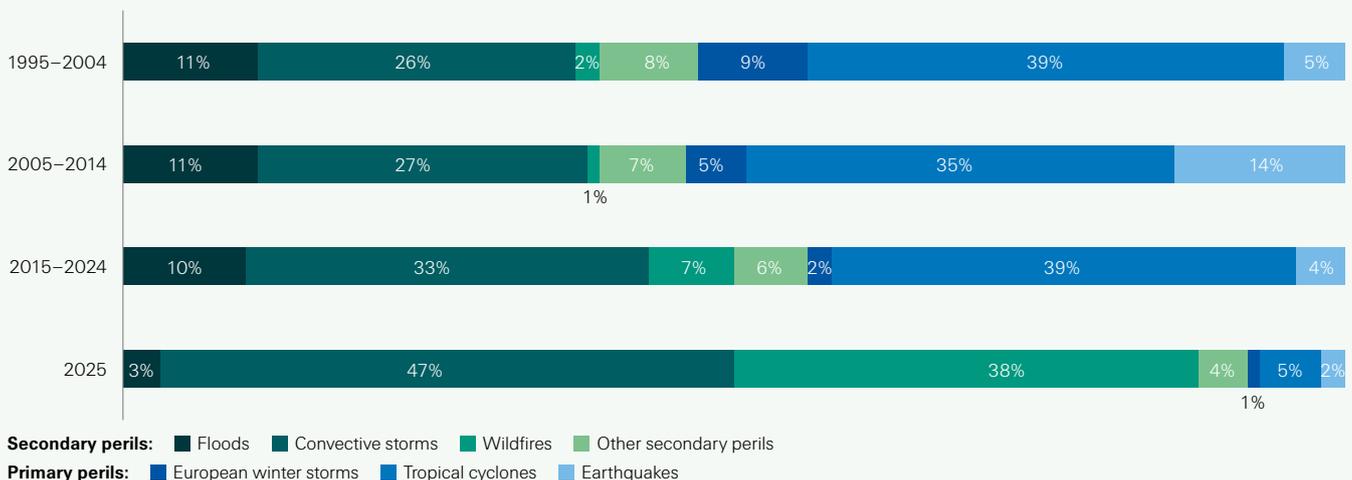
Key takeaways

The year 2025 in a nutshell

Economic losses

Total
USD 235 billion

2024: USD 338 bn
10-year average: USD 280 bn

Natural catastrophes
USD 220 bn

Man-made disasters
USD 15 bn

0.2%
of global GDP

10-year average: 0.25%

Insured losses

Total
USD 120 billion

2024: USD 151 bn
10-year average: USD 121 bn

Natural catastrophes
USD 107 bn

Man-made disasters
USD 13 bn

4.8% of global property
direct premiums written

10-year average: 5.4%

Natural catastrophe insured losses

Total
USD 107 billion

2024: USD 141 bn
10-year average: USD 111 bn

Secondary perils
USD 98.3 bn (92%)

2024: USD 84.0 bn

Primary perils
USD 9.1 bn (8%)

2024: USD 57.3 bn

The natural catastrophe global protection gap

USD 267 bn — 58% (10y avg)
USD 327 bn — 57% (2024)
USD 220 bn — 51% (2025)

■ Insured   ■ Protection Gap

Victims
>17 900

Catastrophe events
280

Source: Swiss Re Institute

Significant insured losses despite no peak peril event in 2025

Secondary perils dominated insured losses in 2025, reflecting the absence of a major hurricane landfall in the US. Wildfires set a new loss record and SCS stayed elevated, together lifting the secondary peril loss share to an all-time high of 92%.

Global insured losses from natural catastrophes by peril in 2025 and previous year averages, %


Period	Floods	Convective storms	Wildfires	Other secondary perils	European winter storms	Tropical cyclones	Earthquakes
1995–2004	11%	26%	2%	8%	9%	39%	5%
2005–2014	11%	27%	1%	7%	5%	35%	14%
2015–2024	10%	33%	7%	6%	2%	39%	4%
2025	3%	47%	38%	4%	1%	5%	2%

Secondary perils: ■ Floods ■ Convective storms ■ Wildfires ■ Other secondary perils
Primary perils: ■ European winter storms ■ Tropical cyclones ■ Earthquakes

Source: Swiss Re Institute

2026 insured loss estimated at USD 148 billion; peak scenario reaches USD 320 billion

Insured losses in 2025 were below the USD 140 billion implied by 5–7% real terms growth trend since 1996 – but the risk has not reduced. Hazard dynamics, natural weather variability and uneven exposure mean many years sit near/below average, while occasional tail events drive extremes. If 2026 reflects the long-run trend, insured losses will likely reach USD 148 billion – and USD 186 billion by 2030.

Global natural catastrophe insured losses, the trend and modelled 1-in-10 year (USD bn, 2025 prices)
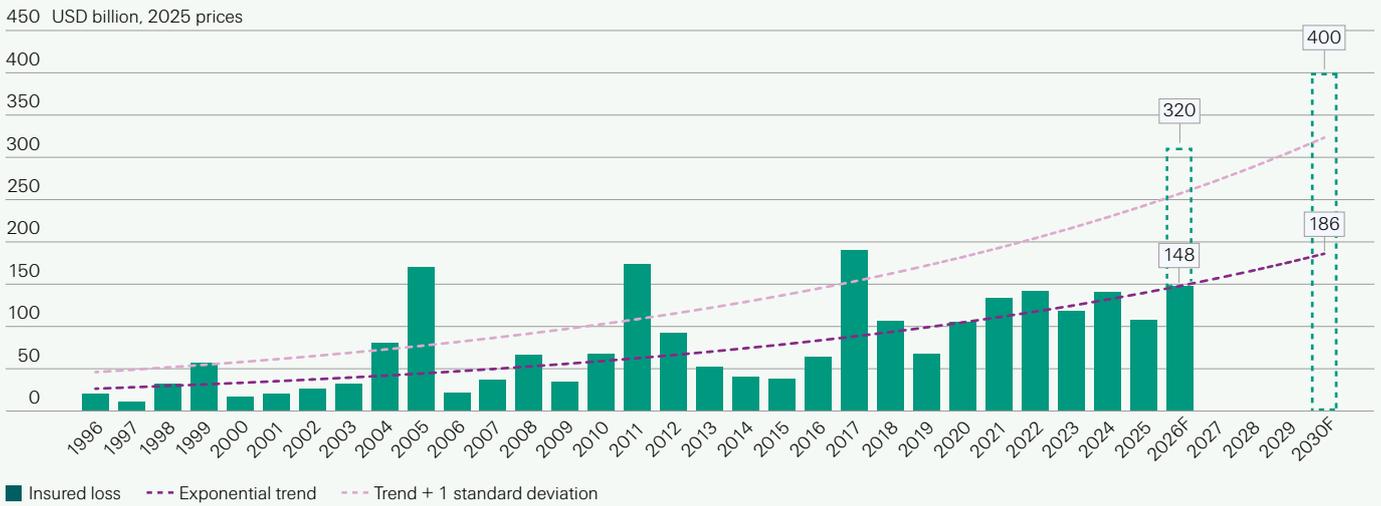
Source: Swiss Re Institute

Exposure growth: a dominant, but not the only driver of historical insured loss growth from secondary perils

While exposure growth has historically been the dominant driver of increasing global weather-related insured losses, it does not tell the whole story. When decomposing the loss trends over the past 55 years by peril and by region, insured losses from wildfires in North America and SCS in Europe grew twice as fast as exposure. Hazard intensification and vulnerability effects, amplified by asset expansion into high-risk areas, are shaping loss trends that exceed exposure growth.

Annual insured loss trends for different peril regions decomposed into key loss drivers
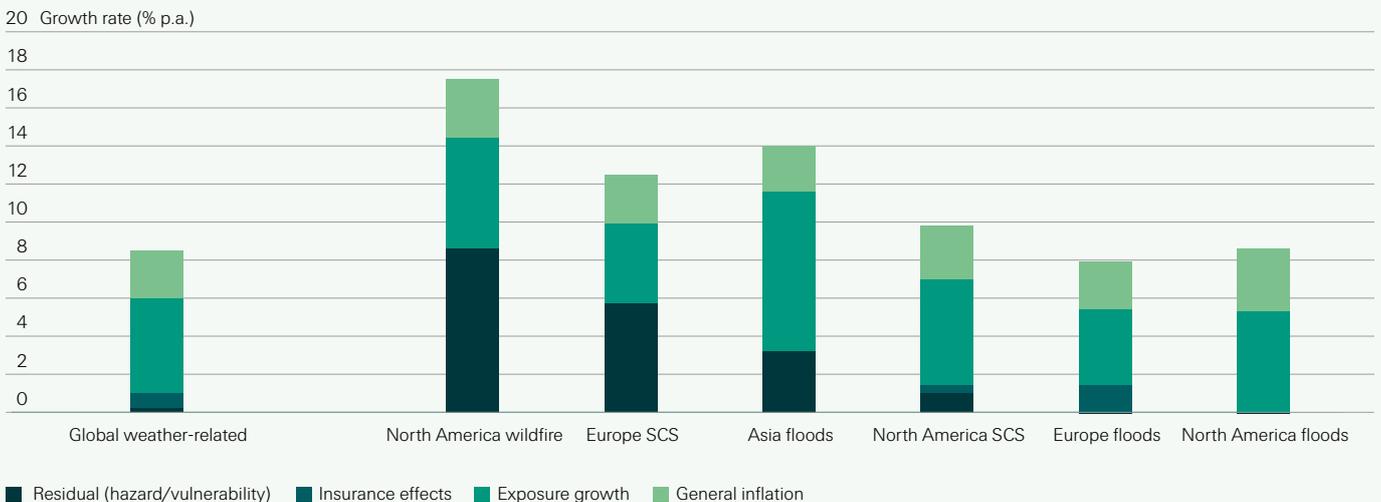
Source: Swiss Re Institute

Narrowing protection gaps requires both insurance and adaptation

Protection gaps, the share of uninsured losses relative to total economic losses, are a key indicator of resilience in property insurance markets. Effective natural catastrophe risk frameworks combine high insurance penetration with active exposure management. Roughly half of global natural catastrophe losses were insured in 2025, a record high but also consistent with a decades-long trend of insurance covering a growing share of global natural catastrophe losses. Insurance covered over 40% of global losses on average in the past decade, up from 23% 30 years ago.

Insured share of global natural catastrophe losses
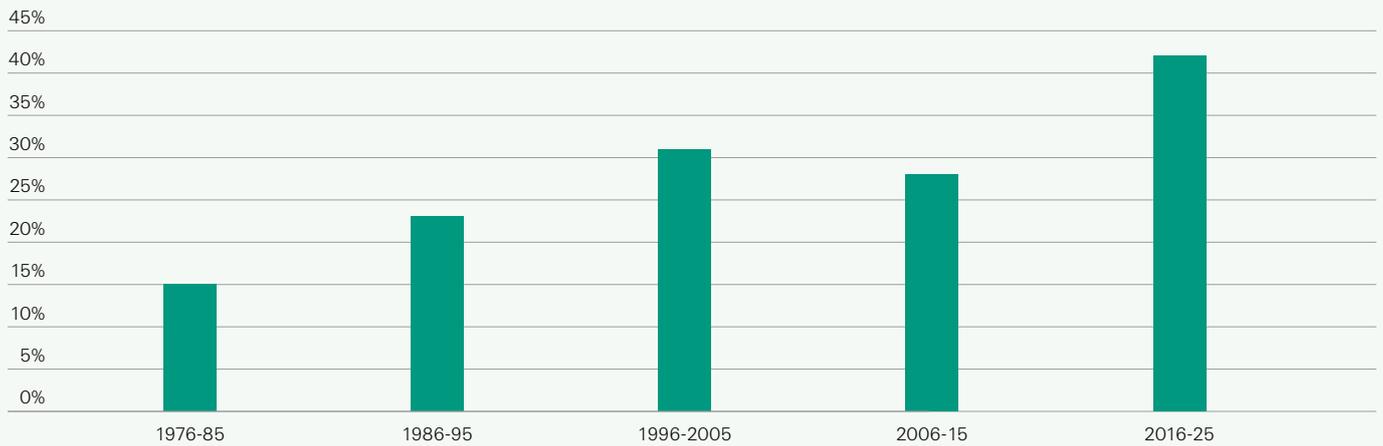
Source: Swiss Re Institute

A year of fires and storms

Global natural catastrophe insured losses were USD 107 billion in 2025, driven by severe convective storms and wildfires. The absence of a major US hurricane landfall kept the 2025 insured loss below the level implied by the long-term 5–7% annual average growth trend. Yet exposure continues to concentrate in hazard-prone areas, and underlying risk potential is elevated as secondary perils lift the annual average loss and peak or tail risks remain present. California's record wildfire loss highlighted how expanding settlements and lengthening fire seasons are lifting wildfire risk. In 2026, if the long-run growth trend persists, insured losses would trend to about USD 148 billion, or to USD 320 billion in a peak year loss scenario. Overall, 2025 was a relatively benign insurance year in a high-risk environment. Careful risk awareness, accumulation management and investment in resilience are increasingly important as growing exposure, hazard shifts and changes in the vulnerability of insured assets drive risk higher.

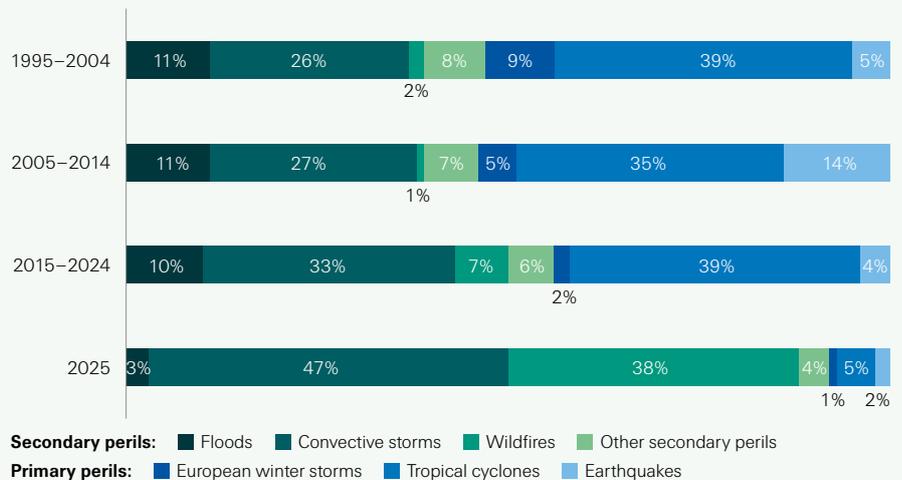## Significant insured losses despite no US hurricane landfall

SCS and wildfires were the leading drivers of 2025 natural catastrophe losses…

Global insured losses from natural catastrophes totalled USD 107 billion in 2025, the lowest of the past 5 years. There were 190 natural catastrophes that met *sigma* criteria (down from 229 in 2024).[4] Secondary perils dominated,[5] while hurricane losses were low in the absence of a major hurricane landfall in the US (see Figure 1). Wildfires set a new loss record and SCS stayed elevated, together lifting the secondary peril loss share to an all-time high of 92%. Secondary perils are causing the fastest-growing insured losses over the long-term and, amid rising exposure and hazard shifts, have increasing relevance in annual loss totals.

…with the LA wildfires setting an all-time loss record.

The defining disasters of the year were the Palisades and Eaton fires in Los Angeles County, with combined insured losses of USD 40 billion, by far the largest global insured wildfire loss events to date. Combined, the fires are in the top 10 costliest insured loss events across all natural catastrophe perils on *sigma* records. Without them, 2025 would have been the least costly year for insurers since 2016. The below-trend result in 2025 was a favourable draw, not a reduction in underlying risk. Year-to-year volatility reflects hazard dynamics and natural weather variability, but the upward trend in insured losses is structural, as exposure keeps building.

Figure 1
Global insured losses from natural catastrophes by peril, in 2025 and for previous past year averages, %.

Secondary perils: ■ Floods ■ Convective storms ■ Wildfires ■ Other secondary perils
Primary perils: ■ European winter storms ■ Tropical cyclones ■ Earthquakes

Source: Swiss Re Institute

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4   See Appendix II: Definitions of terms for details on the criteria used to include catastrophe events – both natural and man-made – in this study.
5   See Appendix II: Definitions of terms for the definitions of primary and secondary perils in this study.
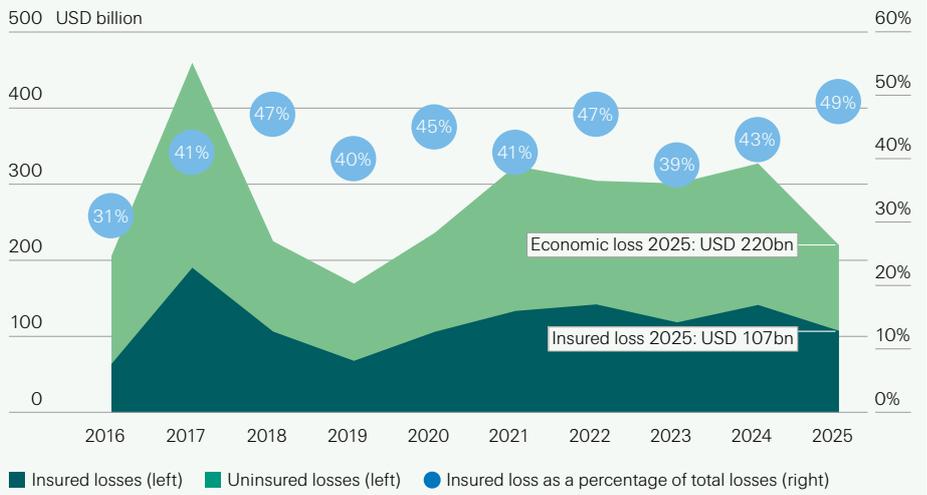
The share of insured losses was
the highest ever...

Economic losses from natural catastrophes, at USD 220 billion in 2025, were also the
lowest since 2019. About 49% of these were insured – the highest share on *sigma*
records (see Figure 2). This reflects the concentration of most 2025 losses in perils and
markets with higher insurance penetration, principally the wildfires and SCS in the US.
Even so, more than half of losses were uninsured, highlighting persistent protection gaps
(see Chapter 3).

...yet most regions remain under-prepared.

The human impact was higher in 2025 than in 2024, after several hazards hit regions
with limited preparedness, such as the Myanmar earthquake in March and Cyclone
Ditwah in Sri Lanka in November. More than 15 000 people are believed to have died
or gone missing from natural disasters (2024: 11 000). Many regions of the world
remain under-prepared due to structural vulnerabilities, inadequate early warning
systems, and rapid, unsafe urbanisation.

Figure 2
Global natural catastrophe insured
and uninsured losses, share of insured losses
(USD bn, 2025 prices)

Economic loss 2025: USD 220bn

Insured loss 2025: USD 107bn

■ Insured losses (left)   ■ Uninsured losses (left)   ● Insured loss as a percentage of total losses (right)

Source: Swiss Re Institute

A low-loss year is consistent with long-run
5–7% annual growth, implying that a
USD 148 billion loss is possible in 2026.

Trend implies a 2026 insured loss of USD 148bn – or USD 320bn peak year loss
The absence of a US hurricane landfall caused a low-loss year for global insured
catastrophe losses. Since 1996, the average annual trend growth of losses has been
5–7% in real terms. Actual insured losses in 2025 fell below the USD 140 billion
implied by this long-term growth trend. However, we emphasise that the risk has not
reduced. Volatility is inherent: hazard dynamics, natural weather variability and uneven
exposure mean most years sit at or below the trend, while a handful of active seasons
determine the peaks. If 2026 reflects the long-run trend, insured losses will likely reach
USD 148 billion – and USD 186 billion by 2030.

Figure 3
Global natural catastrophe insured losses, the trend and modelled 1-in-10 year (USD billion, 2025 prices)

■ Insured loss   - - - Exponential trend   - - - Trend + 1 standard deviation

Source: Swiss Re Institute
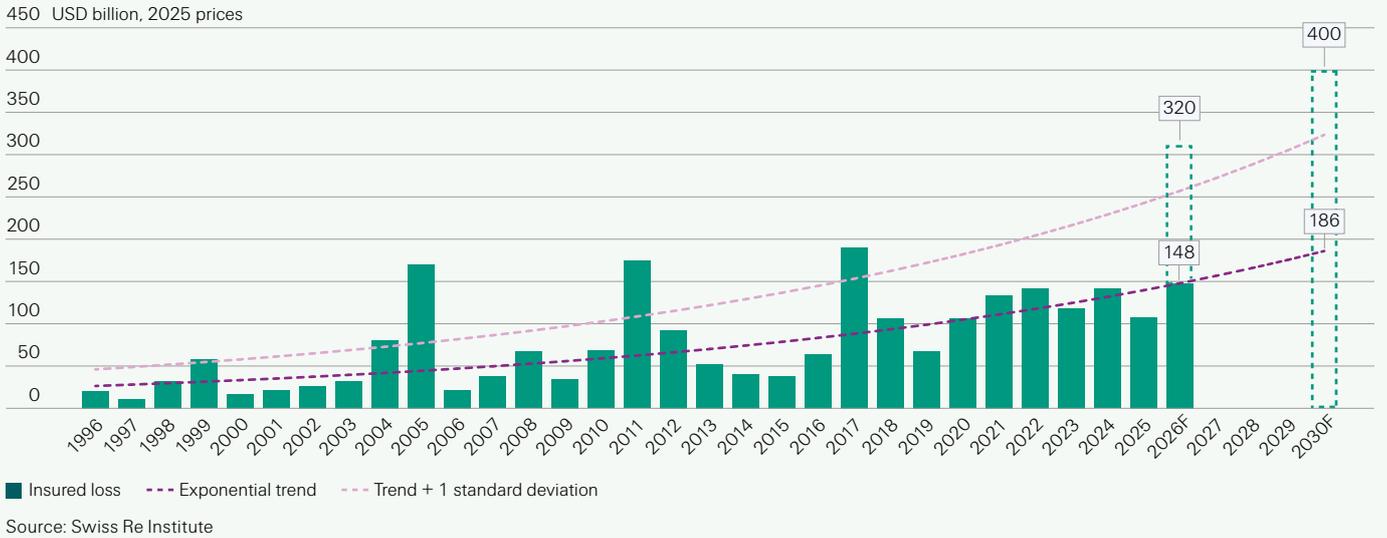
A below-average loss year is not an anomaly; statistically, it is the expectation.

Annual insured losses were also at a lower annual mean in 2013–16, but long-term growth abruptly resumed in 2017. We project that irrespective of year-on-year volatility, losses will continue to grow at trend. Past lulls – such as the 2006–2016 episode of no major hurricane making landfall in the US – ended abruptly with high-impact landfalls. The same logic applies now. Peak-peril threats remain present irrespective of actual events in prior years. A below-trend year should therefore not relax peak-year preparedness.

We model an insured loss of USD 320bn in a peak year loss scenario.

Based on Swiss Re's global suite of in-house catastrophe models, we model a peak year loss scenario. Should this scenario occur in 2026, we estimate it would lead to about USD 320 billion of insured losses.[6] By 2030, if the 5–7% annual growth trend for insured losses continues as exposure accumulates, a global peak loss year could realise about USD 400 billion of insured losses (see Figure 3) – which would be more than double the last actual peak loss year (2017).

Secondary perils: wildfires and storms a growing threat

Loss composition shifted to secondary perils in 2025 as the LA fires spread into high-exposure, high-value neighbourhoods…

Wildfires and severe convective storms (SCS) dominated the natural catastrophe loss outcome in 2025. These two perils also led to the highest aggregated insured losses from secondary perils on *sigma* record. Losses for all other perils were muted in 2025. The USD 40 billion insured losses from the January wildfires in Southern California – also a record loss for this peril – were driven by the burning of some of the densest, highest-value wildland-urban interface (WUI) regions in the US. Windspeeds of nearly 100 mph (160 kph) from the Santa Ana winter winds blew embers into tightly packed buildings, turning wildland fires rapidly into urban conflagrations. The biggest of the fire outbreaks burned close to 40 000 acres in Los Angeles County and destroyed more than 16 000 structures in the Palisades and Eaton neighbourhoods. The number of structures lost was extraordinary – nearly three times the average annual number since 2016 – even though 2025's burned area in California was only about one-third of the post-2016 average.[7]

…with losses magnified by weather and continuous fuel pathways.

The scale of the destruction came from an adverse combination of weather (drought and strong winds), exposure (dense urban/suburban development), and fuel (flammable structures linked by dry grassland that provide a pathway for fire). Critically, the very dry 2024–25 winter followed two unusually wet winters that grew abundant vegetation, which then dried and became highly combustible when the Santa Ana winds blew.

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[6]   As noted in footnote 3, we define a peak year loss scenario as a year in which the insured loss due to natural catastrophes exceeds trend by at least one standard deviation. Our scenario estimates that an annual loss of this magnitude has a 10% chance of occurrence.

[7]   *2025 Fire Season Incident Archive*, CalFire.

Figure 4
Global insured losses from wildfires (USD billion, 2025 prices)
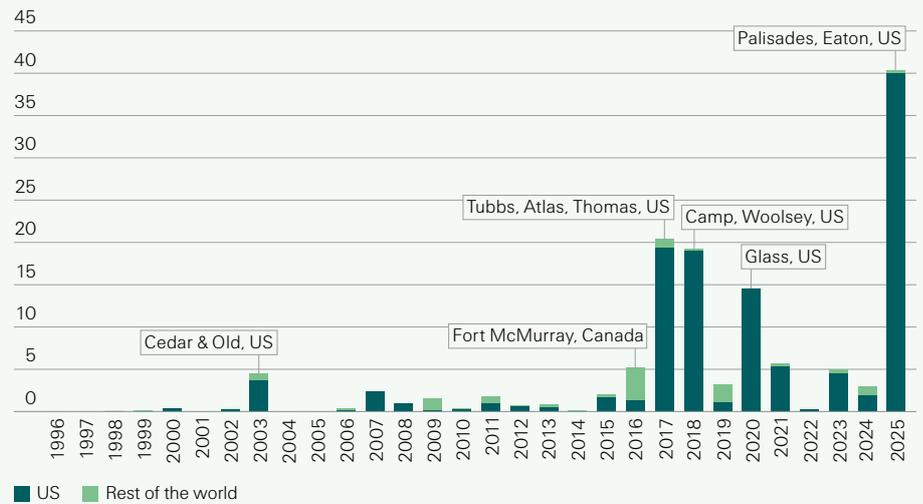
Source: Swiss Re Institute

Wildfire risk is evolving amid settlement trends…

Wildfire stands out as the fastest-growing risk, with insured losses increasing by an estimated 12% per year. In particular, losses from wildfires have risen markedly over the past decade. Since 2015, they averaged 10% of global annual natural catastrophe insured losses, compared with just 2% before 2015. Eight of the 10 costliest loss years. (Consumer Price Index-adjusted)[8] have occurred in the last 10 years (see Figure 4). The principal driver is exposure growth in fire-prone zones. Since 1990, exposure growth in the high-risk WUI zones has outpaced exposure growth in non-WUI zones by a factor of 1.8 in the US, and by a factor of 1.9 in California.[9] As of 2020, about one in three Californians resides in the WUI – and the January 2025 fires burned exclusively within Los Angeles' WUI.[10] The 2025 record loss showed how growing exposure in localised high-risk areas and elevated rebuild costs place massive upward pressure on financial risk (see Chapter 3).

…and lengthening of fire seasons and other hazard shifts compounding the loss threat that fires present.

In addition, shifts in seasonal conditions and rainfall patterns have contributed to drier, more flammable fuels, increasing ignition and fire spread potential. California has historically had wet winters, but recent years have seen longer fire seasons with greater overlap between the period of peak fuel dryness and the peak Santa Ana wind season in December-January. The January fires were unusual in their timing as California's largest wildfire losses typically occur in late summer/autumn, but the winds are often a driver of higher losses.

Urban conflagration risk expands beyond the US.

Most insured wildfire losses originate in the US – especially California – where high hazard intersects with high-value assets. Yet the risk of urban conflagration is rising elsewhere: major insured loss events have occurred in Australia (2009, 2019), Canada (2016 and 2024) and Europe (eg, Portugal 2017). Europe had an intense 2025 fire season (across Spain, Italy and Greece), although the severe hazard has not yet translated into a billion-dollar insured loss. In Canada, wildfire exposure is expanding beyond the traditional provinces of British Columbia and Alberta, bringing in industry losses to new regions for the first time in 2025.

Severe convective storms: the third-costliest year for insurers

Severe convective storms continued their recent trend of elevated losses.

SCS losses reached USD 51 billion in 2025, above the long-term trend of around 7% growth annually, extending the run of years with losses above USD 50 billion (see Figure 5). This was the third-costliest SCS year after 2023 and 2024 (USD 72 billion and USD 54 billion respectively, at 2025 prices). This peril is the second fastest growing after wildfires. The number of SCS events causing large losses of USD 1 billion or more was 44% higher in the five years to 2025 than in the prior five years.

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[8]   We use the US Consumer Price Index (CPI) to account for the impact of economic inflation.
[9]   *Mapping Change in the Wildland Urban Interface, 1990–2020*, Silvis Lab, 2025, based on Radeloff et. al. "Rapid growth of US wildland-urban interface raises wildfire risk", Proceedings of the National Academy of Sciences, vol. 115, 2018.
[10] J. Kimelman, *"LA fires charred the wildland urban interface. Here's what that is"*, CALMATTERS, 28 January 2025.

Figure 5
Global insured losses from SCS (in USD bn, 2025 prices)

SCS insured losses ···· SCS Trend

Source: Swiss Re Institute
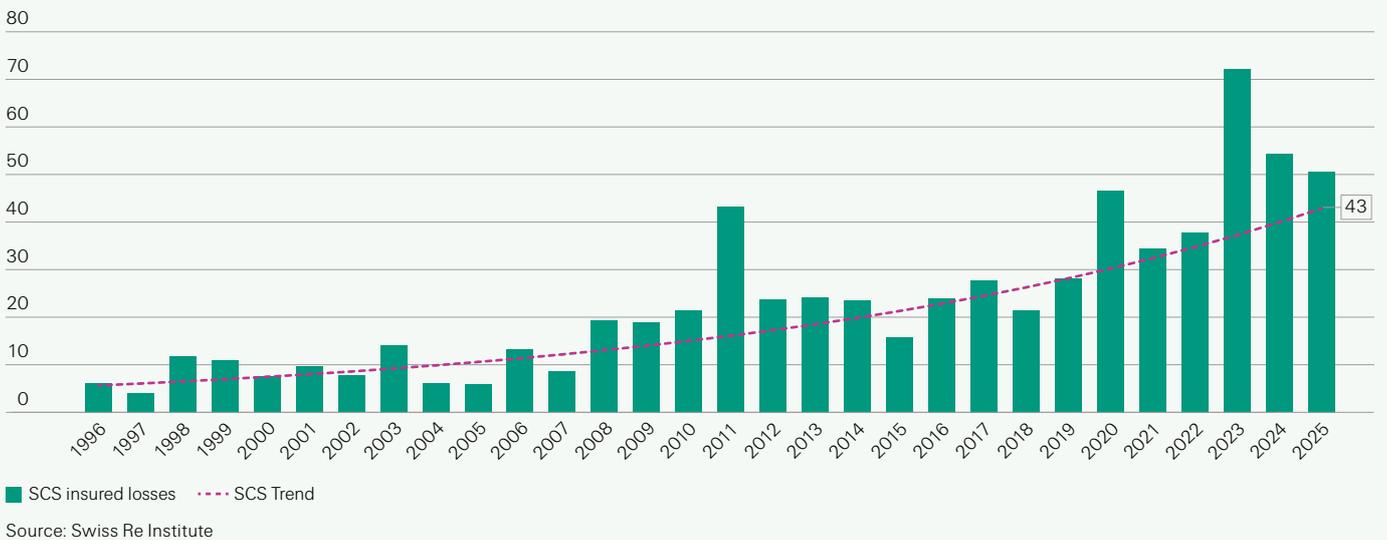
Structural exposure growth points to increasing average annual losses and materially higher extremes.

The drivers of rising SCS insured losses are structural and imply increasing average annual losses, as well as a materially higher annual loss in an extreme season. In the US, which accounts for the largest proportion of SCS losses, urbanisation and sprawl are increasingly concentrating high-value, damage-prone assets in hail belts. Vulnerability has risen with rooftop solar and other exterior equipment. US property reconstruction costs, though flat since March 2025, are still 37% above December 2019,[11] impacting property claims costs.[12] There is also evidence of rising SCS losses in other regions: Australia's second-costliest SCS ever was a Brisbane thunderstorm in 2025 that caused insured losses of USD 1.8 billion. Hazard hail activity was also intense in Europe in 2025, though with low insured losses since it mostly affected areas of low exposure. In Chapter 2, we analyse these loss drivers in more depth.

Flooding across southeast Asia: the danger of compound storms

The Southeast Asia flood was the result of a combination of monsoon-related rainfall and tropical cyclone activity.

Global flood-related insured losses were well below average in 2025 – USD 3.4 billion versus a USD 15.4 billion previous five-year average – despite numerous floods worldwide. Overall flood insured losses grow at approximately 6% per year. Asia, due to the presence of heavily urbanised areas around large river systems and the big influence from the monsoon season, presents the highest annual growth rate, 12%. More on this in Chapter 2. The defining flood episode of the year was a very late-season, compound monsoon flood with tropical-cyclone influence across Thailand, Indonesia and Malaysia in late November to early December. Back-to-back storms arrived 5–15 days apart, late in the monsoon season, as atmospheric and oceanic conditions in the Northwest Pacific (NWP) basin boosted tropical-cyclone activity.[13]

The economic loss came to at least USD 11bn due to the compound impact of the storms…

The economic damage was high, totalling at least USD 11 billion despite relatively low average exposure in several affected areas, due to the compounding effect. The storms acted both sequentially and simultaneously to saturate the soil, overwhelm flood defences and create widespread flooding, landslides and storm surge that left more than 1300 people dead. Cyclone Ditwah, one of the contributing systems, alone caused over USD 4 billion economic losses in Sri Lanka, the country's costliest natural catastrophe on record.

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[11] Producer Price Indexes, Bureau of Labor Statistics, November 2025.
[12] *sigma* 1/2024, Natural catastrophes in 2023: gearing up for today's and tomorrow's weather risks, Swiss Re Institute, 25 March 2024.
[13] *Stalled MJO in November Responsible for Late Season Tropical Cyclones Senyar and Ditwah Flooding Western Indonesia/Southern India*, Climate Impact Company, 30 November 2025.

...and because adaptation has not kept pace with rapid urbanisation.

Late-season November storms are not unprecedented in this basin (eg, four in 2024, two in 2025) – but exposure and fragility amplified the impact. Across the region, rapid urbanisation, inadequate drainage and embankments, and slope instability turned heavy rain into floods and landslides. These pressures are intensifying as adaptation measures have not kept pace with exposure growth. In Thailand, built-up surfaces have grown by 43% between 2003 and 2023, of which more than half (55%) occurred in areas exposed to inland flooding.[14] This pattern increases the value at risk and the likelihood that future compound events will translate into outsized losses.

Primary perils: no US landfall lowers losses but not the risk

The lowest third quarter on *sigma* record as no hurricane made landfall in the US...

The year was remarkable for a historical low share of losses in the second half of the year, following the second costliest first half ever, second only to 2011, and the costliest ever for weather perils only. The second half of 2025 contributed just 17% of the total insured losses (normally 60%) – the lowest share for 30 years. The third quarter was unprecedentedly low at just 9% of the annual total (44% long-term average). Losses were also low in the fourth quarter despite Southeast Asia's floods and cyclones, and Hurricane Melissa in the Caribbean due to their low insured exposures. In the US, the losses from hurricane activity were the lowest for a decade.

Figure 6
Global insured losses from natural catastrophes by quarter (USD billion, 2025 prices), share of 3Q losses
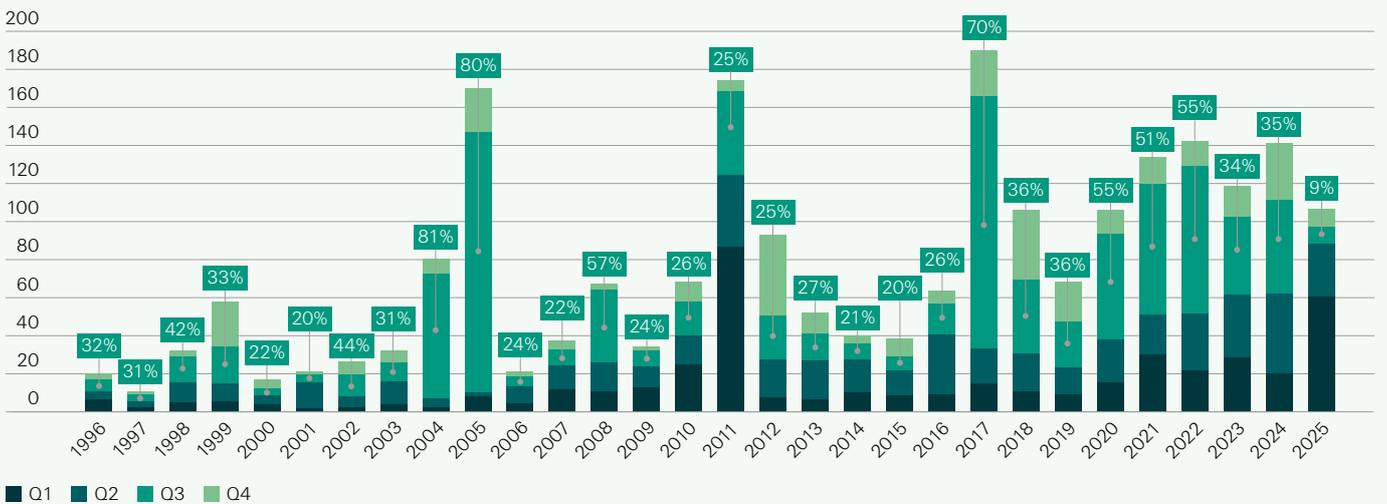
Source: Swiss Re Institute

...despite above-average major hurricane activity.

One of the contributing factors was the absence of costly US hurricane landfalls – this has not happened since 2016. Yet the 2025 Tropical Cyclone North Atlantic (TCNA) season was above normal in activity terms. The year produced three Category 5 hurricanes, the second highest on record after 2005 (4 Category 5 hurricanes).[15] No other season has produced more than two Category 5 hurricanes. Overall, 80% of all hurricanes that formed in the 2025 season reached major hurricane intensity (category 3 or higher), and 60% reached Category Five intensity – the latter is the highest share ever recorded.[16] According to the National Oceanic and Atmospheric Administration (NOAA)'s definition, the season reached an Accumulated Cyclone Energy (ACE) of 132.6, with five hurricanes, four major hurricanes and 13 named storms. The long-run averages (1996–2025) are for a 131.6 ACE, 7.6 hurricanes, 3.5 major hurricanes and 15.6 named storms.

[14] Data from *Global Human Settlement Layer*, European Commission's Joint Research Centre, 9 December 2021, with elaboration from Swiss Re.
[15] *North Atlantic Ocean Historical Tropical Cyclone Statistics*, Colorado State University, webpage accessed 9 February 2026.
[16] Ibid.

Hurricane Melissa is the strongest and costliest hurricane in Jamaica.

Beyond the US, Category Five Hurricane Melissa in October underscored TC risk elsewhere in the North Atlantic basin. Making landfall in southwestern Jamaica with sustained winds near 185 mph (300 km/h), it was Jamaica's strongest hurricane on record and among the most intense Atlantic hurricanes ever observed. It produced the highest insured losses in Jamaica's history (up to USD 2.5 billion), and the Caribbean's second largest after 2016 Hurricane Dorian in the Bahamas (USD 5 billion, 2025 prices). Insured losses were below loss potential, due to landfall in less-dense areas and low insurance penetration.

Early insurance payouts sped relief.

Jamaica was comparatively well prepared – financially and institutionally – to act quickly. Within days of landfall, it received USD 91.9 million from the Caribbean Catastrophe Risk Insurance Facility (CCRIF), providing early-response liquidity. A further USD 150 million followed from the country's World Bank–supported catastrophe bond, adding much needed timely liquidity relief. Melissa is Jamaica's costliest catastrophe in both economic and insured terms, with total economic losses of about USD 8.8 billion, well above the insured losses.

Figure 7
Insured losses from North Atlantic tropical cyclones (USD billion, at 2025 prices)
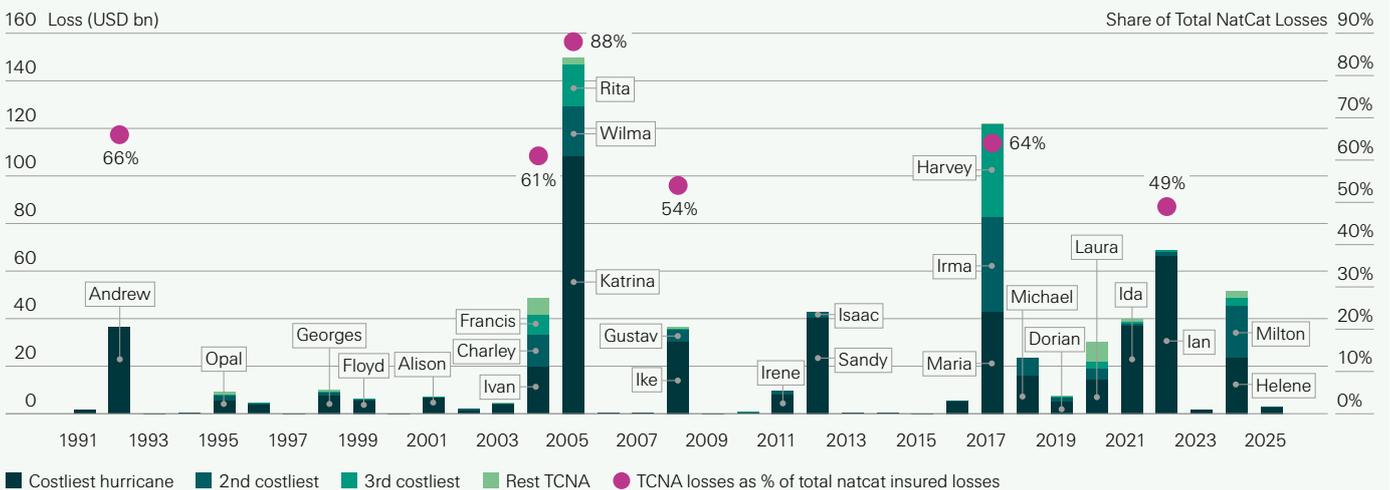
Source: Swiss Re Institute

All it takes is a hit.

While 2025 proved far less destructive than it could have been, historical experience suggests that severe tropical cyclone losses are largely a matter of *when*, not *if*. In 2025, the potential for major losses was clearly present, but fortunately the hurricanes mostly kept away from land. For insurers (and exposed communities), the key factor determining the scale of losses is how many hurricanes make landfall and, most of all, where a hurricane hits. While sea surface temperatures were supportive of intensification, prevailing large-scale atmospheric and oceanic conditions in the basin steered the most intense storms away from the US mainland. They were directed north-eastward across the open North Atlantic or, in the unfortunate case of Hurricane Melissa, toward parts of the Caribbean.

TCNA represents the key swing factor for total catastrophe loss outcomes.

Tropical cyclones exhibit pronounced year-to-year variability in their formation, intensity, and tracks, with the Atlantic basin showing the highest variability of all tropical cyclone basins worldwide. Annual TCNA – and global tropical cyclone – losses are typically driven by a small number of high-impact landfall events. The underlying tail risk is elevated, and the probability of a high-loss year driven by US landfalls is ever-present. Hurricane risk remains a major threat to US eastern seaboard businesses and residents, as well as the Caribbean. Because of their large loss potential, tropical cyclones represent a volatile and capital-intensive peak peril for the re/insurance industry.

The Bangkok basin amplified far-afield shaking.

Seismic ripples from a distant fault: Myanmar and Thailand

A magnitude 7.7 earthquake struck Myanmar in March, claiming about 3 900 lives[17] – more than any other disaster that year – and generating an estimated USD 11 billion in economic losses in Myanmar. Despite striking densely populated regions of the country including Mandalay, its second-largest city, insurance claims were limited to just above USD 200 million, due to very limited risk protection. The shock was felt across India, China and in Thailand, where Bangkok's soft-sediment basin amplified shaking resulting in the collapse of a high-rise under construction and adding to the death toll. For this reason, even though far from active faults, Bangkok is exposed to loss potential from seismic activity. The Thai General Insurance Association estimated insured losses at USD 1.5 billion from the event – underscoring how site conditions and exposure, not just proximity to the epicentre, drive outcomes.

Cities on soft sediments face higher seismic risk.

Many megacities – Mexico City, Los Angeles, Beijing, Tokyo – sit on sedimentary basins where ground motion is amplified, elevating seismic risk. Without robust, enforced building codes, such amplification can cause severe damage and loss of life. Modern hazard assessments must capture local basin effects to set code stringency and test building resilience. Models that ignore basin amplification understate loss potential.

Broadening loss pressures add to the risk burden

Rising secondary-peril losses are combining with the continued risk of a strike by a primary peril…

Rising secondary-peril losses, and the omnipresent risk of a primary-peril strike, imply that losses in a future peak-event year will be significant. Today, even without a major US hurricane landfall, wildfire and SCS generate substantial baseline losses, broaden the set of impactful perils and lift the total annual loss. SCS and wildfires also increasingly expand loss pressures beyond the historical peak zones of US tropical cyclones and global earthquake corridors. And as wildfire and SCS risk models still trail hurricane and earthquake models in maturity, this leads to greater uncertainty in the modeled losses.

…to create a risk of significant losses in future peak-event years.

In addition, peak-peril risk is undiminished, and a few strikes can reset records (eg, hurricanes Katrina–Rita–Wilma in 2005). Primary perils still carry the largest loss potential – eg, a Cat-5 striking Miami or a major quake hitting Tokyo. Their infrequency and volatile outcomes mask the trends, yet they produce the largest departures from the trend when they hit. The same forces – population growth, higher property values in exposed areas, and hazard shifts – drive losses from both. It is possible in any given year for total annual insured property losses from natural catastrophes to far exceed the baseline amount.

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[17] SITUATION UPDATE No. 10 – M7.7 Mandalay Earthquake, AHA Centre, 23 April 2025.

Figure 8

Distribution of annual losses from primary and secondary perils in % deviation from trend (1996–2025)

Source: Swiss Re Institute
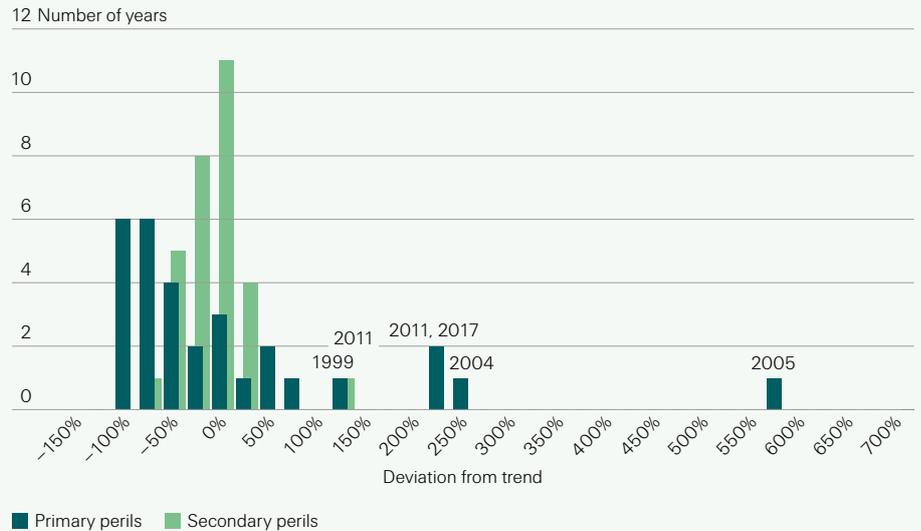
Primary perils carry the biggest loss potential and drive the biggest y-on-y loss volatility.

Figure 8 shows loss volatility around the trend since 1996, by plotting in how many years (y-axis), and by how much in percentage terms (x-axis), the annual losses deviate from trends. Primary perils produced five years – 1999, 2004, 2005, 2011, 2017 – with >100% above-trend losses; in each, total natural catastrophe losses also more than doubled. The outlier 2005 reached 575% above trend (Katrina-led). Secondary perils exceeded +100% only once in 2011 (Thailand floods, +125%). In all other years, secondary-peril deviations stayed within ±100% of trend.

The baseline is rising, despite a quiet year.

There is no reduction in the underlying risk, and the upward trend is structural. Exposure keeps building in coastal zones, floodplains and the wildland–urban interface as urbanisation lifts asset values. Elevated reconstruction costs have reset claim severity, and vulnerability is drifting for instance as ageing roofs and roof-mounted equipment increase damage potential for SCS. Even without stronger hazards, comparable events now generate larger losses and greater year-to-year variance. Together, these forces raise the annual total loss and keep the trend line pointing upward.

Understanding the underlying drivers of rising catastrophe losses is fundamental to predicting risk evolution.

Amid rising risk, it is critical to analyse how economic growth, urbanisation and claims cost inflation combine to place more – and pricier – assets in harm's way. Understanding these drivers explains why catastrophe losses keep climbing, where the next pressure points will emerge, and which adaptation and resilience investments deliver the biggest payoff. This understanding underpins credible risk modelling and helps keep insurance a cornerstone of economic stability and recovery. The next chapter examines these growth drivers in detail.

The drivers of weather-related insured loss growth

Exposure growth is the primary driver of rising weather-related insured losses. Our analysis finds that exposure growth contributes more than 80% of the global weather-related insured loss trend since 1970. Within this broader increase, secondary perils are the dominant drivers of the growth in insured losses over the past 55 years. Severe convective storms (SCS), floods (excluding TC-induced flooding), and wildfires account for about two thirds of the change in observed annual average losses since 1970. The insurance industry's challenge to understand and assess these risks is made more difficult because impacts are highly localised and risk landscapes are rapidly evolving. In certain regions – for wildfires in North America and SCS in Europe – insured loss trends are exceeding exposure growth by a factor of two. Hazard intensification and vulnerability effects – amplified by asset expansion into high-risk areas – are creating loss trends that significantly exceed economic growth, putting pressure on economies and the insurance industry. For other perils, such as floods, adaptation measures have already shown to be effective in moderating insured-loss outcomes, with sustained investment needed to keep up with projected hazard intensification.

Rising exposure explains four-fifths of insured loss growth

Increasing exposure to weather perils explains more than 80% of insured loss growth.

The extent to which secondary perils add to annual insured losses poses a key challenge for the re/insurance industry, as these traditionally less comprehensively modelled perils are now materially increasing the overall loss burden (see Chapter 1). The three key perils, of SCS, wildfire and floods,[18] are creating rapidly growing insured losses with widely varying drivers worldwide. We use *sigma* insured loss data for 1970–2025 to disentangle exposure factors such as wealth and cost increases, in each peril's insured losses in different regions. We find that at a global level, exposure growth explains more than 80% of the historical weather-related loss growth and the remaining growth is due to an increasing fraction of losses being taken up by insurance.[19]

Residual loss growth offers signals of changes to hazard and vulnerability and is highest for wildfire and lowest for flood.

The residual portion of loss growth is attributable to changes in the hazards or vulnerabilities in each region. This offers directional insight into how to deploy insurance and adaptation measures to reduce the rates of loss growth to ensure policies remain economically viable. It also points to regions where rapidly shifting risk conditions may outpace existing models, or where modelling gaps persist, requiring more frequent model updates. The residual is highest for North America wildfire, where more than half (60% of 14% annual loss growth) is unexplained by exposure growth or the role of insurance. This suggests that hazard intensification is playing a larger role in increasing insured losses. The lowest residual component of insured loss growth is for flood, where in several regions the loss trend is fully explained by exposure and insurance dynamics.

Factors influencing insured loss trends
- **Exposure:** changes in the quantity and value of assets at risk, including population growth, urbanisation, and economic developments.
- **The role of insurance:** includes insurance penetration, policy conditions, deductibles and claims practices.
- **Residual:** attributable to shifts in **hazard** and **vulnerability.**
Hazard refers to the frequency, intensity, and spatial distribution of weather-related events, which change in response to long-term shifts in underlying atmospheric and environmental conditions, or human intervention (e.g. flood defences, land management, ignition dynamics through over-proportional growth in high-risk zones).
Vulnerability refers to how susceptible exposed assets are to damage, influenced by factors such as building practices, construction quality and risk mitigation measures such as emergency responses.

With the fastest growth, secondary perils drive insured loss trends
SCS insured losses are growing fastest in Europe, at an estimated annual growth rate of 10% in real terms (see Table 1 for the ranges of the estimates). North America has the highest wildfire loss growth, at 14%, though Europe (9%) and Oceania/Australia (8%) also report strong growth. The strongest flood insured loss growth is in Asia (12%) and Oceania/Australia (11%); flood loss growth rates are much lower in North America and Europe, at 4% and 5% estimates respectively.[20]

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[18] For the purpose of this analysis, flood refers to inland flooding, including fluvial and pluvial events. Coastal flooding associated with storms, and flooding caused by tropical cyclone-induced precipitation, are captured under cyclone and winter storm losses, where applicable.

[19] Analysis based on SRI data, SR Global Flood Zones, World Bank World Development Indicators – Population, total [SP.POP.TOTL] and GDP per capita (current US$) [NY.GDP.PCAP.CD] (2025) – as well as European Commission, Global Human Settlement Layer (GHSL) Data Package 2023 (Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/098587, JRC133256), and Verisk Property Claim Services.

[20] Trends are estimated using a log-linear Theil–Sen estimator, with uncertainty quantified via bootstrap resampling pooled across different smoothing and time-window selections, and the interquartile range (p25–p75) reported as the likely range of observed growth rates from 1970–2025.

Table 1

Estimated annual real-terms growth rates of insured losses per peril by region, 1970–2025

Region / Peril Annual loss growth range (%)	SCS	Wildfire	Flood
Asia	Not available	Not available	9–15
Europe	9–11	8–11	3–8
North America	6.7–7.1	13–17	3–7
Oceania/Australia	7–9	4–11	7–15

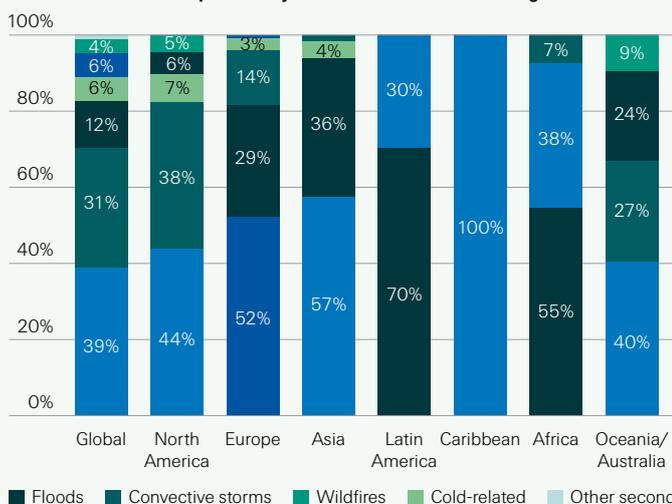Note: Ranges denote the interquartile range (p25–p75) of estimated growth rates over 1970–2025, derived from bootstrap resampling. Source: Swiss Re Institute

Combining growth rates with absolute loss levels shows that SCS in particular drive insured loss growth.

The significant shift to secondary perils is seen when the growth rates are combined with absolute levels of losses for each peril (see Figure 9). Though tropical cyclones are still the largest contributor to the long-term annual average level of losses,[21] SCS are the single largest driver of historical insured loss growth (38% contribution), higher than that of the key primary peril, tropical cyclones (28% contribution). Wildfires, despite highest growth rates, contribute about 20%, due to lower historical loss levels. Floods account for roughly 10% of global insured loss growth.
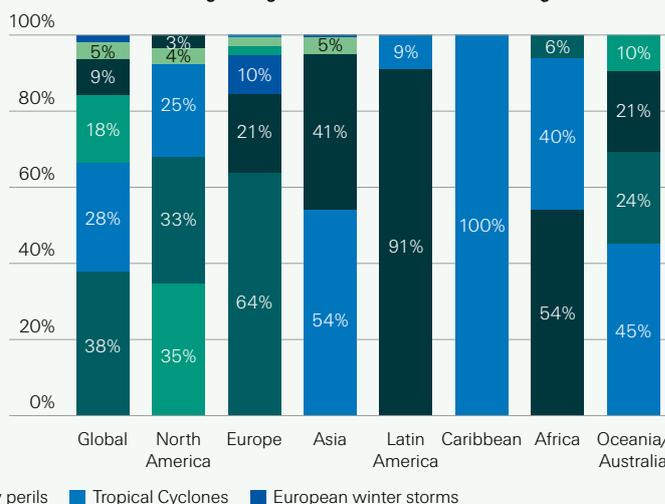
Figure 9

Exposure-adjusted annual average losses 1970–2025 (left) and long-term loss growth 1970–2025 (right), showing contribution of each weather-related peril, global and per region

Peril contribution to exposure-adjusted historical annual average losses

Peril contribution to long-term growth in historical annual average losses

■ Floods ■ Convective storms ■ Wildfires ■ Cold-related ■ Other secondary perils ■ Tropical Cyclones ■ European winter storms

Note: growth contributions are calculated as each peril's share of the difference between CPI-adjusted historical annual average losses and losses adjusted for peril- and region-specific long-term trends.
Source: Swiss Re Institute

Secondary perils are responsible for the greatest part of weather-related insured loss growth in most regions.

When viewed by region, secondary perils are responsible for the greatest part of insured loss growth in most regions. North America's historical loss growth is driven primarily by wildfire and SCS, with tropical cyclones a significant contributor as well. North America has a small share of losses related to cold storms and freeze (for example, the US freeze in January 2026), which are also considered secondary perils but differ from European winter storms. Floods (excluding TC) in North America account for 3% of estimated insured loss growth as of today. In Asia, insured loss growth from secondary perils is dominated by floods but the largest growth driver remains tropical cyclones. In Oceania/Australia, loss growth is more evenly distributed across perils, with tropical cyclones, SCS and floods all meaningful and wildfires contributing a smaller share.

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[21] Because our analysis is grounded in observed insured losses over a constrained time period, rather than modelled loss distributions, it captures realised experience but will under-represent tail risk and peak peril losses.

Europe's weather-related insured loss growth is dominated by SCS, while wildfires still have a negligible impact.

In Europe, more than half of weather-related insured loss growth is attributable to SCS, while floods provide a secondary contribution of around 20%. Winter storms, despite their historical significance, have contributed little to recent growth, since the most destructive events occurred in 1990 and 1999. A classic peak peril, European winter storms are low-frequency, high-severity events, where individual loss years strongly influence trends. In contrast, wildfire contribution to loss growth in Europe is negligible as of today, due to relatively low observed loss levels, even though the trend estimates also show increasing risk.

Exposure growth is key to loss trends

Exposure, vulnerability and hazard, plus the role of insurance, shape insured loss trends…

Changes in exposure, vulnerability, hazard or the role of insurance are key drivers shaping insured loss growth. We decompose real insured loss growth based on historical loss data into five subcomponents (see Figure 10): construction costs, population at risk, GDP per capita, fraction covered by insurance and remaining residual.

…with rising exposure and growing insurance penetration playing the biggest role of them all on a global level.

When aggregated globally, virtually all of the 6% historical annual weather-related loss growth can be attributed to increased exposure and the growing role of insurance since 1970. Insurance is a positive contributor, signaling that a greater share of economic losses are being transferred to the insurance sector over time. The near-zero residual indicates that changes in hazard and vulnerability have, overall, played a comparatively limited role. If there has been an intensification in hazard this has been largely balanced out by vulnerability improvements. However, when each peril is analysed at a regional level, far more varied trends become clear.

Figure 10
Global insured loss growth for weather-related perils, decomposed into key exposure drivers, insurance effects and residuals
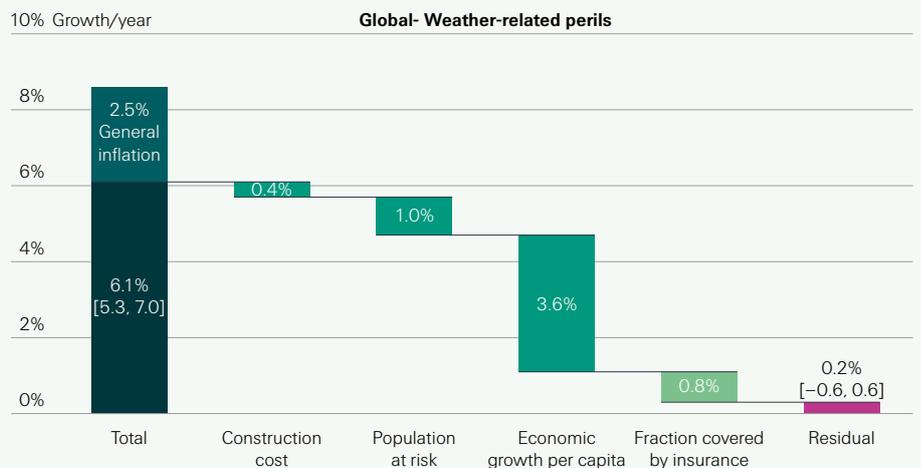
Source: Swiss Re Institute

We normalised the data to account for changes to the risk landscape over time.

Our methodology
We applied a series of **normalisation steps** at country level to the historical insured loss data to account for the changes to the risk landscape over time. While these cannot capture all aspects (e.g., changes in land-use patterns such as soil sealing, or non-uniform exposure growth), they provide useful directional insight.
1. We adjusted insured losses for economic **inflation** and for construction cost inflation, capturing the additional impact of higher rebuilding costs that have often surpassed general price increases.
2. We approximated **exposure** expansion using population-based indices.[22]
3. We increased the asset values using economic growth per capita.
4. We estimated trends in the fraction of economic losses covered by **insurance**.

[22] Population-based indices reflect changes in population on a country-aggregate level. For floods, we specifically account for population change in flood zones. Given the dominant contribution of the US to global insured losses, a more granular treatment is applied for the US, using state-level, peril-specific normalisation indices, weighted by historical loss contributions.

| The remainder reflects other influences. | Remaining trends not explained by the normalisation factors are discussed qualitatively. These reflect the combined influence of shifts in hazard characteristics and evolving vulnerability due to adaptation and mitigation measures, and residual effects including sampling uncertainty, simplifications and uncertainties in the normalisation approach.[23] |

SCS: contrasting drivers of insured loss growth in North America and Europe

| SCS are the biggest contributor to loss growth globally, but regions differ sharply. | SCS have contributed the most to the rise in insured losses globally since 1970, but the drivers differ fundamentally between the key regions (see Table 2). |

Table 2
Overview of key findings of loss drivers across regions for SCS

	North America	Europe
Contribution of SCS to regional insured loss growth	33%	64%
Growth rate [p.a. in real terms]	7%	10%
Drivers	80% exposure growth Smaller contribution from changes in vulnerability and/or hazard	50% exposure growth Large contribution from changes in vulnerability and/or hazard

Source: Swiss Re Institute

| North America's insured loss trend from SCS is led by higher exposure. | North America's 7% increase in insured losses from SCS is largely explained by exposure growth (see Figure 11), including rising asset values and expanding development in exposed areas (80% of the loss growth). Changes in insurance coverage only play a minor role. The remaining residual, albeit small, may reflect a combination of changes in vulnerability and hazard intensification. |

Figure 11
Insured loss growth from SCS in North America, decomposed into key exposure drivers, insurance effects and residuals
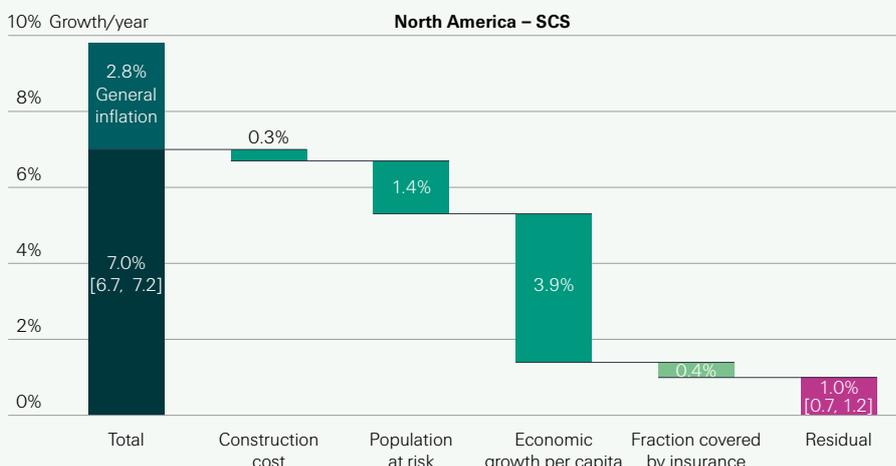
Source: Swiss Re Institute

| Ageing housing stock may increase susceptibility to hail and wind damage. | In the US, the ageing of housing stock increases susceptibility to hail and wind damage. The median age of homes nationally has risen over the past decades.[24] Older homes are generally more vulnerable to hail and wind damage, with roof damage being the main contributor to insured losses from hail. Building codes and their enforcement also shape |

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[23] A challenge in quantifying and disentangling loss trends arises from the limited length of available observational records, particularly for low-frequency, high-impact perils. Sampling uncertainty and natural climate variability can add large uncertainty, especially for regional analyses and for perils with sparse event historiesFor this reason, earthquakes are excluded from this analysis, as the short observational record does not support reliable inference on long-term loss trends.

[24] N. Zhao, "The Age of the U.S. Housing Stock", National Association of Home Builders Economic Research Blog, 12 February 2024.

loss outcomes. Texas, where a majority of SCS losses originate, ranks relatively low on building code strength, particularly in aspects related to adoption and enforcement.[25]

Changes in hazard are less clear for the US.

Changes in hail hazard are uncertain for the US. Model projections suggest a decrease in small hail and increase in large hail events.[26] Yet there is large uncertainty on historical trends in large hail, and scientists observe large regional differences across the US.[27]

Figure 12
Insured loss growth from SCS in Europe, decomposed into key exposure drivers, insurance effects and residuals

Source: Swiss Re Institute

The rise in Europe's SCS losses is not explained by exposure growth alone.

In Europe (see Figure 12), less than half of the observed increase in SCS losses can be explained by exposure growth. A substantial residual remains, pointing to drivers beyond exposure. Changes in hazard characteristics, including shifts in storm intensity and hail severity, may play a more prominent role. Supporting this view, an increasing number of studies find a rise in severe hail frequency for parts of Europe.[28] A global analysis[29] of very large hail events (>5 cm) finds that Europe, especially northern Italy, is experiencing the sharpest increase in the frequency of such events, driven by rising low-level moisture and increasing atmospheric instability.

Changes in vulnerability are also a likely contributor to the large residual.

Changes in vulnerability are likely also contributing to the large remaining residual. For example, in Europe, the total solar capacity has increased by a factor of five between 2015 and 2025.[30] Solar power installations on roofs can be particularly vulnerable to hail damage, increasing potential losses from severe convective storms. Looking ahead, this rapid expansion is expected to slow, with recent trends suggesting that solar growth has reached a near-term peak in Europe.[31]

Wildfires: high-risk expansion, hazard intensification drive double-digit growth

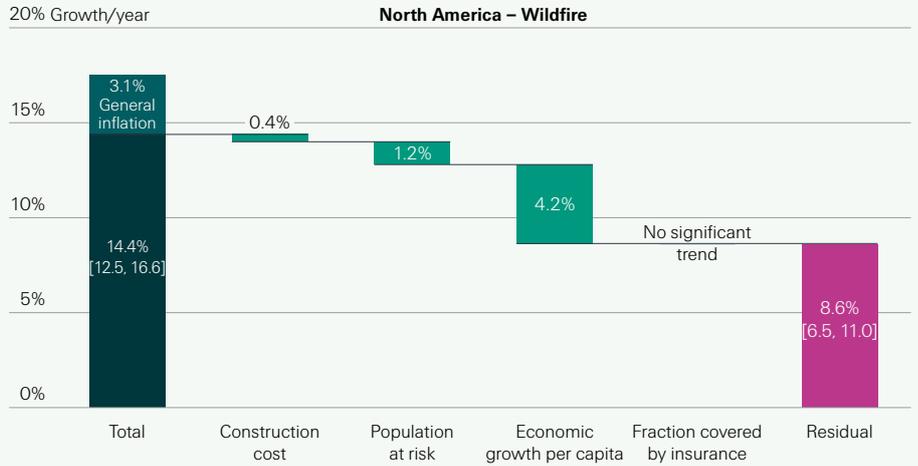*Wildfires are seeing by far the strongest growth in insured losses.*

Wildfire insured losses have been growing at an annual growth rate of more than 14% in North America, 98% of which fall in the US. As Figure 13 shows, exposure-related factors explain only a bit more than a third of the growth, and the roughly 60% residual share points to clear changes in the underlying risk landscape (see Chapter 1). Fire-conducive weather, characterised by dry fuels, low humidity and strong winds, creates environmental conditions that favour wildfire ignition and rapid spread.[32] An increase in

[25] *Rating the States: Hurricane Coast*, Insurance Institute for Business & Home Safety (IBHS), 2024
[26] V.A. Gensini, W.S. Ashley, A.C. Michaelis *et al*, "Hailstone size dichotomy in a warming climate", *npj Clim Atmos Sci* 7, 185 (2024). https://doi.org/10.1038/s41612-024-00728-9
[27] Battaglioli, F., Taszarek, M., Groenemeijer, P. *et al*. Contrasting trends in very large hail events and related economic losses across the globe. *Nat. Geosci.* 19, 52–58 (2026). *https://doi.org/10.1038/s41561-025-01868-0.*
[28] Battaglioli, F., Groenemeijer, P., Púcik, T., Taszarek, M., Ulbrich, U., & Rust, H. (2023). Modeled Multidecadal Trends of Lightning and (Very) Large Hail in Europe and North America (1950–2021). Journal of Applied Meteorology and Climatology, 62(11), 1627–1653. *https://doi.org/10.1175/JAMC-D-22-0195.1.* and Thurnherr, I., Cui, R., Velasquez, P., Wernli, H., & Schär, C. (2021). The effect of 3°C global warming on hail over Europe. npj Climate and Atmospheric Science, 4, Article 37.
[29] Battaglioli, F., Taszarek, M., Groenemeijer, P. et al. Contrasting trends in very large hail events and related economic losses across the globe. Nat. Geosci. 19, 52–58 (2026). https://doi.org/10.1038/s41561-025-01868-0.
[30] SolarPower Europe (2025): EU Solar Market Outlook 2025–2030.
[31] *Ibid*
[32] *Wildfires and Climate Change – NASA Science.*

atmospheric vapour pressure deficit, indicating drier air and fuels, has been strongly linked to larger burned areas. In the western US, increases in fire weather risk have coincided with a near-doubling of average burned area in the early 21st century.[33]

Figure 13
Insured loss growth from wildfire in North America (US and Canada), decomposed into key exposure drivers, insurance effects and residuals
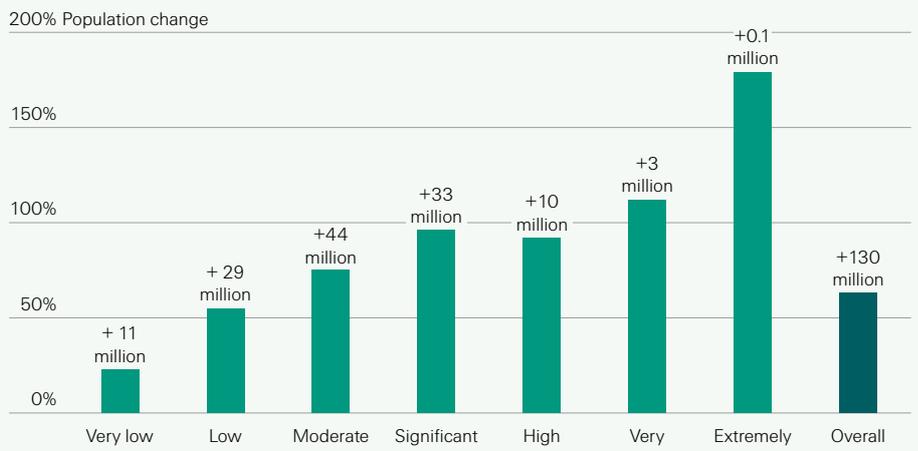
North America – Wildfire

Category	Value
Total	14.4% [12.5, 16.6]
(General inflation)	3.1%
Construction cost	0.4%
Population at risk	1.2%
Economic growth per capita	4.2%
Fraction covered by insurance	No significant trend
Residual	8.6% [6.5, 11.0]

Source: Swiss Re Institute

Growth in US population in high wildfire-risk zones adds to the risk of higher losses.

At the same time, a disproportionately strong expansion into the most susceptible areas for wildfire has added to the risk of higher losses (see Figure 14). In relative terms, the US population growth in the highest wildfire-risk zones has been three times as high as the overall population increase across the US since 1975, adding to the high-risk exposure concentration.[34] Although in absolute terms the population grew the most in moderate-risk zones, about 10% of population growth was in regions of high to extreme wildfire risk. This matters because faster expansion in the areas most at risk of wildfires leads to a disproportionate increase in overall risk. For comparison, Canada's population growth was homogeneous across wildfire-risk zones, meaning there was no over-proportional growth in high-risk areas. For Canada, 70% of the observed trends for wildfires can be attributed to exposure growth.

Figure 14
US population growth between 1975 and 2025, grouped by wildfire risk class

200% Population change

Risk class	Absolute change
Very low	+11 million
Low	+29 million
Moderate	+44 million
Significant	+33 million
High	+10 million
Very high	+3 million
Extremely high	+0.1 million
Overall	+130 million

Note: bars reflect the relative change, while the values show the absolute change in population, within each risk zone. Source: Swiss Re Institute

[33] Zhuang et al. (2021), Quantifying contributions of natural variability and anthropogenic forcings on increased fire weather risk over the western United States.
[34] Based on Swiss Re's wildfire costing model, incorporating historical wildfire frequency, environmental modifiers, proximity to burnable fuel, and long-term atmospheric trend adjustments. SwissRe analysis combining internal risk classification and population provided by European Commission, GHSL Data Package 2023, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/098587, JRC133256

Wildfire is unlike other perils in that rising exposure also triggers greater hazard, as humans start most fires.

Wildfire differs from other perils in that exposure growth strongly shapes hazard too. Humans cause about 85% of US wildfire ignitions,[35] and exposure growth can amplify hazard due to this self-reinforcing feedback; as population increases in the WUI, both the exposure and the hazard (ignition risk) are higher. This human-based component also poses challenges for traditional natural catastrophe modelling, which has historically struggled to account for the complex interactions between hazard and exposure.

Wildfire is the peril with the clearest implied hazard-driven signal in the historical data.

The magnitude of the residual makes wildfire the peril with the clearest implied hazard-driven signal in the historical insured loss data. The residual reflects both the increases in fire-conducive conditions, and the disproportionate exposure growth in high-risk areas. The January 2025 wildfires and observed loss trends highlight the growing importance of mitigation and adaptation in supporting long-term resilience in the years ahead.

Floods: how adaptation can help shape insured loss trends

The bulk of flood losses are uninsured.

Floods (excluding TC-induced flooding) have contributed less to the growth of global insured losses over past decades, due to both moderate growth in developed economies and persistently low insurance penetration in many rapidly developing regions. Floods in Asia contribute the largest growth in historical economic losses, but due to the large flood protection gap, currently estimated at 83% across Asia, the impact on global insured losses is comparatively low. Insurance penetration for flood is also low in many other regions. For the US and many countries in Europe, flood is not covered under standard property policies, so local insurance penetration plays a more prominent role. Estimates vary, with 4–17%[36] of US homes suggested to have additional flood coverage.

Exposure growth is still the primary driver of insured flood losses in Asia, but the large residual indicates shifts in hazard, land use and urbanisation with limited mitigation.

Across Asia, insured flood losses have increased by an estimated 12% per year (see Figure 15). Owing to the region's strong heterogeneity in hazard, economic development, and insurance markets, combined with rapid growth over recent decades, uncertainty around the trend estimates remains high. Nevertheless, our analysis indicates that economic growth has contributed to the majority of the observed loss trend. A clear residual remains, indicating that mitigation and adaptation have not fully kept pace with other risk drivers, including hazard shifts, land-use change (e.g. soil sealing), and rapid urbanisation. In China, built-up areas within flood zones increased by 480% between 1975 and 2025, compared with a 76% increase in exposed population.[37] While part of this divergence reflects rising wealth and infrastructure expansion, it also increases flood risk: more impervious surfaces lead to greater soil sealing, reduced infiltration, and stronger runoff, likely amplifying historical insured losses beyond what demographic growth alone would imply.

Figure 15

Insured loss growth from floods in Asia, decomposed into key exposure drivers, insurance effects and residuals
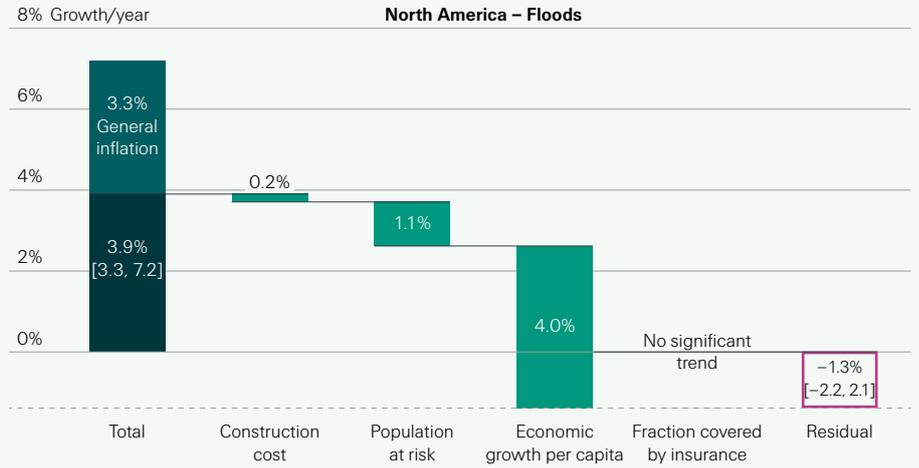

Source: Swiss Re Institute
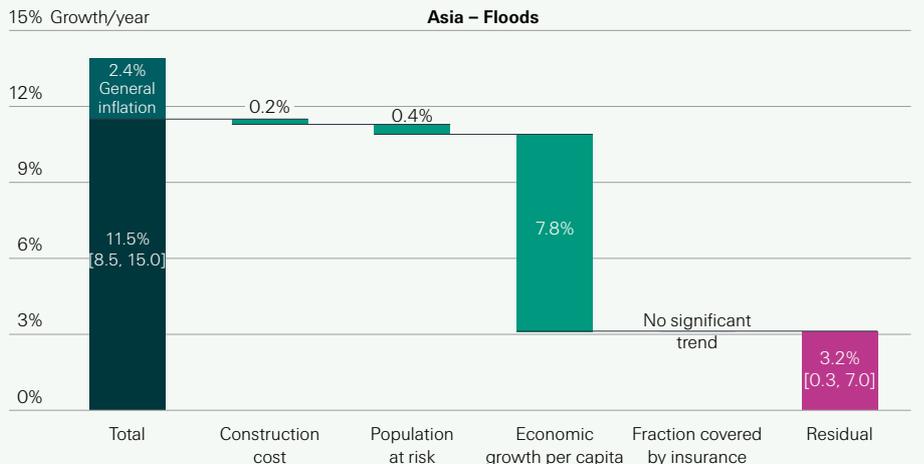
[35] *https://www.nps.gov/articles/wildfire-causes-and-evaluation.htm*
[36] *https://www.milliman.com/en/insight/unpriced-costs-of-flooding-an-emerging-risk-for-homeowners-and-lenders*; and *Facts + Statistics: Flood insurance | III*
[37] Swiss Re analysis combining internal risk classification and population provided by European Commission, GHSL Data Package 2023, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/098587, JRC133256.

North American flood insured losses are rising at only about 4% per year.

In contrast, North America shows more moderate increases in flood losses, excluding TC-induced flooding (~4%, see Figure 16). After accounting for economic growth and expansion into flood-prone areas, estimated loss trends are near zero or negative, albeit with uncertainty. This suggests that investments in flood protection and adaptation have helped to limit loss growth.

Figure 16
Insured loss growth from floods in North America, decomposed into key exposure drivers, insurance effects and residuals

Source: Swiss Re Institute

Europe's insured flood losses have grown at a moderate 5% annually.

In Europe, flood insured losses have grown moderately as well (see Figure 17), and after accounting for the increasing insurance take-up in many countries, no residual loss growth is observed. Insured flood losses grow more slowly in Western/Central Europe (about 5% per year) than in Southern Europe (about 6% per year). In Western/Central Europe, our analysis suggests that flood protection and adaptation measures have been effective in constraining insured loss growth, particularly for countries such as the UK, France, Switzerland, and Austria.

Flood adaptation has reduced European flood economic losses by around 63% since 1950.

These results are consistent with research showing that adaptation has reduced European flood economic losses by around 63% since 1950,[38] largely offsetting increased flood risk from hazard shifts and floodplain expansion, with stronger effects in Western/Central Europe than in Southern Europe. Fathom, a Swiss Re-owned company specialising in water risk, estimates that the UK's annual household flood losses would be about 2.8 times higher without its current flood protection.[39] In comparison, Southern Europe still exhibits upward pressure on losses. The recent flood events in Spain illustrated how, despite investments in flood protection, more intense rainfall[40] combined with rapid urban expansion and increasing soil sealing in flood-prone areas can amplify runoff and result in substantial losses.

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[38] D. Paprotny et al. "Attribution of flood impacts shows strong benefits of adaptation in Europe since 1950." Science Advances 11.33, 2025.
[39] *UK Flood Defences Prevent £1.15BN in Damages | Flood Re & Fathom*
[40] C. Calvo-Sancho, J. Díaz-Fernández, J.J. González-Alemán et al, "Human-induced climate change amplification on storm dynamics in Valencia's 2024 catastrophic flash flood", Nat Commun 17, 1492 (2026). *https://doi.org/10.1038/s41467-026-68929-9*

Figure 17
Insured loss growth from floods in Europe, decomposed into key exposure drivers, insurance effects and residuals
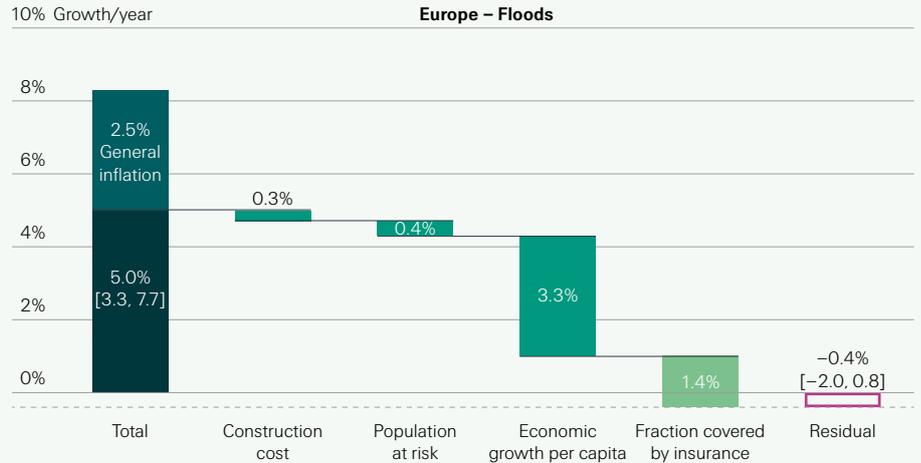
Source: Swiss Re Institute

Flood hazard intensification is expected in many regions.

Under future conditions, flood hazard intensification is expected in many regions, driven by more extreme precipitation and elevated coastal water levels.[41] (see *Intensifying flood risk in the US*). Yet loss impacts will remain highly regional, shaped by local basin characteristics, land use practices, and protection efforts.

Adaptation works when it keeps pace with economic growth, urbanisation and shifting hazard.

The contrasting regional patterns underscore that adaptation proves effective as long as it keeps pace with economic growth, urbanisation and shifting hazard. Sustained and targeted investments in flood protection and adaptation will be critical to prevent future flood losses from accelerating (see Chapter 3). Existing flood protection infrastructure in developed markets is ageing and was designed for past conditions, leaving systems vulnerable under more extreme and frequent events.[42] In addition to private insurance, public-private mechanisms such as Flood Re in the UK, and Italy's recently introduced mandatory natural catastrophe insurance requirement for businesses, also demonstrate how structured schemes can increase insurance penetration and enhance financial resilience at the same time.

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[41] *Climate Change 2022: Impacts, Adaptation and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, 2022."

[42] S. Pare, "Thousands of dams in the US are old, damaged and unable to cope with extreme weather. How bad is it?", LiveScience, 30 Janaury 2026.

Intensifying flood risk in the US

Key takeaways
- In the US, hazard intensification is projected to increase average annual flood economic losses by 1% per year to 2050.
- Coastal and pluvial (surface water) flooding to be most impacted.
- Fathom projects the 1-in-250-year tail loss to grow approximately 33% more slowly than average annual flood losses.
- Uncertainty in flood-risk estimates is increasing: the spread of the US flood loss projections grows by more than 1% per year.

Hazard shifts are expected to increase economic average annual flood losses by 1% per year through 2050.

Fathom models the impact of long-term changes in atmospheric and oceanic conditions on each of the three key flood types – coastal, pluvial (surface water) and fluvial (river) floods – to project the development of economic losses to 2050.[43] By 2050, we expect that changes in flood hazard will raise the average annual flood losses by 29% [17–37%] above the 2025 level, on top of expected changes from exposure and vulnerability developments. This represents a 1% [0.6–1.3%] year-on-year increase attributed to the intensification of flood hazard.

Each flood type has a different projected profile of economic average annual losses.

Each flood type has a different projected loss profile by 2050. Coastal flood average annual losses are projected to increase most strongly, at 2.6% [2.3–2.8%] per year. Rainfall-driven (pluvial) flood average annual losses are increasing more slowly at 0.7% [0.2–0.9%] year-on-year. And fluvial flood average annual losses show only marginal growth, at 0.1% [-0.3–0.5%] per year, with the *likely* range of outcomes spanning both increases and decreases in risk.

Flood types face different hazard shifts

Projected loss growth is highest and most uniform for coastal flood across the contiguous US coastline.

The wide variation in the projected loss outcomes for each flood type reflects the extremely heterogeneous and uncertain hazard shifts projected for each flood type (see Figure 18)[44]. Coastal flood hazards show the strongest and most uniform signal of upward risk, and the entire contiguous US coastline is projected to see large increases in flooding up to 2050. Pluvial (surface water) flood hazards also show a modest positive signal across the eastern and midwestern US, reflecting the thermodynamic relationship between atmospheric moisture content and rainfall intensity under future conditions.

Figure 18

Median change in average annual flood volume at 1° resolution between 2025 and 2050 under the SSP2-4.5 scenario

Fluvial

Pluvial

Coastal

All flood perils

Average Annual Flood Change (%)
- ● < −50%
- ● −50% to −25%
- ● −25% to −10%
- ○ −10% to 10%
- ○ 10% to 25%
- ● 25% to 50%
- ● > 50%
- ☐ Mixed signal
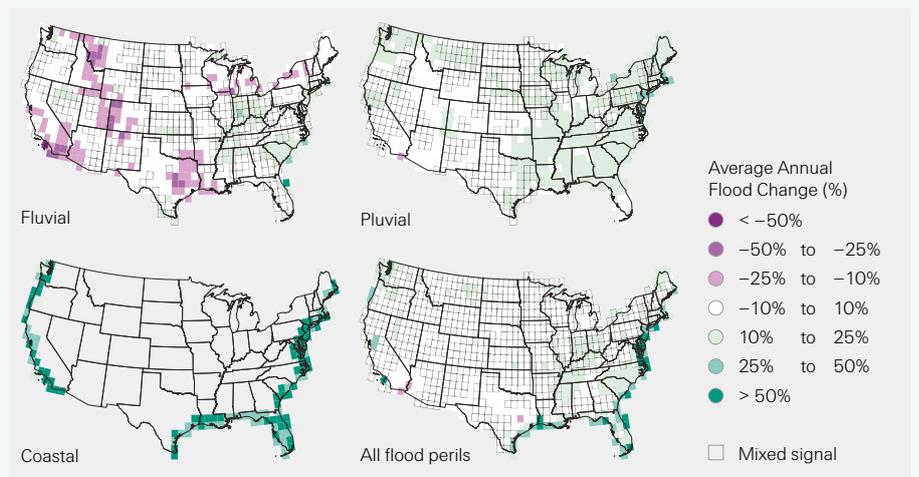
Note: A grid cell has a mixed signal where the likely range spans both a positive and negative change.
Source: Fathom

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[43] To capture the full extent of projected hazard changes in flood risk across the US, we use economic losses and include tropical cyclone-induced flooding.
[44] O. E. J. Wing et al, "A 30m Global Flood Inundation Model for Any Climate Scenario", Water Resour. Res. 60, e2023WR036460 (2024). https://doi.org/10.1029/2023WR036460

Fluvial flood projections vary regionally, and local signals are often uncertain.

However, fluvial (river) flood hazard changes are expected to vary significantly across the US, including some decreases in the southern and western US. Increases in rainfall do not necessarily translate to increases in river floods; changing catchment conditions may soak up any excess rainfall, and a reduction in winter snowpack sharply reduces snowmelt-driven flooding.

Uncertainty in flood projections is very high.

These results are specific to the US and not transferable to other regions, given substantially different local hydrological conditions and precipitation projections. Uncertainty is high in all of the hazard insights and projections. When considering all flood types, the IPCC climate models used as inputs to Fathom's proprietary catastrophe model,[45] do not even agree on the *direction* of the change (let alone its *strength*) for the vast majority of contiguous US land areas. Any assertions of future flood risk should represent this.

Peak "1-in-250yr" loss to increase less rapidly than average annual losses

Tail risk losses are projected to grow 33% more slowly than average annual losses.

Growth in average annual losses does not translate directly into higher tail risk. Tail losses are projected to increase less rapidly than attritional losses, with the 1-in-250-year loss growing about 33% slower than annual losses. This reflects attritional loss creep driven by intensified coastal and pluvial hazard, primarily affecting higher-frequency losses.

Catastrophe models are still our best tool for understanding and pricing risk, but uncertainty is increasing.

Catastrophe models remain our best tool for understanding and pricing risk, but still have to be viewed through the lens of increasing uncertainty. At present, the range of plausible average annual losses spans about one-third of the central estimate. By 2050, this expands to nearly half, as uncertainty grows by around 1.2% per year. While annual underwriting results will always remain subject to the randomness of whether big events happen, the background signal of risk is shifting. True resilience in this era of non-stationarity requires pricing for the creep in loss frequency, while also accounting for an increase in uncertainty.

Fathom's model simulates damage to a US property exposure database.

The Fathom Global Flood Cat model
All projections in this section are simulated by the Fathom Global Flood Cat model based on economic damages to a market US property exposure database, whose composition and vulnerability remain unchanged through time. The model represents correlated fluvial, pluvial, and coastal flood events, including tropical cyclones. Financial metrics are reported relative to 2025 US GDP (USD 31.1 trillion) and represent the 0.4% Annual Exceedance Probability (250-year), or mean annual loss (AAL). Climate projections up to 2050 are based on the Intergovernmental Panel on Climate Change (IPCC) Shared Socioeconomic Pathways (SSP2)-4.5 ("Middle of the Road") scenario, here termed "medium scenario". Reported uncertainty ranges follow the IPCC definition of *likely*, meaning the central two-thirds of simulated outcomes from IPCC climate model ensembles, and thus represent climatological uncertainty only.

Modelling loss growth in a changing global risk landscape

Overcoming data gaps and hazard uncertainty is key to improving the accuracy of catastrophe models for secondary perils.

Catastrophe models are the industry's primary tool for assessing risk. By extending event catalogues beyond the observed historical record and simulating a broader range of plausible events, they enable a more complete assessment of current risk. This is particularly important for secondary perils, where historical hazard data is sparse and often insufficient to capture the full risk landscape. Events such as hailstorms, floods and wildfires are typically highly localised and affect only small areas. When they occur away from populated areas or do not create observable damage, they are likely to be absent from catastrophe records. This introduces biases and gaps in observational data that have traditionally limited the representation of these hazards.

Models are improving, but uncertainty around hazard and extreme events remains inherent.

This challenge is compounded by uncertainty surrounding future shifts in the hazard characteristics of secondary perils and how the frequency and severity of individual hazards have evolved over time, complicating the accurate representation of present-day risk in catastrophe models. The scientific community and the re/insurance industry are working to overcome such challenges, for example by using environmental proxies to produce hail climatologies and incorporating climate model outputs. However, inherent uncertainties about the frequency and severity of events remain.

Human influence on wildfire risk amplifies the challenge of accurate modelling still further.

For wildfire risk, challenges in hazard representation are amplified by the strong influence of human activity. Population growth in the US in the highest wildfire-risk zone has increased by almost 180% since 1975[46] which has increased the likelihood of ignition in the areas most susceptible to wildfires. This has contributed to the large increase in the observed losses over past years. In contrast, in countries such as Spain, Portugal, and Italy, population levels in high wildfire-risk zones have declined consistently over recent decades.[47] While this reduction in population exposure may be beneficial from an exposure perspective, it can also lead to unintended consequences. Rural depopulation is often associated with land abandonment and reduced landscape management, which can increase the availability of fire fuel.[48] Consequently, wildfire hazard in these regions may persist or intensify even despite declining population levels. These contrasting dynamics make wildfire risk particularly difficult to quantify in catastrophe models, as hazard, exposure, and human behaviour interact in non-linear and region-specific ways.

Incomplete or missing exposure data can exacerbate modelling challenges.

Finally, incomplete or missing exposure data can exacerbate modelling challenges. For secondary perils in particular, exposure information including asset values and characteristics are often outdated or inconsistently captured over time. Missing or incomplete data can lead to systematic underestimation of loss potential, particularly where exposure grows rapidly or vulnerability changes are not adequately reflected. As a result, modelled losses may lag behind realised outcomes, contributing to loss creep as observed losses exceed expectations. This has been seen strikingly for cases like Italy in 2023 where final loss estimates of hail losses ended up being nearly triple the initial estimates.[49]

Sustained investment in modelling of secondary perils and regular model updates are needed to support re/insurers.

For the re/insurance industry, these challenges illustrate that sustained investment in modelling secondary perils is needed. This includes efforts to improve underlying data quality, for instance, by constantly tracking the nature and value of what is insured, proactive sharing of data throughout the insurance value chain, and regular model updates. These measures ensure that risk assessments can keep pace with the rapidly evolving risk landscapes, and that premiums and capital remain commensurate with the underlying evolving risk. While this discussion focuses on secondary perils, it is important to note that the same dynamics also affect low-frequency, high-severity peak perils. Exposure growth and evolving vulnerability increase loss potential for all perils, as demonstrated by the increase in the peak year loss scenario to USD 320 billion for 2026 (see Chapter 1).

Adaptation can also help reduce loss potential and maintain insurability in exposed regions.

Adaptation and mitigation measures are crucial to reducing loss potential and maintaining insurability in exposed regions. Our findings indicate that adaptation can materially offset loss growth when implemented effectively. Flood adaptation measures, such as dams, flood barriers, retention systems, and improved water management, have proven to be highly cost-effective.[50] Countries including France, the UK, and Switzerland have invested heavily in such measures over recent decades and, according to our analysis, have meaningfully constrained the growth of insured losses. Moreover, governmental insurance schemes and pools, are proven to be effective in increasing protection. As exposure continues to grow, understanding which adaptation measures are most effective becomes increasingly important. Chapter 3 examines in detail how mitigation, protection investments, and insurance structures can reduce loss potential and sustain long-term insurability.

[46] SwissRe analysis combining internal risk classification and population provided by European Commission, GHSL Data Package 2023, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/098587, JRC133256
[47] *Ibid*
[48] *How a rural exodus stoked Europe's deadly wildfires*, Financial Times, 2025.
[49] https://www.swissre.com/reinsurance/insights/loss-creep-european-nat-cat.html
[50] *Flood risk: protective measures up to ten times more cost-effective than rebuilding | Swiss Re*

Sustaining risk transfer through risk mitigation

Insuring natural catastrophes is becoming structurally more challenging as exposure, hazard and vulnerability rise and growing secondary perils lift the annual loss baseline. In the US homeowners' market, catastrophe losses are now the largest share of personal property insurance claims – more than double their share two decades ago. A one-time surge in economic inflation in many advanced markets in 2021-22 abruptly reset loss levels and insurance prices. Despite progress in some markets, global protection gaps remain large, particularly in emerging economies where 80−90% of catastrophe losses remain uninsured. Major advanced economies also face significant underinsurance for low-frequency, high-impact risks such as earthquakes. Adaptation can stabilise the loss trajectory and ease some cost pressures, evidence shows. Several US states use targeted physical adaptation at the homeowners' level to materially reduce insured losses. New construction practices can also create vulnerabilities; therefore, exposure data and building standards should be continuously updated. An integrated approach that combines insurance coverage and adaptation measures is key to narrow natural catastrophe protection gaps.

|	
Loss growth is colliding with the limits of insurability…	**Price increases and catastrophe trend challenge insurability** The combination of high rebuilding costs, clustered exposure in often high-risk areas, and, for some perils, long-term hazard shifts, can place sustained pressure on insurance companies and premiums. Even in years without a peak hurricane landfall, secondary perils are lifting the annual loss baseline and reinforcing structural growth in insured losses. This is particularly so in hazard-prone regions where losses are increasingly concentrated. In localised high-risk areas, this dynamic puts strain on both insurers and policyholders and can ultimately challenge insurability – the economic and structural feasibility of covering a risk. The USD 40 billion California wildfire loss, concentrated in neighborhoods that generated roughly USD 2 billion in annual homeowners' premiums,[51] illustrates how quickly the economics of insurance can become stressed when high exposure, vulnerability and hazard converge.
…and emphasising the key role of insurance.	Over the three decades from 1996 to 2025, California's aggregate homeowners' insurance loss ratio was broadly in line with the national average of (~65%) but with greater volatility, as extreme wildfire years offset periods of below-average losses. In the past 10 years (2016−2025), with multiple years of elevated wildfire activity, California's estimated average homeowners' loss ratio of ~93% is well above the national average 68%. This volatility highlights the fundamental role of insurance: pooling risk across time and geography, absorbing shocks in extreme years and providing financial resources when losses materialise.
Adaptation is no longer optional: it is increasingly a prerequisite for insurability.	Reducing weather-related property losses requires sustained efforts to shape how and where assets are built. Chapter 2 demonstrates empirically that adaptation can materially alter loss trajectories, particularly for flood risk where protection investments have offset some of the underlying growth in exposure. Where adaptation keeps pace with economic development and evolving hazards, insured loss growth can be stabilised; where it lags, losses accelerate and insurance markets bear increasing strain.
Because most premiums are paid out as claims, the rise in claims costs in turn lifted premiums.	The price increases following the COVID-19 pandemic have further sharpened attention on claims costs. The 37% jump in US reconstruction costs between 2019 and 2025 has reset claims severity higher and resulted in premium increases across many markets.[52] Because claims costs account for nearly 75% of premium payments, on average, higher costs of labour, materials and other insurance claims components translated into a large and persistent increase in total costs for insurers that ultimately flowed through to premiums. For consumers, claims inflation was eventually reflected in higher average premiums, while for insurers, average underwriting profit over the past five years was approximately zero (see Figure 19).

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[51] SRI calculation of ZIP code level earned premiums data as of 2023 extrapolated to 2025. Downloaded from *Residential Property Insurance Report*, California Department of Insurance.
[52] PPI construction, cited in chapter 1.

Figure 19
Allocation of insurance premium,
US homeowners, 2021–2025E
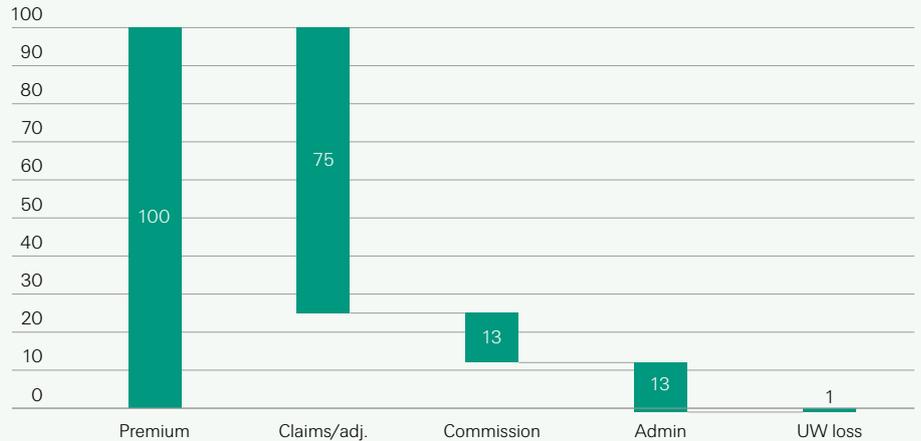
Source: NAIC, S&P Capital IQ, Swiss Re Institute

Price increases and secondary perils raise
the need for adaptation measures.

Economic inflation in the US has now eased, but flattening loss growth in a world where weather-related insured losses trend upward by 5–7% annually in real terms requires continuous adaptation. Between 2021 and 2025, catastrophes accounted for just over half of US homeowners' insurance claims, compared with less than a third in 2001–2005 (see Figure 20).[53] Without investment in mitigation and risk reduction, underlying loss pressures will likely continue to translate into higher premiums and tighter underwriting conditions.

Figure 20
Share of homeowners claims attributed
to natural catastrophes

Note: estimates shown are subject to some bias due to factors such as the use of a constant catastrophe threshold (Verisk applied USD 25 million over the period covered) and changes in the take-up rates of peril-specific policies (eg, earthquake and flood). Source: Verisk, NAIC, S&P Capital IQ, AM Best, Swiss Re Institute.

Physical adaptation can materially reduce
expected losses.

Adaptation measures can lower economic losses and insurance costs
Evidence from Hurricane Sally in 2020 shows how targeted physical adaptation at the homeowners' level can materially reduce disaster losses. In Alabama, a coordinated strategy combining the Insurance Institute for Business & Home Safety's Fortified building standard with premium discounts, public retrofit grants and independent third-party verification, led to materially lower insured losses. Homes built or retrofitted to the Fortified standard saw reductions of 55–70% in claims frequency and 14–40% in severity, contributing to loss ratios 51–72% lower than conventional construction.[54] [55] Fortified homes also outperformed buildings constructed to similar codes without third-party verification, underscoring the importance of enforcement and quality assurance.

[53] Swiss Re Institute calculations using Verisk and National Association of Insurance Commissioners data.
[54] Ranges refer to both the IBHS' Fortified Roof and Fortified Gold standards.
[55] L. Powell, "Performance of IBHS FORTIFIED Home Construction in Hurricane Sally", Alabama Department of Insurance and University of Alabama, 5 May 2025.

Public infrastructure projects can provide highly cost effective mitigation benefits.

Switzerland provides a recent example of how targeted adaptation through public mitigation infrastructure can largely reduce extreme loss scenarios. A flood relief tunnel diverting peak flows from the river Sihl into Lake Zurich mitigates what was long considered the largest flood risk in the canton of Zurich. Costing CHF 175 million, the project protects Zurich's dense and exposed city centre. Scenario analyses suggest that a major Sihl flood could have caused property damages of up to CHF 6.7 billion. By diverting flood peaks, the tunnel is estimated to reduce flood risk by around 99%, corresponding to a benefit-to-cost ratio of roughly 38:1.

When adaptation is measurable, insurance responds.

Well-defined adaptation measures can translate directly into insurance benefits. In Louisiana, homes retrofitted to the IBHS Fortified building code standard receive a 7–24% discount on annual homeowners insurance premiums, demonstrating that risk-based pricing can reward resilience measures. Retrofitted homes in higher-risk coastal areas typically received a larger discount than homes in interior regions.[56] Such measures show that when mitigation is measurable, enforceable and transparent, insurers can incorporate it into pricing, aligning incentives with societal risk reduction.

In some markets, reducing non-physical drivers of loss escalation can be critical to stabilise insurance availability.

Florida is also an example of how institutional and legal reforms can bend the cost curve. After years of market stress driven by litigation costs and loss amplification, reforms enacted since 2022 have materially reduced insurers' and consumers' legal uncertainty. Private market participation has risen, the policy count of the state's residual market, Citizens Property Insurance, has fallen sharply, and average premiums have begun to stabilise and even decline.[57] Citizens has proposed modest average rate reductions for 2026 for the first time in over a decade.[58] By addressing non-physical drivers of loss escalation, the reforms eased loss cost pressures and supported a gradual normalisation of insurance availability in one of the world's most catastrophe-exposed markets.

Adaptation is more challenging for some secondary perils.

Our Chapter 2 analysis highlights where adaptation is falling behind. For SCS in Europe and wildfires in the US, the large unexplained residuals point to hazard intensification and evolving vulnerability that are not being offset by adaptation efforts. For SCS, adaptation is inherently more challenging, as damage is driven by highly localised hazards across broadly exposed regions. Resilience can be strengthened by improved building codes and construction standards, particularly against hail, and better data to improve risk assessment. For wildfires, human activity is a major source of uncertainty, but effective risk-reduction measures include risk-informed land-use planning, vegetation and fuel management, and resilient urban design. Past events show that proactive measures can enhance the resilience of communities exposed to wildfire risk.[59]

Evolving vulnerability requires proactive adaptation

Vulnerability is evolving, often faster than adaptation.

Yet vulnerability remains a moving target. New construction practices (e.g., rooftop solar installations mentioned in Chapter 2) can increase susceptibility to perils such as hail and wind. As building characteristics evolve, risk models and underwriting assumptions must adapt accordingly. Without continuous updating of building standards, exposure data and modelling frameworks, insured losses may exceed expectations.

Large-scale investment in adaptation can curb protection gap growth.

China illustrates both the benefits of large-scale adaptation and the challenges posed by rapidly shifting exposures. In July 2021, extreme rainfall in Zhengzhou (Henan province) triggered catastrophic urban flooding, causing hundreds of fatalities and exposing structural weaknesses in urban drainage and flood-management systems. In response, authorities expanded financing of major infrastructure priorities, including water conservancy and flood-control infrastructure projects as part of the RMB 2 times trillion in ultra-long special treasury bonds.[60] These measures complement the ongoing expansion of the "sponge city" programme, which promotes upgraded urban drainage standards and nature-based water retention systems to mitigate pluvial flood risk.[61]

The effectiveness of adaptation depends on keeping pace with rapidly evolving exposure.

At the same time, exposure growth is accelerating in coastal provinces. China added 75 GW of wind power capacity in 2023 alone, including large-scale offshore

56 M. Waguespack, "Louisiana Fortify Homes Program", Louisiana Department of Insurance, 7 March 2025.
57 *Florida Tort Reform: A Sunshine Success Story*, Gallagher Re, 2025.
58 *"Citizens Recommends Rate Cuts for Most Policyholders"*, Citizens Property Insurance Corporation, 10 December 2025.
59 See *7 lessons learned from the California wildfires for European insurers | Swiss Re*
60 *China to issue 1 trillion yuan in additional government bonds for disaster recovery and prevention.*, State Council of the People's Republic of China, 2023
61 *Sponge Cities in the PRC*, ADB Brief No. 222, Asian Development Bank, 2022.

installations concentrated in typhoon-exposed eastern regions.[62] The rapid build-out of renewable energy infrastructure, alongside continued urban and industrial asset accumulation in coastal megacities, is increasing the value of assets located in high-hazard zones.[63] These opposing dynamics illustrate that while large-scale adaptation can materially reduce vulnerability and slow protection-gap growth, exposure expansion can outpace resilience gains if risk reduction does not keep pace with asset growth.

Narrowing protection gaps requires both insurance and adaptation

Protection gaps reflect both progress and imbalance.

Protection gaps are defined as the share of uninsured losses in total economic losses. They are a key indicator of resilience in property insurance markets and arise from the interaction between insurance take-up rates and losses. Effective natural catastrophe frameworks therefore combine high insurance penetration with active exposure management. As Chapter 1 notes, roughly half of global natural catastrophe losses were insured in 2025, a record high reflecting the concentration of losses in more-insured perils and markets. This reflects a decades-long trend of insurance covering a growing share of global natural catastrophe losses. Over the past decade, insurance covered over 40% of global losses on average, increasing from 23% 30 years ago (Figure 21). This is partly the result of rising take up rates, e.g. Germany, and, in recent years, a higher share of losses from perils and regions with higher take up rates e.g. US SCS and wildfires.

Figure 21
Insured share of global natural catastrophe losses.
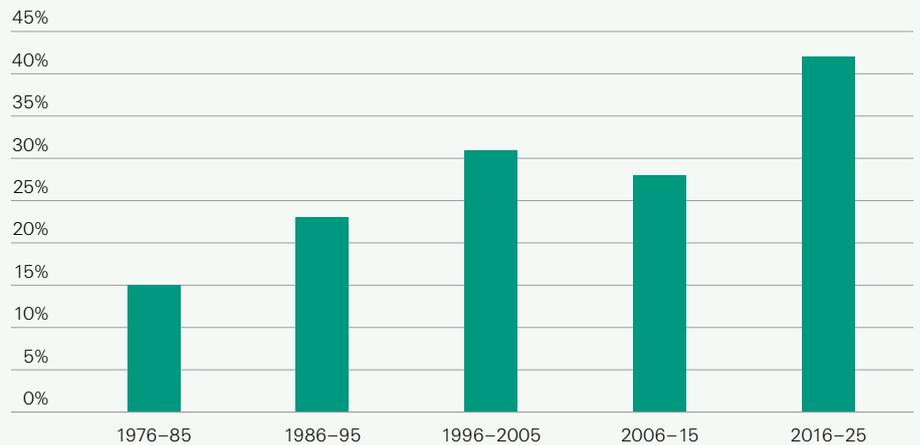
Source: Swiss Re Institute

Emerging economies have the highest protection gaps in percentage terms.

Protection gaps also persist as developing economies with relatively low insurance penetration account for a growing share of global exposure growth. In emerging economies, typically 80–90% of natural catastrophe losses are uninsured, compared to 40–60% in developed markets. Demand-side factors driving large emerging market protection gaps nclude low levels of risk perception, complexity of insurance products, and supply side factors such as adverse selection and legal and regulatory challenges.[64]

Protection gaps illustrate that the risk of low-frequency high-impact perils remains real.

Even developed economies still have large protection gaps for certain perils, such as earthquake or flood. For example, in California only 12% of residential property insurance policies included coverage for earthquake risk in 2024, down from 14% in 2020 (see Figure 22) and 30% in 1994, at the time of the Northridge Earthquake.[65] With USD 4.6 trillion of residential property exposure without earthquake coverage in the state in 2024,[66] it serves as a reminder not to overlook low-frequency and high-severity risks, even after periods in which losses are dominated by more frequent secondary perils.

[62] *China Wind Power Annual Report 2024*, IEA Wind / CWEA, 2024.
[63] For documentation of concentration of offshore wind deployment in eastern coastal provinces, see: *China Offshore Wind Report*, Lawrence Berkeley National Laboratory, 2024.
[64] *Safeguarding Home Insurance: Reducing exposure and vulnerability to extreme weather*, The Geneva Association, May 2025.
[65] *California Earthquake Zoning and Probable Maximum Loss Evaluation Program*, California Department of Insurance, 9 February 2021.
[66] *Annual Report to the Legislature and the California Insurance Commissioner on CEA Program Operations*, California Earthquake Authority, 1 August 2025.

Figure 22
% of California residential insurance policies
with earthquake coverage
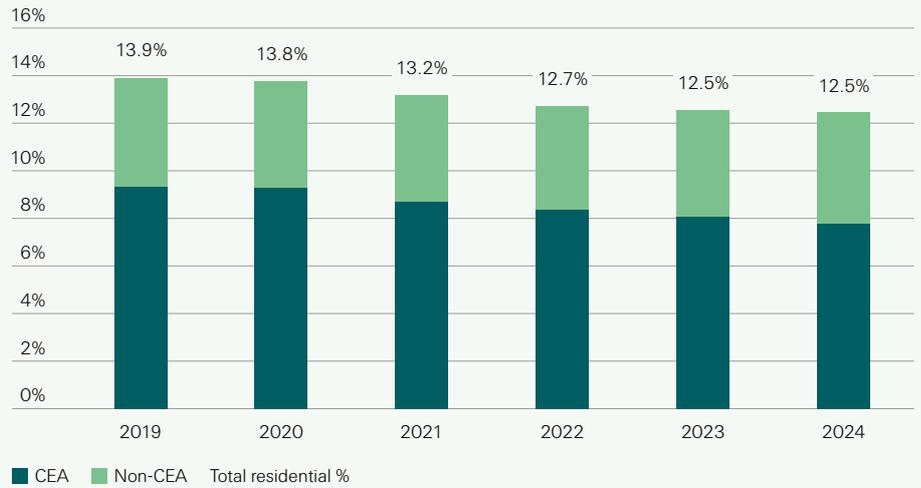
Source: California Earthquake Authority, Swiss Re Institute.[66]

Integrated frameworks: aligning insurance and adaptation

High insurance penetration for standard policies can coexist with material gaps for select perils.

Germany illustrates both the strengths and limitations of high insurance penetration in managing natural catastrophe risk. Insurance coverage for fire, storm and hail exceeds 99% of residential buildings, reflecting long-standing market practices and strong consumer awareness.[68] However, protection gaps remain for flood risk: only around 57% of households are insured against pluvial and fluvial flooding, despite a substantial increase from roughly 20% two decades ago. Improved risk awareness and more granular underwriting have supported this progress. Coverage among corporate clients has also risen to 39% in 2024, up from 24% in 2008.

Sustainable protection gap reduction requires an integrated approach combining adaptation, optionality, and re/insurance.

Narrowing protection gaps requires more than expanding insurance coverage alone. It also depends on effective risk reduction and adaptation measures to ease the limitations on demand coming from rising cost of insurance and homeownership. In Germany, following devastating floods in 2021 and amid discussions about introducing compulsory natural catastrophe insurance, the German Insurance Association (GDV) has proposed an alternative integrated framework.[69] This aims to reduce expected losses while narrowing protection gaps via three complementary measures: (i) binding prevention and adaptation requirements in land-use regulations, including stricter control of floodplain construction, (ii) an opt-out natural hazard insurance embedded in residential building policies, and (iii) a public-private reinsurance mechanism to absorb tail risks.[70] Combined, it seeks to align insurance coverage, risk reduction and public support by addressing the underlying drivers of catastrophe losses rather than relying solely on higher insurance penetration.

Long-term, bending the catastrophe loss curve is essential to support societal resilience.

While the post-COVID-19 surge in economic inflation amplified short-term cost pressures, the persistent 5–7% trend growth in global natural catastrophe losses poses the greater long-term challenge for insurance availability and affordability. As exposures continue to rise, strategies that combine systematic risk reduction with well-designed insurance mechanisms will be critical to containing protection gaps and sustaining the insurance sector's role in supporting long-term societal resilience.

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[67] Note, chart shows percentage of total residential insurance policies (Homeowners, renters, condo, dwelling fire, mobile home) in California that include earthquake coverage. For homeowners policies specifically, the share with earthquake coverage is 15%.
[68] *Flood Risk Management in Germany – Building flood resilience in a changing climate*, The Geneva Association, 2020.
[69] *Basic protection for all: Insurers present framework for a safeguard system against natural catastrophes*, German Insurance Association, 4 December 2025.
[70] *Germany's insurers pitch Elementar Re catastrophe reinsurance risk pool*, Artemis, 10 December 2025.

Appendix I: facts and figures

Number of catastrophic events in 2025: 280

By *sigma* criteria, there were 280 catastrophes worldwide in 2025, down from 338 in 2024. There were 190 natural catastrophes (down from 229 in 2024), and 90 man-made disasters (down from 109 in 2024).

Figure 23

Number of catastrophic events, 1970–2025

■ Man-made disasters —— Natural catastrophes

Source: Swiss Re Institute

Number of victims: 17 929

Worldwide, 17 929 people are believed to have died or gone missing in disaster events in 2025 (2024: 14 125). Natural catastrophes claimed 15 425 victims (2024: 10 864). Man-made disasters claimed a further 2 504 victims (2024: 3 261).

Figure 24

Number of victims, 1970 – 2025

■ Man-made disasters —— Natural catastrophes
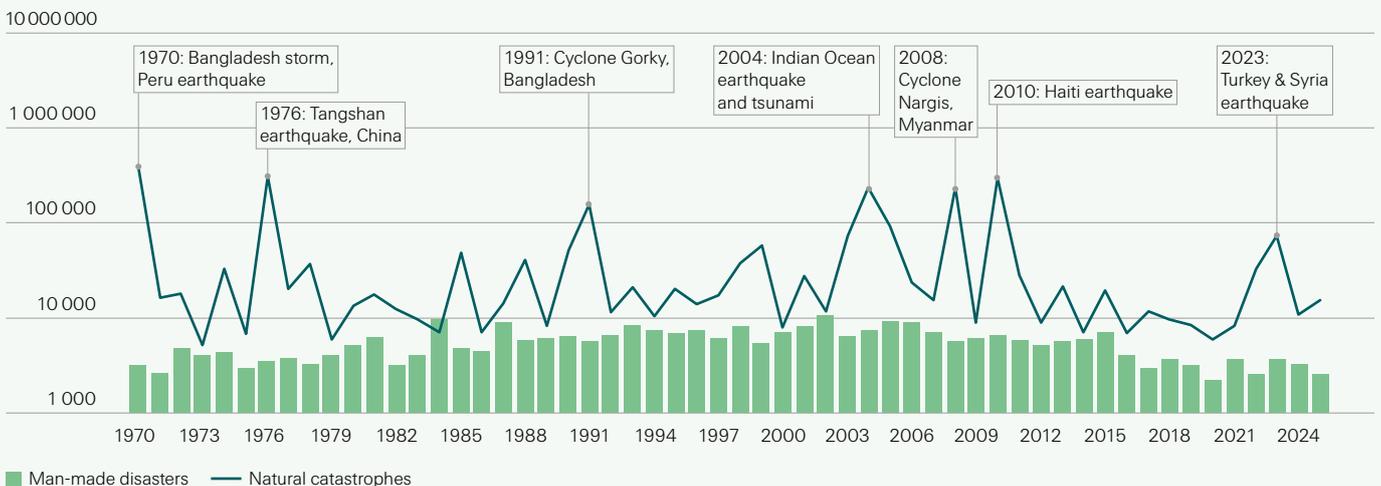
Note: Scale is logarithmic: the number of victims increases tenfold per band
Source: Swiss Re Institute

Global insured losses
Record high wildfire losses and third highest SCS losses led to global insured losses from natural disasters of USD 107 billion in 2025. This is less than the USD 141 billion (CPI-adjusted) of 2024.

Figure 25
Insured catastrophe losses, 1970 – 2025 (USD bn, 2025 prices)
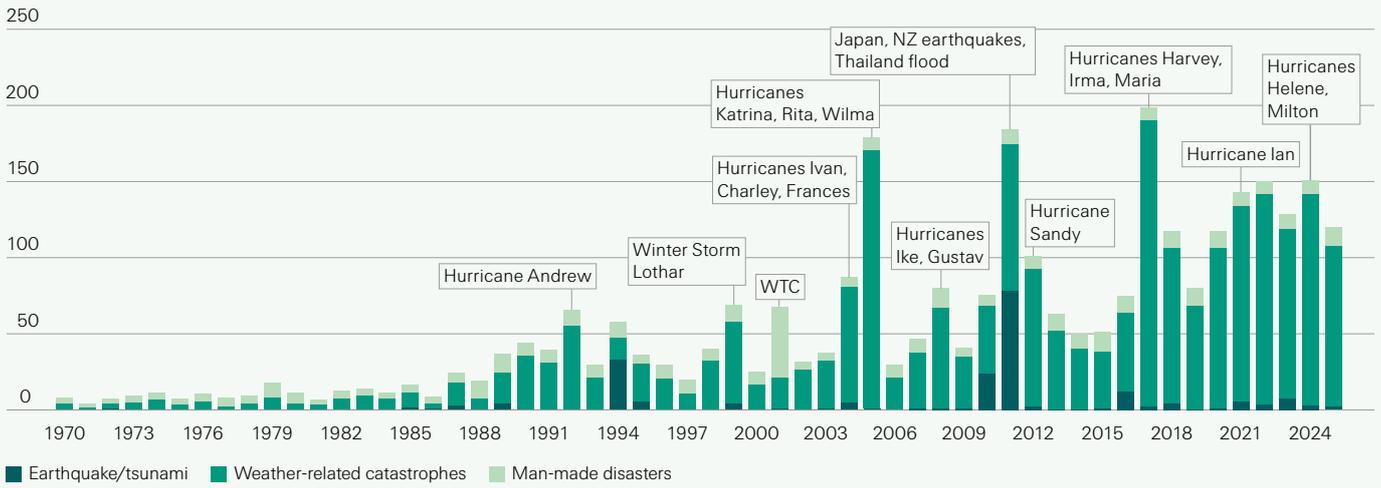
Source: Swiss Re Institute

Primary and secondary perils
Record high losses from wildfires and elevated severe convective storm losses brought the share of insured losses from so-called secondary perils (See Table 5 in the Appendix) to 92%, record high (2024: 59%).

Figure 26
Global insured losses from primary and secondary perils, 1970 – 2025 in USD billion at 2025 prices
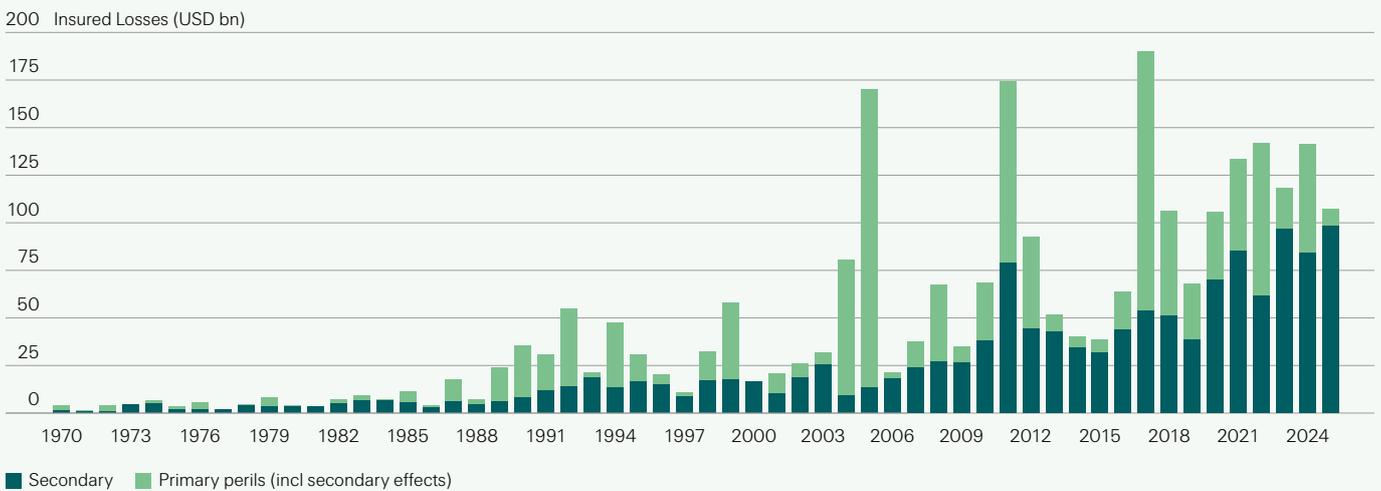
Source: Swiss Re Institute

Total economic losses: USD 235 billion

Economic losses (natural catastrophes and man-made) were highest in North America, driven by the Los Angeles wildfires, elevated severe convective storms losses, Hurricane Melissa in the Caribbean and large scale floods in Asia.

Table 3
Economic losses, in USD billion and as a % of global GDP, 2025

Regions	in USD bn	in % of GDP
North America	133	0.41%
Europe	10	0.03%
Asia	69	0.16%
Latin America	13	0.19%
Africa	2	0.07%
Oceania/Australia	6	0.30%
World total	235	0.20%
10-y average*	280	0.25%

*inflation adjusted
Note: some percentages may not add up to 100 due to rounding.
Source: Swiss Re Institute

Regional loss overview

Insured losses were the largest in North America, driven by the Los Angeles fires and elevated severe convective storm perils. Next, insured losses in Asia were driven by the Myanmar earthquake in Myanmar causing losses also in neighbouring Thailand and a series of man-made disasters.

Table 4
Number of events, victims, economic and insured losses by region, 2025

Region	Number	Victims	Insured losses in USD bn	in %	Economic losses in USD bn	in %
North America	91	617	96	80.2%	133	56.9%
Europe	36	2514	6	5.4%	10	4.2%
Asia	95	12797	9	7.5%	69	29.6%
Latin America	21	489	3	2.7%	13	5.6%
Africa	31	1481	1	0.5%	2	1.0%
Oceania/Australia	6	31	5	3.7%	6	2.7%
World total	**280**	**17929**	**120**	**100.0%**	**235**	**100.0%**

Note: some percentages may not add to 100% due to rounding.
Source: Swiss Re Institute

Global natural catastrophe protection gap: USD 112 billion

Figure 27 shows global economic and insured losses over time. This highlights the insurance protection gap, ie the financial loss generated by natural catastrophes not covered by insurance. In 2025, the global protection gap was around USD 112 billion. This represents 51% of total economic losses (down from 57% in the previous year), the lowest ever on *sigma* records. This reflects the concentration of most 2025 losses in perils and markets with relatively higher insurance penetration.

Figure 27
Natural catastrophe insured vs uninsured losses in USD billion at 2025 prices

■ Insured losses   ■ Uninsured

Economic losses = insured + uninsured losses.
Source: Swiss Re Institute
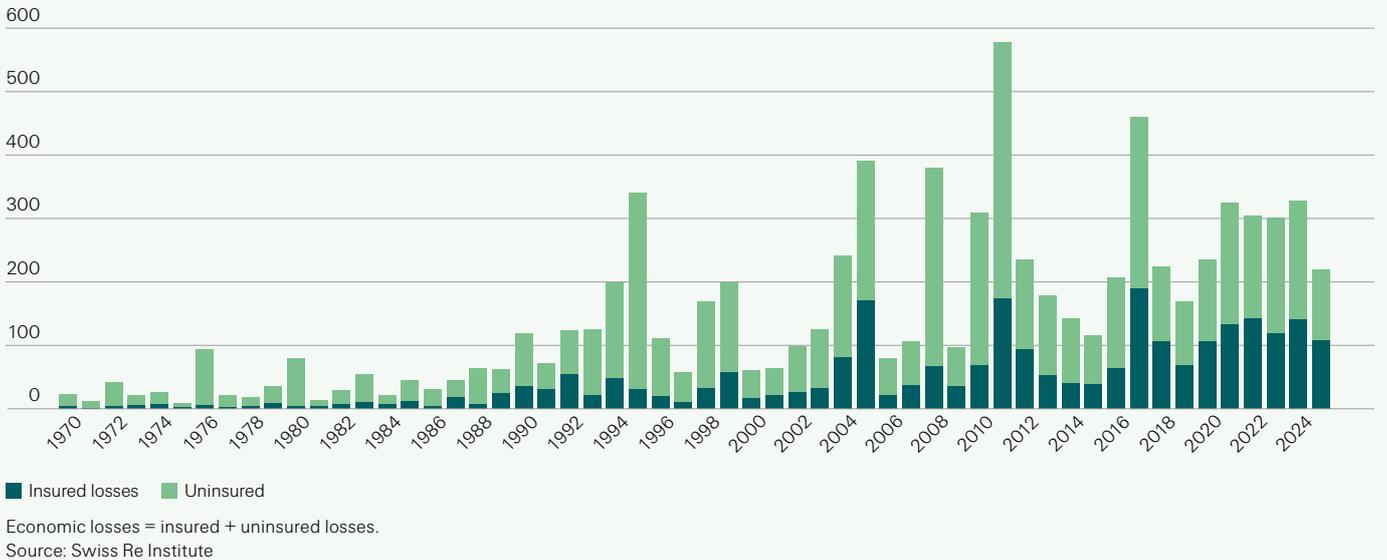
Figure 28
Natural catastrophe insured vs uninsured losses by region, 2016 – 2025, in USD billion at 2025 prices

■ Insured losses   ■ Uninsured losses

Source: Swiss Re Institute
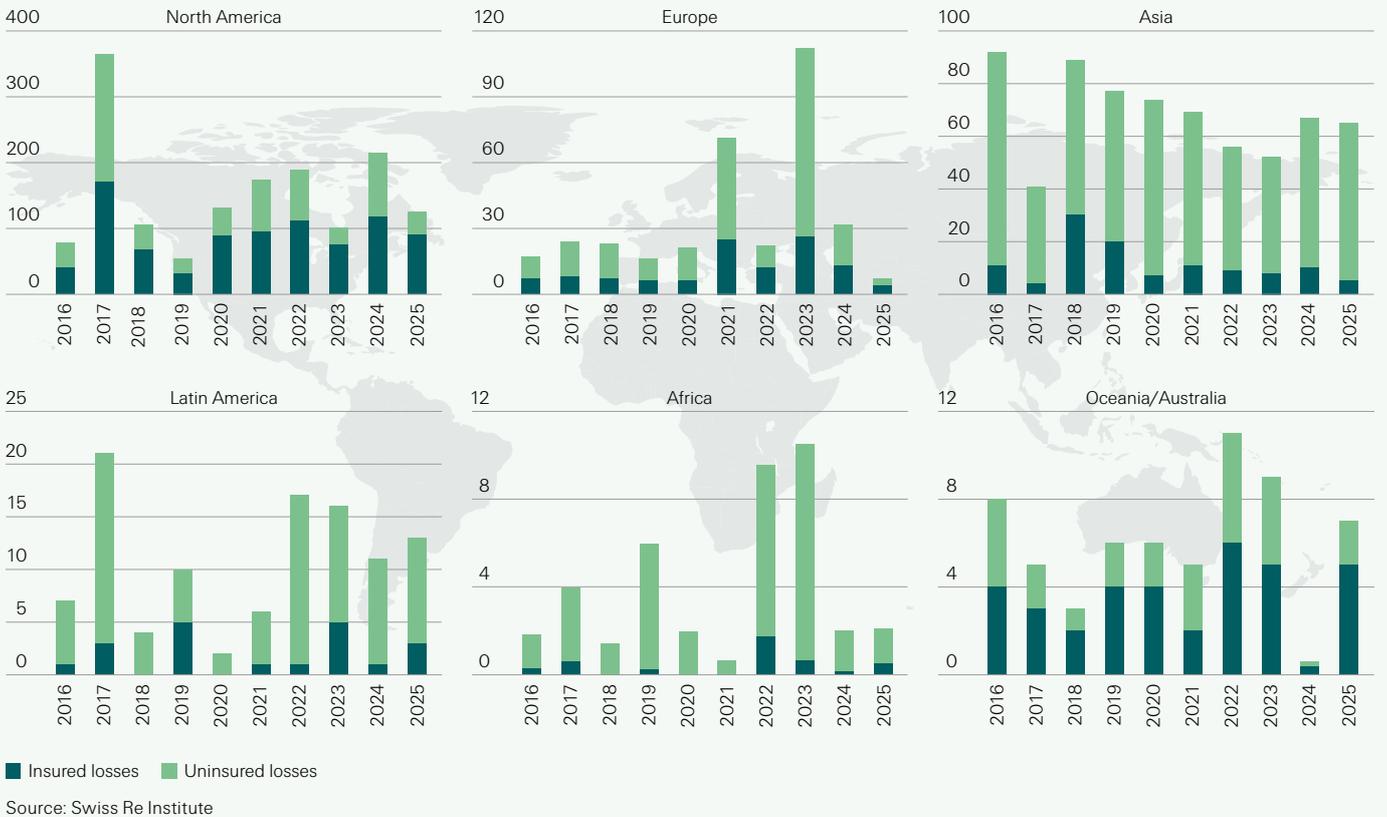
Appendix II: definition of terms

Natural catastrophes

"Natural catastrophe" refers to an event caused by natural forces. Such an event generally results in a large number of individual losses involving many insurance policies. The scale of the losses resulting from a catastrophe depends not only on the severity of the natural forces but also on man-made factors such as building design or the efficiency of disaster control in the afflicted region. In this *sigma* study, natural catastrophes are subdivided into the following categories: floods, storms, earthquakes, droughts/forest fires/heat waves, cold waves/frost, hail, tsunamis, and other natural catastrophes.

Man-made disasters

This study categorises major events associated with human activities as "man-made" or "technical" disasters. Generally, a large object in a very limited space is affected, which is covered by a small number of insurance policies. War, civil war, and war-like events are excluded. *sigma* subdivides man-made disasters into the following categories: major fires and explosions, aviation and space disasters, shipping disasters, rail disasters, mining accidents, collapse of buildings/bridges, and miscellaneous (including terrorism).

Primary and secondary perils

For the purposes of this study, we use "primary" to define perils that are likely to generate very large event losses in the context of the global re/insurance industry, and for which risk modelling is advanced (eg, earthquakes, tropical cyclones, European windstorms). In contrast, "secondary" perils (all others excluding primary) are characterised by higher frequency and lower severity, though their cumulative impact can result in significant losses and individual event losses can also be sizeable.

Though both primary and secondary perils inflict damage, some perils have a very high loss potential, taking full-year losses well above trend, even by 100% or more. We define a "peak loss year" as a year in which the insurance loss due to natural catastrophes exceeds trend by at least one standard deviation. Between 1995 and 2024, there were five such years: 1999, 2004, 2005, 2011 and 2017. A peak loss year can be based on a single very large loss event, such as Hurricane Katrina in 2005, a combination of several large primary events (2017) or combined high secondary peril and large primary peril losses. Large loss events normally belong to the primary peril category, but secondary peril events can cause severe damage, as in the Los Angeles wildfires in 2025.

Table 5
Swiss Re Institute classification of primary and secondary perils

	Event type	Re/insurance industry status	Examples
Primary perils	▪ Natural catastrophes that tend to happen less frequently, but with high loss potential for the global re/insurance industry. ▪ Include secondary effects.	▪ Traditionally well-monitored and managed risks in developed re/insurance markets. ▪ Secondary effects are not always explicitly modelled alongside the originating primary peril, less rigorous monitoring.	▪ Tropical cyclones (including tropical cyclone-induced inland flooding and storm surge), earthquakes (including tsunamis, liquefaction and fires following earthquakes), winter storms in Europe.
Secondary perils	▪ Natural catastrophes that can happen relatively frequently, and typically generate low to medium sized losses, from a global re/insurance industry perspective. ▪ Refer to independent secondary perils only.	▪ Less rigour in the industry monitoring and modelling than for primary perils. Weaker exposure data capture and claims tracking.	▪ Severe convective storms (including thunderstorms, hail and tornadoes), floods, droughts, wildfires, landslides, snow, freeze.

Source: Swiss Re Institute

Economic losses

For the purposes of the present *sigma* study, economic losses are all the financial losses directly attributable to a major event, ie damage to buildings, infrastructure, vehicles etc. The term also includes losses due to business interruption as a direct consequence of the property damage. Insured losses are gross of any reinsurance, be it provided by commercial or government schemes. A figure identified as "total damage" or "economic loss" includes all damage, insured and uninsured. Total loss figures do not include indirect financial losses – ie loss of earnings by suppliers due to disabled businesses, estimated shortfalls in GDP and non-economic losses, such as loss of reputation or impaired quality of life. Generally, total (or economic) losses are estimated and communicated in very different ways. As a result, they are not directly comparable and should be seen only as an indication of the general order of magnitude.

Insured losses

"Losses" refer to all insured losses except liability. Leaving aside liability losses, on one hand, allows a relatively swift assessment of the insurance year; on the other hand, however, it tends to understate the cost of man-made disasters. Life insurance losses are also not included. Adjustment for economic inflation: *sigma* converts all losses for the occurrence year not given in USD into USD using the end-of-year exchange rate. These USD values are extrapolated using the US Consumer Price Index to give current (2025) values. For the 2025 reporting year, the lower loss thresholds were set as follows:

sigma thresholds for 2025

Insured losses (threshold in USD m)	
Maritime disasters	27.4
Aviation	54.9
Other losses	68.1
or Total economic losses (threshold in USD m)	136.3
or Casualties	
Dead or missing	20
Injured	50
Homeless	2 000

If changes to the loss amounts of previously published events become known, *sigma* takes these into account in its database, but Swiss Re is under no obligation to publicly revise or update this *sigma* study.

Sources

Information is collected from newspapers, direct insurance and reinsurance periodicals, specialist publications (in printed or electronic form) and reports from insurers and reinsurers. In no event shall Swiss Re be liable for any loss or damage arising in connection with the use of this information (see the copyright information on the inside back cover).

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