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STEMMING A RISING TIDE

HOW INSURERS CAN CLOSE
THE FLOOD PROTECTION GAP



Stemming a rising tide: How insurers can close the flood protection gap

Floods cost the global economy more than \$82 billion in 2021, accounting for nearly a third of all economic losses from natural catastrophes, according to a recent Swiss Re study.¹ Only about \$20 billion of that amount was insured.

Over the past 20 years, the report says, just 7% of aggregate economic losses from flood events have been covered by insurance in emerging markets, compared with 31% in advanced economies.

In 2021, the Emergency Events Database recorded 432 natural catastrophes, compared with 357 on average annually for 2001-2020. Floods dominated these events, with 223 occurrences, up from an annual average of 163.²

The size of the losses, the protection gap, and human devastation all underscore the importance of addressing flood risk. And, while insurance is a critical part of risk mitigation, it's clear that risk transfer alone is insufficient to address the challenges ahead.

"Risk transfer is just one tool in the resilience toolkit," says Insurance Information Institute (Triple-I) CEO Sean Kevelighan. "The insurance industry's understanding of loss trends and expertise in assessing and quantifying risk must

be joined at the hip to technology, public policy, finance, and science. We need to partner with communities and businesses at every level to promote a broad resilience mindset focused on pre-emptive mitigation and rapid recovery."³

Data, risk modeling, and analytical tools have a vital role to play in improving and streamlining underwriting, pricing, policy administration, and claims processing.

Flood Facts

\$82

Billion +
Global
economic
losses

\$20

Billion
Global
insured
losses

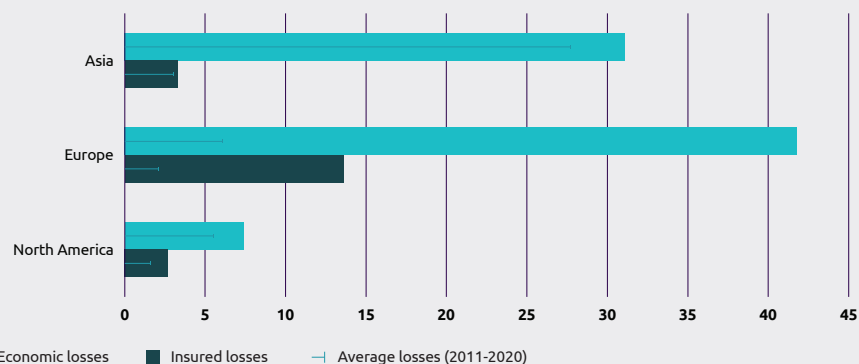
75%

Global
protection
gap

Source: Swiss Re, Natural Catastrophes in 2021: The Floodgates are Open

Flood Protection Gap by Region

Historic Economic Losses and 2021 Economic & Insured Losses - 2021 US \$ Billions



Source: Swiss Re Institute

Overview of global flood risk

The main drivers of rising flood losses are related to economic growth and urbanization. Coastal development puts more property at risk and eliminates ways for water to flow or to be absorbed. Other factors – such as aging or absent flood-control infrastructure and increased rainfall – also affect losses.

Extreme weather and rising sea levels exacerbate the global threat. To select just one metric, data from the World Resources Institute indicates that one meter of increased sea level would likely result in 80 airports worldwide being underwater.⁴ With just half a meter, 11 European airports and seven in Asia are at risk of being submerged.

Airports are already feeling the effects of storm surge and extreme weather. LaGuardia, John F. Kennedy International Airport, and Newark International Airport all experienced severe flooding during Hurricane Sandy in 2012: almost 10,000 flights⁵ were canceled, and millions of dollars⁶ in revenue were lost. In September 2018, Kansai International Airport in Japan was surrounded by ocean after a typhoon.⁷

Such events hint at what may be the new normal for airports. Consider the impact on roads, subway systems, and other infrastructure in low-lying areas, and the prospects for losses multiply.

Asia leads in losses, lags in protection

Historically, Asia has suffered the highest economic losses from flood, but it lags in terms of insured losses, Swiss Re reports.⁸ In 2011–2020, annual economic losses from flood events averaged almost \$30 billion. This includes the Thailand flood of 2011, in which nearly 900 people were killed, millions were displaced, and insured losses amounted to \$18 billion (in 2021 dollars), according to global insurance broker Aon.⁹

Asia and the Pacific region experienced relentless disasters in 2021, severely affecting more than 57 million people during the peak of the pandemic. There has been no let-up so far in 2022, with flash floods and landslides killing and displacing thousands in Thailand, the Philippines, Malaysia, Indonesia, and elsewhere.¹⁰

In the past decade, Swiss Re says, only 7% of flood losses in Asia were covered by insurance, compared with 34% in Europe. In 2021, flood-related insured losses in Asia totaled \$3 billion (11% of economic losses), while insured losses in Europe and North America accounted for 32% and 36%, respectively, of economic losses.

Europe's summer flooding

Summer flooding in Central and Western Europe is not new, and the events of July 2021¹¹ invite comparison with those of 2002¹² and 2013¹³ -- which resulted in economic losses of \$13 billion and \$16 billion, respectively, according to JBA Risk Management. Since insurance penetration is relatively high in Central Europe, JBA says, insured losses for these events were estimated at around \$3.4 and \$3.9 billion, respectively.

- July 2021 flooding was the costliest natural disaster on record in the region, with economic losses of \$41 billion and insured losses of \$13 billion, according to Swiss Re.
- A recent World Bank report¹⁴ found the average annual cost of flooding could increase up to 25% and 21% for Germany and France, respectively, by mid-century.

U.K.: wet and getting wetter

More than five million people in the United Kingdom live and work in 2.4 million properties that are at risk of flooding, according to the U.K. Environment Agency.¹⁵ According to the Association of British Insurers, storms Ciara and Dennis in 2020 cost £360 million in claims, with an average household flood claim of about £32,000.¹⁶ More recently, storm Franklin in February 2022 flooded hundreds of homes across England and Wales.¹⁷ Franklin was one of three named storms that occurred in one week. The bill for storms Eunice, Dudley, and Franklin could approach £500m.¹⁸

The latest U.K. State of the Climate Report indicates that the country has become wetter over the past few decades, although with significant annual variation. Six of the country's 10 wettest years have occurred since 1998.¹⁹ Overall, 2011–2020 was 9% wetter than 1961–1990; the number of days where rainfall totals exceed 95% and 99% of the 1961–1990 average have increased in the past decade, as have rainfall events exceeding 50 mm.²⁰ In addition to the threat to people, homes, and businesses, a new interactive tool from Climate Central²¹ that looks at flood risk reveals a rising severity of the sea-level threat to U.K. nuclear power stations.²² The searchable map indicates that all current and proposed U.K. nuclear stations are at risk from rising sea levels by 2030.

U.S. “woefully underprepared”

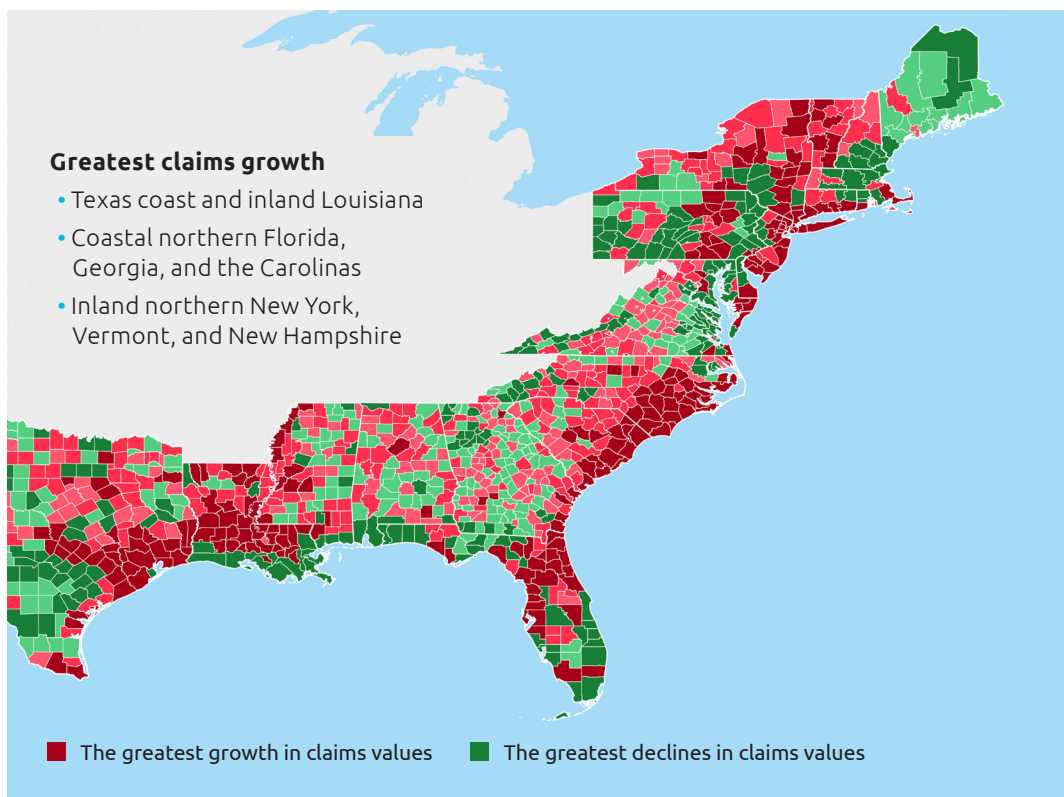
About 90% of U.S. natural disasters involve flooding.²³ For decades, U.S. insurers considered flood risk “untouchable”²⁴ due to difficulty quantifying exposures. Flood damage is excluded under standard homeowners’ and renters’ policies, but coverage is available from FEMA’s National Flood Insurance Program (NFIP) and a growing number of private insurers that have gained confidence in their ability to underwrite this risk using sophisticated risk modeling.

Nevertheless, a large coverage gap remains. The U.S. residential flood insurance market has roughly \$4 billion in written premium, but risk-management firm Milliman estimates that the total potential market stands between \$37 billion and \$47 billion.

Milliman cites “a relative lack of consumer demand” being at the root of the insurance gap, with many homeowners only wanting coverage if their bank requires it for a mortgage.²⁵

A First Street Foundation analysis²⁶ found the U.S. to be woefully underprepared for its growing flood risks. It identified “around 1.7 times the number of properties as having substantial risk” as compared with Federal Emergency Management Agency (FEMA) flood zone designations. It further estimates that economic damage due to flooding will grow 61% over the next 30 years, to an average annual loss of \$7,563 per property — for an estimated total loss of \$32.3 billion — as more people move into flood-prone areas.²⁷

Inland U.S. Flood Claims on the Rise



Source: Triple-I analysis of NFIP, Census Bureau, and FHA data

Creating a resilience mindset

Awareness and understanding of weather and climate risk has grown in recent decades. While action is being taken, much work remains to establish a mindset focused on resilience and pre-emptive mitigation.

Data and communication

Improved data tools have increased insurers' comfort covering perils like flood. Global positioning system (GPS) and satellite technology, the Internet of Things (IoT), and the ubiquity of mobile devices for personal and business use – combined with unprecedented computing power to harness these rivers of data – have helped streamline underwriting, pricing, and claims paying. As these tools facilitate processes, they also uncover issues and trends that might once have gone unnoticed or been insufficiently quantified to be useful. Demographics play a huge role in natural-catastrophe costs and how they are distributed. Much of the impact falls disproportionately on vulnerable groups, including minorities and the elderly.

In the United States, communities with large minority populations are among the most vulnerable to the effects of climate change, according to experts and federal data.²⁸ Areas with large numbers of Black and Hispanic residents are more likely than others to suffer from extreme heat and flooding because those areas are often damage-prone and the residents lack resources to recover quickly. The National Weather Service issued its first-ever flash-flood warning²⁹ or New York City in 2021, as remnants of Hurricane Ida brought rains that flooded subway lines and streets in New York and New Jersey. More than 40 people were killed in those states and Pennsylvania as basement apartments suddenly filled with water.

Combining real-time stories like these with improved curation and analysis of data can expose inequities and prompt government actions to protect life and property in neighborhoods far from the coastline.

While insurers acknowledge the significance of climate risk and the role of data in addressing it, a recent Capgemini analysis notes that relatively few are “on course to achieve climate resiliency.”³⁰

- Of insurers surveyed, 40% said they consider climate risk a “top priority.”
- Climate resilience requires a sophisticated data strategy, yet only 35% said they have adopted



advanced tools – such as machine-learning-based pricing and risk models – that Capgemini says are “critical to unlocking new data potential and enabling more accurate risk assessments.”

“Risk prevention based on data and behavioral science is at the top of the agenda for future-focused insurers,” says Seth Rachlin, Global Insurance Industry Leader, at Capgemini, adding that insurers should “deploy IoT, cloud, artificial intelligence, and machine learning to improve risk management, develop products, transform claims processing, and enhance customer experience.”



“Within current business dynamics, each data-ecosystem partner owns a piece of information. When they seamlessly share the data, they understand the holistic nature of risk and arrive at a comprehensive customer risk profile.”

Dipak Sahoo

Regional CIO, Asia, Generali
Hong Kong

Collaboration and innovation

The growing frequency and severity of flood events will make it harder to protect properties using traditional insurance alone. Pre-emptive mitigation in a wetter world will require creative measures and constructive partnerships.

- Flood Re, a collaboration between the U.K. government and insurance industry, has launched an initiative to make homes more flood resilient. Participating insurers reimburse up to £10,000 – beyond the cost of repairing flood damage – for installing flood resilience measures.³¹
- In a similar vein, community-based catastrophe insurance (CBCI) – arranged by local government or quasigovernmental bodies to cover individual properties – is being used in the United States. In addition to improving financial recovery for communities, CBCI can provide more affordable coverage for families and businesses and could be

linked to financing for community-level hazard mitigation.

Parametric insurance has been gaining traction with respect to weather-and climate-related risks.³² Unlike indemnity insurance, parametric covers risks without sending adjusters to assess damage after an event. Instead of paying for damage, it pays out if certain conditions are met – for example, a specific wind speed or earthquake magnitude in a particular area. If coverage is triggered, a claim is paid regardless of damage. Structuring and pricing requires a firm understanding of the exposures to select the best trigger. This can be hard with flood. Water depth alone is not as straightforward a measure as, say, local windspeed, since composition and pitch of the ground are significant variables. So is surrounding infrastructure.

Potential Benefits of a CBCI Program

Enhances financial resilience	Provides affordable coverage	Creates incentives for community/individual risk reduction
Reduces community's contingent disaster liabilities	Reduces premium costs by: <ul style="list-style-type: none"> • Increasing buying power and securing volume discounts • Enhancing data provision for risk analysis • Reducing administration costs • Supporting means testing 	Enables premium discounts for community-scale and household mitigation efforts
Enhances community's credit risk profile	Increases insurance availability by: <ul style="list-style-type: none"> • Lowering premium costs • Guaranteeing coverage post-loss 	Supports financing of risk reduction via premium surcharge
Speeds recovery of insureds		Enhances decision-making through risk analytics and pricing
Supports post-disaster economic revitalization		

Source: Marsh & McLennan, Community-Based Catastrophe Insurance: A model for closing the disaster protection gap

Nevertheless, parametric coverage is being applied to flood, mainly outside the United States. U.K.-based FloodFlash writes parametric flood coverage, with each policy linked to a sensor installed at the property. When the trigger depth is reached, FloodFlash is alerted and the claims process begins, without documentation or inspection required.

“Parametric policies have been written for commercial clients for years,” says Carolyn Kousky, associate vice president for economics and policy at the Environmental Defense Fund and a Triple-I Non-Resident Scholar. Firms may choose parametric solutions when they have concentrated assets in high-risk areas or to cover perils like business interruption.

- “Policies can be designed with a ‘peril agnostic’ trigger to cover multiple sources of loss,” Kousky says. “For example, a hotel might purchase a product that pays when bookings or revenues fall below some threshold.”
- Parametric pilots also have been tried for farmers and small landholders in developing economies. Kousky notes that such approaches help keep transaction costs low. Parametric policies also are starting to be offered in the developed world to residential clients to cover gaps in standard coverage and provide immediate post-disaster liquidity.

The insurers’ role evolves

New insurance products can help close the protection gap, but insurers also need to educate policyholders, businesses, and communities about risk mitigation and provide incentives to drive purchases. This includes discounts for improvements that reduce the likelihood and size of claims. Tulsa, Oklahoma residents, for example, are benefiting from the city’s NFIP Class 1 rating through the lowest flood insurance rates in the United States.³³

Tulsa spent decades developing and implementing stormwater-management improvements. Reducing losses through improved zoning, land use, and building standards in flood-prone areas will reduce claims, allowing insurers to increase coverage in areas that need it most while keeping it affordable.

“A lot of progress has been made in terms of affordability,” says Matt Junge, head of property underwriting, U.S. regional and national, at Swiss Re. He attributes much of these gains to more precise mapping capabilities. “More granular mapping enables insurers to more closely customize policies and pricing to the risk characteristics of specific properties.”



In addition to improving underwriting accuracy and price affordability, technology helps streamline claims processing in cases of widespread catastrophe-related losses. After Hurricane Ida in September 2021 poured unprecedented volumes of water inland over a few hours, submerging many vehicles, total-loss auto claims across New Jersey spiked 35%. Cure Auto Insurance – having implemented an integrated solution that eliminates manual paperwork, speeds title/lien releases, and accelerates policyholder payments – was able to process claims 40% faster. The insurer reported that customer satisfaction increased by 50%.³⁴

Emerging opportunities

Improved data and analytical tools make flood not just an insurable risk but a significant business opportunity. Research makes it clear that exploiting this opportunity will require a mix of approaches involving government, national and global business leaders, academia, community organizations, local businesses, and families.

At all these levels, awareness of the nature and scope of flood risk and the protection gap are key. People won't take action or spend funds

to address issues they don't understand or believe are too distant to matter right now. Decision makers must understand not only the risks but the cost of failure to act. This underscores the importance of education and collaboration. Public-private partnerships are essential, both for gaining consensus on the scope of the challenges and for developing cost-effective solutions – from improved building codes and infrastructure priorities to funding frameworks that address the needs of the most vulnerable populations.



“The key to closing the protection gap is to do it both from the top down (reducing overall risk) and from the bottom up (transferring the remaining risk).”

Michael Szőnyi

Flood resilience program lead for Zurich Insurance



In conclusion

Given both traditional and emerging expertise and capabilities, insurers are well-positioned to develop cost-effective risk-transfer products for diverse customer needs. They can also help drive essential conversations and action around pre-emptive mitigation and resilience, and support policies needed to reduce the suffering and losses associated with flood. To move these priorities forward, insurers should focus on the following four areas:

- Access data sources that provide accurate, granular, real-time risk information to inform underwriting, pricing, and reserving
- Deploy advanced technology to develop risk-prevention solutions, reduce losses, and streamline claims processing
- Partner with communities on strategies like improved building codes and CBCI programs that can reduce risk and make insurance more affordable
- Educate insureds on the connection between mitigation and the cost of protection by linking coverage discounts to investments in resilience.

The role of insurers in closing the flood protection gap can be a crucial one, and the time to act is now.

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