



2023 State of Flood Report

The Way to Flood Resilience





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Unity is strength...when there is teamwork and collaboration, wonderful things can be achieved.”

– Mattie Stepanek

The Power of Public and Private Partnerships

Collaborative solutions are critical to promoting flood resilience



As one of the world's most frequent and devastating perils, flood is indiscriminate in the damage it does to communities. Risk levels related to climate change, land use, and population concentrations, among others, are changing rapidly. And as floods increase

in quantity and severity, these risks are compounded. Thus, it's essential to plan for the future of floods.

Businesses, individuals, and society at large are all at risk of loss when floods occur. The time and effort needed to recover after an event depend largely on the resilience of those who experience and respond to flooding events. This global threat requires resilience to minimize damage during a flood catastrophe and to overcome the destruction afterwards. For these reasons, solving flood risk urgently requires increased collaboration by the public and private sectors.

Flood insurance has been available for many years through public and private sources — including government programs such as the US National Flood Insurance Program (NFIP) and the insurance industry. Other countries approach flood insurance in a variety of ways, but in most geographies flood insurance is underutilized, resulting in protection gaps.

Unfortunately, the gap between economic and insured losses from flood has been widening. Between 2007 and 2021, only 17% of global flood losses were insured, according to Marsh McLennan analysis.

Working together, the public and private sectors can speed recovery following flood events and increase communities' resilience to future risks. This is especially needed in communities where insurance take up rates are low due to availability, affordability, or complacency. It's a balancing act between the two sectors to ensure entrepreneurship produces long-term profitability that alleviates the strain on taxpayers footing the bill for recovery and resiliency measures.

One of the best ways to expand on public and private partnerships is through complementing a government-sponsored flood insurance program with private flood insurance products. This market offers an alternative that allows consumers to select the option that best suits their needs. It also lessens the burden on taxpayers and de-risks the public sector.

Another prime example of the success of public/private partnerships is community-based catastrophe insurance (CBCI), an innovative and flexible approach to resilience. CBCI is a disaster insurance program arranged by a local government, a quasigovernmental body — such as a special-

“We are working on public and private solutions to flood risk today, and we are focused on improving flood resilience for the long term.”

KEVIN TOBIN
President and CEO of Torrent
Technologies, Inc.

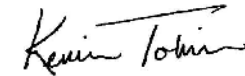
purpose district — or a community group covering individual properties within the community. CBCI has the potential to enhance the financial resilience of communities and their residents, provide affordable and reliably available disaster insurance, and create incentives for community-level and individual risk reduction. CBCI can play many roles in the dynamic ecosystem of existing public and private catastrophe insurance mechanisms. A CBCI policy could be for a single hazard, such as flood, or for multiple hazards, such as both flood and wildfire. Communities determine if they are willing and able to pay the costs of a CBCI program — through assessments and/or other public funds — in exchange for the broad benefits. This includes not just the primary benefit of improved financial recovery from disasters but also benefits from heightened understanding of the risks the community faces, larger incentives for risk reduction, and a more comprehensive risk management program.

In our *2022 State of Flood Report*, we highlighted a CBCI program in New York City that expands coverage to low- and middle-income households through innovative parametric insurance — insurance that pays a fixed amount on a claim triggered when an already established threshold is met. It also mitigates catastrophe risks with investments in resilience. New York’s program is a partnership between Marsh McLennan and global reinsurer Swiss Re, the National Science Foundation, the Mayor’s Office of Resilience, the Environmental Defense Fund, and other organizations.

The *2023 State of Flood Report* examines the current condition of government-sponsored and private flood insurance programs, the evolving nature of flood risk, steps that public and private sector organizations can take to mitigate this risk, and ways Torrent is making flood insurance more accessible. Our hope is the State of Flood Report will inform and inspire policymakers, communities,

insurance agents, and others to deepen their understanding of flood risk and come together to develop long-term solutions that increase resilience.

Torrent and our colleagues at Marsh McLennan recognize the power of public/private partnerships, but those cannot thrive without continuing leadership and vision in both sectors. A key element required is trust between public and private entities, but also between those parties needed to close this gap, including individuals, communities, organizations, and society as a whole.



Kevin Tobin

President and CEO, Torrent Technologies, Inc.

POTENTIAL BENEFITS OF CBCI



Enhance Financial Resilience

- Reduces the community’s contingent disaster liabilities
- Enhances the community’s credit risk profile
- Speeds the insured individuals and businesses to recovery
- Supports the community’s post-disaster economic revitalization



Provide Affordable and Available Coverage

- Reduces premium costs by:
 - Increasing buying power and securing volume discounts
 - Enhancing data provision for risk analysis
 - Reducing administrative costs
 - Supporting means testing
- Increases insurance availability by:
 - Potentially lowering premium costs
 - Guaranteeing coverage post-loss
 - Increasing confidence in risk assessment and peril modeling
 - Retaining and attracting catastrophe capacity



Incentivize Community-level and Individual Risk Reduction

- Enables capture of premium discounts for community-scale and household mitigation efforts
- Supports financing of risk reduction activity via premium surcharge
- Enhances decision-making around risk reduction through risk analytics and pricing

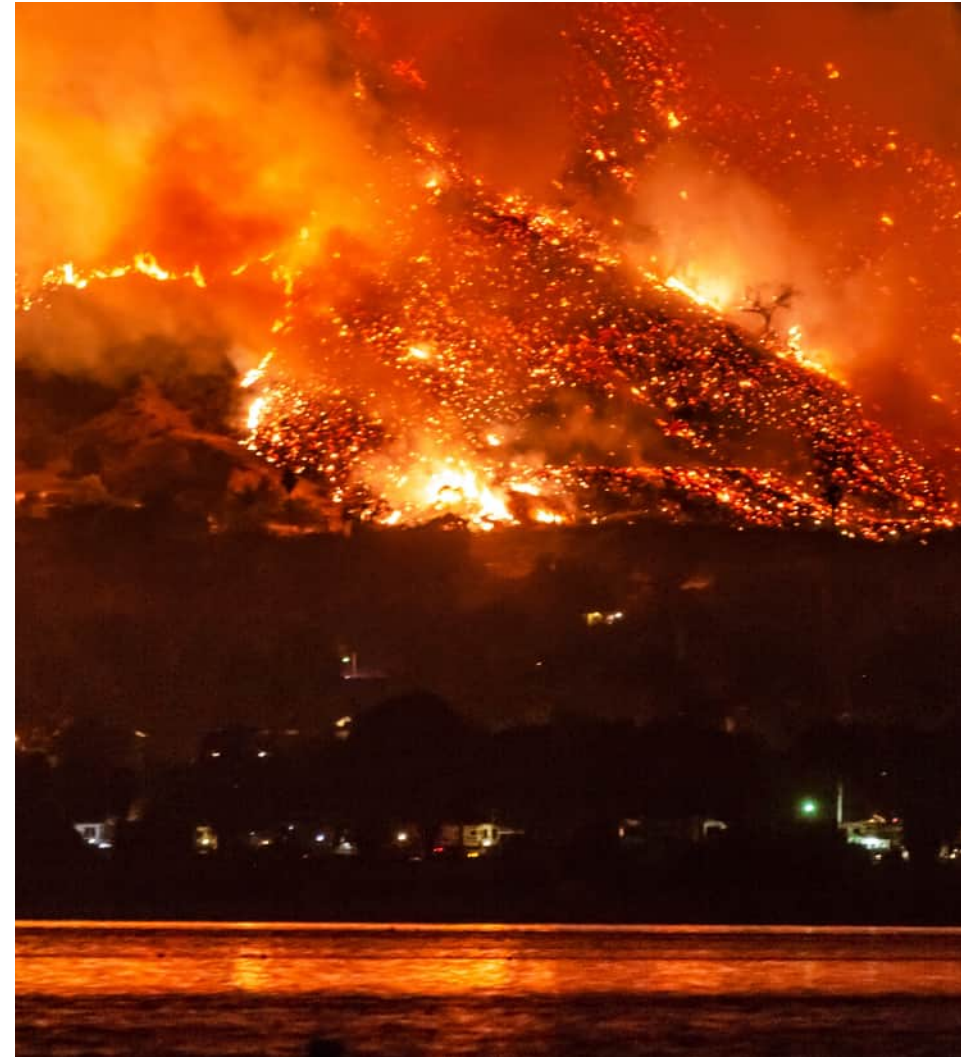
Executive Summary: Flood Insurance in Review

As climatic conditions shift and worsen, natural catastrophes are becoming more severe. They also are becoming more interconnected, exacerbating the impact of flooding. For example, persistent drought is worsening wildfires, which in turn deprive landscapes of vegetation and other natural barriers to flood. A cycle of drought coupled with atmospheric rivers is causing severe flash floods in many areas. With more communities at risk, the need for public/private partnerships to close the protection gap and develop long-term flood resilience is greater than ever.

During 2023, several instances of extreme precipitation caused massive flooding. These included: Tropical Storm Hilary, the first such storm to hit Southern California in 80 years; record flooding in western Kentucky; historic rainfall in northern New England; inundation and landslides in Italy's Emilia-Romagna region; a rainstorm that triggered evacuations in central Greece following a prolonged drought; and the catastrophic flooding in Libya as a result of dam failure.

Catastrophe loss frequency and severity have driven up reinsurance rates for six consecutive years, according to Marsh McLennan's reinsurance broker Guy Carpenter. These conditions have added pressure to commercial insurers and diminished global capacity for insurance against catastrophes and other weather-related perils. Nevertheless, Torrent continues to see growth in the private flood insurance market. Worldwide, there is an ongoing need for more options in standalone flood insurance.

Closing the protection gap and improving resilience will require even more partnerships between governments and private industry. Working together, the public and private sectors can improve community flood mitigation efforts and speed recovery following flood events.



Flood Market Overview

Financing for flood risks is available in many countries, mainly under government-backed programs. A private market for flood insurance has been growing steadily, especially in the US and UK, where more private flood insurance products and parametric options are becoming available. Elsewhere, however, standalone flood insurance from any source — private or public — remains limited.

THE NATIONAL FLOOD INSURANCE PROGRAM

The main source of flood insurance in the United States is the National Flood Insurance Program (NFIP), which Congress created in 1968 and requires periodic congressional reauthorization. The Federal Emergency Management Agency (FEMA) administers the NFIP.

At publish date, President Biden had signed legislation extending the NFIP's reauthorization through November 17, 2023.

Congress' last multiyear reauthorization of the NFIP expired in 2017. Since then, there have been 25 short-term extensions and three brief lapses.

DISTRIBUTION OF NFIP POLICIES

Federally backed flood policies are available through the following two channels:

- The Write Your Own (WYO) program is comprised of a group of nearly 50 insurers that use their own licensed agents and producers. FEMA authorizes the WYO insurers to act as fronting carriers and to service NFIP policies.
- NFIP Direct is a program that allows agents not appointed by WYO insurers to obtain flood insurance directly through the NFIP.

PRIVATE FLOOD INSURANCE

In the decades before the NFIP was created, the private insurance market abandoned coverage for flood losses due to an unsustainable aggregation of claims. Recent improvements in risk technology and analytics have enabled private insurers and reinsurers to better understand flood risks. This has led to a steadily growing, private flood insurance market in the US.

Types of private flood insurance currently available include:

Primary Residential and Commercial Flood

This type of insurance can mirror NFIP coverage terms or provide enhanced coverage for residential and commercial properties.

NFIP Versus Private Market Options for Residential Flood Coverage

Standard NFIP Coverage	Private Market Coverage*
Dwelling limits of \$250,000	Dwelling limits up to \$2 million +
Contents limits of \$100,000	Contents and personal property limits up to \$1 million
Contents-only limits for renters up to \$100,000	Personal property up to \$1 million
30-day waiting period	No waiting period or limited period, e.g., 7 days
No additional living expenses are currently offered via NFIP	Potential additional living expenses up to \$250,000

+ Some homeowners insurers also provide coverage for flood via endorsement

* Examples of private primary residential flood coverage

NFIP Versus Private Market Options for Primary Commercial Flood

Standard NFIP Coverage	Private Market Coverage*
Building limits of \$500,000	Building and contents combined limits up to \$10 million
Contents limits of \$500,000	
30-day waiting period	Often a limited period, e.g., 7 days
Business income coverage is unavailable at the moment	Business income coverage is often available privately

* Examples of private primary commercial flood coverage

Commercial “All-Risk”

A broad form of coverage designed for large businesses, all-risk policies can provide protection for different kinds of property risks, including flood and business interruption. The amount of coverage available in these policies is typically much greater than a flood-only policy. In recent years, however, underwriters have put more scrutiny on flood in all-risk programs, and in some instances, reduced coverage for specific locations. All-risk coverage for flood is usually unsuitable for small businesses and does not apply to homeowners.

Excess Flood

This form of private coverage sits atop underlying private primary coverage or an NFIP policy. Excess flood insurance is available to individuals and businesses, and it can provide higher limits of protection, as well as enhanced coverages such as additional living expenses and business interruption.

Contents-only Coverage

Many people renting homes, apartments, and condominiums do not have contents-only flood insurance. This form of private flood insurance is an opportunity to help renters achieve financial peace of mind.

Other nations have also set up government-backed flood insurance programs, with varying features. Here is an overview showcasing a handful of programs:

UK: Flood Re is a government-provided reinsurance scheme for the flood component of homeowners insurance. Unlike other national flood insurance programs, Flood Re is designed to smooth the transition to a private flood insurance market by 2039, with review of the program’s progress every five years. The program was conceived in 2014 as a partnership between the UK government and the insurance industry to keep flood insurance available and affordable for homeowners. In its 2023 Transition Plan Report, Flood Re said its “Build Back Better” campaign of investing in flood defenses, which launched in 2022, is ensuring flood-prone properties are rebuilt to be resilient to future flooding. According to Flood Re’s research, each £1 invested in flood defense saves £5.60, resulting in at least £1.1 billion saved annually.

Canada: In March 2023, Canada announced government funding for its first National Flood Insurance Program, which will launch sometime in 2025. Details are still to be worked out between federal authorities and the insurance industry, but the program is expected to emulate the UK’s Flood Re. This is a timely idea, as Canada recently has experienced extreme weather and wildfires, which exacerbate inland flood risks.

Australia: Until the establishment of a [cyclone and flood damage reinsurance pool](#) in July 2022, the flood peril in Australia was largely left to private insurers. Variable definitions of floods and differing levels of coverage led Australia to require a standard definition of flood for all insurance policies. Excluded from the cyclone reinsurance scheme are non-cyclone severe weather events, including seasonal flooding.





Flood Risk Rising

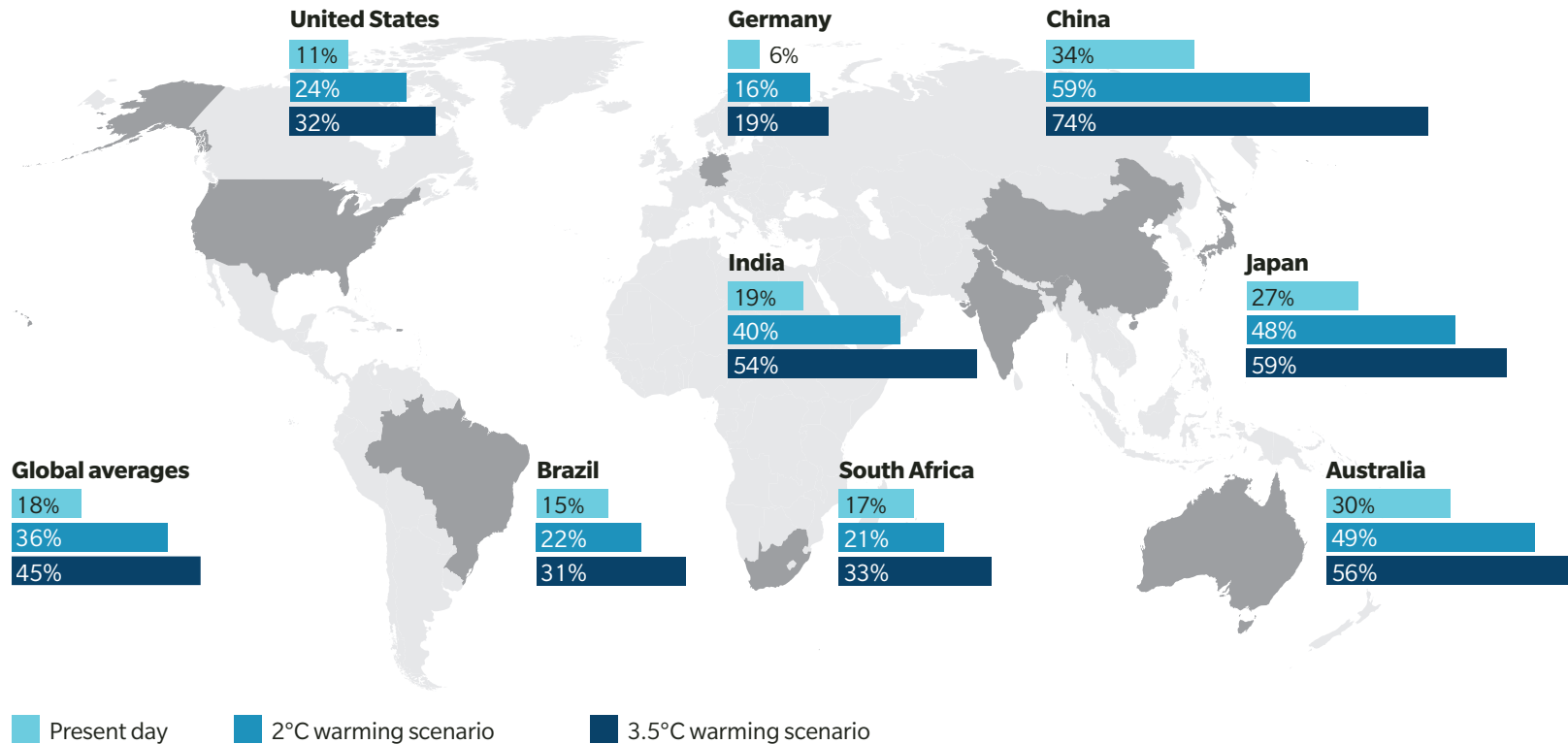
The frequency and severity of floods around the world are increasing, as demonstrated by recent events.

In 2022 and 2023, for example, extreme rainfall caused severe flooding that killed and displaced thousands of people in Pakistan and Australia. Flooding in Libya from massive downpours led to dam failure and resulted in loss of life for tens of thousands of people, while displacing many others. This tragically demonstrates the role of infrastructure in preventing these losses.

Persistent flooding in Indonesia's capital, [Jakarta](#), has led the country to begin relocating the capital to a higher elevation on the Island of Borneo, 800 miles away. Surrounded by rivers that spill over during monsoon season, sinking land plus increasing rainfall and rising sea levels, and ever-expanding urbanization, Jakarta is vulnerable to a constant state of flooding and the health hazards that accompany each flood. [Italy](#), [Turkey](#), [Bulgaria](#), and [Greece](#) experienced floods and mudslides that claimed lives and destroyed businesses. Sadly, many of those affected did not have flood insurance or other means to mitigate their flood damages.

In the US, flooding remains the #1 natural disaster, with zero boundaries to season or location. The usual patterns of floods are shifting. This is true on a global level as well.

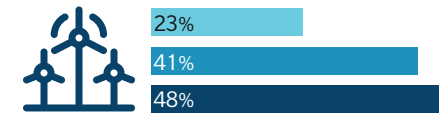
Population of Risk at Present and Under 2°C and 3.5°C Warming Scenarios



Infrastructure at Risk at Present and Under 2°C and 3.5°C Warming Scenarios

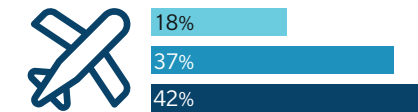
Power infrastructure

Generation capacity



International airports

Seats



International ports

Trade outflows

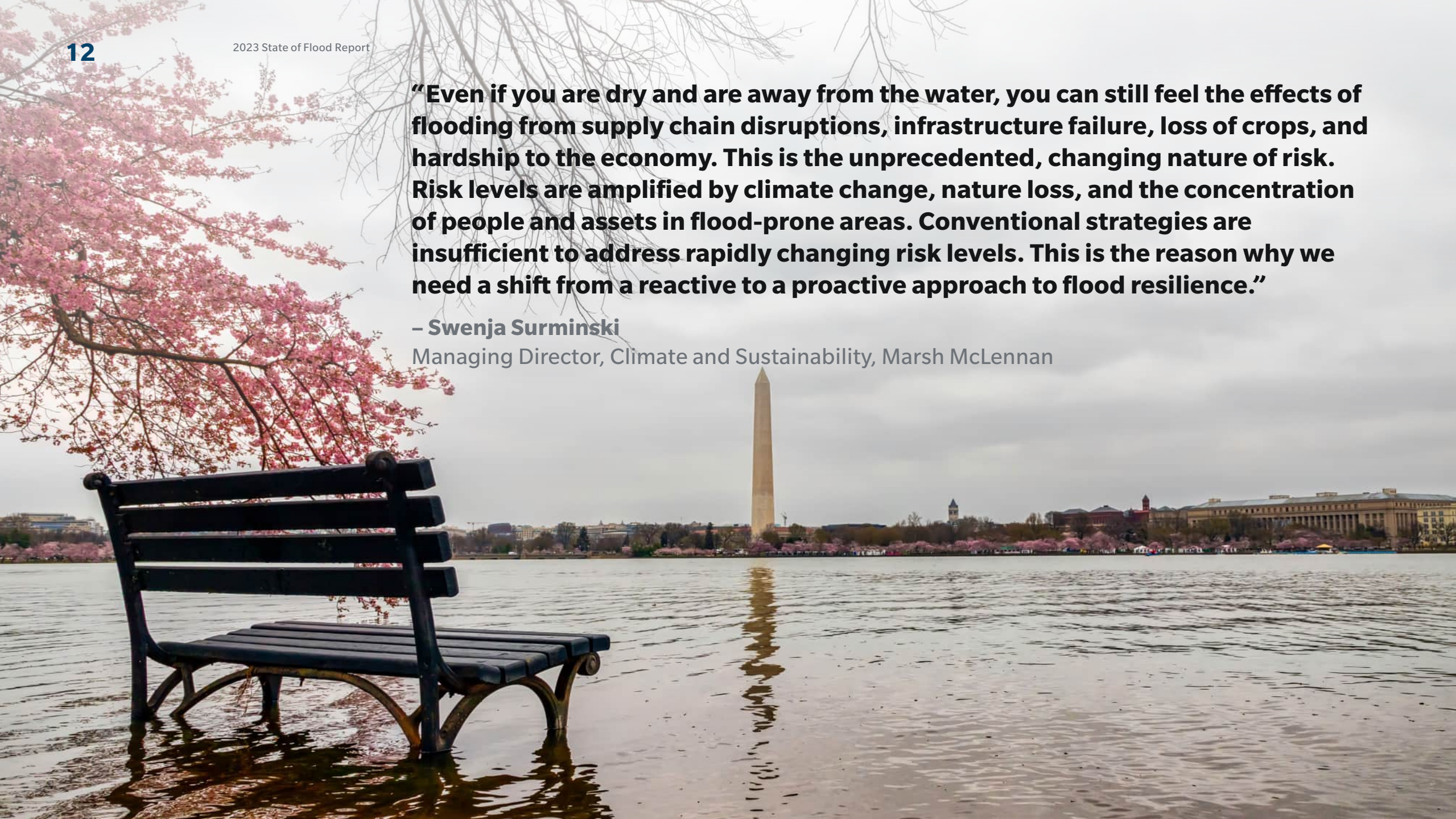


■ Present day
■ 2°C warming scenario
■ 3.5°C warming scenario

“Even if you are dry and are away from the water, you can still feel the effects of flooding from supply chain disruptions, infrastructure failure, loss of crops, and hardship to the economy. This is the unprecedented, changing nature of risk. Risk levels are amplified by climate change, nature loss, and the concentration of people and assets in flood-prone areas. Conventional strategies are insufficient to address rapidly changing risk levels. This is the reason why we need a shift from a reactive to a proactive approach to flood resilience.”

– Swenja Surminski

Managing Director, Climate and Sustainability, Marsh McLennan



Extreme precipitation — mostly in the form of rain, but in some areas, snowfall — is becoming common in the US. A report by the First Street Foundation, “[The 8th National Risk Assessment: The Precipitation Problem](#),” concludes that high-severity floods are occurring with much greater frequency — affecting millions of Americans, including urban areas far from rivers or coastlines.

Flood risk maps and models may not fully capture these changes in flood risk.

Examples of Common Failures in Flood Risk Management



Governance

- Failure to account for changing risk levels
- Limited appreciation of socioeconomic implications
- Ineffective incentive systems



Land Use and Infrastructure

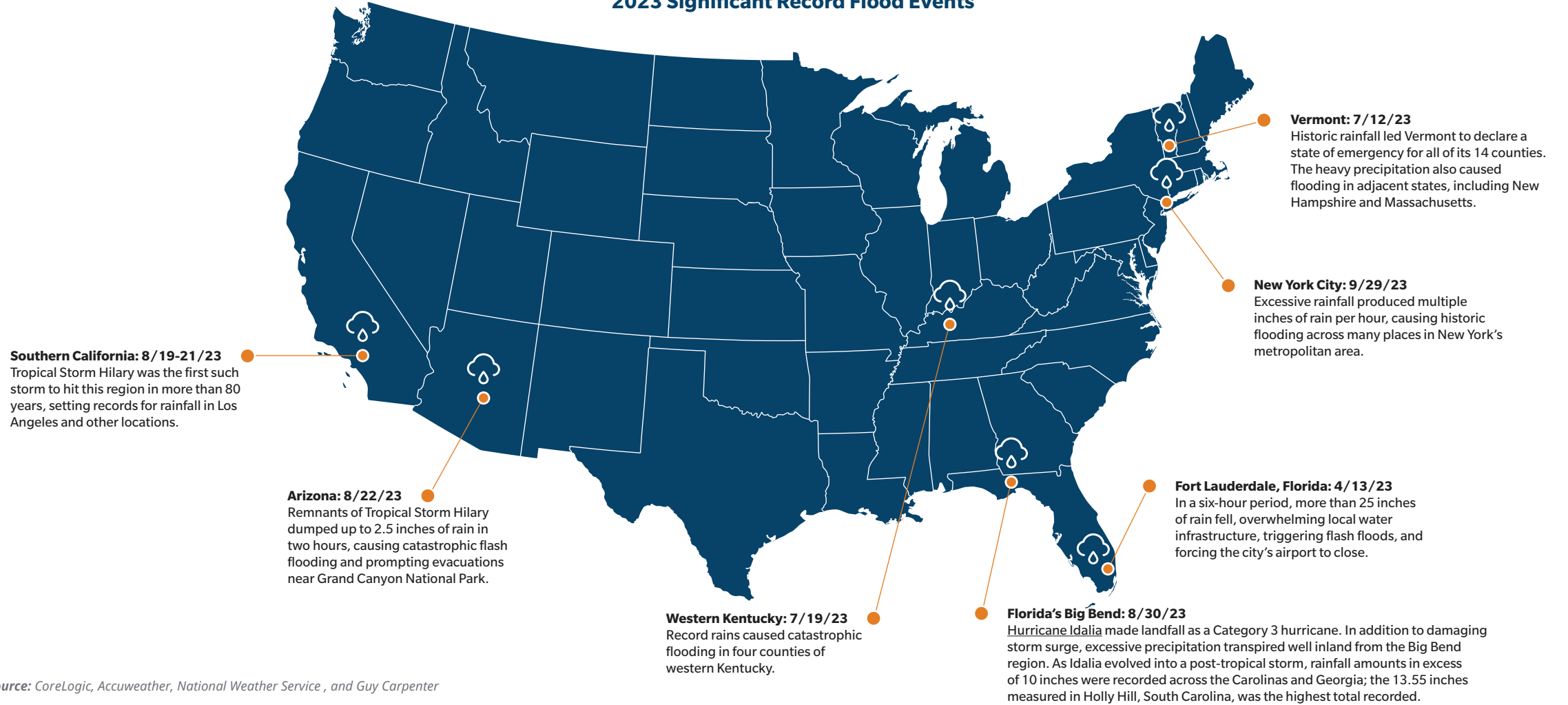
- Permitted maladaptation and continued risk creation
- Overreliance on gray infrastructure and underinvestment in nature-based solutions
- Inadequate infrastructure maintenance efforts



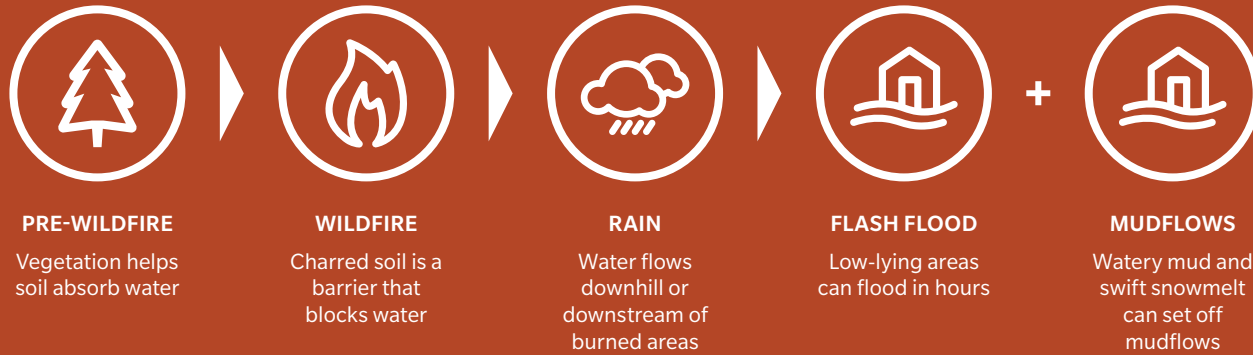
Finance

- Disruption to insurers’ business models and reduced access to coverage
- Challenges in persistent lack of resilience measurement and indicators
- Chronic underinvestment in risk reduction and preparedness

2023 Significant Record Flood Events



Fire Fuels Flood



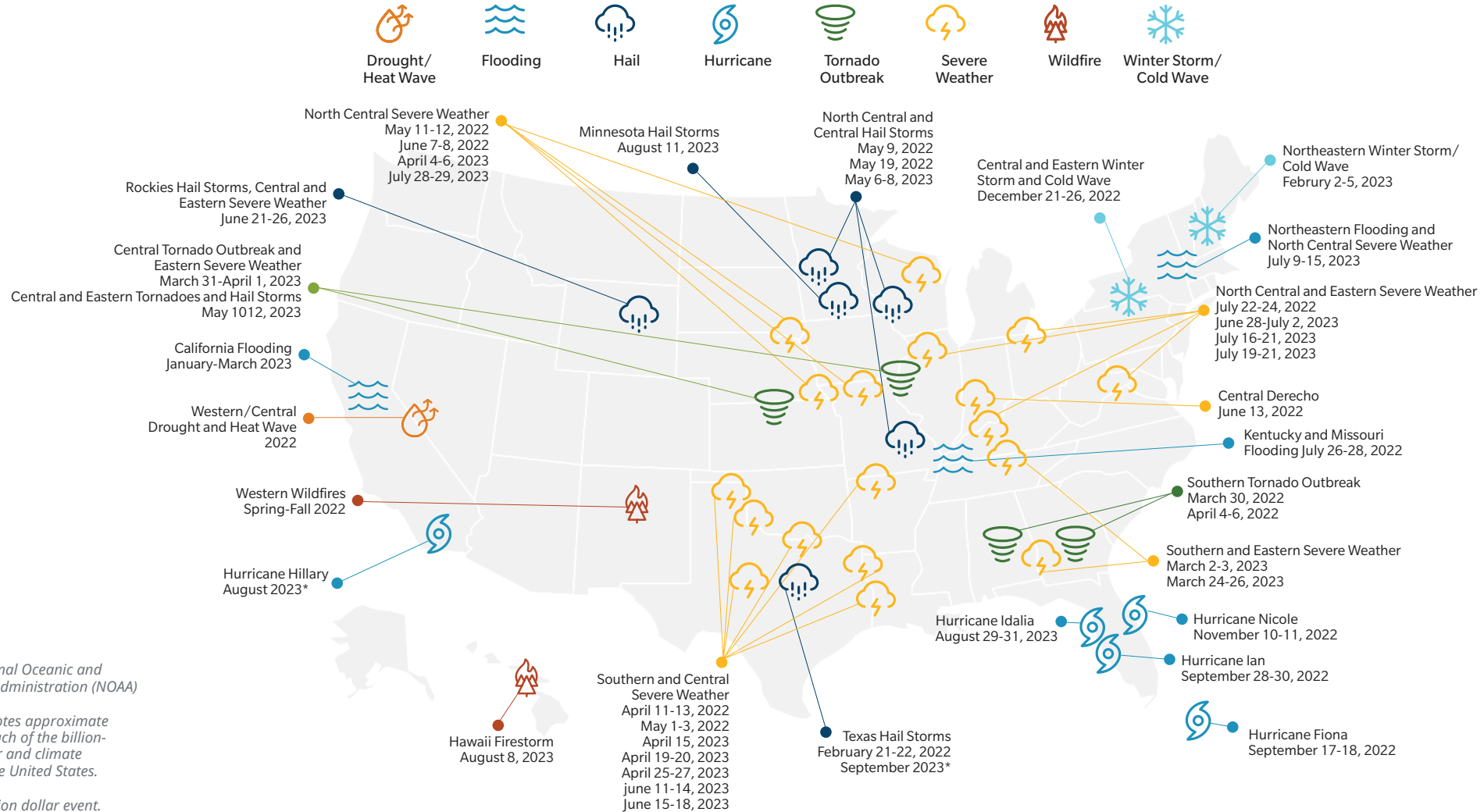
Wildfire and drought compound flood risk. Loss of vegetation can divert water or reduce the ground's ability to absorb it. With the prevalence of these conditions in many parts of the US, and a greater incidence of extreme precipitation, flash floods are happening more often, and in more areas.

The standard for severity established by FEMA and defined by flood maps as Special Flood Hazard Areas (SFHAs) is the 1-in-100-year flood. This is an expression of probability, meaning a flood event that has a 0.01% chance of occurring. The First Street Foundation's analysis, however, determined that this understanding of flood risk is outdated, and that a 1-in-100-year probability should no longer be considered accurate.

The First Street Foundation noted severe flood events have been occurring in succession during the past 20 years.

Notably, the First Street Foundation report suggests another impediment to understanding flood risk due to extreme precipitation is the near-universal focus on rainfall within a 24-hour period. Why is this deceptive? Because often excessive rain is not spread out over a 24-hour period, which would make it easier to be absorbed or channeled to stormwater systems in urban areas. Four inches of rain in 24 hours is entirely different from four inches of rain in two hours. The 24-hour measurement period obscures the reality: Intense precipitation in these shorter bursts overwhelms local infrastructure and topography leading to more frequent flooding.

US 2022-2023 Billion-Dollar Weather and Climate Disasters

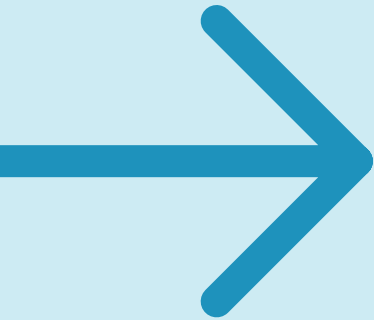


Source: National Oceanic and Atmospheric Administration (NOAA)

This map denotes approximate location for each of the billion-dollar weather and climate disasters in the United States.

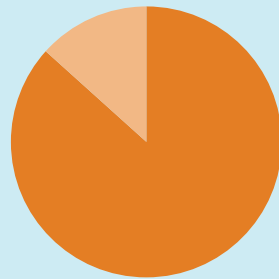
*Potential billion dollar event.

Hurricane Ian in 2022 displayed firsthand the critical nature flood insurance plays in recovery. NFIP data shows there were nearly 50,000 Ian flood insurance claims. Total payments to insureds were over \$4.3 billion, with the average claims payment nearly \$114,000.



In Focus: Agents as Trusted Advisors

Flood is a global problem, but its impact is felt locally by families, businesses, and communities. Unfortunately, the percentage of property owners that lack flood insurance is high. According to the Insurance Information Institute (III), only 22% of homeowners report they are at risk for flooding and of those, only 78% purchased flood insurance. In addition to the misperceptions seen in the chart below, there are other reasons for the lack of uptake, including affordability in our inflationary times as property owners seek ways to cut expenses and need more adequate flood insurance products to help close the gap. For these reasons, insurance agents have a vital role to play in helping to manage the risk where floods happen. By serving as trusted advisors, agents offer guidance and help property owners better understand their exposure to flood, as well as the options for addressing it.



78% of US homeowners believe their property is **NOT** at risk for flooding

Many individuals and businesses forgo flood insurance due to lingering misperceptions, including:

Misperception	Reality
A homeowners or business policy will cover flood damage.	Almost all homeowners policies exclude flood. Not all business policies cover flood losses; commercial property policies vary in the perils they will cover, and in some, flood is sublimited, which means it's covered at a lower amount than the policy limit and subject to a higher deductible.
If the property is not within a SFHA, it does not need flood insurance.	Home loans that are federally backed generally require borrowers to have flood insurance if their property is in an SFHA, but the lack of a lending requirement is not a reflection of flood exposure. Indeed, FEMA notes about 40% of NFIP flood claims come from non-SFHAs.
Disaster assistance funds can be used to repair damage to a property after a flood.	Federal disaster assistance may take the form of Small Business Administration (SBA) loans, which must be paid back with interest, or disaster assistance grants, which generally are limited to \$5,000. Even minor flood damage to a home or business is likely to far exceed that amount. In addition, it can take time to apply for and receive such funds. Flood insurance claim payments typically can be advanced or settled more quickly, but disaster assistance is an important complement. It's worth noting that disaster assistance rules usually require recipients to obtain flood insurance to remain eligible for future assistance.
The area hasn't flooded recently, or isn't near a body of water.	Flooding can happen anywhere, even inland and in areas of higher elevation. In fact, 99% of US counties have experienced flooding, according to FEMA.
The only option for flood insurance is the NFIP, and that doesn't provide adequate coverage.	The NFIP is one source of flood protection, but the private insurance market is steadily growing, with a variety of new products and enhanced coverages. NFIP annually pays out billions of dollars in claims for dwelling and contents. After Hurricane Ian, for example, the average NFIP claim was \$104,000, within or close to the limits available under the NFIP.

Relationships matter in insurance, and agents often have strong connections with homeowners and businesses in their communities. Talking with clients about their flood exposure and ways they can manage the risk is a good way for agents to demonstrate their value and enhance those relationships.

Steps That Can Simplify Agents' Ability to Act as Trusted Flood Risk Advisors



Offer flood insurance with every policy quote – for renters, homeowners, and businesses.



Insist on clients signing a waiver if they decline flood insurance.



Educate clients about flood risk and discuss their perspectives.



Revisit flood coverage annually as part of account reviews.



Include private flood insurance solutions to complement the NFIP's standard coverage.



Make it easier to purchase flood insurance with auto-populated data and instant quote/bind from insurers.

Torrent is leading the way to make flood insurance more accessible, with a growing number of product offerings, an intuitive website interface with enhanced auto-populate capabilities, and improved customer experience in all aspects of flood resilience, from buying policies to claims service.



Actions for Public and Private Sectors

With flood risk rising, more communities are immediately exposed to flood events, and the number is growing rapidly as the threat escalates. Given these conditions, a goal of the public and private sectors should be to help communities achieve flood resilience.

Government agencies working with private sector organizations can develop solutions that accomplish three important states of flood resilience:

Mitigation

At the local, state, and national levels, government and the private sector can enhance building codes to improve flood risk mitigation and strengthen defenses when flooding does happen. Green infrastructure as proposed by the US Environmental Protection Agency (EPA), for example, can provide a natural means of controlling both localized and riverine flooding. Designers and engineers, meanwhile, can explore ways to reduce the volume of stormwater flowing into streams and rivers, and to better visualize where to site properties to avoid floods.



Natural hazard mitigation saves \$4-\$11 in avoided future losses for each \$1 invested.

Source: National Institute of Building Sciences

Recovery

People, businesses, and communities fare better following flood events when they can rebuild quickly. Flood insurance is a valuable means of protection that enables recovery and rebuilding. Infrastructure repair is essential for getting materials and services to people who need them. For example, roads and bridges must be restored as quickly as possible to get resources in and the dangers out. Governments and the private sector can make flood insurance easier to obtain and smooth the claims process for property owners, as well as their agents and brokers. In the US, the WYO program is an important channel for individuals and businesses to get NFIP protection, though it's not the only one. Many private flood insurance options exist that complement the NFIP, and the list is growing. This is good news in the effort to help close the flood insurance gap.

Resilience

Pairing flood insurance with mitigation leads to better outcomes — exemplified by the CBCI pilot in New York City — and enables individuals, businesses, and communities to build greater resilience against loss due to flood damage. Building for past or even current weather patterns is no longer sufficient as climate change will create increasingly volatile and tumultuous storm activity in the years ahead. In order to reduce vulnerability to future flooding, resiliency must be considered at the community level. FEMA recently announced its program to build resilience across the US, providing additional resources for the most vulnerable areas. The program provides opportunities for private and public partnerships for mitigation and resilience projects — a prime example of public and private collaboration efforts.

Portfolio of Established and Emerging Tools to Manage Flood Risk



BEHAVIORAL

Risk information sharing, evacuation training, supply chain diversification, and others



ENGINEERED

Structural measures to control water and reduce the potential impacts of flooding



NATURE-BASED

The restoration, preservation, and management of natural capital (e.g., ecosystem protection and soil rehabilitation)



POLICIES AND REGULATIONS

Building codes, mandatory resilience standards, risk disclosure requirements, and others



R&D AND DATA

Advancements in risk analytics, modelling, monitoring, and forecasting



RISK TRANSFER

Traditional insurance and reinsurance, and innovative risk transfer solutions (e.g., parametrics, risk pools)

To rethink how to use existing tools and approaches for managing flood risk, we developed three principles:

- 1 Embrace current and forward-looking risk trends discerned through advanced analytics
- 2 Harness co-benefits by taking a systems-level approach to resilience (working with nature, for example)
- 3 Coordinate the implementation of tools through new modes of collaboration

Resilience incentivization is a roadmap conceptualized by the National Institute of Building Sciences (NIBS) that details these recommendations for incentivizing resilience efforts focused on flooding from excessive rainfall, also known as pluvial flooding:

1. **Develop a flood resilience building certification program.**
2. **Pilot test an incentive program**, such as discounts on mortgage fees for flood mitigation measures undertaken by homeowners, or insurers incorporating parametric insurance to more efficiently protect against damages sustained by homeowners after experiencing a pluvial flood event.
3. **Test the conjecture that flood resilience has a market value.** Do flood resilient features in homes provide a good return on investment at the time of sale?
4. **Engage private insurers to help them to accelerate their investment in resilience.** NIBS provides a three-step approach to engaging private insurers and state insurance regulators on pluvial flooding, risk reducing mitigation actions, and relevance of private flood insurance.

“However, as I saw firsthand during my time at FEMA, the government alone cannot address the resilience gap. It will take public and private stakeholders, each working to leverage their unique capabilities, resources, and programs for the greater good. While they may lack direct authorities (the “sticks”), many of these stakeholders hold the carrots that could prove pivotal in closing the resilience gap.”

DANIEL KANIEWSKI, PH.D.

Chair, NIBS Committee on Finance, Insurance, and Real Estate Multi-Hazard Mitigation Council
Managing Director, Public Sector, Marsh McLennan



POLITICAL PLAYS: EXTENDING THE NFIP LONG TERM WHILE ADDRESSING AFFORDABILITY AND REMOVING BARRIERS TO INNOVATIVE SOLUTIONS

Flood risk is not a partisan issue; floods and the conditions that lead to them recognize no political affiliations. Fortunately, US legislators have proposed bipartisan flood insurance reforms that enhance flood risk protection and increased transparency. A longer-term NFIP extension would help stabilize the program. As mentioned earlier, it's been in a state of short-term extensions since 2017.

Risk Rating 2.0 is a new pricing methodology that FEMA rolled out beginning in 2021. The rating program is intended to make NFIP premiums more actuarially sound to better reflect the underlying flood risk and recognize loss mitigation efforts.

One of the biggest issues is affordability. Currently, NFIP flood insurance premiums will increase up to 18% each year until they reach actuarially sound rates. This places financial burdens on many people and communities unable to relocate or pay the premiums.

New approaches to financing flood risk for vulnerable populations, as well as new private flood insurance products, are possible. These include:

Community-based Catastrophe Insurance

CBCI is disaster insurance arranged by a local governmental or quasi-governmental body or community group covering a group of properties within the community. There are two key features of CBCI:

1. It is purchased or facilitated by some type of community entity
2. It covers multiple properties

Beyond these two features, there can be enormous flexibility in the structure and design of CBCI. In most cases, it will make sense for CBCI to serve as a complement to traditional property insurance markets, potentially in the form of supplemental disaster protection.

This could either provide small cash payouts to community members in the event of a disaster or offer full-limit, single-peril property protection in areas with high risk. In areas where the uptake of private insurance is low or protection gaps persist for other reasons, CBCI can offer the community a means to work with carriers or private capital providers to rebuild (and subsequently sustain) insurance uptake while facing loss volatility.

Parametric Insurance

This form of alternative risk transfer is becoming more widely used as a tool to improve climate resilience. Parametric insurance solutions use a third-party index to set predefined triggers, and the policy pays out once the agreed metrics are reached, regardless of the loss sustained. For example, a parametric flood insurance product could pay property owners when a threshold amount of rainfall is reached in a specified area and time period. An advantage to parametric insurance is the separation of the cover trigger from the cover beneficiaries — it removes potential underwriting bias found for lower-income communities.

Potential Roadmap to Implementation



Driving Toward Resilience

The industry, led by Torrent and Marsh, is taking steps to close the protection gap, mitigate flood risk, and promote resilience. We see five core areas as priorities for achieving these goals:

Long-term Authorization of the NFIP

Legislation pending in Congress deserves support from the private sector to provide sustained funding of the NFIP as a key source of flood protection.

Private Sector Engagement With Federal Policymakers

Given their interest in the expansion of private flood options to provide more choice to policyholders, the insurance industry and businesses should make their case to members of Congress and executive branch officials.

Flood Insurance Offered With Every Property and Casualty Quote

Agents can and should offer quotes on flood coverage for every new and renewal P&C insurance quote.

Promotion of Resilient Construction and Rebuilding

Proper design and thoughtful planning can promote flood resilience in the construction of new buildings as well as rebuilding following disasters.

Increased Use of FEMA Programs

Disaster assistance, such as the grants available from FEMA, can supplement flood insurance, whether from the NFIP or a private insurer. The insurance industry should encourage customers and communities to make use of this funding and other FEMA programs. This includes the relatively new [Building Resilient Infrastructure and Communities \(BRIC\)](#) grant program and other legacy hazard mitigation grant programs. These grant programs enable communities to invest in a variety of hazard mitigation projects, to include funding to remove or relocate buildings and infrastructure from [floodplains](#). Such buyouts are an effective way to reduce the long-term costs of flood damage.

For example, [Charlotte-Mecklenburg County](#) in North Carolina is using FEMA and non-federal funds to relocate about 700 families and businesses from local floodplains. This project began in 1999 and is expected to be completed by 2035.

**RESISTANCE + RECOVERABILITY =
RESILIENCE**

Flood **resilience** is a combination of:

- 1. Resistance:** Measures that hold back water.
- 2. Recoverability:** Measures that minimize the impact and speed of recovery if water enters a building.



Torrent is hyper-focused on the following actions to help pave the way to resilience:

Educate

We are driving awareness of the need for flood insurance as a significant part of the resiliency equation and are promoting the variety of options available in the marketplace to accompany the NFIP in the US.

Make Flood Insurance Easier

We continue to advance our technology platforms to make it as easy as possible for agents, brokers, policyholders, and soon-to-be policyholders, to use. Evolving features that make our platform easier include automated population of data fields and Intuitive Compliance® that generate more accurate quotes. Torrent is enhancing our service and simplifying the process to obtain flood coverage and handle claims.

Make Flood Insurance More Accessible

As part of the journey to make flood insurance easier, we are making it more accessible by joining forces with national entities to deliver a complementary array of flood insurance solutions.

Torrent is committed to delivering technology, service, and products to agents, brokers, and consumers that make it as easy as possible to access flood insurance and to have a satisfying claims experience. As the leader in the flood insurance space, Torrent is part of the bigger picture of improving flood resilience, benefitting from the broad array of strategies and solutions being innovated by Marsh McLennan to transform the industry.

Increase Options

We are increasing the number of flood insurance products available through the Torrent platform. We are working collaboratively with our colleagues at Marsh and other Marsh McLennan businesses to make a positive difference through climate resilience strategies and solutions. Torrent and Marsh McLennan are building confidence and risk appetite with providers of risk capital to make private flood insurance more extensive and affordable, leading the way to flood resilience.

Enhance the Customer Experience

Torrent clients rely on us to provide peace of mind in the moments that matter. Torrent knows flood insurance is not just a technology venture — it's a people business. We're enhancing the customer experience through policyholder portals that allow claim status monitoring and exploration of direct-to-consumer options. We are working to make flood insurance more readily available, while delivering exceptional customer service, for an industry-leading experience.

Direct and Indirect Drivers of Flood Risk

Direct drivers



Extreme rainfall



River overflow



Storm surges



Sea level rise

Indirect drivers



Urban development

Urban sprawl in at-risk areas, impermeable surfaces, inadequate drainage networks, and aging flood defense infrastructure



Improper agricultural practices

Alteration of soil structure and water retention capacity



Nature loss

Deforestation and the degradation of ecosystems reducing natural flood defenses

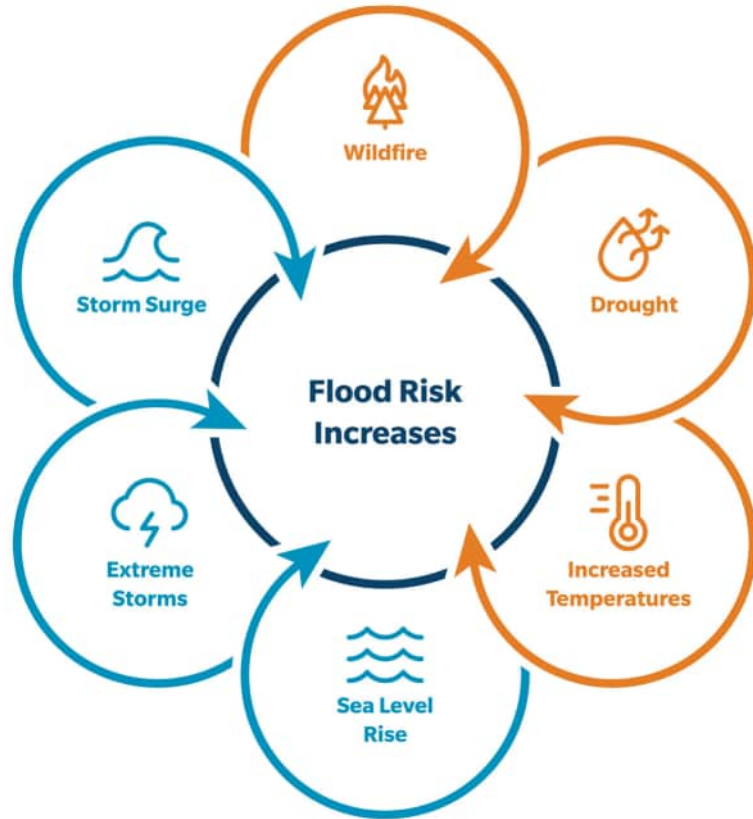


Interdependence with other perils

Drought, coastal erosion, wildfires and subsidence interacting with and worsening flood hazard

Climate change influences direct and indirect drivers and amplifies flood risk

Natural Catastrophes Feeding Flood



THE WAY FORWARD, TOGETHER

As a leader in addressing the world's complex and increasingly interconnected dynamics around risk, strategy, and people, Marsh McLennan helps clients embed climate resilience strategies into every aspect of their businesses, from navigating the transition to a resilient, low-carbon economy to managing the physical risks associated with extreme weather events, including flood.

Flooding is no longer a localized challenge, but a systemic, global threat.

Flood risk is increasing at an alarming rate in many parts of the world. More frequent and severe floods pose an increasing, complex threat to society, economic activity, and the environment. Risk levels are amplified by climate change, nature loss, and the concentration of people and assets in flood-prone areas.

Sea level rise is worsening the impact of storm surges in some coastal regions, while changing climate patterns are also increasing flooding outside traditional risk zones, for example, through record-breaking rainfall events.

Global economic losses from floods increased from \$504 billion in the 15 years between 1992 and 2006 to \$729 billion between 2007 and 2021 (in inflation-adjusted 2021 dollars), an increase of over 30%.

The global population threatened by flooding is expected to rise from 18% now, to 36% in a 2°C warming scenario, to 45% under a 3.5°C warming scenario.

Flood insurance protection gaps are growing in many parts of the world. Losses are leading to challenging renewals and insurers exiting markets. In many countries, flood insurance is not even available.

Flooding creates significant social costs. Floods exacerbate inequalities, reverse development gains, and cause large-scale population displacements. With expected sea level rises these social costs could multiply, as up to 630 million people will live on land below projected annual flood levels by the end of this century.

TO ACCELERATE THE TRANSFORMATION OF FLOOD RISK MANAGEMENT, WE PRESENT THREE WAYS FORWARD.

For each, we define the rationale and vision, outline the core components, and provide examples of implementation. In many locations, all three ways forward should be integrated into flood resilience strategies.

1. Learning to Live With Floods

Society must expect and prepare for flooding, with responses that enable a return to normal with minimal disruption after low-level, low-intensity floods. This means adapting to changing risk levels in a timely manner. Risk culture must balance fairness and individual responsibility. Risk data should be used effectively and knowledge translated into action. Community engagement initiatives should cultivate a culture of shared risk ownership, while innovative technologies link early warning to early action, and insurance solutions incentivize risk reduction.

2. Building Strategic Protection

Destructive, tail risk events still require protection, particularly for essential assets and locations where moving is not an option. In this instance, water is a design driver for urban development, while society increases investments in preserving ecosystems. We can design and build for resiliency. Funding comes through innovative financial mechanisms that monetize resilience for investors and provide attractive returns. Standardized frameworks help investors measure resilience, and resilience assessments from rating agencies steer private sector investments. New risk finance pools for communities provide insurance and resilience finance. Investments in data and technology support schemes such as resilience bonds, while risk reduction makes it possible to extend insurance coverage through solutions such as resilience-focused, public-private risk pools.

3. Preparing for Relocation

In high-risk locations, it may not be feasible to accommodate floods or build protection. Planned relocations of people and assets can be both economically efficient and equitable. Here, risk assessments serve as the basis for action, and countries lay the foundations for relocations early with anticipatory governance and long-term funding arrangements. Communities are empowered to contribute to decisions on acceptable levels of risk, identifying priorities such as cultural preservation. Mechanisms to redirect resources from disaster relief to pre-emptive buyouts enable societies to avoid a pattern of cyclical destruction and rebuilding. In countries with space constraints, relocations take place across borders and are governed by international agreements. New financing and funding mechanisms based on long-term cost minimization and distributional fairness are deployed at scale.

Bold steps from governments and the private sector are needed if society is to shift from a reactive to a proactive approach to flood resilience. Strong narratives about co-benefits are essential. Similarly, decision makers must be prepared to confront difficult trade-offs.

RESILIENCE SOLUTIONS FOR THE US

Driving climate resilience initiatives with the [Marsh McLennan Disaster Resilience Center of Excellence](#), Marsh McLennan and Torrent are paving the way for proactive engagement within the public and private sectors necessary for better US flood resiliency practices.

Solutions are available. We see the way forward as a collaborative relationship between the public and private sectors. Recently, Julian Enoizi from Guy Carpenter shared during a Congressional flood insurance hearing insights on the five ways the public and private sector can work together to narrow the flood insurance protection gap. These include:

1. Strengthen the NFIP
2. Protect US taxpayers with reinsurance
3. Grow the private flood market
4. Reduce risk and embrace innovations, this includes designing and building for resilience along with parametrics
5. Deliver new solutions such as community-based catastrophe insurance [CBCI]

Features of Parametric Insurance Solutions



SPEED

- Faster and simpler to settle than conventional insurance.
- Accelerate recovery and enhance resilience.



COSTS

- Lower administrative and frictional costs.
- No claim adjustment process is typically required.



FLEXIBILITY

- Any type of financial loss can be covered.
- Unrestricted use of payouts. These do not directly indemnify for damage, enabling organizations to invest in resilience or offset revenue impacts.



COMPLEMENTARITY

- Can supplement traditional insurance policies by addressing their limits and exclusions.
- Provides coverage for types of risks that are difficult to insure through conventional policies.



TRANSPARENCY

- Payouts and terms are clearly defined based on measurements of physical variables (e.g., rainfall amount).
- Reduced disputes over coverage.



ACCESSIBILITY

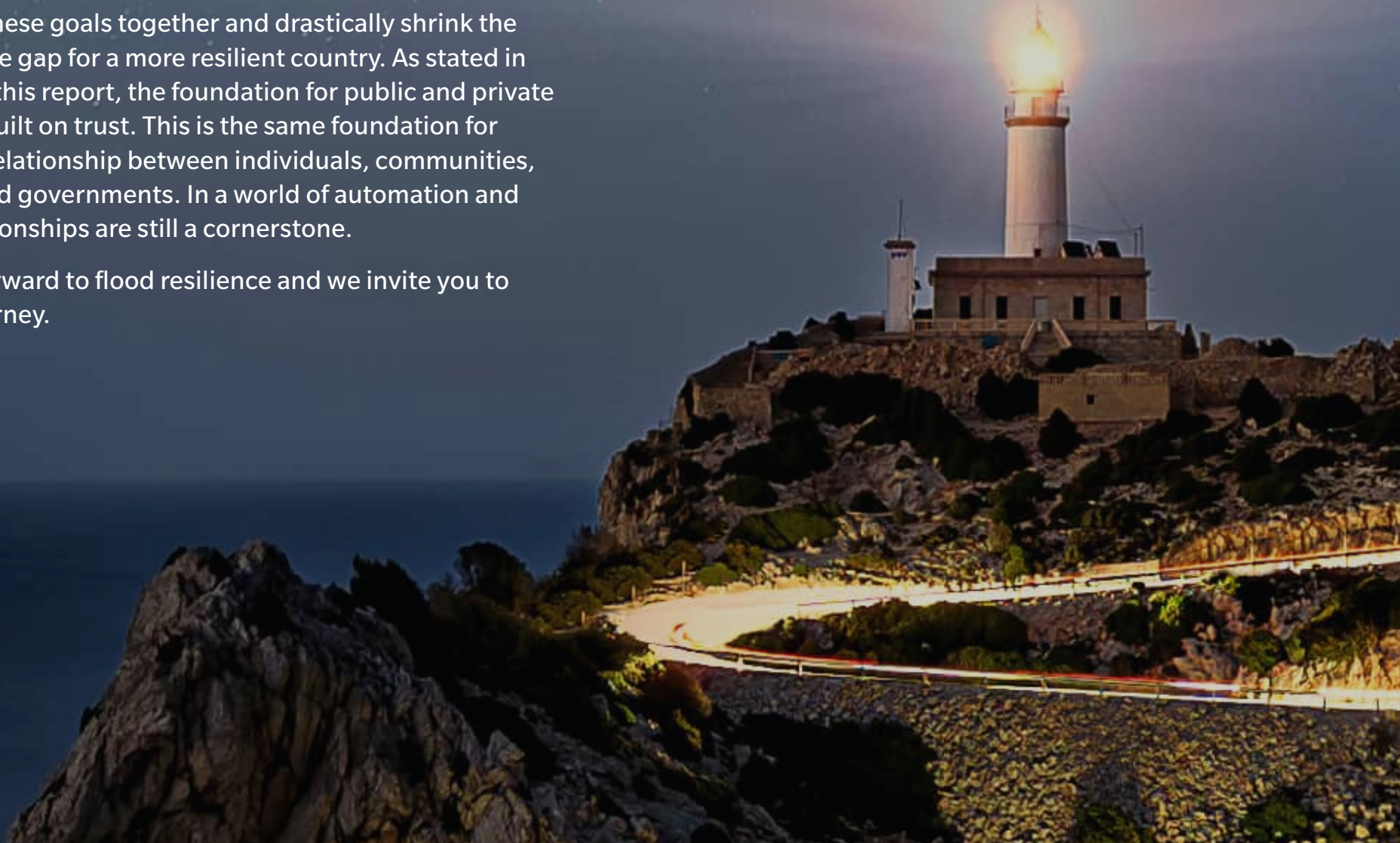
- Payouts and terms are clearly defined based on measurements of physical variables (e.g., rainfall amount).
- Reduced disputes over coverage.

Disadvantages include basis risk: The possibility that the payout may not cover losses in full, or may exceed the damage sustained by the insured.

Source: Marsh McLennan

We can achieve these goals together and drastically shrink the US flood insurance gap for a more resilient country. As stated in the beginning of this report, the foundation for public and private collaboration is built on trust. This is the same foundation for any sustainable relationship between individuals, communities, organizations, and governments. In a world of automation and technology, relationships are still a cornerstone.

This is the way forward to flood resilience and we invite you to join us on the journey.



ABOUT TORRENT TECHNOLOGIES

Torrent Technologies, Inc. is a part of Marsh that leverages industry-leading service and technology to improve the underwriting, distribution, and claims service of flood insurance. Since 2017, Torrent has been the National Flood Insurance Program (NFIP) Direct Service Provider. About 75% of Torrent's Write Your Own (WYO) carrier clients utilize its full business process outsourcing capabilities, which include underwriting, claims, accounting, agency support, training, marketing, information technology, and mailing services. Integrated private primary flood and excess flood policies are offered along with the NFIP to provide agents and policyholders with a more seamless experience. A cloud-based, software as a service model enables clients to retain elements of flood insurance servicing. Torrent also offers integrated private primary and excess flood insurance for WYOs, their agents, and clients.

ABOUT MARSH

Marsh is the world's leading insurance broker and risk advisor. With over 45,000 colleagues operating in 130 countries, Marsh serves commercial and individual clients with data-driven risk solutions and advisory services. Marsh is a business of Marsh McLennan (NYSE: MMC), the world's leading professional services firm in the areas of risk, strategy and people. With annual revenue over \$20 billion, Marsh McLennan helps clients navigate an increasingly dynamic and complex environment through four market-leading businesses: Marsh, Guy Carpenter, Mercer and Oliver Wyman. For more information, visit marsh.com, and follow us on [LinkedIn](#) and [Twitter](#).

Torrent Technologies is a business of Marsh, which along with Guy Carpenter, Mercer, and Oliver Wyman, are the primary businesses of Marsh McLennan.

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