ANTICIPATORY FLOOD RISK MANAGEMENT

5 steps for insurers

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EXECUTIVE SUMMARY

Floods are the most frequent type of natural disaster and occur when an overflow of water submerges usually dry land, according to the World Health Organization (WHO). Although there may be specific geographical reasons, studies conclude that overall climate change can trigger flood events.

Aside from heavy rainfall, which causes most flood damage, melting glaciers and snow-caps are also concerning. Increasing population density, accumulation of assets, and rising urbanization exacerbate the situation further. Floods affect regions differently, with high-income areas facing more significant damage costs and low-income regions facing more deaths.

Micro, Small and Medium Enterprises (MSMEs) are vulnerable because they typically have fewer financial and technical resources to cope with risks and negative community impact. What's more, the lack of proper risk mitigation strategies often forces governments and taxpayers to bear the economic burden.

Low insurance penetration in emerging economies, accounts for most global insurance gaps and may present a growth opportunity for private firms to establish flood insurance initiatives and risk vulnerability plans. A study of existing flood insurance policies worldwide found that most geographies approach flooding reactively. The report recommends a move towards a five-step anticipatory flood risk management framework:

1. Creating flood vulnerability maps,
2. Educating residents about flood insurance,
3. Making insurance affordable,
4. Creating a reinsurance pool, and,
5. Digitizing the insurance value chain.

Various financial instruments could generate cash to invest in resilient infrastructure and boost insurance coverage. Additionally, public/private partnerships can help states and municipalities offer local bonds, maintain their credit rating, and build a backstop against catastrophic loss.

With adequate support and an open mindset, insurers can play a significant role in building more flood resilient communities.

UN PANEL SAYS CLIMATE CHANGE IS DRIVING THE RISE OF FLOODS[1]

Claims Journal highlights the story of Alberto Castaneda who let his home's flood insurance lapse, a mere two months before Hurricane Harvey. He had never filed a claim on the policy in 10 years, and he needed the extra cash to expand his restaurant business.

The floods from the Hurricane have cost Castaneda and his uninsured neighbours. A couple in their 70s let their home go into foreclosure; two people, overwhelmed by the difficulties of rebuilding, committed suicide. It cost Castaneda nearly $135,000 from his business to cover repairs to his home that Harvey submerged under more than 2-feet of water.[2]

He is not alone. Worldwide, individuals and companies are struggling to respond to the rise in flood events in recent decades (close to 62% of the 4,250 flood disasters (reported since 1970) have occurred since the year 2000).[3]

Jayne Shepherd co-owns a restaurant in Kings Staith, York, England, which had been open for 18 months when it was completely flooded during the Great Britain and Ireland floods of 2015. They lost absolutely Everything was lost – tables, chairs, cutlery, kitchen equipment, and bar equipment. Damages totaled around £60,000, and the owners lost income for three months. They had insurance but said they couldn't get flood coverage for flooding that year.[4]

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[1] Although there may be specific geographical reasons, the Intergovernmental Panel on Climate Change (IPCC), a UN Panel, said it found conclusive evidence of the impact of climate change on the rising instances of flood events.

[2] Claims Journal, "Flood Damage Caused by Hurricane Harvey Boosts Insurance in Texas,"Aug 1, 2018.

[3] Data collected by Centre for Research on the Epidemiology of Disasters (CRED) on historical disaster events, 2016

[4] The Guardian, "One year on from the floods: businesses tell how they picked up the pieces," Dec 26, 2016

1. Increase in the frequency of heavy precipitation over many global regions as higher air temperatures allow the atmosphere to retain more water
2. Rise in the mean sea level to contribute to upward trends in extreme coastal high-water levels
3. Changes in heat waves, glacial retreat, or permafrost degradation may cause slope instability and glacial lake outburst floods

Among these contributors, heavy rainfall accounts for most damages. For example, as part of a 2021 Stanford study, researchers said intensifying precipitation contributed one-third of the financial costs of flooding in the United States over the past three decades, totalling almost $75 billion of the estimated $199 billion in flood damages from 1988 to 2017.

The situation is further exacerbated due to increasing levels of urbanisation, which tends to reduce the water absorption capacity of land by converting natural terrain to urban use.

In a statistical study, the University of Washington analyzed 37 mountain glaciers worldwide, including the Palcaraju Glacier in the Peruvian Andes. The study found that mountain glacier retreat is more than 99% likely to be the result of climate change over the past century. Residents and businesses around these high-risk areas are concerned about stories like those of Castaneda and Shepherd.

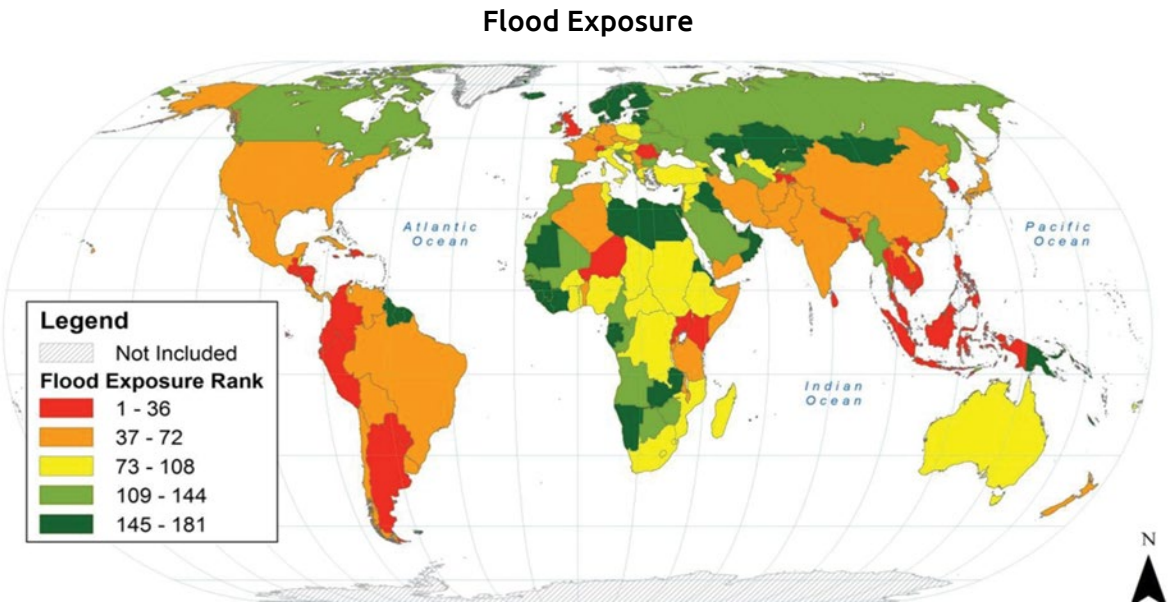
FLOOD AFFECTS EACH REGION DIFFERENTLY

Vulnerabilities contingent upon geography, economy, and risk strategy

Flood exposure is defined as the extent to which valued aspects of a community's life (e.g., health, prosperity, security) are likely to be affected by a flood. Each country has a different flood exposure due to a combination of geographical reasons and risk mitigation strategies. For instance, mainland Southeast Asia faces higher flood exposure due to rising sea levels and frequent tropical cyclones.

Countries with the least insurance are typically exposed to risks the most, including climate change impact, and are least able to fund disaster recovery efforts. Emerging and low-income economies account foralmost all of the global "insurance gap," according to a Lloyd's report.[5]

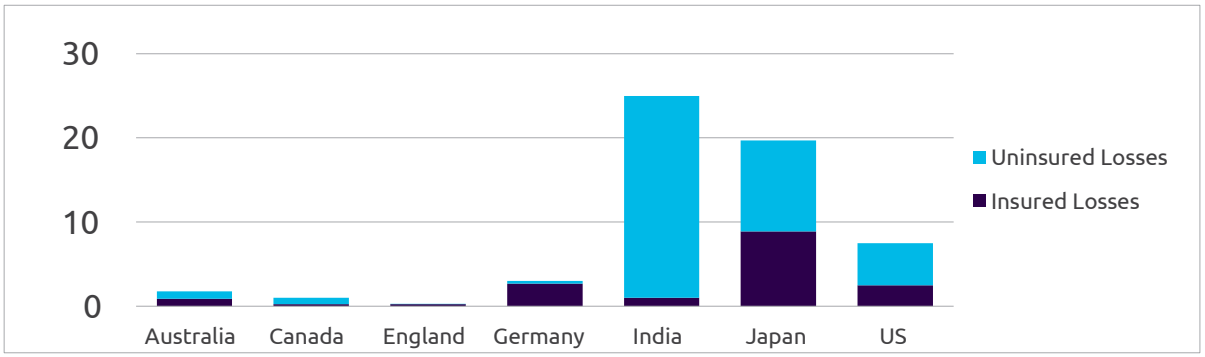
Figure 1. Countries ranked by flood exposure level



Sources: World Bank, "People in Harm's Way: Flood Exposure and Poverty in 189 Countries", September 2020

[5] A world at Risk- Lloyds, 2018

Figure 2. Insured vs. uninsured losses around the world (2019)



Sources: Munich RE, "Natural disaster risks: Losses are trending upwards", September 2020

Insurance penetration rates are on average twice as high in rich nations as those in developing countries, the report noted. Bangladesh, India, Vietnam, the Philippines, Indonesia, Egypt, and Nigeria all have an insurance penetration rate of less than 1%, the Lloyd report further added.

Significant Impact on Livelihood

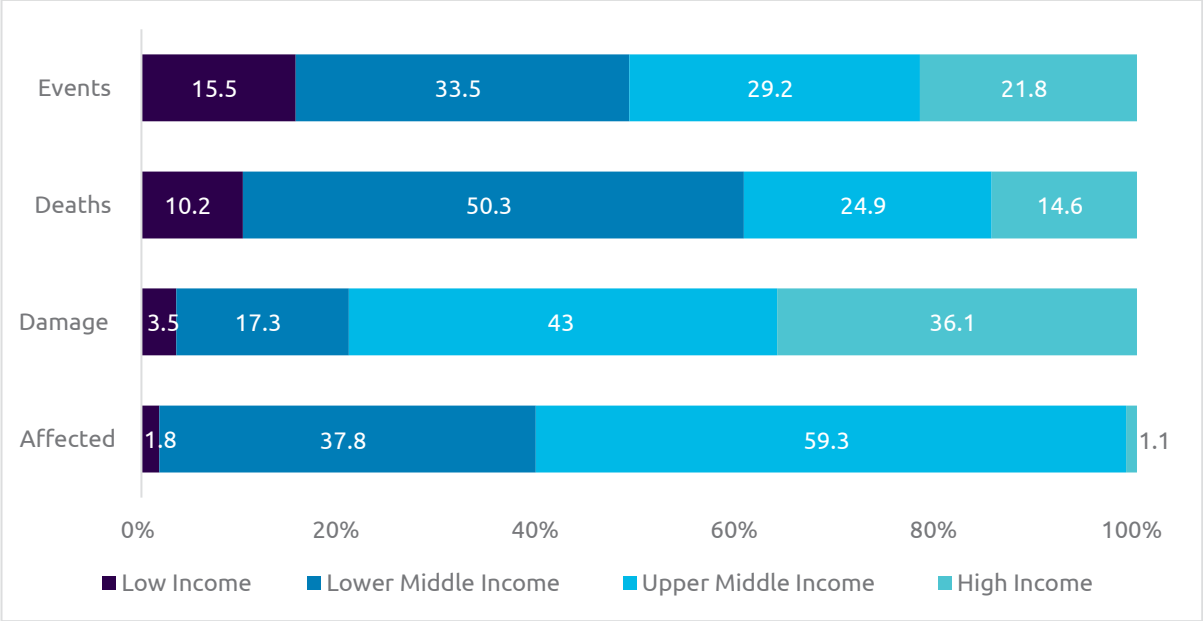
Floods are capable of widespread destruction and devastation. A single event can result in loss of lives and damages to personal property and critical public health infrastructure. Flooding is Australia's costliest natural hazard-related cause of disaster when both tangible and intangible losses are considered.[6] However, the impact is amplified due to population growth and the accumulation of assets in flood-prone areas, which have led to a substantial increase in built-up areas susceptible to flooding.

The consequence of flooding varies substantially with levels of income of the affected country. Lower-income countries like Sri Lanka and Bangladesh tend to face higher deaths, while higher income countries such as the United States and China face higher levels of property damages. Based on a recent study from Gen Re, floods make up 24% of economic losses caused by natural catastrophic events in China. The inundations have resulted in direct economic losses worth around 200 billion yuan (USD 29 billion), according to a Chinese official at a media conference.[7]

[6] The Geneva Association, "Flood Risk Management in Australia", Dec 2020

[7] Lockton, "Severe monsoon floods expose protection gap in China", Sep2020

Figure 3. More than 60% of the deaths have occurred in low or lower middle income countries, while high and upper middle-income countries accounted for about 80% of damages[8]



Sources: Financial Management of Flood Risk-OECD, 2016

MSMEs Face High Vulnerability

Micro and Small Medium Enterprises (MSMEs) are more vulnerable to natural disasters than other types of businesses. In 2016, Sri Lanka faced the worst ever floods in 27 years. Aside from the impact on more than 300,000 individuals, small businesses also bore the brunt of the floods. According to NDRSC records, around 31 MSMEs were fully damaged and 5176 MSMEs were partially damaged in the Colombo district alone.[9]

Among all the sectors, Agriculture faces the most direct flooding impact of flood. The foremost adverse effect of flood on agriculture is water logging in cropping area. Crops do not survive under water after a certain period, and the production gets affected severely after that. After the spring floods in 2019, farmers in the US faced losses upwards of $300 - $400 per acre.[10] Crop losses like these leads to feed and forage shortages for livestock later and have broad impact nationally and internationally.

Their vulnerability can be twofold:

1. Lower financial and technical resources to cope with risk and lack of risk management mechanisms. Most MSMEs lack the resources for proper risk management such as insurance, diversified supply and customer base and social protection for their employees.
2. General negative impact of disasters on communities in which MSMEs operate.

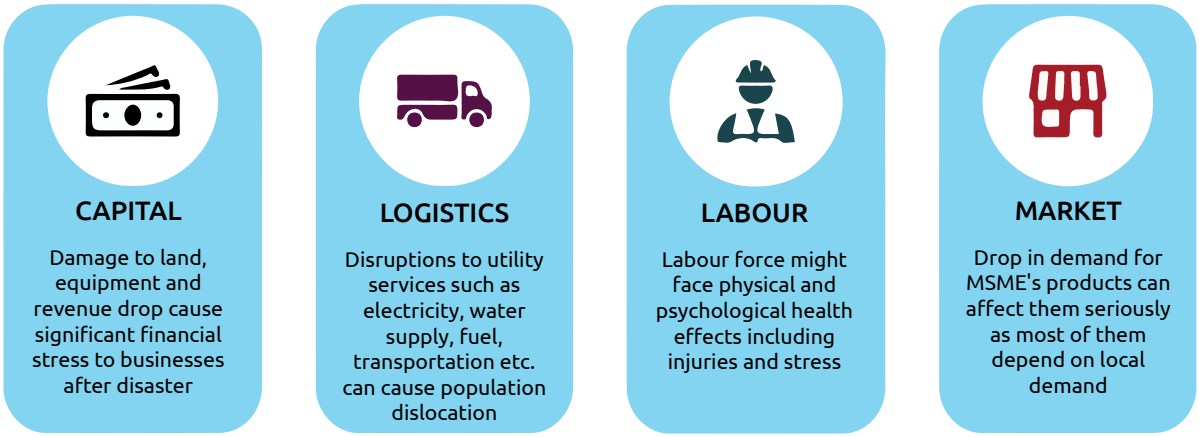
MSMEs face challenges on several fronts due to floods (Figure 2). They operate in a delicate ecosystem and need external support to minimize their disaster risk. Insurance schemes, with governments stepping in as a premium sharing partner, can allow most of the MSMEs to get protection.

[8] OECD, 'Financial Management of Flood Risk', 2016

[9] ScienceDirect, "A Case Study on 2016 Flood Event in Western Sri Lanka," 2018

[10] Reuters, 'After brutal spring floods, U.S. farmers face big losses', 2019

Figure 4. Aspects of MSME Flood impact



Sources: Capgemini Research, This is a diagram we created summarising the impact

Floods Increase Tax Liability on Wider Population

The increase in flood risk across the globe has also led to an increase in the economic burden on taxpayers. After a disaster, in the absence of a flood insurance policy, losses are generally paid through the government fund. In the United States, the National Flood Insurance Program (NFIP), funded by taxes, is under a debt of $20.5 Bn after being hit by the hurricane season across the Southeast and Gulf Coast. The astounding interest rates of $1 Mn a day will make it difficult for NFIP to repay its debts if Global Warming induced floods continue to devastate the region.

Avon, a town in the center of Hatteras Island in the US State of North Carolina, desperately needs at least $11 million to stop its main road from washing away. In the absence of any alternative source of funds, the government has planned to increase Avon's property taxes by almost 50%. Officials in Miami, Tampa, Houston, and San Francisco have borrowed money, raised taxes, or increased water bills to help pay for efforts to shield their homes, schools, and roads.

Audrey Farrow's grandmother grew up in Avon and met Farrow's grandfather when he moved to town as a fisherman in the late 1800s.

Standing on her porch last week, Farrow talked about how Avon had changed in her lifetime. The water is now closer, she said, and the flooding more constant. The wind alone now pushes water up the small road where she lives and into her lawn. "If we've had rain with it, then you feel like you've got waterfront property," she said.

New York Times, "https://www.nytimes.com/2021/03/14/climate/outer-banks-tax-climate-change.html"
Tiny Town, Big Decision: What Are We Willing to Pay to Fight the Rising Sea?

[11] Insurance Journal, "How Everybody Ends Up Paying for Climate Crisis", Mar 15, 2021.

RISK- BASED APPROACH IS BETTER THAN ONE SIZE FITS ALL

The first step towards establishing a flood insurance program is creating flood risk vulnerability maps. Hydraulic modelling programs can help to estimate flood risk and produce maps that indicate where flood-prone areas are located. Once the flood risk for different regions has been ascertained, it aids in setting flood insurance premiums. In the risk-based premium model, the higher the flood risk of a region, higher is the premium. High premiums incentivize residents to work towards mitigating the flood risk in their neighbourhoods.

FEMA's new Risk Rating 2.0 will enable a more equitable distribution of premium across divisions. On an average, 23% of NFIP policyholders will see a decrease of $86 per month. However, this would be countered by an increase of $10-$20 for a 7% population and more than $20 for nearly 4% of the policyholders.

EXISTING FLOOD INSURANCE PROGRAMS AROUND THE WORLD

It is interesting to note that different countries have taken a widely different approach in creating insurance programs for their communities. While some countries have opted to make flood insurance a mandatory policy, others have given the freedom to the residents to purchase flood insurance if they deem it necessary. In countries like such as the United States, private insurers do not insure against flood due to the prevalence of adverse selection i.e., a situation where only those at high risk of floods purchase flood insurance. In others like France, Belgium, Spain, and Romania, while the insurance program is mainly run by the government, some private support is available for less extreme events.

Most countries still focus their efforts on responding to flooding events when they occur rather than addressing their current and future vulnerability to flooding

Country	Government Initiatives	Private Sector	Stage	Challenges
Australia	Doesn't provide insurance cover; responsible for creating flood hazard maps & definition	Standard inclusion for home insurance policies (93% penetration) with an option to remove flood cover[12]	Risk- based premiums -> need to create re-insurance pool	Risk- based premium makes affordability a concern in high-risk flood regions
France (mandatory)	Mandates inclusion within home insurance policies	N/A	Flat rate premiums	Residents have no incentives to invest in risk mitigation since insurance is offered at a standard price
United States	Controls 96-97% of market through **National Flood Insurance Program (NFIP)** FEMA's **Individuals and Households Program (IHP)** provides financial aid to households affected by a disaster, who have uninsured or under-insured needs.	Policies for commercial properties & residential "excess" policies, above the $250,000 NFIP residential building coverage cap		IHP grants are capped at $34,000 and the average award provides only about $5,000 – $6,000. Flood insurance is mandatory only for SFHA areas, but 20% of claims are from non SFHA areas. FEMA - home repairs & housing costs, to make homes habitable after a flood, not bring them back to pre-disaster conditions
India	Unified Package Insurance Scheme (UPIS) mandatory crop insurance against floods for farmers		Vulnerability maps & scanty insurance policies	Low penetration (4%) despite high flood risk & past damage
Germany	Flood insurance bundled as a supplement with building insurance for earthquakes, avalanches, or snow build-up			

[12] Insurance Council of Australia, 2018

Country	Government Initiatives	Private Sector	Stage	Challenges
England	Government is responsible for investing in flood protection.	Covered under standard home insurance, banks require evidence for flood insurance for mortgage lending. Flood Re a reinsurance pool that is owned and operated by the insurance industry allows insurers to reinsure high- risk policies at a subsidized price	Have a reinsurance model in place	95%-98% for building insurance; 75% for contents insurance; 50% for tenants Flood Re doesn't incentivize reduction of flooding risk.
Japan	43% of insurance policies are offered by public-private co-operatives	Offered voluntarily only when bundled with home insurance		Very low penetration despite high risk
Norway (mandatory)	The government strongly regulates the insurance market.	Private insurers have formed a distribution pool that settles compensation damage. But policies are offered by insurers individually	Reinsurance pool	
Morocco	Government provides non-insured with some degree of compensation	Flood insurance is bundled with home insurance		

An emergent concept in mitigating losses due to flood risk is Community-based Catastrophe Insurance (CBCI). It is essentially group-based insurance strategy when any government or quasi-governmental entity arranges for the insurance on behalf of its residents within its jurisdiction or for a portion of its residents. With over 70% of natural catastrophe losses going uninsured, it caters to many communities that are facing increased volatility due to climatic changes. This can enable them to have better climate adaption strategies. Further, it is laid out on the lines of the existing national-level policies namely the Disaster Recovery Reform Act which authorizes building resilient infrastructure and community programs which is currently being implemented by FEMA.

The New York's Department of City Planning developed new zoning regulation in collaboration with the communities throughout the city to reduce flood risk for the neighborhood located in the vulnerable coastal areas. Along with this construction codes were amended to elevate beyond the preliminary new flood map for building in the SFHA.

Globally, assets worth about **$163 billion** are not insured against catastrophes, posing a "significant threat" to livelihoods and prosperity, London-based insurance market Lloyd's said in a report[13]. However, to improve society's ability to prepare for, respond to, and recover from flooding, there is a need to move to integrated, **anticipatory flood risk management (FRM)**.

[13] A world at Risk- Lloyds, 2018

Framework for anticipatory flood risk management (FRM)

	Existing Issues	Government	Insurers	Reinsurers	Local Communities
Flood Insurance Awareness	Standard homeowners insurance covers interior water damage, due to tornadoes and rainstorms but not damage by floodwaters.	Educate residents on the difference between flood insurance & homeowners' insurance policy's hazard coverage	Establish trust & spread awareness among local communities		Organize local events, create forums and prepare distributive material to sensitize the community on the importance of flood resilience
Flood Risk Vulnerability Maps	Several countries have not even begun the process of creating maps, which is a prerequisite for establishing a flood insurance program.	Chart out multiple zones with varying flood risk while creating vulnerability maps, especially for areas existing on the boundaries of high-risk zones	Provide risk assessment data to the government and quantify risk through catastrophe modelling.		
Creating Flood Resilience	Areas with high flood risk are increasingly becoming densely populated	Reduce occupancy in flood- prone regions, invest in infrastructure that can divert flood water & improve communication in high-risk areas		Sponsor CSR initiatives to augment flood resilience among communities	
Affordable Flood Insurance	High cost is a barrier in developing countries in South Asia & Africa.	Reward states that reduce flood risk by adopting high standards of property construction	Implement Risk-Based Premium model to incentivize communities to reduce flood risk. Engage with policymakers to lobby for tax exemptions for insurance products	Create a flood insurance pool (like Flood Re in UK) to enable reinsurance of high-risk policies at a subsidized price; insurers can thus pass on their own cost savings to policyholders	Work towards improving flood resilience. As flood risk reduces premiums for insurance go down
Digitisation of Insurance Value Chain		Geo-localise, communicate policies and enroll clients to make the process highly efficient.	Advanced digital modeling to design reliable indexes for risk maps & remote sensing to predict floods. Automate premium collection & pay-outs		

INSURERS CAN PLAY A VITAL ROLE

A report released by Lloyd's and the UK-funded Centre for Global Disaster Protection outlined innovative financial instruments that could generate cash to invest in resilient infrastructure and boost insurance coverage. They include loans that incorporate insurance to keep interest payments low, and bonds whose payments are linked to the success of resilience measures. Another idea is "resilience service companies" that would retrofit buildings to better withstand natural hazards, for example, reducing risks and lowering insurance premiums.

Public-private partnerships can play a crucial role in building a backstop against catastrophic losses that neither entity could provide on its own. Insurers and legislative bodies can work together to not only make communities resilient, but also help in maintaining the credit ratings for state and local bonds. While insurers can bring their financial strength, rich data, and risk expertise to bear, public entities can help to increase the take-up rate of coverage by encouraging communities to adopt risk mitigation regulations and educating consumers.

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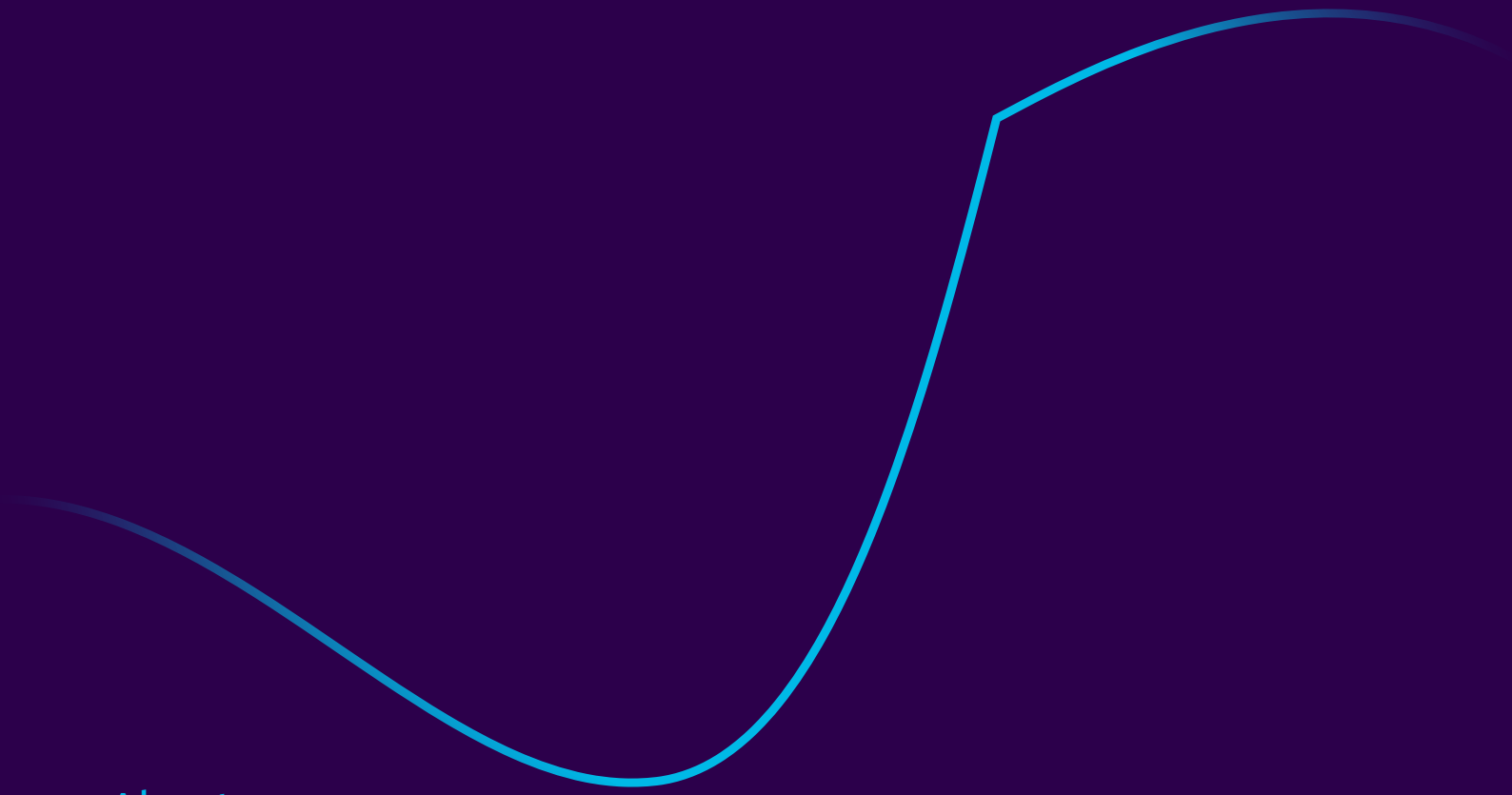

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