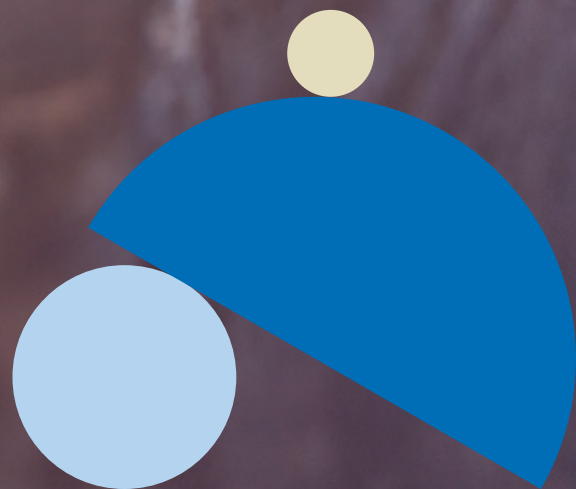




Climate Risks:  
Strategies for Building  
Resilience in a More  
Volatile World



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## Executive Summary

The Los Angeles wildfires at the start of 2025 were a stark reminder of the threat that extreme weather and natural catastrophes pose. They demonstrated that even the wealthiest nations are unprepared for the impact of increasing climate risks.

Natural catastrophes are becoming more frequent. The devastating human and economic costs inflicted by wildfires, windstorms, floods, heatwaves, droughts, and other extreme weather events will continue to rise, driven by long-term shifts in climate patterns, rising urbanization, and higher population density in vulnerable areas. The question that needs to be answered is: how do we respond?

Insurance has a critical role to play in offering protection to households, businesses, and governments, helping them recover financially from the effects of natural catastrophes. However, if the frequency of extreme weather events continues to rise, premiums for natural catastrophe insurance will need to increase to reflect the additional risk. This, in turn, will affect the level of protection that individuals and businesses are willing and able to purchase, with potential consequences for the overall functioning of the market.

To tackle this challenge, we need a new approach – one that focuses on reducing risks and protecting communities and businesses at the same time as extending the availability of insurance cover.

The insurance industry has a pivotal role to play here, too. Its risk management insights and capabilities can inform companies, governments, and communities on how to most effectively – and efficiently – strengthen their resilience to physical climate risks. By de-risking capital flows, the insurance industry can also help unlock the finance needed to build the infrastructure required to deliver that resilience. Reduced risks and enhanced resilience will in turn support continued insurability. Resilience is the best insurance.

However, the nature of the challenge means that the insurance industry cannot act alone. A coordinated approach between private and public sectors is required. With that in mind, this paper makes three recommendations for action:

- 1. Prioritize investment in risk prevention and reduction, leveraging insurance expertise.**
- 2. Expand access to insurance through supportive policy frameworks.**
- 3. Develop public-private risk-sharing mechanisms to ensure protection over the long-term.**

This paper outlines a roadmap for achieving these policy goals, emphasizing the need for immediate and sustained action from all sectors: governments, municipalities, communities, businesses, individuals and investors, as well as the insurance industry.

Together, we can work towards societies to be better equipped to withstand and recover from the growing threats posed by extreme weather and natural catastrophes.





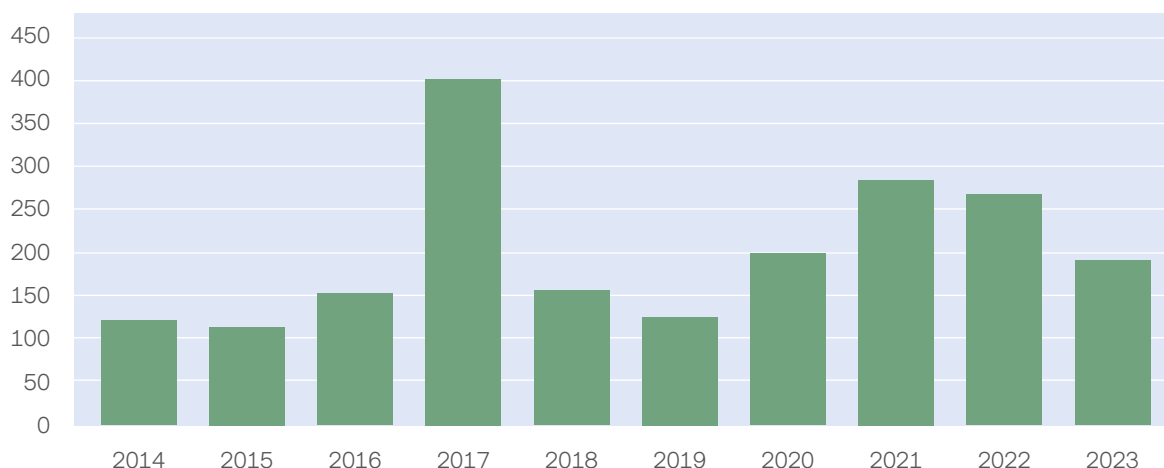
## The Challenge

# The rising cost of extreme weather and natural catastrophes

Extreme weather and natural catastrophes are imposing a significant human and economic toll across the world. Hurricanes, floods, wildfires, and other extreme weather events devastate communities and disrupt lives, incurring substantial economic costs. These costs arise from the destruction of property and infrastructure, as well as from the interruption of business operations, which are exacerbated by households and businesses locating in areas exposed to climate risks. Additionally, there are long-lasting financial repercussions, such as deterring investment, intensifying resource scarcity, and deteriorating social, economic, and environmental issues.

Over the past decade (2014–2023), extreme weather and natural catastrophes have resulted in approximately USD 2 trillion in economic losses, a figure that is on the rise. In 2022 and 2023 alone, losses totaled USD 451 billion, representing a 19 percent increase compared to the annual average from the preceding eight years (see Chart 1).

**Chart 1: Economic impact of climate-related extreme weather events**  
in USD billions, 2014 – 2023



Source: International Chamber of Commerce

The human cost of these events is equally significant, with approximately 1.6 billion people directly affected by extreme weather over the past 10 years, leading to death, disease, and economic instability.

The frequency and intensity of extreme weather events are increasing, and this trend will be exacerbated by long-term shifts in climate patterns in the coming decades. Variations in global average temperatures, rising sea levels, and changes in precipitation patterns will impact ecosystems, agricultural productivity, and human health, resulting in persistent environmental and economic damage. At the same time, the rise in urbanization and population density in vulnerable areas further increases the potential for extreme weather-related losses.

The urgent need to address the escalating costs of extreme weather and natural catastrophes is evident. Investment in risk reduction and prevention must not be delayed. Tackling this twin challenge requires coordinated action from both the public and private sectors. Insurers should leverage their risk expertise to help customers enhance resilience and optimize insurance coverage. Meanwhile, governments play a crucial role in coordinating economy-wide strategies to mitigate the risks posed by extreme weather events.

## Maximizing access to insurance

Insurers possess deep expertise in understanding and managing risk. This expertise informs how they deploy capital to provide the insurance cover that helps individuals, businesses, and the public sector recover from natural catastrophes. In 2023 alone, the insurance industry paid out USD 108 billion in claims related to natural catastrophes losses, providing a financial shock absorber to help economies and communities mitigate the impact of extreme weather events.

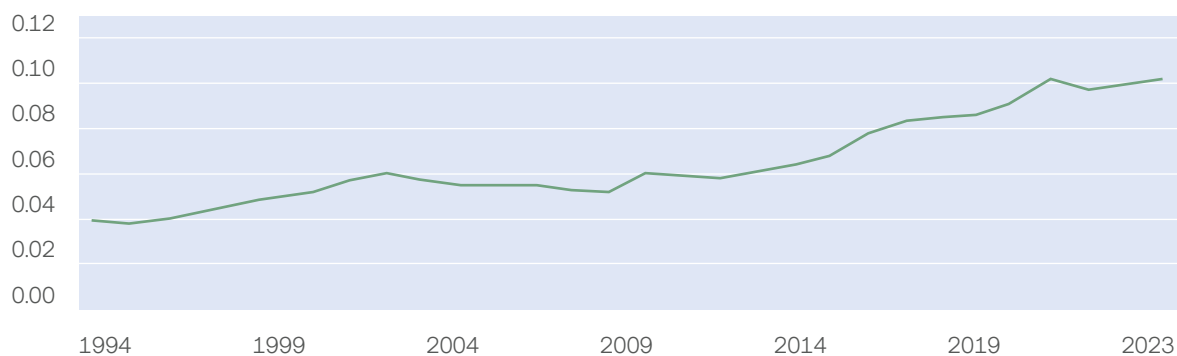
However, there are limits to the resilience that insurance coverage can provide. While insurance offers financial protection, it cannot alleviate the trauma caused by a hurricane, prevent the delays and disruptions from a flood, or restore lives lost to a wildfire. Additionally, even in the most developed markets, insurance penetration remains limited. In 2023, only 38 percent of global losses from extreme weather and natural catastrophes were insured, leaving USD 174 billion of global losses uninsured.

Several factors contribute to these uninsured losses. Underdeveloped insurance markets and a lack of understanding of insurance are significant issues. Additionally, low risk awareness and the underestimation of potential losses and the probability of extreme weather events can deter individuals from purchasing adequate coverage. Addressing these challenges will require efforts to both reduce risk and enhance insurance uptake.

## Shifting focus to proactive risk management strategies

Over the past 30 years, global insured losses from natural catastrophes have grown at a faster rate than the global economy. In inflation-adjusted terms, average insured losses increased by 5.9 percent per annum between 1994 and 2023, while global GDP rose by 2.7 percent per annum over the same period (see Chart 2). This indicates that insured losses have more than doubled relative to GDP since 1994.

**Chart 2: Global insured natural catastrophe losses as % of global GDP in %, 1994–2023**



Source: Swiss Re Institute

If insured losses continue to grow at this rate, premiums for climate risk coverage will need to increase to reflect the additional risk. This in turn, will affect the level of protection that individuals and businesses are willing and able to purchase, with potential consequences for the overall functioning of the market.

To address the compounding challenges posed by rising insured losses and their impact on insurance availability and affordability, there must be an urgent shift in focus toward risk prevention and risk reduction. These efforts should complement traditional insurance against extreme weather and natural catastrophes.

The solutions are not new. Measures such as improved infrastructure, better and stricter land-use planning, and community resilience programs are already being employed to reduce the risk and severity of damages caused by extreme weather and natural catastrophes. However, a new level of ambition is required to achieve resilience in the face of the evolving natural catastrophe risks we encounter today.

The insurance industry has the expertise to help business and individuals develop effective resilience to extreme weather and natural catastrophes. The same risk management insights used to provide financial protection are already being used to advise companies, governments and municipalities on the most efficient approaches to risk reduction and prevention.

Across the industry, there is an array of sophisticated risk management tools, capabilities and solutions that contribute to strengthening climate resilience. These include advanced modeling and risk assessment tools that can accurately predict the likelihood and potential impact of extreme weather events and help customers identify vulnerabilities. While some of these vulnerabilities can be addressed at the individual company or community level, others require a more coordinated, system-level response. For instance, effective reduction of wildfire or flood risk requires sustained and forward-looking action on zoning decisions, building codes, and water management. Addressing drought risk involves coordinated action of water users throughout a geography and across value chains. That level of coordination requires action by governments, as well as the private sector.

**Risk reduction** involves implementing measures to minimize the potential impact of extreme weather events and catastrophes on lives, livelihoods, and assets. This may include strengthening infrastructure, enhancing building codes, and improving emergency response systems to ensure communities are better prepared for adverse events.

**Risk prevention** focuses on avoiding the creation of new risks altogether. This can involve developing land-use policies that restrict construction in high-risk areas and implementing environmental regulations to protect natural defenses, such as wetlands, which play a crucial role in mitigating flooding.

Together, risk reduction and risk prevention form a comprehensive approach to managing the impacts of climate-related hazards. By addressing both existing vulnerabilities and potential future risks, we can create safer and more resilient communities.

## A call to action

Protecting societies and economies from the growing threats posed by extreme weather and natural catastrophes requires policymakers to prioritize climate resilience. The increasing costs from physical damages and the need to invest in risk reduction and prevention present a dual challenge that is best addressed collectively. This approach requires and incentivizes contributions from all sectors: governments, municipalities, communities, businesses, and individual households.

To effectively drive collective action on these challenges, policymakers should consider three key complementary responses:

- **Prioritize investment in risk prevention and reduction strategies, leveraging insurance expertise.**
- **Expand access to insurance through supportive policy frameworks.**
- **Develop collaborative risk-sharing mechanisms to ensure protection over the long-term.**

The following chapters outline a roadmap for achieving these goals with practical recommendations that emphasize the need for immediate and sustained action. Additionally, the paper highlights how the insurance industry can play a crucial role in delivering these goals.



The Solutions

# Invest in risk prevention and reduction strategies

The rationale for investing climate resilience is clear. However, determining where and how to invest in risk prevention and reduction requires specific expertise and collaboration among specialists from various fields. This requires government intervention.





One way to do this is through the establishment of ‘centers of competence’ that inform planning decisions. In Switzerland, this is done through the Swiss National Platform for Natural Hazards (PLANAT), which provides insights directly to the executive branch of government. PLANAT acts as a center of competence in climate resilience by uniting experts from diverse fields such as land use planning, forestry, risk prevention, and climate impact research.

Annually, Switzerland allocates approximately CHF 3 billion (USD 3.3 billion) to climate resilience initiatives. PLANAT’s strategic guidance informs the deployment of these funds – sourced from federal, cantonal, and communal authorities, as well as households, businesses, and the insurance sector – to optimize risk reduction and maximize protection for the country as a whole.

One example of the benefits of the approach is the investment in flood management and infrastructure that was designed to prevent downstream flooding from Lake Sihl into the Sihl River, Lake Zurich, and the Limmat River. These measures have successfully reduced anticipated economic losses by 93 percent from CHF 67 million to CHF 5 million.

Another area of critical importance to risk reduction is the use of risk modeling and risk assessment tools. While there is substantial expertise and data already within the private sector, there is an opportunity to enhance this further by improving availability and consistency of government and public sector data.

## Key recommendations for policymakers:

- 1. Make climate resilience part of national planning:** Governments need to make formal commitments to strengthen climate resilience. This will require adopting robust strategies that significantly increase investment into risk prevention and risk reduction measures. It will also require the implementation and enforcement of building codes and urban and rural planning regulations that account for current and future climate risks, and the societal acceptance for these necessary and profound changes.
- 2. Create centers of competence:** Governments should establish “centers of competence” to strengthen climate resilience – working with the private sector wherever possible. These centers would collect up-to-date data, develop risk maps to identify vulnerable communities, and pilot innovative technologies, such as smart infrastructure. Resilience efforts should encompass not only physical infrastructure but also nature-based solutions, such as preserving and restoring wetlands, and societal aspects, including educational campaigns and community-based emergency preparedness, to enable a swift, coordinated response during disasters.
- 3. Enhance risk assessment and climate modeling:** Governments, companies, and insurers need to make more effective use of technology, data analytics, and scientific research to gain a deeper understanding of the potential impacts, frequency, and duration of extreme weather events. Embracing the forward-looking risk management approach of the insurance industry can help businesses and communities build resilience to future climate risks. To support this, improved access to government data – such as zoning decisions and infrastructure resilience – will be crucial, helping to refine risk modelling and improve insurability.



## The Singapore Green Plan 2030

As part of Singapore’s Green Plan 2030, the island city-state is undertaking significant measures to strengthen its climate resilience. The establishment of the Centre for Climate Research aims to increase expertise in projecting future climate scenarios. Additionally, the development of a Coastal-Inland Flood Model will help the city better assess future flood risks from monsoon rains and sea level rise. This model will also facilitate the design of more effective nature-based and hard-engineered solutions, including mangroves, sea walls, earthen bunds, and revetments. Singapore is also investing heavily in smart infrastructure, such as advanced drainage systems designed to cope with intense rainfall and sensors that monitor infrastructure health in real time.

To cope with rising temperatures, Singapore – which already grapples with a hot and humid climate – is investing in the planting of more greenery and piloting the use of cool paint on building facades. The city has also launched the Cooling Singapore 2.0 project, deploying an island-wide network of climate sensors to collect data regarding the impact of the urban heat island effect. By better modeling the impact of heat on Singapore, the project aims to enable even more effective actions to build climate resilience.

The Solutions

# Enhance insurance market accessibility and affordability

Insurance will always play a key role in strengthening climate resilience. But if the severity and frequency of extreme weather events continue to trend upward, the cost of insurance coverage will rise as well. This means that, over time, there is a risk that households and businesses may end up underinsured or even without coverage. In a worst-case scenario, “insurance deserts” could develop in regions where there is a high accumulation of extreme weather risks.

Investment in risk prevention and reduction measures is the best first step to addressing this challenge. Resilience is the best form of insurance. However, there are also positive actions that governments can take to enhance insurance accessibility and affordability. For example, governments can raise awareness of extreme weather risks and offer incentives for households and businesses to obtain adequate insurance.

While governments can exert a positive influence, it is vital that any regulatory regimes remain flexible, allowing pricing and products to adjust to evolving climate risks. Regulating rates and premiums can obscure the true costs associated with underlying risks, potentially encouraging development in hazardous areas such as coastal regions, floodplains, and forests, while discouraging necessary investments in resilience against extreme weather events.

Instead, governments should permit insurance markets to establish rates and premiums that accurately reflect the actual level of risk and the costs associated with repairs for these events – referred to as ‘risk-based pricing.’ This approach guides economies toward resilient and sustainable development practices, mitigates vulnerabilities, and ensures that resources are allocated effectively to minimize exposure to climate risks.

## Key recommendations for policymakers:

- 1. Optimize reach of private insurance:** As an initial step, governments should implement measures that increase market penetration, capacity, and the range of risks covered. This requires establishing a regulatory environment that sustains market capacity, attracts new entrants, and fosters competition to broaden coverage options for consumers. Governments can directly increase the prevalence of natural catastrophe insurance – thereby reducing reliance on post-disaster government aid – by introducing incentives, subsidies, and mandatory insurance requirements. By allowing regulation to evolve and removing lengthy bureaucratic processes, governments can also help facilitate product innovation. For instance, supporting the introduction of innovative parametric weather index insurance.
- 2. Enhance transparency:** Governments and insurers should share climate data. This practice allows for more informed policymaking and enhanced preparedness for extreme weather events. Additionally, it improves risk assessment, enabling insurers to implement ‘risk-based pricing,’ which creates more effective insurance markets, encourages safer building practices, and discourages development in hazardous locations. Risk-based pricing also ensures a more equitable distribution of natural catastrophe losses. Furthermore, when insurers can price policies according to actual risk levels, they are more likely to maintain solvency and fulfill claims. This capability fosters greater market participation and encourages innovation.
- 3. Leverage insurance expertise to build back better:** Governments should utilize risk insights from the insurance industry to ensure that damaged properties are not merely rebuilt, but constructed to be more resilient, and that critical infrastructure is fortified against an evolving risk landscape. By collaborating, governments and insurers can create more resilient building and zoning codes, fostering stronger, safer communities that are prepared for future challenges.



### Protecting vulnerable Sumatran coffee farmers with innovative insurance

In Indonesia, Zurich collaborated with insurance regulators to develop an innovative parametric weather index insurance product that is specifically designed for thousands of coffee farmers in Sumatra, who are often uninsured and therefore vulnerable to extreme weather events.

This parametric coverage is structured as a *takaful* product, a type of Islamic insurance, which provides automatic payouts to coffee farmers – often through a local cooperative – when a weather-based parameter or index threshold is reached or exceeded based on independent data. This means that when a pre-determined weather event occurs, such as heavy rain, a claims payment can be triggered without the need for farmers to submit a claim or undergo inspections. This approach simplifies the process and ensures that coffee farmers receive vital payments quickly.

The Solutions

# Develop collaborative risk-sharing solutions

As set out in the two previous chapters, strengthening climate resilience requires investing in risk prevention and reduction measures, as well as enhancing insurance accessibility and affordability. However, given the constraints on public finances, the costs are likely to be too high for many governments to bear. Instead, innovative risk-sharing solutions and public-private partnerships need to be developed.



For instance, 'blended finance' can help increase investment in risk prevention and reduction by crowding in private finance. The insurance industry can help unlock these investments by de-risking capital flows.

There could also be a role for public-private partnerships to enhance insurance accessibility and affordability. For instance, the creation of (re)insurance pools can help share resources and distribute risks, which can improve affordability and prevent the development of "insurance deserts." Private insurance markets can price these risks, while the government determines how natural catastrophes losses are distributed.

### Unlocking investment: How insurance de-risks capital flows

Insurance plays a vital role in mobilizing private capital flows by de-risking investments. By providing risk coverage, insurance enhances investor confidence, allowing them to commit capital to projects that might otherwise seem too risky.

Additionally, insurance can improve access to financing for infrastructure that enhances risk prevention and reduction. By partnering with financial institutions, insurers can provide guarantees or backed policies, making lenders more likely to extend credit to otherwise risky projects. This collaboration broadens the capital pool and encourages investments in climate resilience.

## Key recommendations for policymakers:

- 1. Expand 'blended finance' for risk prevention and reduction:** Blended finance combines public and private sources to make projects financially viable and sustainable. It entails using public resources to catalyze private financial flows. It can bridge the interests of public and private capital to fund investments into physical infrastructure. Governments can mobilize private capital by creating a conducive investment environment. Insurers can also play a key role by helping to de-risk these long-term projects with its risk-transfer solutions and risk management expertise. Therefore, governments should collaborate with insurers to develop blended finance initiatives that unlock capital flows for complex projects.
- 2. Develop risk-sharing solutions:** Stable premiums and the continuity and accessibility of natural catastrophe insurance can be achieved through risk-sharing solutions, such as public-private partnerships (PPPs), and the use of reinsurance, capital markets, and, under the right circumstances, insurance pools. If structured to maximize diversification among policyholders and risks across broad territories, risk-sharing solutions can also manage large-scale losses without destabilizing insurance markets. In extreme situations, governments can offer a safety net for insurers through state guarantees, preventing them from exiting specific insurance lines or the market entirely, as observed temporarily after the 9/11 terrorist attacks. However, it is crucial that governments do not introduce solutions that displace private insurance markets.



## De-risking clean hydrogen investments through insurance

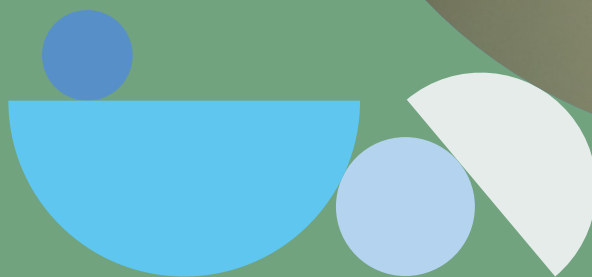
In 2024, Zurich Insurance and Aon launched a pioneering clean energy insurance facility designed to provide comprehensive coverage for blue and green hydrogen projects with capital expenditures of up to USD 250 million.

This initiative, with Zurich as the lead insurer and Aon as the exclusive broker, aims to accelerate the development of clean hydrogen projects by addressing the complex risks involved. The facility offers a single integrated policy that covers construction, delay in start-up, operational risks, business interruption, marine cargo, and third-party liability. Additionally, it includes coverage for carbon capture technologies, providing a complete suite of solutions across the entire hydrogen production value chain. By offering this comprehensive coverage, Zurich and Aon are helping to derisk clean hydrogen projects, making them more attractive to developers and capital providers.



## Joint initiative for affordable flood insurance

In the UK, affordable flood insurance is provided by Flood Re, a joint industry and government reinsurance initiative. Home insurance providers pay a levy to Flood Re, raising GBP 135 million annually. Insurers can then choose to transfer the flood risk portion of a policy to Flood Re, which charges a fixed premium based on the home's council tax band rather than its actual flood risk. The policy has a limited excess of GBP 250. This structure ensures that all UK households have access to affordable home insurance.





Conclusions

# Racing against time: Key insights for climate resilience

The escalating costs of extreme weather and natural catastrophes highlight an urgent call to action for governments, municipalities, communities, businesses, and individual households – alongside the insurance industry – to collaboratively build climate resilience.

Addressing these challenges requires a multifaceted approach that includes targeted investments in resilience, enhancements to insurance markets, and the development of effective risk-sharing solutions.

The recommendations outlined in this paper are complementary and provide strategies for achieving these goals, emphasizing the need for immediate and sustained action.

Together, we can work towards societies to be better equipped to withstand and recover from the growing threats posed by extreme weather and natural catastrophes.

## Key Takeaways

### **The costs from extreme weather and natural catastrophes are rising**

- The past decade has seen USD 2 trillion in economic losses due to extreme weather and natural catastrophes, with a marked increase in recent years.
- The frequency and intensity of such events are expected to grow, exacerbating economic and social burdens.
- The risk level is heightened by a growing number of households and businesses locating in areas exposed to climate risks, either due to unawareness of the potential risks or lax zoning laws.
- Immediate action is essential to build climate resilience through investments in risk prevention and reduction measures.

### **Invest in risk prevention and reduction strategies**

- Prioritize climate resilience by integrating it into national planning and leveraging technology to foster community-based preparedness.
- Recognize that investing in climate resilience – both in physical infrastructure and public education campaigns – yields substantial economic returns.
- Establish centers of competence for climate resilience, improve risk assessments, and invest in smart infrastructure.

### **Enhance insurance market accessibility and affordability**

- Raise awareness of extreme weather risks and offer incentives for households and businesses to obtain adequate insurance.
- Strengthen insurance markets, which are pivotal for enhancing climate resilience and ensuring financial protection against extreme weather events.
- Promote risk-based pricing and transparency to enhance insurance market capacity and provide better coverage options.

### **Develop collaborative risk-sharing solutions**

- Mobilize private investment for risk prevention and reduction projects through blended finance, enhancing its attractiveness by de-risking risks with insurance solutions.
- Develop risk-sharing solutions, such as public-private partnerships, to maintain insurance affordability and market stability.
- Consider using reinsurance, capital markets, and insurance pools to distribute climate risks more effectively



