Redefining systemic risk governance in the insurance industry

ClimateWise

University of Cambridge Institute for Sustainability Leadership

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ClimateWise

ClimateWise brings together the insurance industry into a member network convened by CISL, which integrates sustainable leadership with world-leading research capability to address the impacts of climate change. ClimateWise is uniquely placed to bring together business, government and academic expertise; it provides a collective voice for the industry; a forum to interact with other stakeholders, and it enables the transition of the insurance industry through a defined set of Principles aligned to disclosure requirements. ClimateWise is part of CISL's Centre for Sustainable Finance.

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Disclaimer

Audience of report

This technical paper is crafted for risk professionals and strategic decision-makers who are engaged in both the assessment of risks and the exploration of opportunities that arise from these assessments. It provides a deep dive into physical climate risk modelling and the strategic investment in adaptation, offering insights for those with a macro-oriented view on governance within their organisations and across broader systems. The paper is particularly relevant for those interested in transforming risk findings into opportunities for resilience and growth, emphasising a co-ordinated macro and systemic mindset. By addressing the scaling of strategies from localised to systemic levels, this report serves as a resource for professionals aiming to integrate comprehensive risk governance frameworks into their operations, ultimately fostering sustainable development and financial stability.

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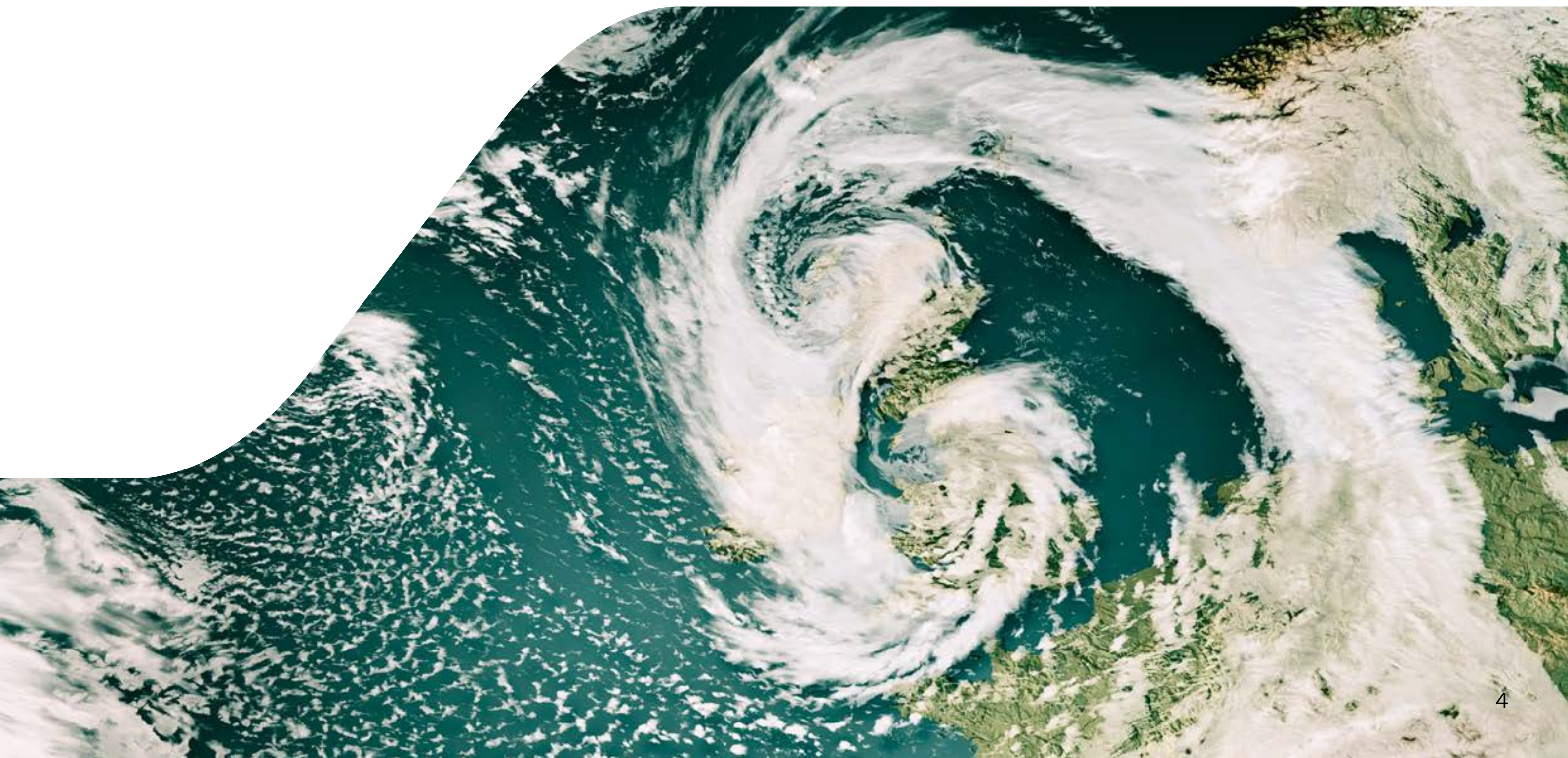
Executive summary

The growing intensity and interconnectedness of climate, nature, macroeconomic and geopolitical risks are amplifying systemic vulnerabilities across global financial systems. Physical climate impacts – such as extreme weather, droughts, rising sea levels and wildfires – now interact with ecosystem degradation, biodiversity loss, water scarcity and soil erosion, alongside inflationary pressures, geopolitical instability and supply chain breakdowns, to erode financial stability. In 2024 alone, natural catastrophes caused $318 billion in US economic losses, while global insured losses have exceeded $100 billion annually since 2017.[1]

Climate risk becomes systemic when localised or sectoral disruptions propagate through financial interconnections. While multiple systems may be simultaneously affected by climate-related shocks, this does not automatically render climate risk systemic to the financial sector. Rather, climate risk becomes systemic when issues like insurance withdrawal, asset repricing, credit contraction or sovereign debt distress create feedback loops that impair financial stability. In this paper, we argue that managing this requires co-ordinated governance across insurers, banks, investors and regulators – grounded in shared data, integrated modelling and common resilience objectives.

Traditional financial risk frameworks are limited in capturing the dynamic, cross-sector nature of climate and nature-related financial vulnerabilities. Conventional stress tests often overlook how risks interact across institutions, sectors and ecosystems. In agriculture, for example, drought conditions in Australia cut wheat yields by around 30 per cent, triggering spikes in loan defaults and insurance claims, while soil degradation and water stress undermined recovery.[2,3] In real estate, over 13 million US properties are vulnerable to 100-year flood risks, yet banks and insurers often operate from divergent models and timelines that only partially capture the role of natural flood buffers – such as wetlands and mangroves – in mitigating local flood exposure.[4] Both sectors illustrate how risks cascade through financial markets and natural capital, reinforcing the need for adaptive governance that accounts for interdependencies between underwriting, lending, investment decisions and ecosystem services.



Systemic risk governance provides a unifying framework to address structural gaps in how climate and nature-related risks are managed. Systemic risk governance is a proactive framework that replaces siloed risk management with co-ordinated, cross-sector action to address interconnected threats like climate change. Its purpose is to move beyond managing individual shocks and instead build collective resilience to safeguard the stability of the entire financial system. This approach emphasises collaboration between insurers, banks, investors and regulators to align data, modelling techniques and risk-sharing structures. Co-management strategies include cross-sector stress-testing – bringing insurance assumptions into real-time scenario planning – and integrating network-based modelling (eg, supply chains and ecosystem dependencies) as well as systemic or macro analysis (eg, agent-based modelling) with traditional financial analysis.[5,6]

Examples across sectors demonstrate the practical value of embedding systemic governance into financial decision-making. Section 3 of this paper highlights examples from the agriculture, real estate, energy, transport and maritime sectors, with each demonstrating both how risks cascade, and how systemic risk governance would add value protecting financial stability. Together, these examples highlight that climate and nature risks manifest through cross-sector dependencies – requiring co-ordinated policy interventions such as integrated risk data platforms, adaptive capital frameworks and co-financing mechanisms in order to support ecosystem resilience. While other risk mitigation strategies such as early-warning systems, targeted incentives and diversification mechanisms also offer valuable tools for managing systemic risks, this research emphasises systemic governance as a framework for co-ordinating these isolated interventions to address risks arising from institutional and market interdependencies.

The report outlines a practical approach to embedding systemic risk governance in financial practice. Aligning with the International Risk Governance Council's systemic risk governance cycle[7] provides a clear pathway to integrate climate and nature risks into financial decision-making (as well as being relevant to policymakers and the public sector), linking risk management with resilience-building via seven steps. These include (i) the need for organisations to explore their systems to understand the interdependencies, while also (ii) developing forward-looking scenarios that capture how climate, ecological, regulatory and technological shifts interact to affect financial stability. Organisations must then (iii) define risk tolerances and quickly move to (iv) design collaborative approaches that actively reduce systemic vulnerability. (v) Preparing for critical shifts, such as tipping points or systemic failures, is vital to successfully (vi) pilot, test and operationalise adaptive risk governance strategies. Finally, (vii) organisations must continuously monitor, learn and adapt, ensuring their strategies evolve alongside new data and changing circumstances.

To scale this approach, five recommendations targeted across insurers, banks, institutional investors as well as policymakers and the public sector, are put forward for advancing systemic risk governance:

1. **Scale financial innovation** that connects insurance, banking, investors and hybrid capital as a driver of systemic governance and enabler of stability.

2. **Support risk co-management** through shared data, joint stress-testing and cross-sector governance.

3. **Enhance advanced integrated modelling** that goes beyond catastrophe models to capture real-time climate–economic–nature feedback.

4. **Expand cross-sector incentives** that align market structures with resilience.

5. **Embed systemic thinking into existing governance** for underwriting, investment, financing and credit models.

This report argues that addressing systemic climate and nature-related risks involves a crucial shift from reactive crisis management to proactive, integrated governance across the financial and public sectors. Insurers are central to this. They provide deep actuarial expertise and hazard intelligence, which must be leveraged alongside capital from banks and investors. Combining insurer data with ecosystem intelligence helps translate foresight into tangible resilience outcomes. Without shared frameworks, however, these powerful tools remain fragmented. A systemically oriented approach does not require constant, complex stress tests. Instead, it focuses on how insurer insights inform practical decision-making and policy responses across all sectors. This is crucial as insurance stability influences banking performance and the wider economy – a core feedback loop. By embedding structured learning cycles and cross-sectoral interpretation of stress-test results, insurers can act as an early-warning system to strengthen systemic risk governance. Financial security will depend on how the industry collectively interprets and governs risk in relation to the natural systems our economies rely on.

Section 1: The case for systemic risk governance

Financial systems are facing a new class of systemic risks that are non-linear, cross-sectoral, and increasingly driven by climate and nature-related disruptions.* Systemic risks now propagate across institutions and asset classes through dense and interdependent networks. Several factors explain this shift. Globalisation has tightly coupled supply chains, meaning that localised shocks rapidly become systemic. Financialisation has deepened interconnections between insurers, banks and investors, amplifying contagion channels. At the same time, climate change and ecological degradation introduce unprecedented non-stationarity, undermining the assumptions of historical risk models. Crises such as the 2008 financial collapse, COVID-19, geopolitical instability and escalating climate disasters demonstrate that risks are no longer isolated – they cascade, amplify, and disrupt entire markets.

Climate and nature-related risks increasingly shape financial system stability, with climate events driving structural shifts in global risk exposure. In 2024, natural catastrophes caused over $318 billion in economic losses globally.[8] Events like back-to-back Hurricanes Helene and Milton significantly disrupted regional real estate and mortgage markets, triggering localised capital flight from coastal Real Estate Investment Trusts (REITs) and repricing of flood-exposed assets. While such disasters remain far smaller in scale than systemic financial crises like 2008 or COVID-19, they illustrate the route along which multiple, geographically concentrated shocks can accumulate through insurance withdrawals, mortgage market stress and municipal debt risk to create pathways for potential systemic transmission. Understanding these mechanisms – and identifying guardrails such as adaptive reinsurance structures, contingent liquidity facilities and localised resilience investments – can help prevent local physical shocks from escalating into system-wide instability.

The insurance sector is both a shock absorber and a potential systemic risk transmitter. Its capacity is driven by the risk appetite of individual (re)insurers, which is informed by evidence-based factors like risk-based pricing and risk diversification. Withdrawal from high-risk markets occurs when cumulative losses exceed risk tolerances and capacity cannot be adequately covered. Insurers cover climate and catastrophe exposures worldwide, acting as financial first responders in crises. Yet when cumulative losses exceed risk tolerances – such as in US coastal property markets where premiums have risen over 30 per cent since 2020, and several major carriers have withdrawn from new business in California and Florida – insurance retreat can contribute to localised repricing pressures, shifts in coverage patterns and fiscal exposure for state-backed insurers.[9] Earlier crises such as Hurricane Andrew (1992) and Hurricane Katrina (2005) revealed the structural fragility of this feedback loop. Andrew caused $27 billion in damages and led to 11 insurer insolvencies, prompting state intervention through the Citizens Property Insurance Corporation; Katrina's $125 billion in damages exposed systemic underinsurance and the lack of co-ordination between insurers, banks and federal disaster financing. While market withdrawals have not led to widespread collapse – Florida's real estate sector, for instance, remains active and Miami-Dade recently saw $3 billion of its bonds upgraded by Moody's – these dynamics highlight how the sector, in providing a buffer against loss, can also be a route via which stress can move through financial channels.

*While climate and nature-related risks are deeply interconnected, their governance mechanisms and economic pathways differ. Climate risk primarily manifests through physical and transition channels, whereas nature-related risk often propagates through ecological dependencies – such as soil fertility, pollination and water security – that affect production and supply chains. Addressing both within a shared systemic framework allows for identifying reinforcing and conflicting dynamics (eg, climate mitigation projects that degrade local ecosystems), but this paper distinguishes their respective systemic pathways and policy implications to maintain analytical clarity.

The systemic risk arises not from the collapse of individual insurance markets but from the cumulative interaction between insurance capacity, credit conditions and public balance sheets. When insurers withdraw or raise premiums sharply, mortgage affordability declines, property values fall, and municipalities face reduced tax revenues and higher borrowing costs. This, in turn, pressures banks through higher default probabilities and collateral devaluation, while state-backed insurers and guarantee schemes absorb growing fiscal liabilities that ultimately link back to sovereign creditworthiness. As climate volatility increases and private capital retrenches from high-risk regions, these feedback loops between insurers, banks, governments and investors form transmission mechanisms through which localised insurance stress has the potential to scale into wider financial instability. Managing this chain requires co-ordinated governance across insurance regulation, financial supervision and fiscal policy to prevent the spread of instability to the wider economy.[10,11]

When physical climate risks intersect with existing regulatory constraints, they can trigger insurance market withdrawals, posing a substantial risk to broader financial stability. Banks rely on insurers to de-risk collateral, and investors depend on insurance coverage for business continuity within their portfolios. In addition, in markets such as the US, flood coverage is primarily provided through the National Flood Insurance Program (NFIP), which cannot withdraw coverage even when private insurers do. So while events such as Hurricane Florence did not result in widespread defaults, they reveal how property value adjustments and reduced insurance availability can indirectly pressure local banking systems and municipal finances over time.[12,13] The 2008 financial crisis demonstrated how insurance–finance linkages can transmit systemic risk through mispriced exposures. Insurers' participation in mortgage-backed securities and credit default swaps extended systemic fragility beyond traditional banking channels, requiring public intervention to stabilise markets. A recent US Federal Reserve pilot climate scenario exercise brings to light how physical climate risks could have the potential to transmit. The scenario exercise – which tested a 'no insurance' scenario across the six largest banks – found that if there were *no insurance at all*, the risks to financial stability would become meaningfully larger.

The report found that removing insurance protection increases default probabilities on real estate loans (both residential and commercial), especially in regions and scenarios subject to severe climate shocks, and that impact on default risk is limited only in cases where either there was low insurance coverage at the start or in cases when property damages were lower than the deductibles. This type of targeted testing is a pragmatic way to evaluate sectoral dependencies,[14] providing a sense of how insurance–finance linkages could have the ability to transmit systemic risk.

Systemic governance reframes the role of insurance from risk absorption to resilience stewardship. Rather than focusing solely on single-entity solvency, systemic governance emphasises forward-looking scenario analysis, cross-sector data transparency and shared understanding of aggregate risk exposure. In practice, this means insurers, banks and investors can co-ordinate through data-sharing, joint scenario interpretation and complementary risk management strategies to anticipate how localised shocks could propagate through the broader economy. It is worth acknowledging at this point that in some regulatory environments, however, insurers are not generally permitted to price future or anticipated climate risk directly.[15,16] This means that they have to adapt in other ways – like using better climate data, running scenario exercises or setting up government-backed reinsurance programmes that spread the losses. The systemic concern, therefore, should be less about physical risk pricing and more about how changing perceptions of risk, asset values and government policies might ripple through interconnected markets. For this reason, instead of trying to price climate risk the same way for everyone, systemic governance promotes a *diversified approach* – using different financing tools, targeted government support and shared planning across sectors – to strengthen the whole system and prevent chain reactions when shocks occur.

Section 2: Why traditional financial governance is limited in the face of climate and nature-related risks

The traditional actuarial foundations of insurance are being increasingly challenged by non-linear and compounding climate shocks. Although catastrophe models aim to reflect current conditions, their results still rely on assumptions and data sets that cannot easily capture rapidly evolving climate patterns. This is not because insurers assume stability, but because available data and model structures cannot fully represent shifting baselines, correlated extremes, and feedback effects that increasingly define climate and nature-related risks. Even modest divergences between modelled and realised losses – whether under- or overestimation – can therefore generate volatility in pricing, capital allocation and reinsurance demand.[17,18] Moreover, while the competitive modelling ecosystem provides a stabilising influence through diversity of views,[19] systemic vulnerabilities arise when correlated models, shared assumptions or simultaneous repricing amplify market-wide shifts in coverage or capital costs. For example, when multiple firms recalibrate catastrophe models in response to new hazard data, this can synchronise premium hikes or portfolio withdrawals across markets. The challenge is therefore less about insurers assuming stability and more about the limits of model adaptability in the face of rapidly evolving climate patterns.

This rising unpredictability challenges the foundations of financial modelling. Even the most advanced modelling systems struggle to capture the complex, non-linear feedback now shaping climate and nature-related risk. Since the 1990s, the insurance industry has moved well beyond traditional actuarial methods through the widespread adoption of catastrophe models, which explicitly simulate current hazard patterns and evolving exposures. Yet these tools remain constrained by data gaps, model interoperability limits and structural uncertainties – particularly when multiple hazards interact or compound over time. Thompson[18] highlights how financial models across sectors still fail to represent cascading dynamics and emergent systemic feedback, while Surminski and Thieken[20] emphasise the underutilised potential of insurance to drive risk reduction and adaptation. From a systemic perspective, the challenge is not that insurers assume stability, but that the boundary of model reliability itself has become unstable – as climate and ecological tipping points generate risks that extend beyond current probabilistic frameworks. To remain viable, models across finance and insurance will need to evolve towards more systemic, non-linear approaches that can integrate compounding hazards, institutional interdependencies and governance responses into forward-looking risk assessment.

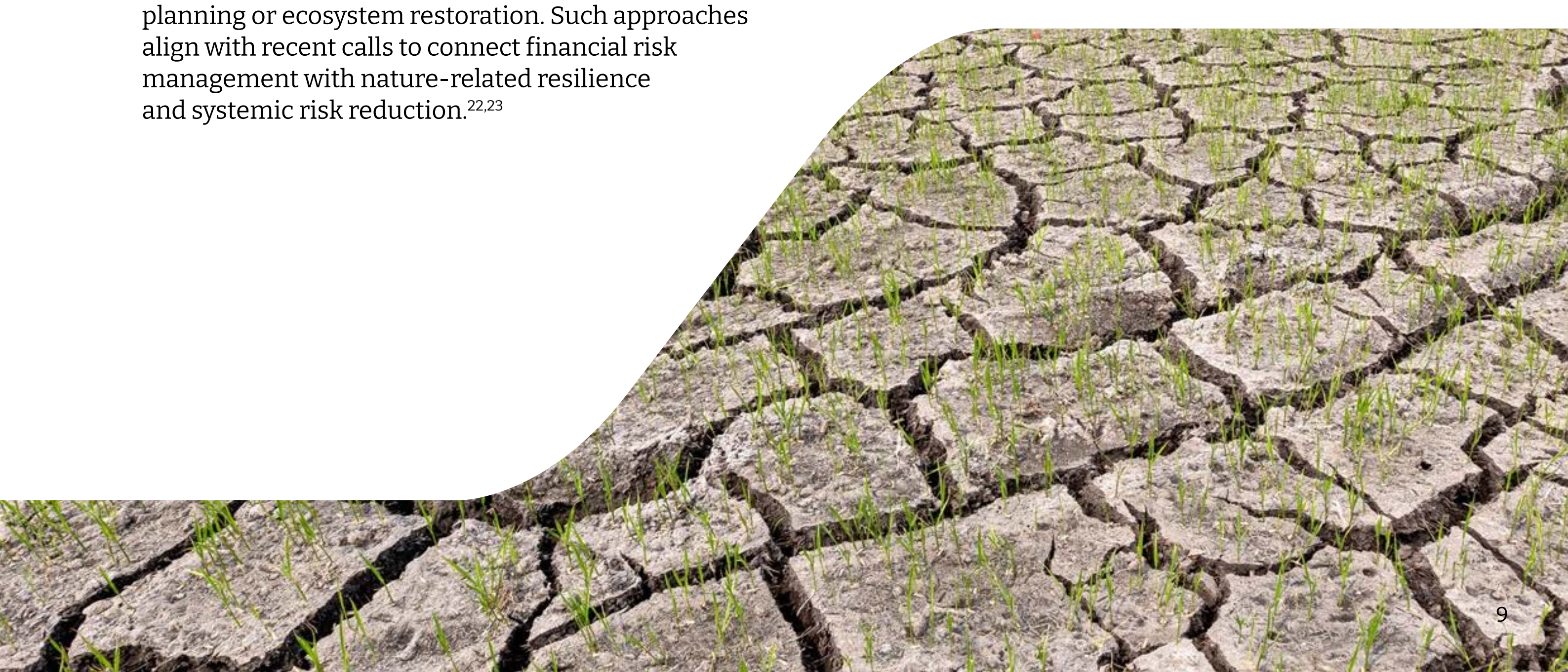
Beyond acute disasters, there may also be transmission channels for systemic financial risk resulting from more chronic environmental stressors which are not well captured in current models. While there are few current examples of insurers explicitly withdrawing from regions solely due to heat stress or ecosystem degradation, emerging conditions suggest such scenarios could materialise in the near future. For instance, prolonged extreme heat could drive sustained increases in claims linked to business interruption, rail and energy infrastructure malfunction and worker health impacts. In such a case, rising claim frequencies would erode underwriting profitability, while the high capital costs of retrofitting assets or investing in heat-resilient infrastructure could make coverage economically unviable. If financial institutions remain slow to finance large-scale adaptation investments, the resulting protection gap would widen. In this scenario, insurers' gradual retreat from high-heat or ecologically stressed regions would depress asset values, constrain local credit availability and reduce municipal fiscal resilience. While there are few examples of this in reality so far, the potential knock-on effect of insurance withdrawal to the banking and investment sectors in this instance illustrates how chronic environmental stressors such as heat stress could also become transmission channels for systemic financial risk, even in the absence of acute disasters. This is made especially pressing by the fact that climate change challenges many long-standing modelling assumptions. For example, many of the losses from natural catastrophes which reached $318 billion globally in 2024 were in regions where historical models significantly underestimated both frequency and severity.[21] To add to this, nature-related risks expose similar limitations: biodiversity loss, soil degradation and water scarcity destabilise agricultural production, alter commodity flows, and shift health and infrastructure risks in ways that historical data cannot capture.

This reveals a critical gap: insurance institutions are absorbing risk but not yet systematically reshaping it. Without a more proactive role in influencing market behaviour, infrastructure investment and regulatory design, insurers risk remaining passive absorbers of systemic shocks – until capital constraints force retrenchment. For insurers to remain viable and relevant in a world of compounding shocks, the focus must evolve from simply compensating for losses to actively transforming underlying risk profiles.

Products like parametric insurance, as well as the reinsurance market, will be critical in supporting this shift. This does not imply that parametric insurance or reinsurance themselves reduce risk exposure – they do not – but rather that they can be structured to incentivise or enable risk-reduction behaviours. For example, parametric products can be linked to pre-agreed adaptation investments – such as improved irrigation in agriculture or microgrid resilience in energy systems – so that payouts fund prevention as well as recovery. Similarly, existing reinsurance markets already distribute risk globally, but their transformative potential lies in how capital can be channelled towards resilience-building rather than merely absorbing losses. Regional and sovereign risk-sharing mechanisms could increasingly integrate risk-reduction incentives – for instance, linking financial protection instruments to adaptation planning or ecosystem restoration. Such approaches align with recent calls to connect financial risk management with nature-related resilience and systemic risk reduction.[22,23]

In this expanded role, insurers contribute to the pricing of systemic risk itself – not simply through individual insurance policies, but by informing how physical, transition and ecological risks are reflected in broader financial valuations. Through their loss data, catastrophe models and risk analytics, insurers help banks more accurately price collateral and credit exposures, and help investors revalue assets and portfolios in line with emerging climate and nature realities. This systemic repricing does not mean that insurers set financial market prices directly, but that their risk intelligence becomes an input into how markets interpret long-term vulnerability and resilience. In this sense, insurance functions as both a signal generator and a stabilising intermediary – translating physical and ecological risk information into the financial metrics that govern lending, investment and capital allocation. By embedding this intelligence into financial decision-making, insurers can help shift the system from reactive loss compensation towards proactive adaptation and long-term resilience.

The insurance sector holds untapped capacity to catalyse systemic resilience; to enable this the future of the sector will need to be interconnected, strategic and adaptive. As data holders, capital allocators and long-term risk modellers, insurers can take a leading role, but only through co-ordinated governance with regulators, banks and investors. Without this alignment, the sector is in danger of managing risk in ways that unintentionally intensify system fragility. With systemic governance, insurance transforms from a financial safety net into a strategic enabler of climate adaptation, nature protection and economic stability. By integrating with financial regulators, embedding dynamic stress-testing, and co-investing in solutions that strengthen both ecosystems and infrastructure, insurance becomes a pillar of 21st-century financial resilience – not just a product line.



Section 3: Sectoral examples demonstrating the value of systemic risk governance

We have illustrated how climate and nature-related risks significantly amplify financial vulnerabilities, underscoring the need for a systemic governance approach. This next section sets out a series of case studies which demonstrate practical examples of how climate and nature risks manifest across sectors, and – as a result – the practical value of embedding systemic governance into financial decision-making.

Agriculture
Climate and ecological vulnerabilities in food systems

Agriculture has become a frontline for climate and nature-driven financial shocks. The sector is highly exposed to droughts, heatwaves, floods and biodiversity loss, which reduce yields, degrade soils, and weaken ecosystem services such as pollination and water retention.

During Australia's severe drought years, wheat yields dropped by up to 30 per cent, triggering a surge in crop insurance claims and loan defaults. This led insurers to revise pricing models and caused widespread defaults in farm lending. Using climate analytics and catastrophe models, institutions project not just direct losses but broader macroeconomic impacts such as grain supply shocks, food price inflation and capital flight from agriculture-dependent regions. At the same time, opportunities emerge for investment in adaptation, including drought-resistant crop varieties, improved soil management and nature-based solutions such as watershed restoration to secure long-term productivity.

In the US, the federal crop insurance programme, managed through the US Department of Agriculture's Risk Management Agency, heavily subsidises premiums and underwrites a large share of agricultural exposure. This creates a different dynamic, as this federal backstop stabilises insurance availability and limits private insurer withdrawal, but it also transfers much of the systemic risk to the public balance sheet. As a result, agricultural insurance in the US is influenced not only by hazard frequency and severity but also by policy incentives, commodity pricing and regulatory frameworks that shape planting decisions and capital allocation. For asset managers and international lenders, this creates a complex systemic picture: agricultural risk is not solely driven by direct climatic impacts, but also by the interaction between federal programmes, market incentives and global supply chain dependencies.

In this example, a systemic risk governance approach would replace this fragmented model by aligning public backstops with private capital through shared data and joint stress-testing. This co-ordination would shift the focus from reactively absorbing losses to proactively financing system-wide agricultural resilience, ensuring the sector's long-term stability.

Real estate and infrastructure
Climate and nature risks to property valuation

Climate and nature-related risks are reshaping property markets, mortgage portfolios and infrastructure investment. In the US, flood-related property losses have averaged roughly $30–40 billion annually over the past decade, according to estimates from Swiss Re and First Street Foundation. While not individually systemic at the national scale, these figures represent a sharp and persistent increase from historical averages in the early 2000s. The significance lies not in the headline number alone but in the concentration of losses: when multiple high-value regions are repeatedly affected, local markets can experience liquidity constraints, collateral devaluation, and falling tax revenues that pressure municipal and regional balance sheets. Most US homes with flood insurance are covered by the federally backed NFIP, which, unlike private insurers, cannot withdraw coverage. As private insurers pull back, the NFIP's growing financial strain and the lack of coverage in inland areas can create knock-on effects across real estate lending, municipal budgets and mortgage markets. Flood risk is also worsened by the loss of natural protections like wetlands and permeable land. While small changes – such as losing urban trees – have mixed effects, the cumulative impact of replacing natural areas with buildings increases runoff and flood damage. These shifts are starting to affect credit ratings, mortgage values and infrastructure decisions, driving more interest in climate-resilient and nature-positive investments that protect both property values and financial stability over time.

After Hurricane Florence caused widespread inland flooding in North Carolina in 2018, property values in severely affected areas declined, and mortgage delinquencies temporarily spiked as homeowners faced repair costs and loss of income. The event exposed a critical underinsurance problem: NFIP take-up rates in many inland counties were below 1 per cent, leaving most households and small businesses without coverage. Consequently, the financial strain fell largely on borrowers, local governments and lenders rather than private insurers. The implications were less about private insurer solvency and more about the potentially systemic gaps created by underinsurance and its impacts on both wider private financial markets and public balance sheets. Banks were forced to reassess their collateral risk models for properties outside mandatory flood zones, while municipalities faced fiscal stress from declining property tax bases. The absence of natural buffers, such as degraded wetlands and floodplains, intensified the damage, illustrating how ecological decline compounds financial vulnerability.

A systemic risk governance approach would replace this fragmented response by co-ordinating insurers, lenders and public planners around shared data on climate and ecological risks. This collaboration enables a shift from managing isolated losses to proactively investing in collective resilience – such as restoring natural floodplains – thereby protecting long-term asset values and strengthening regional financial stability.

Energy
Climate extremes and ecological dependencies in power systems

Energy systems – both fossil fuel-based and renewable – are increasingly exposed to a combination of climate variability and ecological constraints. The intensification of heatwaves, droughts and storms is materially affecting energy reliability and insurance exposure. During European and Chinese heatwaves, for example, water scarcity curtailed thermal and nuclear generation due to cooling limitations, while reduced hydropower output simultaneously drove higher fossil fuel demand and volatility in energy markets. These events reveal how physical climate risks interact with ecological dependencies to shape both the cost and reliability of power generation.

Nature-related risks also manifest through trade-offs within energy transitions. For example, expanding land use for bioenergy crops like corn ethanol can reduce emissions, but it also simultaneously increases land competition, water use and biodiversity loss – creating cross-pressures between climate mitigation and ecological stability. From a systemic perspective, such tensions require integrated governance that recognises these interdependencies: ensuring that insurance, banking and investment frameworks evaluate not just climate transition risk, but also the ecological feedback that influences long-term energy security and financial resilience.

In the US, Hurricane Harvey disrupted Gulf Coast energy infrastructure, triggering large-scale insurance claims and energy price volatility. Financial institutions responded by embedding climate stress-testing into energy lending and increasing finance for grid resilience, energy storage and decentralised renewables. Also in the US, the 2021 Texas winter storm caused between $80 billion and $130 billion in damages and led to widespread grid failure.[24] While it remains debated whether such extreme cold had a causal linkage to climate change, the episode nevertheless underscores the systemic vulnerability of tightly coupled energy, financial and insurance systems to extreme weather events.

A systemic risk governance approach would replace these reactive measures by co-ordinating energy firms, investors and insurers around a shared understanding of interconnected risks. This alignment would support the energy transition to enhance grid reliability and ecological health simultaneously, thereby channelling capital towards resilient infrastructure and preventing system-wide economic disruptions.

Transport
Climate and nature disruptions in global supply chains

Transport systems are critical chokepoints through which climate and nature-related risks propagate across global supply chains. Extreme weather events can disrupt logistics, increase insurance and operational costs, and trigger cascading effects across production and trade networks. However, not all disruptions are systemic: the degree of correlation, duration and geographic spread determines whether a shock remains localised or becomes globally destabilising. For instance, COVID-19 represented a truly systemic supply chain disruption due to its simultaneous, prolonged and globally correlated impact across all modes of transport. In contrast, even large-scale regional disasters like hurricanes or floods tend to have temporary, spatially contained effects unless they coincide across key trade hubs. This distinction highlights why systemic governance must differentiate between localised hazard shocks and globally correlated disruptions.

Protecting against systemic contagion requires diversifying transport and logistics dependencies, investing in resilient infrastructure, and integrating ecological stability – such as maintaining healthy wetlands, coastal barriers and biodiversity that support agricultural and maritime transport – into supply chain risk management. In short, resilience planning should prioritise correlation management: preventing multiple sectors and geographies from being simultaneously disrupted, thereby limiting the escalation of local transport shocks into global systemic risk.

To illustrate this, the 2010 Eyjafjallajökull volcanic eruption disrupted European air travel for nearly a week, grounding over 100,000 flights and costing airlines close to $2 billion in lost revenue.[25] While the event was geographically concentrated and short in duration, its cascading impacts extended through supply chains – delaying pharmaceutical shipments, perishable goods and time-sensitive manufacturing components. These temporary shocks exposed how even short-lived transport disruptions can generate liquidity stress and credit exposure for firms reliant on just-in-time logistics. For banks, such interruptions increased short-term credit risks and working capital demands; for insurers, they triggered claims for delayed cargo, cancelled flights and business interruption losses. Although the eruption was not climate related, it nevertheless illustrates how systemic escalation in the transport sector can occur under different conditions driven by extreme and unpredictable weather events. If such a disruption were prolonged – spanning several weeks – or occurred across multiple global transport hubs simultaneously (for example, during overlapping extreme weather events), the effects could amplify into systemic financial stress through inventory shortages, commodity price spikes and supply chain-driven inflation.

Under a systemic risk governance framework, transport operators, financiers and insurers would have collectively modelled these supply chain dependencies beforehand, allowing them to build co-ordinated financial backstops designed to maintain system stability rather than simply manage individual claims.

Marine and trade
Systemic risks in shipping and coastal ecosystems

Maritime and shipping systems sit at the intersection of physical climate risk, ecological degradation and global finance. The 2021 blockage in the Suez Canal disrupted one of the world's busiest trade corridors, halting an estimated $9–10 billion[26,27] in global trade per day and exposing the systemic vulnerabilities of maritime supply chains. Although not caused by climate change, this event serves as a vivid demonstration of how a single chokepoint disruption can ripple through global supply chains. Because the event was short in duration (six days), geographically isolated, and swiftly resolved through logistics rerouting and inventory management, it did not trigger a wider crisis. But it nevertheless provides an analytical benchmark for understanding how and when maritime disruptions might scale to systemic risk.

If we consider a more prolonged or multi-site disruption such as simultaneous port closures from typhoons or sea-level-driven flooding, then we see how climate-driven weather events could escalate into trade bottlenecks, inventory shortages, and inflationary pressures that reverberate through credit, commodity and insurance markets. Ecological degradation compounds these risks. The loss of mangroves, seagrass beds and coral reefs – natural infrastructure that reduces coastal flooding and port damage – exposes marine assets to higher insured and uninsured losses, estimated at billions annually.

By degrading natural defences, ecosystem decline increases the frequency and cost of disruptions, raising premiums and constraining the availability of marine coverage. For example, following major Atlantic hurricanes such as Hurricane Sandy (2012) and Hurricane Florence (2018), multiple East Coast ports – including New York–New Jersey, Wilmington and Charleston – were temporarily closed, causing significant cargo delays and generating extensive marine and business-interruption insurance claims.[28,29,30] These shocks forced financial institutions to model port resilience and reassess trade-backed instruments. Diverging perceptions emerged – insurers focused on uninsurability, while banks faced deteriorating credit profiles – highlighting the need for cross-sector alignment. At the same time, opportunities were visible in investments into flood barriers, climate-resilient port design, and ecosystem-based adaptation such as mangrove and coral reef restoration, which provide both natural protection and investable resilience assets.

From a systemic governance perspective, the lesson from both Suez and climate-related port risks is that time and correlation define systemic implications. Preventing short-term shocks from compounding into macroeconomic crises requires diversifying global shipping routes, investing in resilient port infrastructure, and integrating ecological protection – such as coastal restoration – into financial risk management. These strategies can mitigate contagion from local maritime shocks before they amplify across global trade and financial systems.

Systemic governance as a catalyst for financing adaptation

Systemic governance frameworks open new opportunities for insurers and banks to co-finance adaptation and resilience at scale. Rather than treating climate and nature risks solely as liabilities, they can be reframed as investable challenges – where shared tools, data and capital structures deliver systemic value. In a world of compounding physical and ecological risks, adaptation is not only a policy imperative but also a financial necessity.[31,32]

Insurers possess uniquely granular data on hazard exposure, loss probabilities and resilience measures – data that can inform how banks and investors evaluate climate and nature-related financial risks. By integrating these insights into credit risk models, loan pricing and infrastructure finance assessments, insurers can help align financial capital with real-world adaptation needs. However, one of the key barriers to adaptation investment is financial uncertainty – the risk that climate shocks could cause revenue losses or project delays. This is where insurance-linked instruments like parametric insurance and catastrophe bonds play a role. Such instruments do not reduce the underlying physical or transition risk of a project, but they do provide rapid liquidity after an event and cover losses that are often excluded from traditional property insurance, such as evacuation costs or public service disruption. Their value lies in addressing liquidity and timing risk, not in changing the project's fundamental risk profile. This can be especially important in emerging markets, where delays in post-disaster funding can create cascading defaults or fiscal stress. Beyond these market tools, climate risk guarantees represent a more direct way to support adaptation. These are public–private arrangements where insurers and development finance institutions share risks, allowing banks to lend to adaptation projects that might otherwise seem too risky. For example, a guarantee facility might protect lenders from part of the losses caused by extreme weather, unlocking private investment in flood protection or ecosystem restoration. In this sense, insurers act not as de-riskers of physical hazards themselves, but as liquidity and credit enablers – making it possible for adaptation investments to proceed despite uncertainty.

Integrating climate and nature data from insurers into credit assessments can improve how banks identify and price risk. This process, however, involves a fundamental tension. On one hand, better risk segmentation – by revealing the full exposure of projects in flood-, drought- or heat-prone regions – naturally leads to higher cost of capital for the most vulnerable areas. On the other hand, these same regions are where adaptive infrastructure and resilience investments are most urgently needed. If banks respond to improved data solely by repricing risk upwards, rather than by designing new risk-sharing mechanisms, the result could be a contraction in capital availability and a widening of protection and adaptation gaps.*[33] In this way, banks can serve as scalers of resilience, not by tightening credit criteria, but by co-developing financial structures that enable investment in adaptation while containing the potential for systemic contagion. New forms of blended finance, including resilience bonds, development guarantees or co-lending platforms, can also be supportive. These mechanisms allow insurers to underwrite risk while banks deploy capital. In this structure, insurance serves as a first-loss absorber or liquidity backstop, reducing barriers to private finance for adaptation. Banks, in turn, provide long-term financing that expands solutions from early-warning systems to drought-resilient logistics and nature-based coastal protection.[34]

Systemic governance therefore reframes the relationship between insurers and banks from transactional to strategic, focusing on how financial decisions can actively embed resilience as a long-term market signal. In practice, resilience investments – such as flood defences, building retrofits or ecosystem restoration – are already reflected to some extent in insurance pricing, but their impact on overall premiums is often diluted. This is because insurance covers a broad spectrum of unrelated hazards – ranging from household accidents to electrical failures – so the influence of climate and nature-related adaptation on pricing is most visible only in high-exposure geographies where catastrophe risk dominates. To strengthen resilience as a market signal, systemic governance needs to extend beyond premium adjustments and leverage complementary information channels, such as public hazard maps, risk disclosure standards and open data on resilience performance. These tools amplify insurers' pricing signals across the financial system – helping banks, investors and governments to identify where adaptation is both necessary and value-creating. In this way, the integration of insurance data with broader market and policy signals enables a more transparent and actionable framework for aligning capital with resilience outcomes, turning adaptation from a niche risk management activity into a recognised driver of systemic financial stability.

*This tension lies at the heart of what some regulators and researchers refer to as climate-aligned lending standards. These standards can be interpreted in two distinct ways. The first approach emphasises risk-based pricing, encouraging banks to internalise physical and transition risks to prevent systemic under-pricing, but potentially deepening inequality and regional capital flight. The second approach encourages resilience-oriented finance, where risk-based pricing is balanced by adaptive credit enhancements, public guarantees, or concessional capital designed to keep investment flowing to high-risk but socially essential regions and sectors. From a systemic risk perspective, neither approach is sufficient on its own. A combined model – where climate-informed pricing is matched with adaptive support mechanisms – can prevent both moral hazard (by recognising real risk) and capital retreat (by mitigating uninsurable exposure).

Section 4: How financial institutions can better manage systemic risks

Systemic governance begins with a shift from static to dynamic, forward-looking risk frameworks. Traditional models rely heavily on historical data, assuming stable relationships between hazard, exposure and vulnerability. As demonstrated, climate change and ecological degradation break these assumptions: they alter the frequency, intensity and geography of risks, while also interacting with political, social and technological trends. Systemic governance requires tools that recognise these shifts. Three modelling shifts to support this are particularly promising. First, counterfactual and multi-hazard scenario planning enables institutions to simulate interacting threats – climate shocks alongside biodiversity decline, commodity volatility, geopolitical tension and migration patterns.[35] Second, agent-based modelling (ABM) simulates how heterogeneous financial agents respond to stress, allowing for emergent dynamics such as liquidity freezes or credit spirals.[36] Third, complexity-based analytics identify tipping points and feedback loops across sectors, capturing how both climate disruption and ecosystem collapse propagate from insurance claims into mortgage markets, agricultural yields or energy pricing.[37] Insurers bring unique value here – catastrophe models, actuarial data and real-time hazard assessments – while banks can integrate these insights into credit risk models and systemic stress-testing frameworks.

Co-management strategies among the financial services sector and regulators form the backbone of systemic governance – not through centralised control, but through co-ordinated risk management among interdependent actors. The aim is not to blur institutional boundaries or risk anticompetitive alignment, but to improve transparency and sequencing in how capital, data and policy move through the system in response to shared climate and nature risks. Rather than enforcing joint stress tests or common models, systemic co-management should focus on how capital flows align with policy objectives and geographic realities – ensuring that investments are distributed in ways that strengthen system-wide resilience rather than concentrating exposure. For example, adaptive capital allocation could support vital but vulnerable regions – like coastal ports or flood-prone farmlands – by pairing private investment with public guarantees or regional risk-sharing systems to discourage capital withdrawal. In this framing, the goal is not to withdraw from risk but to redistribute and buffer it through layered instruments such as resilience bonds, contingent credit lines or nature-linked infrastructure funds. To avoid perceptions of anticompetitive co-ordination, co-management frameworks must emphasise transparency, open data and public oversight. Integrated risk intelligence platforms can share anonymised ecosystem, insurance and financial data to identify where policy incentives – such as adaptation subsidies or regulatory capital relief – could crowd in private investment rather than drive correlated retreat. By co-ordinating these functions, financial institutions shift from reactive risk absorbers to stewards of systemic capital flow, ensuring that resilience investments are geographically and thematically aligned with long-term economic stability.

Aligning with governance frameworks like those developed by the International Risk Governance Council (IRGC) strengthens legitimacy and adaptability. As climate and nature risks intensify, financial institutions – particularly insurers and banks – face growing exposure to physical risks. These hazards damage real assets, degrade agricultural productivity, reduce ecosystem service flows, disrupt supply chains, threaten collateral values and challenge insurability. But they also present a clear opportunity: to invest in adaptation technologies, nature-based solutions, and strategies that build systemic resilience and unlock future market value. The IRGC's *Guidelines for the Governance of Systemic Risks*[38] provide a seven-step framework that helps organisations and regulators anticipate, assess and co-manage highly interconnected and non-linear risks through adaptive and collaborative governance.

Table 1: Applying the IRGC's guidelines for the governance of systemic risks to the financial sector

Step	Objective	Example
1 Explore the system in which the organisation operates	Understand how financial institutions are embedded in interdependent systems – for example across agriculture, energy, real estate, transport and ecosystems – and to map exposure to cascading risks.	A global bank and reinsurer could map agricultural supply chains in sub-Saharan Africa, linking drought impacts with soil degradation, biodiversity loss, insurance claims and credit defaults. By tracing these dependencies, they uncover systemic points of vulnerability and investment opportunities.
2 Develop forward-looking scenarios	Explore how climate, ecological, regulatory and technological shifts interact to affect financial stability.	Insurers, banks and asset managers might co-develop event-based or compound-risk scenarios that capture plausible combinations of hazards and trace how institutional responses – such as insurer withdrawal, capital tightening or sovereign intervention – feed back into systemic outcomes. This moves scenario design from static temperature pathways to dynamic system stress-testing focused on feedback, contagion and resilience.
3 Define risk tolerances	Set thresholds for acceptable exposure where risks become unmanageable – such as uninsurability, stranded assets or ecosystem collapse – with an awareness that what qualifies as 'unmanageable' is not purely a physical measure, but also a social and economic judgement, given that communities differ in their tolerance for disruption.	A regional bank could link loan conditions to adaptive measures – such as flood-proofing, wetland restoration or soil and biodiversity safeguards – while recognising that resilience depends as much on local governance and social capacity as on biophysical limits.
4 Co-develop strategies	Design collaborative approaches that reduce systemic vulnerability.	A public–private partnership could develop a bundled product for smallholder farmers: parametric drought insurance tied to loans, for example, with payouts triggered by rainfall and soil moisture metrics, while investments are directed to ecosystem restoration. This ensures both financial stability and long-term resilience.
5 Prepare for sudden critical shifts	Anticipate tipping points or systemic failures.	In wildfire-prone California, a coalition of banks, insurers and regulators might establish a 'climate insurance backstop' while financing reforestation to reduce fire risks. Similarly, lenders in Southeast Asia could prepare for coral reef die-off by funding artificial reef structures to protect tourism revenues and loan portfolios.
6 Decide and implement	Pilot, test and operationalise adaptive strategies.	An investment bank might issue a resilience bond tied to coastal infrastructure upgrades, where avoided losses from storm surges are quantified alongside the protection value of mangroves, with performance-linked coupons rewarding both infrastructure resilience and ecological restoration milestones.
7 Monitor, learn, adapt	Embed feedback loops, so strategies evolve with new data.	A multinational reinsurer could integrate real-time climate hazard data with biodiversity and water stress indicators, sharing results with banking partners. When cyclone intensity or ecosystem decline increases, insurance pricing and lending terms are adjusted, enabling continuous adaptation across the system.

Embedding the IRGC systemic risk governance framework sets a pathway for financial institutions to better manage systemic risks and develop collaborative strategies. So, systemic governance is not just about risk avoidance but about creating a strong enabling framework for investment into resilience. Working together, banks, insurers and asset managers can collectively drive capital into climate and nature solutions that reduce future volatility. This includes de-risking supply chains by supporting climate and ecosystem-resilient logistics and inputs in agriculture and manufacturing; backing breakthrough adaptation technologies and nature-based infrastructure that reduce systemic shocks; mobilising catalytic capital through guarantees and blended finance to crowd in private investment for restoration and adaptation; and repricing resilience by incorporating ecosystem and climate indicators into underwriting and credit scoring to align markets with long-term value creation.

Systemic risk governance benefits from comparative approaches that identify both similarities and differences across evolving risks. Examining crises such as the 2008 global financial collapse, the COVID-19 pandemic, geopolitical shocks, supply chain disruptions and major natural catastrophes reveals that systemic events share common propagation mechanisms – cross-institutional linkages, global market interdependence and information asymmetries – but differ in scale, duration and correlation. The 2008 financial crisis became global because the triggers – mortgage defaults and asset devaluation – were embedded in securitised products held by institutions worldwide, creating tightly coupled financial contagion. COVID-19, by contrast, was systemic due to its simultaneity and persistence: it disrupted supply chains, labour markets and demand globally, leaving few unaffected sectors. Regional shocks, such as the Russia–Ukraine conflict, create concentrated but transmissible effects through commodity and energy price spikes that ripple outwards without collapsing the entire system. Localised natural catastrophes, including hurricanes or wildfires, often remain non-systemic because their losses, while severe, are geographically bounded and absorbed through reinsurance, fiscal support or diversification. Identifying these distinctions offers signposts of systemic escalation: (i) global correlation across markets or institutions, (ii) duration and persistence of disruption, (iii) feedback loops that amplify losses and (iv) erosion of key buffering mechanisms such as insurance or fiscal capacity. Using these markers, financial institutions can discern when climate or nature-related shocks might transition from local disruptions to systemic events. Embedding this comparative, cross-risk learning helps refine governance strategies, design early-warning systems, and target resilience investments that not only reduce direct losses but also interrupt the transmission channels that propagate instability through the financial system.

Section 5: Recommendations for advancing systemic risk governance

Earlier sections have shown how climate and nature-related risks cascade across agriculture, real estate, energy, transport and trade, generating vulnerabilities that extend beyond individual institutions. The challenge now is to embed resilience into the day-to-day operations of insurers, banks, asset managers and corporates. This requires a transition from broad principles to practical implementation. While encouraging progress has been made through pilot projects and voluntary collaborations, the field remains fragmented. Most initiatives are still exploratory, operating at the margins of mainstream capital markets. The opportunity lies in scaling what works, clarifying where gaps persist, and directing attention to areas where new mechanisms are urgently required.

Based on the interviews and research conducted for this report, five recommendations are put forward for advancing systemic risk governance. These recommendations apply to various extents to insurers, banks, investors, regulators and even corporates. To support a shift from reactive crisis management to proactive, integrated governance across the financial and public sectors, all of these actors must think about their contribution, as well as be willing to work with the others.

Table 2: Recommendations for advancing systemic risk governance

Audiences

Financial services

Government and regulators

Corporates

	Recommendation	Audience
1	**Scale financial innovation as a driver of systemic risk governance** Traditional risk transfer mechanisms have served well in the past, but the growing complexity, compounding and cross-sectoral nature of climate and nature-related risks necessitates an evolutionary step. The new generation of instruments that has emerged must be significantly expanded in scale and application, requiring greater coordination and systems engagement to build robust financial resilience for the future. **Parametric policies** We have seen that the systemic risk value of parametric policies lies in containing financial contagion, not in lowering physical vulnerability. Expanding the use of such instruments to new domains – such as urban flood recovery, wildfire business interruption or biodiversity-linked ecosystem restoration – would help to strengthen the financial system's capacity to absorb shocks and speed recovery. **Resilience bonds** Resilience bonds have so far been concentrated in advanced economies but could be adapted for developing markets by linking them to sovereign debt structures or embedding them within regional catastrophe facilities. **Hybrid capital vehicles** Beyond single instruments, systemic governance requires hybrid capital vehicles that integrate insurers' first-loss capacity, banks' loan structuring expertise, institutional investors' demand for scale, and concessional or philanthropic capital willing to de-risk adaptation. Aligning these capabilities across the capital spectrum would also help stabilise post-disaster liquidity, maintain insurability and protect credit flows.	
2	**Support risk co-management through shared data, stress-testing and governance** Systemic governance depends on risk co-management, yet insurers, banks and investors still operate with fragmented models and data systems, leaving blind spots in how risks propagate. Developing integrated risk platforms that merge underwriting, collateral and natural-capital data will require co-ordinated leadership – most likely from existing coalitions such as the Network for Greening the Financial System (NGFS).[39] This is not a call for a new, centralised regulator, but for a federated modelling environment – a network where financial institutions, supervisors and public agencies share data standards, scenario templates and model outputs while retaining their own analytical autonomy. Rather than joint modelling or uniform stress tests, such a framework would focus on systemically oriented analysis: tracing how sector-specific decisions amplify or mitigate feedback loops between the economy, ecosystems and financial markets. In practice, this could evolve through a multi-institution consortium – supported by central banks, development finance institutions and insurers – tasked with building open-source data infrastructure and consistent governance protocols for physical and nature-related risk. Over time, this federated approach would provide the backbone for adaptive, cross-sector stress-testing that captures compound events (eg, drought coupled with ecosystem collapse and sovereign debt stress) and translates those findings into early-warning signals and co-ordinated resilience investment strategies. As with all joint voluntary initiatives, any such collaboration would need to operate in accordance with Competition Law.	

	Recommendation	Audience
3	**Enhance advanced and integrated modelling to capture emergent risks** Standard probabilistic models are capable of reflecting the risks today that insurers have traditionally faced, but helping society understand the future risk they face with a dynamically changing risk environment will require new approaches. A new generation of integrated models is therefore needed which combines real-time economic, climate and ecological data. This will help to make modelling more effective as a risk governance tool. Non-traditional approaches such as counterfactual and multi-hazard scenario planning, agent-based modelling and complexity-based analytics are valuable, not because they predict outcomes precisely, but because they illuminate feedback loops and blind spots that standard models miss. Insurers already extend catastrophe models by stress-testing frequency, severity and spatial distributions using insights from climate science, effectively blending empirical and scenario-based methods. Similar creativity could be applied across the financial system: banks could integrate insurance exposure data into sovereign and corporate credit models; asset managers could use geospatial datasets and satellite monitoring to adjust capital allocations dynamically; and regulators could combine macroeconomic stress-testing with ecosystem indicators to capture how environmental degradation translates into fiscal and market instability. By explicitly revealing model uncertainty and structural limitations, institutions can embed flexibility into governance – treating models as living infrastructures for co-ordination, learning and early warning rather than static predictors of risk.	
4	**Expand cross-sector incentives to align market structures with resilience** Financial institutions should evolve from shifting risk in the market, to actively reducing it. At present, the incentives that shape investment behaviour are misaligned with systemic stability. For example, supply chain resilience programmes, co-designed by corporates, insurers and investors, could bring ecological and climate risks into procurement and credit terms by linking preferential financing to verified resilience metrics. Likewise, public–private resilience pools, catalysed by development banks and national governments, could be scaled to lower capital costs for adaptation and restoration projects in vulnerable economies, using insurance as a risk absorber and banks as long-term financiers. The key is for policymakers and financial regulators to design incentives, such as preferential capital treatment, that reward forward-looking actors, making resilience a competitive advantage rather than an externality.	
5	**Embed systemic thinking into existing financial governance** Systemic governance cannot remain voluntary or peripheral. It needs to be institutionalised across risk management, investment strategy and regulatory oversight. The IRGC's *Guidelines for the Governance of Systemic Risks* sets out the pathway for insurers and the insurance ecosystem to embed systemic thinking into existing financial governance. Such a framework can also be adopted more widely in the financial system. At the same time, supervisory incentives should be aligned to encourage co-investment in adaptation and nature-based solutions, while solvency and stress-testing frameworks should reflect resilience as a central objective. By aligning market oversight with systemic resilience, governance moves from being an optional practice to a structural principle.	

Section 6: Conclusion – governing climate and nature risks systemically

The insurance industry plays a dual role – absorbing shocks while simultaneously amplifying fragility when it withdraws from risk-exposed markets. Without cross-sectoral frameworks to align insurers, banks and investors, the financial system will remain vulnerable to cascading risks. The examples and insights throughout this report show how localised climate and ecological shocks – such as droughts, floods, wildfires and biodiversity loss – have the potential to propagate into broader financial instability as physical climate impacts continue to become more forceful and more frequent.

Yet these same events also illuminate where targeted investment in adaptation and resilience can interrupt contagion pathways and prevent local losses from escalating into systemic crises. The shift towards governing climate and nature risks systemically can be enabled by supporting financial innovation, enabling risk co-management, developing advanced integrated modelling, expanding cross-sector incentives, and strategically embedding governance into underwriting, investment, financing and credit models. The future of financial stability depends on shared governance, adaptive institutions and strategic co-ordination.

Annex 1: Methodology

This report is based on semi-structured interviews with experts from the insurance, banking, investment and regulatory sectors, focusing on systemic risks linked to physical climate impacts, nature-related disruptions and adaptation challenges. While traditional approaches to risk, investment, economics and governance tend to follow linear models, this study drew on concepts from complex adaptive systems and co-management, which emphasise non-linear dynamics, feedback loops and cross-sector interdependencies. These insights were considered within a systemic risk governance framework, integrating dynamic assessment tools to understand how challenges originating in the insurance sector scale across the wider financial system. Findings were thematically assessed to highlight the ways systemic fragilities propagate and where opportunities for resilience emerge. At the same time, the report acknowledges the need for further research, using a combination of quantitative and qualitative methods, to expand and validate these findings across different contexts and geographies.

It is acknowledged that systemic risks could be managed through alternative strategies such as enhanced early-warning systems, targeted incentives or diversification mechanisms. However, the approach set out in this paper adopts a systemic governance lens because such risks emerge from interdependencies across institutions, markets and ecosystems that cannot be effectively mitigated through isolated interventions. In this sense, governance is treated not as a substitute for early-warning or market-based instruments, but as a meta-framework that co-ordinates, enables and contextualises them within a dynamic, adaptive system. Systemic governance provides the analytical and institutional frameworks needed to align distributed actors, manage feedback loops and adapt policies in real time.

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