

# Financial Resilience against Climate Shocks and Disasters

## RECENT PROGRESS AND NEW FRONTIERS<sup>1</sup>

World Bank Technical  
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# 1. CONTEXT

**In a world affected by growing and overlapping crises that threaten economic development and human well-being, financial resilience against climate shocks and disasters is needed to protect livelihoods and people.** Disaster risk finance (DRF) is increasingly recognized as a key policy area for building resilience to natural disasters, climate risks, and other emerging shocks. DRF has been increasingly highlighted in international forums, including recently at the 2022 G7 discussions, where countries agreed to establish the Global Shield against Climate Risks, a major initiative to scale up climate and disaster risk finance and insurance for vulnerable countries and populations. DRF is also reflected in the G20 Quality Infrastructure Investment Principles, which include a principle on physical and financial disaster resilience.

**Building financial resilience requires policy actions and financial mechanisms to strengthen both financial preparedness and operational preparedness.** It requires establishing the mechanisms and instruments to pre-arrange finance for all beneficiaries through a combination of contingent finance and risk-sharing instruments (financial preparedness) and linking these to the systems and implementation channels that can ensure better post-disaster outcomes (operational preparedness). One example of this approach that has seen significant take-up is adaptive or shock-responsive social protection. This approach can be replicated across the whole economy, including programs to better protect micro, small, and medium enterprises (MSMEs) and programs to build resilient lifeline infrastructure that ensures continuity of service delivery in the aftermath of shocks.

**Private capital mobilization is key to improve financial resilience.** Private capital can facilitate and effectively support financial resilience, in particular where policy reforms create an enabling environment to mobilize international finance and unlock domestic private risk capital. Relevant reforms in this context include, among others, regulatory reforms to promote the development of domestic insurance markets and procurement reforms to allow national and subnational entities to purchase insurance. Private capital can be mobilized through (re)insurance and guarantees to help de-risk investments and secure emergency recovery financing; for example, these instruments can ensure the rapid post-disaster restoration of critical infrastructure services or post-disaster access to emergency financing for businesses. Private risk capital can be mobilized through access to international reinsurance markets, such as through regional catastrophe risk pools, and/or deeper and better-developed domestic private catastrophe risk insurance markets.

**This technical note reviews progress in financial resilience since 2019, when the World Bank issued its technical report for the 2019 G20 Presidency, and it sets out key considerations for mainstreaming financial resilience in the development agenda.** In 2019, at the request of the Ministry of Finance of Japan, the World Bank prepared a technical report for Japan's G20 Presidency, "Boosting Financial Resilience to Disaster Shocks: Good Practices and New Frontiers" (World Bank 2019). Significant progress has been achieved since then in developing and implementing risk finance programs for improved financial resilience. This technical note reviews recent progress and highlights areas for continued focus to enhance the financial resilience of governments, businesses, and households.

**Financial resilience complements and reinforces investments in physical and social resilience.** Risk-informed financial decisions minimize the creation of new risk and strengthen physical and social resilience through targeted public investments in risk reduction and preparedness. Investments in nonstructural preparedness measures, such as early warning systems and contingency planning, help reduce the potential impacts of disasters on governments, households, and businesses. To strengthen social resilience and ensure resources reach targeted beneficiaries at the right time, financing can be tied to efficient and transparent disbursement channels such as cash-transfer programs.



## 2. BUILDING FINANCIAL RESILIENCE

**Pre-arranged finance is a critical enabler to building resilience, but it must be part of comprehensive reforms and be well planned to be effective and good value for money.** Countries seeking to reduce the impact of shocks and provide sustainable protection must undertake planning and investment to strengthen financial resilience as part of a comprehensive approach to building resilience, one that includes risk reduction, preparedness, and better reconstruction. Financial planning must also follow emerging good practices to ensure that investments in financial instruments are good value for money and lead to better post-disaster outcomes.

**Financial resilience must be linked to and complemented by investments in physical resilience and preparedness.** Only through a whole-of-government approach to building resilience can rising risks be managed sustainably. Reducing all risks, however, is not possible or affordable. Financial resilience helps governments better manage their residual risks and set incentives for financial preparedness throughout the economy (World Bank 2019). See Figure 1.

FIGURE 1: RELIANCE OF RESILIENT DEVELOPMENT ON PHYSICAL, FINANCIAL, AND SOCIAL RESILIENCE



Source: World Bank 2019.



PHOTO BY: STEPHAN BACHENHEIMER, WORLD BANK

**There is a close interaction between strengthening physical and financial resilience.** By reducing damage and the subsequent reconstruction cost, risk management measures reduce disaster-related contingent liabilities. Likewise, risk finance instruments can make important contributions to risk reduction and preparedness, for example by pricing risk and establishing clear risk ownership—that is, the rules for who is responsible for managing risk and who has to bear the costs for post-disaster response. See Figure 2.

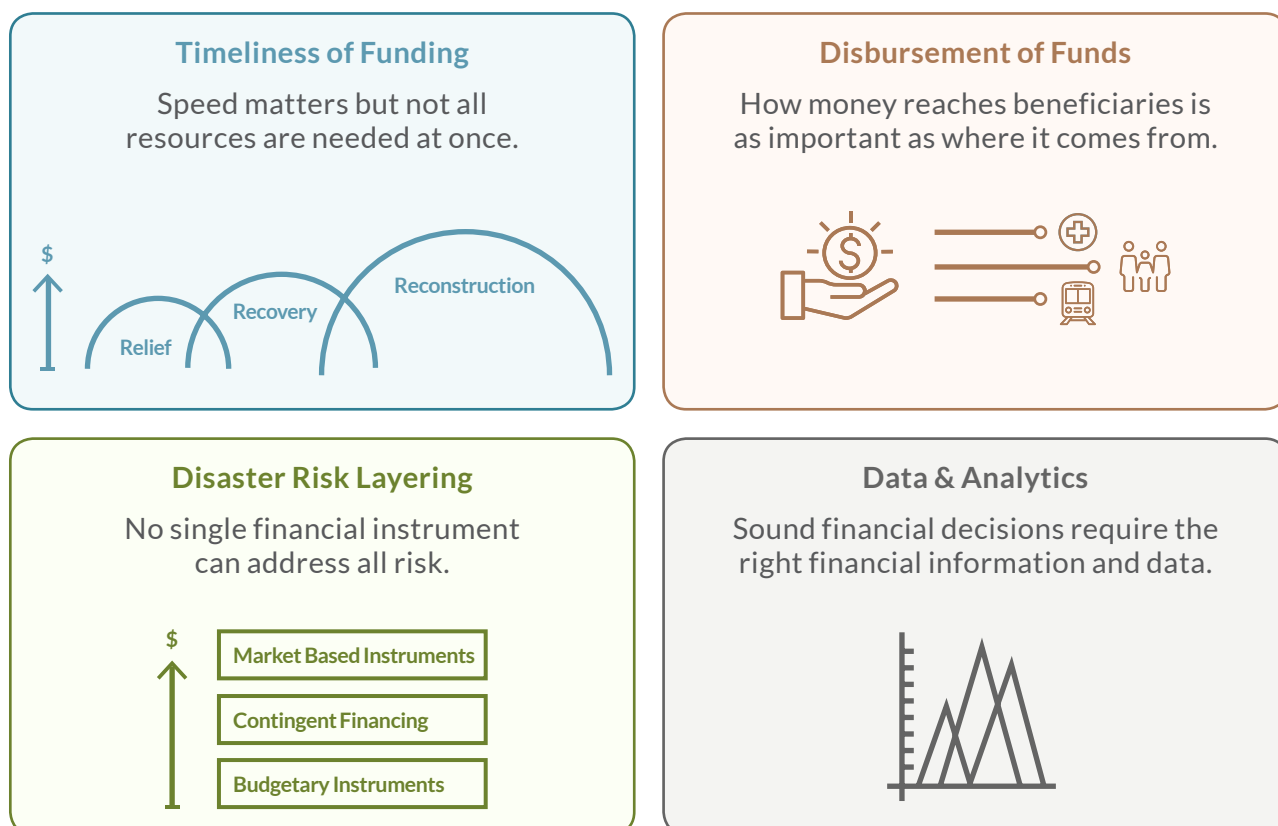
**FIGURE 2: CONTRIBUTION OF RISK FINANCE TO SUSTAINABLE AND RESILIENT DEVELOPMENT**



Source: World Bank.

**Core principles for disaster risk finance have emerged from over a decade of implementation and learning by countries around the world and their international partners.** These principles are a framework that helps ensure DRF decisions meet policy objectives. These principles do not tell decision-makers what to do, but they provide a lens for evaluating policy decisions and financial instruments (Figure 3).

**FIGURE 3: FOUR CORE PRINCIPLES OF DISASTER RISK FINANCE**



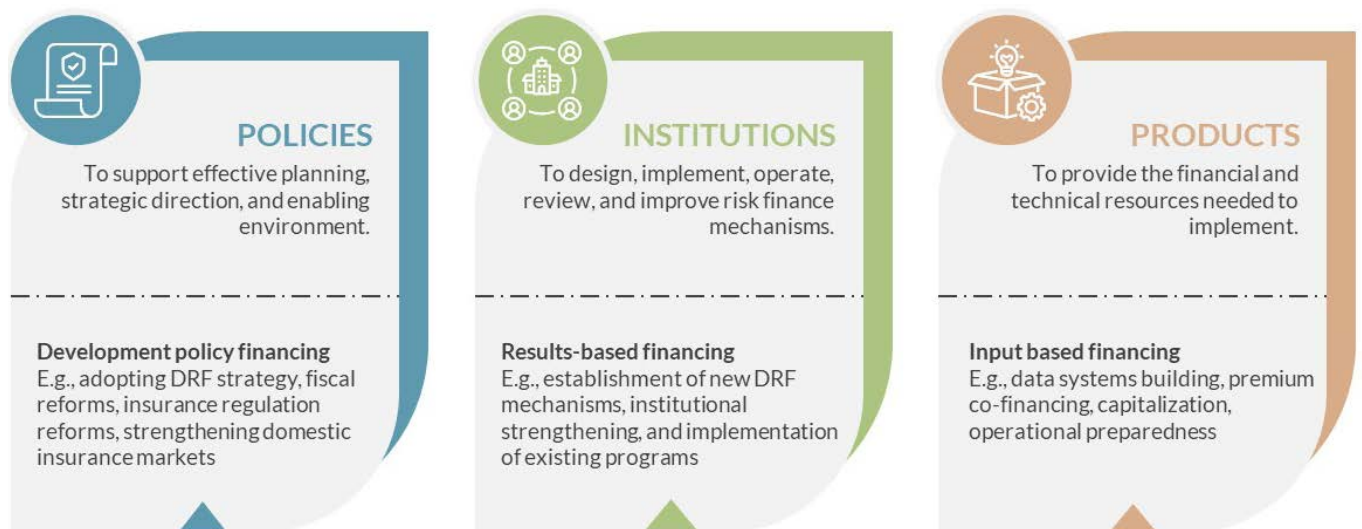
Source: World Bank 2019.



**Better post-disaster outcomes for governments and people require both financial preparedness and operational preparedness, closely linked together.** Financial instruments and mechanisms are at the core of DRF. But they are only as useful as the systems within which they are embedded. An effective financial instrument—one that pays out at the right time and in the right amount and that is financially well priced—is still bad value for money from a development perspective if the money does not flow to enable better outcomes. Another way to put this is that equal attention should be paid to “money in” and “money out.” The components of systems that can effectively respond to shocks are the same, but their form changes across different beneficiary groups and sectors of the economy.

**Appropriate policies, institutions, and products are needed for better disaster response and recovery.** Developing more and new financial instruments is not the main bottleneck to better disaster response. Better response requires an enabling policy framework to align expectations and coordinate work across departments and ministries. Equally it requires the institutions in place to build and sustain financial and operational preparedness for the long term and across projects. Development partners can support each step of this journey (Figure 4).

**FIGURE 4: THREE PILLARS FOR BETTER FINANCIAL RESILIENCE AND POTENTIAL WORLD BANK SUPPORT**



Source: World Bank



The insurance sector has long experience in managing financial risk, but this is too often seen within the narrow frame of commercial transactions. There are many different vehicles and structures that use insurance to support better financial resilience. Governments can set up structures for self-insurance or mutual insurance (risk pools) that involve public or private entities or even states (Box 1).

### BOX 1: TYPES OF INSURANCE

There are many different structures and vehicles that build on the long experience of the insurance industry and through which governments can manage and insure risks efficiently. Examples for each of the types listed below can be found in the World Bank's (2022b) Public Asset Insurance Textbook.



*Self-insurance.* A pool of money set aside by a government or agency to fund an unexpected loss. While claims are often paid with insurance processes and principles, there is no risk transfer to a third party. This structure differs from non-insurance and from lack of dedicated funding for unexpected losses.



*Mutual insurance.* An insurance entity formed as a cooperative to provide coverage to members and owned entirely by its policyholders. Any profits earned by a mutual can be retained within the company, rebated to policyholders as dividends, or used to lower future premiums.



*Market-based insurance.* An insurance company that is part of the insurance market and provides risk transfer to policyholders. Insurance companies return profits to shareholders.



*Public entity risk pools.* A cooperative group of public entities joining together through a written agreement to finance their similar risks, which could be material damage or liability. A risk pool can be thought of as combined self-insurance for a number of asset owners.



*Sovereign risk pools.* A risk pool to provide coverage to multiple countries and access to international reinsurance markets with a joint portfolio. Typically, an entity is set up to deal with the administration, premium collection, and payouts to the different jurisdictions.

Considering the full range of insurance structures and experience from existing programs is particularly important as private insurance markets are increasingly encountering limits in the most exposed regions. For example, some areas exposed to high and rising hurricane, flood, or wildfire risk insurance markets are at risk of collapse following withdrawal or failure of private insurance companies. This leaves people and business unable to secure insurance coverage. Such increasing risk requires new thinking and public-private collaboration as existing business models are pushed to the limit (Franck, 2023).



**The insurance industry also offers expertise and tools that can be leveraged to reduce and manage risk.** These include direct incentives—steps that reduce the probability of a loss and in turn reduce the cost of managing that risk (for example through a reduction in insurance premium). These tools also offer indirect benefits, which arise from taking the steps required for risk financing solutions. Many prerequisites for risk finance programs also can inform and incentivize risk reduction measures (Box 2).

## BOX 2: HOW INSURANCE CAN SUPPORT RISK REDUCTION

Insurance can support risk reduction in several ways:



**Data.** Risk finance and insurance require good underlying data. Better data can directly translate into lower insurance premiums—a fact that can incentivize governments to invest in better data systems and regular data collection, which then can inform many applications, including risk reduction.



**Risk engineering.** Applying engineering skills and methodologies to the management of risk allows for hazard identification, risk analysis, risk evaluation, and risk treatment. Within infrastructure risk management, risk-engineering analyses and solutions help infrastructure owners and operators manage loss control, mitigate risk, improve safety, and reduce insurance claims. These analyses must also look at risks before, during, and after an event.



**Pricing of risk.** Quantifying the potential damage and losses (“pricing risk”) can help inform investment decisions for risk management, in part by incentivizing or providing the required evidence for investments in risk reduction.



**Certifications and requirements.** Insurance can require certain risk mitigation steps to be taken before a risk becomes insurable—for example, regular testing of electrical equipment or installation of fire alarms and sprinklers in buildings. In this way, it propagates good risk management practices and acts as a mechanism to bring standards through the whole economy.



**Support to clients/members.** Insurers, whether commercial, mutual, or a risk pool, can act as a close partner to the insured and provide additional risk management support, for example through provision of data, analytical tools, trainings, or experience exchange.

Source: Adapted from World Bank 2022b.



PHOTO BY: DOMINIC CHAVEZ, WORLD BANK

### 3. RECENT PROGRESS IN FINANCIAL PROTECTION

Recent progress in financial protection to climate and disaster risk finance and insurance can be reviewed through new results in (i) policy and institutional dialogue, (ii) technical work, and (iii) implementation of programs and financial products. This approach builds on the World Bank (2019) technical report on DRF for the G20, which identified the emerging fields that progress can be measured against (Box 3). The international DRF landscape has significantly transformed since the 2019 stock-take due to stronger actions by vulnerable countries and their partners to address the challenges of compounding shocks and crises, including the COVID-19 pandemic, but also due to the role of new actors helping to advance financial resilience, including civil society organizations and global humanitarian organizations.

#### BOX 3: NEW FRONTIERS IN DISASTER RISK FINANCE IDENTIFIED IN 2019

The World Bank (2019) technical contribution to the 2019 G20 Finance Ministers' and Central Bank Governors' Meeting identified five emerging DRF frontiers, as listed below. While there has been significant progress on all of these, continued work is now even more important. Events over the past three years and the current challenges facing the world mean these areas should now be considered at the center of policy needs and decision-making.

1

Integration of financial resilience in **macro-fiscal frameworks**

2

Building financial resilience through **integrated financial solutions**

3

Expanding financial protection strategies to **cover other crises and complex risks**

4

Growing financial protection policies and instruments against **interconnected risks**

5

Shifting financial protection of critical infrastructure **from assets to services**

Source: World Bank.



## Policy and Institutional Progress

**Risk finance has become part of regional and global policy discussions on resilient development.**

Discussions were held under the 2021 and 2022 G7, leading to the establishment of the Global Shield against Climate Risks (as mentioned above and described in Box 4); discussions were also held under the 2017 and 2019 G20 and at meetings of the United Nation Climate Change Conference (UNFCCC COP), Asia Pacific Economic Cooperation (APEC), and Association of Southeast Asian Nations plus China, Japan, and Republic of Korea (ASEAN+3), among others. These discussions support coordination and alignment of policies as well as the establishment of new financing vehicles for implementation of solutions (Box 5).

### BOX 4: G7 GLOBAL SHIELD AGAINST CLIMATE RISKS



The Global Shield against Climate Risks was set up by countries of the G7 and V20 (Vulnerable 20, an association of states particularly threatened by climate change) to support poor and vulnerable people and countries in getting better protection against climate-related risks, such as heavy flooding or droughts. The Global Shield was officially launched on November 14, 2022, at the COP27 in Egypt.

Designed in 2022 during the German G7 Presidency and unanimously supported by the G7, the facility will bundle activities in the field of climate risk insurance and prevention in close cooperation with the V20.

Source: InsuResilience Global Partnership, “Global Shield,” <https://www.insuresilience.org/knowledge/global-shield/>

### BOX 5: REGIONAL COLLABORATION—THE CASE OF ASEAN+3

The ASEAN+3 countries—members of the Association of Southeast Asian Nations plus China, Japan, and Korea—have for many years advanced regional collaboration to strengthen financial resilience against climate risks.

This collaboration led to the establishment and launch of the Southeast Asia Disaster Risk Insurance Facility (SEADRIF) in 2019; this is the first regional catastrophe risk facility established by ASEAN members. The SEADRIF Insurance Company is incorporated and domiciled in Singapore, licensed as a general insurer. In 2020, SEADRIF issued its first parametric catastrophe risk insurance policy to the People’s Democratic Republic of Lao. Seven of the 10 ASEAN states have joined SEADRIF to date.

Since launching SEADRIF, the ASEAN+3 members have continued to advance the concept of a regional initiative and have taken steps to establish a permanent DRF initiative under ASEAN+3, with participation by all 13 states. In a May 2022 Joint Statement of the 25th ASEAN+3 Finance Ministers’ and Central Bank Governors’ Meeting, the association formally acknowledged “the concept paper prepared to conduct a detailed study among ASEAN+3 members with the aim to launch a new ASEAN+3 initiative on Disaster Risk Financing building on the existing regional initiatives such as the ASEAN Disaster Risk Financing and Insurance (ADRFI) and the Southeast Asia Disaster Risk Insurance Facility (SEADRIF)” (ASEAN+3 Finance Ministers and Central Bank Governors 2022).

**Financial protection has also been fully recognized as a core aspect of managing climate change, including as part of the adaptation agenda and the emerging loss and damage agenda.** In the World Bank, DRF is an important aspect of Country Climate and Development Reports (CCDRs)—new core diagnostic reports that integrate climate change and development considerations to help countries prioritize the most impactful actions on climate while delivering on broader development goals (Box 6).

#### BOX 6: RISK FINANCE IN WORLD BANK COUNTRY CLIMATE AND DEVELOPMENT REPORTS

To support the alignment of development and climate objectives at the country level, the World Bank Group has launched a new core diagnostic tool: Country Climate and Development Reports. The CCDRs integrate climate change and development considerations and aim to help governments, private sector investors, citizens, and development partners prioritize the most impactful actions that can boost resilience and adaptation and reduce greenhouse gas emissions, while delivering on broader development objectives. A recent review of the first set of 20 CCDRs emphasized that success requires undertaking challenging policy reforms, reallocating scarce public resources, increasing mobilization of private capital, and increasing financial support from the international community.

The CCDRs also recognize the importance of developing integrated climate and disaster risk finance strategies in order to strengthen financial resilience to climate shocks. This step requires identifying and quantifying contingent liabilities and the financial protection gap caused by climate shocks for governments, businesses, farmers, and households, and undertaking cost-benefit analyses to evaluate the potential benefits of alternative DRF instruments. Climate and disaster risk finance strategies should build on a risk-layering approach that leverages a mix of policy reforms and financial instruments—such as reserves or funds, contingent credit, insurance, and catastrophe bonds—to address different layers of risk. Developing catastrophe insurance markets and capital markets offers new opportunities to mobilize private capital for resilience through innovative financial solutions (such as parametric insurance and catastrophe bonds) in order to protect government budgets and assets as well as firms, farmers, and households. Improving access to finance by leveraging digital financial services is another important route for increasing the resilience of households and micro, small and medium enterprises (MSMEs).

Source: World Bank 2022a.



PHOTO BY: GENTI SHKULLAKU, WORLD BANK



Many new initiatives and collaborations have been established to bring together public and private partners in support of financial resilience. These include centers, coalitions, and coordination bodies for public agencies, the private sector, civil society, and academia (Box 7).

#### BOX 7: COLLABORATIONS TO ADVANCE RISK FINANCE POLICIES AND PARTNERSHIPS

*The InsuResilience Global Partnership* for Climate and Disaster Risk Finance and Insurance was launched at the UNFCCC COP23 in 2017. It brings together 120 partners to strengthen the resilience of developing countries and to protect the lives and livelihoods of poor and vulnerable people from the impacts of climate shocks and disasters by enabling faster, more reliable, and more cost-effective responses (<https://www.insuresilience.org/>). The InsuResilience Global Partnership has adopted principles for a common understanding among members and partners of recipient eligibility as well as the volume, duration, and form of premium and capital support. The guidance note “Smart Premium and Capital Support: Enhancing Climate and Disaster Risk Finance Effectiveness through Greater Affordability and Sustainability” (InsuResilience Global Partnership 2022) presents a coordinated and principled approach to premium financing to improve the effectiveness of financial support for climate and disaster risk finance.

*The Insurance Development Forum* is a public-private partnership led by the insurance industry and supported by international organizations. It seeks to optimize and extend the use of insurance and its related risk management capabilities to build greater resilience and protection for people, communities, businesses, and public institutions that are vulnerable to disasters and associated economic shocks (<https://www.insdevforum.org/>).

*The Coalition for Disaster Resilient Infrastructure* is a partnership of national governments, UN agencies and programs, multilateral development banks and financing mechanisms, the private sector, and knowledge institutions that aims to make new and existing infrastructure systems more resilient to climate and disaster risks in support of sustainable development, including through promotion of appropriate risk finance solutions (<https://www.cdri.world/>).



PHOTO BY: DOMINIC CHAVEZ, WORLD BANK



## Technical Progress

**New partnerships have also materialized to address technical challenges and provide the required inputs for improved risk finance.** Partnerships share insights and learning on new areas such as anticipatory action with civil society and governments; collaborate with industry to ensure all infrastructure investments incorporate physical climate risks and advance climate resilience; make risk data and analytics available in new ways; and implement programs to bring insights on climate and disaster risk directly to resource-limited ministries around the world (Box 8).

### BOX 8: COLLABORATIONS TO ADVANCE TECHNICAL SUPPORT TO RISK FINANCE

*Anticipation Hub.* The Anticipation Hub is a platform to facilitate knowledge exchange, learning, guidance, and advocacy around anticipatory action both virtually and in person. Hosted by the German Red Cross in cooperation with the International Federation of Red Cross and Red Crescent Societies (IFRC) and the Red Cross Red Crescent Climate Centre, it brings partners across the Red Cross Red Crescent Movement together with universities, research institutes, nongovernmental organizations, UN agencies, governments, donors, and network initiatives to promote and implement anticipatory action (<https://www.anticipation-hub.org/about>).

*The Coalition for Climate Resilient Investment (CCRI).* With over 120 members and US\$20 trillion in assets under management, the coalition spans governments, international organizations, technical institutions, ratings agencies, and private financial institutions. By bringing together industries and leaders from across the finance and investment world, the coalition is pioneering solutions that are both innovative and practical to ensure all infrastructure investments incorporate physical climate risks and advance climate resilience (<https://resilientinvestment.org/who-we-are/>).

*The Global Resilience Index Initiative (GRII).* Established in late 2020 and formally launched at COP26 in 2021, GRII provides globally consistent risk and resilience data and metrics openly and transparently. It aggregates the best available data and combines this information with new analytics to capture systemic risks, such as risks to infrastructure systems and supply chains (<http://www.globalresilienceindex.org>).

*The Global Risk Modelling Alliance (GRMA).* Funded by the German government and supported by the Insurance Development Forum, the GRMA offers countries open data, technology, and practical learning through co-development of risk management strategies and applied risk finance projects (<https://www.grma.global/about-the-alliance>).

**Technical advances have informed and enabled new investments, financial products, and preparedness mechanisms.** Recent years have seen continued progress in innovation and experimentation to enable improved financial resilience (Box 9). Examples include innovation in digital technology and big data such as earth observation, analytics to transform that data into decision-relevant insights, quantitative and qualitative methodologies to inform investment decisions, and finally new financial products building on these insights.

## BOX 9: DATA AND ANALYTICS INNOVATION

New technologies and products support improved financial resilience planning. For example:

**The Philippines' digital National Asset Registry System.** In 2017, the Bureau of Treasury began the development of a new digital National Asset Registry System (NARS) to maintain a reliable inventory of the national government's nonfinancial assets and help in the monitoring, inspection, validation, and management of these assets. By the end of 2021, the system covered over 380,000 assets worth over US\$34 billion. These include roads, bridges, school buildings, power plants, towers, hospitals, and irrigation facilities (Philippine DoF 2022). One of the core use cases for these data is the development of an indemnity insurance program to protect these assets.

**Next Generation Drought Index Project.** Droughts are a significant source of food insecurity, and they are expected to get worse with climate change. Yet there is no commonly accepted drought definition or standardized approach to drought risk modeling. The Next Generation Drought Index platform provides access to the latest and most reliable drought risk information and focuses on bridging the gap between satellite technology, risk modeling, and decision-making. Established as a collaboration between the World Bank's Disaster Risk Financing and Insurance Program and the European Space Agency's Center for Earth Observation, it is supported by the International Research Institute for Climate and Society at Columbia University (Bavandi, Aubrecht, and Enenkel 2021).

**Infrastructure Network Risk Analysis.** The World Bank and the University of Oxford have developed a prototype methodology and platform for regional, multi-sector, and multi-hazard risk analysis of infrastructure networks. These pilot tools can support governments to identify critical vulnerabilities in infrastructure systems, quantify financial risks related to critical infrastructure, and explore financial solutions to access immediate funding and speed up the reinstatement of critical services post-disaster. In its first phase, the pilot was developed for the Southeast Asia region. It has since informed the development of the wider Global Resilience Index Initiative. This regional infrastructure risk analytics platform is accessible through a prototype web interface, including a mapping tool to visualize infrastructure networks' exposure and vulnerability to natural hazards and a dashboard displaying aggregate risk metrics (see image below). Key risk metrics shown include infrastructure failure probability by sector; expected annual damage at asset level; loss-probability distributions at province level by hazard and sector; expected annual economic losses at asset level; and loss-probability distributions at province level by hazard (Mahul et al. 2021).



Source: Southeast Asia Infrastructure Risk Prototype, <https://seasia.infrastructureresilience.org/>

## Implementation Progress

Recent years have seen progress in translating policy and technical innovations into enhanced resilient development outcomes. Many of the priorities since 2019 have shown progress by informing implementation of programs and investments. Examples include the integration of risk financing in broader macro-fiscal planning, improved linking of financial mechanisms to sources of contingent liabilities, integration of risk financing into broader financial sector risk management, application of the lessons and mechanisms of sovereign risk financing to new organizations and sectors (for example for improved humanitarian outcomes), development of new financial products, and the further expansion of sovereign risk pools.

**The Global Risk Financing Facility was set up to test new approaches to implementation across sectors within World Bank projects.** This entity has evolved into the Global Shield Financing Facility, which aims to fund the implementation of comprehensive financial packages under the G7-endorsed Global Shield against Climate Risks. Since the launch of the Global Risk Financing Facility in 2018, important lessons have emerged that inform current planning for scaling up risk finance through new initiatives (Box 10).

### BOX 10: LESSONS LEARNED FROM THE GLOBAL RISK FINANCING FACILITY

Some key lessons have emerged from the operational work of the Global Risk Financing Facility, implemented by the World Bank since 2018.

- 1. Carry out climate and disaster risk finance diagnostics.** An important analytical tool, these diagnostics help countries quantify the fiscal and economic impacts of climate shocks and disasters, review their existing financial and budgetary tools, and identify potential funding gaps.
- 2. Move from financial instruments to financial strategies.** Countries need integrated risk financing strategies in place to protect their budget, economies, and populations. Such strategies can also be replicated at the subnational level and at the sectoral level.
- 3. Complement financial instruments with policy reforms.** The design and implementation of financial instruments against climate shocks and disasters can support and incentivize policy reforms to strengthen climate adaptation and resilience.
- 4. Combine grants and lending for enhanced financial protection.** Grants can be combined with concessional lending (credits and loans) in order to increase the impact of financial instruments.
- 5. Facilitate access to private risk capital for recovery financing.** The scale of resources needed to fund climate action for adaptation and recovery is immense. Public funding and reforms should enable and mobilize private capital and support effective execution for improved recovery.
- 6. Protect the real economy.** Improving SMEs' access to credit, especially in the aftermath of a disaster, can help the economy, and ultimately the population, recover quickly. This step should complement the focus on protecting the poor and vulnerable in society.
- 7. Combine financial and operational preparedness.** Beyond the availability of financial resources, the capacity of governments to support post-disaster response and recovery also depends on their ability to deliver these resources effectively to the targeted beneficiaries.
- 8. Engage with nontraditional partners.** Public, private, and civil society actors are increasingly engaging in climate and disaster risk finance. Their support to governments should be coordinated.

Source: World Bank.



**The increased consideration of disaster-related contingent liabilities in broader fiscal risk management under the leadership of ministries of finance is a key enabling step for financial resilience, and one where important progress has taken place.** Analytical work to improve macro-fiscal forecasting and planning, such as Public Expenditure Reviews and Debt Sustainability Analysis, provides the foundation for the systematic integration of exogenous physical shocks into overall fiscal planning (Box 11).

#### **BOX 11: UNDERSTANDING DISASTER-RELATED PUBLIC EXPENDITURES TO SUPPORT FISCAL PLANNING**

Improved understanding of governments' actual total disaster-related spending helps make hidden costs of disasters explicit. This understanding can inform the assessment of contingent liabilities, fiscal analysis, and ultimately the design of appropriate fiscal instruments. It can be achieved by completing a Public Expenditure Review specifically focused on disaster-related spending. For example, in 2020 the World Bank completed the first comprehensive assessment of public spending on disaster response, recovery, and reconstruction activities in the Philippines (World Bank Group 2020). In 2022, a technical note on post-disaster expenditures in Kenya provided the rigorous evidence needed to strengthen fund management in the aftermath of disasters and to support the government's strategic priorities as set out in its first Disaster Risk Financing Strategy (Calcutt and Pietrkiewicz 2022). In addition, a review conducted in 2022 assessed the impact of COVID-19-related budget reallocations in Albania, helping to inform fiscal planning and public management (Skalon et al. 2022).



PHOTO BY: KELLY SIKKEMA, UNSPLASH



**Financial instruments have been increasingly linked directly to preparedness planning and operational structures for enhanced post-disaster outcomes.** The World Bank’s G20 technical note on DRF specifically noted a new direction by governments toward “more sophisticated risk financing strategies that better match financial instruments to their liabilities, especially for public assets (including infrastructure), national-subnational cost sharing, and social safety nets” (World Bank 2019). The most significant progress has taken place in social protection through linking of financing to adaptive safety nets. But similar work is ongoing in other areas (Box 12).

#### BOX 12: EXAMPLES OF MATCHING FINANCIAL INSTRUMENTS TO LIABILITIES FOR BETTER DEVELOPMENT OUTCOMES

*Adaptive social protection.* In Malawi, a US\$125 million World Bank lending operation, including a US\$21.5 million grant by the Global Risk Financing Facility, enables the country’s social cash-transfer program to scale up during emergencies and funds the design of a parametric insurance instrument to provide protection against more severe events.

*Infrastructure.* The Government of Indonesia in 2019 launched an indemnity insurance program for public assets, which currently covers more than 7,500 public buildings valued in excess of US\$3 billion. This program channels risk to the domestic insurance market, with international reinsurance protection for excess risk. This arrangement directly links financial protection to one of the most important sources of contingent liability for the government.

*Shock-responsive guarantees for micro, small, and medium enterprises in Rwanda.* In Rwanda, MSMEs represent 98 percent of businesses and contribute 55 percent of total GDP; but one-third of Rwandan MSMEs cite limited access to finance as their single biggest business constraint. A World Bank project, supported with a grant from the Global Risk Financing Facility, capitalizes a bridge lending window, covers insurance premiums, and provides technical support to enhance DRF capacity in the government and private sector so that banks can continue lending to MSMEs in the agricultural sector as they struggle to recover from drought or the COVID-19 pandemic.

Source: World Bank.



PHOTO BY: JOHN HOGG, WORLD BANK

**New financial instruments have been scaled up to support fiscal resilience by providing fiscal buffers in case of severe events.** Between 2018 and 2013, several countries issued catastrophe (CAT) bonds to protect their fiscal balance against climate shocks and disasters. The CAT bonds were part of each government’s mix of climate and disaster risk finance instruments. It also includes new financial innovations, such as a “catastrophe wrapper” used by the Government of Belize to make debt servicing more sustainable in case of climate shocks. Contingent financing instruments, such as the World Bank’s Development Policy Loan with Catastrophe Deferred Drawdown Option (Cat DDO), proved their importance for preparedness to compounding shocks during the COVID-19 pandemic (Box 13).

### BOX 13: SCALE-UP OF FINANCIAL INSTRUMENTS FOR FISCAL RESILIENCE

**Catastrophe bonds.** The World Bank has supported countries around the globe in securing protection against disaster shocks through the issuance of CAT bonds. This includes transactions in 2018 (Pacific Alliance: Chile, Colombia, Mexico, and Peru), 2019 (Philippines), 2021 (Jamaica), and 2023 (Chile) to secure over US\$2.5 billion in protection for vulnerable countries against earthquakes and tropical cyclones.

**Contingent credit.** The World Bank’s CAT DDO is a contingent credit line that provides immediate liquidity to countries in the aftermath of a natural disaster. In total the World Bank has issued over US\$5 billion in such contingent financing to countries. This funding was among the first support disbursed to countries during the COVID-19 emergency. Other multilateral and bilateral development partners offer similar financial instruments that provide contingent credit to governments as standby financing that can be rapidly disbursed.

**Belize catastrophe wrapper protecting commercial sovereign debt repayment in case of a hurricane.** In 2021, the Government of Belize benefited from the world’s first “catastrophe wrapper” for US\$364 million in commercial sovereign debt through a “blue bond” (for ocean conservation). The parametric insurance policy provides coverage for a blue loan debt payment (coupon and principal) following an eligible hurricane event in Belize (The Nature Conservancy 2021).

Source: World Bank.



PHOTO BY: SCOTT WALLACE, WORLD BANK



Risk from disasters and climate shocks is also increasingly recognized as a potential threat to the stability of the financial sector, and by extension to the real economy, because it curtails access to finance. New analytics have been rolled out to better assess and understand the potential impact of climate risks on balance sheets and overall financial sector stability. For example, diagnostics have been carried out in the Philippines as part of the World Bank–International Monetary Fund (IMF) Financial Sector Assessment Program (FSAP) (Box 14). Other countries also explicitly integrate climate shocks in guarantee programs to maintain access to finance for the real economy, and in particular SMEs, for example through shock-responsive partial credit guarantee programs.

#### BOX 14: INTEGRATION OF PHYSICAL CLIMATE RISKS IN FINANCIAL SECTOR STRENGTHENING—THE PHILIPPINES’ FSAP

The joint World Bank–IMF FSAP analysis conducted in the Philippines developed a new macro scenario stress-testing method to assess banks’ physical risks from climate change. Climate, disaster, and macro-financial scenarios were developed. The climate scenario was based on an existing study about the changes in typhoon intensity and frequency in the future. The disaster scenario was based on a catastrophe risk model for the Philippines and translated the impact of typhoons on the loss of physical capital. The macro-financial scenario used a Dynamic Stochastic General Equilibrium (DSGE) model calibrated for the Philippines, which calculated the impact of lost physical capital on the economy, reducing production capacity by damaging capital stock and productivity.

The simulated scenarios show that extreme typhoons’ impact on GDP growth could be systemic in the Philippines. The paths for GDP show that for both current and future scenarios, typhoons with 10- and 25-year return periods give less than one standard deviation shock to GDP, which is also smaller than the shock to the Philippines during the Global Financial Crisis or Asian financial crisis episodes. The results show that climate change could cause significant risks to financial stability in a compound shock scenario. Without other extreme tail events, such as a pandemic, climate change in the future would reduce bank capital ratio visibly only in the tail events once in 500 years.

Source: IMF 2022.



PHOTO BY: ALEX BALUYUT, WORLD BANK



Initiatives have also taken risk finance lessons learned to new areas, for example, have used risk finance principles to support anticipatory humanitarian action. Actors in this rapidly growing area of innovation have adopted lessons and methodologies from a decade of risk financing and are applying them to make humanitarian assistance faster and more predictable (Box 15).

#### BOX 15: INNOVATION IN RISK FINANCE FOR IMPROVED HUMANITARIAN OUTCOMES AND ANTICIPATORY ACTION

*Anticipatory action for humanitarian response to floods in Bangladesh.* Coordination between the Red Cross, Red Crescent and the World Food Programme with the government set the stage for scaling up anticipatory action in Bangladesh. During the 2020 flood season, for example, the World Food Programme reached approximately 145,000 people with anticipatory actions, and the Bangladesh Red Crescent Society reached 16,400 (Anticipation Hub 2021).

*Start Network's Start READY.* Start Ready, launched in 2021, is a financial mechanism that enables networks of frontline humanitarians to proactively manage risks by getting ahead of predictable crises and to avoid losses by acting faster and more efficiently. It allows Start Network members to pool funds and risks, thus stretching funding up to three times further than traditional humanitarian response funding (<https://startnetwork.org/funds/start-ready>).



PHOTO BY: AMELODY LEET, WORLD BANK



**Sovereign risk pools have continued to innovate to support their members with new solutions, cutting across many of the areas of progress discussed above.** For example, development of new insurance products is extending protection beyond the government budget to specific sectors of the economy. Partnership with nonstate actors has extended the principle of risk pooling to the humanitarian aid field through so-called replica policies. This approach helps further diversify risk and grow premium volume. It also brings risk finance principles and tools to the humanitarian field to strengthen early action for supporting vulnerable populations (Box 16).

#### BOX 16: PROGRESS MADE BY RISK POOLS IN SUPPORTING MEMBER STATES' EFFORTS TO BUILD RESILIENCE

*African Risk Capacity (ARC).* In December 2022, the ARC Group and its partners launched a parametric insurance product that will provide parametric insurance to African Union member states for the pathogens responsible for Ebola virus disease, Marburg virus disease, and meningitis. Senegal was the first African country to join this new innovative financing mechanism (ARC 2022).

*ARC Replica for civil society organizations.* The ARC Replica program allows nongovernmental partners like the Start Network to purchase a replica insurance policy under the same terms and conditions as the government to increase coverage of the at-risk population. The Start Network has purchased ARC Replica coverage in Senegal, Somalia, and Zimbabwe (<https://startnetwork.org/funds/start-ready/arc-replica>).

*Caribbean Catastrophe Insurance Facility (CCRIF) electric utility policy.* Launched in 2020, this parametric insurance product for electric utilities provides protection against direct damage to the transmission and distribution components of the electric power system due to impacts of wind. This was the first product by a multicountry risk pool to extend coverage to non-sovereigns and to the private sector (CCRIF SPC 2020).

*Pacific Catastrophe Risk Insurance Company (PRCIC).* PRCIC is expected to launch its excess rainfall and drought insurance product in 2023 to complement its original insurance products against tropical cyclone and earthquake/tsunami (<https://pcric.org/>).

*Southeast Asia Disaster Risk Insurance Facility.* In 2021 SEADRIF launched its first product, providing parametric insurance cover against flood and other risks to Lao PDR. This marked the operational launch of the fourth, and newest, sovereign risk pool, after similar initiatives in the Caribbean, Africa, and the Pacific (<https://seadrif.org/>).

**Policy, technical, and implementation progress has set the foundation to make risk finance part of the whole-of-economy approach to climate change and other crises for enhanced resilient development outcomes.** Over the past decade, risk finance has moved from a frontier idea to a core topic in resilient development. This is a result of a combination of policy and institutional reforms, technical innovations, and operational scale-up.

- ✦ Policy and institutional reforms have allowed vulnerable countries to mainstream risk identification, assessment, and management as part of their budget and fiscal planning. This has been supported by recent international initiatives, such as the Global Shield against Climate Risks.
- ✦ Technical innovations, such as catastrophe risk modeling and innovative (parametric) product design, have allowed vulnerable countries to better quantify the economic, financial, and social impacts of climate shocks and disasters, and to explore innovative financial solutions, supported by the private sector.
- ✦ The combination of new technologies and policy reforms has allowed vulnerable countries to improve the shock-responsiveness of their programs (such as adaptive social protection schemes) as well as some sectors, thereby increasing their overall financial protection of people.

**Risk finance should become part of business as usual in large-scale investments and policy planning.** This could be achieved by further strengthening financial preparedness, mobilizing private capital, and linking financial preparedness and operational preparedness to enhance the “last mile” delivery of post-disaster support to affected households and businesses, and to the agencies responsible for recovery and reconstruction.



PHOTO BY: AHMED AKACHA, PEXELS

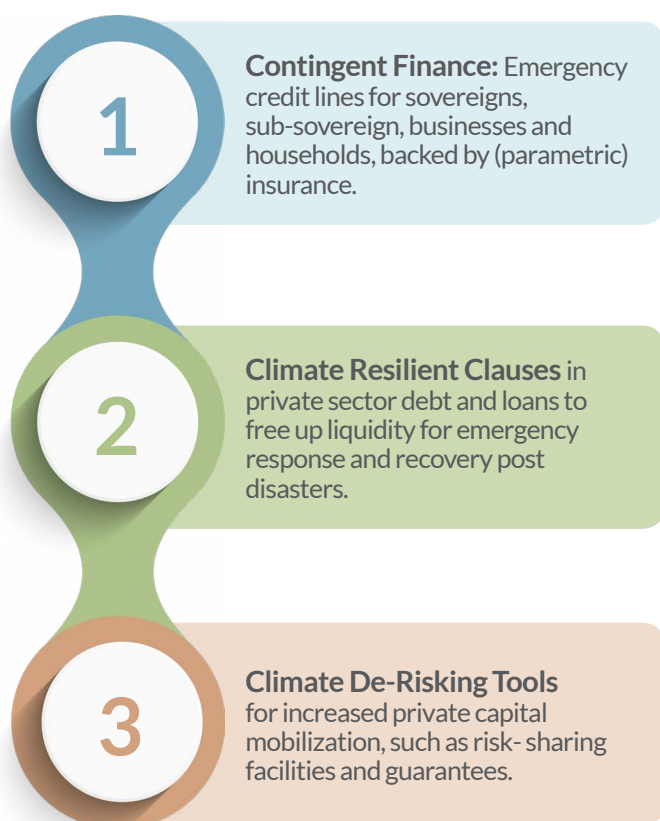


## 4. NEW FRONTIERS FOR ENHANCED FINANCIAL PROTECTION

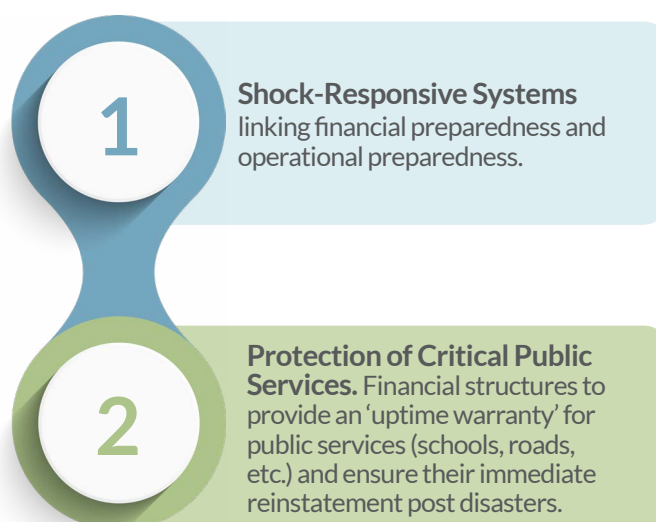
Given the recent progress made in building financial resilience and the good practices that have been learned, there is an opportunity for looking ahead and identifying new frontiers to further enhance financial protection. Three frontiers that build on recent promising developments in risk finance are discussed below: (i) further integration of financial preparedness and operational preparedness to ensure seamless, cost-effective, and rapid mobilization and execution of funds for post-disaster response and recovery; (ii) mobilization of international and domestic private capital to complement and enhance public funding for resilience; and (iii) development of shock-responsive systems in other sectors, such as infrastructure and the private economic sector, to improve the overall resilience of the country (Figure 5).

FIGURE 5: NEW FRONTIERS IN FINANCIAL AND OPERATIONAL PREPAREDNESS

**Developing a suite of financial instruments for cost-effective emergency response and recovery**



**Building shock-responsive systems to ensure quick and transparent flow of fund to targeted beneficiaries**



## Financial Preparedness: Sources of Funding

**When considering the most cost-efficient way to mobilize pre-arranged finance, public and private stakeholders need to look at strategies and mixes of instruments, not individual instruments.** No single financial instrument can address all risk. International experience has shown that different instruments should be combined to protect against events of different frequency and severity. This approach, known as risk layering, is part of a comprehensive financial protection strategy that mobilizes different instruments, either before or after a disaster strikes, to address the evolving need for funds.

**Risk layering ensures that cheaper sources of money are used first and that the most expensive instruments are used only in exceptional circumstances.** For example, (parametric) insurance can protect against extreme events but is usually not cost-effective against low-intensity events that recur regularly. Governments should rely on contingent finance to retain this lowest risk layer, for example through a dedicated budget mechanism or through pre-arranged funding from development partners.

**Contingent finance is a core part of a risk-layering strategy.** Contingent finance secures access to more flexible funding (with softer triggers) to finance more frequent recovery needs. Contingent loans, like the World Bank's CAT DDO or similar instruments offered by other development partners (e.g., the Asian Development Bank, Inter-American Development Bank, and Japan International Cooperation Agency) have proven highly effective at ensuring access to funding for post-disaster recovery. Such instruments also serve other purposes: they incentivize policy reforms in disaster risk management and disaster risk finance; provide affected countries with emergency budget support; and finance pre-identified shock-responsive programs (through contingent investment financing), such as scale-up of social protection or reinstatement of critical infrastructure assets and services. Such contingent finance instruments could be mainstreamed beyond sovereign entities, including to reach sub-sovereigns (e.g., municipalities) and businesses.

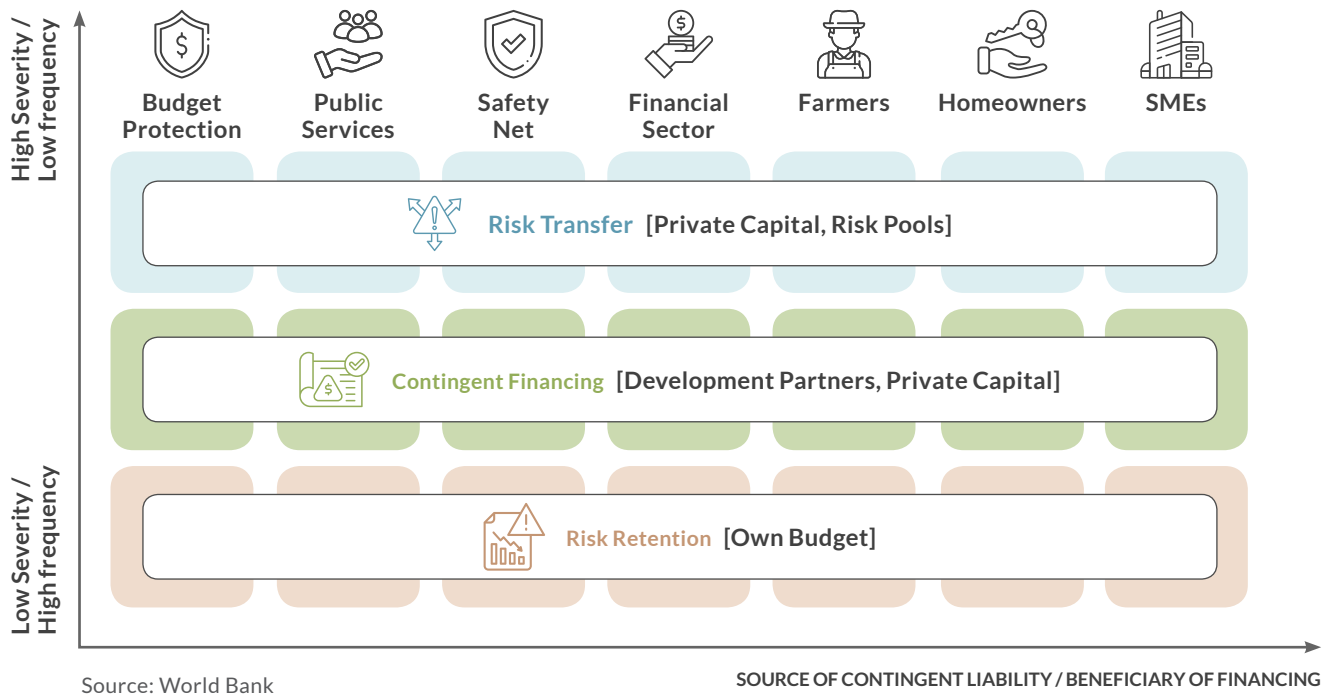
**A risk-layering strategy should focus on the different sources of risk and on the beneficiaries of the different instruments.** In a comprehensive approach, financial instruments have different beneficiaries, for example national or local governments, firms, individuals, or civil society groups. The optimal financial protection strategy may look different for each sector and beneficiary group and will drive the risk-layering strategy, which separates various sources of risk for each source of contingent liability or each beneficiary across the economy (Figure 6).



PHOTO BY: STEVE HARRIS, WORLD BANK



FIGURE 6: RISK LAYERING ACROSS VARIOUS BENEFICIARY GROUPS



## Mobilizing the Private Sector for Enhanced Financial Preparedness

Private capital mobilization is key to improve financial preparedness, and policy reforms help create the enabling environment for mobilizing international finance and unlocking domestic private risk capital. Relevant reforms include, among others, regulatory reforms to promote the development of domestic insurance markets, and procurement reforms to allow national and subnational entities to purchase insurance. Private capital can be mobilized through (parametric) (re)insurance and guarantees to help de-risk investments and secure emergency recovery financing; these instruments can ensure (for example) the rapid post-disaster restoration of critical infrastructure services or post-disaster access to emergency financing for businesses (Figure 7).

FIGURE 7: MOBILIZING MORE PRIVATE CAPITAL



Source: World Bank

**Domestic private capital facilitation for risk finance should be further developed.** Besides improving access to international reinsurance capacity, such as through regional catastrophe risk pools, it is also important to promote and deepen domestic private catastrophe risk insurance markets. Several countries have already taken this step. In the Philippines, for example, the Philippine Catastrophe Insurance Facility was established in 2022 as a public-private partnership with domestic insurance companies (17 domestic insurers have joined as of early 2023) to offer catastrophe risk insurance to homeowners and businesses. Likewise, the Government of Indonesia in 2019 launched an insurance program for public assets, which has scaled to US\$3 billion coverage by 2022 for public buildings from a consortium of sixty domestic insurers backed by international reinsurers.

**Private insurance markets are increasingly pushing against limits faced with growing risks and require new ways of public-private collaboration to secure sufficient protection for all.** Leveraging the power of the private markets often requires public support to innovate and be able for private capital to generate a return. New forms of public private partnerships can help bring and keep private capital and investments in the riskiest areas. This is a challenge even in the most mature domestic insurance markets when insurance companies may stop offering cover to certain, highly exposed, areas or the premium to secure cover becomes unaffordable. This should be part of wholistic risk management and planning, for example around investments in risk reduction or zoning regulation.

**Beyond (parametric) insurance, de-risking instruments can help mainstream risk finance and mobilize more private capital.** Climate-resilient de-risking instruments, such as guarantee instruments and risk-sharing facilities, are powerful catalysts for unlocking private capital. They help de-risk projects by providing credit enhancement to cover risks that private capital is not willing or able to take on in full. De-risking instruments can help (i) mobilize private investment (equity and/or debt) to deliver positive development impact; (ii) mitigate key government-related risks to facilitate financial viability and bankability; (iii) enhance the credit quality of sovereign, sub-sovereign, and state-owned enterprises so it reaches acceptable levels; and (iv) improve financing terms for projects and governments.

**Climate-resilient debt clauses are being explored as a new way to mobilize immediate resources after a disaster.** These clauses are included in debt instruments to allow deferral of a country's debt repayments in the event of a pre-defined, severe climate shock or natural disaster. This arrangement allows the borrower to free up resources to finance rapid post-disaster response and recovery. Such clauses received widespread attention when they were introduced as part of debt restructuring in Grenada in 2015 and Barbados in 2019 (PSWG 2022). Such clauses should be considered as part of the broader toolkit for financial preparedness.



PHOTO BY: BART VERWEIJ, WORLD BANK

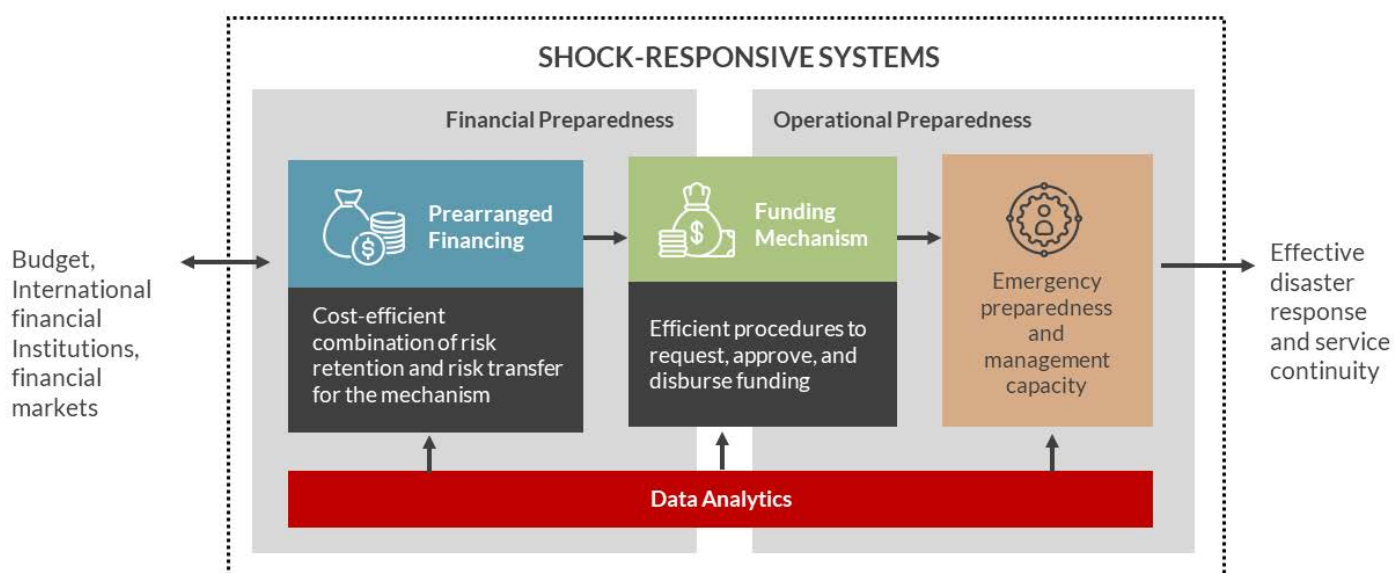


## Operational Preparedness: Distribution and Implementation of Funding

In order for financial preparedness to lead to better development outcomes, it is as important to consider how money reaches beneficiaries as where it comes from. Governments require dedicated mechanisms and expertise to effectively allocate, disburse, and monitor funds for recovery and reconstruction. Strong collaboration between the ministry of finance and the public entity tasked with spending post-disaster funds—such as local governments or agencies that maintain public infrastructure—is crucial. In addition, the disbursement system must balance the fast disbursement desired by policy makers with the transparency and accountability required by the public and donors (Figure 8).

**Linking financial preparedness with operational preparedness builds resilient development.** For example, when infrastructure operators know they have adequate financing in place, they are better able to prepare and implement contingency plans, deploy spare equipment, and activate agreements necessary to ensure rapid service restoration. For financial planners, financial preparedness offers the assurance that any allocation of funding can be executed quickly and in line with agreed objectives. Systems should be underpinned by data and analytics to assess probable impacts, to prioritize planning, to trigger early action, and to guide recovery interventions.

FIGURE 8: THE COMPONENTS OF SHOCK-RESPONSIVE SYSTEMS



Source: World Bank

**Operational preparedness differs from sector to sector.** In some instances, there is growing understanding of what such operational preparedness linked to financial preparedness looks like. For example, shock-responsive or adaptive social protection has emerged as a critical intervention that pre-arranges funding and integrates it into the existing safety net systems to protect the poorest and most vulnerable. In other sectors, work remains to be done to build on relatively scarce examples of integrated financial and operational preparedness for improved resilience.

**Protecting micro, small, and medium enterprises against climate shocks and disasters should be another key priority.** MSMEs are the backbone of economies around the globe and drive job creation. Access to finance in emergencies is critical for MSMEs to survive exogenous shocks, and many MSMEs will not have access to liquidity at the required speed and volume. Disasters may weaken MSMEs' credit profiles as well as damaging properties and inventories and causing associated losses of revenues (Vu Dicko and Ranger 2020; Vu Gjika, and Tran 2022). Didier and Cusolito (forthcoming) show that during the COVID-19 pandemic crisis, firms that had access to external financing were better able to maintain employment levels and avoid falling into arrears.

**Protecting the delivery of critical public services in the aftermath of climate shocks and disasters is equally critical.** The development objectives associated with infrastructure projects, as well as infrastructure's poverty reduction impact, relate to the services the infrastructure provides. The economic impact of the loss of such services far outweighs the cost of damage to physical assets. For this reason, it is necessary to ensure the continuity of critical infrastructure services in the event of a disaster—not just the underlying physical assets. Protecting services is particularly important for lifeline infrastructure systems. Likewise, when development partners work with vulnerable countries to finance new infrastructure, the ultimate impact is undermined if the asset gets damaged by a natural disaster a few years after handover (Hallegatte, Rentschler, and Rozenberg 2019; World Bank 2021).

**Similar steps are required in many other sectors to ensure effective distribution channels for pre-arranged finance.** Examples include improved disaster preparedness through emergency response and civil protection agencies, improved preparedness for pandemic and public health risks, improved preparedness planning in education, and adequate regulatory regimes for resilient financial systems.

**Moving forward, ministries of finance have a key role to play in financial resilience, leading financial preparedness and coordinating with sectoral ministries on operational preparedness.** Policy, technical, and implementation progress have set the foundation to make financial resilience business as usual in development planning and financing. Such a foundation will also be reinforced as countries continue to strengthen their financial preparedness and their operational preparedness to ensure timely, transparent, effective and targeted “last mile” delivery of post-disaster support to affected households and businesses, and to the agencies responsible for recovery and reconstruction. Ministries of finance have a central role to play in leading the development and implementation of disaster risk finance strategies, as part of their macro-fiscal framework, and in coordinating with sectoral ministries and agencies. The private sector also plays an important role not only to mobilize domestic and international private capital but also to leverage private delivery systems. Such strong institutional arrangements will help vulnerable countries build green resilient and inclusive development.



PHOTO BY: SIMON REZA, PEXELS



## REFERENCES

- Anticipation Hub. 2021. "How Coordination between the Red Cross Red Crescent and the World Food Programme in Bangladesh Set the Stage for Scaling-up." World Food Programme. <https://www.wfp.org/publications/how-coordination-between-red-cross-red-crescent-and-world-food-programme-bangladesh>
- ARC (African Risk Capacity). 2022. "Update." <https://www.arc.int/news/african-risk-capacity-launches-its-first-parametric-insurance-product-against-high-impact>
- ASEAN+3 Finance Ministers and Central Bank Governors. "Joint Statement of the 25th ASEAN+3 Finance Ministers' and Central Bank Governors' Meeting." May 12, 2022. <https://www.mas.gov.sg/news/media-releases/2022/joint-statement-of-the-25th-asean-plus-3-finance-ministers-and-central-bank-governors-meeting>
- Bavandi, Antoine, Christoph Aubrecht, and Markus Enenkel. 2021. "Faster and Better Risk Indicators: Introducing the Next Generation Drought Index (NGDI) Project." Financial Protection Forum blog, March 4, 2021. <https://www.financialprotectionforum.org/blog/faster-and-better-risk-indicators-introducing-the-next-generation-drought-index-ngdi-project>
- Calcutt, Evie, and Michal Pietrkiewicz. 2022. "Technical Note: Review of Post-Disaster Expenditures in Kenya 2014–2020, to Inform Implementation of DRF Strategy." World Bank, Washington, DC. <http://documents.worldbank.org/curated/en/099715006192219648/P175146003cf960090986a0997c637095fb>
- CCRIF SPC (Caribbean Catastrophe Risk Insurance Facility Segregated Portfolio Company). 2020. "Electric Utilities Policy." [https://www.ccrif.org/node/12272?language\\_content\\_entity=en](https://www.ccrif.org/node/12272?language_content_entity=en)
- Didier, Tatiana, and Ana Paula Cusolito. Forthcoming. "Misallocation of Firm Financing: New Evidence and Policy Implications for Developing Countries." World Bank, Washington, DC.
- Frank, Thomas. 2023. "Climate Change Is Destabilizing Insurance Industry". E&E News on March 23, 2023. <https://www.scientificamerican.com/article/climate-change-is-destabilizing-insurance-industry/>
- Hallegatte, Stéphane, Jun Rentschler, and Julie Rozenberg. 2019. Lifelines: The Resilient Infrastructure Opportunity. Washington, DC: World Bank. <https://documents1.worldbank.org/curated/en/111181560974989791/pdf/Lifelines-The-Resilient-Infrastructure-Opportunity.pdf>
- IMF (International Monetary Fund). 2022. "Philippines: Financial Sector Assessment Program–Technical Note on Bank Stress Test for Climate Change Risks." Country Report No. 2022/154. IMF, Washington, DC. <https://www.imf.org/en/Publications/CR/Issues/2022/06/02/Philippines-Financial-Sector-Assessment-Program-Technical-Note-on-Bank-Stress-Test-for-518566>
- InsuResilience Global Partnership. 2022. "Smart Premium and Capital Support: Enhancing Climate and Disaster Risk Finance Effectiveness through Greater Affordability and Sustainability." <https://www.insuresilience.org/publication/smart-premium-and-capital-support-enhancing-climate-and-disaster-risk-finance-effectiveness-through-greater-af-fordability-and-sustainability/>

- Mahul, Olivier, Jim Hall, Shoko Takemoto, Nicola Ranger, and Lit Ping Low. 2021. "Piloting the Next Generation Analytics for Climate-Related Financial Resilience of Critical Infrastructure in Southeast Asia." Financial Protection Forum blog, October 28, 2021.  
<https://www.financialprotectionforum.org/blog/piloting-the-next-generation-analytics-for-climate-related-financial-resilience-of-critical>
- Philippine DoF (Department of Finance). 2022. "BTr Asset Registry Lists P1.9-T Worth of Non-financial State Properties in End-2021." News & Views, February 21, 2022.  
<https://www.dof.gov.ph/btr-asset-registry-lists-p1-9-t-worth-of-non-financial-state-properties-in-end-2021/>
- PSWG (Private Sector Working Group). 2022. "Private Sector Working Group–Climate Resilient Debt Clauses (CRDCs): Chair’s Summary." November 9, 2022.  
<https://www.icmagroup.org/assets/Chairs-Summary-UK-Chaired-Private-Sector-Working-Group-Sub-Group-on-CRDCs.pdf>
- Skalon, Tatiana, Stephanie Allan, Dayna Connolly, and Fatma Jaupi. 2022. Albania–The Impact of COVID-19-Related Budget Reallocations. Washington, DC: World Bank Group.  
<http://documents.worldbank.org/curated/en/099505006202299116/P17481105fbb4f03f0a5400e6abe9e0952a>
- The Nature Conservancy. 2021. "The Government of Belize Partners with The Nature Conservancy to Conserve 30% of its Ocean through Debt Conversion." November 5, 2021.  
<https://www.nature.org/en-us/newsroom/blue-bonds-belize-convert-thirty-percent-of-ocean-through-debt-conversion/>
- Vu, Hang Thu, Tenin Fatimata Dicko, and Nicola Ranger. 2020. "Five Reasons to Support SMEs So They Can Build Stronger Resilience to Future Disaster Shocks." Financial Protection Forum blog, July 31, 2020. <https://www.financialprotectionforum.org/blog/five-reasons-to-support-smes-so-they-can-build-stronger-resilience-to-future-disaster-shocks>
- Vu, Hang Thu, Keler Gjika, and Trang Thu Tran. 2022. "Albania: The Case for Strengthening the Financial Resilience of Micro, Small and Medium Enterprises against Disaster and Pandemic Shocks." Financial Protection Forum blog, March 31, 2022. <https://www.financialprotectionforum.org/blog/albania-the-case-for-strengthening-the-financial-resilience-of-micro-small-and-medium>
- To Disaster Shocks: Good Practices and New Frontiers." World Bank Technical Contribution to the 2019 G20 Finance Ministers’ and Central Bank Governors’ Meeting. World Bank, Washington, DC.  
<https://openknowledge.worldbank.org/entities/publication/78558121-8909-5da0-887b-18fa48bfc36d>
- World Bank. 2021. "Financial Protection of Critical Infrastructure Services." World Bank, Washington, DC.  
<https://openknowledge.worldbank.org/entities/publication/f2b5dbdf-4149-5333-b2af-7a4b10794c56>
- World Bank. 2022a. Climate and Development: An Agenda for Action. Emerging Insights from World Bank Group 2021–22 Country Climate and Development Reports. Washington, DC: World Bank.  
<http://hdl.handle.net/10986/38220>
- World Bank. 2022c. "Public Asset Insurance Textbook." Washington, DC, World Bank.
- World Bank Group. 2020. "Technical Report Public Expenditure Review: Disaster Response and Rehabilitation in the Philippines." World Bank, Washington, DC. <http://hdl.handle.net/10986/35064>