

**ECONOMIST  
IMPACT**

# **Building disaster resilience:**

A study of disaster events  
and financial lending streams

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# About this report

**“An ounce of prevention is worth a pound of cure.”**

Benjamin Franklin, (1736)

The imperative for investing in disaster risk reduction (DRR) has never been more pressing, given that disaster risks are only increasing. As climate change escalates, it has set off new risk dynamics, such as the emergence of new pathogenic viruses resulting from ecological change, while cybersecurity concerns continue to grow more worrisome with increasing instances of attacks on public infrastructure and government networks.

*‘Building disaster resilience: A study of disaster events and financial lending streams’*, is a report by Economist Impact, written with support from United Nations Office for Disaster Risk Reduction (UNDRR). It is based on a wide-ranging expert interview program and desk analysis by Economist Impact and seeks to highlight the importance of a proactive approach to disaster prevention through the financial system.

The report opens with case studies on eight disaster events over the past decade that explore in detail the financial and economic costs of these events. The event case studies cover a range of human and natural hazard-induced

disaster events across different countries and attempt to explore the existence of any proactive risk-reduction measures in place before these disaster events occurred. Through the analysis, we try to understand the extent of financial and economic damages and the reasons behind under-preparedness for disasters. To understand the reasons behind under-preparedness for the known disasters, we explore the role played by financial institutions in promoting disaster preparedness through incentives for risk reduction and resilience building. The second half of this report focuses on studying the role of multilateral and national lending streams in risk reduction and resilience building through a study of the incentives inbuilt in current lending channels, which form the backbone of economic activity.

The audience for this report is intended to be policymakers in national governments, particularly fiscal and monetary authorities, and multilateral development banks. The report also outlines recommendations for both national governments and multilateral institutions to further promote risk reduction and resilience building through their national and international lending practices.

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# Executive summary

The COVID-19 pandemic was a stark reminder of what we stand to lose, collectively, by being ill-prepared for disasters. The huge losses incurred in the form of lives, jobs, economic output, years of education, developmental gains and the toll on the mental health of millions has underscored the importance of building resilience before a disaster strikes. The massive shock to economic activity experienced across the world during the pandemic reinforces the importance of building financial resilience, over and above physical resilience to any disaster. Globally, national governments swung into action, taking measures to control not just the spread of the pandemic, but also to contain the economic and financial fallout from the slowdown in economic activity, highlighting the responsibility of governments in disaster response. Additionally, countries where governments had invested in pandemic preparedness beforehand, reported lower infection rates and mortality numbers in the initial stages of the pandemic, underscoring the benefits of investing in resilience building. Below is a summary of the key findings that have emerged from our research.

## Key findings

- 1. Underinvestment in disaster risk reduction prevails worldwide**, despite the compelling case for resilience investments—every US\$1 spent on disaster reduction saves US\$4 to US\$7 in disaster response.<sup>1</sup> An ex-post analysis of selected disaster events in this report reveals that governments understandably prefer to allocate scarce funds to investments that generate immediate, tangible outcomes, rather than to risk reduction efforts whose gains are measured in events avoided. Even where here DRR investments do produce benefits in the form of damage avoided at the time of a disaster, those are likely to be overshadowed by the devastation that could not be stopped.
- 2. Political stability, strong governance and institutional strength are prerequisites for building disaster resilience.** In our event analysis, marked differences were observed between countries in terms of the long-term financial consequences of disasters and their commitments towards resilience building. Those with strong institutions,

stable political climate and credible financial management policies were able to mobilise post-disaster finance effectively and use those opportunities to undertake further measures for resilience building.

**3. Coordination between stakeholders is crucial for risk reduction and resilience building.**

Disasters caused by extreme weather cannot always be predicted, but warning systems can be developed to warn of possible occurrences by analysing historical data. Some disaster events in our analysis could have been predicted, with the right combination of early warning systems, learnings from past occurrences and timely communication of warnings. For instance, in the case of the Sulawesi earthquake in Indonesia (2018), warning systems malfunctioned before the tsunami, which meant warnings could not be communicated in time, and in the case of the Chennai floods in India (2015), flood predictions based on historical patterns were not calculated and hence warnings could not be disseminated. This lack of coordination between stakeholders led to the huge losses experienced in Chennai and Sulawesi.

**4. National focus on resilience building is still missing.** The landscape for incorporating environmental and climate risk in the financial sector is expanding, even though a larger and conscious focus on resilience building continues to be missing. In most cases, there is no mandate for national banks to screen for resilience building in their channels, making compliance difficult to monitor. Mostly, the emphasis is on resolving near-term disasters rather than the far-off disasters caused either by natural hazards or climate change that could potentially have debilitating impacts.

**5. Lending institutions can play an important role in shifting the focus of investments from ex-post to ex-ante.**

By nature of their lending activities, banks are often the primary source of credit required to fund economic activity. Banks and other lending institutions can leverage their lending activities to promote resilience building. Where it is implemented, a focus on evaluating disaster risks during project lending assessments helps prevent the worsening of existing risks and prevents the creation of new ones. Multilateral development banks (MDBs) are using embedded DRR in their lending channels as a means of promoting resilience building through development finance.

**6. MDB investments in risk reduction and resilience building are often demand-driven.**

Risk reduction and resilience building are not a precondition for lending for all MDBs studied in this report. For MDBs that do not have an explicit DRR mandate, such investments are still based on demand, driven by individual needs expressed by member countries.

**7. Resilience building is happening through environmental and social guidelines.**

Banks—both multilateral and national—are using their environmental and climate risk assessment tools to evaluate existing vulnerabilities to prevent future disasters. Often these environmental and social guidelines take the form of climate adaptation and mitigation measures.

While terminology differs among banks, the focus is on evaluating several disaster risks (natural-hazard-induced or human-induced) during project lending assessments and ensuring that environmental factors that could exacerbate existing risks, or create new risks, are eliminated.

**8. DRR investments often overlap with climate finance among MDBs.** There is no one-size-fits-all approach among MDBs. They are not using a uniform strategy to promote resilience building through their lending channels. While the Asian Development Bank (ADB) has a stand-alone DRR funding mechanism, the World Bank uses its investment project financing (IPF) mechanism to promote resilience building. Among the other MDBs, climate adaptation and mitigation are important areas of operation, under which many projects are focused on disaster resilience. To avoid double-counting, some of these projects get labelled under the sustainability/climate change/environment category, where financing for disaster risk reduction activities is often being confused with finance for climate action.

**9. Post-disaster recovery and reconstruction financing is an important tool to promote resilience building.** The past decade has witnessed an increase in MDBs using their role as financiers of post-disaster recovery and reconstruction to promote 'Build Back Better'. For instance, the World Bank-financed housing reconstruction in Nepal after the 2015 earthquake was directed at rebuilding affected houses with multi-hazard resistant core housing units in targeted areas. The project also involved technical assistance to educate homeowners about resilient construction methods. The project helped build capacity among engineers and masons and established a culture of resilient building practices.<sup>2</sup>

## Key recommendations

To fulfil their primary responsibility to reduce disaster risk and build resilience, governments need to be more proactive in undertaking measures to understand their risk landscape and taking steps to build disaster resilience. This could include structural measures such as

disaster-resilient infrastructure, enforcement of seismic building codes, and non-structural measures such as strengthening institutions and building financial mechanisms and systems to manage and contain the human and economic impact of disasters when they do occur.

However, none of these measures can be implemented without adequate support from the financial system. **Hence, to build resilience, there is an urgent need to rewire the current financial systems towards (a) de-risking current investments (b) integrating risk reduction into credit allocation and (c) redirecting financial flows towards risk reduction.** Based on an analysis of events and lending streams, we outline below some recommendations for national governments, finance ministries and monetary authorities to promote investments in risk reduction and resilience building. The following recommendations have been organised within the four priorities of the Sendai Framework.

### For national governments

**1. Invest in research to understand risk, include multi-hazard risks into regulatory and institutional frameworks, and identify potential new threats.** Limited information at an aggregate level will make it difficult to estimate the extent of exposures of a country to disaster risks. To build resilience, governments should aim to understand risk and prepare for disasters through appropriate legislation, regulation and decentralisation of authority and by building up institutional capacity and investments in research. This includes investments into identifying potential new threats that may lead to future disasters and widening the definition of disasters to include more than just climate risks. Research yields that much of MDB financing towards resilience building addresses environment and climate-related disasters, with less

attention being paid to other disasters, such as pandemics, industrial accidents and cyber-attacks. Widening the scope of disasters being addressed and against which resilience is to be built, will be beneficial in preventing future economic losses from a range of disaster events.

**2. Leverage data and technology for risk identification and assessment.** A shift towards open-sourced data and open platforms, especially in quantitative disaster risk information and modelling, could help all stakeholders access the best intelligence to make risk-informed decisions. An accurate quantification of risks through these measures could also inform the building of adequate financial buffers for disaster response.

**3. Promote cooperation and collaboration at the international and local levels.** Leveraging the experience of others can be helpful in strengthening preparedness. Participating in international exercises that involve knowledge sharing and understanding best practices can save time and resources by enabling them to apply these learnings in the local context. However, care must be taken to adapt best practices into the local context taking into account the local culture, socio-economic differences and natural ecosystems.

**4. Promote uptake of insurance to manage residual risk:** Insurance needs to be used as a complementary tool to build resilience. While there is no substitute for risk reduction, there is a need for instruments to manage the economic costs of residual risks. Promoting the uptake of insurance can help in managing post-disaster costs without significantly straining public finances and diverting funds from long-term development plans.

**5. Measure and track investments in resilience.** To assess the adequacy of current investments in resilience, the first step is to measure and track existing DRR investments, for example by tagging DRR-related expenditures in national budgets. Measuring current investments is crucial to identify how much more investment is needed and the sectors where investment is needed. Quantifying the potential economic, financial and humanitarian cost savings that would result from investment in resilience building would provide a strong foundation for the private sector and other stakeholders to take up investments in resilience building. Research can be a powerful tool in raising awareness and gathering evidence on the benefits of investing in resilience building. Providing grants to academic and research institutions could further this objective. Research would help build a body of research to quantify the gains to be made in terms of economic growth, development, and poverty reduction.

#### For MDBs

**6. Ring-fence money for DRR.** To include resilience building at the very core of their lending channels, lenders can adopt an approach of ring-fencing money for DRR, by mandating that a certain percentage of each loan be spent on risk reduction and building resilience in the concerned sector. This investment could include structural measures, such as physical resilience (disaster-resilient infrastructure), or non-structural measures, such as designing a business continuity plan, investing in new technological equipment to improve data collection for modelling and forecasting, investing in manpower training or research and development on how to prevent creating new risks and minimise risks from current disasters.

**7. Finance non-traditional approaches, especially at the local level.** MDBs are already financing a number of structural measures, such as resilient infrastructure building. Widening the scope of activities that can be financed with multilateral funds will help in promoting non-traditional, nature-based and often very localised solutions to build resilience. For instance, investment in restoring mangrove forests along with building a seawall to prevent sea damage from storms. Other non-structural measures include investing in technological solutions to enable better data collection, modelling and forecasting.

**8. Expand concessionary lending access to middle-income countries.** An initiative that has been proposed in the Bridgetown Initiative<sup>3</sup>, this involves expanding access to concessionary MDB lending for middle income countries. They are home to 62% of the world's poor population, who are also among the most vulnerable to the impacts of climate change driven disasters. This additional access to lending channels would give them the much-needed financial resources needed to invest in resilience building.

#### **For fiscal and monetary authorities**

**9. De-risk investment through (a) mandatory disaster risk assessment in credit allocation and (b) risk-adjusted credit pricing.**

Monetary authorities have the potential to play an important role in promoting a culture of resilience building by linking domestic credit issuance with mandatory DRR activities. Finance ministries and monetary authorities should make disaster risk assessment an important precondition for loan approval. By making this precondition, borrowers will be forced to evaluate existing and potential risks to their projects, thereby prompting the borrower to take a number of steps that promote a culture of resilience building.

Additionally, monetary authorities could set guidelines such that interest rates are set according to the borrower's level of disaster risk preparedness.

**10. Mandatory implementation of guiding principles on sustainable finance, such as the Principles of Responsible Banking, to achieve de-risking of investments.** Finance ministries and monetary authorities must lead the process of designing a disaster-resilient financial system by promoting the adoption of responsible banking guidelines. Finance ministries need to work with monetary authorities in setting out guidelines and directives for commercial lenders to integrate risk-conscious behaviour in lending practices. For instance, overseeing the implementation of the Equator Principles for large infrastructure projects and Principles for Responsible Banking among banks could encourage wider adoption of risk-conscious lending practices as those frameworks provide a good starting point for lenders to begin their journey on sustainable finance.<sup>4</sup> Based on the experience of countries cited in the research, we noted that membership of institutions that promote sustainable finance, such as the network for greening of the financial system, has kickstarted sustainable finance for many countries. Finance ministries can use these initiatives to promote responsible lending and gradually use the platform to embed resilience building as a core strategy in the financial sector.

**11. Reforms to the international financial architecture:** As proposed in the 2022 Bridgetown Agenda<sup>5</sup> for the Reform of the Global Financial Architecture, there is a need to add disaster and pandemic clauses in all debt instruments, including those from official lenders and private creditors, to absorb future shocks better.

The above recommendations have been organised within the four priorities of the Sendai Framework.

**Table 1: Mapping recommendations to the priorities under the Sendai Framework**

| Sendai Framework Priorities                                                                                                                           | Recommendation                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Priority 1</b><br>Understanding disaster risk                                                                                                      | 1. Invest in research to understand risk, include multi-hazard risks into regulatory and institutional frameworks, and identify potential new threats.<br>2. Leverage data and technology for risk identification and assessment                                                                                                                             |
| <b>Priority 2</b><br>Strengthening disaster risk governance to manage disaster risk                                                                   | 3. Promote cooperation and collaboration at the international and local levels<br>4. Promote uptake of insurance to manage residual risk                                                                                                                                                                                                                     |
| <b>Priority 3</b><br>Investing in disaster risk reduction for resilience                                                                              | 5. Measure and track investments in resilience<br>6. Ring-fence money for DRR<br>7. Finance non-traditional approaches, especially at the local level<br>8. De-risk investment through (a) mandatory disaster risk assessment in credit allocation and (b) risk-adjusted credit pricing<br>9. Expand concessionary lending access to middle-income countries |
| <b>Priority 4</b><br>Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction | 10. Mandatory implementation of guiding principles on sustainable finance, such as the Principles of Responsible Banking, to achieve de-risking of investments.<br>11. Reforms to the international financial architecture                                                                                                                                   |

# Introduction

## The rising cost of disasters

Increased incidences of natural hazard-induced and man-made disasters, and their associated costs, have exposed more people and assets to vulnerabilities. Even before COVID-19 caused huge economic disruption, disasters have resulted in losses of US\$520bn annually (2018), pushing as many as 26 million people into poverty.<sup>6</sup> In 2021, disasters caused by natural hazards resulted in overall losses of US\$280bn,<sup>7</sup> with 103.5 million people affected by the disasters, 23 million people displaced and almost an equal number living in acute food insecurity driven by weather extremes.<sup>8</sup> According to the World Bank, the cost of some disasters could amount to 200% of GDP for small island countries, and 20%-25% of GDP for middle-income and advanced economies.<sup>9</sup> Inter-American Development Bank (IDB) found that the post-disaster growth rate is lower than the pre-disaster average, which suggests that the output loss during the disaster is never fully recovered.<sup>10</sup> Understandably, investing in measures that reduce the economic losses arising from these disaster occurrences must be a common goal for countries across the world. To grow sustainably at a time when the world faces multiple disaster threats originating from natural hazards as well as man-made

causes, countries need to invest in disaster risk reduction. Although the case for resilience investments is compelling—every US\$1 spent on disaster reduction saves US\$4 to US\$7 in disaster response<sup>11</sup>—underinvestment in disaster risk reduction prevails worldwide.

The COVID-19 pandemic complicated matters further by adding to the financial constraints faced by developing countries in setting aside resources for reducing disaster risks. Even developed nations are potentially looking at battling long-term debt issues in the aftermath of the pandemic, which has implications for financing disaster responses at both national and international levels, thus establishing a vicious disaster debt cycle and further emphasising the need to invest in disaster risk reduction prior to a disaster.

## Why invest in disaster resilience?

Disasters caused by natural hazards like climate change and geophysical hazards, as well as man-made catastrophes such as cyber-attacks, do not have predetermined impacts on lives, livelihoods and economies. Heavy rains can become catastrophic floods in poorly designed, unplanned cities. In another context, where zoning and building codes are informed by an appreciation of disaster risk, and adhered to

## The Sendai Framework on Disaster Risk Reduction 2015-2030<sup>15</sup>

'The Sendai Framework for Disaster Risk Reduction 2015-2030' is a set of voluntary, non-binding global guidelines for DRR. It is the successor instrument to the 'Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters'. The Sendai Framework places significant emphasis on DRR through the following four main priorities:

- (1) Understanding disaster risk
- (2) Strengthening disaster risk governance to manage disaster risk
- (3) Investing in disaster risk reduction for resilience
- (4) Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction<sup>16</sup>

Governments are the natural lead actors responsible for managing disaster responses. They hold both moral and legal responsibilities to provide emergency response and support to affected populations in the form of temporary shelters and rebuilding damaged public assets.<sup>17</sup> To some extent, these losses can be reduced by investing in risk reduction, but there remains confusion around who should drive these investments.

The Sendai Framework clearly outlines that the primary responsibility for DRR rests with the State, but that it should be shared with other stakeholders, such as local government and the private sector.

by developers, the impacts can be contained. A disaster's economic fallout, similarly, varies greatly based on the policy choices made before a disaster occurs in building both physical and financial resilience to disasters. The same event can have markedly different impacts depending on actions taken by the key stakeholders involved, such as national and local governments, financial institutions, the private sector and the citizens themselves. A prime example of returns on investing in disaster preparedness

can be found in Bangladesh. A country sitting at the mouth of the Bay of Bengal, Bangladesh is vulnerable to tropical storms and cyclones that batter the country's shores on an annual basis. It also faces the dangers of climate risks, such as rising sea levels that threaten to swallow up its coastal land. Cyclone Bhola, in 1970 killed between 300,000 to 500,000 people and caused extensive economic damage. Over the years, the country's diligent investments in building disaster preparedness, particularly towards weather-driven disasters, has paid off as the number of cyclone-related deaths has fallen over 100-fold since 1970.<sup>12</sup> The results are visible in the significantly lower number of human casualties witnessed during cyclone Bulbul in 2019.<sup>13</sup> Another prime instance of how investment in DRR can promote both direct and indirect benefits is Angola, where investments in building multipurpose dams translated into a direct reduction in average annual losses of US\$6m and future economic benefits of up to 8.5% of GDP.<sup>14</sup>

### Disaster risk reduction: The financing imperative

Disaster risk reduction (DRR) has ascended the policy agenda over the last two decades, especially in the aftermath of extreme events whose devastating toll proved to governments the need for better planning and foresight, particularly the 2004 Indian Ocean tsunami. The number of crises experienced since—extreme weather events, geophysical disasters, and the pandemic among them—have sadly proven that despite the great gains in human welfare in the 20th century, the present millennium is one of grave, global and complex threats, which we need to prepare for through investments in risk reduction and preparedness. The Sendai Framework on Disaster Risk Reduction 2015-2030, recognises this need to build disaster resilience and the need for focused action within and across sectors at the local, national, regional and global levels through four priorities (discussed in the box out above).

While swift and coordinated action can still make a significant difference in whether an event cascades into a wider humanitarian crisis, post-disaster financial needs often take a huge toll on fiscal resources and divert much-needed resources away from long-term development priorities. Hence, investment in risk reduction and resilience building before a disaster can translate into both direct and indirect gains. Over the years, there has also been a growing awareness of the benefits of using post-disaster financial intervention as an opportunity to rebuild damaged infrastructure in a way that fully accommodates future risk, simultaneously supporting post-disaster recovery and helping 'build back better'.

To prevent new disasters and reduce the risk from existing ones, dedicated policy action needs to be taken before a disaster occurs. However, political realities tend to limit investment in DRR. Governments understandably prefer to allocate scarce funds to investments that generate immediate, tangible outcomes, rather than to risk-reduction efforts whose gains are measured in events avoided. Even where investments do produce benefits in the shape of damage avoided during a disaster, that may still be overshadowed by the devastation that could not be stopped. Coordination is also difficult while implementing risk-reduction measures, which cuts across sectors and ministries and may lack any individual lead actor with the mandate to force reforms in periods where no disaster is evident.

Counterintuitively, often, the availability of international aid for post-disaster emergency recovery and rebuilding acts as a moral hazard for decision makers. Politicians with limited terms in office and competing demands for limited financial resources, may decide to use the available funds to achieve more tangible outcomes (such as subsidies, tax rebates or investment in employment-generating activities such as huge infrastructure projects).

Despite this, investing in appropriate foresighted actions to build resilience to disaster risk is an advised strategy for all countries, depending on their risk level and resources.

### **Understanding financial resilience**

The economic and financial impact of disasters can take a significant toll on a country's public finances. Hence, building disaster resilience involves a focus on financial resilience in addition to physical resilience, such as critical infrastructure. Financial resilience holds dual functions and is a core component of macro-fiscal policy. It not only ensures countries' capacity to provide timely disaster response and recovery funds post-disaster, without depleting financial resources while ensuring the normal functioning of the financial system, but also involves having policies and financial instruments in place to cope with disaster-related contingent liabilities and financial costs of the disasters over time, as well as investing in DRR policies.

The interdependence between financial and physical resilience cannot be ignored. Financial resilience is heavily reliant on physical resilience considering the large and unexpected expenditure that can be created by failed infrastructure. The interaction of the two forces is a must to generate a virtuous circle in DRR and economic development, as large, unexpected expenditures could be avoided through pre-arrangement and good management of existing and future risks, including risks to communication networks and critical infrastructure, which guarantee the uninterrupted delivery of public services.

# Event analysis

While policymakers understandably prefer to focus on investments with short-term tangible benefits, rather than risk reduction with uncertain payoffs and limited political benefits, an analysis of the economic fallout of disasters proves the adage that an ‘ounce of prevention is worth a pound of cure’. This chapter provides an analysis of the economic and financial implications of selected disasters over recent decades, to provide quantitative evidence to support the economic case for *ex-ante* action.

## Event summaries

### Nepal earthquake, 2015

On April 25th 2015, Nepal was hit by a 7.8-magnitude earthquake that, together with multiple aftershocks, devastated large parts of the Kathmandu Valley, including the capital, causing US\$7bn in damage, nearly 35% of Nepal’s economy.<sup>18</sup>

One-third of the population was impacted by catastrophic damage to residential and commercial property, and infrastructure (power and transport). Agriculture and services, which account for nearly 80% of the economy, were severely damaged, with tourism the hardest hit.<sup>19</sup>

**Real GDP growth fell from 4% in 2015 to 0.4% in 2016, compared to a forecasted 5.5%.<sup>20</sup>**

The gross national savings rate fell from a high of 46.4% in 2015 to 36% in 2016 as households and businesses funded their post-earthquake reconstruction.<sup>21</sup> Nepal’s five-year-long current

account surplus turned into a deficit due to increased imports. Surging imports, due to a rise in demand for construction materials as part of the reconstruction and recovery process, pushed the Nepalese Rupee into a higher-than-forecast depreciation.<sup>22</sup>

### Effective government response and the power of sound financial management

The Nepal government quickly mobilised financial and human resources for emergency relief. The National Disaster Response Framework was key in coordinating the response, alongside the release of financial resources from the Prime Minister’s Disaster Relief Fund—US\$910m capacity in the fiscal year 2015/16 budget—for recovery and reconstruction, with 18% allocated through ministries and public agencies and the rest designated for the National Reconstruction Fund.

MDBs, including the World Bank and ADB, provided financial aid for emergency relief, reconstruction and recovery via emergency assistance loans and grants; US\$4.4bn was raised from international donors at a high-level conference in June 2015.<sup>23</sup>

Public confidence in the banking system was maintained thanks to the central bank's quick response and provision of services. The central bank—Nepal Rastra Bank—took immediate steps to prevent financial shocks or cascades, including simplifying account opening procedures and allowing restructuring or rescheduling of loans for earthquake victims.<sup>24</sup>

**Table 2 : Financial stability indicators**

| Indicator                          | mid-July 2014 | mid-July 2015 |
|------------------------------------|---------------|---------------|
| Total credit/total deposits        | 76.5          | 76.8          |
| NPL/Total loans                    | 3.8           | 3.3           |
| Real estate exposure/Total loans   | 7.3           | 6.2           |
| Total liquid assets/Total deposits | 32.5          | 30.2          |
| Total capital/RWA (%)              | 12.7          | 12.9          |

Source: Financial Stability Report, Nepal Rastra Bank, March 2016

Nepal's experience offers both exemplary best practice as well as shortcomings that need to be anticipated for future disasters. Positively, Nepal's financial stability was maintained due to effective institutions, a stable economic base and international credibility in financial markets and among international donors. This shows how sound financial and macroeconomic management are themselves be an asset during disaster recovery contexts when significant financial resources need to be raised and disbursed.

Areas for improvement include a clearer focus on resilience building; there was limited evidence of proactive disaster-reduction measures despite Nepal's vulnerability to geophysical disasters.<sup>25,26,27</sup> The institutional framework is heavily oriented to ex-post management such as response and recovery. Mitigation measures that exist were inadequately enforced, such as the failure of many buildings to adhere to a 2009 recommendation to use more earthquake-

resistant designs and materials. The country may benefit from the use of incentives and financial instruments to tackle its main risk exposure—lack of adherence to building regulations—such as tax breaks, subsidies or penalties for failing to adhere. Greater use of property insurance (both commercial and residential) for natural hazard induced catastrophes could also provide a cushion to individuals and businesses and provide a financial reprieve in the aftermath of a disaster, rather than relying on government relief.

An assessment of Nepal's post-disaster response reveals a good mix of multilateral and national instruments. The country did not rely solely on multilateral channels for post-disaster response and recovery. In the immediate aftermath, the government dipped into its fiscal buffers to fund emergency relief and response activity while the country's strong economic credentials allowed it to mobilise funds from multilateral channels in the medium term.

## Digital Vulnerabilities of critical infrastructure (Ukraine, global)

### 'BlackEnergy' Ukraine Energy Grid Hack (2015, Ukraine)

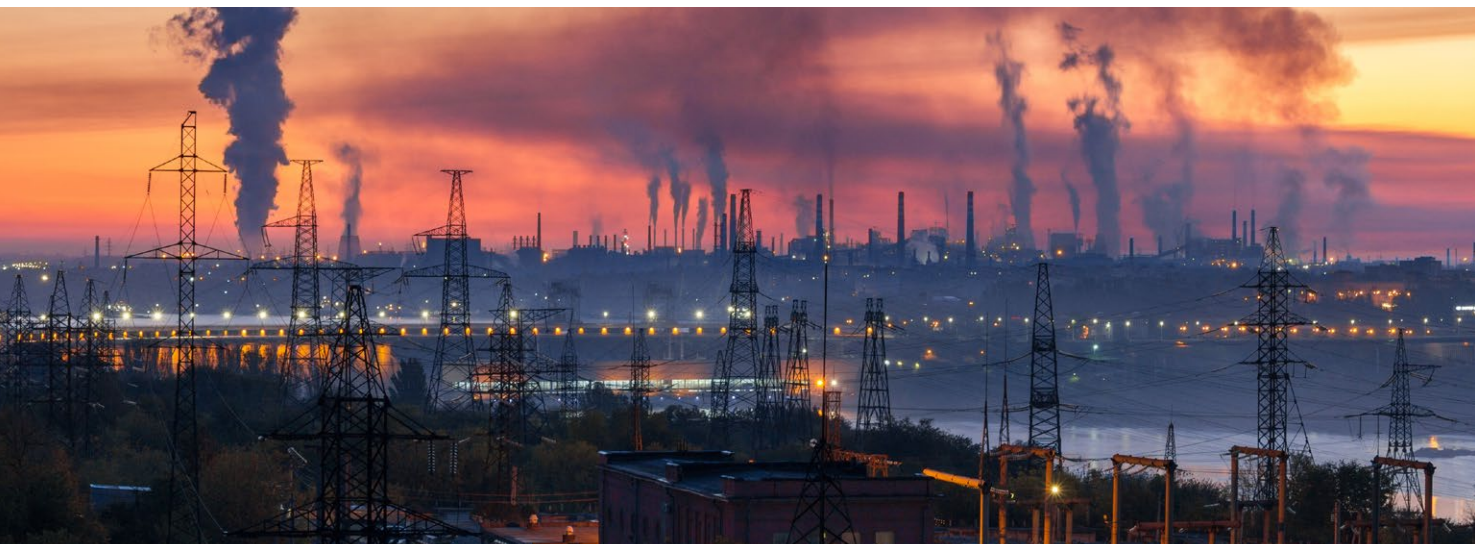
In December 2015, a portion of the Ukrainian power grid was compromised by hackers; three Ukrainian operations centres were unable to regain remote control of more than 30 substations.<sup>28</sup> Seven 110kV and 23 35kV substations were disconnected for a duration of three hours due to malware dubbed "BlackEnergy".<sup>29</sup> As a result, the region experienced power outages, some lasting up to six hours.<sup>30</sup> Threat actors simultaneously flooded telephone services, specifically customer service lines, in a Telephony Denial of Service (TDOS) attack, preventing customers from seeking help.<sup>31</sup>

This was the first of a series of cyber-attacks to strike Ukraine, which faced threats to its political stability (e.g., external financial/military destabilisation, resistance to reform by vested interests, nationalist militias and falling government support).<sup>32</sup> **The BlackEnergy hack halted one-fifth of Kiev's power consumption at night, affecting heating, electricity and internet and communication services.**

The event in 2015 caused nearly US\$1 bn in losses<sup>33</sup> and had major socio-political ramifications as it created a platform for subsequent large-scale events, possibly impacting more public systems. Future events could include physical damage to critical infrastructure using more sophisticated malware that remotely and permanently affects physical security.<sup>34</sup> Ukraine experiences severe winters with freezing temperatures, which could be fatal without heating utilities.<sup>35</sup>

Ukrainian authorities had been considering switching critical infrastructure to entirely automated systems. Given the need for manual controls to reboot the uninterruptible power supply and converters in order to remotely divert energy back to the distribution companies during the event, further research was started on the automation of critical infrastructure and its security.<sup>36</sup>

Ukraine had many security features in place at its facilities; its key vulnerability lay in remote access to servers, for which it requires more sophisticated measures. Regular identification of security systems and the placement of system verification buffers, such as multi-factor authentication, one-time passwords and biometric access points, are likely to prevent such



an event by presenting a warning and creating a barrier preventing the threat actors from gaining access to the servers.

Other Eastern European countries also suffered a spate of increasingly sophisticated cyber-attacks on critical infrastructure, including physical and non-physical systems and services, including a 2007 Distributed Denial of Service (DDoS) attack on Estonia, which left residents unable to use much of the internet, disrupting access to newspapers, government websites and banking services.<sup>37</sup> In July 2008, Georgia experienced a series of DDoS attacks, disrupting approximately 2,000 public and government websites.<sup>38</sup>

Building technical safety and security capacities among employees is a key lesson. Critical infrastructure security needs to be tightened, including training employees on spear phishing and malware, to prevent future events in which threat actors are able to install malicious software and gain access to employee credentials. Regular knowledge-sharing sessions and tabletop exercises are likely to provide a swifter and more coordinated response to such events in the future.

### **WannaCry ransomware attack (2017, global)**

In May 2017, WannaCry Ransomware infected Microsoft Windows systems globally. The threat actors held user files hostage through the malware and demanded Bitcoin payment in return for their release. If the ransom was not paid within three days, victims were told that their files would be permanently deleted.<sup>39</sup> Approximately 1.7 million internet-connected endpoints are still vulnerable to WannaCry.<sup>40</sup>

This event is known to have been widely preventable and a result of a lack of awareness of the need for timely software updates. Two months prior to the event, Microsoft had released a security patch against the very exploit—EternalBlue—that resulted in the event.<sup>41</sup>

### **A digital virus, a new reality**

WannaCry had a major impact on organisations that had not updated their security software and patches. Nissan Motors, FedEx, China National Petroleum, Renault SA, Deutsche Bahn, Hitachi, Sberbank of Russia, Megafon, Telefonica, Andhra Pradesh Police Service, Yancheng police department in China, the Russian Interior Ministry, and the British National Health Service were among those impacted.<sup>42</sup> Nearly 48 National Health Service (NHS) trusts in England reported difficulties in hospitals, surgeries and pharmacies, while 13 NHS organisations in Scotland were also affected. Ambulances were rerouted and over 19,000 healthcare appointments were cancelled.<sup>43,44</sup> Two major hospitals in Jakarta, Indonesia were severely impacted by WannaCry as patient files were locked and held for ransom. This was specifically noted at Dharmas Cancer Hospital, where patients were unable to get queue numbers to seek help and hospital staff faced difficulties in locating paper-based files from hospital records.<sup>45</sup> The US Department of Homeland Security noted that a number of infrastructure systems were affected with significant disruption.<sup>46</sup> Gas stations in Chongqing city, China were unable to accept card payments after systems at China National Petroleum Corp became infected.<sup>47</sup>

It was also a landmark moment, as one of the fastest-growing and most widespread cyber-attacks in history, and set an ominous precedent for public and commercial activities. A cybersecurity firm, Kaspersky, deemed the event a “global epidemic”.<sup>48</sup> Although the perpetrators were motivated by profit, it set the stage for future events allowing perpetrators with political and security motivations to potentially hold organisations hostage to their demands. The event resulted in losses amounting to US\$4bn globally.<sup>49</sup>

There is no evidence that countries required the use of lending streams such as a reserve fund, contingency fund, ad-hoc funding, regional disaster funds, international aid (incl. loans and grants) or donations to respond to this event. Additionally, interviews with the financial sector and DRR experts suggest that

**investments in disaster prevention are a rare phenomenon for cyber-attacks as there are currently no standardised financial models to calculate the risks of future attacks based on past outcomes.<sup>50</sup>**

Yet there are lessons from the experience, which indicates a need to include cyber risks to critical infrastructure in DRR, given the impacts on both public services and the private sector. One is building technical safety and security capacity for the labour force. The WannaCry attack could have been prevented through more vigilance in technical software updates. Given the diversified nature of the attack, advocating for and building IT literacy is essential to preventing such events from occurring in the future. A second is to establish cyber hotlines and emergency redressal focal points. The availability of national helplines and support services for reporting cyber threats and providing guidance in cases of cybercrime emergencies is likely to prevent organisations from making ransom payments to malicious hackers in the future.

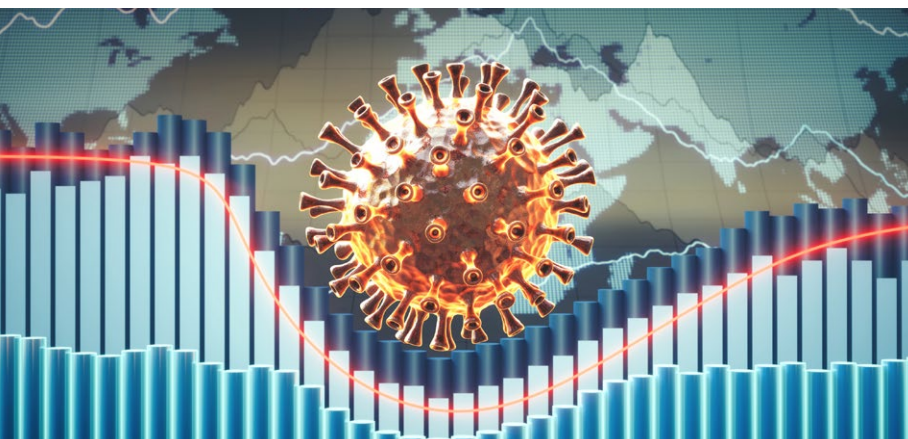
## The COVID-19 pandemic, 2020 (the US)

The US was among the worst-affected countries in the world in the first year of the pandemic, in terms of health impact and economic shock. From January 2020 through December 2021, there were 53.5m confirmed cases and 817,826<sup>51</sup> deaths. The US economy contracted at a record average annualised rate of 19.2% from its peak in the fourth quarter of 2019 through the second quarter of 2020. Approximately 22 million job losses were recorded between February and April 2020 before rebounding to 11 million in August 2020 and 12 million by November 2020. Bureau of Labor Statistics (BLS) further noted that the **job losses in April and May 2020 were significantly higher than those during the Great Recession (2007-2009).**<sup>52</sup>

The government response to the crisis was massive in scale and varied in scope, from low-interest loans to sector-specific funds and monetary policy reforms to buoy financial markets and encourage lending and borrowing for economic continuity. The US Federal Reserve, whose remit has dramatically expanded since the 2008 financial crisis, effectively buffered the economy, protecting businesses and consumers. Stimulus payments, child tax credits, loans and assistance, and financial aid were all critical interventions to prevent a total economic collapse in view of the massive jolt to economic activity as a result of lockdowns.

### An uneven crisis

A key lesson from the US COVID crisis is the uneven impact of a hazard that does not discriminate. Most job losses were recorded in the leisure and hospitality industry.<sup>53</sup> Workers in retail trade (10% of all workers) and food services and drinking places (6%) were the most vulnerable.<sup>54</sup> Other industries with a high risk of job losses included transportation,



accommodation, personal care and laundry services, arts, entertainment and recreation, and child day care services.<sup>55</sup> Outcomes were also worse for disadvantaged societal groups. The pandemic disproportionately affected women, non-white workers, lower-wage earners, and those with less education. While US non-farm jobs were held by more women than men for the first time during a period of job growth in December 2019, this relationship reversed by May 2020. Further, young adults were at higher risk of layoffs due to COVID-19.<sup>56</sup>

COVID-19 negatively impacted academic performance and further widened existing inequalities, especially for those with disabilities and for people of colour. Studies show that LGBTQIA+ students faced a heightened risk of anxiety and stress due to loss of mental health support mechanisms.<sup>57</sup> Sexual and identity-based harassment, especially hate crimes, increased significantly against women, girls, gender non-conforming individuals, and people of Asian-American and Pacific Islander origin, likely exacerbated by the pandemic.<sup>58</sup>

The 2021 Global Health Security Index highlighted that limited access to healthcare during COVID-19 greatly widened the gap between those with access to healthcare and those without.<sup>59</sup> The spread of the virus was likely worsened by the fact that uninsured and under-insured people were unable to self-isolate or receive a diagnosis for fear of the economic and cost implications.

### **Trust in public institutions**

According to the 2019 Global Health Security (GHS) Index, the US had more global health security capacity to prevent and respond to epidemics and pandemics than any other country. The nation's disastrous outcomes thus shocked many experts. The 2021 GHS added a caveat that public attitudes and

confidence in government play an essential role in adherence to control measures like mask-wearing and vaccination.

Declining budgets to support public health preparedness also eroded local capacities. Other gaps identified in the US response to COVID-19 include weaknesses in the US healthcare system, limited access to care without cost barriers, and lower numbers of healthcare personnel and hospital beds per capita than in many other high-income countries.<sup>60</sup>

There is no evidence of financing instruments and programs in place for public health emergencies within the US financial architecture. Experts interviewed by Economist Impact state that pre-event modelling for risk stratification and management greatly impedes the ability of the financial sector to invest in financial instruments that could mitigate the risk of future disasters.<sup>61</sup>

There are three lessons from the US experience of the pandemic. The first is that a whole-of-government response can contain the economic shock from disasters. In the case of COVID-19, a V-shaped recovery was made possible by a series of complementary policies across government agencies and massive financial support provided in the aftermath of the event. The scale of response built on an existing trend of central bank activism dating back to the financial crisis. Current inflationary dynamics, however, indicate the tough task of timing the shift to 'normal' monetary policy. Second, pre-existing operational and policy capacities to address disasters only go so far when implementation is heavily dependent on public trust in governance. Although the US had more global health capacities in place to mitigate the impact of the COVID-19 pandemic than other countries, low public confidence in the government is likely the cause of poor public adherence to control measures, such as mask-wearing and

vaccinations, which are known to be the key challenges to the US pandemic response. Lastly, patchy healthcare coverage can worsen the spread of pandemics. A predominantly private health insurance market, with many uninsured or underinsured lower-income Americans, is one reason the country faced such rapid viral spread. Prohibitive costs associated with accessing preventive resources remain a key challenge for the US public healthcare system in response to the pandemic.

In the case of the US, an evaluation of funding sources used to respond to the COVID-19 crisis reveals that most of the funding received was from national sources.

### The Ebola outbreak, 2014-16 (Guinea, Sierra Leone, Liberia)

Clusters of the Ebola Virus Disease (EVD), a deadly haemorrhagic illness, have plagued equatorial Africa since the 1970s.<sup>62</sup> The West African outbreak of 2014-2016 was by far the worst,<sup>63</sup> causing more than 28,600 cases and 11,300 deaths in Guinea, Sierra Leone, and Liberia.<sup>64</sup>

Existing resource constraints in these countries further impaired their ability to take timely action to prevent the spread of the epidemic. All three countries relied on help from the international community.<sup>65</sup> Eventually, foreign governments donated billions of dollars and deployed thousands of volunteers and military personnel. The World Health Organisation (WHO), which led the response, received US\$459m from donors.<sup>66</sup> The World Bank Group provided US\$1.62bn and the UN Ebola Response Multi-Partner Trust Fund raised over US\$166m.<sup>67</sup> By the end of 2016, US\$5.2bn had been pledged by donors.<sup>68</sup> Some US\$2.17bn in debt relief was provided to the affected countries.<sup>69</sup>

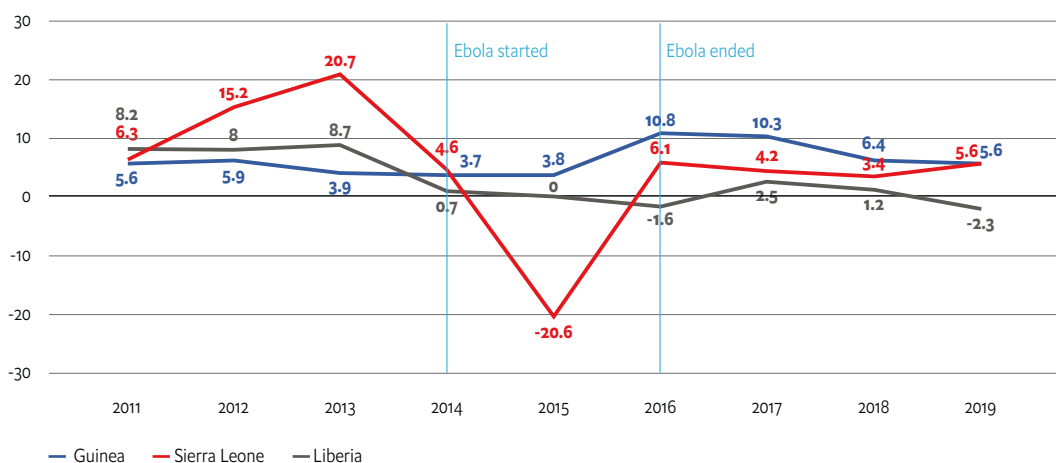
### The cost of a slow response

Vast human costs have outlasted the epidemic. During the outbreak, there were 10,623 additional deaths from HIV/AIDS, tuberculosis and malaria and 3.5m untreated malaria cases.<sup>70</sup> One study found that measles caused up to 16,000 extra deaths, with 1m children missing vaccinations.<sup>71</sup> The number of pregnant women receiving medical care plummeted.<sup>72</sup> School closures caused a spike in adolescent pregnancy and set back the education of perhaps 5m children.<sup>73</sup> In addition, critical numbers of health staff died from Ebola.

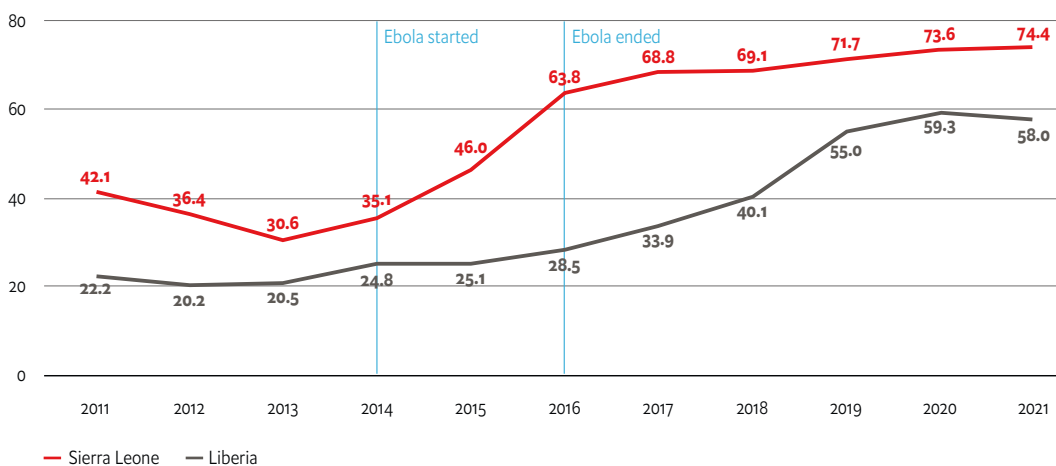
Estimates for the economic burden range from US\$2.8bn<sup>74</sup> to US\$14bn<sup>75</sup> in lost GDP. Falling productivity, investment and agricultural production were compounded by a drop in global resource prices. Sierra Leone suffered a devastating recession. A 10-year stretch of economic growth ended in Liberia in 2014 (see Chart 1), and unemployment soared in all three countries, reaching 56.2% in Liberia after the outbreak.<sup>76</sup>

The fiscal impacts have been long-lasting. Ebola triggered declining revenues and widening deficits. **Sierra Leone's public debt as a percentage of GDP doubled from 30.6% in 2013 to 63.8% in 2016. In Liberia, it rose from 20.5% in 2013 to 28.5% in 2016. It has continued to rise in both countries since the outbreak** (see Chart 2).

Weak healthcare systems hobbled West Africa's response to Ebola and both national and international mobilisations were sluggish, with the WHO admitting its initial response was insufficient.<sup>77</sup> Faster action from both governments and international partners will be critical in controlling the spread of future diseases.

**Chart 1: Real GDP growth, Guinea, Liberia and Sierra Leone, 2011-2019**

Source: Economist Intelligence Unit

**Chart 2: Public debt, Liberia and Sierra Leone, 2011-2019**

Source: Economist Intelligence Unit

The outcomes in the aftermath of Ebola highlight the critical role of building financial resilience before a disaster to limit the damage from disasters in the future. In this event, what stands out is the heavy reliance of the affected countries on international aid from donor countries, which

was channelled through MDBs and international partners. In the absence of a well-functioning economy, domestic financial resources were scarce to maintain even a proper healthcare infrastructure in these countries, let alone a disaster response and post-disaster recovery.

### The chemical explosion, 2020 (Beirut, Lebanon)

On August 4th 2020, a massive explosion ripped through a warehouse in the port of Beirut, Lebanon's capital, causing extensive damage and casualties. The warehouse housed 2,700 tonnes of ammonium nitrate—an extremely explosive material—and the accident sparked the largest non-nuclear explosion ever recorded.

The port, in central Beirut, is Lebanon's main trade artery—receiving more than 80% of goods—and is situated close to commercial districts and the downtown area, resulting in severe damage to shops, offices, restaurants, transport and communications infrastructure. The explosion displaced over 300,000 people—almost 4% of Lebanon's population—and caused **economic losses worth US\$4.6bn, representing 7% of Lebanon's GDP in 2020.** Nearly 70,000 people lost their jobs, directly or indirectly impacting nearly 12,000 households. The headcount poverty rate increased from 28% to 55% between 2019 and 2020.<sup>78</sup>

#### Compounding effects of crises

One of the striking lessons of the crisis was how it played into pre-existing economic crises in the country, which was already suffering due to

causes including COVID-19, the Syrian refugee crisis and falling tourism revenue—leaving the government with limited fiscal capacity to allocate post-disaster funds. International aid was more significant; US\$14.1m was released from the UN's Central Emergency Response Fund and the Lebanon Humanitarian Fund.<sup>79</sup> By April 2021, disaster funding reached US\$314m, with US\$165m received through an UN-coordinated flash appeal and US\$149m from other sources.

Yet this international aid was delivered directly to hospitals, UN agencies, non-government organisations and on-the-ground associations, rather than the government, due to the latter's limited ability to handle the financing transparently and effectively.<sup>80</sup> The Beirut disaster shows how broader governance and financial stability determine a country's ability to marshal and allocate financial resources to tackle a crisis and limit its impact on the economy. GDP growth had been on a downward trend, with a rise in consumer price inflation and public debt since 2016. The crisis was tinder to the flame; severe supply-side constraints resulting from damage to the city's physical infrastructure led to hyperinflation, with the average consumer price index almost doubling between 2019 and 2020. Food price inflation reached over 400% in December 2020.<sup>81</sup>

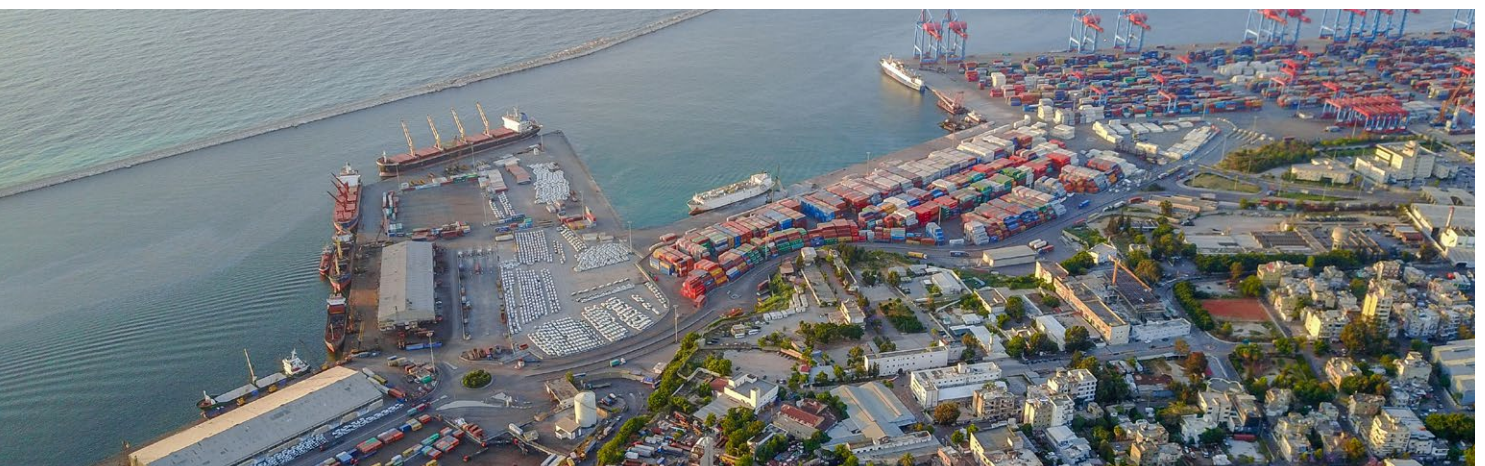
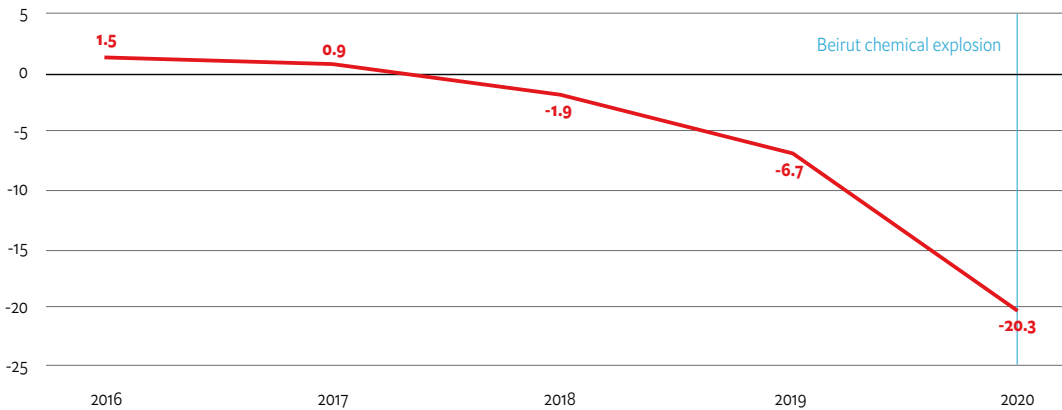
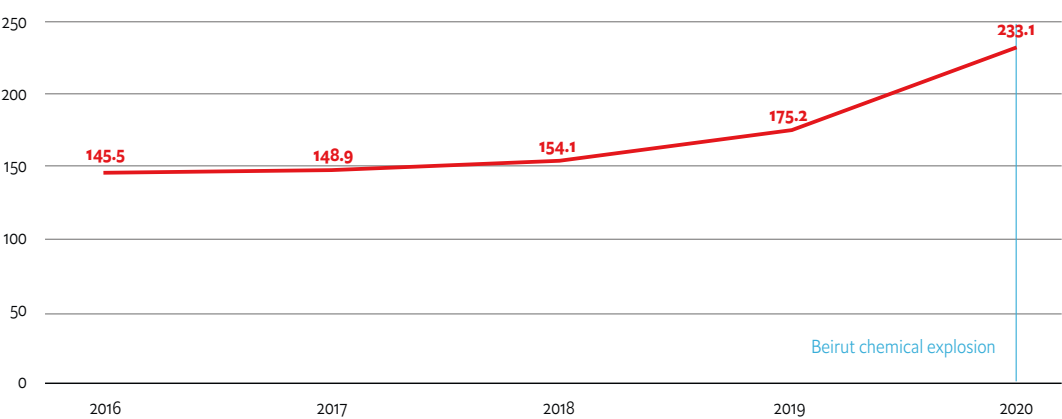


Chart 3: Real GDP growth, Lebanon, 2016-2020



Source: Economist Intelligence Unit

Chart 4: Public debt, Lebanon, 2016-2020



Source: Economist Intelligence Unit

Similar to the Ebola outbreak, the disaster response in Beirut was heavily skewed towards a reliance on multilateral channels and international partners. The lack of a well-

functioning, robust and diversified economy led to a perpetual shortage of funds even for the daily functioning of the economy, let alone disaster response and recovery.

## The Chennai floods, 2015 (India)

Tamil Nadu state experienced exceptionally heavy rainfall in November and December 2015 leading to devastating floods in the city of Chennai—a major manufacturing and services hub—and the adjoining districts of Kancheepuram and Tiruvallur.<sup>82</sup> The overflowing of two key rivers—the Adyar and Cooum rivers—led to the flooding of several low-lying areas occupied by informal settlements.

The flooding damaged transport infrastructure, disrupting road and rail services and leading to the closure of the city's airport for almost six days, paralysing the entire city. The region's manufacturing economy contributes nearly 3% of national GDP and is home to significant automobile manufacturing, automotive component and ancillary industries and a major IT services hub. **Estimates indicate losses of nearly INR840 crore (US\$130.8m) each week for Micro and Small and Medium Enterprises (MSMEs)** in sectors such as gold and jewellery, leather, printing, garments, plastics and pharmaceuticals.

The human toll was severe, with 1.8 million people displaced, equating to 3% of the state's population, and total economic losses estimated at US\$2-3bn.<sup>83</sup> Nearly 30% of households in Chennai faced losses ranging between INR2 lakh and INR20 lakh (US\$3,115 and US\$31,153).<sup>84,85</sup> There was a 32% spike in consumption rates in the aftermath of the disaster<sup>86</sup> as families dipped into their savings to repair damaged houses and rebuild lost assets, affecting the savings rate in the short term.<sup>87</sup>

Nearly three million families in low-socioeconomic communities suffered total or partial damage to their houses, leaving them either homeless or with significant loss of personal belongings and sources of income. The floods impacted low-lying areas, which were mostly occupied by low-income families and marginalised communities. The floods also led to the death of around 98,000 livestock and poultry, a key source of income for lower-income families.

### A swift post-disaster response, but little foresight

The state and national government responded swiftly to the crisis, with a national disaster response team mobilised to provide emergency relief. Post-disaster financing was principally paid out of the state budget and earmarked for national disaster response to floods.<sup>88</sup> Relief measures included monetary compensation for families who suffered from the death of a family member, a cash handout to each family that suffered damage to their dwelling and provision of dry food rations. Other Indian states also contributed financial aid. Thanks to these measures, and a relatively well-diversified economy, Chennai withstood the worst economic impacts of the floods.

While the post-disaster financial handling was quick and effective, the disaster itself could have



been averted with better planning. Decades of unplanned urban expansion and illegal constructions in low-lying areas led to sprawling human habitations that disregarded the city's natural drainage system of wetlands, lakes, ponds and marshes as well as its flood-prone topography. Chennai had seen at least seven major flooding instances since 2000.<sup>89</sup> A disaster management framework, outlining the roles and responsibilities of national, state and district level disaster management agencies assigned preparedness roles, but the institutions were not functional. Chennai's problem seems to be not a lack of awareness of floods, but a lack of investments in the efforts needed to prevent a commonly known disaster from recurring.

The Chennai floods were certainly a unique study in the sources of funds for disaster response. The post-disaster emergency response, relief and recovery funds were predominantly from domestic sources, with very little received from multilateral sources. The state government utilised earmarked funds from the state disaster relief accounts as well as fresh allocations for disaster relief/recovery in the national budget to fund disaster response and recovery.

### The Sulawesi earthquake, 2018 (Indonesia)

On September 28th 2018, Indonesia's Central Sulawesi province was hit by a series of earthquakes, the strongest measuring 7.4 on the Richter scale, triggering a tsunami and landslides, and leading to liquefaction in Palu city.

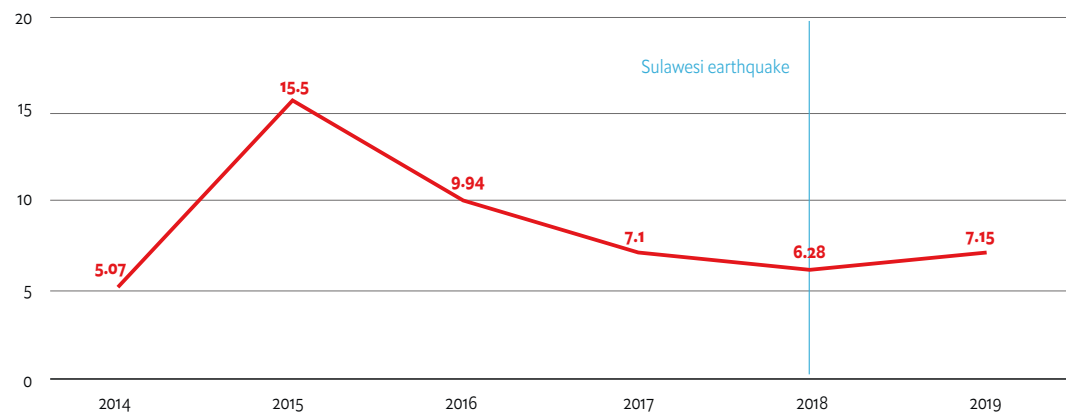
**These cascading disasters displaced 170,000 people (6% of the population of Central Sulawesi province) and caused damage totalling nearly US\$1.3bn (16% of provincial GDP).<sup>90,91</sup>**

The earthquake and tsunami caused widespread physical destruction of residential

and commercial property and transport and connectivity infrastructure such as telecommunications towers, roads, bridges, railway lines, airports and power stations,<sup>92</sup> and disrupted social services<sup>93</sup> such as healthcare,<sup>94</sup> clean water, sanitation and hygiene, education, shelter and protection.<sup>95</sup> Agriculture, fisheries, mining and quarrying, jointly accounting for more than 50% of the province's economy, were the most affected.<sup>96</sup> Damage to agricultural land, irrigation infrastructure, mines, ports and coastal infrastructure reduced economic activity in the fourth quarter of 2018 and the first quarter of 2019 and increased poverty rates in affected cities.<sup>97</sup>

The financial response was significant; the government budgeted US\$102m for economic recovery including cash-for-work programs, cash assistance to restart small businesses, credit schemes for local businesses and training and skills improvement programs. The government instructed the Ministry of Public Works and Housing, Ministry of Education and Ministry of Transport to reallocate existing resources under the 2018 budget to provide priority support for affected areas—an estimated IDR1.7trn (US\$116m). The Central Sulawesi administration disbursed financial assistance to the victims' next of kin, IDR15m (US\$1,062) per person and cash assistance to the owners of damaged houses. A significant amount of international aid was also raised from MDBs.

While timely economic assistance from both the government and aid agencies helped to prevent a complete economic collapse in the affected cities, the loss of economic activity led to a decline in provincial GDP. The three cities hit by the earthquake—Donggala, Palu city and Sigi—each witnessed an increase in incidence of poverty and constrained economic activity due to significant damage to housing and other critical infrastructure.

**Chart 5: Provincial Regional GDP growth, Central Sulawesi, 2014-2019**

Source: Statistics Indonesia

At the institutional level, performance was mixed. Indonesia's archipelagic location in the Ring of Fire—a belt of active volcanoes and earthquake epicentres at the edge of the Pacific Ocean—makes the country highly prone to earthquakes, volcanic eruptions and tsunamis. As a result, Indonesia spends US\$300m to US\$500m each year on disaster recovery and has a well-defined framework for disaster risk management with clearly outlined roles and responsibilities for different institutions during a disaster.<sup>98</sup>

However, a critical early warning system created following the 2004 Indian Ocean tsunami<sup>99</sup> had been non-functional since 2012, and even after the earthquake, it was difficult to disseminate upcoming tsunami warnings because of a breakdown of communications infrastructure. There were no emergency systems in place to issue immediate warnings in the event of a digital communication failure. This can be contrasted with the experience of Bangladesh during Cyclone Amphan in 2020. In the run-up to the cyclone, digital warnings for evacuation were supplemented with on-ground volunteers issuing verbal warnings over

a loudspeaker in vulnerable districts.<sup>100</sup> The country Indonesia has made limited progress in mitigating seismic risk through disaster-resilient building practices, for reasons including a lack of manpower to monitor compliance and limited awareness of disaster-resilient construction standards among design professionals.

Improvements in disaster management were made at the national level, but local governments continue to lack the resources and technical know-how for effective disaster management. This was evident from the fact that the equipment for early warnings had been inoperative for years before the 2018 earthquake and tsunami.<sup>101</sup>

Similar to the Nepal earthquake, the post disaster response in the case of the Sulawesi earthquake was met by both multilateral funding channels and national funds. Given Indonesia's otherwise strong national framework for disaster response, the government was able to tap into domestic financial resources for its disaster relief and response operations. Multilateral channels were well-received later on, for long-term post-disaster reconstruction and recovery.

### Hurricane Maria, 2017 (Dominica, Puerto Rico)

In September 2017, the north-eastern Caribbean was hit by a devastating category 5 hurricane, one of the costliest and most rapidly intensifying cyclones on record, followed by secondary disasters including strong waves, flash floods and landslides. These had a catastrophic impact on human lives and livelihoods, local infrastructure and the economy, with **economic damage amounting to US\$1.3bn in Dominica (226% of GDP)<sup>102</sup> and US\$94.4bn (155% of GDP) for Puerto Rico,** which recorded losses of US\$227m in agriculture production and US\$795m in the tourism industry in the six months after the disaster, respectively.<sup>103,104</sup> Yet the post-disaster financing experience was markedly different in Dominica compared with Puerto Rico, indicating how pre-existing financial, policy and economic conditions determine how a shock event escalates through an economy.

The Dominican government's financial response was relatively strong, with multiple relief measures including stimulus measures, tax exemptions on food and construction material imports, and in-kind grants of roofing materials to assist in rebuilding homes. The government also announced voluntary advances on government salaries and non-contributory pension payments from the Social Security Fund while the National Bank of Dominica (NBD) announced a three-month loan moratorium. Dominica received payouts worth US\$19.3m from the Caribbean Catastrophe Risk Insurance Facility (CCRIF), and international aid worth US\$9.5m. It also utilised funds worth XCD582.6m (US\$215.6m) from its Citizenship by Investment (CBI) program to support recovery. Substantial private insurance pay-outs also facilitated the repair and reconstruction of private housing and structures.

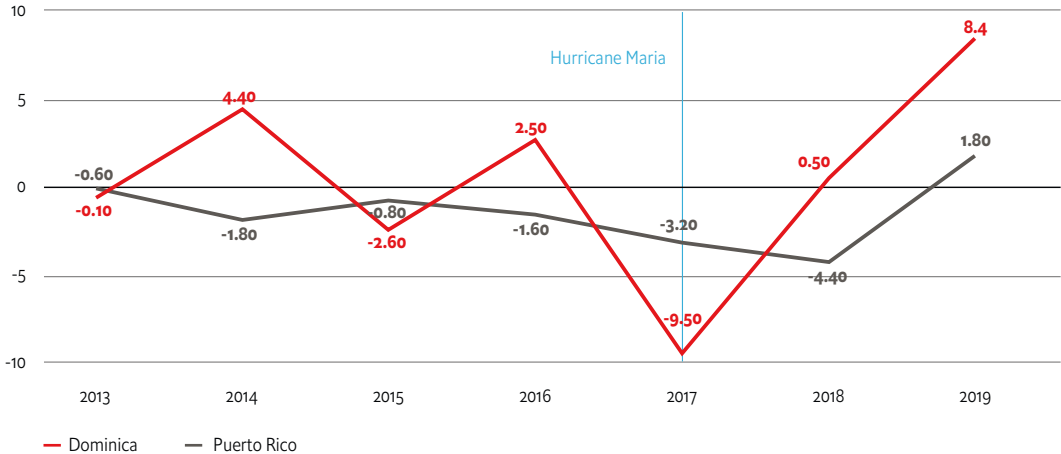
By contrast, Puerto Rico had very limited financial resources to deploy. The island had been in an economic recession since 2013 as an ageing population, a rising dependency ratio, and high levels of social security payments, combined with a lack of economic activity to generate tax revenue, led the government into bankruptcy in May 2017, locking itself out of the bond market, making it unable to borrow money for rebuilding and forcing austerity measures that left little scope to face emergencies.

What made things worse was the false confidence that Puerto Rico had when preparing for the 2017 hurricane season, leading to significant underpreparedness. Even though more than 85% of municipalities reported having disaster preparedness plans in place and 72% reported conducting emergency preparedness exercises at least once a year, only 37% found plans worked adequately after the hurricanes.<sup>105</sup>

Limited resources and capacity left Puerto Rico unable to cope with two extreme hurricanes in succession (two weeks before Hurricane Maria, another category 5 Hurricane, Irma, passed just north of Puerto Rico), forcing it to rely on the US government and Federal Emergency Management Agency (FEMA) for funds and manpower. Administrative complexities led to slower responses in the relief process, as resources and attention were focused on the mainland states affected by previous hurricanes during this active hurricane season. Moreover, unlike Dominica, Puerto Rico did not qualify for financial instruments such as the CCRIF, limiting its ability to borrow from external sources, acquire short-term liquidity and respond to urgent needs.

Financial resources for reconstruction and recovery came from the US government and the commercial sector through funding mechanisms including federal grants, aid, loans, foundation aid, private-sector loans and corporate revenue from State Owned Enterprises. The US Congress allocated around US\$70bn for disaster relief and recovery operations.<sup>107</sup>

Chart 6: Real GDP growth, Dominica and Puerto Rico



Source: Statistics Indonesia

From the Dominican experience, it is clear that while building financial resilience towards a disaster is certainly important, it needs to be supplemented with investments in building physical resilience towards a disaster. The Puerto Rican experience is an indicator of how existing economic vulnerabilities can be worsened in the event of a disaster. Lack of a well-functioning, sound and reliable domestic government, institutions and policies can prove to be economically debilitating in the event of a disaster.

Comparing the post-disaster response of both Dominica and Puerto Rico proves that preparedness pays. Planning well in advance enabled the Dominican government to use a combination of domestic and multilateral financial resources to mobilise post-disaster response and recovery in a timely manner. Meanwhile, Puerto Rico had to rely on external funding sources for its post-disaster response due to a lack of domestic financial capacity.



Table 3: Event summary table

| Event                                                                    | Government Actions                                                                                                                                                                                                                                                                                                                                                                                  | Pre-existing DRR Framework/<br>Early Warning Systems                                                                                                                                                                                                                                                                                                                                                                                                 | Event-specific Takeaways                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Nepal earthquake, 2015</b>                                            | <ul style="list-style-type: none"> <li>Government and central bank responded immediately and mobilised financial resources effectively.</li> <li>Financial stability was maintained due to strong institutions, stable economy and credibility in international financial markets.</li> </ul>                                                                                                       | <ul style="list-style-type: none"> <li>Disaster risk management (DRM) frameworks existed but were inadequately enforced.</li> <li>Proactive DRR measures were missing, such as earthquake-resistant constructions in a hazard-prone area.</li> </ul>                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>Strong institutions and sound financial and macroeconomic management policies enabled the economy to absorb the shock.</li> <li>Financial stability was maintained due to strong institutions, stable economy and credibility in international financial markets.</li> </ul>                                                                                                                                                                     |
| <b>Digital vulnerabilities of critical infrastructure (cyberattacks)</b> | <ul style="list-style-type: none"> <li>None, due to lack of awareness of digital security measures and limited digital literacy.</li> </ul>                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>A largely preventable attack that was the result of a lack of awareness of the need for timely software updates or lack of information technology (IT) literacy.</li> </ul>                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Countries need to build technical safety and security capacities.</li> <li>Incorporating cyber risks to critical infrastructure in DRR is necessary.</li> </ul>                                                                                                                                                                                                                                                                                  |
| <b>The COVID-19 pandemic, 2020 (the US)</b>                              | <ul style="list-style-type: none"> <li>Despite the availability of financial resources and the necessary pandemic management policies in place, the lack of timely execution of these policies caused the virus to spread.</li> <li>The government undertook massive relief measures to ease the economic impact across sectors, which enabled a quick recovery from the economic shock.</li> </ul> | <ul style="list-style-type: none"> <li>Early warnings of a possible pandemic were repeatedly ignored by politicians in previous years</li> <li>Short sightedness by politicians in the initial stages of the pandemic led to a delay in adoption of measures to control the spread of the virus.</li> <li>Preparedness measures adopted from the experience of the last financial crisis (2008) built resilience in the financial system.</li> </ul> | <ul style="list-style-type: none"> <li>Uneven impact of the crisis caused huge losses to vulnerable groups.</li> <li>Pre-existing operational and policy capacities to address disasters only go so far when implementation is heavily dependent on public trust in governance.</li> <li>Despite the availability of financial resources and the necessary pandemic management policies in place, the lack of timely execution of these policies caused the virus to spread.</li> </ul> |
| <b>The Ebola outbreak, 2014-2016 (Guinea, Sierra Leone, Liberia)</b>     | <ul style="list-style-type: none"> <li>Slow response due to weak internal governance frameworks, limited healthcare infrastructure and lack of financial resources led to complete reliance on external aid.</li> </ul>                                                                                                                                                                             | <ul style="list-style-type: none"> <li>No early warning systems in place as weak political and financial institutions led to a lack of financial resources.</li> </ul>                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Domestic governance capacity and pre-disaster financial resilience are critical.</li> <li>Coordination between national government and international partners should be improved to ensure timely action to control the spread of epidemics.</li> <li>Slow response due to weak internal governance frameworks, limited healthcare infrastructure and lack of financial resources led to complete reliance on external aid.</li> </ul>           |
| <b>Chemical explosion, 2020 (Beirut, Lebanon)</b>                        | <ul style="list-style-type: none"> <li>Pre-existing crises created compounded effects and limited the government's fiscal capacity to allocate funds for post-disaster recovery.</li> </ul>                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>None, due to lack of robust domestic institutions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>Sound, well-functioning and accountable economic and political systems are essential to prevent such man-made disasters arising out of negligence.</li> <li>Lack of trust in political institutions led to international aid bypassing the government and going directly to on-ground non-governmental organisations.</li> </ul>                                                                                                                 |
| <b>The Chennai floods, 2015 (India)</b>                                  | <ul style="list-style-type: none"> <li>Timely government response enabled Chennai to withstand the worst economic impacts of the floods.</li> </ul>                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>The DRM framework existed but was not functional due to lack of investments in the efforts needed to prevent a commonly known disaster from recurring.</li> <li>Early warning systems existed, but warnings were not disseminated in time due to lack of coordination among stakeholders.</li> </ul>                                                                                                          | <ul style="list-style-type: none"> <li>Human activities disregarding existing vulnerabilities exacerbated disasters.</li> <li>Mere awareness of disaster risk without active prevention measures is of limited use.</li> </ul>                                                                                                                                                                                                                                                          |
| <b>The Sulawesi earthquake, 2018 (Indonesia)</b>                         | <ul style="list-style-type: none"> <li>Timely economic assistance from both the government and external aid agencies helped to prevent a complete economic collapse in the affected cities.</li> </ul>                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>Well-defined DRM framework functioned relatively well post-disaster, due to the frequency of disasters.</li> <li>A malfunctioning early warning system made it impossible to disseminate advance warnings.</li> </ul>                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Frequent monitoring of warning systems is needed to detect any malfunctioning equipment.</li> <li>Policies, actions and investments at the national level are not enough, local capacity building should be equally emphasised.</li> </ul>                                                                                                                                                                                                       |
| <b>Hurricane Maria, 2017 (Puerto Rico, Dominica)</b>                     | <ul style="list-style-type: none"> <li>Dominica: strong government response along with international assistance helped to allocate necessary resources and boost reconstruction activities.</li> <li>Puerto Rico: A bankrupt government with limited financial resources resulted in a heavy reliance on the US Federal government.</li> </ul>                                                      | <ul style="list-style-type: none"> <li>Dominica: robust financial resilience built through membership of the CCRIF. No physical resilience built to face an event of such severity.</li> <li>Puerto Rico: DRM framework existed but was not complied with; limited coordination between government agencies. No physical resilience built to face an event of such severity.</li> </ul>                                                              | <ul style="list-style-type: none"> <li>Dominica: Financial resilience building needs to be supplemented with investment in physical resilience.</li> <li>Puerto Rico: DRM plan with no real implementation is ineffective. Need for a clear demarcation of responsibilities of participating emergency management agencies.</li> </ul>                                                                                                                                                  |

## Conclusion

**A strategy that focuses heavily on managing post-event response is insufficient, as was witnessed in many of the events discussed above.** Research from the event analysis underscores the importance of investing in pre-disaster resilience building to maintain long-term economic and financial stability. Designing an effective disaster risk reduction strategy requires a focus on identifying existing risks and vulnerabilities before a disaster occurs and taking steps beforehand to put in place the systems to reduce the risks from these vulnerabilities while simultaneously building buffers to absorb the impact of the disasters.

The above section on event analysis also highlights the lack of sufficient investment in risk-reduction measures prior to a disaster, despite widespread knowledge of existing risks. While it is understandable that preparedness for newer events such as cyber-attacks is still evolving, what accounts for the underpreparedness for widely known and existing risks? For instance, despite geophysical hazards being widely known and acknowledged in Nepal, there was little

adherence to building codes that account for seismic risk, which led to the massive losses during the earthquake in April 2015. What are some underlying reasons for this underpreparedness? As we begin to search for an answer, a hint lies in a study of the post-disaster rebuilding funds Nepal received for housing reconstruction. The loans provided to Nepal by the World Bank for housing reconstruction mandated reconstructed houses to adhere to seismic building codes. This begs the question, why were the terms not mandated in the initial financing at the time of construction of these structures?

To explore this in more detail, we turn to analysing the structure of the existing financial system, particularly the role of lending channels, which form the backbone of all economic activity. In the next chapter, we evaluate select international and national lending streams to understand their role in promoting resilience building through their lending activities, and if, and how, they promote a risk-conscious approach to lending.



# Financial lending streams

This chapter evaluates selected multilateral and national lending streams to assess if and how they promote resilience-building behaviour among borrowers.

Crystallised in the Sendai Framework for Disaster Risk Reduction 2015-2030, focused action by States to build risk reduction can be framed in the context of four priorities: understand risk, strengthen risk governance, invest in DRR to build resilience, and enhance preparedness, including recovery, rehabilitation and reconstruction. Of these four priorities, Priority 3 emphasises the importance of investment in risk reduction through structural and non-structural measures by both public and private sources. Such investment measures can contribute towards building resilience for people, as well as economies.

While investments for resilience building may be channelled through many routes, lending activities can play an important role in promoting risk reduction. Financial institutions at both the national and international level hold the power to channel financial resources towards activities

that directly or indirectly promote risk reduction, or at least prevent the creation of new risks. Lending channels such as bank loans (national or international) are important sources of funding for all businesses. Hence, given the importance of this finance mechanism, it is important to study how this channel of funds is currently promoting DRR and identify the gaps that need to be filled.

## International lending streams

Over the last two decades, MDBs, in particular, have significantly increased their engagement with disasters by creating dedicated facilities for strengthening disaster and risk management, including DRR components in policy-based loans and helping to design and promote financial instruments for post-disaster contexts, such as contingent credit facilities and parametric disaster insurance. A wide range of stakeholders are now involved in these conversations. These include finance ministries, subnational governments, academic experts, civil society organisations and volunteers, and private sector players such as insurance companies, utility providers and infrastructure operators.

Broadly, multilateral lending streams that drive DRR at the international level can be classified as outlined in Table 4.

Table 4: Types of DRR investment channels used by MDBs

| Channel                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                | Example                                                                                                                                |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Direct investment channels            |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                        |
| Stand-alone DRR funding               | Direct investment channels<br>Lending instruments meant purely to support DRR activities that involve building infrastructure to minimise or prevent damage from a disaster, such as coastal protection structures, flood banks and early warning systems.                                                                                                                                                                                                 | The ADB established a Disaster Risk Reduction Financing mechanism under the Asian Development Fund <sup>108</sup>                      |
| Indirect investment channels          |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                        |
| Embedded DRR: development finance     | Indirect investment channels<br>The inclusion of DRR components in broader developmental lending channels. The inclusion of mandatory social and environmental risk assessment in these financing modalities indirectly promotes resilience building by ensuring that project activities do not exacerbate existing environmental risks and do not create new risks that could potentially lead to disasters.                                              | The World Bank's environmental and social (E&S) policy for investment project financing (IPF)<br><br>IDB's Mandatory climate screening |
| Embedded DRR: post-disaster financing | Embodying the principle of 'build back better', this channel relates to the inclusion of DRR components in post-disaster recovery and reconstruction funds. Examples include the World Bank's Catastrophe Drawdown Option (CAT DDO), a contingent financing tool that provides immediate financial assistance to countries in the aftermath of a disaster, conditional upon the achievement of pre-agreed disaster risk reduction measures. <sup>109</sup> | The World Bank's CAT-DDO and program-for-results                                                                                       |

In the following pages, we focus on evaluating selected lending channels that are available to nations through MDBs, which are an important source of finance for low- and middle-income countries. **By including DRR in lending**

**channels, MDBs play an important role in promoting resilience among borrower countries, which otherwise have limited capacity to reserve scarce resources for building disaster resilience.**

Table 5: Summary of international lending streams that promote DRR

| MDB               | Lending scope                                                                                                                                                                                             | DRR focused instruments                                                                                                                                                                                                                                                                                                                                                            | Examples                                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IMF</b>        | <ul style="list-style-type: none"> <li>190 member countries</li> <li>No project-based lending</li> <li>Lending only to national governments</li> </ul>                                                    | <b>Direct</b> <ul style="list-style-type: none"> <li>No lending instruments have a direct focus on promoting DRR</li> </ul> <b>Indirect</b> <ul style="list-style-type: none"> <li>Policy conditionality in lending instruments</li> <li>Capacity development</li> </ul> <b>Potential</b> <ul style="list-style-type: none"> <li>Resilience and Sustainability Facility</li> </ul> | The Georgian Ministry of Finance produced a detailed report focused on analysing the fiscal impacts of climate change, which was supported by technical assistance from the IMF under the capacity development channel |
| <b>World Bank</b> | <ul style="list-style-type: none"> <li>189 member countries</li> <li>Project-based lending</li> <li>Lending to national governments and private sector</li> </ul>                                         | <b>Direct</b> <ul style="list-style-type: none"> <li>IPF lending</li> </ul> <b>Indirect</b> <ul style="list-style-type: none"> <li>Environmental and Social policy for IPF</li> <li>CAT DDO (ex-post)</li> </ul> <b>Potential</b> <ul style="list-style-type: none"> <li>Program-for-results</li> </ul>                                                                            | Tunisia's Integrated Disaster Resilience Program                                                                                                                                                                       |
| <b>IDB</b>        | <ul style="list-style-type: none"> <li>26 borrowing member countries in Latin America and Caribbean</li> <li>Project-based lending</li> <li>Lending to national governments and private sector</li> </ul> | <b>Direct</b> <ul style="list-style-type: none"> <li>Investment lending</li> </ul> <b>Indirect</b> <ul style="list-style-type: none"> <li>Mandatory climate screening for investment lending</li> </ul> <b>Potential</b> <ul style="list-style-type: none"> <li>Policy Based loans (PBL)</li> </ul>                                                                                | US\$120m PBL for the government of Colombia to promote DRM and climate change adaptation via legal and institutional reform (Nov 2011)                                                                                 |
| <b>ADB</b>        | <ul style="list-style-type: none"> <li>68 member countries</li> <li>Project-based lending</li> <li>Lending to national governments and private sector</li> </ul>                                          | <b>Direct</b> <ul style="list-style-type: none"> <li>Asian Development Fund DRR</li> </ul> <b>Indirect</b> <ul style="list-style-type: none"> <li>Policy-based lending</li> <li>Contingent Disaster Financing (CDF)</li> </ul>                                                                                                                                                     | CDF for the Cook Islands                                                                                                                                                                                               |
| <b>EBRD</b>       | <ul style="list-style-type: none"> <li>Private sector, municipal entities, publicly owned companies</li> </ul>                                                                                            | <b>Direct</b> <ul style="list-style-type: none"> <li>Climate change adaptation program</li> <li>Climate resilience bonds (CRBs)</li> </ul>                                                                                                                                                                                                                                         | Albania dam safety improvement project                                                                                                                                                                                 |
| <b>AfDB</b>       | <ul style="list-style-type: none"> <li>54 borrowing member countries in Africa</li> <li>Project-based lending</li> <li>Lending to national governments and private sector</li> </ul>                      | <b>Direct</b> <ul style="list-style-type: none"> <li>No specific instruments or clear-stated DRR projects listed</li> </ul> <b>Potential</b> <ul style="list-style-type: none"> <li>Bank intends to start resilience building initiatives by implementing suitable policies, action plans and frameworks.</li> </ul>                                                               |                                                                                                                                                                                                                        |
| <b>AIIB</b>       | <ul style="list-style-type: none"> <li>105 members</li> <li>Project-based lending (infrastructure)</li> <li>Lending to national governments and private sector</li> </ul>                                 | <b>Direct</b> <ul style="list-style-type: none"> <li>No specific instruments or clear-stated DRR projects listed</li> </ul> <b>Indirect</b> <ul style="list-style-type: none"> <li>Specific DRR projects</li> </ul>                                                                                                                                                                | Manila flood prevention project                                                                                                                                                                                        |

Notes: \*The absence of instruments under certain headers implies an absence of "lending instruments" to promote DRR. \*\*Instruments listed under "Potential" are those that can potentially be used by MDBs to promote resilience building. Presently, there is little evidence of these channels being used for resilience building.

## International Monetary Fund (IMF)

Among international lending institutions, the IMF stands distinctly apart as it does not provide project finance. The IMF has 190 member countries and each member can request financial assistance. The IMF focuses on providing financial assistance to countries (at the sovereign level) that are experiencing economic difficulties caused by a range of crisis situations, which may be domestic or external in nature. There are two types of IMF lending—loans provided at non-concessional interest rates and loans provided to low-income countries on concessional terms, which are interest-free loans.<sup>110</sup>

IMF lending is accompanied by ‘policy conditionality’, which is a country’s commitment to undertake certain policy actions prescribed by the IMF to reform the factors that led to the crisis situation driving them to seek financial assistance from the IMF. An analysis of the terms and conditions of its various lending instruments yields little evidence of direct measures that promote resilience building.

Other complementary instruments that can possibly promote resilience building include: (a) IMF capacity development and (b) Resilience and Sustainability Facility (RSF).

- **IMF Capacity development<sup>111</sup>:** Capacity development is one of the three core functions of the IMF, which aims at helping countries achieve their growth and development goals and also contribute towards making progress on Sustainable Development Goals. Under this core functionality, efforts are focused on improving public finances, monetary and fiscal policies, macroeconomic framework and tools, updating legal frameworks and supporting statistics building. The IMF’s capacity development work helps countries tackle their developmental priorities by focusing on: (a) fostering inclusion and reducing inequality; (b) gender equality; (c) climate action.

Under climate action, the IMF works with countries on environmental tax reforms, efficient carbon and energy pricing and helping create robust frameworks and public financial management plans so countries can build resilience to disasters caused by natural hazards. It also assists in monitoring systemic risks to financial stability from climate change shocks, supervises credit risks related to vulnerability and assesses the resilience of financial institutions.

Funding needs for capacity development are met through a combination of IMF resources and funds from external partners. **Climate action under IMF capacity development is the closest description of a promotion of disaster-conscious approach.** The scope is limited to disasters caused by natural hazards and does not account for other human-induced disasters. For instance, the Georgian Ministry of Finance produced a detailed report focused on analysing the fiscal impacts of climate change, which was supported by technical assistance from the IMF.<sup>112</sup> The exercise was aimed at increasing the resilience of public finances by understanding fiscal risks related to climate change and mitigating their potential impact on the economy and government budget.

- **Resilience and Sustainability Facility (RSF)<sup>113</sup>:** Announced in April 2022,<sup>114</sup> the RSF complements the IMF’s existing lending toolkit by helping low-income and vulnerable middle-income countries address longer-term challenges, including those related to climate change and pandemic preparedness. Lending operations under this facility are likely to commence by the end of 2022, subject to achieving the required financing.

A closer evaluation of the RSF terms and conditions reveals that the RSF does not directly promote risk reduction. The RSF

aims to (a) support policy reforms that reduce macroeconomic risks arising from longer-term structural challenges, such as climate change and pandemic preparedness; and (b) increase policy space and financial buffers to mitigate prospective balance of payments risks. Disbursement of funds through the RSF requires countries to meet certain conditions, which include policy reforms. **These policy reforms can potentially promote the development of a risk-conscious approach among member countries, by mandating governments to design policies that promote resilience building towards disasters.**

## The World Bank

The World Bank's response to disasters has increasingly shifted to an ex-ante risk reduction approach, incorporating risk reduction through various lending channels. Since 2014, the World Bank has mainstreamed disaster risk management (DRM) across its operations, pursuing an integrated approach across sectors, instruments and key DRR focus areas.<sup>115</sup> **Between 2010 and 2020, 556 lending projects worth US\$54.7bn were approved by the World Bank for DRR activities,** of which 56% were under the 'Urban, Disaster Risk, Resilience and Land Global Practice'.<sup>116</sup>

An Economist Impact evaluation of the World Bank's portfolio of financing tools indicates the following lending instruments promote resilience.

- **Investment project financing (IPF):** IPF is the World Bank's primary lending instrument, which it uses to either directly finance projects aimed at resilience building, such as the Tunisia Integrated Disaster Resilience Program (February 2021)<sup>117</sup> Improving resilience and emergency response project (Romania, May 2019)<sup>118</sup> and Strengthening risk information for disaster resilience in Bhutan<sup>117</sup> (November 2021).

**Environmental and Social policy as part of IPF:** In addition to direct lending, IPF also promotes resilience building among borrowers<sup>120</sup> by mandating an assessment of environmental and social risks and impacts for each IPF loan processed. The Environmental and Social Framework (ESF), which became effective in October 2018<sup>121,122</sup> applies to all IPF projects and mandates the identification and assessment of environmental and social risks across 10 areas, of which the first relates to climate change and adaptation.<sup>123</sup> The Environmental and Social Standards (ESS) are designed to avoid, minimise, reduce or mitigate the adverse environmental and social risks and impacts of projects.<sup>124</sup>

Through the IPF channel, the World Bank provides financing to projects across all sectors, with a concentration on infrastructure, human development, agriculture and public administration—prime channels that can be used to build disaster resilience of a structural (disaster-resilient physical infrastructure such as roads, bridges, buildings) and non-structural nature (such as institutions, financial, legal and governance frameworks). IPF loans are predominantly investments over a 5- to 10-year horizon and they also serve as a vehicle for knowledge transfer and technical assistance. They require thorough environmental evaluations before a project is implemented to ensure that existing vulnerabilities are factored in, and new risks are not created. By mandating risk screening, World Bank financing is promoting resilience building at the project-level.

- **Development policy financing via Catastrophe Drawdown Option (CAT DDO):** The CAT DDO is a contingent financing instrument that provides access to immediate liquidity to meet emergency needs in a post-disaster scenario, a sign of building financial resilience towards disasters.

**Although the CAT DDO is an ex-post financing instrument, the availability of this lending channel is contingent on meeting a series of criteria that promote disaster resilience.** This includes the requirement to have an adequate macroeconomic policy framework in place, and to be in the process of preparing, or already have in place, a satisfactory disaster risk management program.<sup>125</sup> This approval criteria is an important precondition that promotes investment in building financial and institutional resilience before a disaster.

The CAT DDO is an attractive option for countries looking to build their financial capacity before a disaster as it allows countries an assured and immediately available line of financing in the event of a disaster rather than waiting for bilateral aid and funds from other sources. The funds are available for use immediately after the trigger is met—i.e., the declaration of a state of emergency in the event of a disaster. The timely availability of funds from this lending channel is an important incentive for countries to avail of this option to meet their disaster risk financing needs. Since its inception in 2009, the Development Policy Financing (DPF) with CAT DDOs has proven a popular instrument among countries. Since 2017, both International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA) countries have been eligible. The instrument has demonstrated value in supporting national efforts to undertake policy reform, strengthen institutional frameworks, and arrange access to financing that can be drawn down quickly following a disaster.

CAT DDO programs have played an important role in strengthening disaster preparedness as well as fostering macro-

fiscal stability.<sup>124</sup> A notable example of how the CAT DDO was successful in supporting a country's disaster resilience capacities is that of Maldives. In August 2019, Maldives signed the 'Development Policy Financing with a CAT DDO and Pandemic Emergency Financing Facility Project for Maldives'. This project aimed at enhancing Maldives' financial capacity to effectively manage the human, physical and fiscal impact of climate change, natural hazard-induced disasters and disease outbreaks. Interestingly, this was the first CAT DDO that explicitly included health emergencies as part of a DRM and resilience program. As part of the CAT DDO, the National Disaster Management Authority (NDMA) of Maldives developed The National Emergency Operation Plan (NEOP) and the Ministry of Health developed the Health Emergency Operation Plan (HEOP) to respond to national multi-sector threats, such as a pandemic. Within months of the project approval, the world witnessed the spread of COVID-19, prompting Maldives to quickly activate the NEOP and HEOP to lead an effective and well-coordinated response to the spread of the pandemic.<sup>126</sup> Another element of the CAT DDO funding was the expansion of the water and sewerage network to ensure access to safe water and sanitation to more people. This increase in access to water and sanitation enabled the government to respond adequately when many islands requested emergency water supply during the pandemic.

- **Program-for-results:** This instrument is a results-based financing tool, created in 2012, used to finance the implementation of particular programs or a set of predefined targets using a country's existing institutions and processes. The disbursement of funds

is linked to the achievement of certain program objectives. **This instrument can potentially be used for achieving a variety of objectives, including DRR.** For instance, in 2019, The World Bank supported Mozambique in implementing its DRM reform agenda by incentivising the achievement of targets under Mozambique's own National Disaster Risk Reduction Master Plan 2017-2030.<sup>128</sup>



### The Inter-American Development Bank (IDB)

Recognising the Latin America and Caribbean region's vulnerability to disasters resulting from natural hazards and climate change, the IDB has promoted disaster prevention and mitigation as a priority in the region's development agenda. In 2001, the IDB set up its disaster prevention sector facility. Through involvement with regional governments and various lending and

non-lending channels, the **institution has integrated risk reduction into development planning, while promoting the building of a permanent technical and operational DRR capacity.** The IDB uses several financial and non-financial channels to promote disaster resilience. Of the IDB's three main channels to promote disaster resilience, two are related to lending.

- **Technical assistance:** Through the instrument of technical cooperation, the IDB can channel loans to strengthen institutions, build capacity and support research and knowledge transfer. Technical cooperation programs can be reimbursable loans, in the form of non-sovereign guaranteed loans to carry out the specified cooperation activities.<sup>129</sup>
- **Mandatory climate screening for investment lending:** The IDB has introduced mandatory climate risk screening for all projects on standard loans, with a principle to avoid aggravating existing environmental risks or vulnerabilities, or create new risks and vulnerabilities. Each project undergoes a rigorous process of climate and environmental screening to avoid causing environmental disruption that may be the cause of a future disaster. By mandating rigorous assessments of projects as a part of its loan approval process, the bank is working towards promoting disaster risk reduction through its lending channels.
- **Policy-based loans (PBLs).** PBLs are crucial to building the institutional, policy, legal and governance frameworks necessary to promote a culture of disaster risk resilience in the country. The IDB PBL facility allows member countries access to flexible and fungible funds directed at supporting policy reforms. Through PBL, the IDB encourages policy changes that strengthen disaster resilience

among borrower countries. These loans provide general financing to borrowers and allow them to use the money for any purpose provided they meet predefined targets, with funds tied to the achievement of the pre-specified policy reforms mandated in the terms and conditions.<sup>130</sup> One example is a US\$120m PBL granted to the government of Colombia in November 2011 to promote DRM and climate change adaptation via legal and institutional reform.<sup>131</sup>

In a post-disaster context, the IDB offers an emergency reconstruction facility and an immediate response facility to finance recovery. While these qualify as traditional loans, through its requirement of mandatory climate screening, the IDB is using post-disaster recovery as an opportunity to build resilience against future crises.

Unlike the World Bank and the ADB's contingent lending instruments, the IDB's contingent lending instrument—Contingent Credit Line for Natural Disasters (CCL)—does not mandate existing DRM plans as a prerequisite for the use of its CCL facility.

### Asian Development Bank (ADB)

Over time, the ADB's lending approach has increasingly recognised the emerging threats of climate change, to which Asia is highly exposed, and the bank has been actively involved in promoting disaster risk resilience in the region. In its most recent corporate strategy document—Strategy 2030—the ADB significantly strengthened its focus on disaster resilience by including *“tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability”* as one of its seven operational priorities.<sup>132</sup> The ADB's Revised Disaster and Emergency Assistance Policy (RDEAP), approved in 2021, provides an updated policy framework with enhanced guidance for the ADB's work in providing financial assistance for disasters and emergencies. The ADB carries out both standalone DRR and embedded DRR financing.

The ADB has a separate arm to promote stand-alone DRR funding, through the Asian Development Fund Disaster Risk Reduction Financing (ADF DRR). This was a ground-breaking measure when launched: the first time any MDB had offered financing earmarked for DRR through its concessional assistance arm.<sup>133</sup> It addresses barriers to investment in terms of the public goods benefits of DRR and the government's preference to use limited public resources for projects that address short-term development priorities, yield assured near-term benefits, and generate positive streams of direct or indirect income. The US\$81.5m (2017-18) was allocated in full, including to support incremental costs in the construction of disaster- and climate-resilient infrastructure, the construction of disaster-resilient community infrastructure, and investments in DRR infrastructure, such as stormwater drainage and river embankments. Countries have also utilised this financing to support the integration of DRM considerations into infrastructure planning and management and maintenance processes.

The ADB carries out embedded DRR through its lending channels. The number of embedded DRR projects approved by ADB has increased consistently over the last three decades from fewer than 10 projects in 1994 to nearly 170 projects in 2018. **Between 2014 and 2018, 48% of total approved projects were embedded DRR.**<sup>134</sup>

The primary lending instrument supporting embedded DRR is policy-based lending (PBL). PBL operations are categorised as conventional PBL and crisis response PBL. Conventional PBL comprises a stand-alone and programmatic approach, with financing options such as contingent disaster financing (CDF) and policy-based guarantee (PBG). Crisis response PBL comprises (i) special PBL (SPBL) and (ii) the Countercyclical Support Facility (CSF).<sup>135</sup>

The CDF differs from the Emergency Assistance Loan (EAL) in terms of the prerequisites for approval. The short timeframe within which the EAL needs to be processed after a disaster prevents an effective medium-term discussion on disaster preparedness and response from occurring. The key benefit of the CDF over the EAL for member countries is that for the CDF, the loan processing, approval, due-diligence, policy dialogue and conditions for disbursement are all completed before a disaster. Since time and flexibility are of the essence after a crisis event, the CDF can be a more useful tool to provide immediate financial assistance. Unlike the EAL, the CDF focuses on building the legal, institutional and policy frameworks that can achieve effective

disaster preparedness and response programs. The CDF option under the PBL modality has enhanced ADB's standing as a reliable source of financing for post-disaster response while addressing underlying resilience issues.

Since the first such arrangement was put in place for the Cook Islands in 2016, the country has continued to strengthen its disaster resilience, including through the launch of the 2017 National DRM Plan; the Climate Change Policy, 2018–2028; the Strategic Roadmap for Emergency Management, 2018–2023; and new building codes incorporating DRM considerations in 2018.

The ADB is also using technology and data tools to play a greater role in promoting resilience building. At the ADB, all projects go through a DRR tool to assess the implications of climate change and hazards to help inform resilience design. The ADB is upgrading this with a next-generation approach using significantly advanced GIS-based instruments to ensure all investments regardless of modality, concessional or non-concessional, take into account disaster risk.

### European Bank for Reconstruction and Development (EBRD)

The EBRD is among the large investors in Europe providing project finance mainly to the private sector. It has an explicit requirement in its mandate to promote sustainability through its project operations. The bank applies strict environmental and social standards to all projects it finances, governed by the Environmental and Social Policy and Performance Requirements. The EBRD provides loans, guarantees and equity investments. Eligible borrowers include the private sector, municipal entities and publicly owned companies. **The EBRD does support projects focused on building adaptation and resilience to climate change by offering technical assistance and finance.<sup>136</sup>**



The EBRD helps clients identify climate change impacts that will affect their operations, develop and implement strategies to facilitate adaptation, and invest in measures and technologies that improve their resilience. The EBRD's primary lending channel—loans—have standard project finance terms and conditions and do not include a specific mandate for resilience building. There appear to be no conditions tying the disbursements of the loans to resilience building.

However, the EBRD does work towards directly financing projects aimed at resilience building through two channels: (a) the climate change adaptation program and (b) Climate Resilience Bonds (CRBs). Through the climate change adaptation program, the EBRD has financed projects to make coastal facilities resilient to climate change in Turkey, improve dam safety in Albania and improve the climate resilience of water supplies for cities in Tajikistan.<sup>137</sup>

- **The climate change adaptation program:**  
The EBRD directly promotes resilience building by financing projects (through all its financial instruments) under its climate change adaptation program, which is a part of the Green Economy Transition (GET) 2021-25 approach to build green, low carbon and resilient economies. The GET 2021-25 approach supports the transition to low-carbon, resilient economies by *"scaling investments across a set of priority environmental, climate mitigation and resilience themes, including: greening the financial sector, energy systems, industrial decarbonisation, cities and environmental infrastructure, sustainable food systems, green buildings and sustainable connectivity."*<sup>138</sup>
- **Climate Resilience Bonds (CRBs):**  
The EBRD launched CRBs that provide an *"opportunity to finance projects that seek to build climate resilience by mitigating physical climate change vulnerabilities and*

*risks identified in public and private sector projects in EBRD's countries of operations."*<sup>139</sup>

The proceeds from these bonds are earmarked for investments in climate-resilient infrastructure, such as critical infrastructure systems, for energy, water, transport, communications and the built environment.

## African Development Bank (AfDB)

A detailed study of the AfDB's lending channels and its approval criteria do not yield any concrete results on the inclusion of risk-reduction indicators among its lending instruments. Unlike the ADB and EBRD, the AfDB does not have disaster resilience building or sustainability as a part of its strategy or operational priority.<sup>140</sup>

**The bank's policy documents talk about disaster management, climate change adaptation and mitigation, green growth, and Environmental and Social Assessment Procedures** but stop short of discussing disaster resilience as a key priority.

However, there is evidence that the bank supports resilience-building initiatives through its operations.

- **AfDB's 'Policy on Water'**<sup>141</sup> approved in May 2021 aims to enhance Africa's water security and transform its water assets to foster sustainable growth and development. Among the seven key operational dimensions of the policy is "sustainable, smarter and resilient infrastructure". It also emphasises that water-related DRM is a priority area.
- **Climate Change Action Plan and Green Growth Framework:**  
In 2017, the AfDB's climate change and green growth department approved Africa Thriving and Resilient: The Bank Group's Second Climate Change Action Plan, 2016-2020 (CCAP2). As part of this plan, the AfDB

continues to prioritise the mainstreaming of climate change and green growth across its portfolio. The AfDB has committed to incorporating climate-informed design across all its investments. Under CCAP2, the bank has made the following commitments:

- Allocating 40% of project approvals to climate finance by 2021, with equal proportions for adaptation and mitigation.
- Mainstreaming climate change and green growth into all bank investments by 2021.

### Asian Infrastructure Investment Bank (AIIB)

AIIB is the newest development lender in the international community and, through its 'Green Principle', the bank aims to align its policies, strategies and operations around promoting green objectives through project investments and corporate practices.<sup>142</sup> In 2018, the bank commenced work on a corporate strategy, finalised and released in 2020, which defines its mission as "Financing Infrastructure for Tomorrow".<sup>143</sup> Under this strategy, the bank committed to sustainability by mandating that all its investments be environmentally sustainable. The strategy stops short of mandating investments in DRR as a top priority. However, under the ambit of environmental sustainability, it mandates that project investments undertaken by the bank must not impact the physical and biological environment. By mandating this, it is indirectly promoting DRR by ensuring it does not create new vulnerabilities.

Under its thematic priority, the AIIB prioritises green infrastructure to help members meet environmental and related development goals by financing projects that improve the local environment and investments dedicated to

climate action.<sup>144</sup> **By investing in projects targeted at climate mitigation, conservation and sustainable management of natural resources and biodiversity, the bank is helping to reduce disaster risks** arising from worsening natural hazards that are a consequence of increased human activity, such as climate change.

In terms of projects approved, among its thematic priorities of green infrastructure, connectivity and private capital mobilisation, sustainable infrastructure projects received the most investment by project value in 2020, when a total of US\$2.53bn, compared with US\$749m in cross-border projects and US\$755m in private capital mobilisation. Since the bank's inception in 2016, it has financed a total of 56 projects (55% of total approved projects) under the sustainable category.<sup>145</sup> Specific DRR projects include the Manila flood prevention project<sup>146</sup> (with World Bank); Sri Lanka landslide vulnerability mitigation measures<sup>147</sup> and Istanbul Seismic Risk Mitigation and Emergency Preparedness Project.<sup>148</sup>

### Incentives

This subsection analyses the incentives for lenders and borrowers of the discussed lending channels.

#### Incentives for lenders

- **Enhanced return on investment:** Embedding DRR in project lending terms is a way **of reducing the risk involved in lending.** By ensuring that existing risk is mitigated through project activities, lenders are ensuring that there are fewer disruptions to expected revenue streams once the project is operational. Hence, a project decision that addresses risk parameters will have a lower probability of failure and be more likely to yield the intended returns on investment for the lender.

- **Continued economic and social benefits from underlying assets:** Investing in risk reduction at the start of a project can ensure the long-term safety of underlying project assets, which will, in turn, yield better returns on investment. In the case of physical infrastructure, such as roads, schools, hospitals etc, it also ensures that the infrastructure continues to support local economic growth, providing a range of economic and social benefits, such as access to markets, education and healthcare.
- **Lower demand for future emergency assistance:** From the MDBs' perspective, the primary incentive to include DRR terms in its lending instruments is to **reduce demand for emergency assistance loans in the face of future disasters** and to help member countries sustain their development objectives. The risk reduction investments that lenders finance in the present help to limit the scale of damage from future disasters, thereby, lessening future demand on lenders for post-disaster financial assistance for emergency response, recovery and rehabilitation.

#### Incentives for borrowers

- **Prevent future economic losses:** When MDBs include DRR components in their lending channels, it provides the added benefit of **limiting future losses** that may occur from disasters caused by known and existing risks. These could yield indirect economic benefits for the borrowers in the long-term. Being prepared for disasters can minimise losses and limit damages in the event of a disaster.
- **Additional source of funds:** Through instruments such as PBLs and contingent lending facilities, borrowing countries get access to additional funds that they can use to finance DRR priorities. This allows them to use scarce domestic resources on urgent developmental priorities, such as education, health and poverty eradication. It provides an additional pool of money that helps the country meet its resilience-building commitments.
- **Competitive insurance premiums:** By lowering risk exposure, borrowers stand to benefit from more competitive rates of insurance in the international market. Borrowers with a riskier profile have to pay higher insurance premiums. By investing in projects that are risk sensitive, borrowers can improve their risk profile and get more competitive rates for insurance premiums.
- **Lower borrowing costs in financial markets:** Addressing underlying disaster risks in investments can **enhance the risk profile for borrowers**. By ensuring that all investment is risk-conscious, borrowers can reduce the probability of disasters and thereby improve their risk profile. By ensuring existing risks are not exacerbated and that no new risks are created, borrowers can improve their overall risk perception in the international financial markets, making them eligible for more competitive interest rates for borrowing.



## National lending streams

With the increasing incidence of environmental and climate-related disasters, climate risk has emerged as a top priority among monetary and financial authorities. Central banks and financial supervisors are increasingly recognising climate change as an important source of financial risk. Fiscal and monetary authorities should take steps to address this through policies, guidelines and practices. By linking domestic credit issuance with mandatory DRR activities, central banks can play an important role in promoting a culture of resilience building.

To date, monetary authorities are still in the process of defining their approaches to climate risk, and few have issued binding regulations. However, we do find evidence of risk-reduction parameters being included in environmental and social risk metrics, within the context of climate change. Based on an analysis of the environment and social policies of various monetary authorities, we list below the ways in which those authorities are embedding risk reduction and resilience building in their operations, particularly through lending channels. This section outlines selected examples of how State monetary authorities are working towards incorporating resilience building.

Broadly, monetary authorities are not explicitly naming resilience building as a priority in their strategy or guiding policies. However, similar to MDBs, which are carrying out resilience building under the header of climate adaptation and mitigation, monetary authorities are promoting resilience building through their environmental and social guidelines. DRR is not an independent lending criterion. Instead, risk reduction and resilience building is nested under environmental and social risks.

Several monetary authorities have published Environmental and Social (E&S) risk-related policies or guidelines. However, those documents are general, focusing on ensuring E&S risks are incorporated into commercial banks' corporate strategies, operations and risk management frameworks. Among disaster-prone countries, disaster or climate change is often classified as a type of environmental risk that needs to be taken into consideration. Other countries, in contrast, focus on adverse effects on the environment rather than a disaster. But in general, there is a lack of specific guidance on incorporating DRR into national lending channels.



Table 6: Summary of DRR indicators in national lending channels

| Country            | What exists                                                                                                                                                                                                                                                                                                                                                                                                 | What is missing?                                                                                                                                                                                              |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Nepal</b>       | <i>'Guidelines on Environmental and Social Risk Management for Banks and Financial Institutions'</i> provides banks and financial institutions with a well-defined list of climate risks that lending institutions have to evaluate projects on before issuing credit.                                                                                                                                      | The policy focuses mostly on climate and environmental risks.                                                                                                                                                 |
| <b>Philippines</b> | The Central Bank published the <i>Environmental and Social Risk Management Framework</i> in 2021 to integrate climate change and other E&S risks in setting banks' credit strategy and risk appetite to "effectively identify, assess, monitor, report and manage E&S risks".                                                                                                                               | The framework does not specify DRR as a mandate for the credit-granting process.                                                                                                                              |
| <b>Mauritius</b>   | <i>Draft Guideline on Climate-related and Environmental Financial Risk Management</i> . Issued in 2021, the guideline provides an outline of a prudent approach to climate and environmental financial risks, with a view to enhancing the resilience of the banking sector.                                                                                                                                | These are draft guidelines that await finalisation and implementation.                                                                                                                                        |
| <b>Singapore</b>   | <i>'Guidelines on Environmental Risk Management for Banks'</i> requests that banks assess environmental risks as part of their assessment process for credit facilities or capital markets transactions.                                                                                                                                                                                                    | DRR is not specifically mentioned in these guidelines.                                                                                                                                                        |
| <b>China</b>       | By 2015, E&S risk had been adopted by most Chinese commercial banks. Management practices and green finance had also been implemented into overall environmental economic policy.                                                                                                                                                                                                                           | Emphasis on near-term disasters. Disasters caused by natural hazards and climate change are currently not within the purview of the evaluation.                                                               |
| <b>India</b>       | The Reserve Bank of India issued guidance to apply National Disaster Management Authority guidelines for disaster-resilient construction.                                                                                                                                                                                                                                                                   | Limited scope and voluntary adoption                                                                                                                                                                          |
| <b>Egypt</b>       | The Central Bank of Egypt's (CBE) guiding principles specify that " <i>Integrating environmental and social risks and seeking the help of technological solutions to measure them when preparing a credit study for clients to take a decision to give and renew credit facilities.</i> " And, " <i>Assessing risks of climate change in projects to be financed and working on managing those risks.</i> " | Non-binding principles                                                                                                                                                                                        |
| <b>Kenya</b>       | In October 2021, the Central Bank of Kenya issued the <i>Guidance on Climate-Related Risk Management</i> mandating banks to integrate climate-related opportunities and risks into their governance structure, strategy and risk management frameworks.                                                                                                                                                     | The policy focuses mostly on climate change-related risks.                                                                                                                                                    |
| <b>Ghana</b>       | In November 2019, the Bank of Ghana released its <i>Sustainable Banking Principles and Sector Guidance Notes</i> .                                                                                                                                                                                                                                                                                          | Not all institutions have adopted the principles and reporting on progress is not mandatory.                                                                                                                  |
| <b>Europe</b>      | Financial institutions are expected to evaluate climate-related and environmental (C&E) risks throughout the credit-allocating process and to monitor any risks to the portfolio arising from C&E-related risks.                                                                                                                                                                                            | While almost half of the banks have integrated C&E risks into their lending policies and client due diligence, most still lack a sound risk classification structure or loan pricing framework for C&E risks. |
| <b>Brazil</b>      | In 2017, Resolution 4,557/2017 required all financial institutions to implement processes to identify, assess, evaluate, monitor, report, control and mitigate environmental and social risks in the risk management structure.                                                                                                                                                                             |                                                                                                                                                                                                               |
| <b>Mexico</b>      | No binding regulations from central bank on risk reduction terms in lending channels.                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                               |
| <b>Peru</b>        | The Peruvian National System for Public Investment (SNIP) certifies the quality of Public Investment Projects (PIPs). The principal determining criteria are sustainability, social profitability and relevance. The ex-post assessment methodology emphasises disaster risk identification.                                                                                                                |                                                                                                                                                                                                               |
| <b>Costa Rica</b>  | Guidelines provide a comprehensive framework to assess disaster risk during the planning phase and through operational management and maintenance.                                                                                                                                                                                                                                                          |                                                                                                                                                                                                               |

Below, we highlight instances of how banking and regulatory actors support resilience building in some key countries. The list below is indicative and not exhaustive.

- **Nepal**

In February 2022, the Nepal Rastra Bank—the Nepalese central bank—published its revised *Guidelines on Environmental and Social Risk Management for Banks and Financial Institutions*, which provides banks and financial institutions with a well-defined list of climate risks that lending institutions have to evaluate projects on before issuing credit. According to these new guidelines, it is mandatory for lending institutions to assess if the project site is in an area that is exposed to climate risks such as floods, droughts, cyclones etc, which can have negative impacts on project operations in the long term.<sup>149</sup> Among other items, the guidelines also mandate assessing if the borrowers have adequate disaster management systems in place to deal with climate risks, clearly defined processes to measure and report their greenhouse gas emissions and plans to mitigate these emissions. These guidelines were formulated in 2018 as a conditional requirement for approval of the World Bank's Development Policy Credit.

- **Philippines**

The Bangko Sentral ng Pilipinas, the central bank of the Philippines, published the *Environmental and Social Risk Management Framework* in 2021 to integrate climate change and other E&S risks in setting banks' credit strategy and risk appetite. Other E&S risks include disasters, extreme weather, water crises and failure of mitigation and adaptation strategies. "*The type, quantity and severity of E&S risks shall be evaluated taking into account different factors such as the type of loan, location of the borrower, project and or collateral and the industry of the borrower, among others,*"<sup>150</sup> the circular stated.

The framework specifically requires the setting of "strategic E&S objectives for banks' credit-granting activities to facilitate the integration of E&S principles in lending operations".

Compared with other ESRM policies, this framework, requiring E&S to be incorporated into lending streams, is a direct requirement. It also mentions disasters as part of important E&S risks to be considered. The framework in general emphasised the need to "effectively identify, assess, monitor, report and manage E&S risks" in all aspects of its operational cycle. However, it did not specify DRR as a mandate for the credit-granting process.<sup>151</sup>

- **Mauritius**

The Bank of Mauritius (BoM)—the Mauritian central bank—in recognition of the financial risks created by climate-related and environmental events, published the *Draft Guideline on Climate-related and Environmental Financial Risk Management* in 2021. The guidelines were issued to provide an outline of a prudent approach to climate and environmental financial risks, with a view to enhancing the resilience of the banking sector.<sup>152</sup> These draft guidelines mandate financial institutions to assess climate-related and environmental financial risks when issuing loans and in the subsequent reviews. The BoM pointed out that "*The assessment shall include the ability and willingness of the borrowers to manage and reduce the risks and the potential impact on the probability of defaults and the value of the collateral*". Even though the document does not clearly mention DRR terms, based on the text in this document, it can still be considered a preliminary step. These are draft guidelines that await finalisation and implementation.

- **Singapore**

The Monetary Authority of Singapore has published the *Guidelines on Environmental Risk Management for Banks*, which requests banks to assess environmental risks as part of their assessment process for credit facilities or capital markets transactions. It especially asked banks to assess the ability and willingness of the customer to introduce risk mitigation measures, as well as their capacity, commitment and track record in managing such risk. The guidelines also emphasise the roles that banks can play in engaging and encouraging customers to mitigate environmental risks. Even though DRR is not specifically mentioned in these guidelines, risk mitigation terms for loan origination, as well as other instruments that banks can use to promote mitigation, have similar effects.

- **China**

Chinese monetary authorities have been among the early adopters of environmental and social risks in their lending practices. By 2015, most Chinese commercial banks had adopted E&S risk management practices and green finance had been implemented into overall environmental economic policy. In line with these policies, commercial banks screen loans based on the guidelines and credit is either refused or offered at a higher interest rate to industries that cause pollution or widespread environmental damage. In a conversation with a commercial bank official, it emerged that while banks have to screen for environmental risks, there is no mandate to screen for resilience building in their lending channels. During the project evaluation process, emphasis is placed on near-term disasters that may occur within the loan period and which could affect repayments. Disasters caused by natural hazards and climate change are currently not within the purview of the evaluation.

- **India**

In 2011, the Reserve Bank of India (RBI)—the Indian central bank—issued guidance advising banks and other lending institutions to apply National Disaster Management Authority (NDMA) *Guidelines on Ensuring Disaster Resilient Construction of Buildings and Infrastructure* to all construction projects. The RBI's guidelines are non-mandatory and of an advisory nature, which means compliance is difficult to monitor. It is left to the discretion of individual banks and lending institutions if they follow the NDMA guidelines and ensure disaster-resilient construction.

- **Egypt**

Egypt's Financial Regulatory Authority (FRA) published resolutions in 2021 that require listed companies and non-bank financial institutions to make Environmental, Social and Governance (ESG) disclosures and Task Force on Climate-Related Financial Disclosures (TCFD), depending on their size (as measured by issued capital and net equity). In terms of published guidelines and best practices, the Central Bank of Egypt's (CBE) *Guiding Principles on Sustainable Finance* also address climate risks. The second principle focused on enhancing sustainable finance specifies, "Integrating environmental and social risks and seeking the help of technological solutions to measure them when preparing a credit study for clients in order to take a decision to give and renew credit facilities." The fourth principle specifies, "Assessing risks of climate change in projects to be financed and working on managing those risks."<sup>153</sup> While these principles are non-binding, private sector players indicated that the CBE is following up regularly.

### The Guidance on Climate-Related Risk Management (October 2021), Central Bank of Kenya<sup>155</sup>

- **Risk management** – institutions are expected to assess the potential impacts of climate risks on their business's traditional risk categories (credit risk, market risk, liquidity risk, operational and legal risk, reputational risk and strategic risk).
- **Control and mitigation** – institutions are expected to carry out measures to control and mitigate exposures to climate-related risks on business strategy and risk appetite.
- **Monitoring and reporting** – institutions are expected to implement processes to monitor and report exposure to climate-related risk, ensuring exposure is consistent with risk appetite.
- **Disclosure of climate-related information** – institutions are expected to develop an approach to disclosing climate-related information aligned to published TCFD recommendations under four Pillars (Governance, Strategy, Risk Management, and Metrics and Targets).

Source: Central Bank of Kenya<sup>156</sup>

#### • Kenya

The Climate Change Act (2016) enacted by parliament in 2016 provides a framework for climate finance. It integrates climate risk into all forms of assessment. The same year, the Kenyan National Treasury introduced the National Policy on Climate Finance. In October 2021, the Central Bank of Kenya (CBK) issued the *Guidance on Climate-Related Risk Management* to financial institutions such as commercial banks and mortgage finance companies, mandating banks to integrate climate-related opportunities and risks in their governance structure, strategy, and risk management frameworks. Further, it will guide these institutions in disclosing climate-related information to their stakeholders. The

principles are binding and financial institutions are required to submit an implementation plan by June 2022.<sup>154</sup>

These guiding principles are aimed at (a) embedding financial risks from climate change in governance, (b) incorporating financial risks from climate change into financial risk management practice and (c) developing an approach to the disclosure of financial risks from climate change.

#### • Ghana

In November 2019, Bank of Ghana—the Ghanaian central bank— released its *Sustainable Banking Principles and Sector Guidance Notes*. A process-led initiative that factors in environmental considerations, social inclusion and good governance in the lending decisions made by banks in Ghana, these principles are a guide to banks in mainstreaming the fundamental tenets of sustainability in their business and operations. Principle 1 clearly outlines a focus on environmental risks, which by extension can be interpreted to involve consideration towards disaster risk. Specifically, it reads “Identify, measure, mitigate and monitor environmental and social risks in our business activities. Identify environmental and social opportunities in our business activities.”<sup>157</sup> It is advised that Principle 1 should be applied to the following types of business activities:

- Corporate lending
- Small and medium enterprise (SME) lending
- Project finance
- Leasing
- Equity investments

The five sectors to which these principles should be applied are Agriculture & Forestry; Construction & Real Estate; Manufacturing;

Oil & Gas and Mining; and Power & Energy. The selection of these sectors is based on their criticality to the environmental and social (E&S) risks.



#### • Europe

The adoption of the Paris Agreement in 2015 and the UN 2030 Agenda for Sustainable Development set the ball rolling for the European Union to explore a path of sustainable economic growth. Recognising the importance of the financial sector in contributing to sustainable economic growth, the European Commission appointed a High-Level Expert Group on sustainable finance in 2016 which culminated in the release of the European Commission's Action Plan on Sustainable Finance in March 2018.<sup>158</sup>

The European Central Bank (ECB) recognises climate- and environment-related risks as a key vulnerability for the euro area banking system, but similar to other countries discussed above, the financial regulatory framework governing the euro area's financing does not explicitly incorporate disaster resilience building. In November 2020,

the ECB published the '*Guide on climate-related and environmental risks: Supervisory expectations relating to risk management and disclosure*'. It is a non-binding guide for financial institutions in the euro area that outlines the ECB's understanding of safe and prudent management of climate-related and environmental risks. The guide serves as a basis for supervisory dialogue for the ECB to discuss any divergences observed in institutions' actual practices. **Financial institutions are expected to evaluate climate-related and environmental risks throughout the credit-allocating process and to monitor any risks to the portfolio arising from climate and environmental-related risks.**

In November 2021, the guide was followed by a supervisory review of banks' approaches to manage climate and environmental (C&E) risks. the '*The state of climate and environmental risk management in the banking sector: Report on the supervisory review of banks' approaches to manage climate and environmental risks*.' The findings from this report revealed significant gaps in financial institutions aligning their practices with the supervisory expectations.<sup>159</sup> Only 46% of institutions had integrated C&E risks into credit risk sector lending policies; 28% of institutions had integrated C&E risks into credit risk classification procedures for debtors and only 11% of institutions had integrated C&E risks into the transaction due diligence for the investment process. The box below provides an overview of ECB supervisory expectations.

## Overview of ECB supervisory expectations

1. Institutions are expected to understand the impact of climate-related and environmental risks on the business environment in which they operate, in the short, medium and long term, to be able to make informed strategic and business decisions.
2. When determining and implementing their business strategy, institutions are expected to integrate climate-related and environmental risks that impact their business environment in the short, medium or long term.
3. The management body is expected to consider climate-related and environmental risks when developing the institution's overall business strategy, business objectives and risk management framework, and to exercise effective oversight of climate-related and environmental risks.
4. Institutions are expected to explicitly include climate-related and environmental risks in their risk appetite framework.
5. Institutions are expected to assign responsibility for the management of climate-related and environmental risks within the organisational structure in accordance with the three lines of defence model.<sup>160</sup>
6. For the purposes of internal reporting, institutions are expected to report aggregated risk data that reflect their exposures to climate-related and environmental risks with a view to enabling the management body and relevant sub-committees to make informed decisions.
7. Institutions are expected to incorporate climate-related and environmental risks as drivers of existing risk categories into their existing risk management framework, with a view to managing, monitoring and mitigating these over a sufficiently long-term horizon, and reviewing their arrangements on a regular basis. Institutions are expected to identify and quantify these risks within their overall process of ensuring capital adequacy.
8. In their credit risk management, institutions are expected to consider climate-related and environmental risks at all relevant stages of the credit-granting process and to monitor the risks in their portfolios.
9. Institutions are expected to consider how climate-related and environmental events could have an adverse impact on business continuity and the extent to which the nature of their activities could increase reputational and/or liability risks.
10. Institutions are expected to monitor, on an ongoing basis, the effect of climate-related and environmental factors on their current market risk positions and future investments, and to develop stress tests that incorporate climate-related and environmental risks.
11. Institutions with material climate-related and environmental risks are expected to evaluate the appropriateness of their stress testing with a view to incorporating them into their baseline and adverse scenarios.
12. Institutions are expected to assess whether material climate-related and environmental risks could cause net cash outflows or depletion of liquidity buffers and, if so, incorporate these factors into their liquidity risk management and liquidity buffer calibration.
13. For the purposes of their regulatory disclosures, institutions are expected to publish meaningful information and key metrics on climate-related and environmental risks that they deem to be material, with due regard to the European Commission's Guidelines on non-financial reporting: Supplement on reporting climate-related information.

- **Brazil**

Brazil has a long history of financial regulations (both voluntary and mandatory) that incorporate environmental risks, dating back to 1995, with the signing of the Green Protocol “Protocolo Verde”. This voluntary agreement, signed by five state-owned Brazilian banks, pledged to account for socio-environmental aspects in asset management and investment risk analyses. In 2008 and 2009, Resolution 3,545/2008 and 3,814/2009 were issued to prevent financing for organisations engaged in deforestation. The resolutions mandated that borrowers must provide documentation of compliance with environmental laws. Resolution 3,896/2010, issued in 2010, introduced tax incentives for activities for climate change mitigation. In 2014, Banco Central do Brasil (BCB)—Brazil’s central bank—mandated all licensed financial institutions under its purview to have social and environmental risk management systems in place. In accordance with National Monetary Council Resolution No. 4,327/2014, financial institutions were mandated to account for their exposure to social and environmental risk and ensure that their business profile is compatible with the Policy for Socio-Environmental Responsibility (PRSA). The resolution required financial institutions to formally publish its PRSA.

**Major progress was witnessed in 2017 through Resolution 4,557/2017 that required all financial institutions to implement processes to identify, assess, evaluate, monitor, report, control and mitigate environmental and social risks in the risk management structure.** It also mandates banks to conduct scenario analyses and stress tests for environmental and social risks.

Further progress was made in 2020 when Brazil formally joined the Network for Greening the Financial System. In September

2020, the BCB launched Agenda BC, the sustainability dimension of its work agenda, which aims to promote “the allocation of resources towards the development of a more sustainable, dynamic and modern economy, to foster sustainable and inclusive growth in Brazil”. As part of Agenda BC,<sup>161</sup> sustainability is incorporated into the BCB’s institutional work agenda. Key priorities under the sustainability dimension include: (a) strategic and dynamic agenda for socio-environmental (S&E) sustainability, (b) promotion of sustainable finance, (c) proper management of S&E and climate risks within the National Financial System (SFN) and (d) Incorporation of sustainability variables in the BCB decision-making process.

- **Mexico**

While there is no explicit mention of climate-related risks in the Mexican financial regulatory framework, the landscape on incorporating environmental and climate risk in the financial sector is abuzz with activity. The country’s financial regulators are actively involved in international initiatives on climate change and sustainable finance. Banco de Mexico—the Mexican central bank—is an active participant in the G20 Sustainable Finance Study Group and a founding member of the Network for Greening the Financial System. The Mexican Association of Banks and the Ministry of Environment are also members of the Sustainable Banking Network.<sup>162</sup>

In terms of formal regulations directly addressing climate risks aimed at building resilience, research yields no major binding regulations. However, several voluntary industry-led initiatives have been adopted by industry participants. A sustainability protocol was launched by the Mexican Banking Association in 2016, followed by an uptake of the Principles for Responsible Banking in 2019.

- **Peru and Costa Rica**

Risk-assessed public investments are another opportunity to embed resilience building in the national development process. The practices followed in Peru and Costa Rica provide a good example of how DRR can be a central attribute of both public investment and planning at the urban and territorial levels.<sup>163</sup> The Peruvian National System for Public Investment (SNIP)—created in 2000—is an administrative system that certifies the quality of Public Investment Projects (PIPs). The principal determining criteria here include sustainability, social profitability and relevance. The methodologies for ex-post assessment of investment projects place an emphasis on the economic cost-benefit

assessment, disaster risk identification, economic sustainability analysis of the projects during their functioning time and guidance on the type of environmental impact study in accordance with the project type.<sup>164</sup> Costa Rica provides an interesting case study of a country that has recognised that to achieve sustainable development, DRR must be a central attribute of public investment and planning. The Government of Costa Rica has been working on two key processes: the inclusion of disaster and climate risk analysis in all phases of the public investment processes; and land-use planning for the recovery of degraded urban watersheds, from an integrated perspective.<sup>165</sup>



# Conclusion

By 2030, annual disaster occurrences are likely to increase by 40%,<sup>163</sup> but despite the growing incidences of disasters, underinvestment in risk-reduction measures continues. Today, the frequency of disaster events is at an all-time high. The average number of disaster occurrences during 2001-2020 stood at 350-500, which is

more than double the number experienced in the preceding 30 years: 90-100 events during 1970-2000. Drought events are likely to increase from an average of 16 per year (2001-2010) to 21 per year by 2030, while the number of extreme temperature events are expected to triple between 2001-2030.



In the face of the growing frequency and intensity of disasters resulting from climate change-related hazards, the world stands to face unsustainable economic losses, with annual disaster events expected to increase from 400 (2015) to 560 (2030), nearly a 40% increase. However, **investments in risk reduction have failed to keep pace with the increased likelihood of disasters.** Current research reveals that investment in risk-reduction measures accounted for a meagre 0.5% (US\$5.5bn) of the total funds (US\$1.17trn)<sup>167</sup> invested in development aid over the 2010-2019 period. Even if a fraction of this total development aid were invested in early warning systems in developing countries, it could avoid significant economic losses—US\$800m invested in early warning systems could avoid losses to the tune of US\$3bn-US\$16bn per year.

**Disaster events have significant consequences for economic growth in the long term.**

Disaster events, whether caused by natural hazards such as earthquakes, floods and hurricanes or driven by man-made events such as chemical explosions and can have significant consequences for economic growth in both the short and long term.

**Years of gains made in economic growth and poverty reduction can potentially be wiped out in a matter of minutes.**

The large-scale destruction of physical, economic and social infrastructure that can take place during a disaster can potentially lead to lost economic opportunities for the affected regions and push vulnerable populations into a vicious cycle of poverty. By the time infrastructure is rebuilt—which can take years—these regions can experience mass outmigration of the economically productive labour force in search of better economic opportunities, as was witnessed in Puerto Rico in the aftermath of Hurricane Irma. Disasters can temporarily shift an economy's growth path downwards, leading to lost economic output in the short term, as witnessed after the Nepal earthquake and Beirut explosion. While Nepal witnessed a sharp decline in growth rates for two years after the earthquake, the economic damage from the explosion in Beirut worsened an ongoing economic contraction. In the absence of timely and adequate monetary assistance after a disaster, households are forced to dip into their savings to rebuild their homes. This dip in the savings rate can be a shock to the long-term investment trajectory of the economy and the financial burden of post-disaster recovery can strain government balance sheets as fiscal resources are diverted away from long-term resilience building and towards short-term response and recovery activities.

**The current lending environment does not place sufficient emphasis on risk reduction.**

An analysis of international and national lending streams yields that

**risk reduction is not always a key pre-condition for lending decisions.**

However, a closer look at the assessment criterion of international and national lenders reveals the inclusion of some risk-reduction measures under environmental and social risk guidelines and climate adaptation policies. Not all policies are mandatory, but there is evidence of emerging discussions on the importance of including risk reduction and resilience building in financial systems.

**Financing risk reduction is the need of the hour.**

Resilience building requires (a) reducing the risk from known disasters, (b) preventing the creation of new disaster risks, (c) proactively identifying new disasters and (d) building overall resilience to disasters (both structural and non-structural). Achieving these objectives requires financing, for which there is an urgent need to reorient current financial flows towards risk reduction. Using lending channels to promote risk reduction and resilience building at both the national and international level can be a powerful tool.

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