



Climate and Disaster Risk Financing Instruments: An Overview

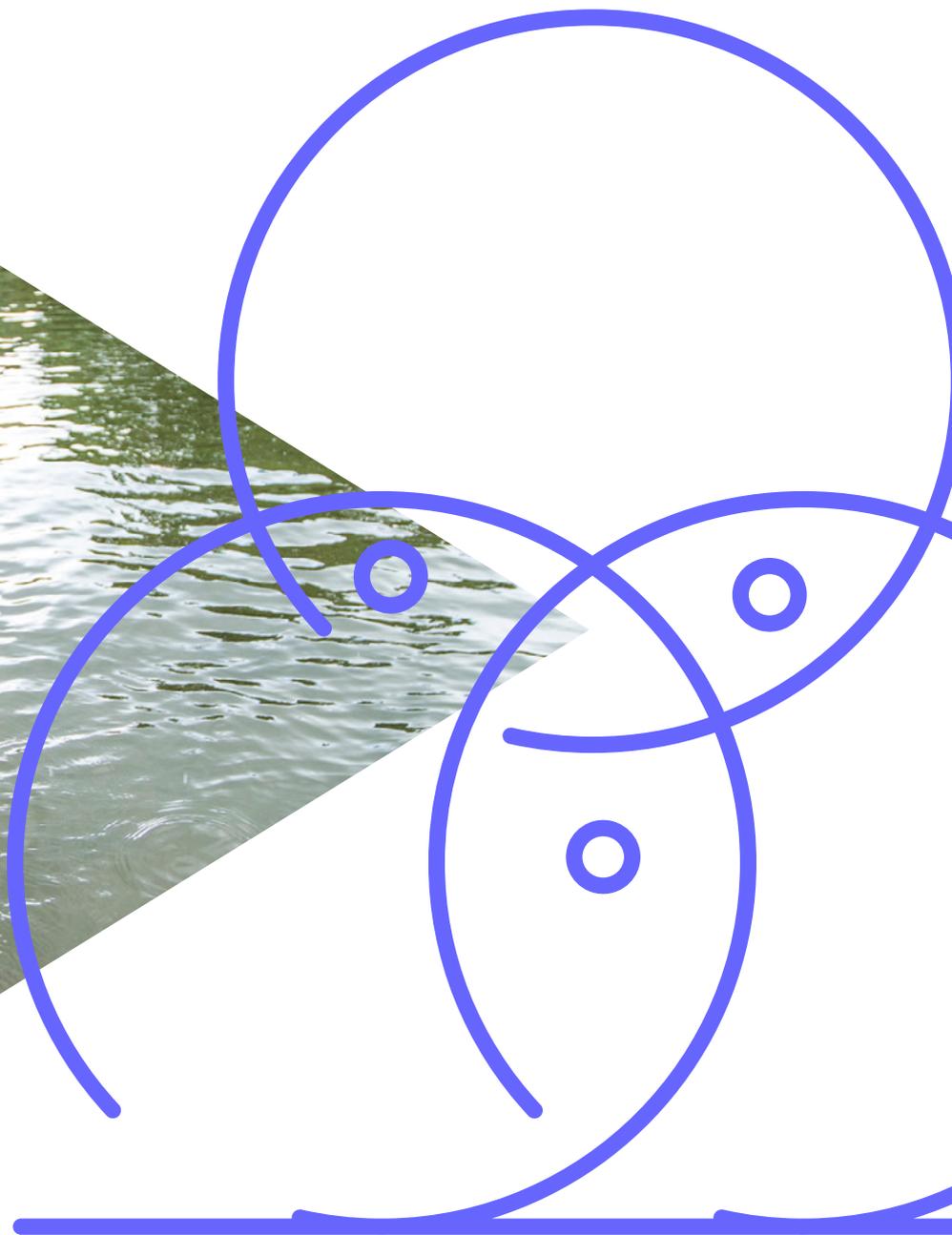


Table of Contents

Introduction	4
Climate and Disaster Risk Financing Needs	5
Risk Transfer	7
Risk Retention	13
External Risk Finance (Grants, Loans, and Other External Finance)	16
CDRF Considerations	23
Enabling Environment	27
Annex 1: CDRF Instrument Examples	29
References	32

Table of Figures

<i>Figure 1: Ex-Ante & Ex Post CDRF Instrument</i>	5
<i>Figure 2: CAT Bond Structure</i>	12
<i>Figure 3: CDRF Considerations</i>	24
<i>Figure 4: Enabling Environment</i>	28
<i>Figure 5: The Integrated Climate Risk Management Cycle</i>	29

Table of Text Boxes

<i>Text Box 1: Pacific CDRF Examples</i>	6
<i>Text Box 2: Risk Transfer Triggers</i>	8
<i>Text Box 3: Basis Risk</i>	9
<i>Text Box 4: World Bank Resources on Financial Protection for Public Assets</i>	10
<i>Text Box 5: Extreme Climate Risk and Natural Hazard Insurance – Key Questions</i>	11
<i>Text Box 6: Forecast-based Triggers for Contingency and Reserve Funds</i>	15
<i>Text Box 7: Debt Sustainability in SIDS</i>	17
<i>Text Box 8: Types of Bonds</i>	21
<i>Text Box 9: Risk Layering in Mexico</i>	25

Acronyms

ARC	African Risk Capacity
ADB	Asian Development Bank
ADF	Asian Development Fund
CAT bond	Catastrophe bond
Cat DDO	Catastrophe Deferred Drawdown Option
CDRF	Climate and Disaster Risk Finance
CRW	Crisis Response Window
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FbF	Forecast-based Finance
FONDEN	Fund for Natural Disasters
G20	Group of Twenty (large economies)
IDA	International Development Association
IBRD	International Bank for Reconstruction and Development
IFRC	International Federation of Red Cross and Red Crescent Societies
MCII	Munich Climate Insurance Initiative
PCRIC	Pacific Catastrophic Risk Insurance Company
PPPs	Public-Private Partnerships
SEADRIF	Southeast Asia Disaster Risk Insurance Facility
SIDS	Small Island Developing States
SPV	Special Purpose Vehicle
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Programme
UNU-EHS	United Nations University Institute for Environment and Human Security
V20	Vulnerable Group of Twenty Ministers of Finance

Introduction

As climate change increases the frequency and impacts of large scale natural hazards, it is critical that governments put in place or update actionable, comprehensive, transparent and inter-ministerial disaster risk management (DRM) plans. For these plans to be implementable and cost-effective, governments should include a climate and disaster risk financing (CDRF) strategy as an integral component of their DRM plan. This document provides a brief overview of the instruments that are available and may be considered as part of the CDRF strategy. While finance is necessary to effectively manage disaster risks, it is not sufficient. DRM plans must also integrate (and resource) risk assessment, institutional capacity building, risk reduction and mitigation, and emergency preparedness.¹ DRM plans should also take into account long-term climate risk, and provide adequate resources for adaptation.

This CDRF overview has been developed as part of the Pacific Insurance and Climate Adaptation Programme, a joint initiative of the United Nations Capital Development Fund (UNCDF), United Nations Development Programme (UNDP) and United Nations University Institute for Environment and Human Security (UNU-EHS). The CDRF overview falls within the Policy and Regulations work stream of the programme. This programme aims to improve the financial preparedness and resilience of Pacific Islanders towards climate change and natural hazards through the development and implementation of market-based meso and microinsurance schemes. The programme will also work together with governments and relevant stakeholders to develop customized climate and disaster risk financing strategies. This CDRF overview will be used as a tool to strengthen the capacity of government officials and other stakeholders on available financial instruments, their strengths and weaknesses, and their appropriateness for different levels of risk.

In addition to this work, the Pacific Islands Forum recently published *An Overview of Climate and Disaster Risk Financing Options for Pacific Islands Countries*, which provides an excellent overview of disaster risk in the Pacific context, and the need for disaster risk financing to help Pacific Islands Countries to strengthen financial protection and build resilience to disasters.²

¹ Cummins and Mahul, *Catastr. Risk Financ. Dev. Ctries.*

² Pacific Islands Forum, "An Overview of Climate and Disaster Risk Financing Options for Pacific Islands Countries."

Climate and Disaster Risk Financing Needs

Governments need financing to meet a variety of disaster risk-related needs. These resources are required at various times for disaster prevention, preparedness, response and recovery. The amount of resources needed at these stages will vary, as does the cost of capital. These financial resource needs can be broadly broken down into ex-ante financing needs (for which resources are spent before an event takes place) and ex-post needs (for which resources are spent after an event occurs). As shown in Figure 1, there are a variety of risk financing instruments that use either ex-ante or ex-post resources. These are described in detail below. While the cost associated with ex-ante and ex-post financing needs are borne at different points, they should both be considered before an event occurs, during the drafting of the CDRF strategy and DRM plan. CDRF planning ensures that the risk financing tools that are ultimately selected are the most appropriate and cost-effective given the need.

Ex-Ante Finance

Governments will need resources to finance several aspects of disaster risk before any particular hazard strikes, including resources to strengthen DRM (investments in risk assessment, institutional capacity building and emergency preparedness) including costs and investments associated with disaster risk reduction (DRR), climate adaptation and mitigation, such as:

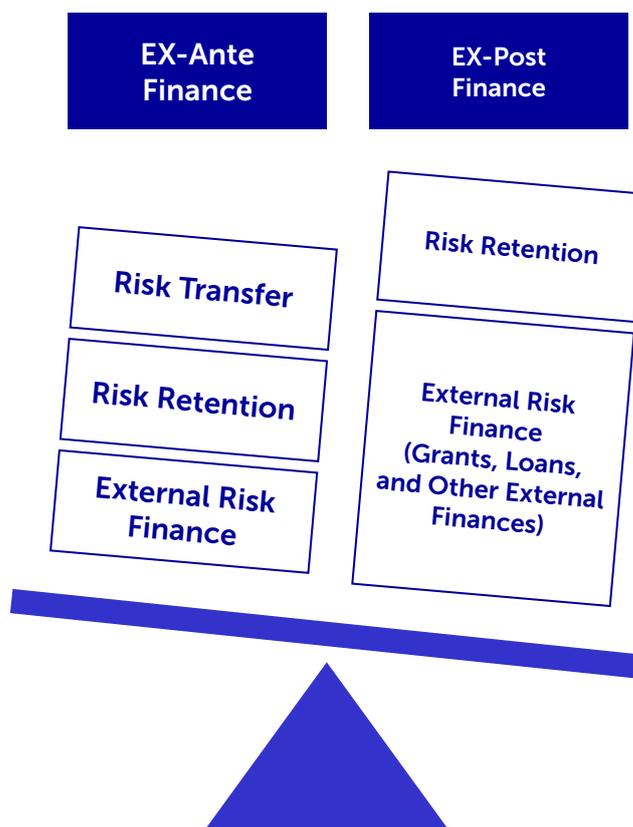


Figure 1: Ex-Ante & Ex Post CDRF Instrument

- risk reducing and mitigating infrastructure expenditures (e.g., sea walls, road repaving to reduce run-off, climate mitigation, etc.);³
- costs associated with the development of regulatory standards to promote climate resilience;⁴
- general financial sector resilience expenditures to improve regulation and support business continuity planning and stress testing;⁵
- expenditures for the development of legal and regulatory frameworks to increase the availability of climate and disaster risk insurance, distribution channels for insurance, or to establish domestic risk financing pools;⁶
- costs associated with the establishment or integration of early warning systems, safety nets and (adaptive or shock-responsive) social protection systems;
- other expenditures focused on strengthening the enabling environment for CDRF (discussed more below).

Text Box 1: Pacific CDRF Examples

Following Tropical Cyclone Winston, the Fijian Government established the **Prime Minister’s National Disaster Relief and Rehabilitation Fund** to receive ex-post donations from international and domestic sources.

Fiji has also set up an **Environment & Climate Adaptation Levy** to fund environmental, carbon-reducing and climate adaptation projects.

The **Pacific Catastrophic Risk Insurance Company (PCRIC)** paid out USD 1.9 million to Vanuatu following Tropical Cyclone Pam. More recently they have made payouts to Tonga following Cyclones Gita and Harold.

The Pacific Islands Forum Secretariat has also compiled several reports including CDRF options and examples from the Pacific, including *Pacific Experiences with Options Relevant to Climate Change and Disaster Risk Finance*, and *An Overview of Climate and Disaster Risk Financing Options for Pacific Islands Countries*.⁷

In addition to these, governments and their partners may have ex-ante expenditures for **risk transfer** (such as insurance premium payments). Although typically less important, there are aspects of **risk retention** with government funds and **external risk finance** (such as some grants and loans) that involve ex-ante resources. These include investments that provide liquidity for future risk retention and standby fees associated with contingent credit. These four instruments will be discussed in greater detail below.

³ Organisation for Economic Cooperation and Development, “Climate-Resilient Infrastructure.”

⁴ Organisation for Economic Cooperation and Development.

⁵ Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

⁶ World Bank Group, “World Bank Group Development Solutions for Disaster Risk Finance: Sustainable Solutions for Financial Protection.”

⁷ Pacific Islands Forum, “Pacific Experiences with Options Relevant to Climate Change and Disaster Risk Finance”; Pacific Islands Forum, “An Overview of Climate and Disaster Risk Financing Options for Pacific Islands Countries.”

Ex-Post Finance

While governments may expend considerably to prepare for natural hazard risk ex-ante, in many cases the bulk of government and partner expenditures will occur ex-post, after a hazard strikes. These costs may include:

- emergency response and assistance
- economic recovery and support to state-owned enterprises
- infrastructure reconstruction and the reconstruction of uninsured housing
- associated logistical and supply chain costs (which are particularly high for remote areas)⁸ and
- loan repayments for financing of the above

Despite the high opportunity costs for these resources,⁹ governments will need to finance whatever needs are not met through risk transfer (the residual risk that remains) through a combination of **risk retention** and **external risk finance** (grants, loans and other external finance).

Risk Transfer

There has been a lot of attention on risk transfer, particularly insurance, for managing household risk over the last twenty years. According to an early review of index-based microinsurance for weather risk management, insurance was successfully piloted for the management of weather risk as early as 2003, when a rainfall insurance product was offered in Andhra Pradesh, India.¹⁰ CCRIF SPC (formerly known as the Caribbean Catastrophe Risk Insurance Facility), the first multi-country risk pool for transferring sovereign risk was formed in 2007. The African Risk Capacity (ARC) and Pacific Catastrophic Risk Insurance Company (PCRIC) followed in 2012 and 2016, respectively. In 2015, during the Climate Talks in Bonn, Germany, G7 leaders committed to increasing climate insurance (which includes extreme weather insurance) for poor and vulnerable people in highly exposed, low income countries. The Vulnerable Group of Twenty Ministers of Finance (V20) and Group of Twenty (G20) large economies officially launched the V20/G20-led InsuResilience Global Partnership for Climate and Disaster Risk Finance and Insurance Solutions two years later at the Bonn UN Climate Conference, in November 2017. InsuResilience supports regional risk pools and has created two funds, InsuResilience Investment Fund and the InsuResilience Solutions Fund. As a result of these pilots, pools and initiatives, there are more insurance and non-insurance risk transfer solutions for natural hazards and extreme weather risk than ever before.

8 Asian Development Bank, "Economic and Fiscal Impacts of Disasters in the Pacific."

9 Cummins and Mahul, *Catastr. Risk Financ. Dev. Ctries.*

10 Cole et al., "The Effectiveness of Index-Based Micro-Insurance in Helping Smallholders Manage Weather-Related Risks."

Risk transfer products are considered ex-ante financing because, while the products pay out after an event occurs, they need to be paid for ahead of time, usually through premium payments. In addition to debt financing for development and DRR projects, many countries also finance their risk transfer premium payments with debt. In theory, the premium payments may avoid the need to take on larger debt burdens after an event. In practice, however, risk transfer products are designed to provide quick liquidity and cannot meet all of a government's ex-post financing needs. Rather, risk transfer products can complement other CDRF tools. Nonetheless, many countries are still not finding that risk transfer adequately meets their needs while considering competing budget priorities¹¹ and realistic planning horizons.

Text Box 2: Risk Transfer Triggers

Risk transfer products can be triggered to payout in various ways depending on design. These include:

- indemnity triggers (depend on actual losses)
- index triggers (triggered by an estimated industry loss "index")
- parametric triggers (based on well-defined parameters of an event)
- modelled triggers (based on parameters input into exposure models)
- hybrid triggers (combinations of the above triggers)¹²

In practice however, index-based, parametric and modelled triggers are all often referred to as "index-based" to differentiate them from the more traditional indemnity products.

Sovereign Risk Insurance & Regional Insurance Pools

Perhaps the most well-known type of sovereign risk transfer for natural hazards and climate risk are the various regional insurance pools that have been created since 2007. In addition to these, governments can be creative in designing domestic pools and replica products. These pools typically offer parametric insurance products, which are designed to provide quick liquidity at reasonable costs but are also susceptible to basis risk. See below for a brief discussion of basis risk.

- Regional Insurance Pools include ARC, CCRIF SPC, PCRIC and the Southeast Asia Disaster Risk Insurance Facility (SEADRIF). In addition to providing parametric sovereign risk insurance (also referred to as macro insurance), these pools play an important role in building regional capacity as well as collecting and disseminating information on hazards and risk exposure in their respective regions.

¹¹ Global Risk Financing Facility, "Literature Review of Evidence on Disaster Risk Finance."

¹² Bouriaux and MacMinn, "Securitization of Catastrophe Risk: New Developments in Insurance- Linked Securities and Derivatives."

- Domestic Insurance Pools allow national governments to build on the lessons of the regional insurance pools. For example, the proposed Philippine City Disaster Insurance Pool would provide parametric insurance against typhoon and earthquake risk for city governments in the Philippines.¹³
- Replica Coverage, such as the ARC Replica product created by the Start Network, is an opportunity for non-governmental and civil society organizations to buy into regional (or perhaps even domestic) insurance pools. Governments work with their civil society or development partners to develop joint contingency plans, and the partner pays the premium for a policy matching the government's sovereign risk policy, purchased from the regional pool. The pilot ARC Replica policy paid out in 2019 when the Government of Senegal received USD 12 million, and the Start Network received USD 10 million when their ARC drought product was triggered.¹⁴

Text Box 3: Basis Risk

Basis risk occurs when the estimated losses of an index-, parametric- or model-triggered risk transfer product do not match the actual losses of a policy holder. This benefit can accrue to either the insurer or the policy holder (meaning a product may not trigger when actual losses are quite large, but a payout may also occur when actual losses are quite small). Generally, there are two drivers of basis risk in index-based products: 1) product design and 2) data resolution. Poorly designed products may not do a good job of capturing the experience of policy holders on the ground. Similarly, even well-designed products may be unable to differentiate between the experiences of two policy-holders who fall within the same data grid. While the product may accurately estimate average losses, individual policy holders' experiences may differ substantially.

While the level of basis risk should be assessed when considering an index-based product, improvements in remote sensing mean that data resolution is constantly improving, and basis risk due to data resolution may not be as great of a concern in the future. Governments also have a role to play in limiting basis risk in micro and meso insurance by creating and enforcing quality standards for parametric insurance products.

Insurance for Public Assets

In addition to the parametric insurance discussed above, governments may choose to insure public assets against disasters. Governments should first identify critical ("lifeline"¹⁵) infrastructure—those that are necessary for national or economic security, or the health and safety of the population¹⁶ – and identify steps to reduce the exposure of that infrastructure. The Insurance Development Forum developed guidance on integrating a public asset insurance programme into a country's CDRF strategy. The guide overviews the rationale for insurance of public assets, important considerations including asset prioritization, and enabling environment needs.¹⁷

¹³ Asian Development Bank, "Philippine City Disaster Insurance Pool: Rationale and Design."

¹⁴ African Risk Capacity, "Government of Senegal to Receive a Minimum of US \$22m from the African Risk Capacity Insurance Company Limited for Drought."

¹⁵ Cummins and Mahul, *Catastr. Risk Financ. Dev. Ctries.*

¹⁶ World Bank Group, "Financial Protection of Critical Infrastructure Services."

¹⁷ Insurance Development Forum, "IDF Practical Guide to Insuring Public Assets."

Text Box 4: World Bank Resources on Financial Protection for Public Assets

In the past two years, the World Bank has developed a number of tools and publications to support governments in the financial protection of critical infrastructure and public assets. Recent publications include a technical report on Financial Protection of Critical Infrastructure Services¹⁸ and an Operational Framework on Catastrophe Insurance Programmes for Public Assets¹⁹.

Additionally, the SEADRIF knowledge series on financial protection of public assets compiles webinars and fact sheets from a 2020 webinar series, overviewing the steps needed to design, develop, deliver and implement risk transfer tools to protect public assets. The knowledge series builds on case studies, and serves as a guide for governmental officials.²⁰

Natural Resource Insurance

Most currently available “natural resource insurance” is actually insurance for extractive industries. Insurers offer risk transfer solutions for energy (oil and gas), renewable energy, forestry, and mining and metallurgy.²¹ Governments may want to investigate these, and require extractive industries to take up certain kinds of natural resource insurance, or other protection against natural resource damages. Outside of extractives, insurance solutions for the provision of ecosystem services are underdeveloped.²²

Meso & Microinsurance

In addition to macro (sovereign) insurance, governments may choose to play a variety of roles to support the development of meso and microinsurance against extreme climate and natural hazard risk. While macro insurance is insurance that pays out to a sovereign, typically to meet immediate liquidity needs, meso insurance policies are held by an institution, either to transfer institutional risk (such as default risk held by a microfinance institution), or to aggregate demand of members (such as a farmer’s association taking out a policy to protect its member farmers). Microinsurance is insurance held by an individual (or household).

Meso and microinsurance can be private (market-based or subsidized), public or the result of a PPP. Governments may choose to intervene only by creating an enabling environment for insurance, or more directly as either an insurer or reinsurer. *Disaster Risk Financing: A Global Survey of Practices and Challenges*²³ provides an

18 World Bank Group, “Financial Protection of Critical Infrastructure Services.”

19 World Bank Group, “Catastrophe Insurance Programs for Public Assets — Operational Framework.”

20 World Bank Group, “SEADRIF Knowledge Series – Financial Protection of Public Assets.”

21 See for example AON (<https://www.aon.com.au/australia/natural-resources-insurance.jsp>) and WMB Insurance Group (<https://wmbeck.com/commercial-insurance/mining-natural-resources/>)

22 Paavola and Primmer, “Governing the Provision of Insurance Value From Ecosystems.”

23 Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

excellent overview of how countries are facilitating climate and natural hazard insurance through PPPs, subsidies and tax incentives, and the direct provision of insurance or reinsurance. The Munich Climate Insurance Initiative (MCII) has also created a toolkit²⁴ for integrating insurance into climate risk management.

Text Box 5: Extreme Climate Risk and Natural Hazard Insurance – Key Questions

Key questions²⁵

- Which hazard or hazards will be insured?
- Is the primary goal of the product social protection? Should the product cover property, or business/livelihood interruption? Are life, accident and health included or covered elsewhere?
- What will be the basis of claims? Will the product be indemnity-based, index-based or parametric?
- Will a premium payment or claims payout system need to be developed? What are the pros and cons of digital processes? Who might be excluded, and how can they be reached? What is the role of local network service providers, and what sustainable partnerships can be fostered for to increase access?
- Can existing government systems, such as safety nets, social protection systems or provident funds, be scaled or otherwise leveraged for payouts? Which governmental ministries should be involved in the creation and management of products?
- Will individuals and households be covered directly or indirectly via a meso or macro level product? What distribution and aggregation channels can be used?
- How are the needs of women and men being met? Which segments of the population/livelihood groups are most vulnerable? Which segments are most critical to local and national recovery and resilience?
- Should the product be mandatory (mandatory offer, mandatory purchase or mandatory extension)? Should it be a stand-alone, a rider to a pre-existing policy or credit-linked?
- Will prices be flat (the same for all policy holders), risk-based or progressive (need-based)? Is it affordable? Should deductibles, copays or coinsurance be explored?
- What form will government financial support take? Will the policies be partially or fully subsidized by the government or a government partner? If so, are these market-enhancing subsidies or social insurance premium subsidies? Will taxes be waived?
- Will the government provide other types of support, such as increasing financial literacy or creating the necessary infrastructure and enabling environment to support insurance?

24 Ramm et al., "Integrating Insurance into Climate Risk Management: Conceptual Framework, Tools and Guiding Questions: Example from the Agricultural Sector."

25 Organisation for Economic Cooperation and Development, Disaster Risk Financing: A Global Survey of Practices and Challenges; Ramm et al., "Integrating Insurance into Climate Risk Management: Conceptual Framework, Tools and Guiding Questions: Example from the Agricultural Sector"; Cummins and Mahul, Catastr. Risk Financ. Dev. Ctries.; Organisation for Economic Cooperation and Development, "Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework."

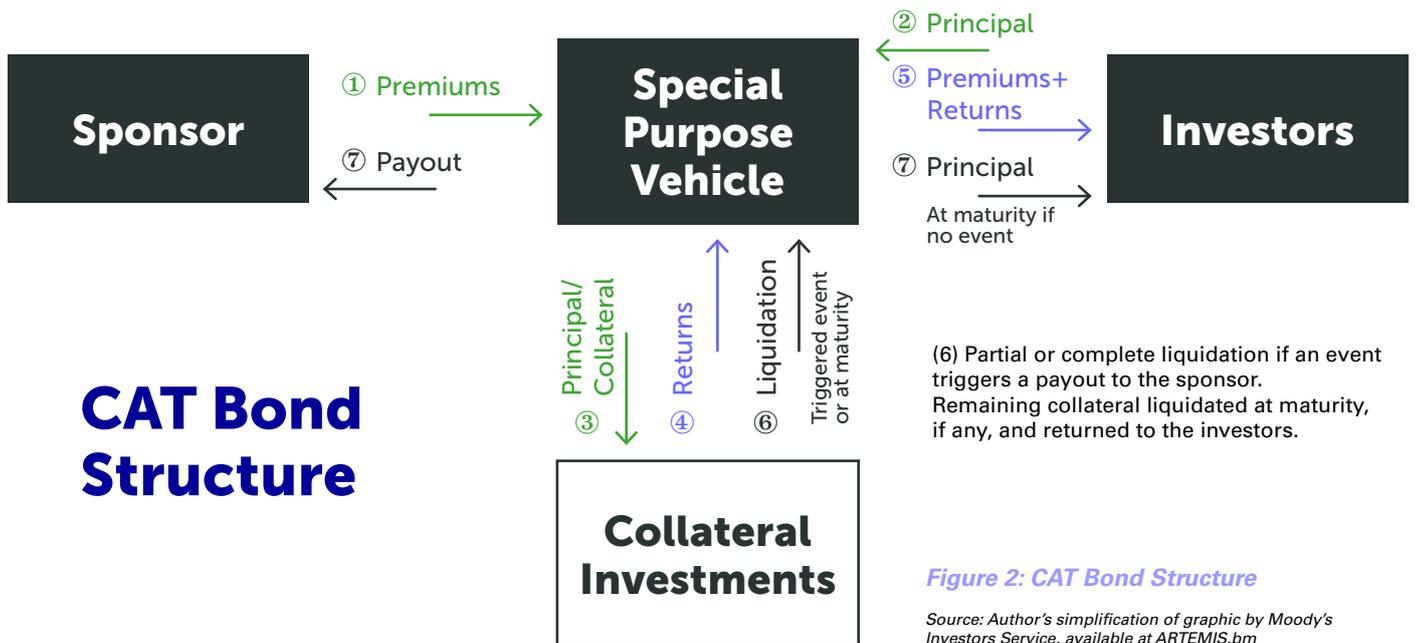
Takaful

Takaful mutual guarantees are a Sharia-compliant, insurance alternative developed for Muslim clients for whom traditional insurance solutions may be considered usury. Takaful is a cooperative insurance mechanism where the policy holders are also the owners.²⁶ Some Takaful insurers have successfully entered the natural hazard space. For example, Takaful Insurance of Africa offers index-based livestock insurance (a parametric drought product), as well as an indemnity-based Fire & Perils product.

Catastrophe Bonds

In 1992, the Category 5 hurricane Andrew struck the Bahamas and the United States. At the time, the hurricane was the costliest to ever make landfall in the United States. The market for insurance-linked securities (ILS) and derivatives appeared following Hurricane Andrew, and has grown substantially in the past fifteen years. The most common and relevant ILS is the catastrophe bond (CAT bond), although other types of ILS and “natural-catastrophe” linked instruments have been developed. As with insurance, CAT bonds may have indemnity, index-based, parametric triggers, modelled or hybrid triggers (see Risk Transfer Triggers, above).²⁷ CAT bonds can cover a variety of climatic and geological risk, including earthquake, extreme wind, hurricanes and named storms, volcanic eruption, wildfire and multi-peril risk. CAT bonds can also cover other types of catastrophic risk. For example, the World Bank issued CAT bonds and insurance-linked swaps to fund its Pandemic Emergency Financing Facility.

As a risk transfer instrument, CAT bonds function much like insurance. With insurance products, risk is transferred from the insured to the insurer. For CAT bonds, risk is transferred from the sponsor to investors. A sponsor is any country, company or other entity looking to transfer risk. Investors may be hedge funds, pension funds or other institutional investors.



26 Al-Amri, "Introduction to Takaful Insurance: Opportunities and Challenges."

27 Bouriaux and MacMinn, "Securitization of Catastrophe Risk: New Developments in Insurance-Linked Securities and Derivatives."

Figure 2 demonstrates a simplified CAT bond structure. In order to facilitate the transaction, the sponsor needs to set up a special purpose vehicle (or SPV—an offshore company to independently manage transactions) to a) issue the bond, b) receive principal payments (also called collateral or proceeds) from investors and c) invest the principal to receive interest (low risk money market accounts are preferred, although the returns are quite low). In addition to the costs of creating the SPV and any custom bonds, the sponsor pays a premium to the SPV, much as an insured party would pay a premium to an insurer, which is passed on to the investor (minus a fee). CAT bonds offer high yields to investors, who receive periodic “coupons” from the interest returns on the collateral investment, and the premiums paid by the sponsor (minus fees). In the case that a triggering event occurs, the collateral investments are (partially or completely) liquidated and the sponsor receives a payout. Any non-triggered funds remaining at the maturity are repaid to the investor. An exception to this structure is when a country chooses to work with the World Bank to issue a CAT bond. In that case, the sponsoring country does not need to set up an SPV and the World Bank effectively takes on that role.²⁸ Middle-income countries have sponsored earthquake and tropical storm CAT bonds through the World Bank, including Chile, Colombia, Mexico, Peru and the Philippines. These have ranged in size from USD 200 million to 500 million. As such, CAT bonds may not be the most appropriate instrument for relatively small economies.

Risk Retention

Despite growing interest in risk transfer instruments, most natural hazard risk is still retained by governments, firms and individuals. High income countries, in particular, retain the vast majority of their risk, but risk retention tools are available to low and middle income countries, as well. Note that many documents consider risk finance to be part of risk retention. In this overview, risk retention and external risk finance are considered separately, with risk retention solutions being financed solely from domestic resources. The section on external risk finance (below), on the other hand, will consider external financing through grants, loans and private sector or non-governmental responses.

While many risk retention instruments are ex-post, such as budget reallocation, there are tools that the government can use ex-ante to retain risk. These instruments, such as contingency and reserve funds are most typically used to manage high frequency events that a government expects to manage annually or every few years.

²⁸ World Bank Group, “Disaster Risk Insurance Platform: Insurance Solutions for World Bank Clients”; ARTEMIS, “What Is a Catastrophe Bond (or Cat Bond)?”

Government Revenue & Budget Allocation

Risk reduction projects can be supported through the regular budgetary allocation process at the central or local government level. These budgets are typically funded through a combination of income taxes, property taxes, corporate taxes, severance taxes, sales and excise taxes and duties, customs duties and earnings on reserves.²⁹ Additionally, some governments may have the option of setting up special purpose levies³⁰ to raise dedicated funds for specific climate change adaptation and DRR projects. For example, Fiji has set up an Environment & Climate Adaptation Levy to fund environmental, carbon-reducing and climate adaptation projects³¹.

Contingency and Reserve Funds

Although risk retention is typically considered something a government does after an event, there are certain instruments that allow governments at all levels (and other actors) to retain a certain amount of risk ex-ante. These include contingency and reserve funds, as well as “emergency funds” which are usually either contingency or reserve funds. Some reserve funds are called “contingency reserves.” The main distinction between these two is whether the funds are returned at the end of the fiscal year if unspent (contingency funds) or accumulated over time (reserves).

Contingency funds are included as part of the normal budgeting process, and although the exact type of contingency may be predefined, more typically these funds are used to finance the government’s management of all sorts of unexpected events. Contingency funds often range between 2-5% of the annual budget. Given their flexibility, contingency funds are often viewed as susceptible to use for non-disaster events. On the other hand, they are quick (and usually simple) to disburse, and therefore useful for financing immediate, emergency-related needs³². Depending on governmental regulations, any funds not used at the end of the fiscal year may lapse and be returned to the Treasury.³³

Reserve funds should be included in the annual budgeting process but, unlike contingency funds, they sit outside of the budget and ideally grow over time (like a savings account). While contingency funds are well-suited for the government to retain expected, low severity but high frequency risk, reserve funds allow governments to retain some amount of slightly less-frequent risk. Like contingency funds, reserve funds should be quite liquid and available immediately, although typically disbursement will need to be triggered in some way, such as by a declaration of an emergency.³⁴ Reserve funds may help countries avoid external (debt) financing for disasters, but they take time to build up. Given that the funds must remain relatively liquid, there is also an opportunity cost to the use of reserve funds³⁵.

29 Tax Policy Center, Briefing Book: A Citizen's Guide to the Fascinating (Though Often Complex) Elements of the Federal Tax System.

30 Fingleton, “Funding Options for Agricultural Development: The Case for Special Purpose Levies.”

31 Ministry of Economy of Fiji, “ECAL in Action: How Your Environment and Climate Adaptation Levy Is Building a Better, Stronger Fiji.”

32 Meenan, Ward, and Muir-Wood, “Disaster Risk Finance: A Toolkit.”

33 Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

34 Meenan, Ward, and Muir-Wood, “Disaster Risk Finance: A Toolkit.”

35 Organisation for Economic Cooperation and Development, “Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework.”

Text Box 6: Forecast-based Triggers for Contingency and Reserve Funds

The humanitarian community has been piloting FbF and other types of anticipatory action for the last several years. While these instruments are not used by governments currently, there is no reason that the forecast-based triggers used to release early action humanitarian funds could not also be adapted to trigger contingency or reserve funds. Governments should explore whether forecast-based triggers make sense when they are determining triggers for contingency and reserve funds, as well as for other extrabudgetary funds (discussed below). See the section on FbF below for more information on forecast-based triggers.

Extrabudgetary Funds

Extrabudgetary funds are funds, managed by the government, that are not included in the annual national or subnational budget. These funds may have a variety of functions including development, investment, budgetary stabilization and savings.³⁶ Some governments create extrabudgetary funds to allow corporations and individuals to donate resources to support the government's emergency response efforts, such as the Prime Minister's National Relief Fund in India. These funds have specific conditions or triggers that dictate when the funds may be released.

Other extrabudgetary funds used for CDRF include offshore sovereign wealth and provident funds. Sovereign wealth funds are offshore funds where government surpluses can be invested. These surpluses are often government revenues from (volatile) extractive industries. Government pension schemes and provident funds may also have significant capital invested offshore. Offshore funds may be used as part of a risk retention strategy ex-post to provide resources for rare, high severity events. The accessibility of these funds will depend on the conditions or triggers to withdraw funds, which can be designed in such a way to increase liquidity after disasters.³⁷

³⁶ Allen and Radev, "Extrabudgetary Funds."

³⁷ Asian Development Bank, "Economic and Fiscal Impacts of Disasters in the Pacific."

Budget Reallocation and Realignment

When contingency funds are lacking, the government can also reallocate in-year budget lines ex-post to manage the impacts of an event. These reallocated funds may be directed to the contingency fund or disbursed directly to the relevant ministry. In the years following an event, the government budget can be realigned to prioritize reconstruction, although these realignments may be insufficient and have a high opportunity cost.³⁸ Budgets may also be cut, as necessary, particularly if government revenue is expected to be impacted by the event.³⁹

Taxation

Taxation is not truly an independent instrument, given that it finances the budgets and sovereign wealth funds discussed above. That said, taxation can be used as a tool to raise DRR and adaptation funds ex-ante, to increase government resources ex-post, or as an instrument to provide relief to suffering populations and industries through tax holidays. To the extent that they are used to raise funds ex-post (which is rarely), tax increases often take several months to implement, and are often best focused on the final stages of recovery and on the reconstruction phase.⁴⁰

External Risk Finance (Grants, Loans, and Other External Finance)

External finance for disaster risk includes the grants, loans (credit), and other outside support that governments and their partners use to manage disaster risk. Some external risk finance—such as contingent credit—can be arranged ex-ante. For the purposes of this overview, external financial arrangements are only considered ex-ante finance if the government or humanitarian partner must make payments (such as standby fees) before an event occurs. All other external financing instruments are considered ex-post financing. Note that risk transfer and risk retention instruments are not considered external risk financing for the purposes of this overview.

38 World Bank Group, "Advancing Disaster Risk Financing and Insurance in ASEAN Member States: Framework and Options for Implementation."

39 Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

40 World Bank Group, "Advancing Disaster Risk Financing and Insurance in ASEAN Member States: Framework and Options for Implementation."

Given the high costs associated with risk transfer mechanisms, and the limited fiscal space of many low and middle income countries, much climate and disaster risk is externally financed. Nonetheless, the impact of debt servicing on growth and economic stability are real, and governments must carefully weigh the extent to which external CDRF will help them reach their long-term resilience and fiscal goals. Ex-post financing may come at an increased cost (compared to ex-ante or non-emergency credit), and traditional post-disaster financing arrangements and practices are inefficient (in terms of cost and timeliness).⁴¹

Traditional DRR, Development, and Climate Finance

Governments wishing to invest in risk reduction have access to a variety of ex-ante development and climate finance options from their development partners. While some governments may have access to grant funding, partner finance from the Green Climate Fund,⁴² the World Bank's International Development Association (IDA) and International Bank for Reconstruction and Development (IBRD),⁴³ regional development banks' performance based allocations or ordinary capital resources, bilateral creditors, and United Nations (UN) agencies often take the form of concessional loans. While these instruments are available to fund DRR and climate adaptation, political considerations and the set-up of the international financial system tend to incentivize ex-post disaster response rather than investments in DRR and adaptation.⁴⁴ Commercial debt and secured lending are also available, although these are usually non-concessional.⁴⁵

Despite the accomplishments of the Highly Indebted Poor Countries and Multilateral Debt Relief Initiatives, debt distress is on the rise again. These initiatives largely did not target Small Island Developing States (SIDS). Given the high debt levels of many natural hazard-exposed countries, the benefits of external finance must be carefully weighed against likelihood of debt forgiveness and the long-term challenges associated with debt repayment, especially for hazard-prone countries where future fiscal space may be volatile. The African Legal Support Facility published a handbook in 2019 that overviews a variety of types of financing, discusses factors contributing to recent debt increases, and provides guidance on public debt management, including background on the joint International Monetary Fund-World Bank Debt Sustainability Framework.⁴⁶

Text Box 7: Debt Sustainability in SIDS

SIDS, including in the Pacific, have been hit hard by COVID-19. The pandemic is expected to negatively impact GDP growth in SIDS more than in other developing and emerging economies. This leaves SIDS open to a potential triple crisis: macroeconomic shock, weakened health systems while facing a global pandemic and

41 Cummins and Mahul, *Catastr. Risk Financ. Dev. Ctries.*

42 Green Climate Fund, "Financial Terms and Conditions of the Fund's Instruments."

43 World Bank Group, "IDA Terms."

44 Martinez-Diaz and Sidner, "Confronting Simultaneous Climate, Public Health, and Economic Shocks in Developing Countries"; Clarke and Dercon, "Beyond Banking: Crisis Risk Finance and Development Insurance in IDA19."

45 African Legal Support Facility, "Understanding Sovereign Debt: Options and Opportunities for Africa."

46 African Legal Support Facility.

natural hazards. In this context, debt sustainability becomes particularly concerning.⁴⁷ There are calls for urgent action to support those SIDS that are facing an impending debt crisis, including the use of debt standstills (extending to all creditors) and a re-assessment of the long-term debt sustainability in SIDS.⁴⁸ While SIDS do have a history of restructuring debt—at least 17 SIDS have restructured their debts collectively over 50 times—restructuring (by lengthening the maturity and reducing the interest rate) without some forgiveness has typically not solved debt sustainability problems.⁴⁹

There has been increasing interest recently in debt-for-climate swaps as one possible way for SIDS to decrease debt burdens while increasing investment in climate adaptation and mitigation. Examples of successful swaps can be found in Jamaica and the Seychelles.⁵⁰ However, there is also concern that swaps could be viewed by international markets as debt forgiveness, having potentially unintended consequences on the credit rating of participating countries.

In addition to taking on loans for DRR, sovereigns may access grant support through trust funds such as the World Bank-managed Global Facility for Disaster Reduction and Recovery, or the Asian Development Bank's (ADB's) Integrated Disaster Risk Management Fund (although this fund is not available to Pacific countries). ADB also provides dedicated funding to its concessional assistance-only countries through the Asian Development Fund (ADF) 12 DRR financing mechanism and concessional assistance countries can access the ADF13 (2021–2024) Regional Thematic Fund for DRR purposes.

While resources to reduce disaster risk and promote climate adaptation support holistic CDRF, not all CDRF should be considered adaptation finance. Similarly, although the international community has committed that USD 100 billion in new and additional climate finance would be available by 2020, by some estimates nearly half of the climate finance available in 2018 was redirected development funding.⁵¹

Contingent Credit/Cat DDO

The purpose of contingent credit is to disburse quick, pre-arranged, liquid resources to governments after a disaster.⁵² Some publications consider contingent credit to be ex-ante finance because it is arranged before an event. In this overview, it is considered to be ex-post finance because the borrower (government) will only begin to make loan repayments after an event has occurred, regardless of the arrangements made ahead of time. The World Bank offers different development policy loans with a catastrophe deferred drawdown option (Cat DDO) for IBRD- and IDA-eligible borrowers. For IDA-eligible countries, 50% of the request will be funded by the country's concessional core IDA allocation, with the balance financed by IDA's overall resources. Borrowing countries

47 Slany, "Multiple Disasters and Debt Sustainability in Small Island Developing States."

48 Bouhia and Wilkinson, "Small-Island Developing States Need Urgent Support to Avoid Debt Defaults."

49 Hurley, "Financing for Development and Small Island Developing States: A Snapshot and Ways Forward."

50 Fuller et al., "Debt for Climate Swaps: Caribbean Outlook."

51 Mitchell, Ritchie, and Tahmasebi, "Is Climate Finance Towards \$100 Billion 'New and Additional'?"

52 Vaughan and Hillier, "Ensuring Impact: The Role of Civil Society Organisations in Strengthening World Bank Disaster Risk Financing."

must have an adequate macroeconomic policy framework (according to the World Bank) and a satisfactory DRM programme (in existence or preparation) that addresses disasters triggered by natural hazards. These pre-arranged Cat DDOs include pre-specified drawdown triggers (usually a declaration of a state of emergency).⁵³

The International Monetary Fund has a Rapid Credit Facility, which provides—on a case-by-case basis—rapid concessional financial assistance with limited conditionality. Some regional development banks have developed contingent instruments. The Inter-American Development Bank has seen relatively little interest in their contingent instruments; this may in part be due to standby fees which must be paid before an event occurs (ex-ante) or even if an event does not occur.⁵⁴

Since 2016, ADB has set up contingent financing programs in ten Pacific developing member countries to provide timelier post-disaster financing through policy-based grants and loans. In August 2019, ADB formally adopted contingent disaster financing as an option under its policy-based operations.⁵⁵ Eligibility to withdraw grant and loan proceeds is based on achieving prior resilience-related policy actions, but disbursements will be triggered when a state of disaster or emergency is declared. DRM policy actions reduce the underlying disaster risk and enhance preparedness. Each government has also agreed upon an ongoing post-program partnership framework to strengthen DRM performance that is based on a gap and needs analysis in each country. In the Pacific, the regional program includes technical assistance to strengthen the policy environment and institutional arrangements for DRM by strengthening post-disaster financial management capacity.⁵⁶

Disaster Response Banking Instruments

In addition to contingent credit instruments, there are a variety of other ex-post external financing options available. The World Bank alone has several. These include the Crisis Response Window (CRW, one of the Bank's largest instrument), the Contingent Emergency Response Component, Immediate Response Mechanism and the inclusion of so-called "zero components" in project allocations.⁵⁷ The CRW was set up to help IDA countries managing exceptionally severe shocks. Funds from the CRW are additional to IDA envelopes, and the World Bank can soften CRW funding terms from loans to grants, should damages exceed a third of gross domestic product.⁵⁸ However, CRW funding can be slow; analysis from 2019 demonstrates that it takes over a year, on average, for funds to be disbursed.⁵⁹

53 World Bank Group, "IBRD Catastrophe Deferred Drawdown Option (Cat DDO)"; World Bank Group, "IDA Catastrophe Deferred Drawdown (Cat DDO)."

54 Inter-American Development Bank, "Contingent Lending Instruments."

55 Asian Development Bank, "Contingent Disaster Financing under Policy-Based Lending in Response to Natural Hazards."

56 Asian Development Bank, "Regional: Pacific Disaster Resilience Program, Phase 3."

57 Vaughan and Hillier, "Ensuring Impact: The Role of Civil Society Organisations in Strengthening World Bank Disaster Risk Financing."

58 World Bank Group, "IDA18 Mid-Term Review Crisis Response Window: Review of Implementation."

59 Spearing, "IDA's Crisis Response Window: Learning Lessons to Drive Change."

The Contingent Emergency Response Component and Immediate Response Mechanism are components of Bank investment projects that allow reallocation of funds from existing projects to support the disaster response, meaning that these funds can be disbursed quickly after eligible disaster events. As such, these instruments are pre-arranged, but do not require any payments ex-ante. These instruments can also be used to finance disaster risk for smaller events for which the CRW cannot be accessed.⁶⁰

Disaster Risk Finance Facilities

A variety of CDRF facilities have been set up specifically to help countries manage their disaster risk. These include the World Bank's Pandemic Emergency Financing Facility, Global Risk Financing Facility; and Famine Action Mechanism. These facilities provide grants under different situations. The Pandemic Emergency Financing Facility and Famine Action Mechanism are primarily ex-post mechanisms, while the Global Risk Financing Facility supports the development of disaster risk financing plans and may provide risk transfer premium support as well.

Non-Bank finance facilities include the African Development Bank's Africa Disaster Risk Financing Programme and the Asia-Pacific Climate Finance Fund. Like the Global Risk Financing Facility, the Africa Disaster Risk Financing Programme provides support for the development of disaster risk financing plans, and also provides sovereign risk transfer premium support. The ADB has also created the Asia-Pacific Climate Finance Fund, which similarly focuses on the development and scaling of financial risk management products.

Bonds

While many instruments are specific to a particular time period or funder, bonds are incredibly flexible. Bonds allow the sponsor—be they a government, private sector entity, PPP or (development) bank—to borrow from investors for a specific purpose, often related to construction or project implementation. When it comes specifically to risk reduction, governments and their development partners can issue bonds, such as green bonds,⁶¹ for climate mitigation (e.g., investments in renewable energy) and adaptation (e.g., desalinization). Depending on the size of the economy, debt sustainability considerations are important when considering bonds, especially considering that low income countries must often sponsor foreign currency denominated bonds, which additionally expose the country to foreign exchange risk and limit its ability to devalue domestic currency.⁶²

60 World Bank Group, "IDA18 Mid-Term Review Crisis Response Window: Review of Implementation."

61 Filkova, Frandon-Martinez, and Giorgi, "Green Bonds: The State of the Market 2018."

62 African Legal Support Facility, "Understanding Sovereign Debt: Options and Opportunities for Africa."

Text Box 8: Types of Bonds

Infrastructure bonds are debt instruments that help governments, utilities and other companies to raise resources to investment in infrastructure.

Catastrophe (CAT) bonds are debt bonds where the funds are used as collateral to provide quick liquidity in the case of a disaster. If no event occurs, the investors receive their investment plus interest. Catastrophe bonds are discussed in much greater detail in the Risk Transfer section, below.

Green (sustainability) bonds are conventional bonds issued for environment or sustainability projects. Typically, the green projects must generate returns for the investors, which could include government savings.⁶³

Blue bonds are inspired by green bonds. These government or development partner issued debt instruments support marine and ocean projects with positive environmental, as well as economic and climate-related, impacts.⁶⁴

Impact bonds (including Social Impact Bonds and Development Impact Bonds) link returns to outcomes. A type of result-based financing, impact bonds allow an investor to provide project resources that deliver positive social outcomes. Typically, investment returns will be funded by the government (or possibly an outside donor) dependent on positive project impacts.⁶⁵

Resilience bonds generate savings by reducing the risk-transfer premiums, often by reducing the risk of loss or damage.⁶⁶

Sovereign treasuries, local governments and municipalities, utilities and other companies may also issue infrastructure bonds for long-term recovery needs after an event. This ex-post financing instrument allows the bond issuers to borrow from bond holders, rather than directly from banks. For sovereign bonds, bonds may be issued in local currency,⁶⁷ although depending on the size of the economy, low income countries may need to issue foreign currency denominated bonds, which exposes them to foreign exchange risk and limits their ability to devalue domestic currency.⁶⁸ Interest rates for bonds may be lower than for credit, although this will depend on the sovereign (credit) rating⁶⁹ as well as the country's exposure to climate risk. Efforts to increase climate resilience may decrease the cost of issuing bonds (bond yields).⁷⁰

63 Mercy Corps, "Financing Flood Resilience: An Option To Avert Displacement - Study Brief"

64 Ray and Bisbey, "Financing Infrastructure in Asia through Bonds and Capital Markets."

65 Mercy Corps, "Financing Flood Resilience: An Option To Avert Displacement - Study Brief"

66 Mercy Corps.

67 Ray and Bisbey, "Financing Infrastructure in Asia through Bonds and Capital Markets."

68 African Legal Support Facility, "Understanding Sovereign Debt: Options and Opportunities for Africa."

69 Sheppard, "Capital Markets Financing for Developing-Country Infrastructure Projects."

70 Volz et al., "Climate Change and Sovereign Risk."

Development partners, such as development banks, may also issue bonds to help governments finance disaster response and recovery. For example, in early 2020 the African Development Bank raised USD 3 billion from a social impact bond “to help alleviate the economic and social impact the Covid-19 pandemic will have on livelihoods and Africa’s economies.”⁷¹

Humanitarian Assistance

Given difficulties in ex-ante planning and debt sustainability concerns, humanitarian assistance—including cash programming in emergencies—has been an important instrument for ex-post CDRF, particularly for highly indebted low income countries. Despite recent call for restructuring to make humanitarian assistance faster and more reliable,⁷² ex-post humanitarian assistance is often very slow and unreliable. At the same time, as mentioned in the discussion of traditional DRR funding above, humanitarian and development funding are increasingly being diverted to help fund climate commitments and only about half of climate finance can be considered additional.⁷³ Non-governmental organizations and UN agencies are increasingly exploring risk transfer instruments that would allow them and their partners to respond more quickly after an event. Examples include the ARC Replica programme and the Center Emergency Response Fund.⁷⁴ Other innovations allow donors to rapidly provide assistance to frontline non-governmental humanitarian workers, such as the IFRC’s Disaster Relief Emergency Fund.

Forecast-based Finance

FbF is a relatively new ex-ante instrument, although one not currently being used by government actors. The goal of FbF is to use forecasts of extreme weather events to allow early (pre-event, anticipatory) humanitarian action to be taken to save lives, reduce suffering and increase the cost-effectiveness of the response. In the case of the International Federation of Red Cross and Red Crescent Societies (IFRC), the Disaster Relief Emergency Fund supports the financing of FbF activities. The fund is available to all Red Cross and Red Crescent societies once they have completed an early action plan, predefining the actions they will take to save lives and livelihoods if an event is forecasted. IFRC establishes threshold triggers ahead of time, and when experts forecast an extreme weather event, the FbF is triggered and funding is released within as little of 24 hours.⁷⁵

71 African Development Bank, “African Development Bank Launches Record Breaking \$3 Billion ‘Fight COVID-19’ Social Bond.”

72 Clarke and Dercon, *Dull Disasters?*

73 Mitchell, Ritchie, and Tahmasebi, “Is Climate Finance Towards \$100 Billion ‘New and Additional’?”

74 United Nations Economic and Social Commission for Asia and the Pacific, “Opportunities for Regional Cooperation in Disaster Risk Financing.”

75 International Federation of the Red Cross and Red Crescent Societies, “Forecast-Based Financing: A New Era for the Humanitarian System.”

At the 2019 Climate Action Summit, the IFRC teamed up with the governments of Finland and the UK (along with other donors and partners) to launch the Risk-informed Early Action Partnership. In addition to scaling up early warning systems and protections for vulnerable communities from climate change impacts, the partnership aims to cover over one billion people with early action plans by 2025.⁷⁶ The UN Office for the Coordination of Humanitarian Affairs is also piloting anticipatory action in Bangladesh, Ethiopia and Somalia, using forecast triggers to release Center Emergency Response Fund resources.⁷⁷ While current FbF systems draw on existing funds, there is room for governments and non-governmental actors to experiment with different financing models, such as forecast-based insurance or credit.

Private Sector Responses

Sovereign and sub-national governments, as well as local communities and civil society organizations, should discuss with their private sector partners how those partners can help to manage disaster risk. Large sectors that are dependent on public infrastructure may be willing to agree ex-ante to help finance risk reduction or repair costs. Industries that are active in local communities have a responsibility and interest to help those communities manage risk. Regardless of the type of support, partnerships and agreements with private sector actors will be most beneficial if discussed and (to the extent possible) formalized ahead of an event.

CDRF Considerations

When designing a comprehensive CDRF strategy to help meet a country's DRM goals, there are several considerations that should be taken into account. These considerations will help identify the most appropriate instruments to fit the government's needs and support a country's financial resilience. As show in Figure 3, these considerations include 1) timeliness, 2) cost, 3) disbursal mechanisms, 4) risk layering, 5) risk information and 6) risk responsibility. The first three are related to the instruments themselves, and a solid understanding of these instrument attributes can contribute to the government's risk layering approach.

When designing a comprehensive CDRF strategy to help meet a country's DRM goals, there are several considerations that should be taken into account. These considerations will help identify the most appropriate instruments to fit the government's needs and support a country's financial resilience. As show in Figure 3, these considerations include 1) timeliness, 2) cost, 3) disbursal mechanisms, 4) risk layering, 5) risk information and 6) risk responsibility. The first three are related to the instruments themselves, and a solid understanding of these instrument attributes can contribute to the government's risk layering approach.

⁷⁶ UK Department for International Development, "Risk-Informed Early Action Partnership (REAP)."

⁷⁷ United Nations Office for the Coordination of Humanitarian Affairs, "UN Humanitarian Chief to Release up to \$ 140M in CERF Funds for Anticipatory-Action Projects."

Timeliness

There are two aspects of timeliness that are critical for financial resilience. The speed of the instrument (how long it takes funds to be made available) and the timing of the instrument (when in the response those funds will be needed, depending on whether they are for relief and emergency response, recovery, or longer term reconstruction). Rapid deployment of relief funds may save lives and decrease the amounts of recovery funds needed later. Reconstruction funding may be the largest needs in monetary terms, but those resources are not needed immediately, or even all at once. Considering the timeliness of various instruments is a critical aspect of financial resilience and risk layering.⁷⁸



Figure 3: CDRF Considerations

Cost

Each instrument has its own costs, and there are also opportunity costs whenever payments need to be made. Ex-ante costs of capital may be lower, but the opportunity costs may make these investments politically and fiscally challenging. The government's CDRF strategy needs to take a holistic view of public finance, and select the optimal mix of CDRF instruments to minimize capital costs while ensuring funds will be available when needed (timeliness).⁷⁹

Disbursal Mechanisms

The final consideration related to the instruments themselves is the disbursal mechanism. The disbursal process should be efficient and transparent in order to promote trust in government and the efficient use of CDRF funds. Many countries have policies regarding accountability and transparency for public funds,⁸⁰ and CDRF strategies should make it clear, ex-ante, how and when funds will flow from the Treasury to the responsible DRM, response, recovery and reconstruction ministries. The process of CDRF budget mobilization and execution promotes discipline in government financial planning, which can increase credibility and trust.⁸¹

78 World Bank Group, "Financial Protection Against Natural Disasters: An Operational Framework for Disaster Risk Financing and Insurance."

79 World Bank Group.

80 Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

81 World Bank Group, "Financial Protection Against Natural Disasters: An Operational Framework for Disaster Risk Financing and Insurance."

Risk Layering

Governments use the information from these instrument-specific considerations and select a combination of instruments that meet their needs to protect the government and population from events of different severity and frequency, making sure that resources are deployed in the most cost-effective and efficient way.⁸² Typically the risks related to high frequency, lower impact events should be retained. External risk finance is more appropriate for higher severity events. Given the costs, risk transfer tools are typically reserved for very high impact, low frequency events. Although often not explicitly included in conversations about risk layering, governments should assess where preventative and risk-reduction activities will provide long-term cost savings and invest appropriately.⁸³

Text Box 9: Risk Layering in Mexico

Mexico created the Fund for Natural Disasters (FONDEN) to support post-disaster reconstruction efforts without unduly constraining government budgets. The fund employs a risk-layering approach to support the Government of Mexico's disaster risk financing needs. For the highest frequency events, FONDEN originally implemented an annual budget allocation (contingency fund) from the federal budget. However, in 1999 this was replaced with a multi-year reserve fund, allowing for unused resources to accumulate.⁸⁴ For medium frequency and severity events, FONDEN can receive additional "exceptional" budget allocations. Low frequency but high severity events are managed through a risk transfer layer, including indemnity-based insurance and CAT bonds (for rare earthquake and named storm events). Finally, the highest severity events are retained by the Government of Mexico through "extraordinary" budget allocations.⁸⁵

Research has shown that the risk layering strategy of the government—incorporating both insurance and CAT bonds—is optimal and costs less than transferring the same risk through reinsurance alone.⁸⁶ FONDEN's most recent CAT bond was issued by the World Bank in 2020, covering earthquake and named storm risk for four years. The USD 485 million bond uses a parametric trigger and allows for proceeds to be used by the World Bank to finance development programs (making it a combined CAT and development bond).⁸⁷

The government has created operating guidelines to promote efficiency, accountability and transparency. As such, there is a clear process for accessing funds, including a disaster declaration, an assessment and request for funding, disbursement and implementation, and public reporting.⁸⁸

82 World Bank Group.

83 Schäfer and Waters, "Climate Risk Insurance for the Poor & Vulnerable: How to Effectively Implement the Pro-Poor Focus of InsuResilience."

84 Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

85 World Bank Group, "FONDEN: Mexico's National Disaster Fund."

86 Hårdle and López Cabrera, "Calibration of Parametric CAT Bonds. A Case Study of Mexican Earthquakes."

87 ARTEMIS, "Catastrophe Bond & Insurance-Linked Securities Deal Directory."

88 Organisation for Economic Cooperation and Development, *Disaster Risk Financing: A Global Survey of Practices and Challenges*.

Risk Information

Before any DRM or CDRF strategy can be developed, actors must have a clear understanding of the hazards, levels of exposure and vulnerability of different segments of the population. When possible, risk assessment should use an intersectionality lens, making sure to explore the how women and men prepare for and experience disasters differently, as well as how the power and marginalization of different groups impacts people's abilities to manage risk. Risk assessment must include information on loss and damage in order for decision makers to understand the true cost of the risk. This information is a critical input into CDRF strategy-building processes.⁸⁹

Additionally, risk information experts need to have a clear plan on how risk information will be communicated, both to governmental decision makers and also to the public. Providing information on how the public can manage these risks, along with clear information on the risks themselves, can promote risk understanding and preparedness.⁹⁰

Risk Responsibility

There are two components involved in assessing who holds responsibility for risk: risk ownership and risk-bearing capacity. For (national and local) governments, risk ownership involves establishing a clear understanding of potential direct losses, as well as contingent liabilities, guarantees and potential changes in the macroeconomic environment as a result of an event.⁹¹ It is also helpful for actors at all levels to understand their risk ownership (and for the government to communicate clearly in this regard) in order to incentivize risk management. For example, clear communication on the level of support households can expect to receive as a result of adaptive social protection programmes can increase ownership and facilitate planning and the micro level.⁹²

In addition to risk ownership, there is the question of risk-bearing capacity. While certain actors may own a particular risk, if they have a limited ability to bear that risk then the ultimate responsibility may fall on other actors. For example, local and other sub-national governments may own significant amounts of risk, but if they have few resources available to respond after an event (and people are unable to bear the risk themselves), the national government may ultimately be responsible for that risk (and unmet needs), unless the necessary risk transfer instruments are put in place ex-ante.⁹³

⁸⁹ World Bank Group, "Financial Protection Against Natural Disasters: An Operational Framework for Disaster Risk Financing and Insurance."

⁹⁰ Organisation for Economic Cooperation

⁹¹ Organisation for Economic Cooperation and Development.

⁹² World Bank Group, "Financial Protection Against Natural Disasters: An Operational Framework for Disaster Risk Financing and Insurance."

⁹³ Organisation for Economic Cooperation and Development, "Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework."

Given the specific challenges related to DRR and climate change, some risk reduction projects may require action from both the public and private sectors. Generally, PPPs reduce the barriers to private sector investment in risk reduction.⁹⁴ While historically the private sector component of PPPs for DRR has focused on the provision of expertise,⁹⁵ there is increasing focus on PPPs for large-scale infrastructure investment as the potential impacts of climate risk on infrastructure is increasingly appreciated by the private sector.⁹⁶

Enabling Environment

To achieve true financial resilience to disaster risk requires a larger agenda than integrating a CDRF strategy into government DRM plans and policies. The government must also create an enabling environment for CDRF at all levels by working across ministries, vertically with subnational and local governments, with the private sector and with communities and civil society. Given that families, communities and small businesses are typically reliant on remittances, informal mechanisms and savings and loans products to manage risk, a functional enabling environment is critical to their financial resilience. Within government, decision makers must mainstream the use of climate risk data and analysis into public financial management. Due to the crippling macroeconomic effects of climate shocks, government actors must work to diversify government revenue away from high-risk sectors while also aligning monetary practices with climate goals.⁹⁷

- The government also has a critical role to play in stimulating private CDRF markets.⁹⁸ The ADB has identified six axes of the enabling environment, depicted in Figure 4, to scale up disaster risk transfer products. These include:
 - focusing on government policy, by creating necessary (and well-coordinated) risk transfer and DRM regulations, tax incentives/subsidies, financial literacy and insurance mandates
 - ensuring economic conditions and other support functions that promote economic and insurance industry growth, increase access to financial services, and provide DRM capacity and risk data
 - securing product availability and affordability through incentivizing product creation as necessary (including business continuity cover), encouraging consumer-friendly products and services, promoting consumer awareness, mandating disaster risk insurance/reinsurance as necessary, and promoting the growth of capital market solutions

94 Watson et al., "Finance for Reducing Disaster Risk: 10 Things to Know."

95 Roeth, "Consultancy Project on the Development of a Public Private Partnership Framework and Action Plan for Disaster Risk Reduction (DRR) in East Asia."

96 United Nations, "Global Assessment Report on Disaster Risk Reduction."

97 Volz et al., "Climate Change and Sovereign Risk."

98 Cummins and Mahul, *Catastr. Risk Financ. Dev. Ctries.*

- growing the credibility of insurance and capital market stakeholders by strengthening the capacity and resources of regulators/supervisors, working with reliable rating agencies, publicly disclosing information on insurer performance, encouraging local risk retention where feasible, strengthening the capacity of and trust in local insurance and capital market agents, and facilitating the creation of guarantees funds to protect against insurer insolvency
- creating effective social protection policy, with a focus on nontransferable risks, and without pricing private insurers out of the market or carving out specific risks, while incentivizing the creation of microinsurance and/or Takaful products;
- managing competition to the formal sector from informal and unlicensed providers by creating strict criteria governing unlicensed competition, regulating unlicensed and foreign actors, raising public awareness, creating strong bankruptcy laws and anti-predatory pricing regulations, facilitating entry and competition in the insurance market while avoiding discriminatory tax treatment or crowding out private sector initiatives, and encouraging local risk retention.⁹⁹

Finally, in order to ensure that CDRF strategies and market-building efforts meet the needs of women and men in the population, including the most vulnerable and marginalized groups, the government should both engage and invest in civil society as part of their broader enabling environment activities. Civil society organizations have deep knowledge about the vulnerabilities, livelihoods and risk management strategies of women, low income households and excluded groups. They can provide insight on the tangible impacts of CDRF solutions and can support the tailoring and piloting of new initiatives.¹⁰⁰ By working with civil society and investing in strengthening their capacity, governments can jump-start the process of building an enabling environment where CDRF solutions and strategies build financial resilience holistically.

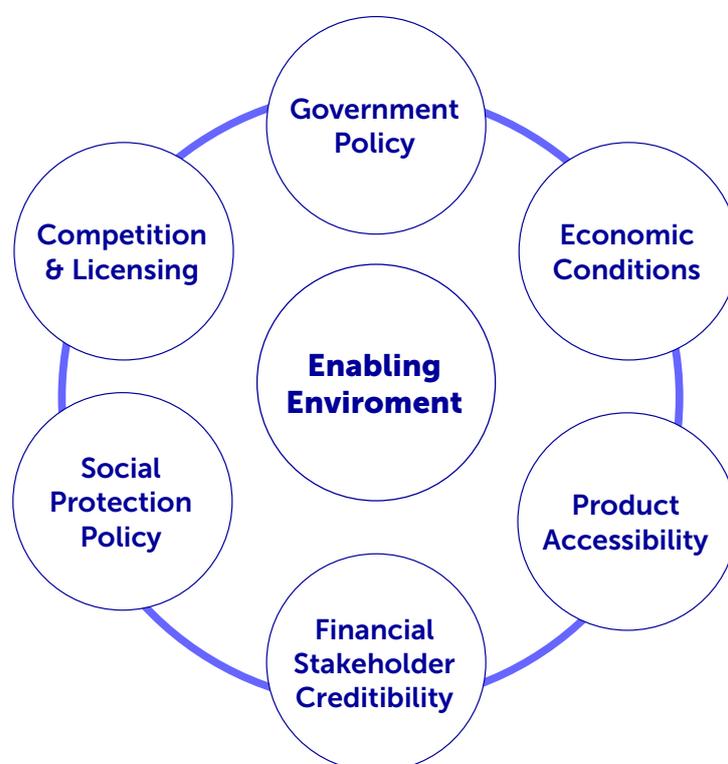


Figure 4: Enabling Environment

⁹⁹ Asian Development Bank, "Assessing the Enabling Environment for Disaster Risk Financing: A Country Diagnostics Tool Kit."

¹⁰⁰ Vaughan and Hillier, "Ensuring Impact: The Role of Civil Society Organisations in Strengthening World Bank Disaster Risk Financing."



Figure 5: The Integrated Climate Risk Management Cycle

Adaptation of GIZ/MCII 2017 figure

Annex 1: CDRF Instrument Examples

Table 1 provides examples of CDRF instruments from Asia and the Pacific. In addition to providing a brief introduction to the various products, the table also describes where the products fit into the Integrated Climate Risk Management (ICRM) cycle. The ICRM cycle, developed by MCII, builds on the traditional DRM cycle by incorporating risk transfer as a specific phase. The ICRM approach has five (5) phases, which are as follows: Prevention, Transfer, Preparedness, Response and Recovery. These phases can all be developed simultaneously and work best when all stakeholders are involved in the planning and implementation of the different steps. This is a constant process of planning, implementing, evaluating and adapting strategies and measures relating to the analysis, reduction and transfer of disaster risks. The process begins generally with the Prevention Phase. Figure 5 adapts the original MCII cycle slightly and explains the five phases of the ICRM approach.¹⁰¹

¹⁰¹ Munich Climate Insurance Initiative, "Increasing Resilience through Integrated Climate Risk Management (ICRM)."

CDRF Instrument	ICRM Cycle	Example
Government Revenue & Budget Allocation (including Ex-Ante Taxation)	Prevention, Preparedness	Fiji has set up an Environment & Climate Adaptation Levy to fund environmental, carbon-reducing and climate adaptation projects. The levy is a tax on prescribed services, items and income and is administered by the Ministry of Economy. The funds are used to support disaster relief and response, meteorology services, rural development, cyclone rehabilitation, urban development, agricultural development, sustainable resource management, infrastructure development, energy conservation, and environmental conservation. ¹⁰²
Bonds (excluding Cat Bonds)	Prevention, Preparedness, Recovery	Fiji issued a sovereign green bond in 2017 to close its climate-resilient development resourcing gap. The approximately USD 50 million bond was one of the first issued by an emerging market country. Over 90% of the bond proceeds focus on adaptation projects. ¹⁰³
Traditional DRR, Development, and Climate Finance	Prevention, Preparedness	In 2020, the Cook Islands received a USD 10 million loan from the ADB for their Disaster Resilience Program to support the government's their disaster risk management activities. ¹⁰⁴ In Vanuatu, the National Green Energy Fund was launched in 2018 to support financial and non-financial intermediaries in the provisioning of affordable, sustainable energy. The fund was created with the support of the Global Green Growth Initiative and with the intention of attracting capitalization from the Green Climate Fund. ¹⁰⁵
Sovereign Risk Insurance	Transfer	PCRIC is a regional sovereign risk pool that was designed to increase the financial resilience of Pacific Island countries by improving their capacity to meet post-disaster funding needs. During the pilot phase (2013-2015), PCRIC provided sovereign risk insurance to Cook Islands, the Marshall Islands, Samoa, Solomon Islands, Tonga and Vanuatu. Tonga received a USD 1.27 million in 2014 following Tropical Cyclone Ian and Vanuatu received a USD 1.9 million payout in 2015 following Tropical Cyclone Pam. ¹⁰⁶
Public Assets Insurance	Transfer	In 2019, Indonesia implemented the State Assets Insurance Policy Phase II. This Property All Risk coverage includes earthquake, volcano, tsunami, flood, typhoon, landslide and terrorism and insures government buildings that provide public services and governance tasks, such as office buildings, education buildings and hospitals. ¹⁰⁷
Microinsurance	Transfer	The Pacific Financial Inclusion Programme has helped over two million low-income Pacific Islanders access formal financial services and financial education. In 2017, PFIIP worked with FijiCare to launch a bundled microinsurance product that includes term life, funeral expenses, personal accident and fire coverage. An annual combined cover limit of about USD 5000 costs only USD 25, or about one Fijian dollar per week. ¹⁰⁸
CAT Bonds	Transfer	The Philippines sponsored a CAT bond with annual coverage of USD 206 million for protection of national government assets against earthquakes and severe typhoons, and USD 390 million in protection against severe typhoons for 25 local government units in 2018. ¹⁰⁹ In late 2019, the Philippines sponsored a new three-year cat bond.
FbF	Preparedness, Response	In 2017, the International Federation of Red Cross and Red Crescent Societies developed Early Action Protocols for the Philippines in collaboration with the Philippine Red Cross. Those protocols covered typhoons and floods in 22 provinces of the Philippines, allowing FbF recipients to strengthen shelters ahead of typhoons, evacuate of livestock and harvest crops, and temporarily relocate small business stocks ahead of urban flooding. Starting in 2019 the project was expanded to also include drought. ¹¹⁰
Contingency and Reserve Funds	Preparedness, Response, Recovery	The Tuvalu Climate Change and Disaster Survival Fund is a nationally driven and nationally owned fund that provides a sustainable, predictable and accessible source of finance for Climate Change and Disaster Risk Management activities. ¹¹¹ Tonga's emergency fund was established in June 2008. An appropriation up to USD 2.79 million can be placed into the fund in any fiscal year. The fund is able to accrue, and the resources are used exclusively for the purpose of providing timely and efficient relief and reconstruction following an emergency. ¹¹²
Extrabudgetary Funds	Response, Recovery	While some Pacific Islands countries, including Tonga, Tuvalu, and Kiribati, have long-term dedicated national funds to help absorb the financial costs of climate change and disaster-related losses (see above), other Pacific countries have more general sovereign wealth funds—to manage revenue from non-renewable sources, revenue windfalls, and donor contributions—that can be drawn upon in the event of an emergency. ¹¹³ In the wake of Tropical Cyclone Winston in 2016, the Fiji government allowed pre-retirement pension withdrawals as a way to smooth consumption and rebuild assets. Pension fund members were allowed to withdraw up to around USD 3,000 as long as it was within the cumulative cap on withdrawals of 30% of the total. About 180,000 applications were approved and the average amount withdrawn was about USD 750. Vanuatu has also allowed early withdrawals; in the aftermath of Cyclone Pam, 40,000 members were allowed to withdraw up to 20% of their retirement savings. ¹¹⁴

102 Munich Climate Insurance Initiative, "Increasing Resilience through Integrated Climate Risk Management (ICRM)."

103 Ministry of Economy of Fiji, "The Fiji Sovereign Green Bond: 2019 Update."

104 Asian Development Bank, "Cook Islands: Disaster Resilience Program (Phase 2)."

105 Pacific Islands Forum, "Pacific Experiences with Options Relevant to Climate Change and Disaster Risk Finance."

106 World Bank Group, "Pacific Catastrophe Risk Insurance Pilot - From Design to Implementation."

107 World Bank Group, "SEADRIF Knowledge Series – Financial Protection of Public Assets."

108 Pacific Financial Inclusion Programme, "The Road to Launching 'Bundled Micro Insurance' in Fiji – Key Lessons."

109 Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, "The Landscape of Climate and Disaster Risk Insurance (CDRI) in South and Southeast Asia and Oceania."

110 Philippine Red Cross, "August 2020 FbF NEWSMAGAZINE."

111 Pacific Islands Forum, "Pacific Experiences with Options Relevant to Climate Change and Disaster Risk Finance."

112 World Bank Group, "PCRAFI Country Note Tonga."

113 Pacific Islands Forum, "An Overview of Climate and Disaster Risk Financing Options for Pacific Islands Countries"; Le Borgne and Medas, "Sovereign Wealth Funds in the Pacific Island Countries : Macro-Fiscal Linkages."

114 Ramachandran and Masood, "Are the Pacific Islands Insurable? Challenges and Opportunities for Disaster Risk Finance."

CDRF Instrument	ICRM Cycle	Example
Budget Reallocation and Realignment	Response, Recovery	Governments often realign budgets for a variety of reasons. In the Solomon Islands, for example, there are three options for acquiring additional funds to facilitate response activities. 1) Transfer funds between accounts within an agency, which requires approval of the head of agency and the minister of finance. 2) Seek a contingency warrant, subject to cabinet approval and in the event that the contingency warrant allocated for that financial year is depleted. 3) Request a supplementary budget allocation from the contingency warrant. According to the Public Financial Management Bill, the finance minister may seek supplementary appropriations when an urgent and unforeseen need has arisen, and the cabinet has granted its approval. ¹¹⁵
Ex-Post Taxation	Response, Recovery	After Tropical Cyclone Evan, Fiji provided a tax incentive (a 200% tax deduction) on donations for to the "Prime Minister's Fund" (the National Disaster Relief and Rehabilitation Fund) to help finance the recovery. ¹¹⁶ After the Great East Japan Earthquake in 2011, Japan issued Japanese Government Bonds to finance the reconstruction costs. The repayment costs of those were mostly financed by an increase in income and per capita local tax with a duration of 25 years starting in 2013. ¹¹⁷
Contingent Credit/Cat DDO	Response, Recovery	The ADB in 2018 approved USD 24 million of catastrophe triggered contingent disaster financing for Pacific islands the Federated States of Micronesia, the Marshall Islands, Solomon Islands and Tonga. Disbursements are triggered when a state of disaster or emergency is declared by the respective government, allowing them to pay out very quickly. This follows a contingent credit drawdown from the ADB in 2018 by Tonga following Tropical Cyclone Gita. ¹¹⁸
Disaster Response Banking Instruments	Response, Recovery	In 2015, Tuvalu was hit by tropical cyclone Pam, resulting in over USD 10 million in damages and threatening Tuvalu's long-term fiscal sustainability. The World Bank's IDA committed USD 3 million through the Crisis Response Window to help reduce fiscal pressure and to assist infrastructure reconstruction. ¹¹⁹
Disaster Risk Finance Facilities	Response, Recovery	In 2020, the World Bank's Pandemic Emergency Financing Facility provided Fiji with a USD 1 million grant from its insurance fund to allow Fiji to strengthen its health system in the context of the COVID-19 crisis. This was in addition to a USD 6.4 million concessional IDA loan. ¹²⁰

115 World Bank Group, "PCRAFI Country Note Solomon Islands."

116 World Bank Group, "PCRAFI Country Note Fiji."

117 Sato and Boudreau, "The Financial and Fiscal Impacts."

118 ARTEMIS, "ADB Provides Catastrophe Triggered Financing for Pacific Islands."

119 World Bank Group, "IDA17 Mid-Term Review: Update on IDA's Crisis Response Window."

120 World Bank Group, "COVID-19: World Bank Boost for Fiji's Health Sector."

References

African Development Bank. "African Development Bank Launches Record Breaking \$3 Billion 'Fight COVID-19' Social Bond." News and Events, 2020. <https://www.afdb.org/en/news-and-events/press-releases/african-development-bank-launches-record-breaking-3-billion-fight-covid-19-social-bond-34982>.

African Legal Support Facility. "Understanding Sovereign Debt: Options and Opportunities for Africa." Abidjan, Côte d'Ivoire, 2019. [https://www.aflsf.org/sites/default/files/resources/2019-05-31 Understanding Sovereign Debt Eng. v10.pdf](https://www.aflsf.org/sites/default/files/resources/2019-05-31%20Understanding%20Sovereign%20Debt%20Eng.%20v10.pdf).

African Risk Capacity. "Government of Senegal to Receive a Minimum of US \$22m from the African Risk Capacity Insurance Company Limited for Drought." News, 2019. <https://www.africanriskcapacity.org/2019/09/05/government-of-senegal-to-receive-a-minimum-of-us22m-from-the-african-risk-capacity-insurance-company-limited-for-drought/>.

Al-Amri, Khalid. "Introduction to Takaful Insurance: Opportunities and Challenges." In Gulf Actuarial Society, 2015. <https://www.actuaries.org.uk/system/files/field/document/23112015 - GAS Introduction to Takaful Insurance.pdf>.

Allen, Richard, and Dimitar Radev. "Extrabudgetary Funds," 2010. <https://www.imf.org/external/pubs/ft/tnm/2010/tnm1009.pdf>.

ARTEMIS. "ADB Provides Catastrophe Triggered Financing for Pacific Islands," 2019. <https://www.artemis.bm/news/adb-provides-catastrophe-triggered-financing-for-pacific-islands/>.

— — —. "Catastrophe Bond & Insurance-Linked Securities Deal Directory," 2021. <https://www.artemis.bm/deal-directory/>.

— — —. "What Is a Catastrophe Bond (or Cat Bond)?" 2021. <https://www.artemis.bm/library/what-is-a-catastrophe-bond/>.

Asian Development Bank. "Assessing the Enabling Environment for Disaster Risk Financing: A Country Diagnostics Tool Kit." Manila, Philippines, June 1, 2020. <https://doi.org/10.22617/TCS200190-2>.

— — —. "Contingent Disaster Financing under Policy-Based Lending in Response to Natural Hazards." Manila, Philippines, 2019.

— — —. “Cook Islands: Disaster Resilience Program (Phase 2).” Accessed April 28, 2021. <https://www.adb.org/projects/50212-002/main#project-pds>.

— — —. “Economic and Fiscal Impacts of Disasters in the Pacific.” Manila, Philippines, April 2018. <https://doi.org/10.22617/TCS189300-2>.

— — —. “Philippine City Disaster Insurance Pool: Rationale and Design.” Manila, Philippines, December 2018. <https://doi.org/10.22617/TIM189799-2>.

— — —. “Regional: Pacific Disaster Resilience Program, Phase 3.” Accessed April 28, 2021. <https://www.adb.org/projects/50028-003/main>.

Borgne, Eric Le, and Paulo Medas. “Sovereign Wealth Funds in the Pacific Island Countries : Macro-Fiscal Linkages.” IMF Working Paper, 2007. <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Sovereign-Wealth-Funds-in-the-Pacific-Island-Countries-Macro-Fiscal-Linkages-21519>.

Bouhia, Rachid, and Emily Wilkinson. “Small-Island Developing States Need Urgent Support to Avoid Debt Defaults,” 2021. https://odi.org/en/insights/small-island-developing-states-need-urgent-support-to-avoid-debt-defaults/?utm_content=buffercc244&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer.

Bouriaux, Sylvie, and Richard MacMinn. “Securitization of Catastrophe Risk: New Developments in Insurance-Linked Securities and Derivatives.” *Journal of Insurance Issues* 32, no. 1 (2009): 1–34.

Clarke, Daniel J., and Stefan Dercon. “Beyond Banking: Crisis Risk Finance and Development Insurance in IDA19.” IDA19, 2019. https://static1.squarespace.com/static/5c9d3c35ab1a62515124d7e9/t/5cac9980e79c709b3c4458f6/1554815366372/Paper_4_Beyond_Banking.pdf.

— — —. *Dull Disasters?* New York: Oxford University Press, 2016. <https://doi.org/10.1093/acprof:oso/9780198785576.001.0001>.

Cole, Shawn, Gautam Gustav Bastian, Sangita Vyas, Carina Wendel, and Daniel Stein. “The Effectiveness of Index-Based Micro-Insurance in Helping Smallholders Manage Weather-Related Risks.” 2012. <http://eppi.ioe.ac.uk>.

Cummins, J. David, and Olivier Mahul. *Catastrophe Risk Financing in Developing Countries. Catastrophe Risk Financing in Developing Countries*. Washington, DC: World Bank, 2009. <https://doi.org/10.1596/978-0-8213-7736-9>.

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH. “The Landscape of Climate and Disaster Risk

Insurance (CDRI) in South and Southeast Asia and Oceania." Makati City, 2020. <https://mefin.org/docs/GIZ-Climate-and-Disaster-Risk-Insurance-CDRI-Landscape-Study.pdf>.

Filkova, Monica, Camille Frandon-Martinez, and Amanda Giorgi. "Green Bonds: The State of the Market 2018." *Climate Bonds Initiative*, 2019. <https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Public-research-resources/CBIGBMFinal032019-120319.pdf>.

Fingleton, Jim. "Funding Options for Agricultural Development: The Case for Special Purpose Levies." *FAO Legal Papers*. FAO Legal Papers. Rome, 2005. <http://www.fao.org/3/a-bb077e.pdf>.

Fuller, Frances, Luis Zamarioli, Bianka Kretschmer, Adelle Thomas, and Laetitia De Marez. "Debt for Climate Swaps: Caribbean Outlook." *Climate Analytics Briefing Papers*, 2018. https://climateanalytics.org/media/debt_for_climate_swap_impact_briefing.pdf.

Global Risk Financing Facility. "Literature Review of Evidence on Disaster Risk Finance," 2021. https://www.globalriskfinancing.org/sites/default/files/2021-01/MEL_Lit_Review.pdf.

Green Climate Fund. "Financial Terms and Conditions of the Fund's Instruments." In *GCF/B.09/08, Meeting of the Board, 24-26 March 2015, Songdo, Republic of Korea, Agenda Item 10*, 2015. <https://www.greenclimate.fund/document/gcf-b09-08>.

Härdle, Wolfgang Karl, and Brenda López Cabrera. "Calibration of Parametric CAT Bonds. A Case Study of Mexican Earthquakes." *Schmollers Jahrbuch* 128, no. 4 (December 2008): 615–30. <https://doi.org/10.3790/schm.128.4.615>.

Hurley, Gail. "Financing for Development and Small Island Developing States: A Snapshot and Ways Forward." 2015. [https://sustainabledevelopment.un.org/content/documents/2181\(UNDP & OHRLS 2015\) Financing for development and SIDS A snapshot and ways forward.pdf](https://sustainabledevelopment.un.org/content/documents/2181(UNDP%20&%20OHRLS%202015)%20Financing%20for%20development%20and%20SIDS%20A%20snapshot%20and%20ways%20forward.pdf).

Insurance Development Forum. "IDF Practical Guide to Insuring Public Assets," 2019. [https://www.insdevforum.org/sites/default/files/2019_09_IDF Practical Guide to Insuring Public Assets -LR.pdf](https://www.insdevforum.org/sites/default/files/2019_09_IDF_Practical_Guide_to_Insuring_Public_Assets_LR.pdf).

Inter-American Development Bank. "Contingent Lending Instruments." Inter-American Development Bank. Washington, DC, 2016. <https://www.ecgnet.org/sites/default/files/Corporate-Evaluation-Contingent-Lending-Instruments.pdf>.

International Federation of the Red Cross and Red Crescent Societies. "Forecast-Based Financing: A New Era for the Humanitarian System," 2019. https://www.forecast-based-financing.org/wp-content/uploads/2019/03/DRK_Bro

schuere_2019_new_era.pdf.

Martinez-Diaz, Leonardo, and Lauren Sidner. "Confronting Simultaneous Climate, Public Health, and Economic Shocks in Developing Countries." WRI Commentary, 2021. <https://www.wri.org/news/confronting-simultaneous-climate-public-health-and-economic-shocks-developing-countries>.

Meenan, Conor, John Ward, and Robert Muir-Wood. "Disaster Risk Finance: A Toolkit," 2019. https://indexinsurancceforum.org/sites/default/files/Publikationen03_DRF_ACRI_DINA4_WEB_190617.pdf.

Mercy Corps. "Financing Flood Resilience: An Option To Avert Displacement - Study Brief." London, 2019. https://www4.unfccc.int/sites/SubmissionsStaging/Documents/201901151715---MercyCorps_ResilienceFinancingBrief.pdf.

Ministry of Economy of Fiji. "ECAL in Action: How Your Environment and Climate Adaptation Levy Is Building a Better, Stronger Fiji." Suva, 2018. <http://www.economy.gov.fj/images/Budget/budgetdocuments/relateddocs/Environment-and-Climate-Adaptation-Levy.pdf>.

— — —. "The Fiji Sovereign Green Bond: 2019 Update." Suva, 2019. <https://www.rbf.gov.fj/wp-content/uploads/2020/03/Fiji-Sovereign-Green-Bond-Impact-Report-2019.pdf>.

Mitchell, Ian, Euan Ritchie, and Atousa Tahmasebi. "Is Climate Finance Towards \$100 Billion 'New and Additional'?" CGD Policy Paper. Washington, DC, 2021. <https://www.cgdev.org/sites/default/files/PP205-Mitchell-Ritchie-Tahmasebi-Climate-Finance.pdf>.

Munich Climate Insurance Initiative. "Increasing Resilience through Integrated Climate Risk Management (ICRM)," 2018. https://climate-insurance.org/wp-content/uploads/2020/05/ACRI_ICRM_Factsheet_final.pdf.

Organisation for Economic Cooperation and Development. "Climate-Resilient Infrastructure." OECD Environment Policy Paper, 2018. <http://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>.

— — —. "Disaster Risk Assessment and Risk Financing: A G20/OECD Methodological Framework," 2012. <https://www.oecd.org/gov/risk/g20oecdframeworkfordisasterriskmanagement.htm>.

— — —. *Disaster Risk Financing: A Global Survey of Practices and Challenges*. Paris: OECD Publishing, 2015. <https://doi.org/10.1787/9789264234246-en>.

Paavola, Jouni, and Eeva Primmer. "Governing the Provision of Insurance Value From Ecosystems." *Ecological*

Economics 164 (October 2019). <https://doi.org/10.1016/j.econ.2019.06.001>.

Pacific Financial Inclusion Programme. "The Road to Launching 'Bundled Micro Insurance' in Fiji – Key Lessons," 2018. <http://www.pfip.org/wp-content/uploads/2018/01/PFIP-FOCUS-NOTES19118.pdf>.

Pacific Islands Forum. "An Overview of Climate and Disaster Risk Financing Options for Pacific Islands Countries," 2021.

— — —. "Pacific Experiences with Options Relevant to Climate Change and Disaster Risk Finance." Suva, 2018.

Philippine Red Cross. "August 2020 *FbF NEWSMAGAZINE*:" *FbF NEWSMAGAZINE*, August 2020. <https://www.forecast-based-financing.org/wp-content/uploads/2020/09/FbF-News-Magazine-2020-by-Philippine-Red-Cross.pdf>.

Ramachandran, Vijaya, and Junaid Sadiq Masood. "Are the Pacific Islands Insurable? Challenges and Opportunities for Disaster Risk Finance." CGD Working Paper. Washington, DC, 2019. https://www.cgdev.org/sites/default/files/WP516-Ramachandran-Are-The-Pacific-Islands-Insurable_0.pdf.

Ramm, Gaby, Kehinde Balogun, Matthias Range, and Maxime Souvignet. "Integrating Insurance into Climate Risk Management: Conceptual Framework, Tools and Guiding Questions: Example from the Agricultural Sector," 2019. <https://united-nations-university.foleon.com/publications/intro/intro/>.

Ray, Shubhomoy, and Jyoti Bisbey. "Financing Infrastructure in Asia through Bonds and Capital Markets." *Journal of Infrastructure, Policy and Development* 4, no. 1 (April 7, 2020): 87–120. <https://doi.org/10.24294/jipd.v4i1.1168>.

Roeth, Helen. "Consultancy Project on the Development of a Public Private Partnership Framework and Action Plan for Disaster Risk Reduction (DRR) in East Asia." Hong Kong, 2009. <https://www.undrr.org/publication/development-public-private-partnership-framework-and-action-plan-disaster-risk>.

Sato, Motohiro, and Laura Boudreau. "The Financial and Fiscal Impacts." Washington, DC, 2012. <http://documents1.worldbank.org/curated/en/501091468044672910/pdf/793960BRI0drm000Box377374B00Public0.pdf>.

Schäfer, Laura, and Eleanor Waters. "Climate Risk Insurance for the Poor & Vulnerable: How to Effectively Implement the Pro-Poor Focus of InsuResilience," 2016. https://i.unu.edu/media/ehs.unu.edu/news/11862/RZ_G7_MCCI_DinA4_6Seiter151201.pdf.

Sheppard, Robert. "Capital Markets Financing for Developing-Country Infrastructure Projects." DESA Discussion

Paper Series, 2003. <https://www.un.org/esa/esadp28.pdf>.

Slany, Anja. "Multiple Disasters and Debt Sustainability in Small Island Developing States." UNCTAD Research Paper, 2020. https://unctad.org/system/files/official-document/ser-rp-2020d14_en.pdf.

Spearing, Michelle. "IDA's Crisis Response Window: Learning Lessons to Drive Change." IDA19, 2019. https://static1.squarespace.com/static/5c9d3c35ab1a62515124d7e9/t/5d9db406d1d15b27de921d58/1570616479892/Paper_3_IDAs_Crisis_Response_Window.pdf.

Tax Policy Center. *Briefing Book: A Citizen's Guide to the Fascinating (Though Often Complex) Elements of the Federal Tax System*, 2018. <https://www.taxpolicycenter.org/briefing-book>.

UK Department for International Development. "Risk-Informed Early Action Partnership (REAP)," 2019. <http://www.globalresiliencepartnership.org/wp-content/uploads/2019/09/REAP-two-pager-230819.pdf>.

United Nations. "Global Assessment Report on Disaster Risk Reduction," 2013. <https://www.preventionweb.net/english/hyogo/gar/2013/en/home/index.html>.

United Nations Economic and Social Commission for Asia and the Pacific. "Opportunities for Regional Cooperation in Disaster Risk Financing." Bangkok, 2018. https://www.unescap.org/sites/default/files/ESCAP_Opportunities_Regional_Cooperation_DRF_2018.pdf.

United Nations Office for the Coordination of Humanitarian Affairs. "UN Humanitarian Chief to Release up to \$ 140M in CERF Funds for Anticipatory-Action Projects." News & Updates, 2020. <https://www.unocha.org/story/un-humanitarian-chief-release-140m-cerf-funds-anticipatory-action-projects>.

Vaughan, Ann, and Debbie Hillier. "Ensuring Impact: The Role of Civil Society Organisations in Strengthening World Bank Disaster Risk Financing." IDA19, 2019. https://static1.squarespace.com/static/5c9d3c35ab1a62515124d7e9/t/5cacb235971a185e7818c61b/1554821697405/Paper_5_Ensuring_Impact_The_Role_Of_Civil_Society_Organisations.pdf.

Volz, Ulrich, John Beirne, Natalie Ambrosio Preudhomme, Adrian Fenton, Emilie Mazzacurati, Nuobu Renzhi, and Jeanne Stampe. "Climate Change and Sovereign Risk." London, Tokyo, Singapore, and Berkeley, CA, 2020. <https://doi.org/https://doi.org/10.25501/SOAS.00033524>.

Watson, Charlene, Alice Caravani, Tom Mitchell, Jan Kellett, and Katie Peters. "Finance for Reducing Disaster Risk:

10 Things to Know." London, 2015. www.odi.org/sendai-2015-new-global-agreement-disaster-risk-reduction.

World Bank Group. "Advancing Disaster Risk Financing and Insurance in ASEAN Member States: Framework and Options for Implementation." Washington, DC, 2012. <http://documents.worldbank.org/curated/en/2012/04/16541964/advancing-disaster-risk-financing-insurance-asean-member-states-framework-options-implementation-vol-2-2-technical-appendices>.

—. "Catastrophe Insurance Programs for Public Assets — Operational Framework." Washington, DC, 2020. <https://openknowledge.worldbank.org/bitstream/handle/10986/34440/Catastrophe-Insurance-Programs-for-Public-Assets-Operational-Framework.pdf?sequence=1&isAllowed=y>.

—. "COVID-19: World Bank Boost for Fiji's Health Sector," 2020. <https://www.worldbank.org/en/news/press-release/2020/06/25/covid-19-coronavirus-world-bank-boost-for-fijis-health-sector>.

—. "Disaster Risk Insurance Platform: Insurance Solutions for World Bank Clients," 2020. <http://pubdocs.worldbank.org/en/179781581013532050/World-Bank-Treasury-FABBK-Disaster-Risk-Insurance-Platform-Brochure-FINAL.pdf>.

—. "Financial Protection Against Natural Disasters: An Operational Framework for Disaster Risk Financing and Insurance." Washington, DC, 2014. <https://openknowledge.worldbank.org/handle/10986/21725>.

—. "Financial Protection of Critical Infrastructure Services." Washington, DC, 2021. [https://www.financialprotectionforum.org/sites/default/files/Financial Protection of Critical Infrastructure Services_March9_2021.pdf](https://www.financialprotectionforum.org/sites/default/files/Financial%20Protection%20of%20Critical%20Infrastructure%20Services_March9_2021.pdf).

—. "FONDEN: Mexico's National Disaster Fund," 2013. <https://openknowledge.worldbank.org/bitstream/handle/10986/22417/FONDEN000Mexic0isaster0expenditures.pdf?sequence=1&isAllowed=y>.

—. "IBRD Catastrophe Deferred Drawdown Option (Cat DDO)," 2018. <http://pubdocs.worldbank.org/en/526461507314946994/product-note-cat-ddo-ibrd-2018.pdf>.

—. "IDA Catastrophe Deferred Drawdown (Cat DDO)," 2018. <http://pubdocs.worldbank.org/en/526461507314946994/product-note-cat-ddo-ibrd-2018.pdf>.

—. "IDA Terms." Washington, DC, 2018. http://ida.worldbank.org/sites/default/files/pdfs/ida_terms_effective_july_01_2018.pdf.

— — —. "IDA17 Mid-Term Review: Update on IDA's Crisis Response Window," 2015. <http://documents1.worldbank.org/curated/ar/758611468185349932/pdf/100994-BR-PUBLIC-Box393254B-IDA-SECM2015-0223.pdf>.

— — —. "IDA18 Mid-Term Review Crisis Response Window: Review of Implementation," 2018. <http://documents1.worldbank.org/curated/en/537601542812085820/pdf/ida18-mtr-crw-stocktake-10252018-636762749768484873.pdf>.

— — —. "Pacific Catastrophe Risk Insurance Pilot - From Design to Implementation." Washington, DC, 2015. https://reliefweb.int/sites/reliefweb.int/files/resources/Pacific_Catastrophe_Risk_Insurance-Pilot_Report_140715%281%29.pdf.

— — —. "PCRAFI Country Note Fiji." Washington, DC, 2015. <https://www.gfdr.org/sites/default/files/publication/country-note-2015-pcrafi-fiji.pdf>.

— — —. "PCRAFI Country Note Solomon Islands." Washington, DC, 2015. <https://openknowledge.worldbank.org/bitstream/handle/10986/21693/949830WP0P13240Note0Solomon0Islands.pdf?sequence=1&isAllowed=y>.

— — —. "PCRAFI Country Note Tonga." Washington, DC, 2015. <http://documents1.worldbank.org/curated/en/251921468291332622/pdf/949860WP0Box38000Country0Note0Tonga.pdf>.

— — —. "SEADRIF Knowledge Series – Financial Protection of Public Assets." Financial Protection Forum, 2020. <https://www.financialprotectionforum.org/seadrif-knowledge-series-financial-protection-of-public-assets>.

— — —. "World Bank Group Development Solutions for Disaster Risk Finance: Sustainable Solutions for Financial Protection." Washington, DC, 2015. <http://pubdocs.worldbank.org/en/717471507314907949/brief-wbg-financial-solutions-diaster-risk-finance-20150909.pdf>.

Published online May 2021.



This publication is brought to you by the United Nations University Institute for Environment and Human Security (UNU-EHS) as part of its work under the Pacific Insurance and Climate Adaptation Programme being implemented jointly with the United Nations Capital Development Fund (UNCDF) and the United Nations Development Programme (UNDP). Included in the Programme is the “Developing Climate Disaster Risk Financing Framework and Parametric Insurance in Fiji” project, supported by the India-UN Development Cooperation Fund. The Munich Climate Insurance Initiative (MCII) is hosted by UNU-EHS. Jennifer Denno Cissé (UNU-EHS/MCII) is the author of this report.



Many people provided review and input into this report. The author would like to thank colleagues at MCII and UNCDF, as well as the members of Risk Financing Working Group of the Pacific Resilience Partnership.

Supported by the Governments of New Zealand, India and Australia.



© 2021 United Nations University Institute for Environment and Human Security

The views expressed in this publication are the author(s) alone and are not necessarily the views of the New Zealand Aid Programme, the Australian Government, the Indian Government, the United Nations—including UNCDF, UNDP, or UNU-EHS—or their member states.