



# REPORT

## CLIMATE RISK ADAPTATION AND INSURANCE

REDUCING VULNERABILITY AND SUSTAINING THE LIVELIHOODS  
OF LOW-INCOME COMMUNITIES

A HANDBOOK FOR POLICY AND DEVELOPMENT PRACTITIONERS  
IN THE CARIBBEAN



hosted at



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*Project consortium*



**UNITED NATIONS UNIVERSITY  
INSTITUTE FOR ENVIRONMENT AND HUMAN SECURITY  
(UNU-EHS)**

**REPORT No. 13**

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# Climate Risk Adaptation and Insurance

Reducing Vulnerability and  
Sustaining the Livelihoods of  
Low-Income Communities

A Handbook for Policy and  
Development Practitioners in  
the Caribbean

# Foreword

The Caribbean region is highly exposed to natural hazards and the increased stress placed on human and natural systems which is arising as a result of a variable, changing climate. There is sufficient evidence to indicate an increase not just in the frequency, but also in the intensity of extreme weather events; there is thus, an urgent need for policy makers, practitioners and decision makers in the region to develop adequate responses to address the adverse impacts of climate change.

Climate risk insurance has the potential to be a viable risk transfer instrument that can cushion people against the adverse impacts of extreme weather events. It can provide vulnerable communities with access to financial safety nets, where previously none may have existed. It can also offer low-income individuals access to alternate coping strategies thereby giving them a pathway out of a life of social and financial exclusion.

The Climate Risk Adaptation and Insurance in the Caribbean project has developed parametric weather index-based insurance solutions that can adequately address the needs of vulnerable, low income communities. Developed under the aegis of this project, the goal of this handbook is to impart a better understanding of climate risk insurance and the role it can play in reducing social vulnerability and poverty in affected populations.

By including climate risk insurance in their arsenal of tools, policy makers and practitioners can realize the benefits of insurance such as protecting livelihoods, preserving human and social capital.

There is a need for continued support to achieve the following:

- Develop the market for climate risk insurance;
- Strengthen the linkages between climate risk insurance and disaster risk reduction measures to realize disaster risk management and adaptation co-benefits
- Harness the scaling-up potential to drive the co-benefits of the approach for policy priorities like food and livelihood security in the Caribbean.

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*This Document has been produced in the context of the Climate Risk Adaptation and Insurance in the Caribbean project.*

*Time-frame:* 2011–2014  
*Countries:* Jamaica, St. Lucia, Belize, Grenada, Guyana  
*Beneficiaries:* Low-income individuals, financial institutions  
*Goal:* Managing and transferring risks associated with extreme weather events



# About the project

The Climate Risk Adaptation and Insurance in the Caribbean project seeks to address climate change, adaptation and vulnerability by promoting weather-index based insurance as a risk management instrument in the Caribbean. The project has developed two parametric weather-index based risk insurance products aimed at low-income individuals and lending institutions exposed to climate stressors.

## Project goals

The objective of the Climate Risk Adaptation and Insurance in the Caribbean project is to help target countries increase social resilience and incentivize sustainable adaptation measures by incorporating climate risk insurance within a broader framework of disaster risk reduction strategies. The overarching goals of the project are:

- To support the development of weather-related risk management solutions, including insurance;
- To support the development of public-private insurance solutions so that financial support is extended to the most vulnerable groups;
- To demonstrate the value of a regional risk pooling instrument in climate change adaptation and risk management.

## Focal region: the Caribbean

The Caribbean is susceptible to a number of natural hazards including droughts, floods and hurricanes, which due to climate change have been increasing in both frequency and intensity.

These disasters severely impair economic growth in the Caribbean because of its reliance on climate vulnerable sectors such as tourism and agriculture.

## Policy implications

Central to the project's agenda is its role in the transfer of learning and experience to further North-South, as well as South-South exchange by:

- Informing policymakers on approaches to loss avoidance and reduction;
- Highlighting the role of international organizations in promoting regional approaches to adaptation; and
- Deepening the debate within the international climate policy negotiations on addressing loss and damage and the role of insurance in this regard.

## Project consortium

The Munich Climate Insurance Initiative (MCII) – hosted at the United Nations University Institute for Environment and Human Security (UNU-EHS) – leads the Climate Risk Adaptation and Insurance in the Caribbean project ([http://www.climate-insurance.org/front\\_content.php?idart=3585](http://www.climate-insurance.org/front_content.php?idart=3585)). The project is implemented by MCII together with its partners, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), MicroEnsure and Munich Re. Funding for the project has been provided by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) under the International Climate Initiative.





# Abbreviations and acronyms

BMU	<i>Federal Ministry for the Environment, Nature Conservation and Nuclear Safety</i>
BMZ	<i>Federal Ministry for Economic Cooperation and Development</i>
Cat DDO	<i>Catastrophe Deferred Drawdown Option</i>
CCRIF	<i>Caribbean Catastrophe Risk Insurance Facility</i>
COP	<i>Conference of the Parties</i>
DRM	<i>Disaster Risk Management</i>
DRR	<i>Disaster Risk Reduction</i>
ECA	<i>Economics of Climate Adaptation</i>
UNECLAC	<i>United Nations Economic Commission for Latin America and the Caribbean</i>
FONDEN	<i>Fondo de Desastres Naturales (Natural Disaster Fund), Mexico</i>
GDP	<i>Gross Domestic Product</i>
GFDRR	<i>Global Facility for Disaster Reduction and Recovery</i>
IIASA	<i>International Institute for Applied Systems Analysis</i>
IPPC	<i>Intergovernmental Panel on Climate Change</i>
LPC	<i>Loan Portfolio Cover</i>
LPP	<i>Livelihood Portfolio Policy</i>
MCII	<i>Munich Climate Insurance Initiative</i>
MPCI	<i>Multi-Peril Crop Insurance</i>
MSMEs	<i>Micro-, Small- and Medium-Sized Enterprises</i>
NCF	<i>National Calamity Fund, Philippines</i>
NPCI	<i>Named Peril Crop Insurance</i>
OECS	<i>Organisation of Eastern Caribbean States Secretariat</i>
PIK	<i>Potsdam Institute for Climate impact Research</i>
SBI	<i>Subsidiary Body for Implementation</i>
SMS	<i>Short Message Service</i>
UNFCCC	<i>United Nations Framework Convention on Climate Change</i>
UNISDR	<i>United Nations International Strategy for Disaster Reduction</i>
UNU-EHS	<i>United Nations University Institute for Environment and Human Security</i>







# Module 1

## Climate risks in the Caribbean

### Climate change in the Caribbean

Caribbean countries share inherent vulnerabilities and common challenges despite their diverse geological and topographical characteristics. With certain variations, they can be characterised as small, open economies that are largely dependent on the service industries and natural resources, with varying levels of poverty and inequality, low levels of social protection, significant cross-border international migratory flows and marked levels of social exclusion that require a deepening of mechanisms for civic engagement (ECLAC, 2011).

These are societies facing serious challenges in the interaction between the human population and the environment that sustains them, an underlying stress that is being exacerbated by climate change, the projected manifestations of which include rising sea levels and an increased frequency and ferocity of extreme weather events, especially hurricanes and tropical storms.

The structure of their economies also make these countries particularly vulnerable to natural hazards, which result in widespread destruction of the productive economy and, even more disastrously, of the capital stock. The region's tourism, agriculture, forestry and fisheries sectors; water resources; and human rights are considered to be most vulnerable to damage from climate change. Such interruptions to the production of goods and services prove devastating in an environment where a few large sectors (e.g., agriculture and tourism) dominate the economic landscape. According to the World Bank, the aggregate economic losses incurred by the small island states of the Caribbean Basin as a result of storms over the period 1979–2005 are estimated at US\$613 million annually (Ghesquiere and others, 2013). Climate variability, as manifested by changing and unpredictable weather patterns, already represents a major challenge to development plan-

ners in the Caribbean. The Inter-Governmental Panel on Climate Change (IPCC) in its seminal report in 2007 indicated that human health in the Caribbean, especially among vulnerable, low-income populations, will be seriously affected by reduced food security, increased rates of infectious diseases, extreme weather events and an altered distribution of some disease vectors such as those related to malaria and dengue fever (IPCC, 2007). Thus, climate change will have social costs both at the household and macroeconomic level. The absence of economic safety nets which could cushion the adverse impact of these climate-related disasters remains a serious concern.

### Exposure of the Caribbean to weather- and climate-related risks

Understanding the impact and forecasting losses from climate change can be difficult tasks given the complex linkages between environmental, social and economic systems and the fact that in some instances the impact itself is intangible, thereby making it difficult to quantify the full extent of losses. Despite this, it is important that strategies are employed and developed to quantify, where appropriate, the losses resulting from climate change. This will provide a greater depth to the understanding of the local impact and chart a path for possible adaptation options.

Within the insurance and reinsurance industry, probabilistic models are used to determine expected losses from given events. This approach is built upon analysing hazard frequencies and severity in conjunction with the concentration of assets. Such an approach provides an option which can be used to understand a location's total climate risk.

As expected, predictions about the future climate are fraught with uncertainties given the complexity of the phenomena. To account for these, decision makers have to plan for different climate change scenarios and factor in varying degrees of losses. A total climate change risk approach can provide important guidance by assessing the total losses that a community is likely to face today and in the future under various climate change scenarios. It considers a continuation of today's weather patterns, projected asset values at risk and additional climate change.

#### Box 1a: Hurricane Ivan: A case for safeguarding small Caribbean countries from climatic risks

As indicated in earlier sections, the impact of meteorological events on Caribbean countries is significant whereby a single event such as a hurricane has the potential to cause catastrophic losses. The experience of Grenada after Hurricane Ivan in 2004 provides a clear demonstration of the devastating impacts of hurricanes, which are expected to become more severe as a result of climate change.

Hurricane Ivan had a measurable impact in eight different countries (Netherlands Antilles, Cuba, Aruba, Jamaica, Grand Cayman, Grenada, Mexico and the United States). The loss to Grenada alone was calculated at US\$800 million, about two times the country's GDP, of which government losses accounted for about 30 per cent (World Bank, 2008). In the Cayman Islands, direct losses reached 138 per cent of GDP with the overall economic impact significantly higher. Although the figures for Jamaica (8 per cent of GDP) and the Bahamas (7 per cent of GDP) were lower, they nonetheless represented a significant economic burden (World Bank, 2008). Of course, the expectation that these types of severe events will become more frequent is of great concern for the developing small island states of the Caribbean. Because of their small size and limited borrowing capacity, Caribbean countries have limited economic resilience to disasters. Unlike larger countries that can generally absorb the impact of adverse natural events and an affected area that can be subsidised by revenues from unaffected regions, this type of geographic distribution of risk is not an option for the small island states of the Caribbean. Their limited borrowing capacity also hinders their ability to access loans, preventing them from spreading their risk over time (World Bank, 2008).

**Box 1b: Financial vulnerability to a hurricane:  
the case of Grenada and Hurricane Ivan**

At the same time as additional resources to finance relief, clean-up and emergency rehabilitations were required, Grenada experienced a dramatic decline in revenues. The revenue shortfall was an estimated 5 per cent of GDP between September and December 2004. The government, which had only limited reserves, faced serious problems financing the public service bill, including salaries and the continuation of key services. It also became evident that the country would not be able to meet its debt obligations as they fell due.

In an effort to secure the necessary resources to continue functioning, the government sought donor assistance in the reconstruction of the island and in helping it meet its expense liabilities (e.g., imports and civil servant salaries). Despite over US\$150 million in pledges, only US\$12 million was available to address the immediate liquidity needs. The remainder of the funds pledged was earmarked for reconstruction projects that were implemented over the following two years. In addition to the requested donor assistance, the government also sought the cooperation of its creditors by developing a proposal to restructure over 85 per cent of its commercial debt. The final effort of the government to address its revenue shortfall was to pass revenue-enhancing measures yielding over 2 per cent of GDP. These included (i) an increase of about 45 per cent in the retail price of fuel; (ii) an increase in excise taxes on alcohol and tobacco; (iii) a special levy on incomes over US\$375 per month for a five-year period; and (iv) improved tax administration.

Despite all these efforts, Grenada's fiscal situation remained challenging and the country still faced a financing gap of 4.5 per

cent of GDP for 2005 with total debt projected to increase to 150 per cent of GDP. Furthermore, instead of focusing on recovery and reconstruction, the government was distracted by the need to finance the emerging resource gap. This led to delays in the recovery and reconstruction processes.

According to Freeman and others (2003) and as demonstrated by the experience of Grenada, the consequences of natural hazards go beyond the direct costs associated with physical damage. They are also typically associated with (i) a worsening of the fiscal position as governments pay for reconstruction and sources of revenue are disrupted; (ii) a worsening of the trade balance as the exporting capacity is hampered and imports for reconstruction surge; (iii) downward pressure on the exchange rate due to the worsening of the trade balance and concerns about the repayment capacity of the government among international investors; and (iv) inflationary pressures. Therefore, the total impact on the budget widely exceeds the direct costs of relief and reconstruction from disasters. These are all consequences which the governments of the Caribbean countries have been faced with in the aftermath of disasters and the resulting impact, which is itself separate and apart from the significant social and environmental disruption that often ensues.

Despite these challenging circumstances, the Caribbean countries have nevertheless made significant strides over the years to cope with the impact of natural hazards and have made substantive attempts to address issues around adapting to the impact of climate change. These attempts have ranged from campaigns aimed at raising public awareness of and knowledge about direct investments in risk reduction measures and also innovation in the development of financial instruments to help manage climate risks.

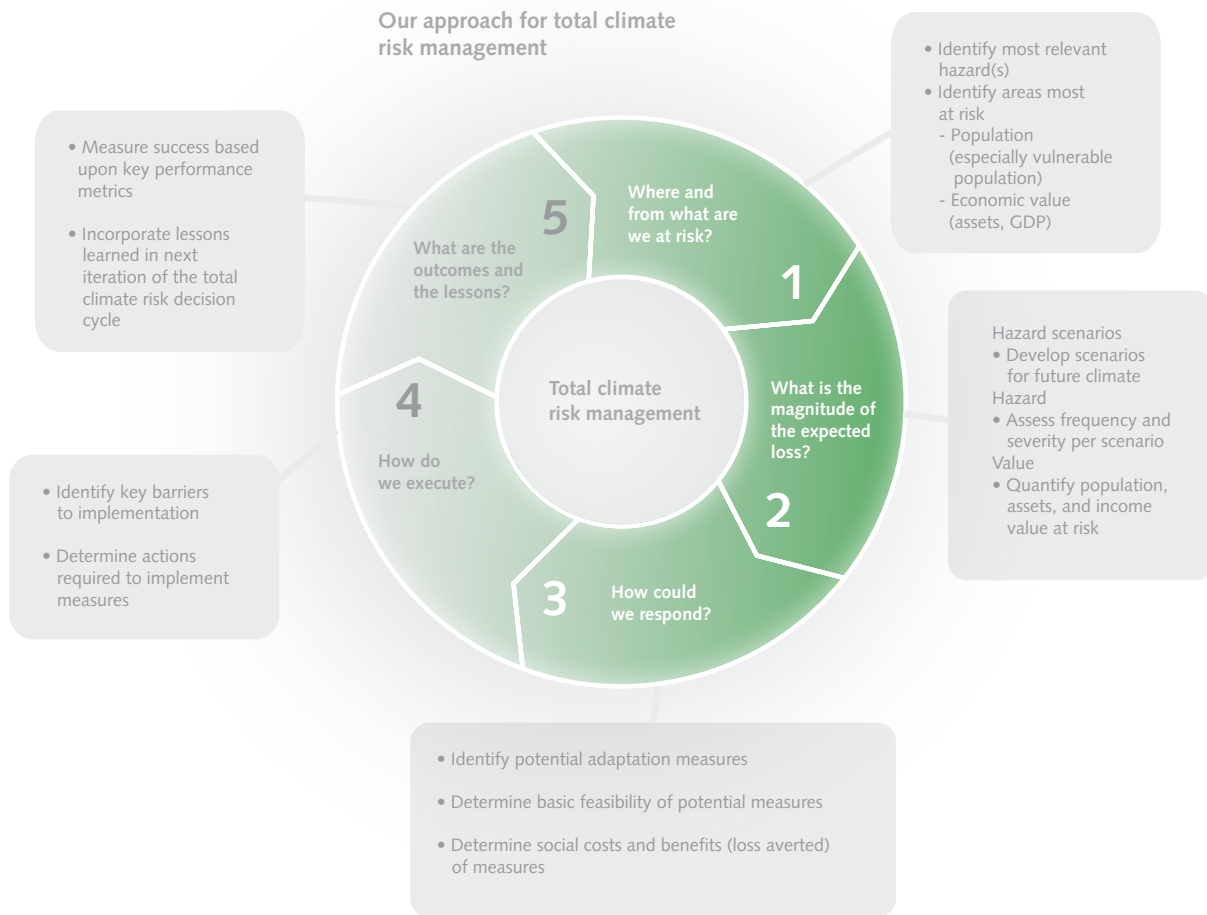


Figure 1: Framework of the Economics of Climate Adaptation study.

Source: Adapted from CCRIF 2011.



### Findings from the Caribbean Economics of Climate Adaptation (ECA) study

In 2010, Caribbean Catastrophe Risk Insurance Facility (CCRIF) initiated the groundbreaking Economics of Climate Adaptation (ECA) study in the Caribbean (see Figure 1). This initiative sought to provide the facts and tools required to develop quantitative adaptation strategies that can be incorporated into national development plans to increase resilience against climate hazards.

The foundation of the study was built around two elements:

- A baseline risk assessment, providing transparency on current and future expected losses from climate risks for three climate scenarios. The baseline assessment of the future risk is based on the concept of total climate risk, i.e., the total future risk that could arise from adding the effects of climate change and economic growth to the current risk level; and,
- An assessment of adaptation measures that could be taken, including an analysis of the expected costs and benefits of risk mitigation and transfer measures.

There were several key regional findings which came out of the CCRIF ECA project. One of these included the fact that the damage potential under current climatic and economic conditions is already high, with annual expected losses totalling up to 6 per cent of gross domestic product (GDP) in some countries in the Caribbean. This economic damage is comparable in scale to the impact of a serious economic recession, but on an ongoing basis. Further findings from the study are elaborated upon in Box 2.

## Box 2: Findings from the CCRIF Economics of Climate Adaptation (ECA) study in the Caribbean

The expected loss from climate risks considered varies significantly across pilot countries, ranging from 1 per cent of GDP in Antigua and Barbuda to 6 per cent of GDP in Jamaica (see Figure 2). Such differences are driven by a diverse set of factors, including:

- topography/exposure to coastal hazards;
- the economic significance of particularly vulnerable sectors (e.g., residential assets, which are typically less well protected against climate hazards); and
- location (e.g., in “Hurricane Alley”).

### Expected loss from climate risk today and in 2030 % of GDP

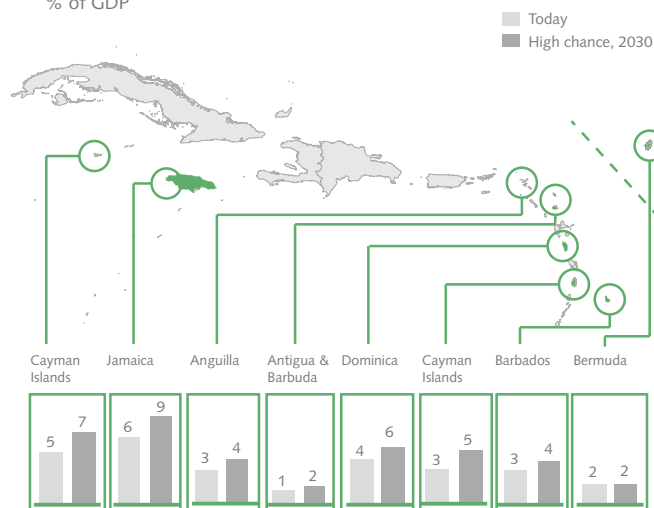


Figure 2: Expected loss from climate risks today and in 2030.

Source: Adapted from CCRIF 2011.

Among the hazards considered, hurricane-induced wind damage has the largest damage potential, accounting for up to 90 per cent of the overall damage. The contribution of coastal flooding and/or storm surge to total damage is higher in low-lying countries.

There is also a considerable difference between the risk profile of smaller and larger countries. Larger countries are more likely to be hit by a strong hurricane by virtue of the area they cover, although hurricanes have a lower relative impact. Smaller countries are hit more rarely on average, but with a more devastating effect.

Some countries can avoid up to 90 per cent of the expected damage by implementing cost-effective adaptation measures. Numerous measures are available to decision makers to respond to the potentially increasing threat of climate change. These responses can be clustered into two main groups:

1. Risk mitigation: Risk mitigation responses are adaptive measures aimed at reducing the damage. They include asset-based responses (e.g., dikes, retrofitting buildings) and behavioural measures (e.g., enforcing building codes).
2. Risk transfer: Risk transfer solutions, such as catastrophe risk insurance, are adaptation measures aimed at limiting the financial impact for people affected by distributing the risk to other players in the market. Risk transfer solutions are particularly effective in the case of low-frequency and high-severity events. Risk transfer mechanisms are based on transferring part of the risk to a third party (e.g., an insurance and/or reinsurance company or the capital market), and include both traditional insurance products and alternative risk transfer instruments (e.g., catastrophe, or cat bonds).

## Managing climate risks in the Caribbean: making the link to UNFCCC negotiations

Within the UNFCCC negotiations, there has been recognition of the need to strengthen international cooperation and expertise in order to understand and reduce the loss and damage associated with the adverse effects of climate change, including the impact related to extreme weather events and slow onset events.

By 2007 the IPCC 4th Assessment Report and other scientific and policy discussions had firmly laid the case for the need for mitigation to be accompanied by adaptation in the UNFCCC process. This realization contributed to discussions about the need for adaptation finance, and activities that would help countries (particularly those most vulnerable to the negative impacts of climate change) to adapt.

Thus by the 2007 COP in Bali, Indonesia, an action plan emerged to include adaptation in what was at the time planned to be a road towards an internationally binding agreement before the end of the 1st commitment period of the Kyoto Protocol. The principle of “common but differentiated responsibility” emphasized that every country – whether Annex 1 or Non-Annex 1, whether industrialized or developing – had a role in addressing adaptation.

Although the Bali Action Plan contained an entire section about (disaster) risk management and loss and damage associated with climate change, possible association with compensation or liability was a cause for discomfort for industrialized Parties. Some Parties tried to subsume this section into other sections, cut it from the discussions, and otherwise avoid discussions related to proposals around compensation for loss and damage. This strategy required delicate steps, as adaptation in the lead up to Bali subsequently gained momentum, particularly among many Parties of G-77 and China whose agreement would be necessary later in matters related to the larger hoped-for legally binding

agreement that was planned to be concluded in Copenhagen at COP15. It was intended that adaptation would receive funding, and the principle of common but differentiated responsibilities was repeatedly invoked. Parties suspicious of “compensation” may have wanted to maneuver the issue of loss and damage out of the process; however, they needed to build consensus with the mass of countries that are anticipated to experience loss and damage in the future.

By the Copenhagen climate talks (Dec. 2009), leaders of industrialized countries pledged resources “approaching” 30 billion USD for fast-track financing by 2012, and 100 billion USD per annum from 2020 onwards. The issue was how to move away from the compensation/liability strand of discussion to other framing of adaptation which would be in harmony with the emerging institutional infrastructure around climate finance and governance.

At COP16 in Cancun, Mexico, the Conference of the Parties of the UNFCCC outlined a framework for countries and regions to enhance knowledge about, coordinate policy, and facilitate action on adaptation to climate change. Paragraph 14 of that decision lists a series of themes and issues that can be pragmatically undertaken by governments to find solutions for adjusting to climatic stressors. The issues listed under the auspices of the Cancun Adaptation Framework may qualify for adaptation funding in the future. Climate risk management, including risk assessment, risk reduction, risk transfer including insurance, and complementary measures like early warning systems feature notably. The Cancun Adaptation Framework also created the SBI work program on loss and damage, including the possibility of creating an international mechanism to address these negative climate impacts.

At the 17th Conference of the Parties (COP17) in Durban, negotiators reached consensus on the elements of the Subsidiary Body for Implementation (SBI) Work Programme on Loss and Damage from COP17 to 18th Conference of the Parties (COP18) (2012).





The Durban decision listed the following three thematic areas for consideration until COP19, in 2013:

- Assessing the risk of loss and damage associated with the adverse effects of climate change and current knowledge;
- A range of approaches to address loss and damage associated with the adverse effects of climate change, including the impact related to extreme weather events and slow onset events, taking into consideration experiences at all levels; and
- The role of UNFCCC in enhancing the implementation of approaches to address the loss and damage associated with the adverse effects of climate change.

In November 2013, at COP19 in Warsaw, the Warsaw International Mechanism was established to promote the implementation of appropriate approaches to address loss and damage in a comprehensive and integrated manner – particularly where loss and damage pushes society to reexamine current ways of thinking and managing climate risks.

For countries and communities already experiencing loss and damage, what will be essential for them in the coming years is whether this new mechanism can:

- Contribute to new ways of viewing the climate change challenge (new paradigms unlock new ways of addressing challenges),
- Mobilize resources and capacity to help these countries, and
- Find ways to prevent disruptive climate shocks from driving vulnerable areas even further away from their development goals.

The Warsaw International Mechanism creates the space and opportunity in the coming three years to create an evidence base that support the determination of: what can be done to help vulnerable communities when they face barriers and limits to adaptation? How can that understanding be channeled back into effective policy and practice at the appropriate level? And how can that understanding also contribute to the wider policy adjustments that are part of the 2015 milestone year to align policy priorities with 21st century realities.

It is, therefore, expected that the experiences of the Caribbean in managing its climate risk will be able to feed into UNFCCC processes; as opportunities for countries within the region to learn from the practices of others will emerge.





# Module 2

## Risk management: key concepts and components

### Climate resilient development

As climate change continues to have a drastic and significant impact at the individual, community and state level, practical measures need to be implemented by countries to improve their resilience through an enhancement of their ability to recover from and adjust to current and future climate risks. The process of applying these measures to help society manage climatic risks is referred to as “climate resilient development”.

As the expenses associated with large-scale disasters increase, national development goals are threatened. Furthermore, an increased frequency and severity of disasters can also result in decreased food-, water- and human security, which, if left unchecked, can lead into a downward spiral into poverty (Anderson, 2011). Climate resilient development, therefore, requires an integrated planning process. Applying risk management strategies to understand and manage the risks associated with current and future climate hazards represents a practical and tangible step towards adaptation to climate change.

The approach recommended by the Global Facility for Disaster Reduction and Recovery (GFDRR) to building resilience and adapting to climate change is found in Figure 3 (GFDRR, 2011). According to GFDRR, it is important to build resilience now in order to better adapt to the changing climate. Thus, a number of initiatives to achieve this end are proposed:

- Enhancement of institutional and policy coordination at the level of individual countries, regions and global institutions. This would involve the development of an approach for integrating disaster risk reduction, climate change adaptation and poverty reduction;
- Identification and measurement of risks stemming from disasters and climate change. This would involve development and utilization of tools and guidelines to assess common country risks from natural hazards and the impacts of climate change;
- Integration of disaster and climate change risk analysis into national planning processes. This would involve the development of medium-term disaster risk management programmes incorporating climate risk management;
- Factoring disaster risk reduction and climate change adaptation into key sectors. This would involve developing and incorporating evidence-based policy inputs into development policy and poverty reduction initiatives which are cross-sectoral;
- Capacity-building at the local, national, regional and global levels. This would involve the strengthening of in-country capacity to assess disaster and climate risks for climate resilient recovery.

According to the United Nations International Strategy for Disaster Reduction (UNISDR, 2010), measures to address exposure to loss and damage as a result of climate change could include:

- Pre-disaster preparedness measures, including early warning systems, community evacuation plans, food and water storage programmes, backup plans for critical infrastructure and energy, etc., to aid better awareness of what to do when a disaster occurs;

- Risk reduction measures such as flood protection, soil restoration, terracing, enforcement of appropriate building codes, retrofitting schools, hospitals and other infrastructure to make it more resilient to disaster shocks, moving human activities out of the path of disasters, etc. Although these measures can be costly and sometimes require new ways of going about economic activities, studies indicate that the benefits can outweigh the costs by several times. In addition to this, risk reduction measures can be combined with risk transfer tools such as insurance, social safety nets, contingency funds, etc., to ensure that countries, communities and people have the necessary and timely resources in the event that a disaster does strike (Warner and others, 2009a; 2009b; 2010);
- Emergency response measures include the effective implementation of evacuation plans, administering emergency relief to affected populations, etc. These measures tend to be very expensive (such as providing clean water, tents, medical care and other services) and often are implemented at great cost by humanitarian organizations. Frequently, only particularly large disasters result in the international provision of emergency response measures, leaving communities that experience smaller but devastating events without help. However, these measures have the benefit of providing help for the period of time immediately following an extreme event;
- Post-disaster rehabilitation measures include rebuilding damaged infrastructure (bridges, roads and buildings) and restoring normal economic and social activities (markets, telecommunications, etc.). Post-disaster rehabilitation measures provide an opportunity to “rebuild right” and build in disaster risk reduction measures and other ways of avoiding or reducing future loss and damage. These measures are often financed by international financial institutions and can be costly, and sometimes a lack of sufficient resources can result in a failure to rebuild at all.



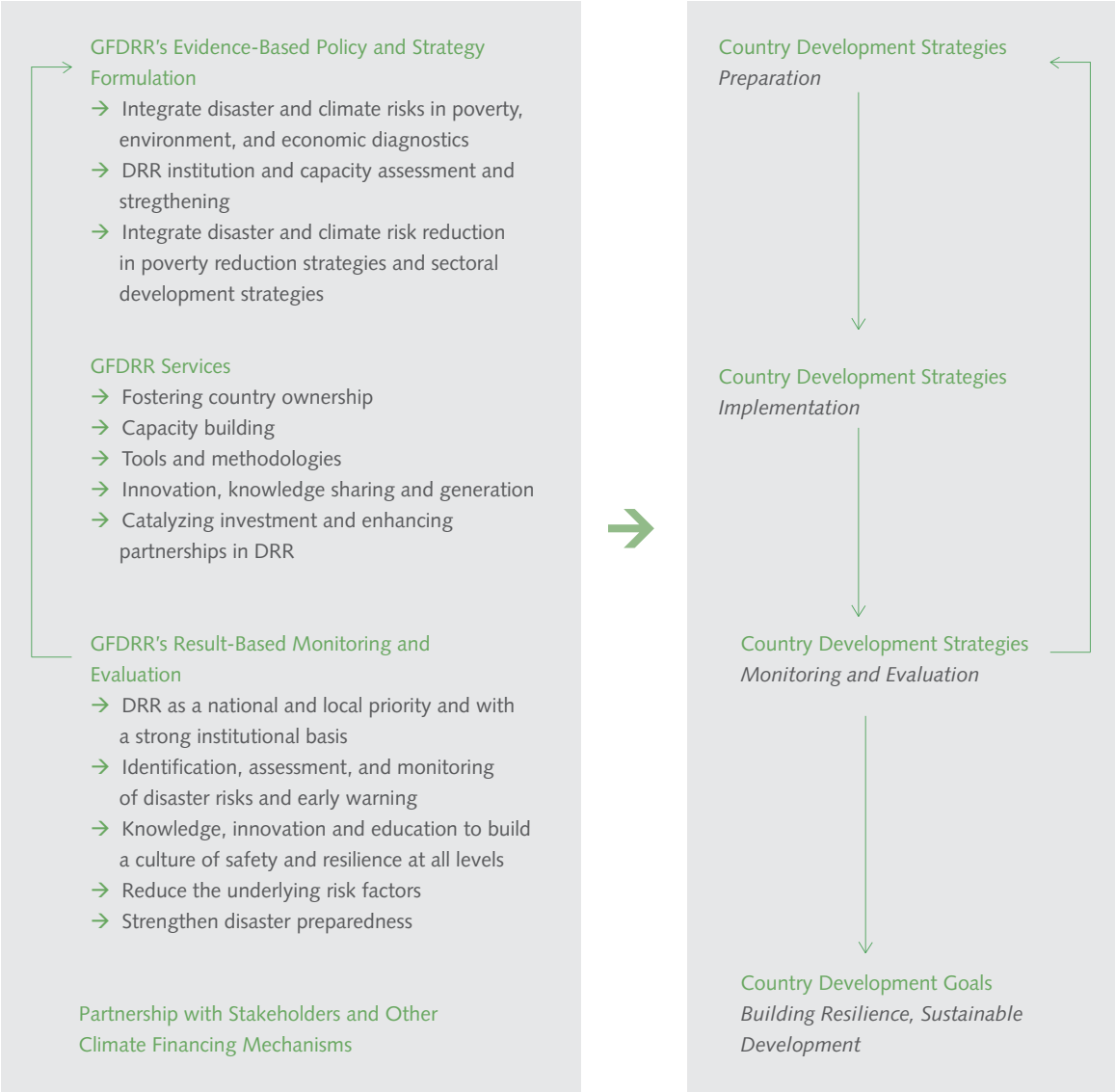


Figure 3: GFDRR approach to building resilience and adapting to climate change. Source: Adapted from GFDRR 2011.

## Introduction to risk management: key concepts and components

Given the complexity of climate change, adapting to its impacts will not only require responding to the physical effects, but will also require adapting the way we conceptualise, measure and manage risks. Given the increasing impact of natural hazards, especially on highly exposed developing countries such as those in the Caribbean, the need for risk management as an alternative to a purely post-disaster response is imperative.

Risk management is a structured approach to managing uncertainty by identifying, measuring and minimizing the effect of uncertain events on systems and their resources. The risk management process encompasses a wide range of concepts, and solutions are aimed at the adequate prevention, preparedness, restoration and risk financing for the government and society when a disaster occurs. All risk management approaches generally include these four stages: identification, assessment, mitigation and adaptation.

The implementation of an efficient risk management process requires a long-term horizon which has a short-term view when addressing climatic hazards, and creating different risk management techniques can diminish the overall long-term effects. It is important for policymakers and stakeholders to prioritize having long-term and sustained progress when addressing climate change and the effects it will have on the government, communities and individuals. It is also important to create and increase awareness of the risks of climate change, not only at the citizen and private sector level, but also at the sovereign level.

Figure 4 provides a brief summary of the major components of a risk management framework and includes programmes to better identify risks, reduce the impact of adverse events and strengthen emergency services.

## Risk identification and assessment

This is the starting point and an essential aspect of risk management. In order to create a framework that will adequately manage climate change, it is important to have a thorough understanding of the risks that will arise.

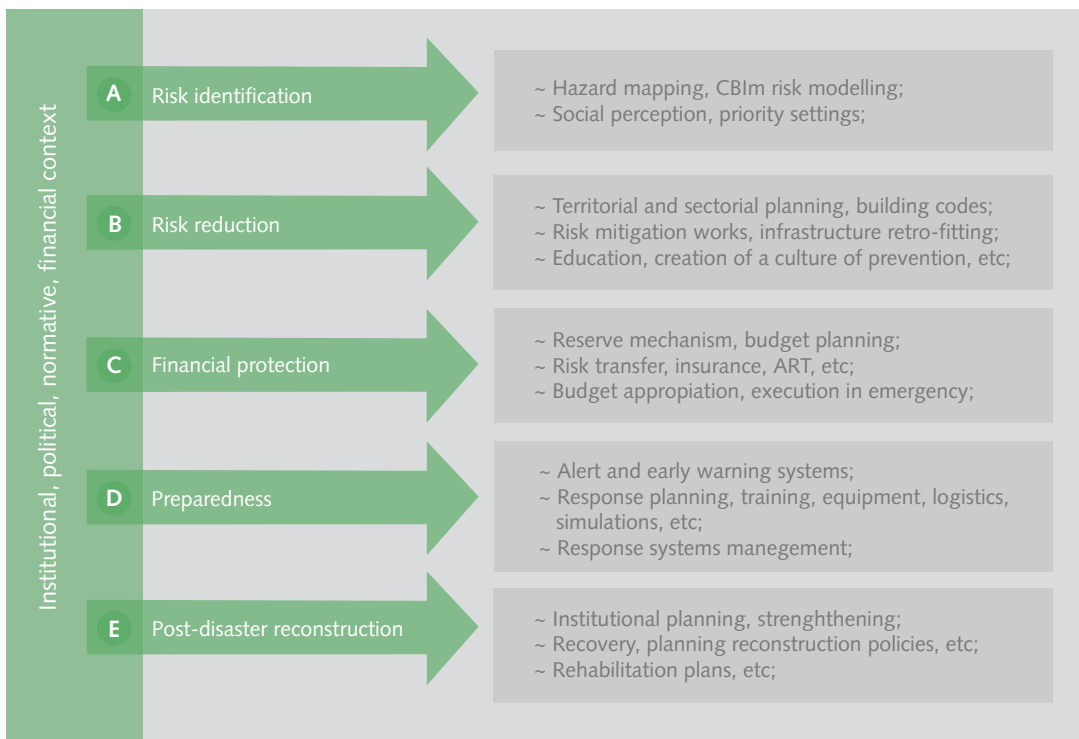
Risk identification and assessment include analysing the current climate-induced hazards, projecting the frequency and intensity of their future occurrence and investigating the socio-economic vulnerability of potentially exposed elements.

This stage of the risk management process involves creating awareness of the identified risks and constantly reviewing the changing risk landscape. Risk identification and assessment should be used by governments (as well as businesses and citizens) to guide decision-making, to provide insight into the root causes of risks and to provide increasingly useful information in the design of more resilient development processes and programmes.

## Risk reduction and/or mitigation

Risk reduction and/or mitigation measures are aimed at reducing the vulnerability to specific hazards, thereby reducing the damage and physical impact associated with natural catastrophes and climate change.

Strategies include asset-based responses (such as dikes and retrofitting buildings) and behavioural measures (such as enforcing planning regulations and building codes). As was indicated earlier in this document, a study on the economics of climate adaptation conducted by CCRIF in 2010 for a number of Caribbean countries showed that risk reduction measures can cost-effectively avert up to 90 per cent of the expected loss in 2030 under a high climate change scenario in some countries (CCRIF, 2010).



*Figure 4: Summary of the risk management process.*

*Source: Ghesquiere and Mahul, 2010.*

Unfortunately, risk mitigation techniques are often expensive, and with many countries facing budgetary constraints, investments for prevention, protection and recovery measures for risk mitigation are often prohibitive. Oftentimes, the benefits of investing in protective measures are not immediately seized upon due to a misperception of risks, a short-term outlook and the prohibitive upfront costs of implementation.

Risk layering

Risk layering utilizes different risk financing instruments based on the frequency and severity of hazards. For example, a low-

frequency, high-severity event (such as a major earthquake or tropical cyclone) is likely to cause extensive damage and would likely be transferred to a third party using financial tools such as insurance or catastrophe bonds.

High-frequency, low-severity events (such as localized floods and landslides) are more suitably self-financed by the insured party (government or effected populace), and instruments such as reserves, budgetary allocations and contingency budgets are appropriate (Ghesquiere and Mahul, 2012). The following figure illustrates a three-tiered risk-layering strategy on the basis of the frequency and severity of the event.

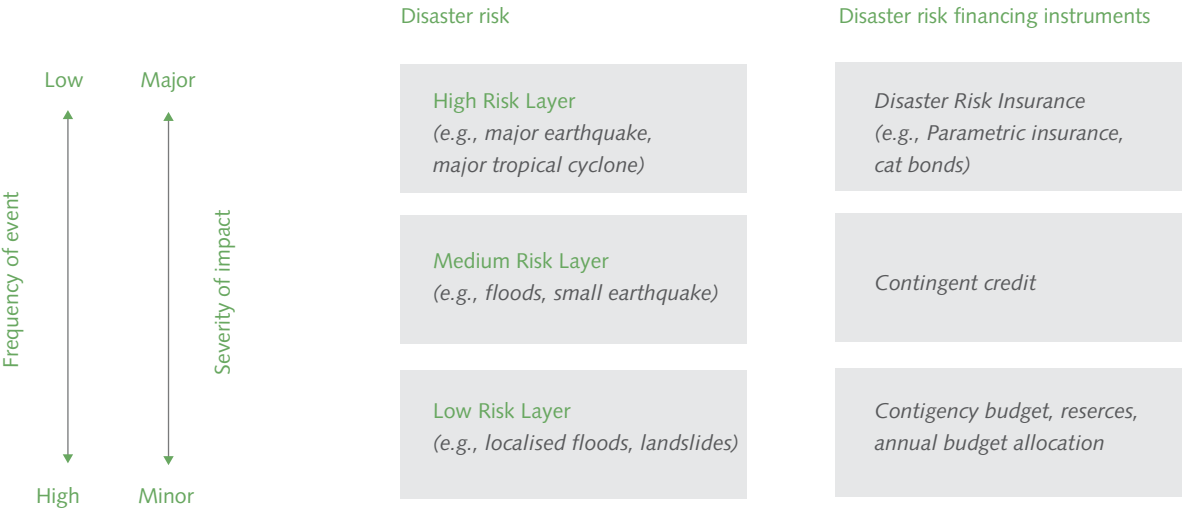


Figure 5: Three-tiered risk layering strategy.

Source: Adapted from Ghesquiere and Mahul, 2012.



## Risk transfer

Risk transfer solutions play a key role when addressing the effects of low-frequency, high-severity weather events. This risk adaptation measure is aimed at limiting the financial impact for those affected by transferring a portion of the risk to a third party. Risk transfer includes both traditional insurance products and alternative risk transfer instruments, such as catastrophe bonds.

## Focusing on sovereign disaster risk financing

In addition to the high human toll, natural hazards generally create enormous strain on the budget of an affected country. The budgetary implications can be derived from the financing needs faced by governments during the three main phases of recovery after disasters.

→ *Relief operations* include emergency assistance provided to the affected population to meet basic needs such as shelter, food and medical attention. Such costs can be difficult to estimate ex ante, since they depend on the specific characteristics of the catastrophic event (e.g., location, intensity, period of the year, period of the day, etc.), but are relatively small compared to the subsequent recovery and reconstruction operations. The capacity of governments to mobilise resources for relief operations on short notice should be a key component of its risk financing strategy;

→ *Early recovery operations* following the initial relief efforts are crucial to limiting secondary losses and ensuring that reconstruction can start promptly. These include the emergency restoration of lifeline infrastructure (e.g., water, electricity and transportation lines), the removal of debris, etc. It is during this phase that engineering firms can be mobilised to start the design of infrastructure works that will be undertaken during the reconstruction phase;

→ *Reconstruction operations* generally centre on the rehabilitation or replacement of assets damaged by a disaster. These include public facilities and infrastructure which are the direct responsibility of the state. In addition, national or municipal authorities usually face obligations that go beyond their own assets. Governments often are called upon to subsidise the reconstruction of private assets, in particular, housing for low-income families who could not otherwise afford to rebuild their homes.

The governments of small island states often face serious liquidity constraints after a disaster as result of the aforementioned factors, thus greatly reducing their capacity to effectively respond to and recover from disasters. A poor post-disaster response leads to secondary socio-economic consequences that often have a disproportional impact on low-income communities as well as exacerbating the total economic cost of a disaster.

The potential liquidity gap is a key factor in the design of a strategy aimed at reducing the financial risks during specific stages of post-disaster operations. In the immediate aftermath of a disaster, expenditure needs are high while available financial resources are usually limited, creating a liquidity gap. Over time, more post-disaster resources become available, allowing the government to better meet its financial needs (see Figure 6).

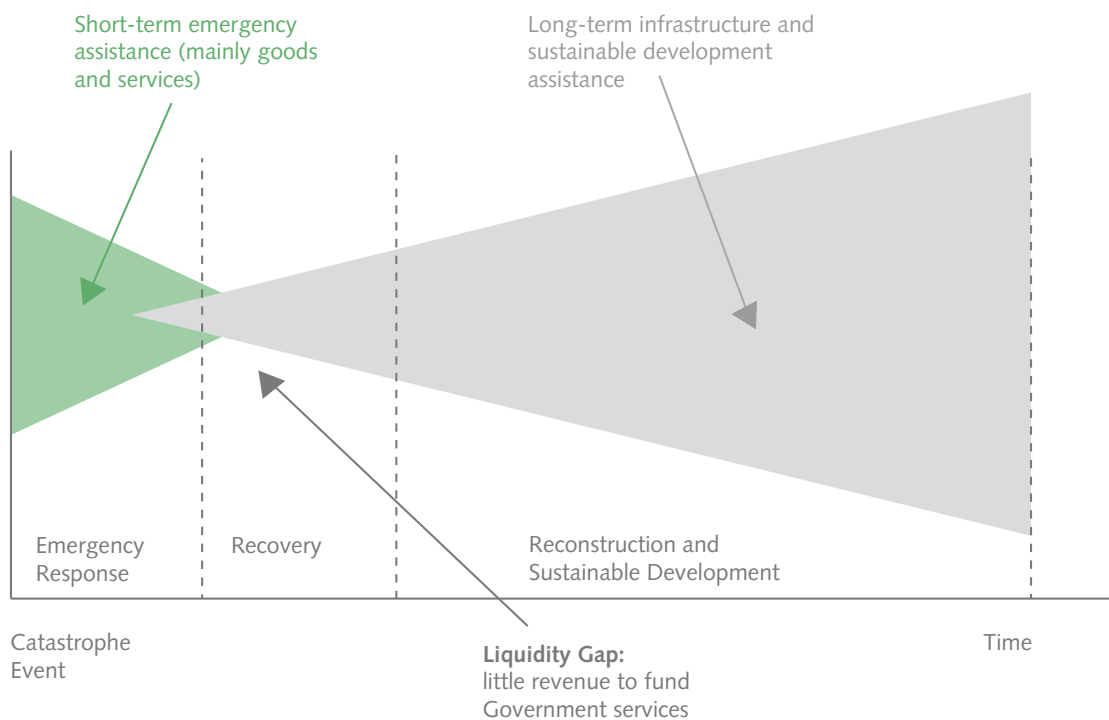


Figure 6: Sovereign liquidity gap occurring after a disaster.

Source: Ghesquiere and Mahul, 2012.

There has been increasing interest in recent years in the use of financial instruments to help developing countries cope with their financial needs resulting from natural hazards. Various new instruments have become available that allow governments to more easily access the international financial markets, enabling them to transfer their risk in order to better manage the budget volatility resulting from natural hazards. Yet, a key lesson from the experience of the last decade is that there is no single panacea. Governments interested in strengthening their response capacity will generally have to combine a number of financial instruments and policies that complement each other.

Disaster risk financing is, therefore, an important aspect of the climate risk management process. Without adequate planning and preparation, post-disaster financing needs are often met by a diversion of funds from development budgets or by taking on expensive loans, both of which harm the long-term growth prospects of a country (Ghesquiere and Mahul, 2010). Therefore, no routine disaster risk financing strategy is applicable to every country; instead, financing risk requires evaluating and matching elements best suited to the individual country.

### Improving the post-disaster financial response

As mentioned above, individual countries must devise a financial protection strategy using a combination of instruments to match the financial needs and volatility of their fiscal accounts. Rapid mobilisation of resources in the event of a disaster is necessary for an effective disaster risk financing strategy. When a natural hazard occurs, the government will have to mobilise resources quickly without jeopardising their fiscal balance (Ghesquiere and Mahul, 2010).

There are various sources of financing that are available to governments following a disaster, which can be categorised as ex post and ex ante financing instruments.

Ex ante risk financing is a more proactive approach to addressing natural hazards, where countries plan ahead in case disaster strikes. This type of financing includes instruments such as budget provisions, reserve funds, contingent credit, parametric insurance, catastrophe bonds, insurance, reinsurance, weather derivatives, etc. (Ghesquiere and Mahul, 2010).

Ex post funding sources are required where there is a lack of sufficient premeditated financial arrangements or explicit allocation of resources prior to an event occurring. Examples of ex post financing include donor assistance, budget reallocation, domestic credit, external credit, tax increases, etc. These post-disaster financing sources usually take a relatively long time to come through and can be highly variable and unpredictable, which is a major disadvantage following a natural hazard. Relying solely on this type of funding can be quite burdensome and increases fiscal uncertainty (Ghesquiere and Mahul, 2010).

An important aspect of the post-disaster financial response is the timing of funding needs. While immediate resources are necessary for early recovery operations and to support relief, the majority of spending needs occur during the reconstruction programme. Both ex ante and ex post financing instruments have different timelines that need to be considered when determining the strategy and combination of disaster risk financing instruments used (see Figure 7).

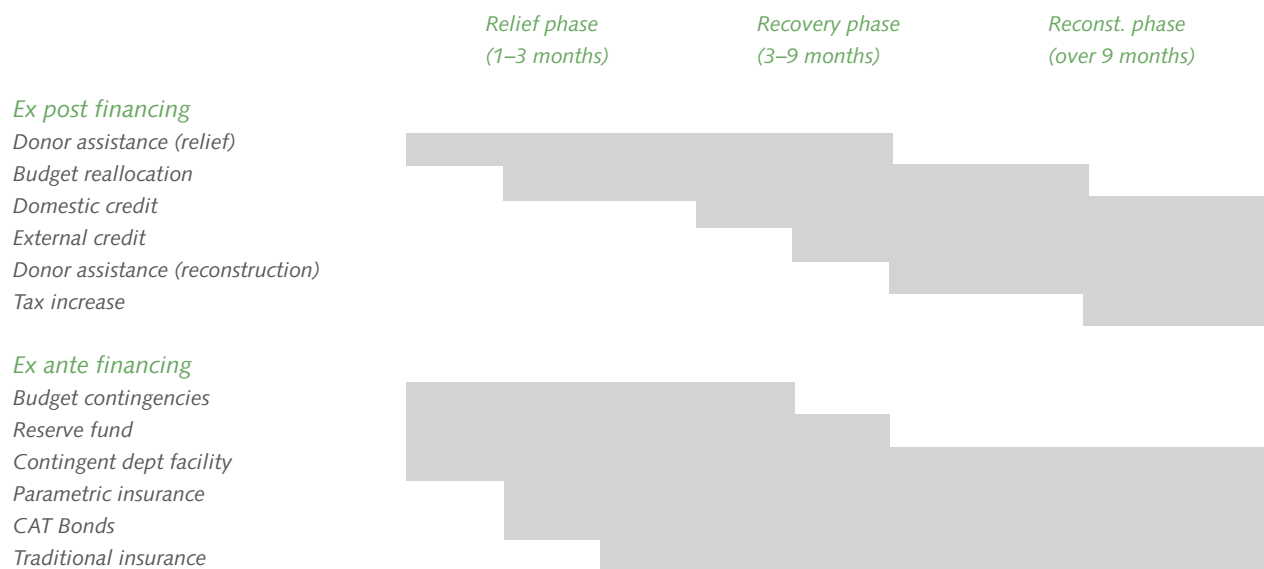


Figure 7: Sources of disaster financing.  
Source: Ghesquiere and Mahul, 2012.

A more detailed review of these instruments is provided in Figure 8. An effective financial strategy against natural hazards, however, relies on a combination of these instruments, taking into consideration the country's fiscal risk profile, the cost of available instruments and the likely disbursement profile after a disaster.

Disaster risk financing strategies, however, should be developed as part of the overall risk management strategy implemented by governments and sovereign states. A comprehensive risk management strategy should cover many other dimensions, including programmes to better identify risks, reduce the impact of adverse events and strengthen emergency services (see Figure 4).



	Type of Instrument	Instrument	Speed of Disbursement	Cost of Financing	Examples	Comment
A	Risk Retention	Reserve Funds	Fast	1–2	National Disaster Fund (FONDEN), Mexico National Calamity Fund, Philippines	The funds in FONDEN, Mexico accumulate over years, while funds in NCF, Philippines lapse at the end of the financial year.
		Budgetary Reallocation	Moderate	1	Budgetary re-allocation is used by most countries to get funds from other budget heads. Procedures, level of approval, and time required varies across countries.	
		Tax Increase	Slow	1	Tax increase as a response to disasters is difficult, as it adversely affects much-needed investment and is not popular. Connect it with the disasters is also difficult, as well as assessing to what degree this instrument is used as a resource.	
		Donor Assistance	Slow	0–1	Normally donor assistance is available only in high severity disasters with international exposure and not for low severity–high frequency disasters. It is also normally slow to come, sometimes with conditions attached, and does not solve the immediate liquidity needs.	
B	Risk Financing	Contingent Credit Line	Fast	1	Catastrophic Risk Deferred Drawdown Option (Cat DDO) from the World Bank.	Only 3 countries have used it through December 2009.
		Loans from International Organizations	Slow	1	Loans from international organizations are normally slow to come and useful mainly for reconstruction.	
C	Risk Pooling	Multi Country/ State Reserve Funds	Fast	1	The only pooled fund in operation is CCRIF, which emphasizes parametric insurance over risk retention, but this concept of combined reserve funds can be very useful for counties with similar disaster vulnerabilities.	

Figure 8: Instruments for disaster risk financing.

Source: Poundrik 2011 (s.u.).







# Module 3

## Risk transfer: focus on insurance

### Introduction to risk transfer

As discussed in earlier chapters, there are numerous measures available to decision makers to respond to the increasing threat of climate change. These responses can be clustered into two main groups: (i) risk mitigation measures and (ii) risk transfer instruments. This chapter focuses on the latter and, more specifically, on insurance instruments.

Risk transfer instruments refer to those adaptation measures aimed at limiting the financial impact of disasters on people by distributing the risk to other players in the market. Risk transfer instruments are particularly effective in the case of low-frequency and high-severity events and are based on transferring part of the risk to a third party (e.g., an insurance and/or reinsurance company or the capital markets), and include both traditional insurance products and alternative risk transfer instruments (e.g., cat bonds).

Although risk transfer mechanisms are commonly utilized in developed countries, their use in developing countries is limited, with coverage usually available to major commercial and industrial properties. Many factors limit the utilization of risk transfer instruments in emerging markets. For example, there are often market gaps, a lack of regulatory frameworks, a lack of data on disaster risk, a lack of a culture of risk financing, reluctance among large reinsurance market players to invest in the development of small risk markets and the fact that these instruments are often expensive for most people in developing countries.

Although risk transfer tools can be a useful source for the injection of liquidity after a catastrophic event and are an important part of the risk management landscape, it is important to also acknowledge that these tools are not a panacea for effectively managing all climate risks. Risk transfer is just one tool within a suite of measures which must be deployed to enhance resilience and are only useful if they are embedded within a wider comprehensive disaster management framework in which risk reduction is paramount.

### Insurance as a disaster risk financing tool: possible role in climate adaptation

The different types of insurance instruments which could possibly play a role in enhanced climate resilience (i.e., address weather risk) can be classified into four broad groups:

- Sovereign disaster risk transfer;
- Agricultural insurance;
- Property catastrophe risk insurance; and
- Disaster microinsurance.

### Sovereign disaster risk transfer

As discussed in the previous module, sovereign disaster risk transfer instruments aim to increase the financial response capacity of governments in the aftermath of natural hazards while protecting their long-term fiscal balances through the use of risk transfer instruments including insurance and insurance-linked securities (e.g., cat bonds, catastrophe swaps and weather hedges). Building on a risk financing strategy, governments are usually better served by retaining most of their natural hazard risk while using risk transfer mechanisms to manage the extra volatility of their budgets or to access immediate liquidity after a disaster (Cummins and Mahul, 2009).

### Agricultural insurance

According to Mahul and Stutley (2010), “agricultural insurance is one of the financial tools agricultural producers can use to

mitigate the risks associated with adverse natural events – events that climate change may render more frequent and more severe in the future”. These tools provide cover for catastrophes that impact crops and livestock and are most effective when applied within a framework for agricultural risk management (see Box 3).

There are different types of agricultural insurance, but these are generally classified into two broad groups: traditional crop insurance products and index-based weather insurance products. Each is discussed in further detail below, drawing from two primary sources of information on recent developments in agricultural insurance, which have been produced by the World Bank’s Agricultural Risk Management team: an agricultural insurance training manual (World Bank, 2010) and a guide to index insurance in agriculture for practitioners (World Bank, 2012a).

#### i) Traditional crop insurance

Traditional agricultural insurance relies on the principle of indemnity – that is, the insurance product responds to an actual loss by providing the amount required to replace that loss. There are two broad types of traditional insurance, namely:

- Named peril crop insurance (NPCI): This type of traditional insurance assesses losses that occur due to a specific peril(s) through field assessments. This makes it easy to determine actuarially sound premiums as long as historical series of weather and loss data exist. NPCI is subject to moral hazard problems (which arise when insured parties alter their behaviour to increase the potential likelihood or magnitude of a loss) since farmers may not take appropriate precautions against crop damage because they are insured.
- Multi-peril crop insurance (MPCI): This type of insurance establishes an insured yield as a percentage of the historical average yield. If the actual yield is less than the insured yield, an indemnity is paid. Yield guarantee insurance is attractive to farmers since it covers drought, flood, high winds, etc., but it has a number of weaknesses:



- It may be actuarially unsound – essentially covering highly spatially correlated and uninsurable risks;
- In the case of plant disease and pest damage, it is hard to disentangle management failures from external factors;
- Normal premiums would be exorbitant; therefore, government subsidies are often needed to increase farmer participation rates, and the programme ends up being an income transfer scheme disguised as a risk management tool;
- Subject to adverse selection (which occurs when the potential insured has better information than the insurer about the potential likelihood or magnitude of a loss, thus using that information to self-select whether or not to purchase insurance) and moral hazard; and
- Costly to administer.

## ii) Index-based products

These compensate farmers based on changes in an index (generally weather-related, but can include other factors) rather than an assessment of actual amounts of damage. The index acts as a proxy for the yield and, hence, changes in the index should reflect changes in the yield. There are two types of index-based insurance products:

- Area yield index: This type of insurance provides a payout based on the realization of an index that is highly correlated with farm-level yield shortfalls. The indemnities are paid based on estimates of the yield in defined areas, e.g., a parish. A threshold is established that is less than the expected parish yield and indemnities are paid to all farmers whenever the realized area average is less than the threshold.

- Weather-based index insurance: Indemnity is based on the realization of a specific weather parameter measured over a pre-specified period of time at a particular weather station. Payout occurs when the realized value of the index exceeds a pre-specified threshold or when the index is less than the threshold. This type of product is appropriate for highly correlated risks and where there is a strong, quantifiable relationship between weather risk and yield loss.

Since index-based insurance does not indemnify the actual loss, its oft-touted advantage over traditional indemnity-based products is the fact that farmers are provided with disaster assistance shortly after the disaster and/or loss has occurred. The farmer, therefore, does not have to wait until the claim has been verified, thereby making this tool attractive to potential capital providers (The Geneva Association, 2009). This ability to payout quickly has a particularly high value in certain settings, particularly the low-income sector. Hess, Wiseman and Robertson (2006) found that, in Ethiopia, one dollar that is quickly available after an extreme weather event may save five dollars in preventing any further impact.

On the other hand, an important issue to keep in mind when reviewing and assessing agricultural index-based products is basis risk. Basis risk is the potential mismatch between contract payouts and the actual loss experienced. This is the main disadvantage of index insurance products, and emerging research on the economic impact of basis risk (e.g., Clarke and Hill, 2013) provides insight for the better design of products and particularly highlights the need for effective benefit distribution mechanisms.

Other benefits of weather index products are that they are not susceptible to adverse selection or moral hazard. Monitoring costs are low, which can lead to more affordable premiums. It is, therefore, often promoted as a very flexible instrument, well suited for low-income individuals and communities with limited resources in disaster-prone areas.

### Box 3: Insurance within the framework for agricultural risk management

Insurance is one tool for mitigating the negative impact of disaster risks, and should be applied within a broader framework for agricultural risk management alongside other financial tools for the mitigation of the impact of disasters, physical mitigation measures and institutional and market development initiatives. The World Bank promotes a proactive approach to the financial management of risks to agricultural production as one compo-

nent of a comprehensive disaster risk management approach. This focuses on dealing with the impact of residual risks that remain after cost-effective risk mitigation techniques (e.g., irrigation, pest treatments) have been implemented. In this framework, agricultural risk financing – including insurance, credit and products to manage price risk (forward sales, futures contracts and options) – is presented as one key risk management pillar alongside institutional capacity-building, quantitative assessment of risks to agricultural production and agri-business segmentation.



Figure 9: World Bank framework for the financial management of agricultural production risk. Source: World Bank Disaster Risk Financing and Insurance Programme)

#### Box 4: Challenges of parametric insurance

- Basis risk. Basis risk emerges when the insurance payout does not exactly match the actual loss. By definition, the index used in a parametric contract is a proxy for the real loss, and, thus, one cannot discount the fact that the parametric insurance indemnity may underestimate (or overestimate) the actual loss. Careful design of the terms and conditions of the parametric insurance policy is critical to minimize this basis risk. Recent catastrophe risk modelling techniques allow for the design of composite indexes that better mimic potential losses.
- Technical limitations of insurable hazards. Because parametric instruments rely on a calculated index, their use is limited to hazards that can be modelled with a sufficiently high level of confidence. Hurricane and earthquake models have been developed and tested for more than a decade and are under constant improvement (particularly following Hurricane Katrina in the United States in 2005). However, catastrophe risk assessment models for hazards such as tsunamis are still under development.
- Market limitations of insurable hazards. The existence of a catastrophe risk model developed by an independent agency is a necessary but not sufficient condition to make this risk insurable. Financial investors generally charge an uncertainty load in the premium to accept risks that are new in the market. This uncertainty load can make the premium so high that, compared to the expected loss, the risk becomes uninsurable.
- Education. Parametric insurance is a combination of insurance concepts and financial concepts. The education of policymakers and government agencies is essential to ensure that the instrument is understood and used appropriately by local authorities.

Source: Caribbean Catastrophe Risk Insurance Facility, 2007.

Besides the issue of basis risk, this type of insurance is limited by its heavy dependence on the quality and quantity of information available for developing risk models of probable loss and is, therefore, often better suited for regions and/or countries with long historical weather data series, good coverage by weather stations and easy access to satellite imagery. See Box 4 for a further discussion on parametric and/or index insurance.

#### iii) Property catastrophe risk insurance

Property catastrophe risk insurance policies cover disaster-related damage to physical assets or loss of income arising from damage to a physical asset. These may take the form of household and contents insurance, or cover commercial and industrial assets (typically as an “all-risks” policy). Loss of income and alternative living expenses can be covered, although this type of coverage is not as widespread. Underwriters tend to be selective in granting coverage where disaster risk is high.

Although the industrialized countries in North America, Western Europe and parts of the Asia-Pacific enjoy a high level of insurance penetration, many countries in Africa, Asia, Latin America and the Caribbean have limited access to non-life insurance, with hardly any catastrophe insurance available.

Box 5: Some key considerations in assessing the role of traditional property catastrophe insurance in climate adaptation

- **Adaptation is key to ensuring future insurability:** Risks arising from natural catastrophes are insurable but adaptation measures are vital to maintain the availability of affordable insurance, particularly for existing coastal properties. Adaptation methods could include elevating properties, reinforced cladding and flood defences such as sea walls. No single approach provides full protection against all losses, and combinations of adaptation measures are essential to provide maximum protection levels. However, there is a cost attached to adaptation, which governments and policyholders must consider. Individuals and businesses may need incentives to take adaptation seriously.
- **Society, business and the insurance industry must be flexible in their response to climate change:** Climate change projections are uncertain and a wide range of scenarios should be considered when planning for the future. Climate change models must be constantly updated to reflect evolving scientific information and society should build them into decisions regarding adaptation.
- **Household and business property valuations should take into account levels of future risk:** A property which has been adapted is more valuable than one that has not because the risks to the home or business owner are reduced. In

some areas where defences have not been introduced or maintained, properties could lose value if they are uninsurable, and the withdrawal of private insurance coverage could be followed eventually by a “managed retreat” from the highest risk areas by property owners.

- **The insurance industry has a key role to play in promoting adaptation:** By setting premiums at a level which reflects the underlying risk, insurers promote the concept of risk-based pricing and enable individuals to understand their risk profiles better and the costs and benefits of investing in adaptation components.
- **Better quality data will help the insurance industry conduct more accurate risk analysis:** All parties involved in the insurance chain must strive for much-improved data quality and geographical resolution in order to allow for full and proper risk analysis.
- **Climate change is only one of several emerging trends driving risk:** Socio-demographic factors such as population increases and the growth of urban areas in coastal and other exposed zones often combine with climate change to exacerbate risk. Adaptation strategies must not be developed in isolation from these factors and must take them into account.

Source: Lloyd's, 2008.



### Weather-related microinsurance

Microinsurance is the protection of low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved (Churchill, 2006).

According to Mechler and others (2006), microinsurance provides low-income households, farmers and businesses with access to post-disaster liquidity, thus securing their livelihoods and providing for reconstruction. Since insured households and farms are more creditworthy, insurance can also promote investments in productive assets and higher risk and/or higher yield crops and can encourage investments in disaster prevention if effectively designed. The World Bank has developed a comprehensive microinsurance development strategy outlined in Box 6.

Low-income groups in developing countries are particularly susceptible to climate risks and will become increasingly so in the face of climate change. Weather-related microinsurance refers to policies specifically designed for low-income populations which provide coverage for physical assets or livelihoods in the event of a weather hazard. Weather-related microinsurance can be designed to protect a number of different values at risk for low-income people. It can be designed to protect livelihoods at risk – as the Caribbean Insurance and Adaptation project presented in this document illustrates. Other approaches of weather-related microinsurance resemble a subset of agricultural and property catastrophe risk insurance lines for low-income people.

It is important to note that amongst low-income groups risk pooling and informal insurance are not new. Informal risk-sharing

schemes have been around for generations and are particularly prevalent in developing countries. They are, however, usually limited in their reach and the benefits typically cover only a small portion of the loss.

It is also equally important to make the distinction that although microinsurance is often loosely used to refer to general risk prevention and management techniques (e.g., savings set aside for emergency purposes, such as insurance funds), in this context it involves an element of risk pooling. A simple description offered by Churchill (2006) is a situation in which those in a risk pool who do not suffer a loss during a particular period essentially pay for the losses experienced by others. Insurance, thereby, reduces vulnerability as households replace the uncertain prospect of losses with the certainty of making small, regular premium payments. This risk pooling function means that insurance is a much more complicated financial service than savings or credit.

Microinsurance is designed to supply easily accessible policies which are highly affordable to low-income households, especially for natural hazards. According to the Geneva Association (2009) “[Microinsurance instruments] can be applied on a stand-alone basis as risk financing instruments that provide effective and timely disaster assistance from the national to the local level, or they can be embedded into credit products, thereby greatly facilitating access to financing for [individuals]”.

Box 6: The World Bank strategy for microinsurance development

The growth of microinsurance markets in developing countries faces a number of key challenges which have been identified as (i) weak distribution and service delivery channels and high transaction costs; (ii) poor product design and low value proposition from the perspective of the insured; (iii) lack of financial literacy, consumer awareness and trust in the insurance sector

and similar lack of capacity and understanding of microinsurance within insurance companies; (iv) inadequate legal, regulatory and supervisory framework; and (v) high risk associated with investment in the microinsurance business line. In response to these challenges, the World Bank has outlined a strategy for microinsurance development based on seven pillars:

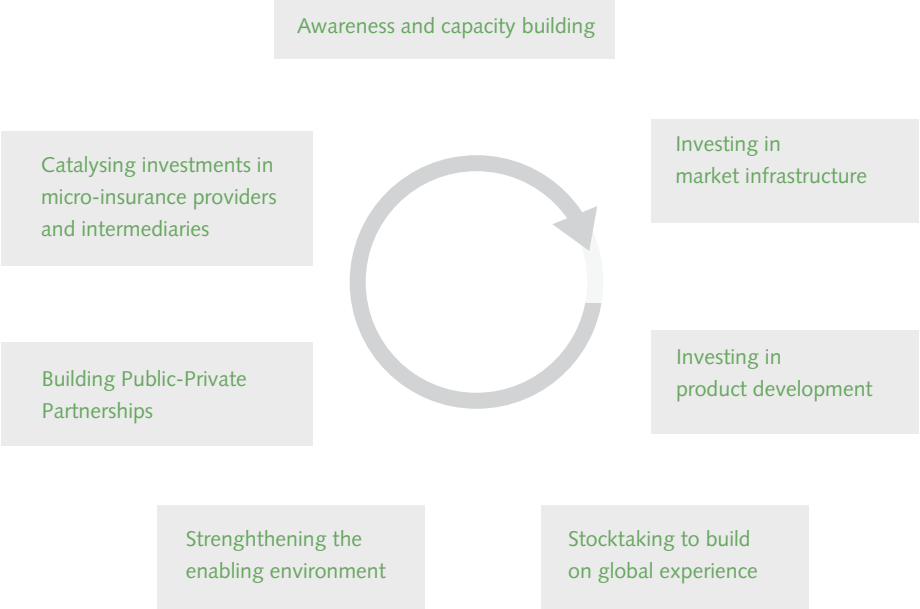


Figure: Strategy for microinsurance development.  
Source: World Bank, 2012b











# Module 4

## Climate risk adaptation and insurance in the Caribbean project

### Climate risk adaptation and insurance in the Caribbean project

Climate change is a reality that tangibly affects vulnerable regions today. In the Caribbean, adverse climatic conditions have affected over 1.5 million people directly and caused over USD 5 billion in damage over the last three decades (Lashley 2012). For a region heavily dependent upon industries that are vulnerable to climate change, the negative impacts are tangible - tourism and agriculture could potentially face an increase in expected losses on account of climate change by 1 per cent to 3 per cent of GDP by 2030, with high rain and wind damage having the potential to account for as much as 90 per cent (CCRIF 2010) of all damage, and the intensity as well as the frequency of adverse weather events is expected to increase over time.

The stress that adverse weather events such as hurricanes, floods, droughts place on societies and natural systems exacts significant socio-economic tolls. These events lead not only to loss of income but also loss of productive capacity forcing low-income vulnerable populations to resort to coping strategies that diminish their ability to cope with current and future climate impacts.

The impact of loss and damage associated with climate change can set back development by potentially increasing not only the incidence, but also the severity of poverty. Poverty and vulnerability are deeply intertwined: the poor have low adaptive capacity because they have fewer resources to cope with climate risk. Successive adverse weather events serve only to further diminish this already scarce resource base, thus deepening poverty and

social vulnerability in the long run. Climate change will greatly exacerbate this situation; and developing countries, which are least responsible for climate change, face its greatest impacts. New tools are urgently needed to help vulnerable people deal with climate change, and the uncertainty that accompanies it.

In 2011, a study conducted by the Munich Climate Insurance Initiative with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and funded by the German Federal Ministry for Development and Economic Cooperation was undertaken to examine the demand for weather-related microinsurance and risk management approaches amongst low income groups within the Caribbean (Lashley 2012). Surveys were conducted with low income communities within Belize, Grenada, Saint Lucia and Jamaica. The results from the survey showed that there was a high level of implicit demand for weather-related microinsurance in the region and a moderate explicit demand. Of those surveyed 23 per cent exhibited a high/very high demand for the product, while 33 per cent indicated a moderate level of demand. The study outline, as well as its results are summarized on pages 47–49.

### Project overview

Insurance solutions – among them weather index insurance designed especially for low-income groups – can play a key role in swiftly and efficiently distributing recovery aid following major losses caused by such natural catastrophes, thus helping to safeguard livelihoods.

The Climate Risk Adaptation and Insurance in the Caribbean project addresses climate change, adaptation and vulnerability by promoting climate risk insurance as an instrument to manage and transfer risk. Funded by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) International

Climate Initiative, the Climate Risk Adaptation and Insurance in the Caribbean project is being implemented by the Munich Climate Insurance Initiative and its partners: the Caribbean Catastrophe Risk Insurance Facility and MicroEnsure, with reinsurance capacity provided by Munich Re.

The project seeks to address climate change, adaptation and vulnerability by promoting weather-index based insurance as a risk management instrument in the Caribbean with an overarching objective to help target countries increase social resilience and incentivise sustainable adaptation measures by incorporating climate risk insurance within a broader framework of disaster risk reduction strategies.

Specifically the project goals are:

- To support the development of weather-related risk management solutions, including insurance;
- To support the development of public-private insurance solutions so that financial support is extended to the most vulnerable groups; and
- To demonstrate the value of a regional risk pooling instrument in climate change adaptation and risk management.

Building on the valuable information generated through the demand study mentioned in the earlier section, the project has developed two parametric weather-index based risk insurance products aimed at low-income individuals and lending institutions exposed to climate stressors. The products are:

- The Livelihood Protection Policy
- The Loan Portfolio Cover

## The Demand for Weather-related Microinsurance and Risk Management Approaches in the Caribbean.

Published in 2012 by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in collaboration with MCII, and on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

The full study can be downloaded from: [http://www.climate-insurance.org/upload/pdf/20121105\\_MCII-GIZ\\_2012\\_Demand\\_for\\_Microinsurance\\_in\\_the\\_Caribbean.pdf](http://www.climate-insurance.org/upload/pdf/20121105_MCII-GIZ_2012_Demand_for_Microinsurance_in_the_Caribbean.pdf)

### Introduction

There were three overarching aims for the research; confirmation of weather-related events as a real threat to the resilience of the Caribbean, especially low income households in agriculture and tourism; assessment of the implicit and explicit demand for microinsurance; and assess potential implementation options. The specific project objectives were:

1. Understand the needs of low income groups in managing loss and damage from weather-related events.
2. Inform policy discussions on loss and damage in the UNFCCC process
3. Use the results of the market demand survey to inform product design and implementation in the Caribbean in 2012.

### Methodology

The project methodology involved three (3) main components: a literature review on background issues in the Caribbean related to climate change, extreme weather events, poverty, coping mechanisms and microfinance; a demand survey of 1,059 low income persons in Agriculture and Tourism in Belize, Grenada,

Jamaica and St. Lucia in order to assess their coping mechanisms and implicit (need) and explicit demand for weather-related microinsurance; and interviews with financial institutions and representative organizations.

The rationale for the structure of the sample was to include persons at risk of loss of goods/customers or loss of employment due to extreme weather.

In relation to the interviews with financial institutions and representative organisations, these were to investigate the potential for distribution channels for a microinsurance product as well as to get another view on the risks and coping mechanisms utilised by their clients/members.

### Survey Results

For the survey of low income persons in agriculture and tourism in Belize, Grenada, Jamaica and St. Lucia, a sample target of 275 persons per country was set with a target of 1100 overall. Following collation and cleaning of the data, 1059 responses were deemed suitable for analysis.

The urban/rural ratio was 1:1, while 64 per cent of respondents were the head of their household, and 52 per cent had completed at least a secondary education. In addition, the average household was operating at 113 per cent of the poverty line (i.e. they were 13 per cent above the poverty line and would therefore be considered vulnerable).

Overall, 49 per cent of respondents indicated that they had a high/very high dependence on agriculture, 41 per cent indicated that they had a high/very high dependence on tourists to their country, and 14 per cent indicated that they were highly dependent on both sectors.

Main Job	Males (%)	Female (%)	Total (%)
Agriculture/Fisheries	39.4	16.8	30.5
Vendor	12.9	43.9	25.1
Catering	4.7	8.0	6.0
Hotel/Restaurant Worker	4.8	11.1	7.4
Taxi	17.0	0.5	10.5
General Services/Other	21.1	19.9	20.5

### Extreme Weather, Coping Mechanisms and Implicit Demand

In demonstrating the at-risk nature of these populations, 42 per cent of the sample had experienced some loss due to extreme weather since 2000, with some respondents experiencing multiple losses.

- 26 per cent experienced house damage due to flooding or high winds
- 38 per cent experienced loss of customers or employment

The coping mechanisms *actually* utilised by the respondents in the aftermath of the last 'disaster' are outlined in the table below. Overall, the dominant response, as seen with previous studies in the region, was the use of *savings* by 36 per cent of sample; followed by *borrowing* (12 per cent) and *government assistance* (9 per cent). Of greatest concern from these results were respondents not 'repairing or replacing', doing nothing, not knowing what to do or 'waiting'.

Interpreting these overall results suggest that approximately 11 per cent of the sample was at risk from not countering any of the adverse effects of these events and this inaction may have more detrimental longer term effects than utilising high stress coping mechanisms such as selling assets or taking children out of school.

Overall the results indicate that the coping strategies utilised are *medium level stressors*. As indicated by Sebstad et al.'s (2006) classification, these medium stress coping strategies have the longer terms impact of *depleting financial reserves*, increasing indebtedness, and interference with family life. For governmental support, this further exacerbates a dependence culture among those affected; as does the inclination to just 'wait' for something to happen.

This inclination to not repair/replace etc., which should be considered *high level stressors*, have longer terms impacts such as: *loss of productive capacity*, *loss of income sources*, *further depletion of assets*, loss of access to finance, untreated health problems and social isolation. The level of these 'do nothing' responses suggests there is an *implicit demand for insurance* as a low stress coping strategy.

In addition to querying coping strategies, and also related to the implicit need for insurance, respondents also conducted a self-assessment as to their risk-exposure from a number of scenarios. The most prominent risk was loss of customers or loss of job, noted as being a high or very high risk by 33 per cent and 30 per cent of respondents respectively. The other issue of concern was that 28 per cent perceived themselves at a moderate to very high risk of house damage due to high winds. In total these results suggests the there is an implicit need for weather-related microinsurance in the region.



Coping Mechanism	Grenada (%)	St. Lucia (%)	Jamaica (%)	Belize (%)	Stressor Level
Insurance Payout	4.8	1.5	2.9	8.6	Low
Used Savings	45.7	96.2	65.4	34.5	Medium
Used Remittances	3.8	3.1	9.6	1.7	Medium*
Found another job	10.5	6.1	0.0	12.1	Medium
Sold possessions	1.9	1.5	0.0	13.8	High
Government Assistance	34.3	8.4	1.9	25.9	Medium*
Borrowed (informal)	7.6	10.7	16.3	13.8	Medium
Borrowed (formal)	7.6	10.7	0.0	36.2	Medium
Did not repair/replace	22.9	59.5	48.1	24.1	High*
Other (includes 'waiting')	9.5	0.8	51.9	6.9	High*
TOTAL	148.6	198.5	196.1	177.6	-

*Stressor Levels from Sebstad et al. (2006). Totals do not sum to 100% as multiple responses were allowed.*

*\*Not included in Sebstad et al. (2006).*

Demand Level	Grenada (%)	St. Lucia (%)	Jamaica (%)	Belize (%)	Average (%)
None	16.2	16.3	27.3	18.5	19.6
Very low	11.0	8.8	12.9	12.4	11.3
Low	15.8	15.0	8.3	11.2	12.6
Moderate	38.6	31.3	22.3	40.6	33.2
High	14.3	24.6	16.3	14.9	17.4
Very high	4.0	4.2	12.9	2.4	6.0

Despite there being a high level of implicit demand for weather-related microinsurance in the region, there is only a moderate explicit demand demonstrated by the study. Overall, 23 per cent exhibited a high/very high demand for the product, while 33 per cent indicated a moderate level of demand.

However, this demand is differentially distributed across the countries with a high/very high demand of over 28 per cent in all the countries with the exception of Belize (17 per cent).

### The livelihood protection policy (LPP)

The Livelihood Protection Policy (LPP) is a weather insurance policy designed specifically to help vulnerable, low-income individuals recover from the damage caused by strong winds and/or heavy rainfall during severe weather events. Targeted at all individuals irrespective of income level, the LPP provides timely cash payouts soon after a weather event, enabling policyholders to start rebuilding their lives in the wake of a natural hazard.

The LPP is intended to provide some stability to the financial situation of vulnerable, low-income individuals after a disaster through the injection of quick liquidity, thereby allowing them to avoid adopting coping strategies that could lead them deeper into poverty. An expected additional benefit of the product is the possibility that it could improve the credit worthiness of individuals in the long term, giving them access to financial services that they previously may not have had access to. Through accessing credit, a space of certainty can be created for people to make investments, allowing them to safeguard their livelihoods.

In designing the LPP, the project team placed significant emphasis on ensuring that the product was simple, flexible and accessible, to ensure that people get the level of coverage they need. In addition, the project team sought to work with the disaster management offices in all three countries to develop an SMS-based warning and claims notification system.

The SMS warning system is a simple way to inform policyholders about upcoming weather events via mobile phones. People who purchase the policy will receive explicit warning in case of upcoming weather events so that they have the opportunity to react in time and secure their assets. Such a system—properly managed and accepted by policyholders—could lead to a significant reduction of losses given that it allows individuals to prepare themselves and protect their livelihoods before an event reaches their country.

The SMS claims notification system sends out an SMS to all policyholders with a triggered policy to notify them when a trigger level is reached. At the same time, policyholders are informed about contact points and time frames to collect any insurance payouts. Such a notification system creates full transparency to the policyholder about trigger events and her/his right to collect payouts.

### Box 7: The Livelihood Protection Policy at a glance

#### Goal:

To stabilize the financial situation and livelihoods of vulnerable individuals

#### Who is covered:

All individuals regardless of annual income (no eligibility criteria)

#### Perils covered:

High wind speed and excessive rainfall (triggers)

#### Type:

Trigger-based parametric index insurance (based on predefined values)

#### How it works:

The policy pays out when threshold values for wind and/or rainfall are exceeded, without any claims assessment procedure

#### Benefits:

- Quick cash payouts enable affected households to rebuild their lives soon after a weather event;
- SMS- based notifications alert policy holders to approaching weather events, allowing them to take precautionary measures and reduce exposure;
- Training and education module to help communities better understand the insurance tool and improve insurance literacy.

#### Weather data monitoring:

Rain is monitored by the Danish Hydrological Institute and wind is monitored by the Caribbean Catastrophe Risk Insurance.

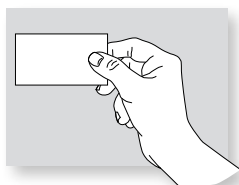
### Box 8: The Livelihood Protection Policy at a glance



1. First the trainer will explain to you how the insurance works, what conditions trigger a payout and how the payout is settled.



It's easy to get your payout settled.  
Once a threshold is reached the money will be automatically transferred to your account.



2. You will receive a policy card with your personal details.



3. **High Wind Speed or Heavy Rain** triggers the Livelihood Protection Policy (You will receive a SMS warning in advance of any approaching storms).



Once a threshold has been reached you will receive a SMS message informing you of the trigger level and the payout. You will receive the payout regardless of the actual damage you have experienced.

## The loan portfolio cover (LPC)

The Loan Portfolio Cover (LPC) is a parametric insurance instrument to help financial institutions manage their credit risk and is designed to protect loan portfolios from climate shocks and eventual loan default. The simple and flexible structure of the policy allows financial institutions to select the level of insurance coverage to be applied to their overall exposed loan portfolio – a payout is triggered when pre-determined threshold values for wind speed and/or rainfall are exceeded, irrespective of any proven loan default the financial institution may have suffered.

Transferring the risk of a financial institution's weather-related loan default means the financial position of these institutions remains stable after an extreme weather event, thereby enabling them to avoid curtailing their lending activity or instituting unfavourable terms of credit. The LPC can, therefore, help to overcome any reluctance to invest, improve access to lending and contribute to reducing the cost of providing financial services.

The development of LPC is, therefore, a tangible step forward in the availability of instruments to better manage the portfolio risks of lending institutions in developing countries such as those in the Caribbean.

Providing development banks, credit unions and cooperatives with tools to better manage the high volatility of defaults on their portfolio due to covariant weather risk allows them to expand their funding base and, therefore, their onward lending capacity to low-income people and micro-, small- and medium-sized enterprises (MSMEs). Maintaining the liquidity of these institutions is critical in ensuring that low-income groups are able to access finances since they are often the only access point to financing for these groups.

An SMS-based warning system for bank clients was also developed as part of the product design by the team. Similar to LPP, the SMS system is a simple way to inform bank clients about upcoming weather events via mobile phones.



### Box 9: The LPC at a glance

#### Goal:

To provide portfolio level protection against weatherrelated loan default for lender institutions

#### Who is covered:

Financial institutions with a nationally distributed portfolio of risk

#### Perils covered:

High wind speed and excessive rainfall (triggers)

#### Type:

Trigger-based parametric index insurance (based on observed values of wind, rain)

#### How it works:

The policy pays out the pre-agreed amount if a certain wind speed and/or rainfall amount is exceeded, irrespective of any proven losses to the insured loan portfolio

#### Benefits:

- Secure the equity base of financial institutions by managing exposure to weather-related shocks
- Provide access to credit to enable people exposed to weather risks to invest in their livelihoods and strengthen their capacities to cope with future events
- Restructure or even write-off defaulted loans of individuals who had suffered from extreme weather events

#### Weather data monitoring:

Rain is monitored by the Danish Hydrological Institute and wind is monitored by the Caribbean Catastrophe Risk Insurance.

The development of LPC is, therefore, a tangible step forward in the availability of instruments to better manage the portfolio risks of lending institutions in developing countries such as those in the Caribbean.

Providing development banks, credit unions and cooperatives with tools to better manage the high volatility of defaults on their portfolio due to covariant weather risk allows them to expand their funding base and, therefore, their onward lending capacity to low-income people and micro-, small- and medium-sized

enterprises (MSMEs). Maintaining the liquidity of these institutions is critical in ensuring that low-income groups are able to access finances since they are often the only access point to financing for these groups.

An SMS-based warning system for bank clients was also developed as part of the product design by the team. Similar to LPP, the SMS system is a simple way to inform bank clients about upcoming weather events via mobile phones.

## Mapping a Course for Future Action

Climate Risk Insurance has the potential to play a meaningful role in helping vulnerable populations cope with the impacts of climate change (Warner and others 2012). It is a viable risk transfer instrument which can provide people with inadequate coping strategies a pathway out of a life of social and financial exclusion. By extending the financial safety net to marginalized communities, climate risk insurance can create space for growth and investment.

The Climate Risk Adaptation and Insurance in the Caribbean project has developed parametric weather index-based insurance solutions that specifically address the needs of vulnerable, low-income communities. Although still in the early stages of implementation, the roll-out of the insurance solutions in the Caribbean yields some key insights as well as lessons learned.

### What factors are needed to create an enabling environment for addressing climate risks?

The opening chapters of this handbook have highlighted some of the commonly observed challenges with the implementation of insurance approaches as well as highlighting the benefits of applying insurance solutions in a climate risk management context. In order to ensure that insurance can play a meaningful role in managing climate-related risk, the following conditions need to be satisfied:

- Appropriate regulatory environment and oversight;
- Public champions and complimentary role of key actors;
- Availability of data and hazard mapping;
- Establishment of cost-effective distribution channels;
- Appropriate back up mechanisms, including reinsurance;
- Risk management education.

Governments and donors in the Caribbean can benefit from these lessons and help further improve climate risk management by undertaking the following:

- Much of the benefits of insurance – protecting livelihoods, preserving human and social capital – build a *compelling argument for donors to step in and fill the gap created by information asymmetries, externalities and to encourage financial markets* to penetrate the often overlooked bottom of the pyramid.
- There is a *need for continued support to develop the market for weather-related microinsurance*. Local stakeholders require support as microinsurance and, more specifically parametric index insurance, is a new tool which requires significant awareness raising amongst all stakeholder groups.
- There are *opportunities for making linkages between climate risk insurance and disaster risk reduction measures to realize disaster risk management and adaptation co-benefits*. This requires tapping into existing disaster risk management networks in countries to identify what those linkages could be and their viability when bundled with climate risk insurance solutions.
- There is tremendous *potential for scaling up*; there is a demonstrated need for climate risk insurance in regions prone to the negative impacts of climate change. Support needs to be provided to harness the *scaling-up potential to drive the co-benefits of the approach for policy priorities like food and livelihood security in the Caribbean*.

At the international climate policy level, the insights gleaned from this experience are also relevant for guiding engagement, investment and international and regional policy. There are opportuni-

ties and possible strategies for the international community that support the design and implementation of country-driven comprehensive climate risk management strategies and approaches that comprise risk transfer and risk-sharing mechanisms. *Governments and the international community can help the Caribbean improve climate risk management by undertaking the following:*

- Foster a better understanding of combinations of tools and approaches, and generate substantive information to inform the dialogue on the role of insurance as a risk transfer instrument within the context of climate change adaptation at the international, regional and national level; and
- Continued engagement with the Conference of the Parties on the role of the UNFCCC in enhancing the implementation of approaches to address loss and damage associated with the adverse effects of climate change based on the practical experiences of countries;
- Facilitate a regional and international dialogue to advance policy coherence on integrated climate risk management;
- Replicate good practices across and between countries;
- Provide guidance on how to overcome operational challenges in setting up weather-based insurance in developing countries;
- Financial support through existing programmes guided by Art.3 of the UNFCCC (e.g., Green Climate Fund, Adaptation Fund and other finance channels).

The IPCC Special Report on Managing the Risks of Extreme Events and Disasters noted that climate change along with socio-economic development leads to a worldwide increase in the frequency and severity of extreme weather events and natural catastrophes. Developing countries and their communities are struggling with the recovery process, and their ability to absorb the losses from these events. In order to manage the impact of catastrophes on the affected population, governments usually provide post-disaster aid programmes, but they are often not timely or financially efficient. This puts additional stress on national budgets and introduces an element of uncertainty on the affected populations (Warner and others, 2013).

The Caribbean faces a number of challenges – financial crisis, demographic shift, changing economic and social structures that affect policy needs and priorities. Decision makers may be tempted to postpone considering approaches to address climate risks. In spite of these challenges, international and national policy fora, as well as communities of policy, science and practice have many tools to help them begin to address climate risks in the Caribbean. Tapping into and jump-starting the action of these different communities and processes should be an essential next step for Caribbean governments and stakeholders.









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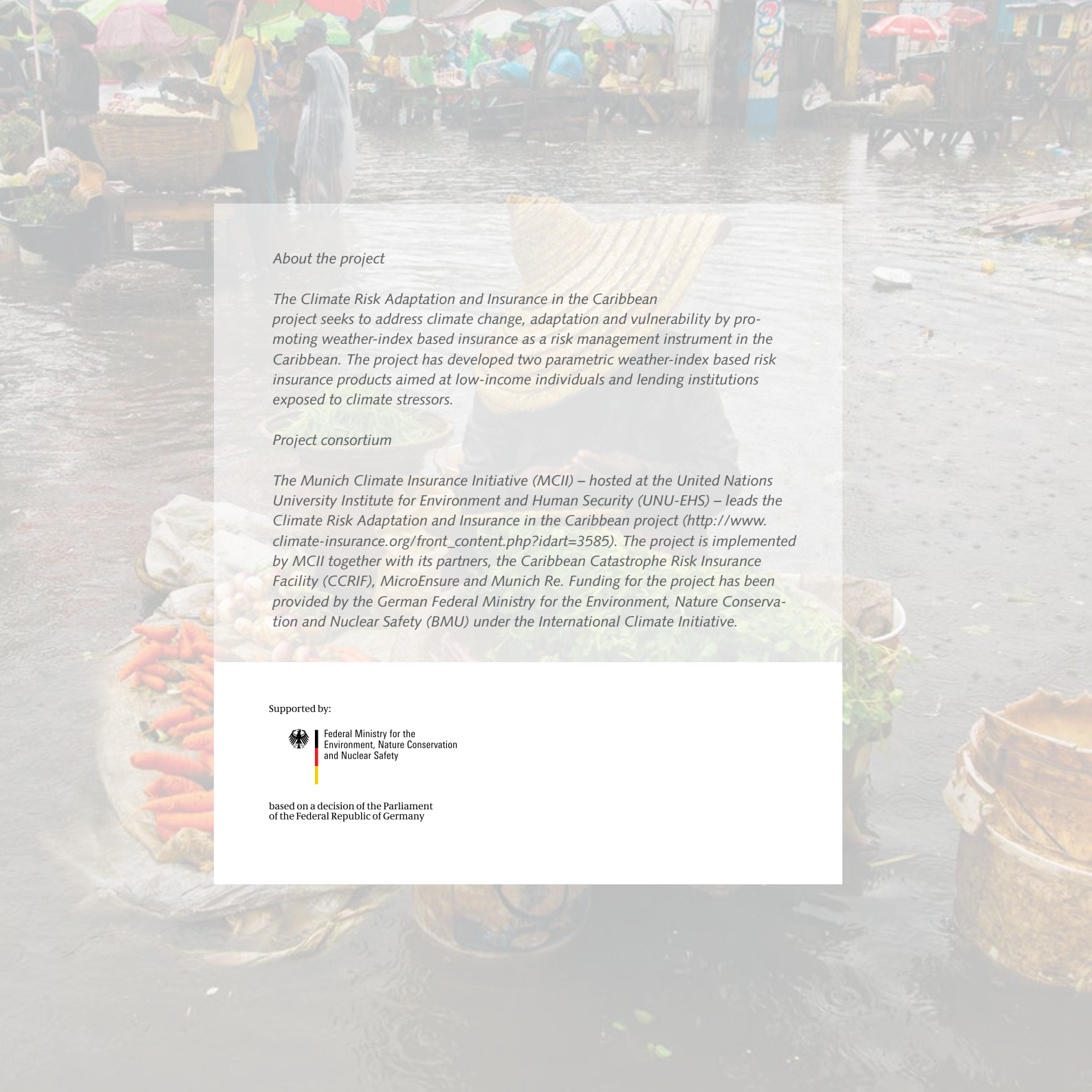
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### *About the project*

*The Climate Risk Adaptation and Insurance in the Caribbean project seeks to address climate change, adaptation and vulnerability by promoting weather-index based insurance as a risk management instrument in the Caribbean. The project has developed two parametric weather-index based risk insurance products aimed at low-income individuals and lending institutions exposed to climate stressors.*

### *Project consortium*

*The Munich Climate Insurance Initiative (MCII) – hosted at the United Nations University Institute for Environment and Human Security (UNU-EHS) – leads the Climate Risk Adaptation and Insurance in the Caribbean project ([http://www.climate-insurance.org/front\\_content.php?idart=3585](http://www.climate-insurance.org/front_content.php?idart=3585)). The project is implemented by MCII together with its partners, the Caribbean Catastrophe Risk Insurance Facility (CCRIF), MicroEnsure and Munich Re. Funding for the project has been provided by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) under the International Climate Initiative.*

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