



# Caribbean and Central American Partnership for Catastrophe Risk Insurance

Pooling Risk to Safeguard against Catastrophes  
Generated by Natural Events



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# Executive Summary

**C**ountries in the Caribbean and Central America have relatively low fiscal resilience to the adverse effects of earthquakes, tropical cyclones, and other major hydro-meteorological events such as excess rainfall. Due to the fiscal challenges associated with the impacts of natural hazards, the Council of Ministers of Finance of Central America, Panama and the Dominican Republic (COSEFIN) requested the World Bank to identify alternatives for sovereign risk protection. The World Bank — in partnership with the United States Department of Treasury — assessed various options, which guided COSEFIN to identify the Caribbean Catastrophe Risk Insurance Facility (CCRIF<sup>1</sup>) as the best option. By becoming members of CCRIF COSEFIN governments will join current Caribbean Community (CARICOM) member countries in being able to purchase parametric insurance coverage akin to consequential loss insurance, which will provide immediate cash payouts in the aftermath of a major natural event. This insurance instrument will be particularly useful in financing the post-disaster recovery needs as payouts are made quickly, allowing the affected government time to mobilize additional resources for longer-term reconstruction activities.

**CCRIF provides cost-effective and fast-disbursing liquidity, and is an efficient way to finance a liquidity gap arising in the immediate aftermath of disaster.** Traditional indemnity insurance makes claims payments based on the formal confirmation of losses. By contrast, CCRIF is the world's first multi-country risk-pooling facility that has developed and successfully offered parametric insurance against tropical cyclones and earthquakes (and now excess rainfall). Backed by both traditional reinsurance and capital markets, CCRIF functions as a joint reserve mechanism and enhances its members' financial resilience to disasters caused by natural events. By providing a policy payout in 14 days or less – in the event of a tropical cyclone or earthquake of sufficient magnitude (based on pre-agreed policy trigger) – CCRIF represents an efficient instrument to provide short term liquidity, as part of a broader Disaster Risk Financing and Insurance (DRFI) strategy.

**This initiative for the Caribbean and Central American Partnership for Catastrophe Risk Insurance requires initial support from donors to capitalize the facility and reduce premium costs.** Donors are in a unique position to help expand this tested model to a highly vulnerable region and to be an early supporter of what has already become a replicable model. Grant resources from donors will help build COSEFIN reserves more quickly. As CCRIF builds its risk-bearing capacity for the COSEFIN portfolio during the implementation, higher price ratios will be offered at the end of this initiative. Under a conservative retention scenario, for each additional US\$10 million of retention, about 10 percent of further premium reduction beyond the initial pooling benefit would be achieved.

**Multi-country risk pooling allows significant savings for members.** COSEFIN members that join CCRIF will pool their risk in a separate portfolio from the Caribbean countries, but both sub-regions will approach the reinsurance market jointly. Accessing the reinsurance market with a diversified risk pool and adequate reserves, will allow COSEFIN members to benefit from an approximate 36 percent reduction in premium costs, in comparison to the indicative commercial premium for individually purchasing catastrophe insurance on the open market.

1 Sixteen governments are current members of CCRIF: Anguilla, Antigua & Barbuda, The Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, Trinidad & Tobago and the Turks & Caicos Islands. CCRIF has begun or will soon begin to offer new products, which include excess rainfall coverage as well as insurance/reinsurance for weather-related risks to small entrepreneurs in the Caribbean and financial institutions that lend to them. Today, CCRIF actively seeks to expand its membership base.

## I. Introduction

**C**ountries in the Caribbean and Central America are highly vulnerable to the adverse effects associated with earthquakes, tropical cyclones, and other major hydro-meteorological events such as excess rainfall. Key socio-economic sectors including transport, health, education, water and sanitation, and agriculture have been greatly affected by disasters caused by natural hazard events. Response efforts in the immediate aftermath of disasters typically place significant strain on the fiscal systems of affected countries. Consequently, Ministers of the Central American Integration System (SICA<sup>2</sup>) and CARICOM countries have expressed a strong intention to collectively manage their disaster risk. Doing so will enhance the fiscal resilience of Caribbean and Central American countries.

*Since 1980, nine countries in the Caribbean and Central America have experienced a disaster event with an economic impact greater than 50 percent of their annual gross domestic product (GDP).* These countries include<sup>3</sup>: Saint Lucia (1980), Jamaica (1988), Antigua and Barbuda (1995), Dominica (1995), Saint Kitts and Nevis (1995, 1998), Honduras (1998), Grenada (2004), Guyana (2005), and Haiti (2010) (See Annex 1). Although earthquakes are associated with the highest probable maximum loss per event to governments in Central America and some Caribbean islands, extreme rainfall events have been known to cause the greatest accumulated losses to certain countries in the Caribbean basin. Hydro-meteorological disasters are by far the most frequent in both sub-regions, with associated economic damages equivalent to more than 1 percent of national GDP per year for 14 countries in the sub-regions<sup>4</sup>.

*Disasters caused by natural events represent a significant explicit and implicit contingent liability to governments, which is often associated with large fiscal costs.* This liability is often implicit; governments often act as (re)insurers of last resort, without precisely knowing its disaster risk exposure. By understanding the loss potential of disasters caused by natural events and the extent of public intervention in recovery and reconstruction efforts, governments can ascertain their respective contingent liabilities. Sovereign disaster risk financing and insurance can also

<sup>2</sup> SICA is the Central America Integration System (Sistema de la Integración Centroamericana). Under SICA, the Ministers of Finance are organized in COSEFIN. The rest of the document will refer to COSEFIN rather than SICA.

<sup>3</sup> The year of the disaster event is indicated in parentheses.

<sup>4</sup> According to the Global Climate Risk Index 2013 compiled by S. Harmeling and D. Eckstein for Germanwatch, the average annual economic losses due to weather-related disasters as a percent of GDP in the period from 1990 to 2012 were: Grenada (9), Dominica (7), St. Kitts (5), Belize (4), Antigua and Barbuda (4), Honduras (3), Saint Lucia (2), Nicaragua (2), Guyana (1), Haiti (1), El Salvador (1), Jamaica (1), Guatemala (1), and Saint Vincent (1).



<http://earthobservatory.nasa.gov/>

safeguard against sudden macroeconomic shocks that negatively impact fiscal performance, and, in turn, economic development.

*Caribbean and Central American governments are constrained in their ability to access quick liquidity to absorb fiscal shocks associated with natural hazard impacts because they have limited ability to create contingency funds, and limited capacity for external borrowing.* The relatively small size of Caribbean and Central American economies, combined with constrained public finances, increases the opportunity costs of allocating resources to contingency reserves (See Annex 2).

*Post-disaster liquidity is an important tool for post-disaster recovery.* A critical challenge confronting governments in the aftermath of a disaster is the need for short-term liquidity, which is vital for assuring emergency response activities.

## II. What is the framework of the initiative?

**T**he objective of the proposed initiative is to improve affordability of high quality sovereign catastrophe risk transfer associated with tropical cyclones, earthquakes, and/or excess rainfall for COSEFIN and CARICOM member countries, and to enhance the capacity of Ministries of Finance for developing and implementing disaster risk financing and insurance strategies. This objective will be achieved through expanding CCRIF services and membership and will contribute to the fiscal resilience of participating countries for covered catastrophic events.

*The proposed initiative will be financed through the payment of annual insurance premiums by (current and new) CCRIF member countries as well as through donor contributions.* Donors will play a critical role in financing CCRIF expenditures associated with retention and transfer of its pooled catastrophe risk for a period of four years. This would allow CCRIF to offer cheaper catastrophe coverage options to its members than it could without donor contributions. At the same time donor support will help CCRIF in building capital reserves for the sustainable continuation of its operations beyond this four-year initiative. This will be implemented through four components:

- \* **Component 1: Finance Parametric Earthquake Risk Insurance for COSEFIN countries within CCRIF.** Component 1 will finance costs associated with reinsurance for earthquake risk contracts and/or accessing capital markets as well as financing all insurance payouts<sup>5</sup> not covered by reinsurance in the aftermath of an earthquake. This funding will help CCRIF build reserves to underwrite coverage more quickly. As CCRIF builds its risk-bearing capacity for the COSEFIN portfolio during project implementation, higher coverage price ratios for the earthquake product will be offered over time.
- \* **Component 2: Finance Parametric Climate Risk Insurance for COSEFIN countries within CCRIF.** Component 2 will enable CCRIF to provide tropical cyclone (hazards related to wind speed and storm surge) and/or excess rainfall coverage to COSEFIN members as a measure to adapt to climate change. The corresponding tropical cyclone models for

5 Payouts paid would depend on individual country decisions regarding the level of premium and the amount of risk transferred to the reinsurance/capital market. Payouts for earthquakes will depend also on the source magnitude and hypocenter (location and depth) of the earthquake using data obtained from the United States Geological Survey (USGS). The magnitude of the earthquake is translated into a ground shaking intensity across each affected country which in turn drives generation of a modeled loss. The payout increases as the level of losses increases, and losses are directly calculated from the amount of ground shaking in the affected country and what assets are exposed to what level of shaking. The specific payout totals are based on the level of coverage a country has. Each individual country chooses its own coverage options in terms of the deductible coverage limit, the ceding percentage, and premium.

COSEFIN countries are available and the insurance coverage is ready to be offered for the 2014 hurricane season, yet technical design work remains to be completed for the excess rainfall product. This work includes preparing a country-risk assessment model, calibrating this model, performing actuarial analyses, and designing country-specific insurance based on these parameters. This component would finance the technical and insurance design work to underwrite the potential excess rainfall losses in close collaboration with the interested countries, starting in 2015.

*Component 2 will cover the main costs of CCRIF's risk retention and transfer with regards to the tropical cyclone and excess rainfall perils of participating COSEFIN countries.* The three specific activities financed under this component include the following: (i) covering all costs associated with reinsurance contracts and/or accessing capital markets; (ii) financing all insurance payouts not covered by the reinsurance in the aftermath of a tropical cyclone<sup>6</sup> or excess rainfall event; and (iii) consultancy services required for the technical work to develop the excess rainfall products.

- \* ***Component 3: Finance Parametric Climate Risk Insurance for CARICOM countries within CCRIF.*** Component 3 will enable CCRIF to provide excess rainfall coverage to CARICOM member countries as a measure to better adapt to climate change. The current tropical cyclone policy for CARICOM countries is linked to wind and storm surge damage caused by an eligible hurricane. In response to strong interest expressed by CARICOM stakeholders, CCRIF initiated designs of a new insurance product to cover disasters caused by excess rainfall, both due to hurricanes and other hydro-meteorological events. As of April 2014, CCRIF has generated preliminary country-risk assessment models for excess rainfall and is advancing work on model calibration in collaboration with interested governments.

*This component will cover the main costs of CCRIF's risk retention and transfer with regards to excess rainfall perils of participating CARICOM countries.* Three specific activities are financed under this component: (i) covering all costs associated with reinsurance contracts and/or accessing capital markets; (ii) financing all insurance payouts not covered by the reinsurance in the aftermath of an excess rainfall event; and (iii) consultancy services required for the technical work needed to develop the excess rainfall product.

- \* ***Component 4: Technical Assistance and Capacity-Building for Disaster Risk Financing and Insurance.*** Under Component 4, technical assistance will enhance the capacity of current and new CCRIF member countries to safeguard fiscal accounts and balances against natural catastrophes while allowing for rapid mobilization of resources in case of a disaster. Overall activities will therefore support the following three objectives: (i) the generation of catastrophe risk profiles for each country and measurement of each country's contingent liabilities; (ii) the design of catastrophe risk financing strategies; and (iii) the strengthening of transparency and accountability related to post-disaster budgetary management and damage evaluation.

<sup>6</sup> The payouts for hurricanes are determined based on government losses calculated using storm data from the National Hurricane Center and parameters fixed within the loss estimation model used to underpin CCRIF's policies. The model calculates the level of wind and ocean hazards, such as storm surge encountered across the affected area, and uses the pre-fixed value and distribution of government exposures to those hazards to calculate a government loss.

### III. What is CCRIF, and how has it been beneficial for Caribbean countries?



**C**CRIF is the world's first multi-country catastrophe risk pooling mechanism, and also the first insurance facility to successfully develop parametric policies backed by both traditional reinsurance and capital markets. Established in 2007 and registered as an insurance company in the Cayman Islands, CCRIF functions as a joint reserve mechanism and enhances its members' financial resilience to natural hazard events, such as hurricanes and earthquakes, by providing financial liquidity when a policy is triggered.

*Since 2007, CCRIF has made eight payouts of a total value of US\$32 million to its current members, and these payouts have proven useful to manage budget volatility in the immediate aftermath of a disaster (See Table 1).* Seven CCRIF members that were affected by covered natural hazard events received a rapid payout providing immediate liquidity at a critical time, with no restriction on the use of these funds. This flexibility allowed the recipient countries to implement their emergency response activities more efficiently than would have been possible without the payouts or incurring additional public debt in the short-term.

*The satisfaction of current CCRIF members is best measured by the consistent annual policy renewal of all 16 countries since 2007.* For the seventh consecutive year (June 1, 2013 to May 31, 2014), all 16 original members renewed their policies. For the current policy year, the combined aggregate coverage limits for all participating countries were US\$368 million for tropical cyclone events and US\$251 million for earthquake events.

**Table 1: CCRIF payout summary since 2007**

Country	Event	Date	Payout (US\$)
Dominica	Earthquake	29-Nov-07	528,021
St. Lucia	Earthquake	29-Nov-07	418,976
Turks and Caicos Islands	Tropical Cyclone Ike	1-Sep-08	6,303,913
Haiti	Earthquake	12-Jan-10	7,753,579
Anguilla	Tropical Cyclone Earl	1-Aug-10	4,282,733
Barbados	Tropical Cyclone Tomas	1-Oct-10	8,560,247
St. Lucia	Tropical Cyclone Tomas	1-Oct-10	3,241,613
St. Vincent and the Grenadines	Tropical Cyclone Tomas	1-Oct-10	1,090,388
<b>Total payouts:</b>			<b>32,179,470</b>



G.J. Arango, 2012

*On the financial side, CCRIF has proven to be robust with seven years of demonstrated experience in successfully securing reinsurance contracts and making timely payouts to participating countries in the event of an eligible catastrophe.* At the end of the financial year 2012—2013, CCRIF's externally audited financial statements showed assets of US\$125.1 million, while confirming that CCRIF has followed standard commercial practices and transparent audit reports. For the current policy year, CCRIF retained US\$27.5 million of risk and reinsured an additional US\$107.5 million, giving it the capacity to make payouts arising from a series of catastrophic events having a modeled probability of occurring only once in 536 years, without drawing on more than US\$27.5 million of its own assets.

*The Facility is designed to provide affordable insurance while remaining financially sustainable.* The high level of country enrollment allows CCRIF to diversify its portfolio efficiently and thus access reinsurance on more affordable terms. The high level of country enrollment permits CCRIF to offer lower premiums than would be charged if individual countries were to approach the reinsurance market directly, providing an average savings of 36 percent.

## IV. What is parametric insurance, and what are its benefits?

**C**CRIF's insurance coverage relies on parametric methods, which are a cost-effective way to finance any liquidity gap arising in the immediate aftermath of a disaster. Parametric insurance products are insurance contracts that make payments based on the intensity of an event (for example, wind speed, earthquake intensity, volume of rainfall) or the amount of loss calculated in a pre-agreed model. Unlike traditional insurance settlements that require an on the ground assessment of individual losses, parametric insurance relies on an assessment of losses using a predefined methodology that is based on variables that are exogenous to both the individual policyholder and the insurer, but have a strong correlation to individual losses. (See Annex 3 for more details on CCRIF's catastrophe model.)

*Parametric insurance is typically less expensive than traditional indemnity insurance and allows for faster payouts.* The selection of a parametric instrument as a basis for CCRIF policies was largely driven by the fact that this type of insurance is generally: (i) more cost-effective than a traditional indemnity insurance product as it does not require a loss assessment procedure in the case of a hazard event, (ii) much easier to administer, and (iii) carries a lower uncertainty loading by reinsurers. Parametric insurance also allows for claims to be settled very quickly. This is an important feature considering the urgent need for liquidity after a catastrophe. In addition, the instrument is also less exposed to moral hazard and adverse selection problems (which are costly to monitor) as the cost of insurance can be immediately related to the probability of an event and the payout is independent of any mitigation put in place after the policy is issued. The parameters of CCRIF's insurance policies are illustrated in Box 1.

## Box 1: The parameters of CCRIF insurance coverage

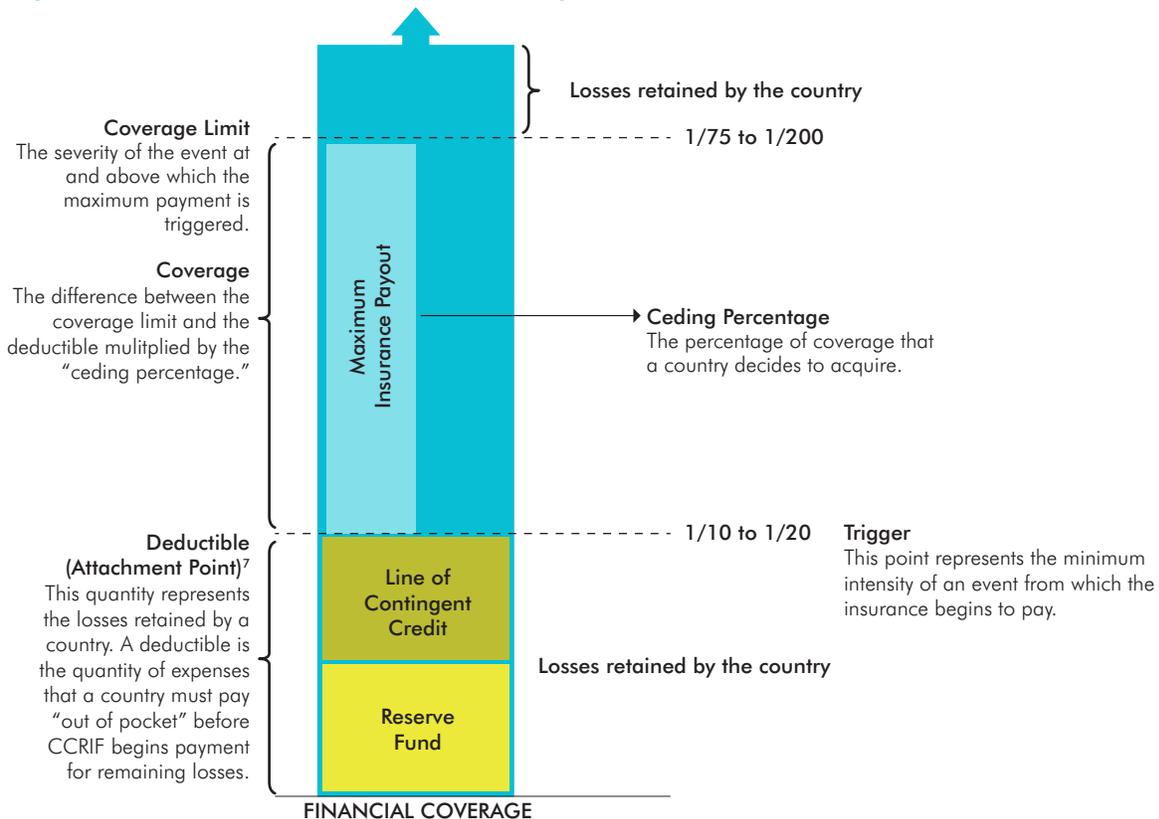
Participating countries decide on the parameters of their coverage. The procedure is broadly similar for earthquakes, tropical cyclones, and excess rainfall. The policyholder needs to determine the following parameters (see Figure 1):

- \* **Deductible:** The “deductible” is based on the likely severity of the event that gives rise to a payment, and therefore is the loss value at which the contract is triggered. Under CCRIF’s current policy parameters, the event cannot be more frequent than a 1-in-10 year event (i.e. an event of catastrophic proportions that it is statistically unlikely to occur more frequently than one in ten years). Generally, CCRIF members have chosen deductibles between 1-in-10 to 1-in-20 years for cyclones and 1-in-20 to 1-in-50 years for earthquakes.
- \* **Coverage limit:** The severity of the event at and above which the maximum payment is triggered. This is called the coverage limit. Current CCRIF members have chosen coverage limits between 1-in-75 and 1-in-200 years.
- \* **Ceding percentage:** The portion of the estimated government loss between the deductible and coverage limit that is covered by the policy.

Payouts for earthquakes would depend on the magnitude, and hypocenter (location and depth) of the earthquake using data obtained from the USGS. Earthquake magnitude is translated into a ground shaking intensity across each affected country, which in turn drives the generation of a modeled loss. The payout increases as the level of losses increases, and losses are directly calculated from the amount of ground shaking in the affected country and what assets are exposed to what level of shaking.

Payouts for hurricanes are determined based on government losses calculated using storm data from the National Hurricane Center and parameters fixed within the loss estimation model are used to underpin CCRIF’s policies. The model calculates the level of wind and ocean hazards, such as storm surge, encountered across the affected area and uses the pre-fixed value and distribution of government exposures to those hazards to calculate a government loss.

**Figure 1: Parameters of insurance coverage**



<sup>7</sup> The attachment point can be described as the minimum severity of the event loss which gives rise to a payment and therefore is the loss value at which the policy contract is triggered. The attachment point therefore functions like a deductible in a standard insurance policy.

## V. Why is risk pooling beneficial to all members of CCRIF?

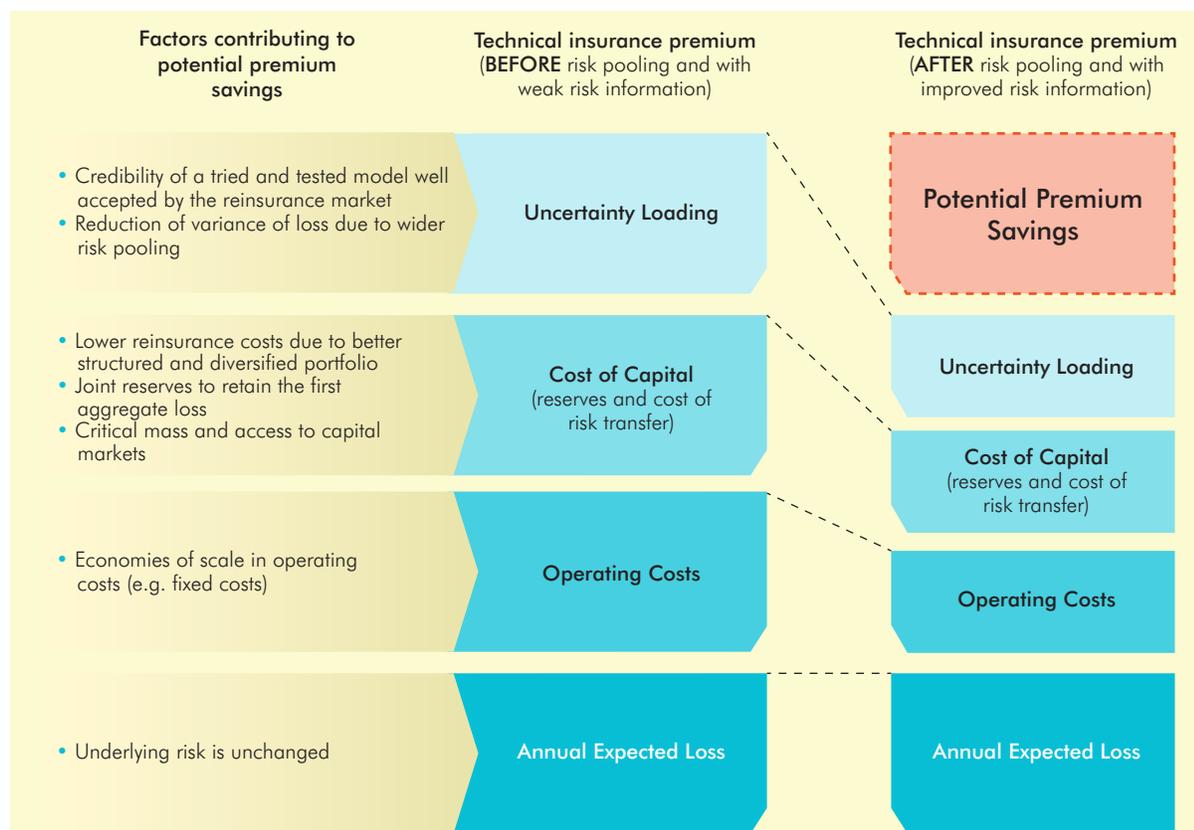
**A**s a risk aggregator, CCRIF will provide insurance coverage to participating countries at a significantly lower cost than individual governments could obtain on their own, by enabling participating countries to pool their individual risks into a single, better diversified portfolio. The pooling concept makes the overall risk more stable and therefore more attractive to the reinsurance market, thereby reducing the cost of reinsurance. Since disaster risks among the Caribbean islands are not perfectly correlated, the variance of the losses under CCRIF insurance portfolio is less than the combined variance experienced by the individual states. With a possible inclusion of Central American countries, the variance of losses in the expanded CCRIF insurance portfolio would further decrease.

*COSEFIN countries could benefit from savings roughly equivalent to 36 percent of the total premium volume and CARICOM countries could benefit from additional savings equivalent to 25 percent if countries approach the reinsurance market and capital markets through CCRIF together rather than independently.* Covering diverse risks implies that payments will trigger with more regularity and there will be less uncertainty with regards to the timing and amount of capital that needs to be available for payouts. Therefore, less capital is required per country to be held in a risk reserve or paid as part of an insurance premium in order to ensure solvency for an event of a specified return period. The underlying risk of each country is unchanged in the risk pooling mechanism. This means that the cost reduction in the insurance premium does not provide a disincentive for countries to also work on improving their disaster risk reduction with an aim to reduce their annual expected losses. There are five key aspects that will allow cost savings for both current and new members of CCRIF: (i) diversification itself, (ii) CCRIF reputation in international reinsurance markets (iii) economies of scale on operating costs, (iv) higher CCRIF retention of lower layers of reinsurance coverage, and (v) access to capital market because of the size of the aggregated portfolio (See Figure 2).

*As country membership, capital from donors, and the size of the bundled portfolio increase, there is a directly correlated increase in the benefit for both partners.* Table 2 shows possible benefits for both CARICOM and COSEFIN members under different scenarios.

*The deeper the partnership between current and new members of CCRIF, the greater the benefit is for both of them.* If only three countries pool their risk they can experience reductions of at least 20% in their indicative premium. Actual benefits to the three COSEFIN countries may be higher, because there would be a significant pricing advantage that we have not been able to quantify

**Figure 2: Conceptual benefits and premium savings due to risk pooling and improved information**



**Table 2: Premium savings distributed based on each sub-region's average annual loss**

Possible Participation Scenarios with New COSEFIN Members	COSEFIN	CARICOM
A) Three Central American countries join <sup>1</sup>	20%	Fee
B) Three countries join & Increased capital retention capacity of US\$7.5 million <sup>2</sup>	22%	10%
C) Six countries join & Increased capital retention capacity of US\$15 million <sup>3</sup>	27%	11%
D) Six countries join & Increased capital retention capacity of US\$7.5 million & Access to capital market <sup>4</sup>	36%	25%

Notes:

- Minimal level of partnership: the reinsurance is placed through CCRIF without sharing diversification. CCRIF will charge a service fee corresponding to the value of the use of CCRIF brand and risk model.
- Based on donor contributions of US\$35 million.
- Based on donor contributions of US\$75 million.
- Same as scenario C, but due to its size, CCRIF can access the capital market and reduce its cost by US\$2m.

associated with the market's trust in CCRIF as a risk placer compared to any new risk placer in the market. If, on top of the three-country pool, CCRIF mixes its own portfolio and increase its current retention by US\$7.5m, both COSEFIN and CARICOM members would obtain additional benefits. Such benefits are increased if there are six countries and higher retention (because more capital is available). If CCRIF has enough volume of risk to place, it could access the capital markets for risk transfer of part of its risk, which could lead to additional cost savings. These scenarios illustrate the importance of one-time capital provided by donors and the benefits of intra-regional and inter-regional collaboration. Finally, it is important to mention that the reinsurance market is currently soft, but eventually the market will become hard again, implying savings may be higher with higher prices in the future than with current ones.

## VI. What is the cost of insurance coverage?

**P**olicies are priced individually according to the characteristics of the coverage that each participating government chooses<sup>8</sup>. CCRIF offers flexible terms and conditions that allow its members to tailor the coverage to their own catastrophe risk financing strategy. CCRIF members decide whether to obtain coverage for earthquakes, tropical cyclones, excess rainfall, or all of these events, and determine the frequency and severity of the potential perils they wish to cover. In doing so, they factor in a number of considerations, including the premium they wish to pay, their access to other domestic or external sources of finance in the event of a disaster, and the speed with which they could access these resources following the disaster.

*Indicative parameters for insurance coverage (by country) for the new members are provided in Table 3 below, for an insurance premium of US\$5 million per peril.* For instance, taking the example of Honduras, Table 3 demonstrates that a US\$5 million premium will allow Honduras to insure earthquake events with a deductible of US\$5 million and coverage limit of US\$139 million. The minimum (maximum) coverage would be equivalent to US\$108 (134) million (with the range due to the potential low and high end of the pricing that CCRIF will achieve for the Central American countries in year 1 of their pool). The rate-on-line, which is defined as the cost of insurance expressed as a percentage of the coverage, would be equivalent to 3.86 percent.

*Table 4 provides an overview of CCRIF premiums for current members and aggregated risk (per peril and total).* The table demonstrates that for the 2013—14 season, a total premium of US\$19 million (US\$12 million for tropical cyclone insurance and US\$7 million for earthquake insurance) would cover a total aggregate risk of US\$619 million (US\$368 million for tropical cyclone insurance and US\$251 million for earthquake insurance).

*It is important to note that a CCRIF policy does not offer full insurance coverage for all damages and losses associated with a disaster event.* The choices a country faces in considering risk transfer options are best informed if made as part of a broader DRFI strategy (see Box 2). A comprehensive DRFI strategy allows governments to employ a broad range of instruments that mitigate the impact of small but recurrent hazard events, as well as more destructive and less frequent ones. A DRFI strategy takes into account (i) the timing of resources needed following

<sup>8</sup> The basis for calculating the cost of transferring risk to the market in partnership with CCRIF is the catastrophe modeling and a government's choice of insurance coverage. Through the "Multi-Peril Risk Estimation System" (MPRES), CCRIF calculates a participating government's average annual loss (AAL) for the risk it is transferring to CCRIF. The insurance premium a government will pay for annual coverage is then set based on the AAL and the standard deviation of losses, in order to cover the combined cost of AAL, CCRIF's operating costs, and its needs for reserve growth in line with its reinsurance strategy.

**Table 3: Parameters of insurance coverage provided at a cost of US\$5 million per peril (earthquake or tropical cyclone)**

Country	Deductible (US\$) (20 years)	Coverage Limit (US\$) (150 years)	Annual Limit (US\$) (Minimum)	Annual Limit (US\$) (Maximum)	Rate on Line (US\$) (Median)
Costa Rica (EQ)	67 M	682 M	140 M	177 M	3.15%
Dominican Republic (EQ)	44 M	566 M	135 M	172 M	3.26%
El Salvador (EQ)	163 M	1,091 M	132 M	167 M	3.34%
Guatemala (EQ)	198 M	1,499 M	133 M	168 M	3.32%
Honduras (EQ)	5.0 M (10 years)	139 M	108 M	134 M	3.86%
Nicaragua (EQ)	56 M	424 M	131 M	165 M	3.38%
Panama (EQ)	23 M	284 M	137 M	174 M	3.22%
Dominican Republic (TC)	290 M	2,762 M	133 M	169 M	3.31%
Guatemala (TC)	5.0 M	34 M	22 M	28 M	3.50%
Honduras (TC)	10 M (10 years)	135 M	80 M	96 M	5.68%
Nicaragua (TC)	1.0 M (10 years)	93 M	75 M	92 M	5.48%

\*Premium is \$5M per peril subject to max 100% ceding. Guatemala TC premium is \$875K, Honduras EQ premium is \$4.675M, Nicaragua TC premium is \$4.575M  
EQ=Earthquake; TC=Tropical Cyclone; M= Million.\*

**Table 4: CCRIF premium and risk summary for Caribbean countries, 2007–2014 (US\$ million)**

Year	Total Premium	Total Aggregate Risk	Tropical Cyclone Premium	Tropical Cyclone Aggregate Risk	Earthquake Premium	Earthquake Aggregate Risk
2007-08	19	495	14	365	5	130
2008-09	22	562	15	385	7	177
2009-10	21	601	14	408	7	193
2010-11	21	618	13	386	8	232
2011-12	20	624	12	371	8	253
2012-13	20	626	12	373	8	253
2013-14	19	619	12	368	7	251

disaster events, (ii) a quantified understanding of the sovereign risk the government is seeking to manage, and (iii) a mix of retention and risk transfer mechanisms that most efficiently matches the government’s needs. Parametric insurance instruments such as those provided by CCRIF should be part of such a strategy, whereby a CCRIF policy covers short-term liquidity problems resulting from high-risk layer events such as earthquakes, tropical cyclones, and excess rainfall.

## Box 2: Conceptual framework for sovereign financial protection against natural hazards

The World Bank has developed an operational framework for Ministries of Finance to develop a sustainable and effective budget protection strategy against natural hazards, as part of their broader fiscal risk management program. The World Bank framework for disaster risk financing aims to assess the contingent liabilities associated with natural hazards; manage the budget volatility caused by natural hazards; and reduce the government's contingent liability associated with natural hazards by promoting ex ante risk financing solutions.

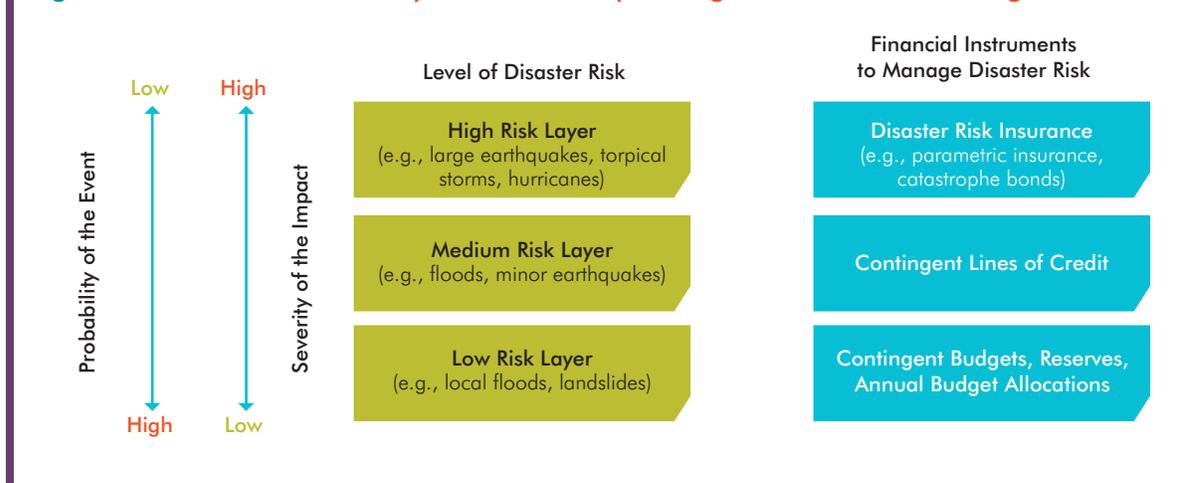
An effective budget management strategy should allow for rapid mobilization of resources in case of a disaster, while protecting fiscal accounts. When confronted by a disaster, governments must mobilize resources quickly without jeopardizing their fiscal balance. This is generally done by building a financial protection strategy that combines a number of instruments in a risk-layering approach to match potential financial needs and manage volatility on the fiscal accounts. The strategy incorporates budget allocations and reserves, contingent credit, and risk transfer instruments (Figure 3). This initiative focuses on risk transfer solutions for the high risk layer that complement the instruments used in lower risk layers.

Market-based risk transfer is usually an effective but expensive proposition for governments that otherwise have access to sovereign financing. The swiftness at which risk transfer instruments can provide liquidity without requiring access to credit makes them attractive to some governments. This is particularly the case for smaller states that do not generally have sufficient capacity to build reserves and are restricted in their access to credit due to already high debt ratios. CCRIF provides an example where small island states acted together to create a regional reserve mechanism to secure access to immediate liquidity in case of a major disaster. Risk transfer instruments can also be useful to manage the budget volatility on government accounts, for example when the speed of post-disaster budget reallocation is an issue. The cat bonds issued by Mexico in 2006, 2009, and 2012 provide an example of creative use of risk transfer instruments.

Catastrophe risk pooling, at the regional or national level, aggregates risk into larger, more diversified portfolios, with participants benefitting from cost savings and access to international markets. The cost of risk transfer to international markets depends on many factors, including the riskiness of the portfolio as a fraction of the size of the portfolio and the amount of capital (if any) directed toward risk retention. Pooling risks generate diversification benefits that are reflected in reduced insurance premiums.

An optimal national DRFI strategy combines ex ante and ex post financial instruments. Ex ante instruments, such as the insurance provided by CCRIF, allow immediate injections of liquidity in the aftermath of disasters that ensure continuity of government operations and enable critical infrastructure to be quickly restored. Examples of ex ante instruments include reserve funds, contingent financing, and risk transfer. Funding from ex post instruments is normally greater but arrives later in the recovery and reconstruction phases and can be used to finance reconstruction costs. Examples include budget contingencies, budget reallocation, debt, and tax increases.

Figure 3: The different risk layers and corresponding disaster risk financing instruments



## VII. What are the benefits for CARICOM members and COSEFIN states in joining CCRIF?

**T**he specific benefits associated with a CCRIF partnership for both current and new members are significant. Four anticipated benefits include: (i) lower premiums for all participating countries, (ii) cost-savings due to efficiency and scale, (iii) increased access to reinsurance and capital markets, and (iv) enhanced regional collaboration and cooperation. Detailed discussion of these benefits is provided below.

- \* **Lower Premiums.** COSEFIN countries could benefit from savings roughly equivalent to 36 percent of the total premium value when approaching the reinsurance market through CCRIF. As part of a collective, CCRIF members are able to secure premiums from the reinsurance market at rates lower than if individual states went to the market independently, or if COSEFIN decided to create its own CCRIF-like mechanism. Savings resulting from the partnership can be shared among COSEFIN and current CCRIF member countries.
- \* **Cost-Savings Associated with Efficiency Gains.** While partnership agreements would first need to be finalized in order to quantify the exact cost-savings benefits, efficiency gains will nevertheless result due to the nature of parametric insurance in and of itself, as well as from the sharing of specific administrative and operating costs.
- \* **Increased Access.** CCRIF parametric model is a payout mechanism already accepted by reinsurance markets. Capital markets are increasingly interested in CCRIF as a diversification option as well, and the potential to increase CCRIF volume will likely enable CCRIF to find further efficiency gains by placing some of its risk on capital markets. This would translate into additional premium reductions for its members.
- \* **Increased Regional Cooperation and Collaboration.** Significantly, a CCRIF partnership joining COSEFIN and CARICOM states could strengthen diplomatic and economic engagement among the countries of the region at a time when countries in the Caribbean and Central America are seeking new economic opportunities and markets in their own region. A partnership with CCRIF can further solidify an existing cooperation agreement among Caribbean and Central American countries in the field of disaster risk management.



Michel Matera (2004)

*Additionally, new members will gain access to the know-how and expertise of CCRIF in multi-country risk pooling, parametric insurance, and accessing reinsurance and capital markets.* CCRIF's extensive experience working as a regional insurance entity further helps guarantee the quality of service required by new members. Significantly, the fact that CCRIF is already licensed and operating — with institutional arrangements established, service providers in place, and parametric risk transfer instruments already active — means that new members will benefit from the time-efficiency, and greatly reduced implementation risk, associated with joining a mechanism that is tried and tested.

*Significant benefits are also associated with pooling risk to safeguard against excess rainfall.* Figures show that while less intense than large events (i.e. tropical cyclones and earthquakes), catastrophic events associated with excess rainfall (e.g. flooding, landslides) are more frequent. By some estimates, excess rainfall events are associated with economic damages equivalent to more than 1 percent of national GDP per year for 14 countries in the sub-regions. It is within this context that the same rationale for developing a risk pooling mechanism for earthquakes and tropical cyclones applies and arguably more economic benefits could arise for participating countries in CCRIF excess rainfall product line. This product will likely be available for Caribbean members in 2014 and Central American members in 2015.

*The benefits of CCRIF membership for COSEFIN and CARICOM countries are associated with minimal risk to the existing capital, structure and/or operations of the Facility.* COSEFIN membership in CCRIF will be achieved via the establishment of a segregated portfolio, which pools the tropical cyclone and earthquake risk of participating COSEFIN member states. The segregation of the portfolio makes it possible for current CARICOM members to keep their accumulated capital reserves legally separate from new COSEFIN members' capital reserves and risk. Additionally, CCRIF annually models its exposure, and on the basis of this modeling, CCRIF Board makes decisions annually on its maximum desired exposure to any single member's risk. Therefore, the risk to current members of allowing COSEFIN countries to join is minimal.

## VIII. How will this initiative be implemented?

**B**ased upon past experience and lessons learned during the initial creation of CCRIF, the World Bank is establishing a Multi-Donor Trust Fund to facilitate the channeling of funds between donors and the proposed initiative. A Grant Agreement will be signed between the World Bank and CCRIF in the amount of donor pledges received and used for the execution of Components 1, 2, and 3 towards the financing of reinsurance premiums and/or access to capital markets and payouts within CCRIF risk retention. Under Component 1 of the MDTF, CCRIF will pool the earthquake risk of participating COSEFIN member states in a segregated portfolio. Component 2 will enable CCRIF to provide tropical cyclone (wind) and excess rainfall coverage to COSEFIN members, and Component 3 will enable CCRIF to provide excess rainfall coverage to CARICOM members. Based on lessons highlighted from the previous MDTF and requested by both client countries and donors, a fourth component has been included to provide Bank-executed technical assistance, which is designed to complement the implementation of Components 1, 2, and 3. Technical assistance will be strategically used to enhance DRFI capacities among client countries as well as ensure timely delivery of the Caribbean and Central America Catastrophe Risk Insurance Program (See Figure 4).

*Insured countries will pay an annual premium commensurate with their own specific risk exposure.* Parametric insurance products will be priced for each country based on the individual country risk profile. Annual premiums will typically vary between US\$200,000 and US\$5 million. A limited portion of the premiums paid by participating countries will be dedicated toward the payment of administrative costs (minimal), while donor contributions will reduce expenses incurred by client countries when participating in CCRIF. The combination of country premium payments and donor contributions will help build the needed reserves over the lifespan of the Trust Fund, thereby creating a self-sustaining initiative by the time of Program close<sup>9</sup>. (See Figure 5.)

*CCRIF is restructuring itself as a Segregated Portfolio Company (SPC) under the laws of the Cayman Islands pertaining to captive insurance companies, in order, inter alia, to manage COSEFIN risk effectively.* CCRIF expects to complete the necessary documentation for this legal transformation by June 2014. Once restructured as an SPC, CCRIF will be able to establish a segregated portfolio for each of its business lines. Initially, CCRIF expects to establish two segregated portfolios for tropical cyclone and earthquake risk: one for the Caribbean, and a second for Central American countries. This SPC structure also creates a “stop loss” effect for each business line, because none of the segregated portfolios have a legal right to draw capital from the other in the event that payout obligations of the policy that is underwritten exceed its own capital and reinsurance lines. Thus, capital provided to underwrite risk in the Caribbean segregated portfolio will be shielded from losses associated with underwriting in the COSEFIN segregated portfolio, and vice versa.

<sup>9</sup> Reinsurers provide risk capital through proportional or excess-of-loss treaties; they require that the primary insurer (in this case, CCRIF) retains at least some of the risk. More importantly, a critical level of initial reserves is essential to ensure the long-term sustainability of the Facility.

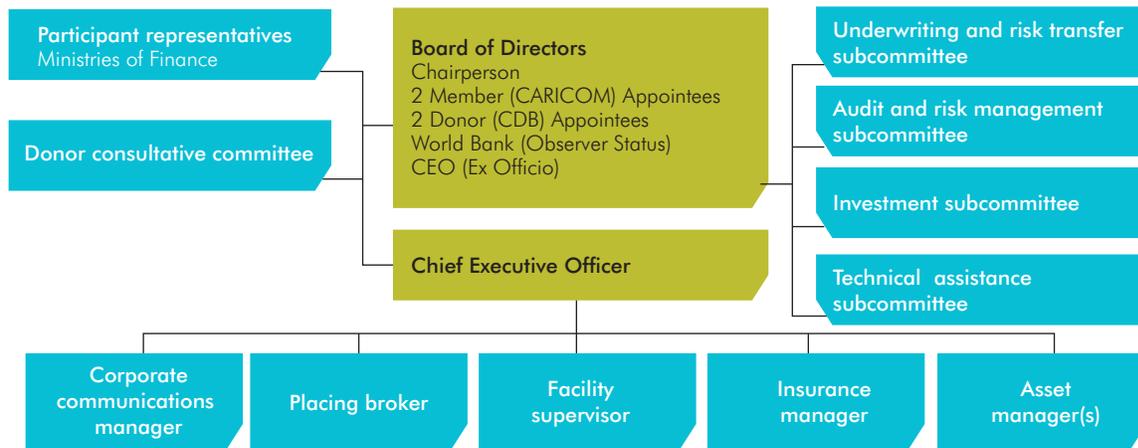


### Box 3: Current governance structure of CCRIF

CCRIF is currently governed by a Board of Directors consisting of a chairman and four Directors composed of representatives of client countries and participating donors. Two are appointed by the Trustee on instructions from CARICOM on behalf of CCRIF member states and the other two by the Caribbean Development Bank (CDB) on behalf of the donors that contributed to the first MDTF. These four Directors elect a Chairman of the Board. Reinforcing this governance structure are four Board Subcommittees: Audit and Risk Management, Risk Transfer and Underwriting, Investment Policy, and Technical Assistance. Figure 6 below details the Management Structure of CCRIF.

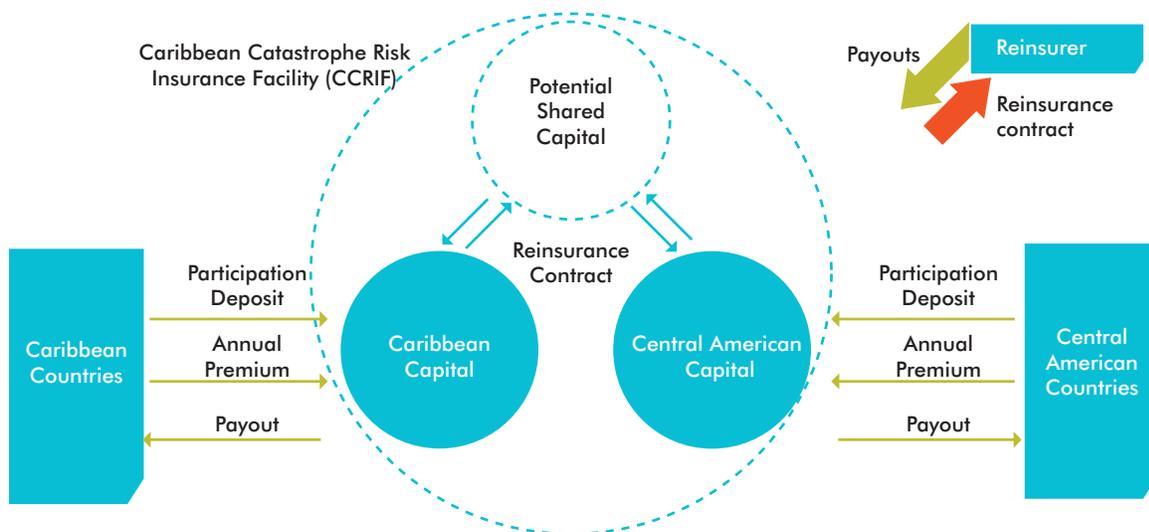
The duties of the Board members are mandated under Cayman law, and additional responsibilities are set out in the Operations Manual. The Board is responsible for making strategic decisions and is supported with technical advice from a Facility Supervisor, and by other services provided by various contracted service providers, including an Asset Manager and a Placing Broker. The Chairman's duties include deciding which matters need to receive full Board attention, subject, however, to advice on regulatory/legal aspects from the Insurance Manager. The duties of the other Board members include but are not limited to ensuring that CCRIF is operating within the mandate of the business plan as approved by the Cayman Islands Monetary Authority, reviewing and approving the annual budget, changes to the CCRIF Operations Manual, the selection of service providers, the annual risk transfer placement and the financial structure, annual financial statements, and annual audit results.

Figure 6: Management structure of CCRIF



<http://www.ccrif.org/content/aboutus/ccrif-organisational-structure>

Figure 7: Schematic of the modalities of a Caribbean - Central American partnership in CCRIF



## IX. Why are donor contributions essential?



**D**onors will play an essential role in enabling COSEFIN states to join CCRIF by supporting the capitalization of the COSEFIN countries' risk retention capacity, similar to when CARICOM countries established CCRIF. Initial donor support in 2007 enabled CCRIF to build reserves during its first four years of operation at an accelerated pace, while also financing initial operating expenditures and paying claims within its risk retention.

*Donor contributions are associated with significant cost savings to member countries.* The reduction of the indicative premium with each additional US\$10 million of capital reserves is typically about 10 percent under a conservative retention scenario.

*In addition, initial donor support to build reserves is essential as the Facility is required to have a minimum amount of capital reserves in order to access the reinsurance market.* Reinsurers always require that the primary insurer (in this case, CCRIF) retains at least some of the risk.

*This proposed initiative was developed based on receiving strong commitment from donors to finance the initial coverage for COSEFIN countries through CCRIF, as well as the development and launch of an excess rainfall product for CARICOM and COSEFIN countries.* Participation from the international donor community is necessary in order to establish the MDTF to address Caribbean and Central American countries' requests for disaster risk insurance. As was the case at CCRIF's inception, initial donor capital will be placed in an MDTF that would be used by the Facility to make payouts until the trust fund is exhausted (See Figure 4). The MDTF will enable the underwriting of the parametric products and technical assistance for COSEFIN and CARICOM countries that will complement the entry of COSEFIN countries into CCRIF. While the parametric product is recipient-executed, the latter is Bank-executed.

*Donor support will represent an important contribution to the sustainability of the Facility.* A minimum level of initial reserves will be essential to ensure the long-term sustainability of the Central American portfolio, and therefore the Facility. These reserves will allow the Facility to retain some of the risk as well as to purchase reinsurance, giving CCRIF the opportunity to grow its reserves over time. CCRIF's financial stability and its capacity to attract and sustain business are the main factors that determine the sustainability of the proposed initiative.



Michel Matera (2005)

## Contacts

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## Annex 1: Fiscal impacts of selected disasters in the Caribbean and Central American region

Country	Year	Event Type	Name of Event	Nominal US\$ Damages & Losses	2000 Real US\$ Damages & Losses	2000 Real US\$ GDP	Damages & Losses as % Real GDP
Belize	1961	Storm	Hattie	\$60,000,000	\$181,743,227	\$90,765,704	200%
Nicaragua	1972	Earthquake	Earthquake	n/a	n/a	n/a	93%
Dominica	1979	Storm	David & Frederick	\$52,000,000	\$173,039,998	\$147,404,440	117%
Saint Lucia	1980	Storm	Allen	\$92,592,593	\$185,663,130	\$267,518,285	69%
Jamaica	1988	Storm	Gilbert	n/a	n/a	n/a	65%
Antigua and Barbuda	1995	Storm	Luis	\$350,000,000	\$460,192,062	\$649,771,716	71%
Dominica	1995	Storm	Marilyn	\$175,000,000	\$238,597,094	\$305,454,756	78%
Saint Kitts and Nevis	1995	Storm	Luis	\$197,000,000	\$261,310,686	\$306,066,092	85%
Saint Kitts and Nevis	1998	Storm	Georges	\$400,000,000	\$490,250,167	\$352,152,046	139%
Honduras	1998	Hurricane	Mitch	n/a	n/a	n/a	81%
Grenada	2004	Storm	Ivan	\$889,000,000	\$774,586,949	\$517,390,197	150%
Guyana	2005	Flood	Flood	\$465,100,000	\$416,246,243	\$738,235,712	56%
Haiti	2010	Earthquake	Earthquake	n/a	n/a	n/a	120%

Source: WB Analysis of EM-DAT database; Global Facility for Disaster Reduction and Recovery (GFDRR); Zapata, Ricardo & Benjamin Madrigal (2009), "Economic impact of disasters: Evidence from Damage and Loss Assessment (DALA) assessments by Economic Commission for Latin America and the Caribbean (ECLAC) in Latin America and the Caribbean", Economic Commission for Latin America and the Caribbean (ECLAC) - Serie Estudios y perspectivas - Mexico - No 117; ECLAC (2011), "An Assessment of the Economic Impact of Climate Change on the Agriculture Sector in Saint Lucia"; Richards, Allison (2008), "Development Trends in Jamaica's Coastal Areas and the Implications for Climate Change," Sustainable Development and Regional Planning Division, Planning Institute of Jamaica; ECLAC (2005), "Caribbean Small States, Vulnerability and Development"; Government of Haiti (2010), "Post Disaster Needs Assessment (PDNA) at a Glance".

## Annex 2: General government gross debt as percent of GDP of selected COSEFIN and CARICOM countries

COSEFIN countries								
Country	2012	2013	2014	2015	2016	2017	2018	2019
Costa Rica	35.1	37.0	39.4	42.9	46.5	50.1	53.9	57.9
Dominican Republic	30.2	33.8	35.4	36.7	38.4	39.4	40.3	41.4
El Salvador	55.1	54.9	57.1	59.5	61.7	63.8	66.0	68.0
Guatemala	24.4	24.4	25.1	25.7	26.3	26.8	27.1	27.3
Honduras	34.4	40.2	44.9	48.6	52.0	55.5	59.2	62.8
Nicaragua	43.2	42.4	40.6	39.7	39.3	38.6	38.0	37.3
Panama	42.6	41.3	41.4	41.3	38.9	36.7	34.4	32.2

Source: International Monetary Fund (IMF) World Economic Outlook Database April 2014. Estimates start after 2012 (except Dominican Republic and El Salvador, where estimates start in 2013).

CARICOM Countries								
Country	2012	2013	2014	2015	2016	2017	2018	2019
Antigua and Barbuda	87.8	92.2	100.7	102.4	100.1	97.8	95.4	93.3
The Bahamas	51.2	56.3	59.3	59.6	58.9	57.6	55.8	54.0
Barbados	85.8	92.0	94.7	95.0	94.3	92.7	90.8	88.6
Belize	75.4	75.5	80.4	92.6	91.8	91.0	90.5	91.1
Dominica	73.3	75.0	75.8	76.3	76.7	77.0	77.6	78.5
Grenada	108.5	115.0	117.0	115.7	111.7	107.2	102.3	97.8
Guyana	64.3	63.9	64.4	64.6	63.8	62.7	59.2	57.1
Haiti	16.4	21.3	24.4	29.4	34.1	38.8	42.7	46.1
Jamaica	146.9	138.9	133.7	129.1	123.9	115.4	107.0	99.0
St. Kitts and Nevis	137.0	104.9	91.2	84.6	77.3	70.7	65.6	61.4
St. Lucia	71.7	79.8	83.7	87.0	90.0	92.2	93.9	95.3
St. Vincent and the Grenadines	71.7	76.4	85.0	84.9	83.5	81.7	80.0	78.2

Source: International Monetary Fund (IMF) World Economic Outlook Database April 2014. Estimates start after 2013 (except Guyana, where estimates start in 2012).

## Annex 3: CCRIF's catastrophe risk and insurance model



**C**CRIF's parametric insurance policies are based on a 'modeled loss' approach, utilizing a catastrophe risk model consisting of five modules (see Figure 8):

**Hazard module:** *The hazard module defines the frequency and severity of a peril at a specific location or within a grid.* This is done by analyzing the historical event frequencies and reviewing scientific studies performed on the spatial distribution, severity, and frequencies in the region of interest. A simulated event set is then produced covering a thousand to tens of thousands of years of events. This module then analyzes the hazard intensity at all locations for each event in the simulated set by modeling the attenuation/degradation of the event from its source location/track to the site under consideration and evaluates the propensity of local site conditions either to amplify or to reduce the impact.

**Exposure module:** *The exposure values of "assets at risk" are estimated from available secondary data sources combined with the distribution of population.* This "proxy" approach is used when the preferred site-specific data are not available. Based on these data, the module computes the value for different exposure types in each grid cell.

**Vulnerability module:** *This module quantifies the damage caused to each asset class by the intensity of a given event at a site.* Damage is estimated in terms of a mean damage ratio (MDR). The MDR is defined as the ratio of the repair cost divided by the replacement cost of the structure. The curve that relates the MDR to the hazard (earthquake, tropical cyclone, or excess rainfall) intensity is called a vulnerability function. Each exposure type will have its own vulnerability curve for each peril.

**Damage module:** *To calculate losses, the damage ratio derived in the vulnerability module is translated into a dollar loss by multiplying the damage ratio by the value at risk.* This is done for each asset class in each grid cell. Losses are then aggregated as required. Government assets or assets that are likely to be financed with government resources can be easily isolated and an assessment of financial needs for reconstruction calculated. Based on the likely timing for reconstruction, these costs can be ventilated between short-, medium-, and long-term financial needs.

**Loss module:** *The module estimates the losses from the damage distribution.* When dealing with government losses, this module estimates relief and recovery costs and tax revenue losses.



## Annex 4: How are disaster risk financing instruments related to a broader Disaster Risk Management strategy?

**T**he use of risk transfer instruments such as CCRIF can be an important element in a country's DRM strategy. However, a comprehensive DRM strategy that includes financial instruments requires attention and policy action in a broader set of areas, as illustrated in Figure 9. A DRM strategy includes five elements: (i) risk identification, (ii) risk reduction, (iii) financial protection, (iv) preparedness, and (v) post-disaster reconstruction. The components of each are described below.

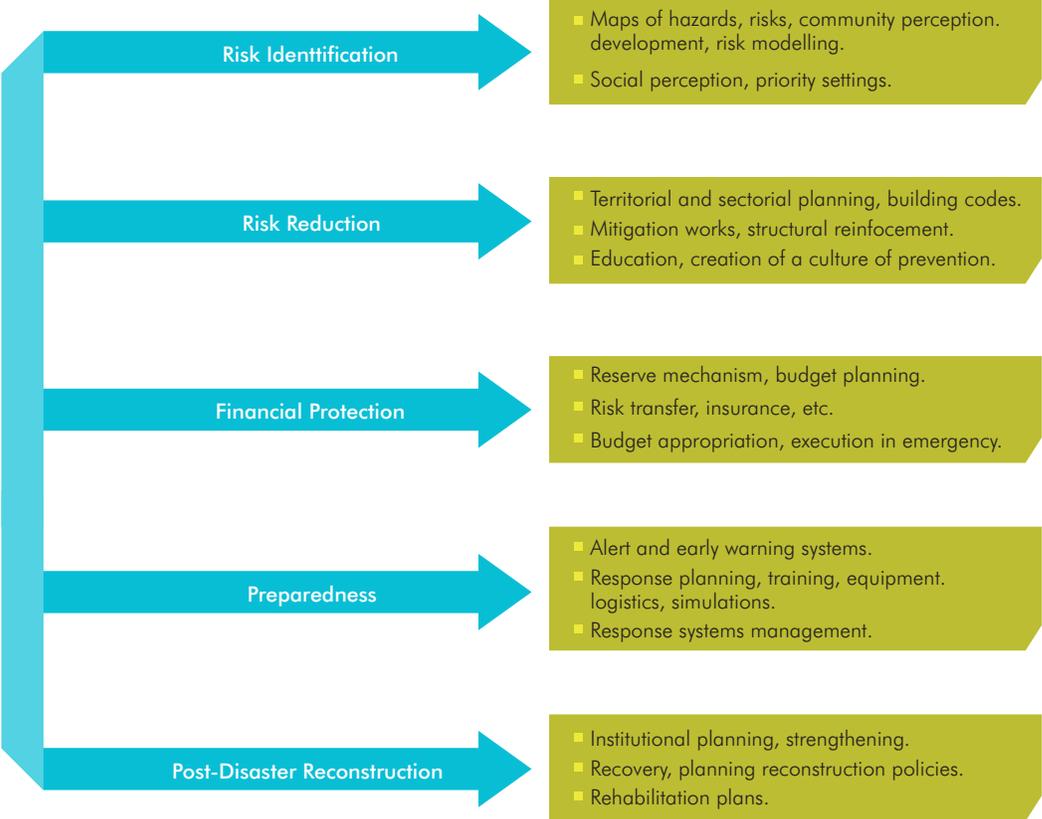
***Risk identification: Understanding hazards, exposure, and vulnerability is the first step toward managing disaster risk.*** Today, a range of new methods can help governments, communities, and private actors assess risk. Quantifying and anticipating the potential impacts of natural hazards on society and the economy, disaster and climate risk assessments can inform decisions on how to manage risk, and facilitate access to development assistance.

***Risk reduction: Action can be taken to reduce risk through development policies and investment programs.*** Information about disaster risk can help guide investment to address existing risk; for example, through the retrofitting of critical infrastructure or the establishment of social safety nets for vulnerable populations. Risk information can also guide policies and programs that seek to avoid the creation of new risks, for example through improved territorial planning or building practices.

***Adequate preparedness is essential, because risk can never be completely eliminated or reduced.*** Preparedness through civil protection and early warning systems saves lives, protects livelihoods, and is one of the most cost-effective ways to reduce the impact of disasters. Preparedness activities include enhancing capabilities at the local level to plan for and respond to disasters, and ensuring that local actors are linked to early warning systems.

***Financial protection strategies, such as the insurance provided by CCRIF, can help protect governments from the economic burden of disasters.*** Insurance increases the financial capacity of the state to respond to emergencies, while protecting the fiscal balance. Additionally, financial protection strategies also include private insurance policies purchased by businesses, households, or individuals, who insure their private property from disaster risks.

**Figure 9: The five pillars of a comprehensive disaster risk management strategy**



*After a disaster, the reconstruction process is an important opportunity to promote resilience.* The risk awareness of governments and affected populations is at its highest in the aftermath of disasters. This is the opportune time to change policies and practices that do not appropriately consider risk.





