Introduction to Disaster Risk Financing and CCRIF Parametric Insurance

DAY 4

Prepared by: CCRIF SPC

CCRIF SPC – The Caribbean’s Disaster Risk Financing Mechanism

CCRIF SPC – The Caribbean's Parametric Insurance Programme

- Prompted by Hurricane Ivan and request for assistance by Caribbean governments made to the World Bank
- CCRIF is the world's first multi-country multi-peril risk pool based on parametric insurance and provides parametric catastrophe insurance for Caribbean and Central American governments.
- CCRIF operates as a not-for-profit organization and currently provides its products and services to 19 Caribbean governments and 3 Central American governments – and 2 electric utility companies.
- CCRIF represents a cost-effective way to pre-finance short-term liquidity to begin recovery efforts for an individual government after a catastrophic event, thereby filling the gap between immediate response aid and long-term redevelopment

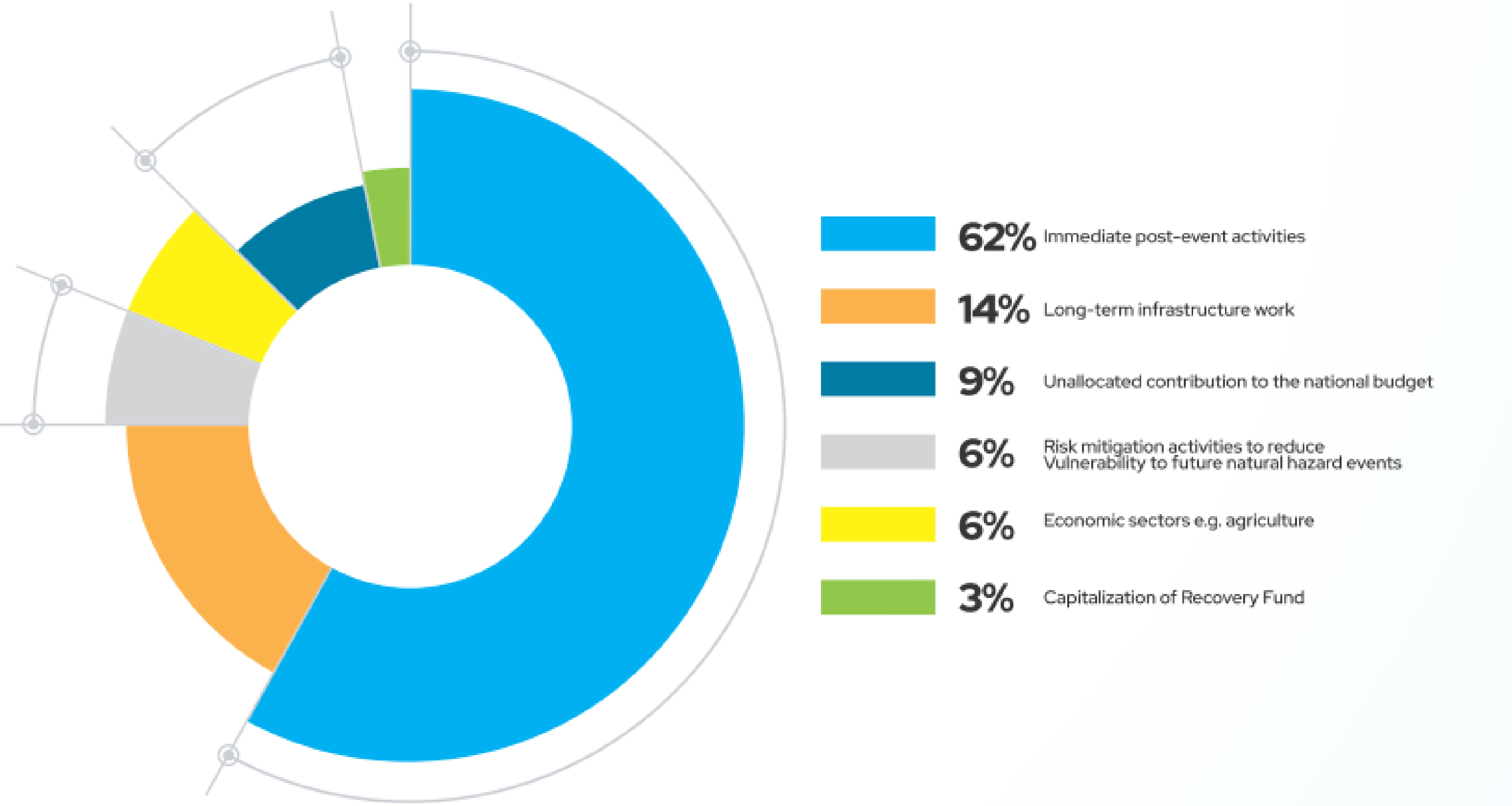
CCRIF CEO,
Mr. Isaac Anthony - Sharing Some of CCRIF's Achievements

CCRIF Parametric Insurance Products, Payouts and Use of Payouts

Tropical Cyclones | Earthquakes | Excess Rainfall | Fisheries | Electric Utilities

60 payouts totalling US$261.8 million
made to 16 member governments…
within 14 days of the event

Approximately 3.5 million persons have benefitted from CCRIF payouts since 2007.



COAST INSURANCE

- A parametric insurance product providing quick payouts
- Supports the livelihoods of fishers and others in the fisheries industry
- Designed to support governments' efforts to rapidly put money into the hands of those impacted by extreme weather, providing them with **immediate** economic relief.
- Policy includes mechanism for disseminating payout to beneficiaries in the fisheries sector
- Promotes a culture of building back better to enhance coastal community resilience after an extreme weather event
- The insurance policy and payouts are based on full transparency and accountability

C|O|A|S|T

In force since July 1st, 2019

In Grenada and Saint Lucia

CCRIF Products, Current and in Development and the Perils Covered

CCRIF Products	Perils											Add. Info
	GS	Wind	Rain	Flood	Drought	Heat Wave	Land-slide	Vol Er	Tsunami wave	Storm surge	Wave Height	
Earthquake	◆											
Tropical cyclone		◆								◆		
Excess Rainfall			◆									
Products under Development												
Drought					◆							
Run-Off				◆								
Eco Sectors Covered												
Electric Utilities		◆								◆		
Fisheries		◆	◆							◆	◆	
LPP (microins)		◆	◆									Adaptive Social Protection
Eco Sectors under Consideration												
Agriculture		◆	◆	◆	◆					◆		Including Livestock
Tourism	◆	◆	◆							◆		
Gov. Buildings and other Infra	◆	◆	◆	◆						◆		Schools, hospitals, offices, PS, houses
Housing Stock	◆	◆	◆	◆			◆			◆		

Also water utilities

Reminder: How CCRIF Parametric Insurance Policies Work

Parametric insurance disburses funds based on the occurrence of a pre-defined level of hazard and impact	Policy triggered on the basis of exceeding a pre-established trigger event loss
	Estimated based on wind speed and storm surge (tropical cyclones) or ground shaking (earthquakes) or volume of rainfall (excess rainfall)
	Hazard levels applied to pre-defined government exposure to produce a loss estimate
	Payout amounts increase with the level of modelled loss, up to a pre-defined coverage limit

CCRIF makes payouts within 14 days after an event.

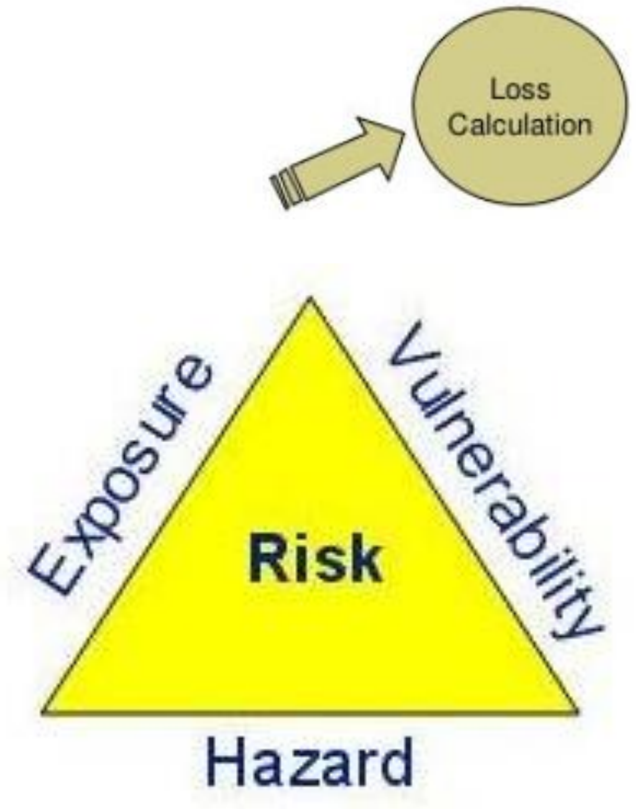
Catastrophe (Cat) Modelling

Catastrophe (Cat) modelling uses computer-assisted calculations to estimate the losses that could be sustained due to a catastrophic event

Catastrophe modeling allows insurers and reinsurers, financial institutions, corporations, and public agencies to evaluate and manage natural catastrophe risk.

A combination of science, technology, engineering knowledge, and statistical data is used to simulate the impacts of natural and man-made perils in terms of damage and loss.

CCRIF’s parametric insurance policies are based on a loss modelling approach.



Risk

Risk is a function of three components—hazard, exposure, and vulnerability.

- ***Hazard:*** the likelihood and intensity of a potentially destructive natural phenomenon, such as ground shaking induced by an earthquake, wind speed associated with a tropical cyclone or rainfall volume for a rainfall event.
- ***Exposure:*** the location, attributes and value of assets that are important to the various communities, such as people, buildings, factories, farmland and infrastructure that are exposed to the hazard.
- ***Vulnerability:*** the reaction of the assets when exposed to the forces produced by a hazard event. For example, a building's vulnerability to an earthquake increases with the intensity of ground shaking and decreases with improved conformity to seismic design standards.

Cat modelling uses these elements of risk to calculate losses due to a hazard event

The 2018 Earthquake in **Trinidad & Tobago**

EVENT IMPACTS

▶The 2-minute, 6.9 earthquake on August 21st led to:

- **Property Damage**
  - One Woodbrook Place and the San Fernando Hospital were among those to suffer damage – but no buildings fell. Cars, homes and farmlands were also affected.
- **Panic**
  - Persons went into a state of panic as it was the worst earthquake in decades.
- **Loss of power & telecommunications**
  - The Trinidad and Tobago Electricity Commission (T&TEC) confirmed that areas in POS and east Trinidad experienced outages.
- **No injuries, casualties, or loss of life**

Why did T&T not face more damage?

When comparing this event to an event of a similar magnitude, we see major differences.

HAITI	2010 7.0 MAGNITUDE 35 SECONDS	70% HOMES DESTROYED	300,000 DEATHS [figures are a matter of some dispute]
T&T	2018 6.9 MAGNITUDE 2 MINUTES	SOME HOMES DAMAGED 0 DESTOYED	0 DEATHS

What caused these differences?

For more information see:

https://www.uwi.edu/ekacdm/node/172

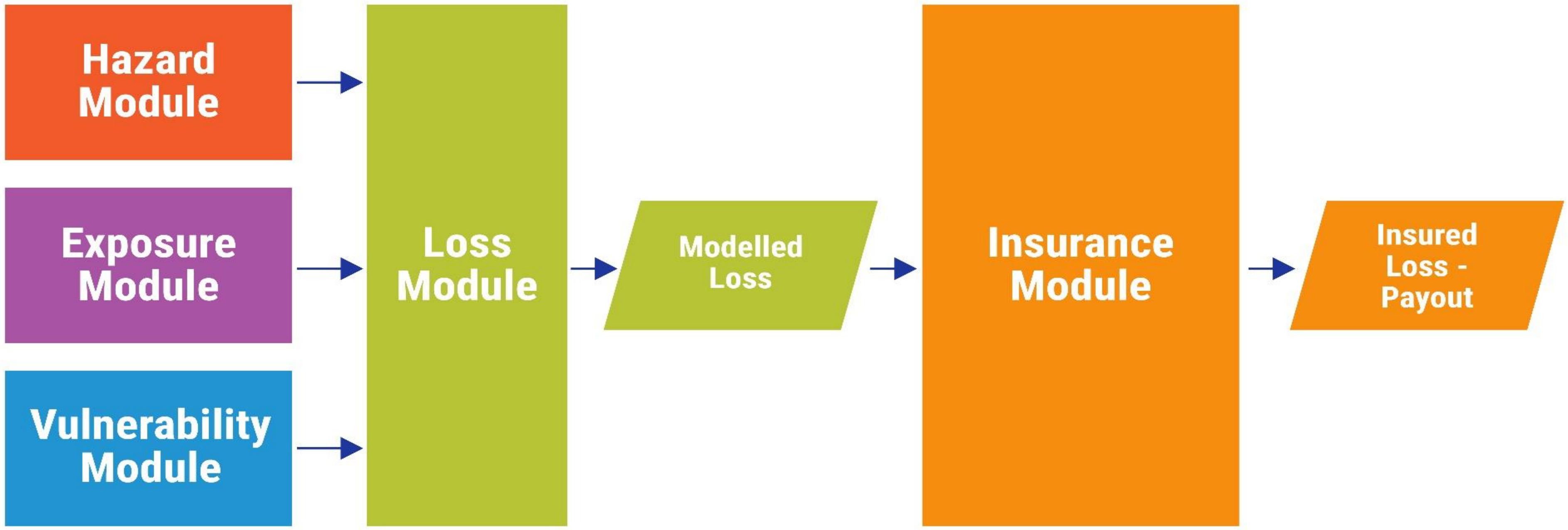
https://www.guardian.co.tt/news/seismologist-it-could-have-been-worse-6.2.913540.b5b1dc34de

https://newsday.co.tt/2018/08/30/earthquake-a-wake-up-call/

https://trinidadexpress.com/news/local/the-day-t-t-trembled/article_dc068422-127e-11e9-82a2-67e1dc612403.html

CCRIF’s Parametric Model Construct

CCRIF’s parametric policies are based on a loss modelling approach. The objective of the loss modelling approach is to equip CCRIF with the capacity to estimate loss probabilities for individual countries, price contracts for specific countries, and estimate site-specific hazard levels and losses for specific events during the contract period.



CCRIF's Parametric Models – The Modules

Hazard

- Defines the expected frequency and severity of a hazard event at a specific location / computes real-time hazard parameters
- Based on a database of historical and simulated events
- EQ: 1520-2022
  TC: 1850-2022
  XSR: 1998-2022

Exposure

- Provides a comprehensive and spatially-distributed list of vulnerable assets e.g. buildings, airports/ports, power facilities, road networks, crops

Vulnerability

- Assesses the vulnerability of the assets in the exposure module to the hazards defined in the hazard module

Loss

- Uses the Hazard, Exposure and Vulnerability modules to calculate a modelled loss for a current hazard event

Insurance

- Applies the modelled losses to the conditions of the country's CCRIF policy to determine if the policy is triggered and computes the payout to the country.

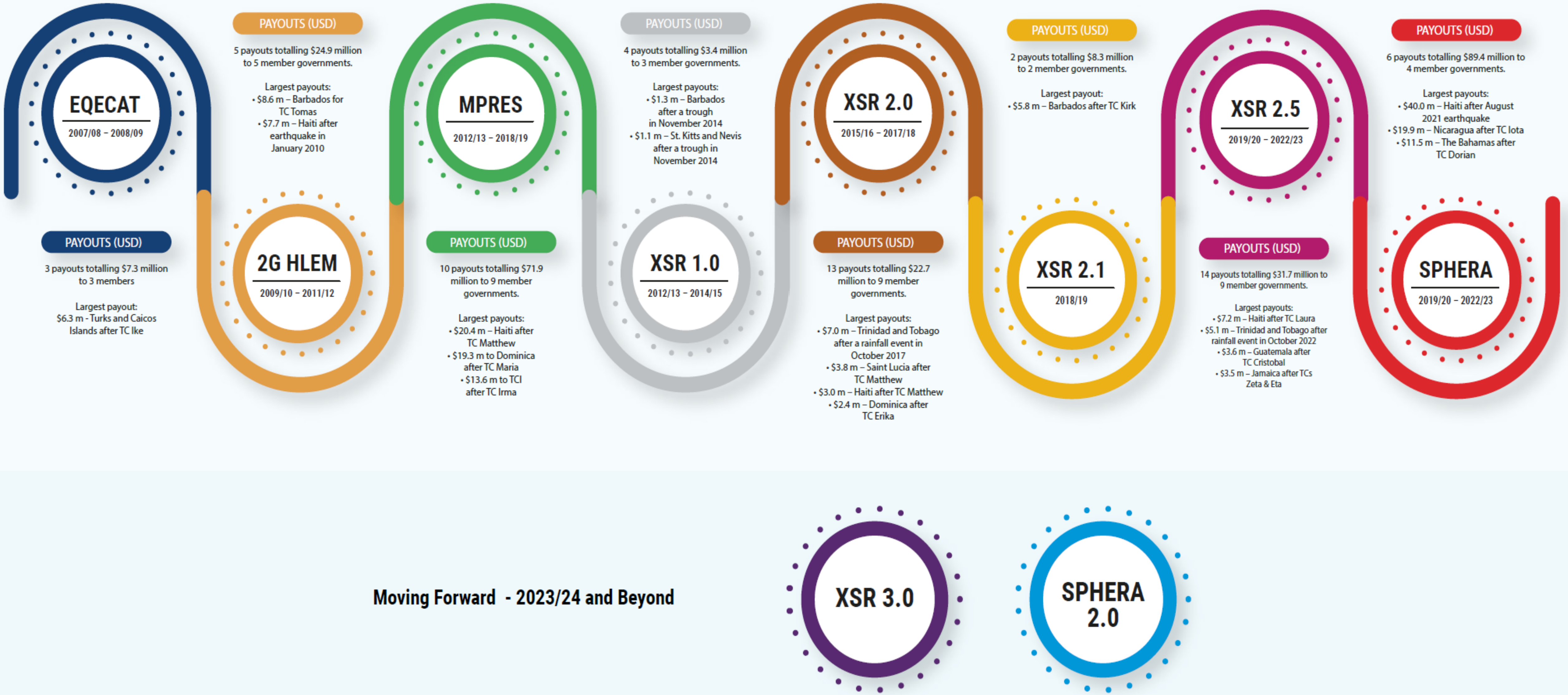
CCRIF’s Parametric Products and Models

- Tropical Cyclone – TC[1]
  - SPHERA[2] model
- Earthquake – EQ
  - SPHERA model
- Excess Rainfall – XSR
  - XSR 3.0 model
- COAST[3] for fisheries
  - Fisheries model

1. Used in Electric Utilities and COAST products also
2. System for Probabilistic Hazard Evaluation and Risk Assessment
3. Caribbean Oceans and Aquaculture Sustainability Facility

CCRIF SPC
The Caribbean Catastrophe Risk Insurance Facility

The Evolution of CCRIF's Parametric Insurance Models: The Journey from EQECAT to SPHERA and Beyond



CCRIF Models – Definitions: TC

A **Tropical Cyclone event:**

A tropical cyclone in the geographical domain which affects at least one CCRIF member country with wind speed > 39 mph (62.7 km/h): a tropical storm or a hurricane – not tropical depression

This applies to the following policies:

- Tropical Cyclone
- COAST
- Electric Utilities

Geographical Domain:
Caribbean and Central America

CCRIF Models – Definitions: EQ

An **Earthquake event**:

An earthquake with a magnitude greater than or equal to 5.0 that occurs inside the geographical domain, which generates a peak ground acceleration of at least 0.01g in at least one CCRIF member country

Peak ground acceleration measures the intensity of the earthquake and is defined as the maximum ground acceleration that occurred during an earthquake

Geographical Domain:
Caribbean and Central America

CCRIF Models – Definitions: XSR

An **Excess Rainfall event – a Covered Area Rainfall Event (CARE):**

A CARE is any rainfall event in which the amount of daily average rainfall, which fell during an accumulation period (12 or 48 hours in Caribbean countries; 24 or 72 hours in Central American countries) is greater than a specified rainfall threshold over at least a specified percentage of the area of a CCRIF member country.

A CARE is composed of a number of consecutive days that meet the conditions listed above, which may include a tolerance period (1 day for Caribbean, 2 days for Central America) in which the rainfall may fall below the thresholds.

The values of the accumulation period's rainfall threshold and covered area percentage are country-specific and were optimized to increase the likelihood that severe XSR events are captured by the model and moderate events are not falsely detected.

A CARE may occur during a tropical cyclone or a non-cyclonic system at any time of year.

CCRIF Models – Definitions: COAST

The fisheries model for COAST policies covers events that fall within the Adverse Weather Component and/or the Tropical Cyclone component.

Adverse Weather Component – a qualifying event:

The occurrence of maximum daily rainfall measured in a 24-hour moving window over any of the exposed assets in a CCRIF member country above a pre-defined threshold, or of a maximum daily significant wave height close to any of the exposed assets above a pre-defined threshold

These conditions must occur for at least three consecutive days to be a COAST adverse weather event.

Tropical Cyclone Component – a qualifying event:

Any tropical cyclone affecting at least one member country with winds greater than 39 mph (62.7 km/h) (same as TC policy)

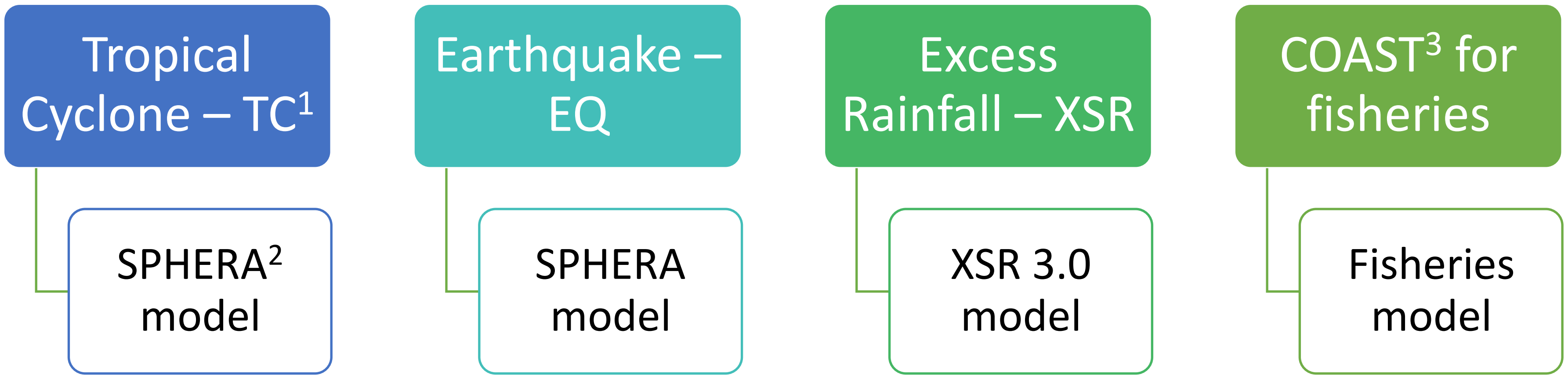
CCRIF Models and Event Reports

- CCRIF monitors and reports on tropical cyclone (TC), earthquake (EQ), Excess Rainfall (XSR)events as well as “COAST events” and “electric utilities events” in the Caribbean Basin that have the potential to affect one or more of its member countries that have the corresponding policies.

- CCRIF reports on all hazard events that meet the definition of a qualifying event (for TC, EQ, XSR, COAST or Electric Utilities) as defined in the previous slides. These events are publicly available on the CCRIF website at: https://www.ccrif.org/content/publications/reports/others

- Note that one tropical cyclone event can generate, a tropical cyclone excess rainfall, COAST and/or Electric Utilities report for the same affected country/ies if the relevant definition is met.

CCRIF's Parametric Products and Models



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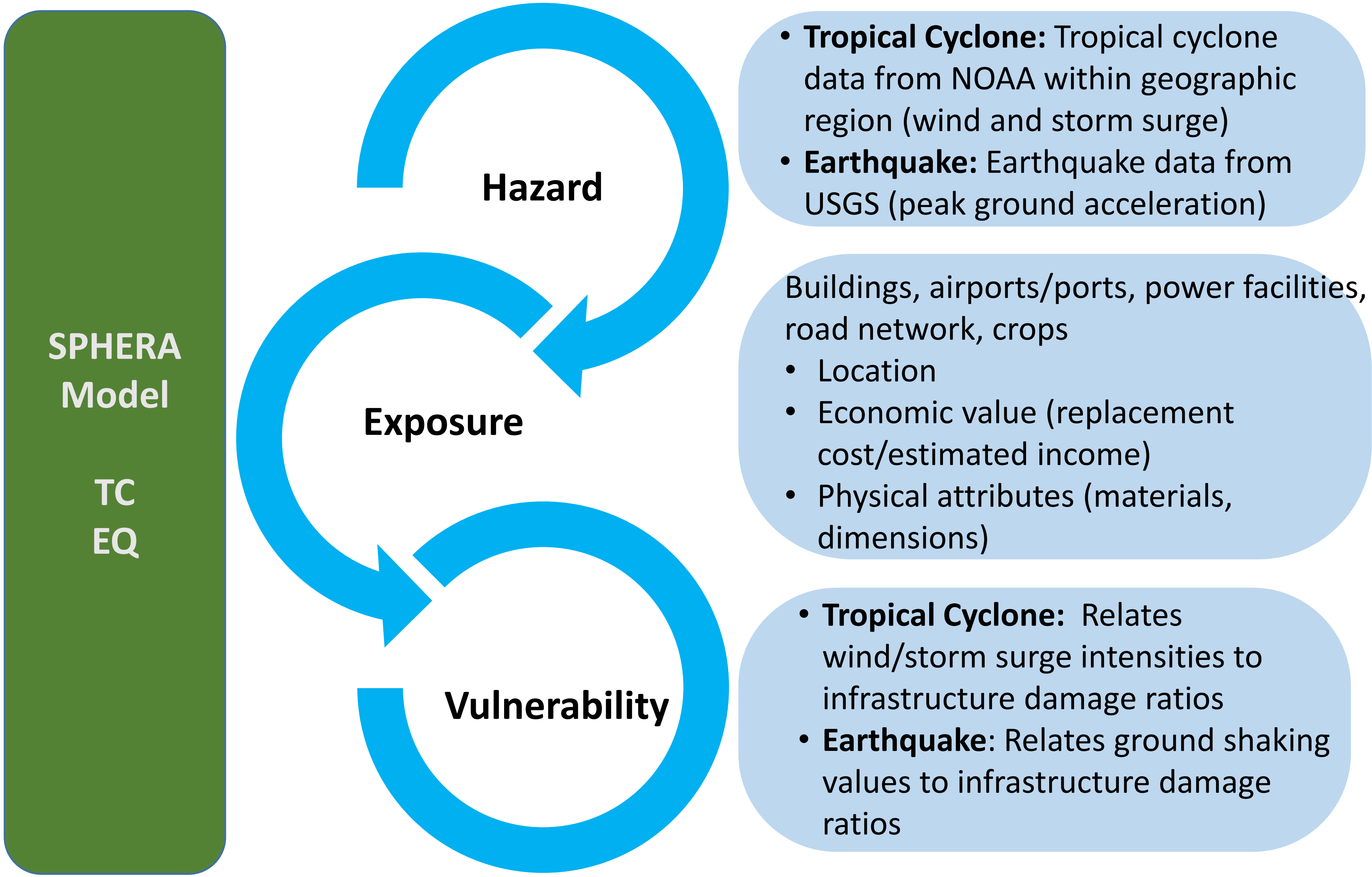
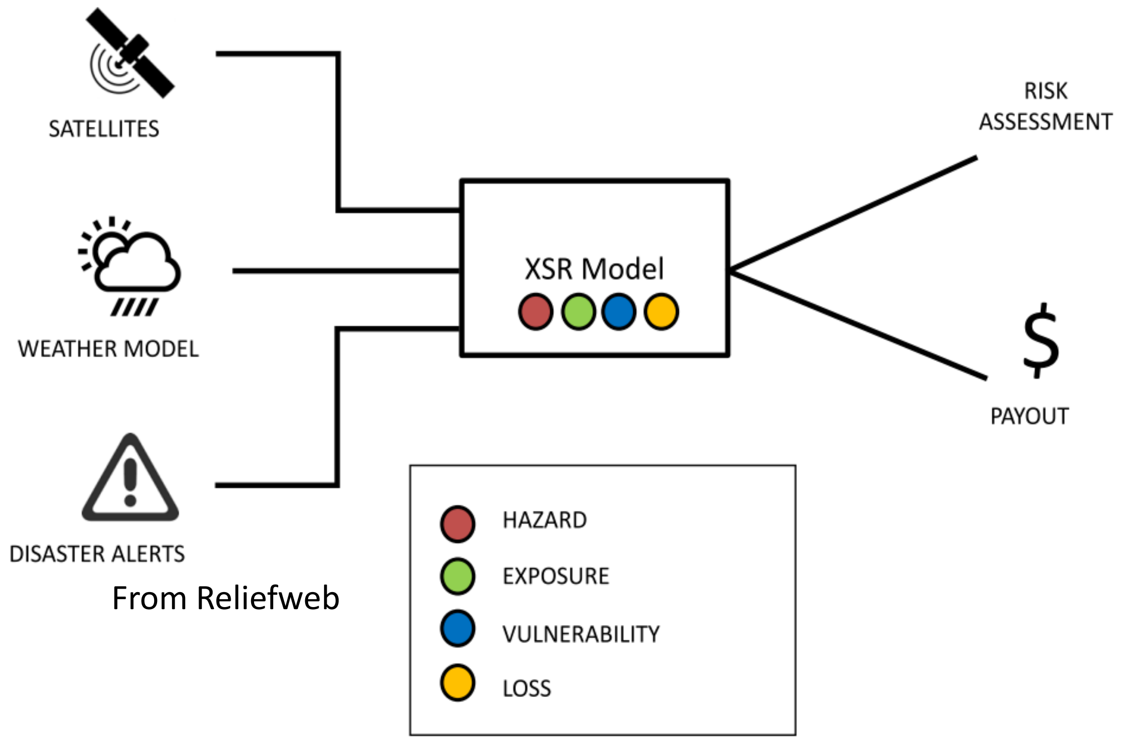

SPHERA Model
TC
EQ
Hazard
Exposure
Vulnerability
• Tropical Cyclone: Tropical cyclone data from NOAA within geographic region (wind and storm surge)
• Earthquake: Earthquake data from USGS (peak ground acceleration)
Buildings, airports/ports, power facilities, road network, crops
• Location
• Economic value (replacement cost/estimated income)
• Physical attributes (materials, dimensions)
• Tropical Cyclone: Relates wind/storm surge intensities to infrastructure damage ratios
• Earthquake: Relates ground shaking values to infrastructure damage ratios

XSR 3.0 Model

CMORPH: developed by NOAA Climate Prediction Center. It is low-orbiter satellite-based precipitation model which captures more precisely the ***spatial and temporal location*** of the rainfall caused by the event.

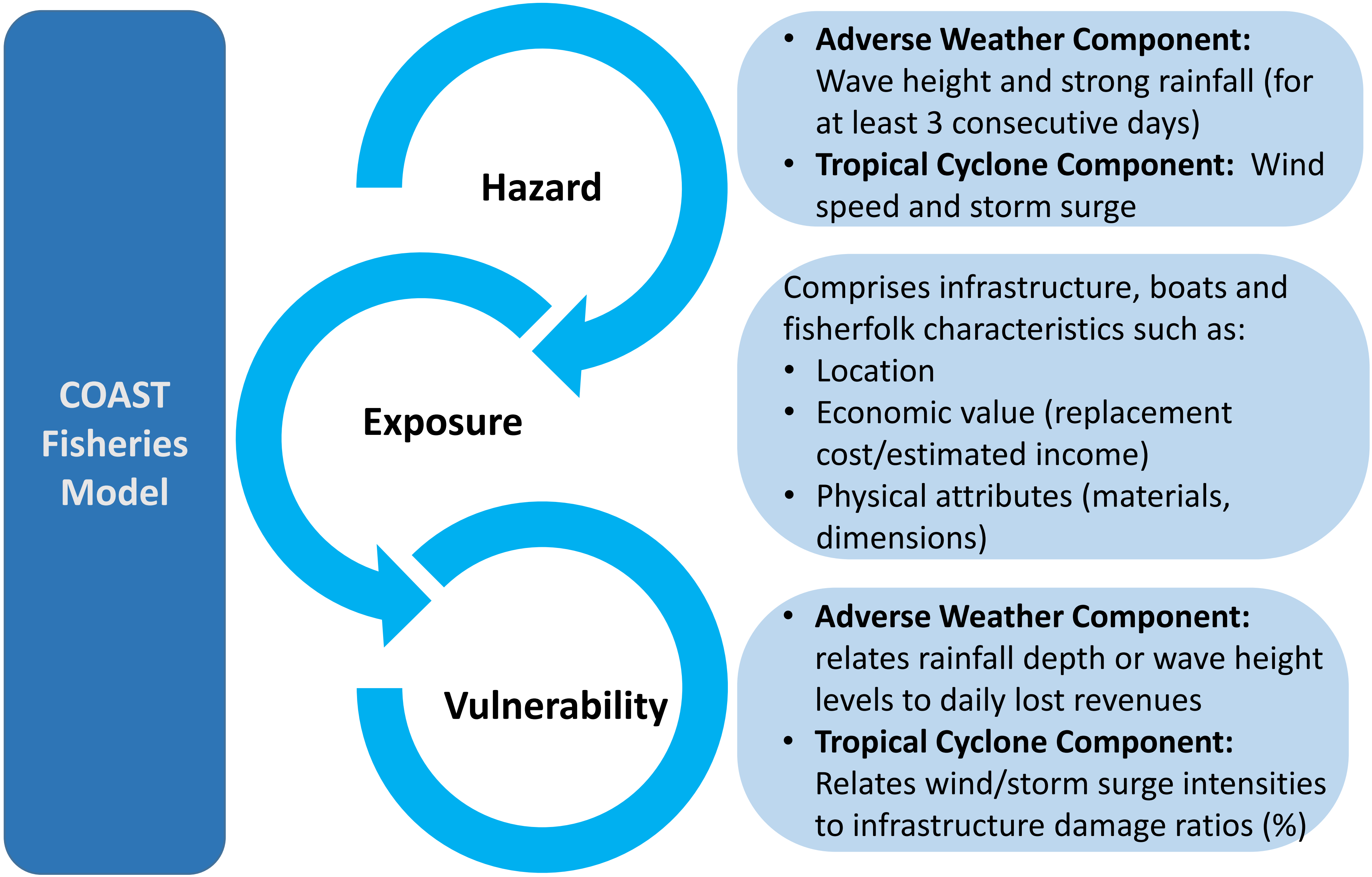
IMERG: Improved satellite rainfall product developed by NASA. Complements CMORPH

WRF: Weather forecasting models developed by the US National and Oceanic and Atmospheric Administration (NOAA), which computes the amount of rainfall based on climate conditions. This weather forecast model reproduces the ***intensity*** of the rainfall event.



Fisheries Model for COAST

- **COAST Fisheries Model: Two Independent Components**
  - **Adverse Weather**
    - Fisherfolk economic activity interruption
      - Wave height
      - Heavy rainfall
  - **Tropical Cyclone**
    - Direct damages to assets (*e.g.* boats, equipment, infrastructure, etc)
      - Wind speed
      - Storm surge

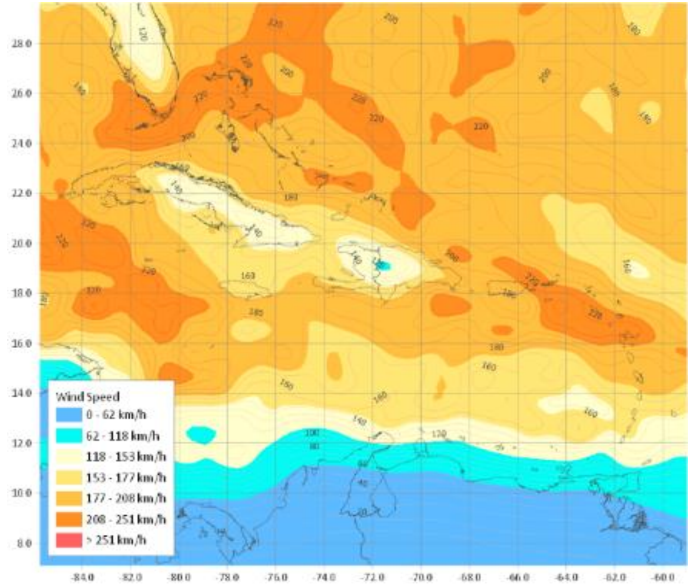


COAST Fisheries Model
Hazard
Exposure
Vulnerability
• Adverse Weather Component: Wave height and strong rainfall (for at least 3 consecutive days)
• Tropical Cyclone Component: Wind speed and storm surge
Comprises infrastructure, boats and fisherfolk characteristics such as:
• Location
• Economic value (replacement cost/estimated income)
• Physical attributes (materials, dimensions)
• Adverse Weather Component: relates rainfall depth or wave height levels to daily lost revenues
• Tropical Cyclone Component: Relates wind/storm surge intensities to infrastructure damage ratios (%)

Hazard Module - TC

Track of tropical cyclones for the Caribbean Sea and Eastern North Pacific from 1998 to 2017, information from the HURDAT2 database

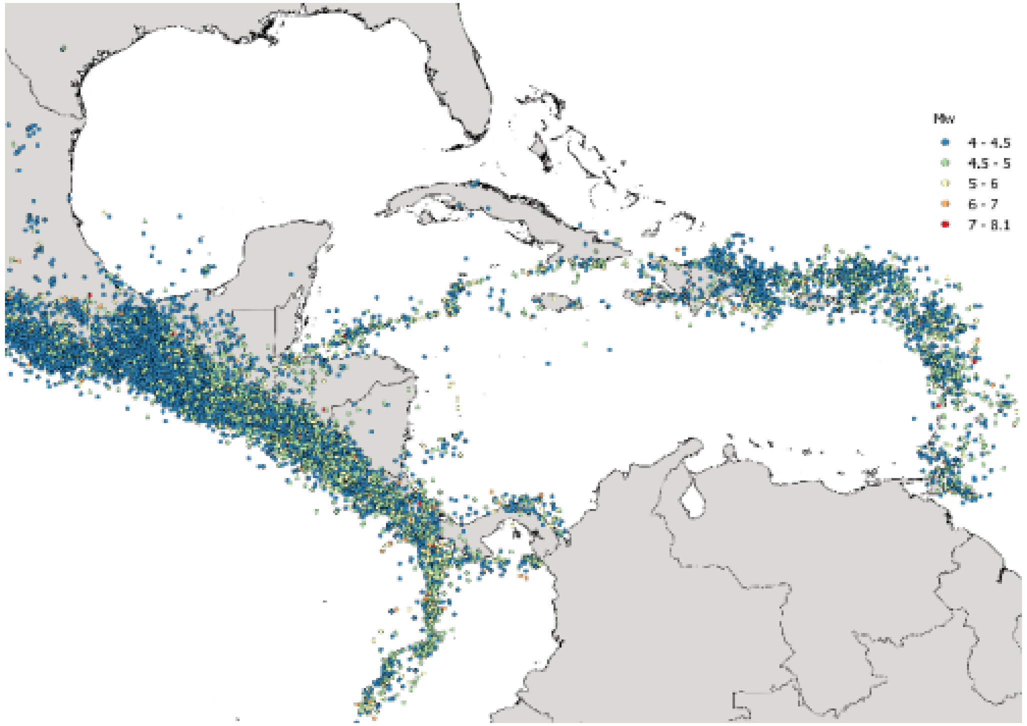
Stochastic catalogue: very large number of theoretical events for risk assessment
The statistical properties of the stochastic cyclones are the same as the observed hurricanes (path, pressure variation, wind velocity, etc.)



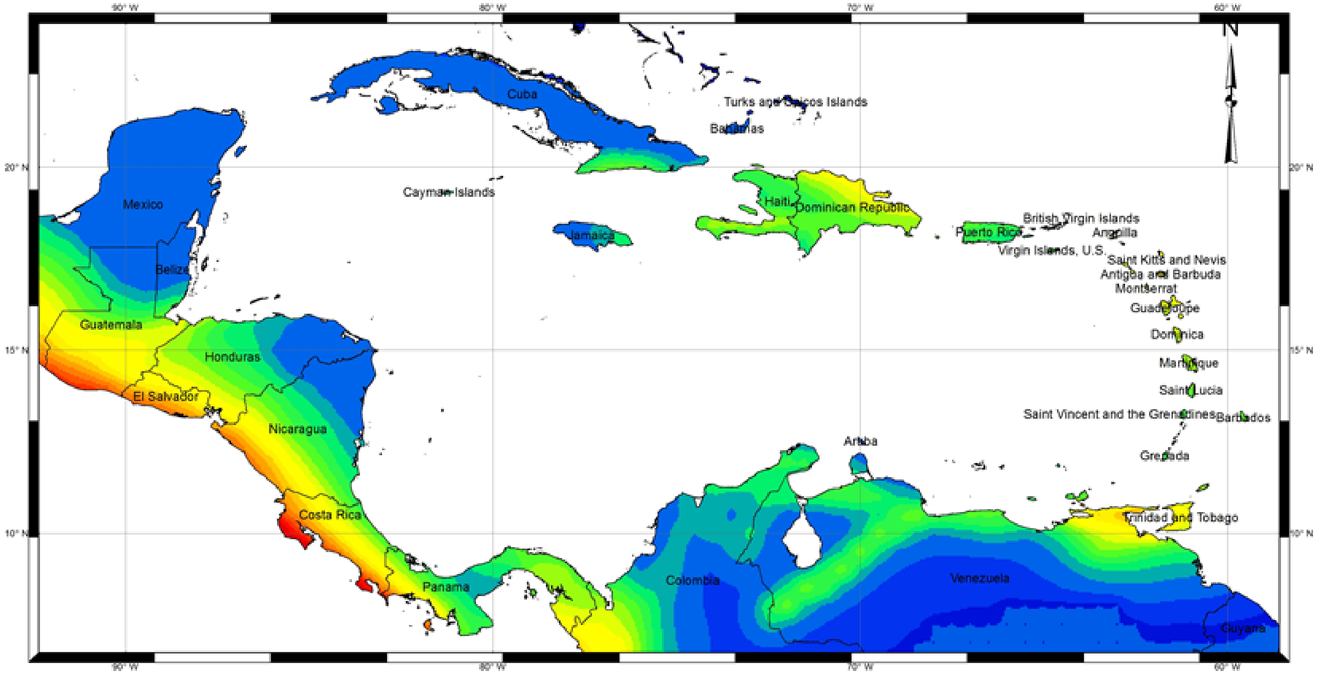
Wind speed

Storm surge

Hazard Module - EQ



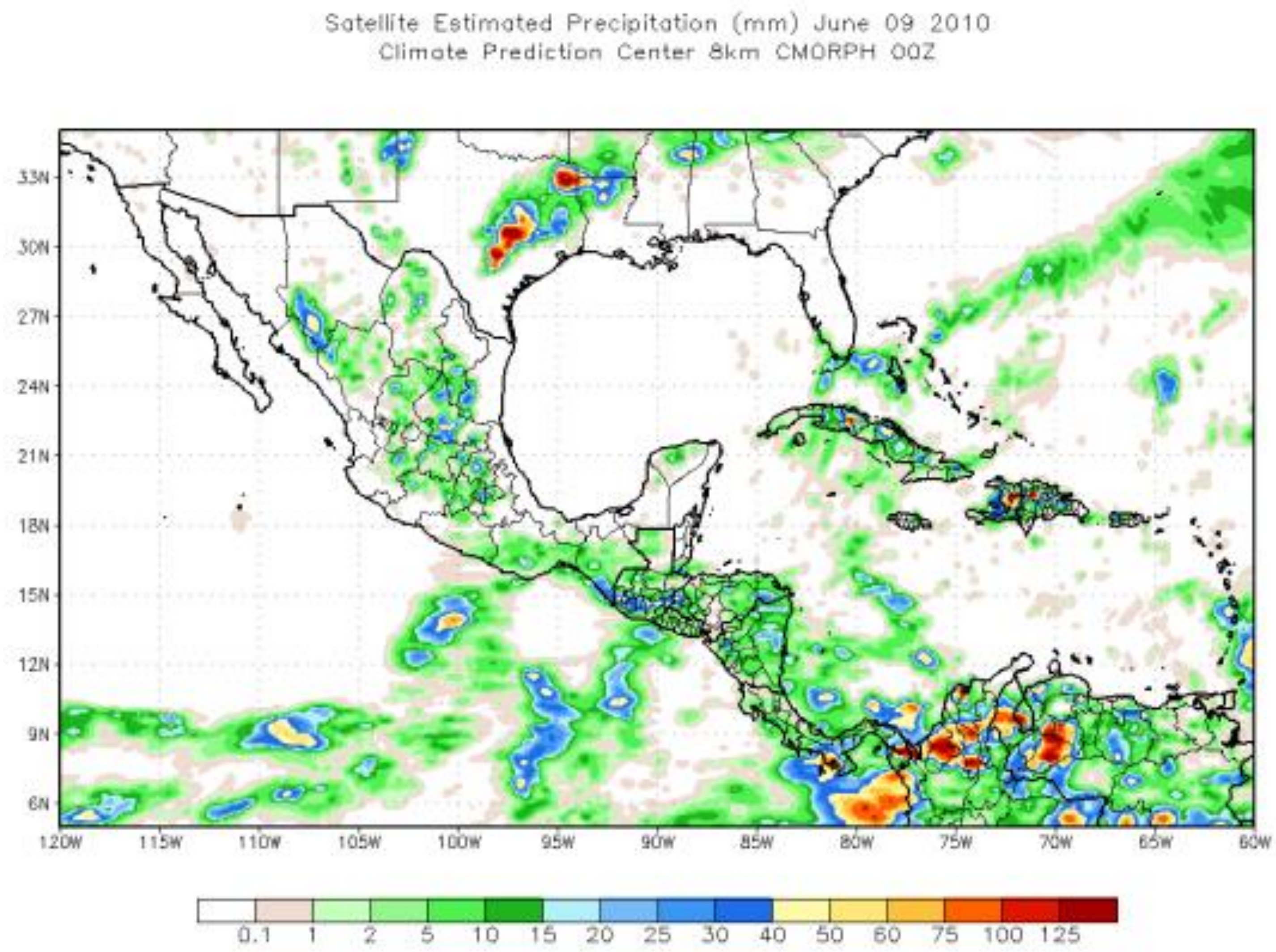
Geographic distribution of earthquakes that occurred in Central America and the Caribbean since 1520



Final hazard model (pga – 475 years on soil – g)

Generation of a **stochastic event-set** statistically consistent with the historical seismicity in the region – 616,000 events

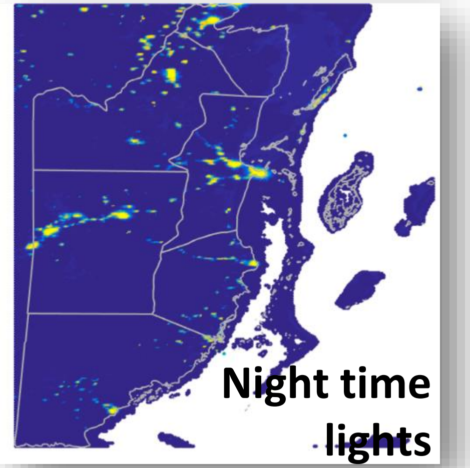
Hazard Module - XSR

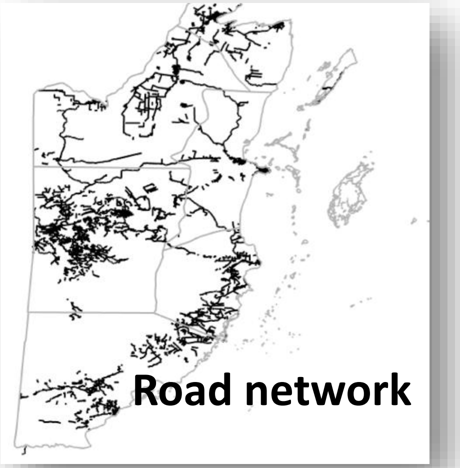


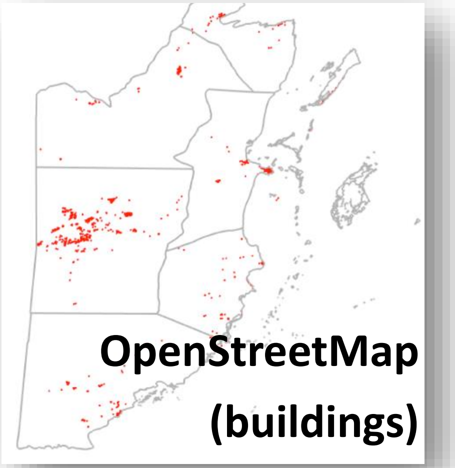
Exposure Database

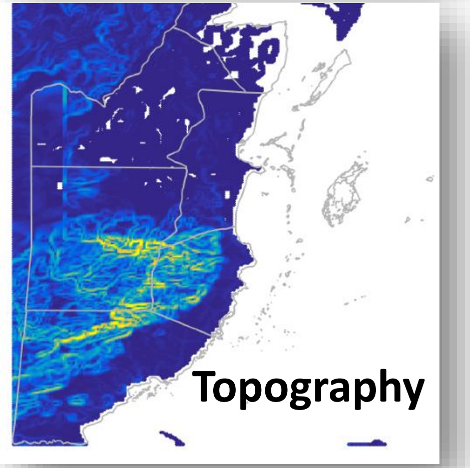
- The SPHERA/XSR Exposure Database is built and validated on **country level census data**, technical documentation, international peer-reviewed literature, publicly available reports and databases, and satellite images

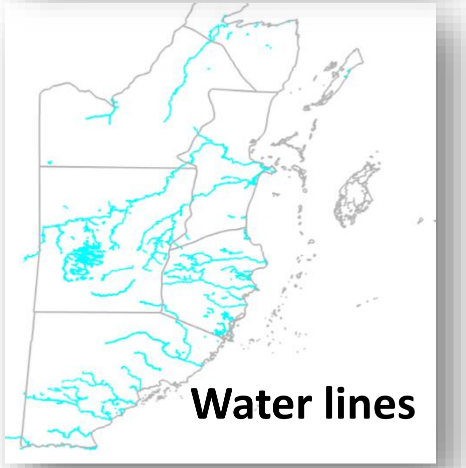
Exposure Database









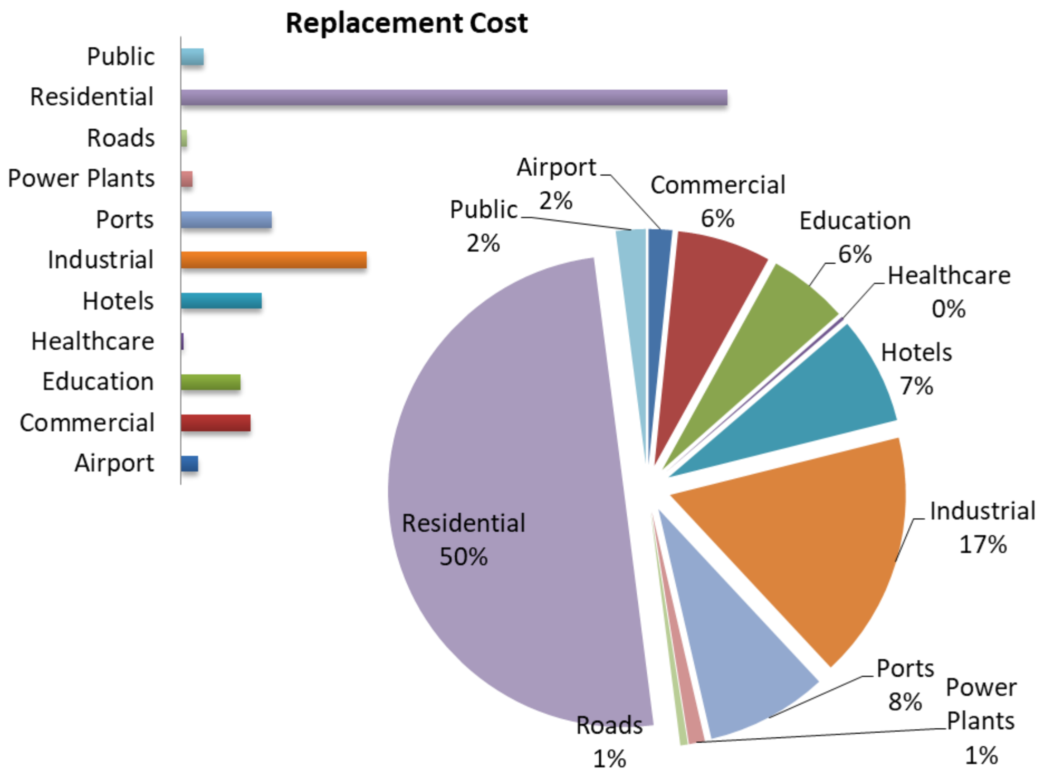


Exposure Module

Using remotely sensed data and economic statistics from various sources, valuation estimates of the country's exposure are determined.

Categories included:

- Residential buildings
- Commercial buildings
- Public Buildings
- Industrial facilities
- Hotels and restaurants
- Healthcare infrastructure
- Energy Facilities
- Education infrastructure
- Airports and ports
- Transportation (roads) network
- Crops



Crops:

- 6 different crops (banana, maize, coffee, rice, sugar cane, and generic)

Exposure for Electric Utilities

Only overhead transmission and distribution lines

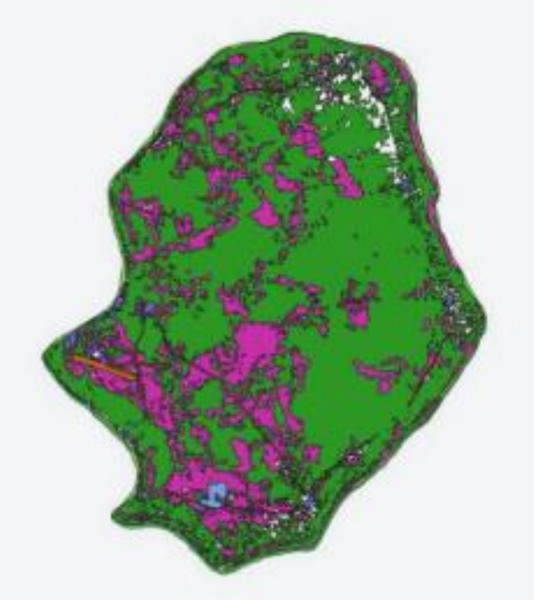
Transmission lines
(high voltage transmission lines, poles and towers, and transformers)

Distribution lines
(medium/low voltage distribution wires, poles and transformers)

Characteristics:

- geographical location
- damage-related features (e.g., the material, age, height etc.)

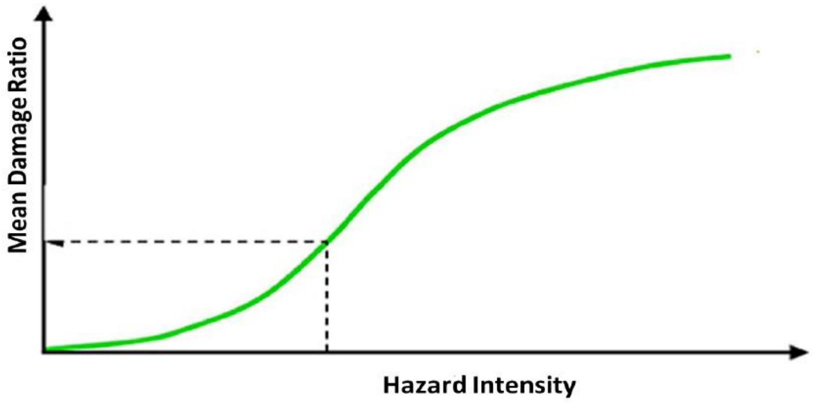
The presence of trees around the poles and wires can significantly impact the behaviour of the T&D lines during a storm. Trees may affect lines and bring down poles, even if the poles can potentially withstand the wind speed that caused the trees to collapse.



Land use maps are used to identify and incorporate the potential impacts of forest/woodland areas

Vulnerability Module

- Susceptibility of an asset (building, infrastructure, crop) to be damaged by a hazard
- Usually expressed through damage curves



- Mean damage ratio (MDR): repair cost divided by replacement cost of the structure

Damage functions assess the structural behaviour and fragility of the assets in the exposure

TC: Two damage mechanisms, hence two sets of damage functions:

Wind damage functions

Storm surge damage functions

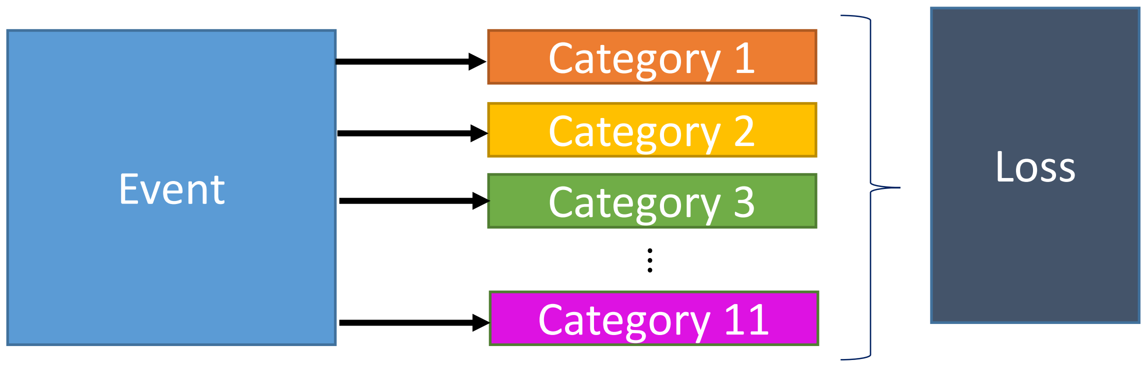
EQ: damage based on ground shaking

XSR: rainfall amount

Based on literature review of existing fragility and vulnerability functions

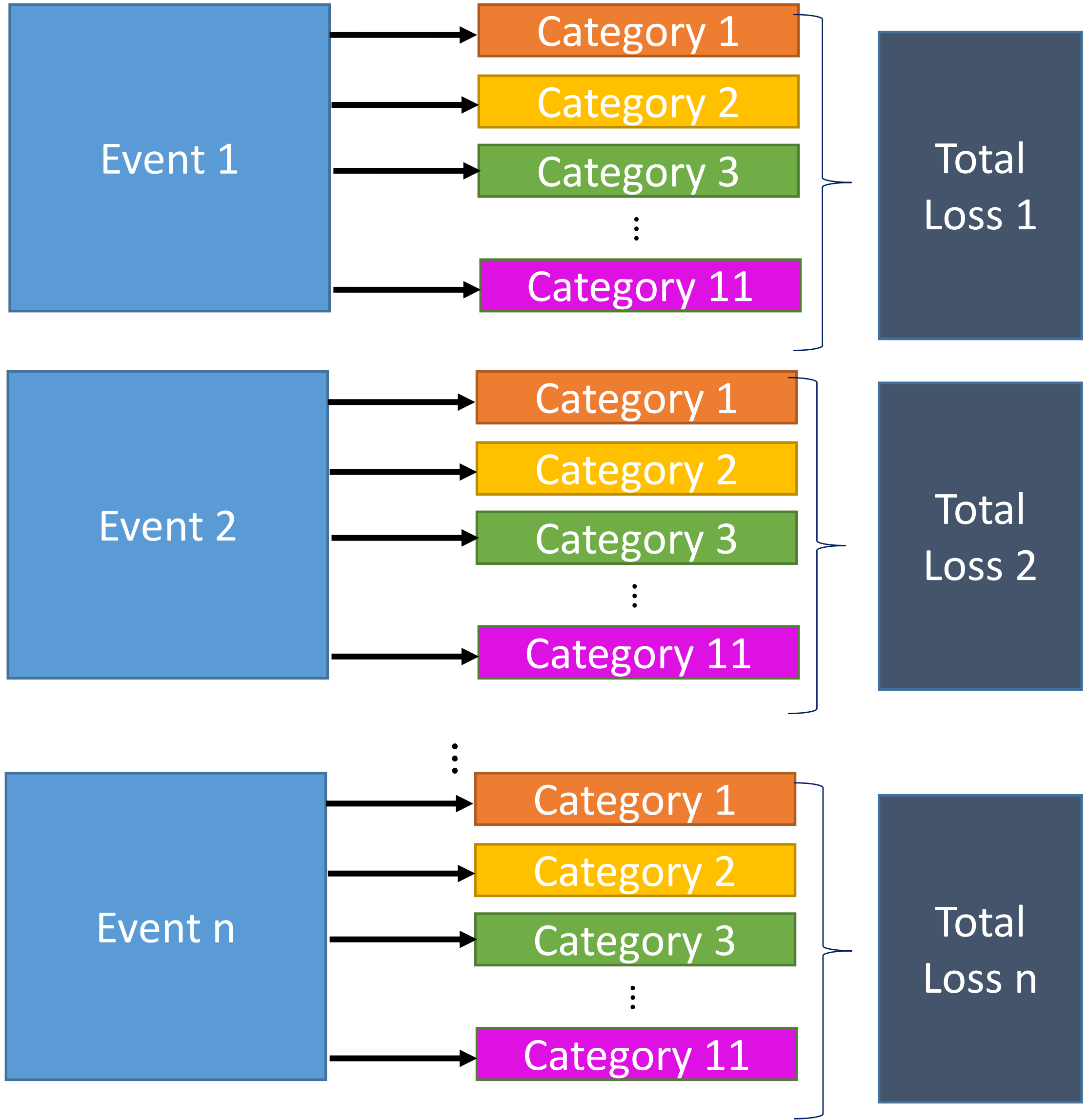
Loss Module

$$L_i = V_i(H_i) \times E_i$$



The loss module translates the damage ratio derived in the vulnerability module into a dollar loss by multiplying it by the value at risk for each asset class across the country.

Loss Module



$$L_i = V_i(H_i) \times E_i$$

The loss module translates the damage ratio derived in the vulnerability module into a dollar loss by multiplying it by the value at risk for each asset class across the country.

Losses are then aggregated at the level governed by the policy (national or sub-national).

Loss assessment

Event	Loss
1	$Loss_1$
2	$Loss_2$
3	$Loss_3$
⋮	⋮
n	$Loss_n$

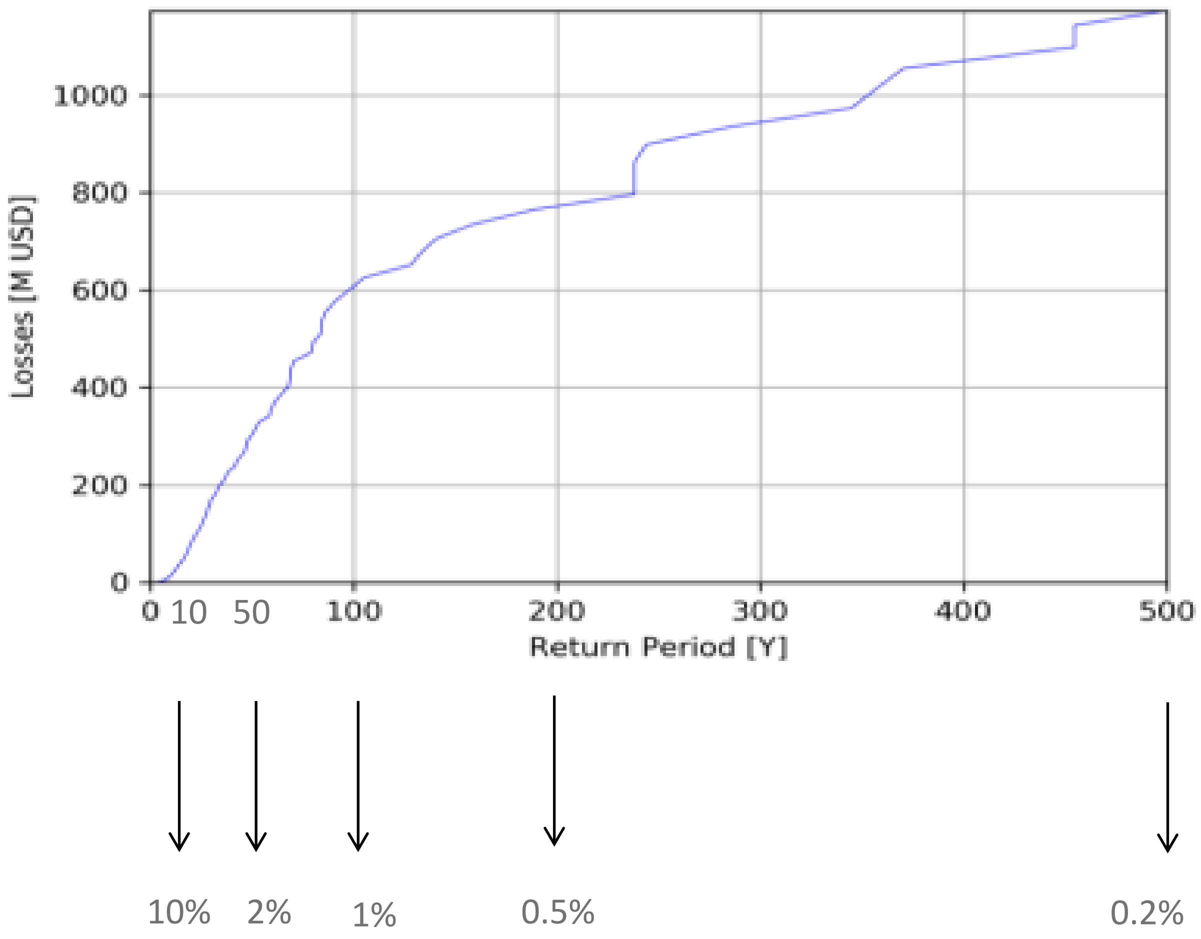
$$\textbf{Annual Probability of Exceedance of "Loss A"} = \frac{Number\ of\ times\ Loss\ A\ has\ been\ exceeded}{Number\ of\ Years}$$

$$\textbf{Return period of "Loss A"} = \frac{Number\ of\ Years}{Number\ of\ times\ Loss\ A\ has\ been\ exceeded}$$

Loss probability curves are generated from the results in the long-term loss event set.

Loss assessment

Loss probability curve for a sample country



$$\textit{Annual Probability of exceedance} = \frac{1}{\textit{Return Period}}$$

Insurance Module

The insurance module compares the modelled losses from the event to the conditions of the member's policy to determine if the policy is triggered and calculates the value of the payout.

A CCRIF policy is triggered when the modelled loss for an event in a member exceeds the attachment point specified in the policy contract.

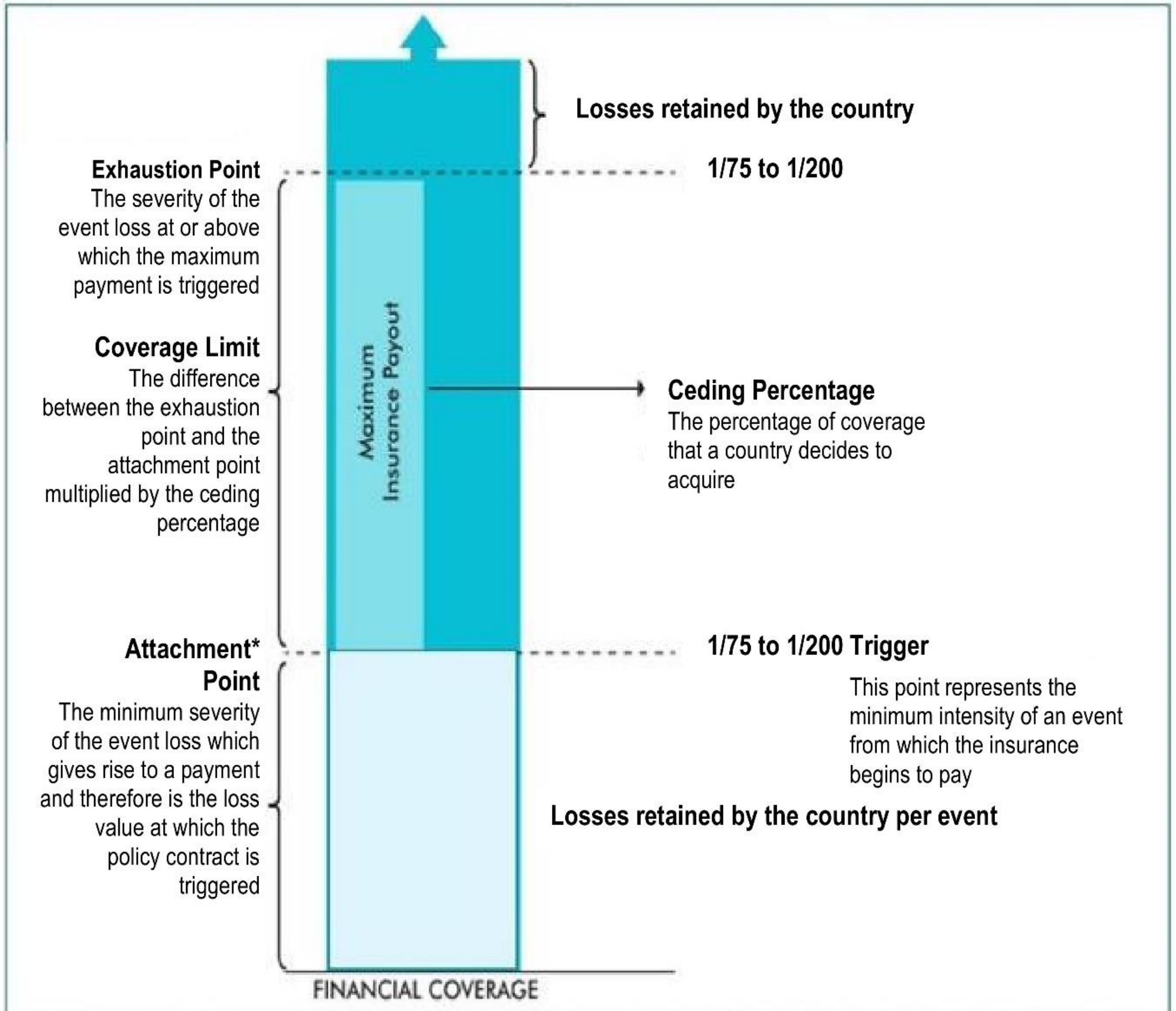
The payout increases as the level of losses increases, up to the policy coverage limit.

- TC: Based on storm's intensity, track and storm surge
- EQ: Based on source magnitude and hypocentre (location and depth) of the earthquake, which is translated into a ground shaking intensity
- XSR: Based on peak aggregate rainfall for the event, distribution of high rainfall relative to exposure and the proportion of the country/exposure impacted

The claims verification, administration and payout process

- CCRIF uses **automated systems** which allows us to monitor every possible event that may trigger a payout under the terms and conditions of a country's policy. The system detects **earthquakes, tropical cyclones and rainfall** events.
- For XSR, there is a **minimum number of days** required to compute the accumulation of rain. Also, a rainfall event is not considered complete until the rainfall has fallen below a given threshold for **two consecutive days**.
- CCRIF issues an **event briefing** after an event has been completed if there has been a loss above a certain value across most of the country.
- If a country's policy is triggered by an event **CCRIF will automatically contact the Ministry of Finance** about the next steps required to receive payment.

Elements of CCRIF Policies



*The attachment point functions like a deductible in a standard insurance policy.

CCRIF policy premiums depend on the selection by Governments of 3 elements:

- **Attachment Point**
- **Ceding Percentage**
- **Exhaustion Point**

These are informed by the country's risk profiles

A CCRIF policy is triggered when the modelled loss for an event in a member country exceeds the attachment point specified in the country's policy contract.

Special Features of CCRIF TC and EQ Policies

In 2017, CCRIF introduced two new policy features for tropical cyclone and earthquake policies: the Reinstatement of Sum Insured Cover and Aggregated Deductible Cover.

These features are voluntary endorsements to the main policies and allow member countries to access coverage designed to be supplemental to the existing TC and EQ policy structures.

RSIC

Reinstatement of Sum Insured Cover

- Establishes a reinstatement of cover provision
- This prevents a country of being exposed until the next policy year in case the coverage limit is exhausted

ADC

Aggregated Deductible Cover

- Provides a mínimum payment for TC or EQ that does not trigger a CCRIF policy
- It was also designed to reduce basis risk.
- It aims to reduce the probability of a missed event.
- A payment can be up to the annual net premium

NEW Features for CCRIF TC and XSR Policies

In 2023, CCRIF introduced 3 new policy endorsements

For Tropical Cyclone Policies:

- Localized Damage Index (LDI) for tropical cyclone events where losses are highly concentrated in small sections of the country.

For Excess Rainfall Policies:

- Wet season trigger (WST), which introduces the ability to detect excess rainfall events that occur when the soil is saturated
- Localized event trigger (LET) for extreme localized events.

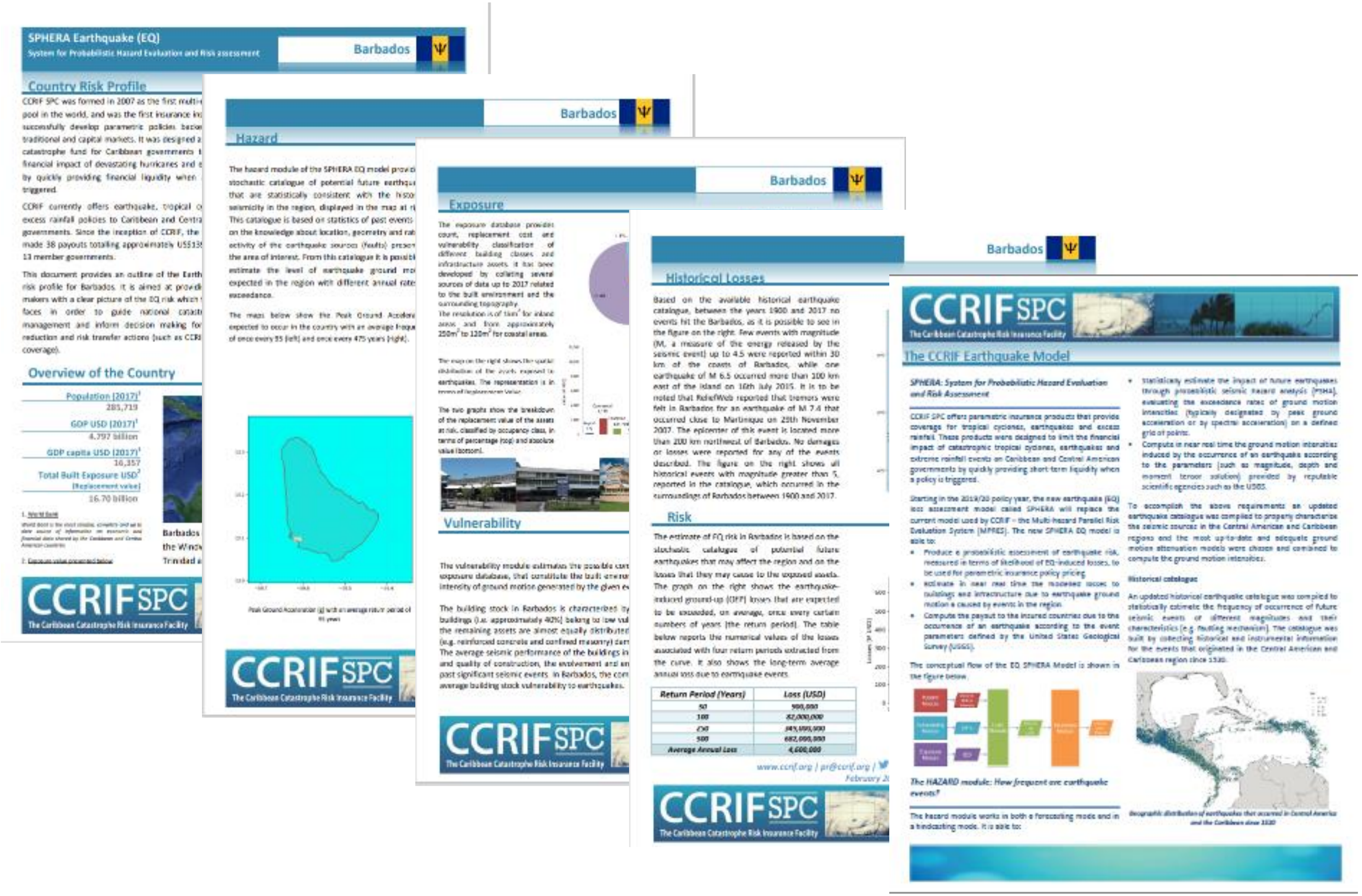
These endorsements are aimed at improving CCRIF's ability to identify and provide coverage for events that occur under very specific conditions that contribute to the negative impacts from the event.

Understanding Country Policy Characteristics

Sample tropical cyclone coverage

	TROPICAL CYCLONE
Annual Premium (US$)	$500,000
Attachment Point/Return Period (years)	15
Exhaustion Point/Return Period (years)	75
Attachment Point ($ of loss)	$20,000,000
Exhaustion Point ($ of loss)	$100,000,000
Full Loss Limit (US$)	$80,000,000
Ceding Percentage	60%
Coverage Limit (US$)	$48,000,000
10-yr event, policy payout	0
25-yr event, policy payout	12,345,678
50-yr event, policy payout	34,567,890
75-yr event, policy payout	48,000,000
100-yr event, policy payout	48,000,000

Introduction to the Country Risk Profiles



AIM OF THE CRPs

- ✓ **Provide information to the Country Risk Managers with simplicity, accuracy and robustness** about the demographic, geological, economic characteristics of their territories
- ✓ **Assess the impact of historical events** which may have caused damages to infrastructure, population and economy
- ✓ **Illustrate and facilitate the risk transfer decisions**
- ✓ **Help decision-making process**. Country risk managers have to decide what is best for the country, given the combination of exposure to risk, risk susceptibility and also considering budgeting restrictions

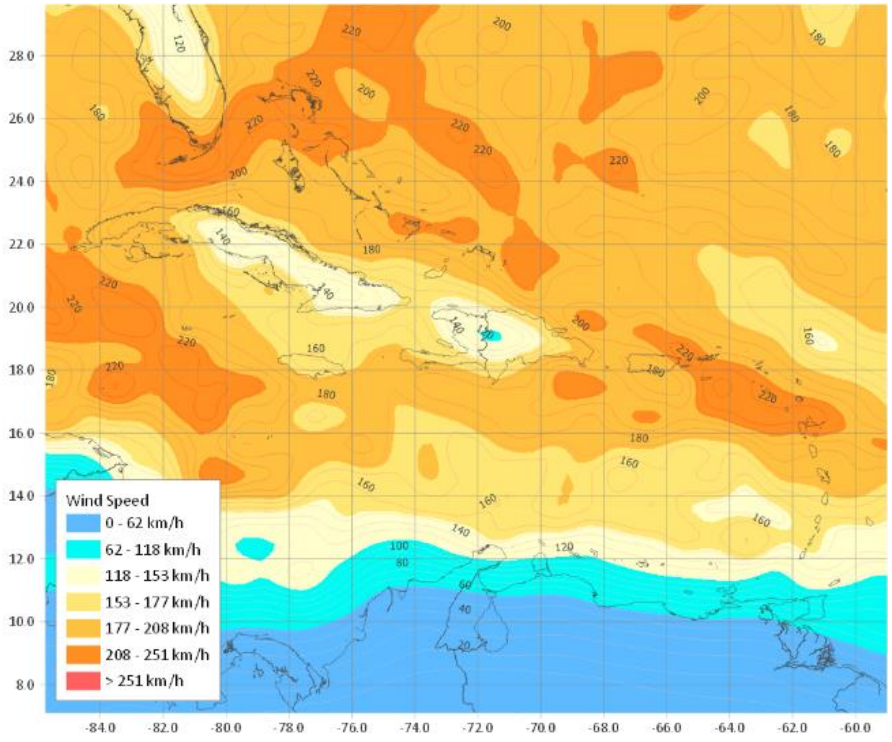
Introduction to the Country Risk Profiles

CONTENT OF THE CRPs

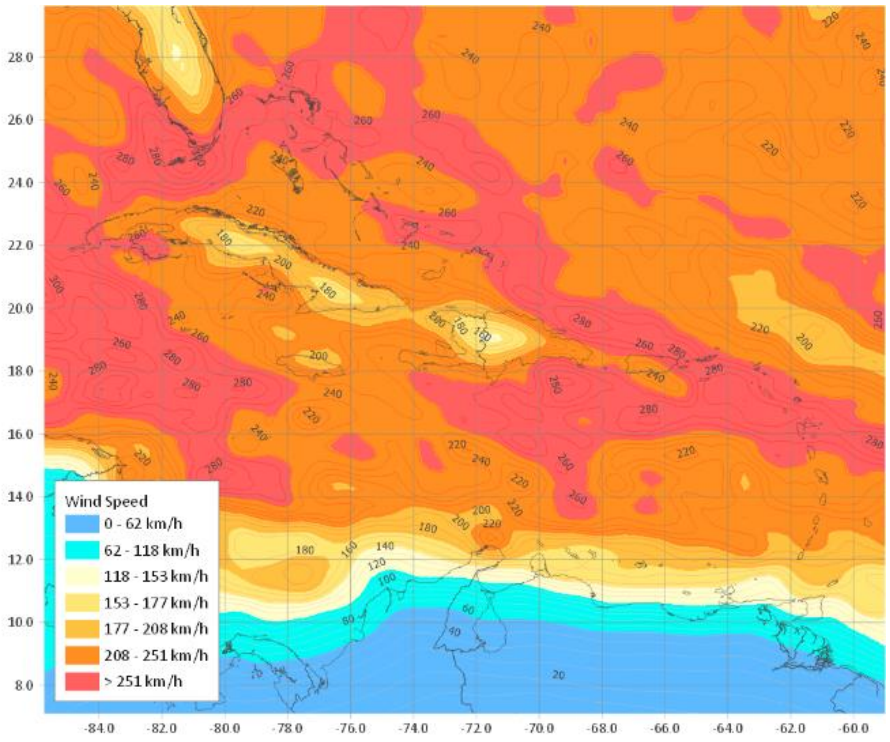
- ✓ Introduction to CCRIF and Country Risk Profile
- ✓ Overview of the Country
- ✓ Hazard (TC, EQ, XSR)
- ✓ Exposure
- ✓ Vulnerability
- ✓ Historical Losses (Annex 2 presents additional information)
- ✓ Risk
- ✓ CCRIF model summary (Annex 1 presents additional information)

Hazard section - TC

TC Hazard for different return periods, using the stochastic events.



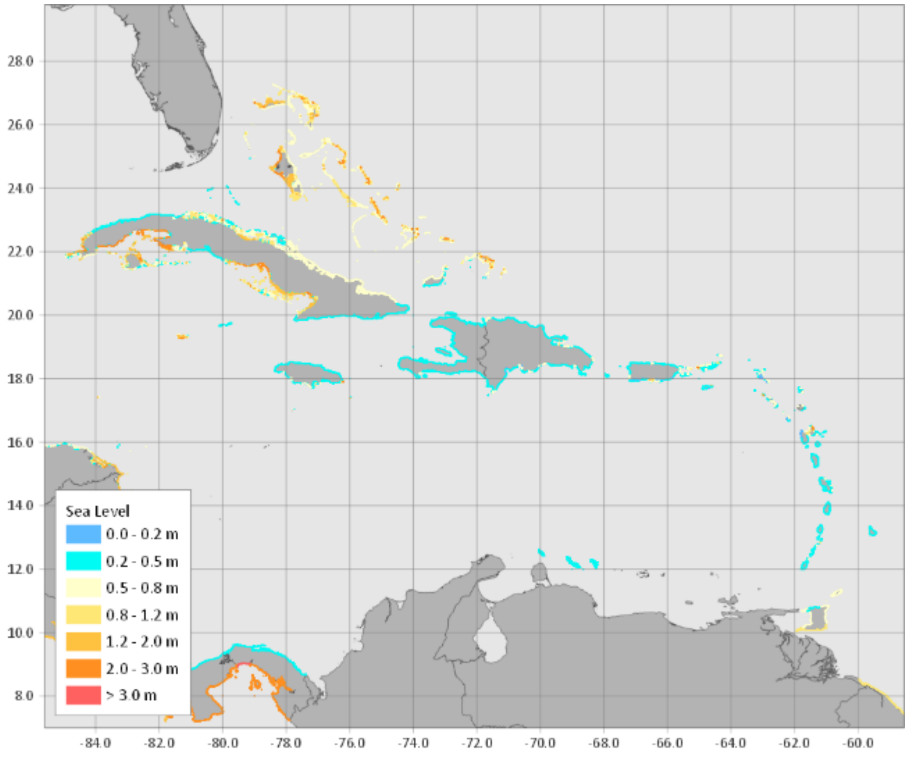
Wind speed for return period of 50 years

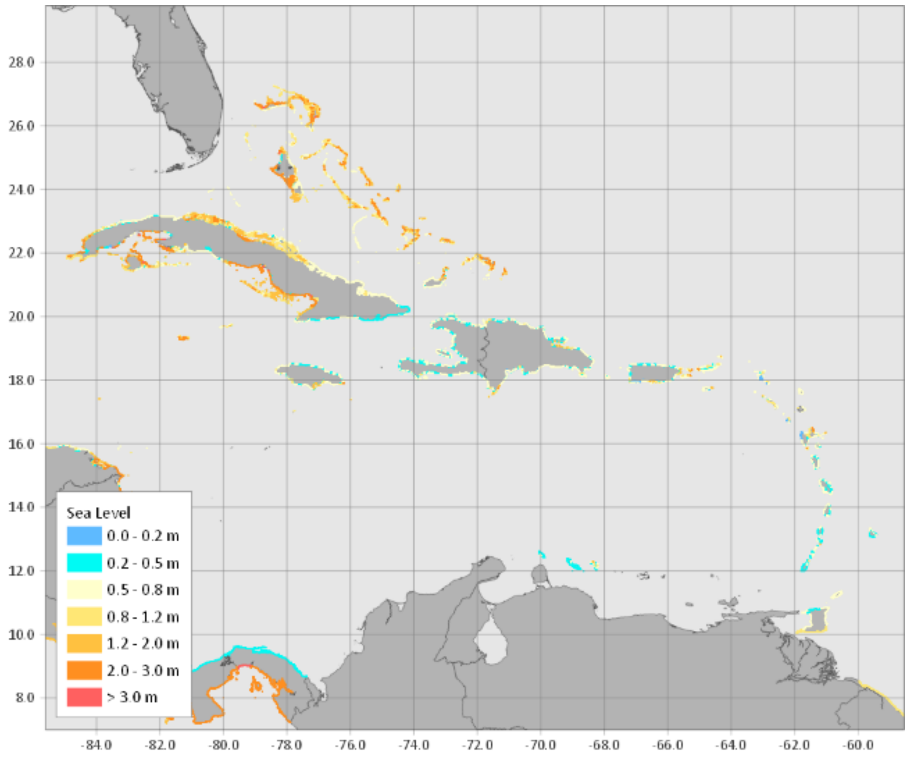


Wind speed for return period of 250 years

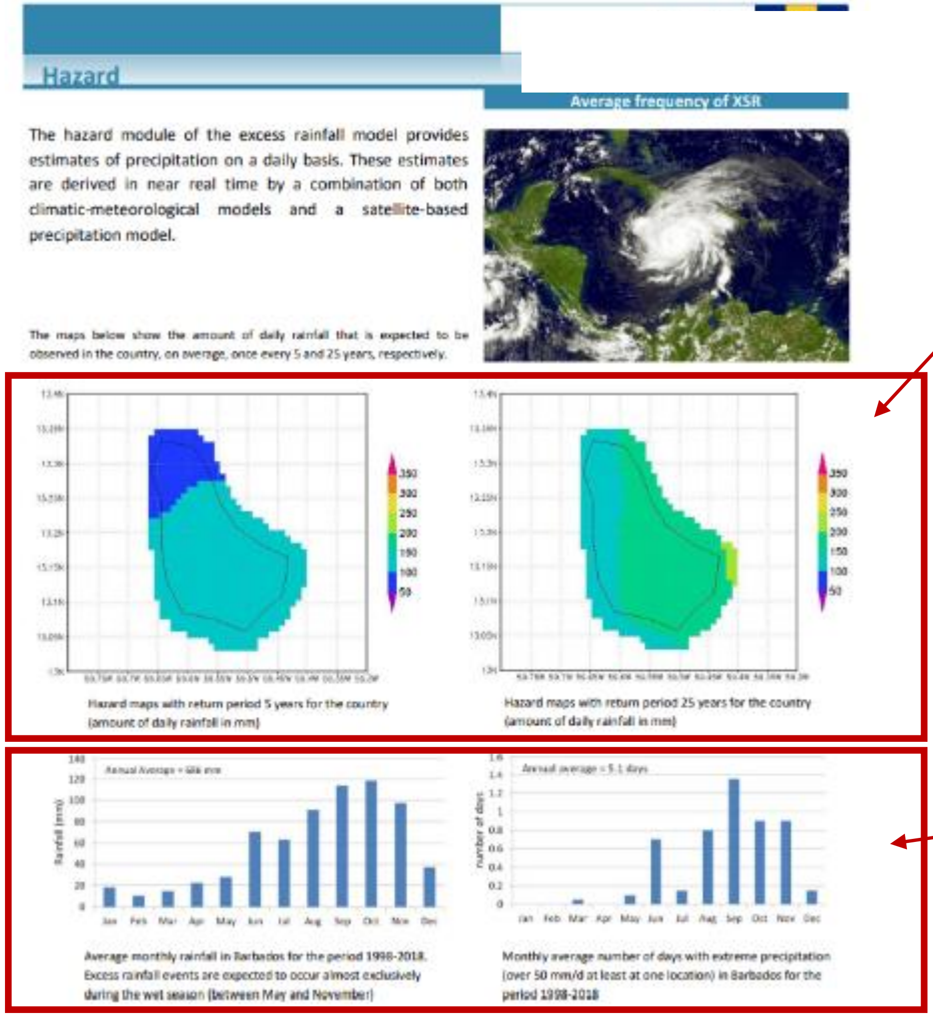
Hazard section - TC

TC Hazard for different return periods, using the stochastic events.





Hazard section - XSR


Hazard

Average frequency of XSR

The hazard module of the excess rainfall model provides estimates of precipitation on a daily basis. These estimates are derived in near real time by a combination of both climatic-meteorological models and a satellite-based precipitation model.

The maps below show the amount of daily rainfall that is expected to be observed in the country, on average, once every 5 and 25 years, respectively.

Hazard maps with return period 5 years for the country (amount of daily rainfall in mm)

Hazard maps with return period 25 years for the country (amount of daily rainfall in mm)

Average monthly rainfall in Barbados for the period 1998-2018. Excess rainfall events are expected to occur almost exclusively during the wet season (between May and November)

Monthly average number of days with extreme precipitation (over 50 mm/d at least at one location) in Barbados for the period 1998-2018

HAZARD MAPS

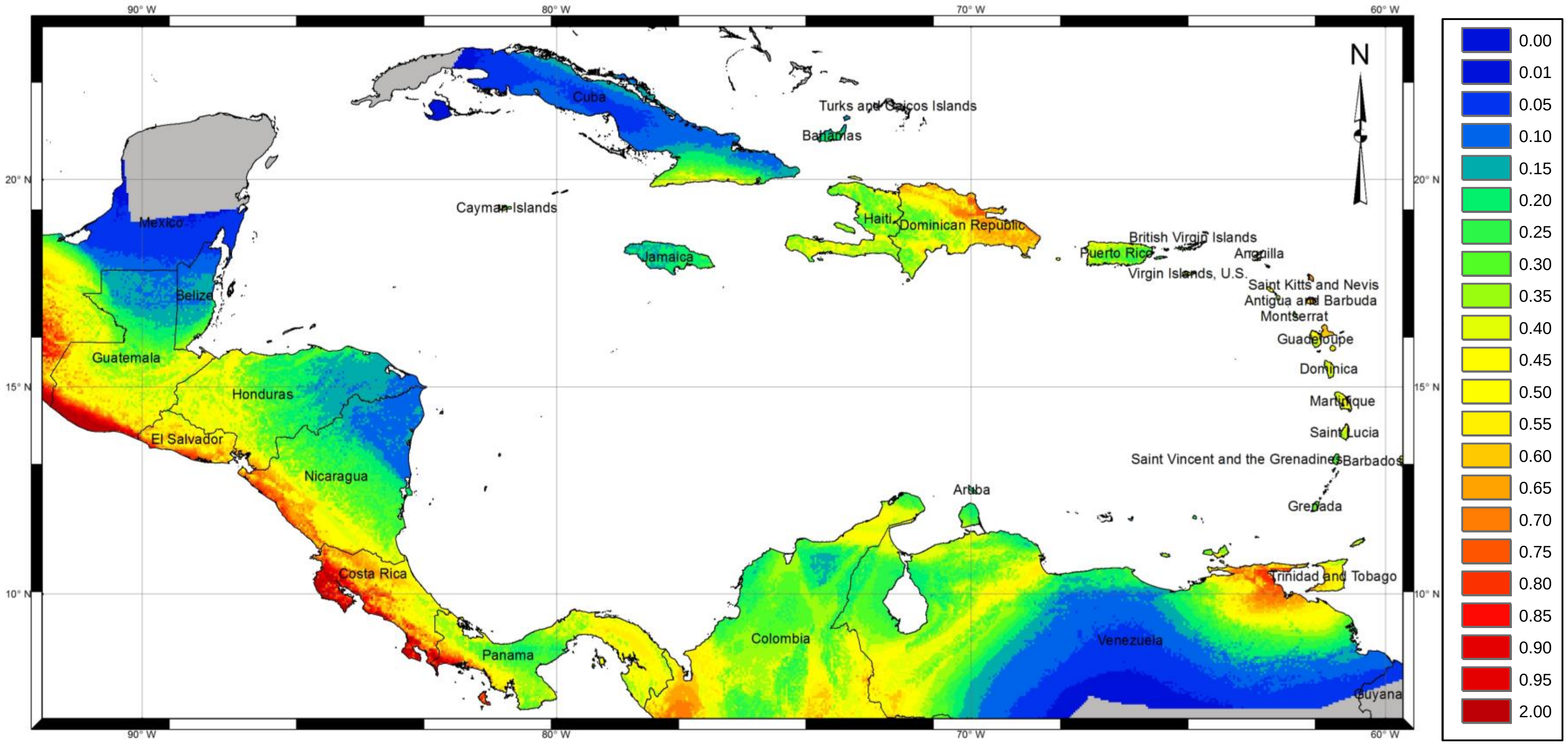
Derived from satellite data for two return periods: 5 and 25 years

MONTHLY STATISTICS

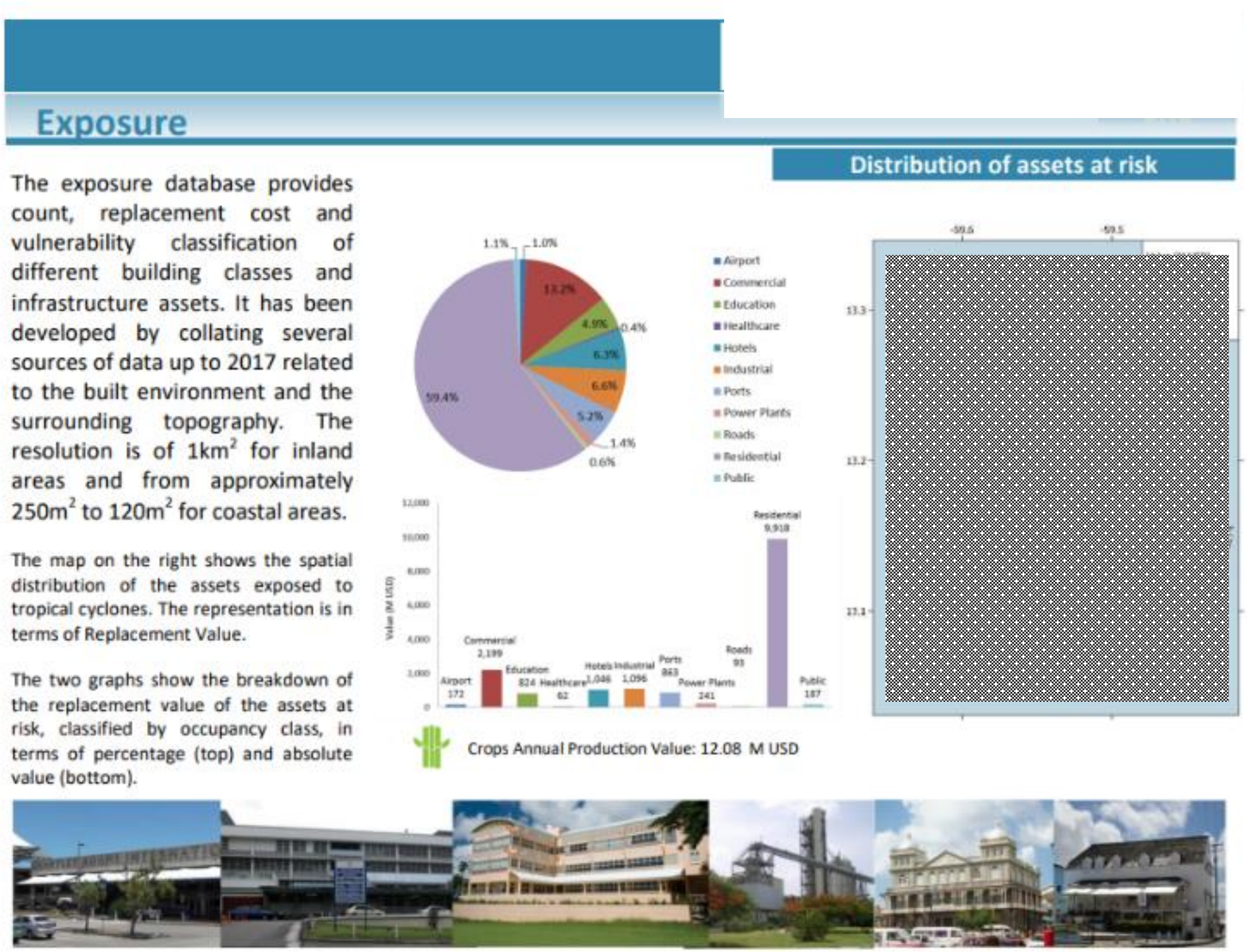
Derived from satellite data show rainfall seasonality and monthly occurrence of extreme precipitation

Hazard section - EQ

- The peak ground acceleration on rock (PGA, in g) expected to be exceeded on average once every 475 years for the region. Maps taken from the CRP



Exposure section



Exposure

The exposure database provides count, replacement cost and vulnerability classification of different building classes and infrastructure assets. It has been developed by collating several sources of data up to 2017 related to the built environment and the surrounding topography. The resolution is of 1km^2 for inland areas and from approximately 250m^2 to 120m^2 for coastal areas.

The map on the right shows the spatial distribution of the assets exposed to tropical cyclones. The representation is in terms of Replacement Value.

The two graphs show the breakdown of the replacement value of the assets at risk, classified by occupancy class, in terms of percentage (top) and absolute value (bottom).

Distribution of assets at risk

Includes:

- **Buildings** (residential, commercial, industrial, education, healthcare, public)
- **Infrastructure** (airports, ports, power facilities, road network)
- **Crops** (banana, maize, coffee, rice, sugar cane and generic)

Vulnerability section

Vulnerability

Consequences of high-intensity tropical cyclones

The vulnerability module estimates the possible consequences of a tropical cyclone on the different assets, described in the exposure database, that constitute the built environment. To do so the model makes use of relationships between the intensity of wind/surge and the repair cost of the exposed damaged assets.

- Extensive research on the building stock at country level
- Four classes to consider the relative vulnerability level

Vulnerability Code	Description
VG1	High building stock quality
VG2	Average building stock quality
VG3	Low building stock quality
VG4	Poor building stock quality

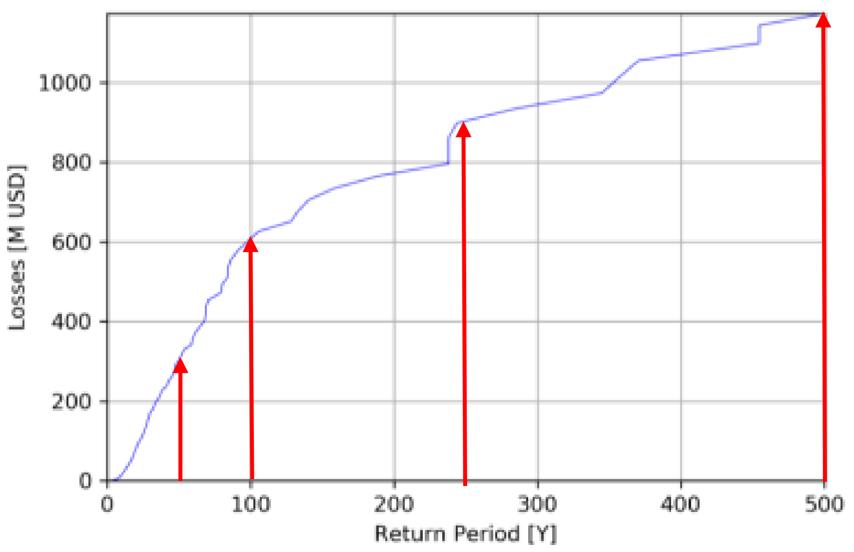
Risk section

Risk

The estimate of TC risk in is based on the stochastic catalogue of potential future tropical cyclones that may affect the region and on the losses that they may cause to the exposed assets. The graph on the right shows the tropical cyclone-induced ground-up losses (OEP) that are expected to be exceeded, on average, once every certain numbers of years (the return period). The table below reports the numerical values of the losses associated with five return periods extracted from the curve. It also shows the long-term average annual loss due to tropical cyclone events.

Return Period (Years)	*Loss (USD)*
20	*82,000,000*
50	*304,000,000*
100	*608,000,000*
250	*904,000,000*
500	*1,173,000,000*
Average Annual Loss	*21,000,000*

Potential losses



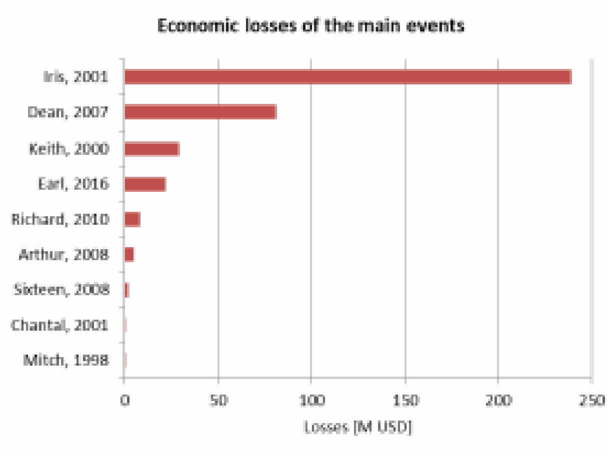
Historical losses section

Historical Losses

Historical Economic Losses

During the period from 1990 to 2017, 27 Tropical Cyclones struck The table presents the 9 events with the highest reported consequences. The most destructive event was Tropical Cyclone Iris in 2001 which caused 27 fatalities. The overall reported losses in Belize for this event ranged between US$70 and US$370 million with a mean of approximately US$240 million.

Event	Start Date	End Date	Hurricane Category	Number of fatalities	Losses (M USD)
Earl, 2016	03/08	05/08	HU1		22.22
Richard, 2010	24/10	26/10	HU2	1	8.27
Sixteen, 2008	14/10	16/10	TD	1	1.82
Arthur, 2008	31/05	02/06	TS	5	5.24
Dean, 2007	20/08	21/08	HU5		81.17
Iris, 2001	08/10	09/10	HU4	27	238.73
Chantal, 2001	20/08	22/08	TS		0.42
Keith, 2000	01/10	04/10	TS	13	29.34
Mitch, 1998	27/10	04/11	TS	10	0.01



Category	Tropical Depression	Tropical Storm	Hurricane 1	Hurricane 2	Hurricane 3	Hurricane 4	Hurricane 5
Wind Speed (1 minute sustained winds)	≤ 38 mph	39–73 mph	74–95 mph	96–110 mph	111–129 mph	130–156 mph	≥ 157 mph
Central Pressure	> 980 mbar	> 980 mbar	> 980 mbar	965–979 mbar	945–964 mbar	920–944 mbar	< 920 mbar

Purpose of Country Risk Profiles

The main objective of CCRIF's country risk profiles is to provide a clear picture of the key risks that the country faces in order to guide national catastrophe risk management and inform decision making for both risk reduction and risk transfer.

Once the CRPs have been reviewed by the country, making these documents publicly available, for instance on the CCRIF website, can benefit several DRM practitioners at the local and international level

CCRIF's risk profiles are designed specifically to be used as a **complementary tool for its parametric insurance policies**

The risk assessment included in the risk profile is used to **design the country insurance policies**

The risk assessment included in the risk profile is **consistent with the real time model** (the same model is used behind both applications)

Other Uses

Valuable information can be found in the profiles for:

- Reinsurers
- Local disaster risk managers
- Decision-makers for land use, investment and development planning
- Financial investment planners
- Local and international disaster risk managers

Making the Country Risk Profiles available would allow raising risk awareness

Financial protection is only one component of a comprehensive disaster risk management scheme. Country Risk Profiles present information that give a complete overview of the potential losses for each country.