

CCRIF Technical Workshop

Session 5: CCRIF New Product
Developments and Updates



New product development

Fluvial Flood product based on Runoff model

CCRIF already offers a flood-related parametric coverage to its clients (Excess Rainfall):

- ✓ Based on precipitation, not runoff/river flow
- ✓ Intended for flood events caused by excess rainfall (pluvial flood), not large rivers overflowing their banks
- ✓ Works well for small catchments (i.e., in small Caribbean catchments), not suitable for large rivers and floodplains

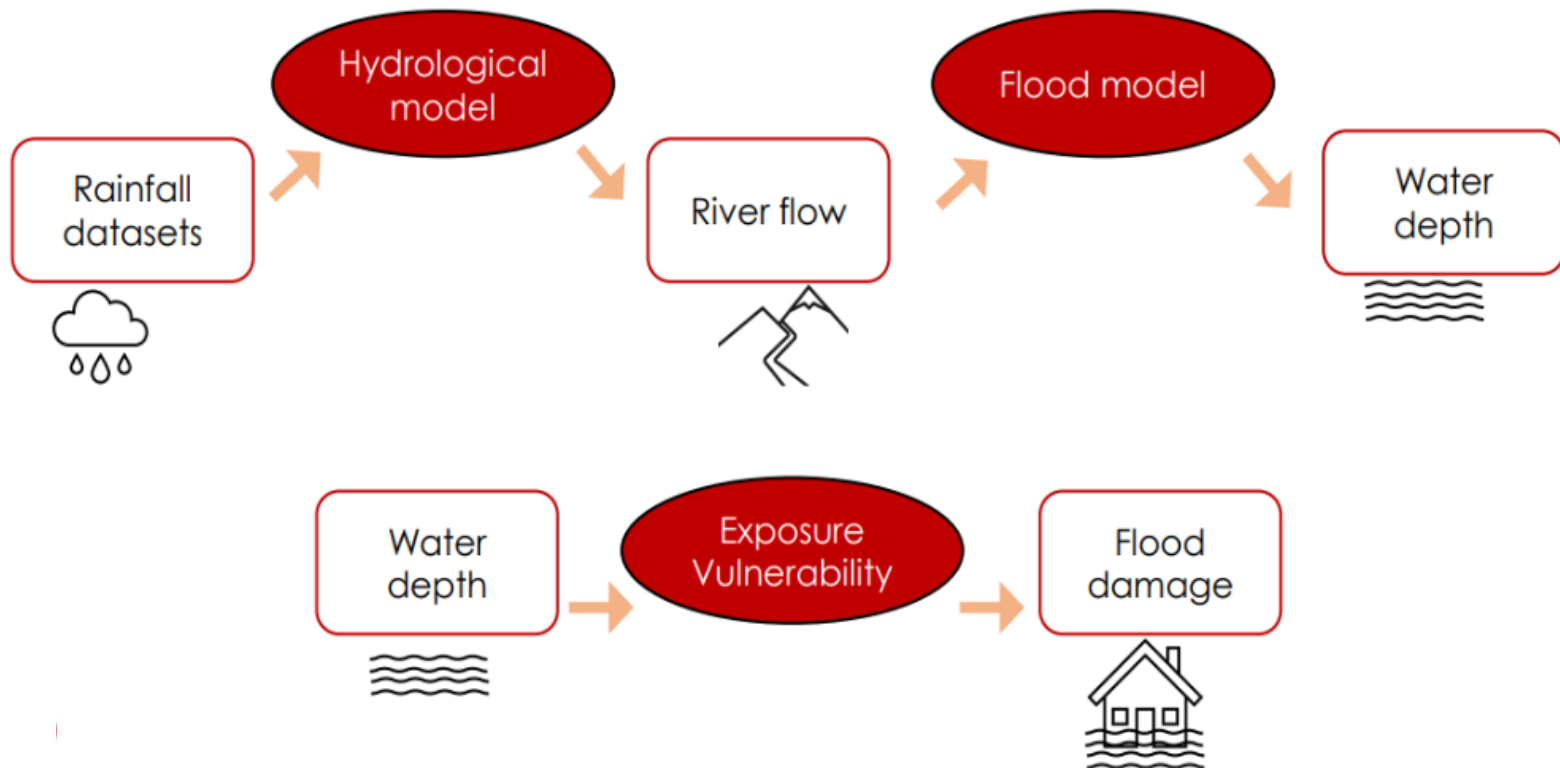
A new product is being developed **to provide parametric coverage for losses caused by fluvial floods:**

- ✓ For large countries with complex hydrology
- ✓ Precipitation can occur in uninhabited areas and cause rivers overflow in exposed areas
- ✓ Pilot study for Guyana and Suriname will be completed in the next weeks

New product development

Fluvial Flood product based on Runoff model

Model structure



New product development

Fluvial Flood product based on Runoff model

Input rainfall data

Use of an **ensemble approach** (similar to XSR):

- **IMERG (NASA)**: Integrates data from multiple satellites to provide detailed and high-resolution global precipitation information in real time. Available: 2000-present.
- **CMORPH (NOAA)**: Employs a morphing technique to merge satellite-based precipitation estimates, resulting in a high-resolution global dataset that provides continuous and near-real-time precipitation information. Available: 2000-present.
- **ERA5-Land (ECMWF)**: Reanalysis dataset, merging observational data with outputs from a land surface model. This synthesis yields a comprehensive and finely resolved depiction of precipitation dynamics across global land surfaces. Available: 1951-present.

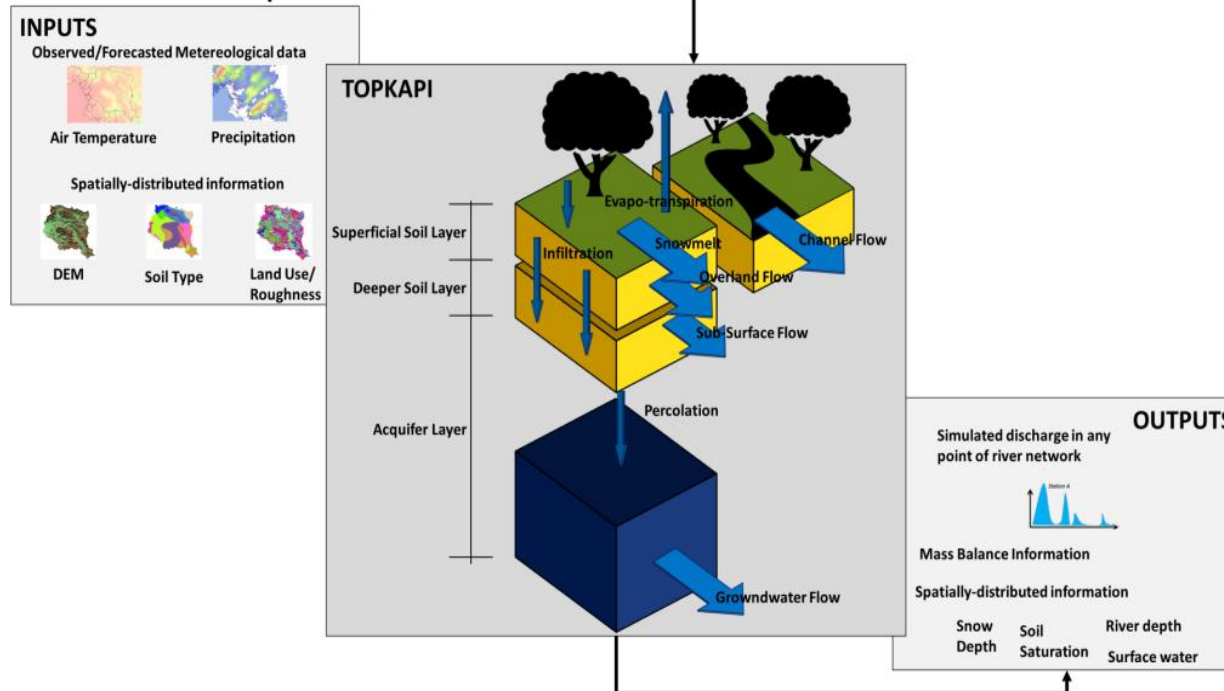


New product development

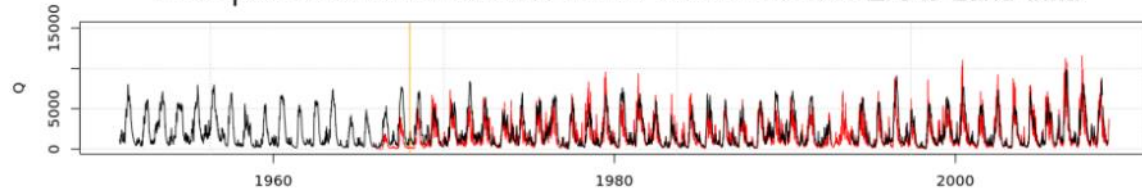
Fluvial Flood product based on Runoff model

Hydrological model

TOPKAPI model



Essequibo river observed data vs TOPKAPI simulation ERA5-Land data



New product development

Fluvial Flood product based on Runoff model

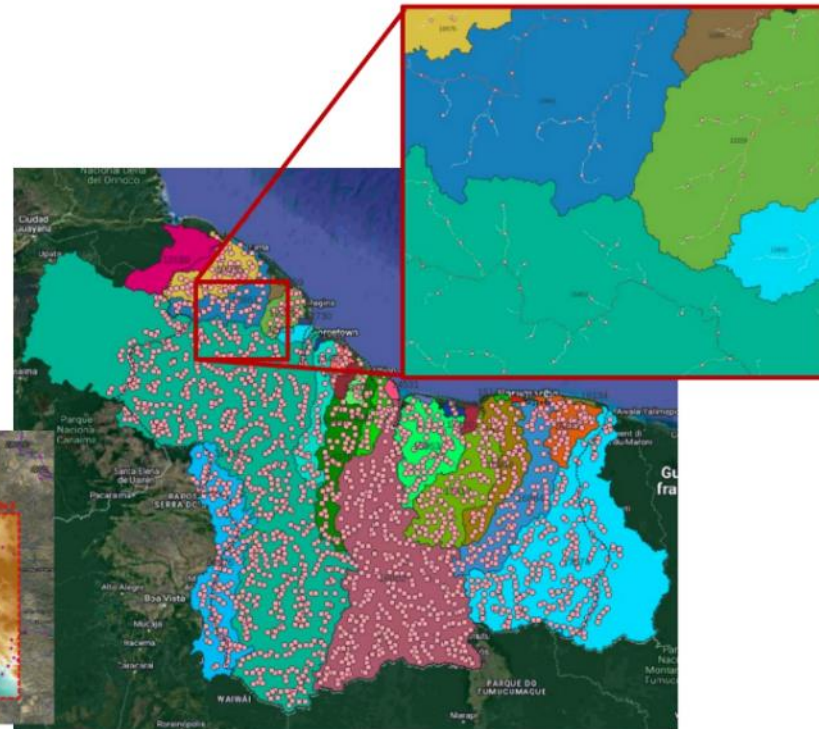
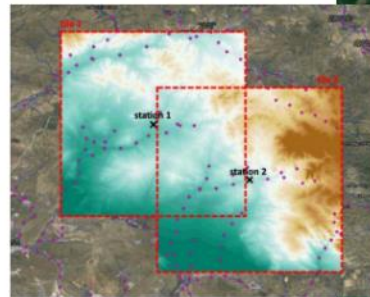
Flood model

To run CA2D the domain is discretised

We define the virtual stations that will serve as inlets in the hydraulic simulation

Each virtual station is associated to a tile that represents the unit simulation domain for the hydraulic model CA2D

Output:
**flood extension and
flood intensity**

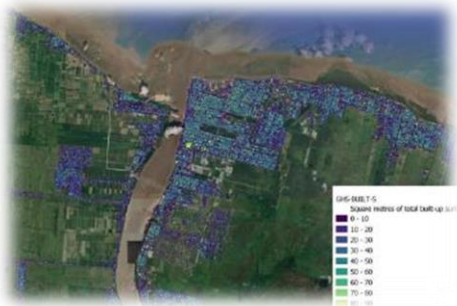


New product development

Fluvial Flood product based on Runoff model

Exposure

- ✓ Exposure data consistent with the other models (TC, XSR, EQ)
- ✓ Includes residential, commercial and industrial buildings, roads, crops, ...
- ✓ Increased spatial resolution (90m) using the Global human Settlement Layer



Vulnerability

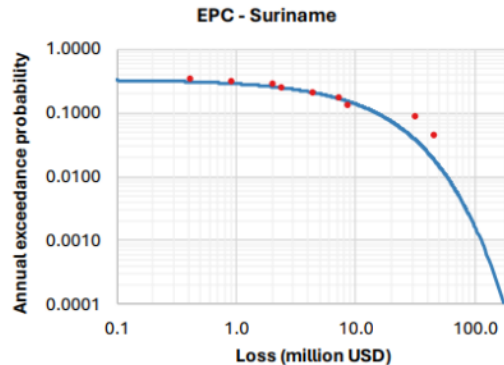
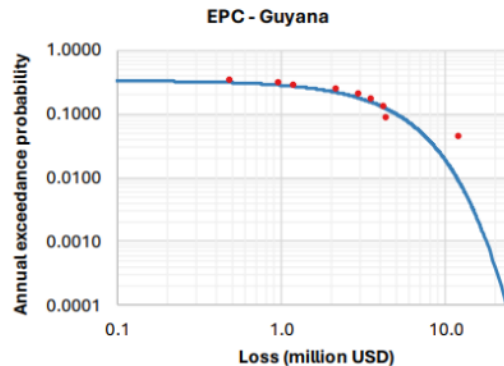
- ✓ Vulnerability functions that relate flood depth to damage
- ✓ Includes aggregated information on specific flood related characteristics (e.g., number of floors, basement, elevation of base floor, building material ...)



New product development

Fluvial Flood product based on Runoff model

Results – risk assessment



- ✓ Model for Guyana and Suriname already completed
- ✓ Risk assessment results under review
- ✓ Same Policy Structure as TC, XSR and EQ
- ✓ Expansion to other countries in future

New product development

Drought product

- ✓ Droughts are widely recognized as environmental and natural hazards.
- ✓ Related to the reduction in the amount of precipitation received over an extended period of time.
- ✓ Drought model already developed to respond to the need for a swift financial response to the loss of cash crops caused by exceptionally dry years.
- ✓ Targeted cash crops (agricultural crops intended to be sold for profit) not subsistence crops (meant to support the producer or livestock)
- ✓ Model under review and expected to be completed in the next weeks

New product development

Drought product



New product development

Drought product

An agricultural drought product.

Two types of drought are considered:

Dry-spell event

A dry spell is a period characterized by very low rainfall typically less than 5 mm/day. A dry spell will be declared in a location if a certain number of consecutive dry days is observed in a period, whose length depends on the rain regime of the country

Yield reduction event

A yield reduction event is a drought event that decreases significantly the crop yield due to abnormally low annual accumulated precipitation.

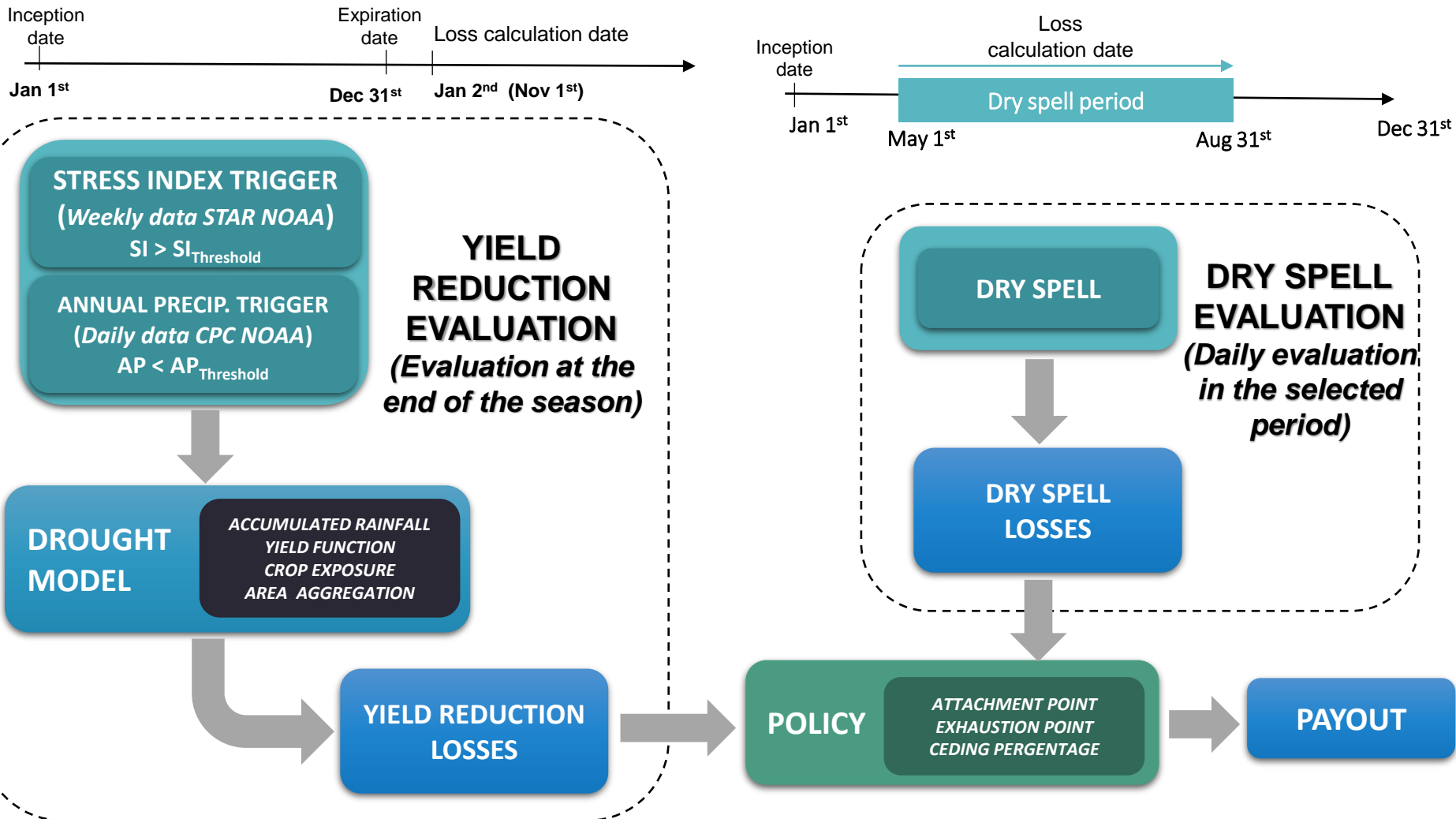
New product development

Drought product

- Daily precipitation come from **CPC Unified gauge-based analysis of global daily precipitation** (NOAA).
 - Gauge reports from over 30,000 stations (GTS, COOP, and other agencies).
 - $0.5^{\circ} \times 0.5^{\circ}$ from 1979 to present.
 - Quality controlled station reports are interpolated to create analyzed fields of daily precipitation with consideration of orographic effects.
 - Quality control with historical records and independent information from nearby stations, concurrent radar / satellite observations, as well as numerical model forecasts.
- Stress index calculated from the Vegetation Condition Index (**VCI**), obtained from the **Center for Satellite Applications and Research (STAR)** of NOAA.
 - $4\text{km} \times 4\text{km}$ from 1981 to present.
 - Re-processed Vegetation Health data set derived from VIIRS (2013-present) and AVHRR (1981-2012) GAC data

New product development

Drought product



New product development

Agriculture Multi-Peril product

- ✓ Product to cover agriculture sector: crop production, livestock, agricultural assets (warehouses, processing plants, etc.)
- ✓ Multi-peril: drought, rainfall, tropical cyclone, earthquake
- ✓ Built on top of the existing models
- ✓ Targeted to: governments (parametric sovereign product) and/or farmers (micro-insurance)

Updates to the Country Risk Profiles

The Country Risk Profiles have been updated based on the new SPHERA models for TC and EQ and XSR 3.0

CONTENT	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)

SPHERA Earthquake (EQ)
System for Probabilistic Hazard Evaluation and Risk Assessment

Barbados

Country Risk Profile

CCRIF SPC was formed in 2007 as the first multi-country risk pool in the world, and was the first insurance instrument to successfully develop parametric policies backed by both traditional and capital markets. It was designed as a regional catastrophe fund for Caribbean governments to limit the financial impact of devastating hurricanes and earthquakes by quickly providing financial liquidity when a policy is triggered.

CCRIF currently offers earthquake, tropical cyclone and excess rainfall policies to Caribbean and Central American governments. Since the inception of CCRIF, the facility has made 38 payouts totaling approximately US\$139 million to 13 member governments.

This document provides an outline of the Earthquake (EQ) risk profile for Barbados. It is aimed at providing decision makers with a clear picture of the EQ risk which the country faces in order to guide national catastrophe risk management and inform decision making for both risk reduction and risk transfer actions (such as CCRIF insurance coverage).

The country risk profile also serves as a platform for the provision of more detailed information on the System for Probabilistic Hazard Evaluation and Risk Assessment (SPHERA) platform which will be used to underpin CCRIF policies from the 2019/20 policy year. The SPHERA model is briefly described in the abridged annex at the end of this document.

Two more annexes are available separately and complement this document by detailing the SPHERA model and providing the underlying database of historical earthquakes that occurred in the Central American and Caribbean region, and the resulting economic losses.

Overview of the Country

Population (2017) ¹	283,713
GDP USD (2017) ¹	4.797 billion
GDP capita USD (2017) ¹	16,937
Total Built Exposure USD ² (Replacement value)	16.70 billion

1. World Bank
World Bank is the most reliable source and we do other source of information on economic and financial data shared by the Caribbean and Central American countries.
2. Exposure value presented below.

Barbados is located in the western area of the North Atlantic, 62 miles east of the Windward Islands and Saint Vincent and the Grenadines and north-east of Trinidad and Tobago.

CCRIF SPC
The Caribbean Catastrophe Risk Insurance Facility

Use of the CRPs

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.

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 when a hazard event occurs**

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.

Other Uses for the Country Risk Profiles

Besides the use of the Country Risk Profiles for which these were developed, valuable information can be found in the profiles for:

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

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