



# Collaboration with private sector: best practices and lessons learned

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# Key areas of engagement

There are three main areas of collaboration with the catastrophe risk insurance markets:

- **Technical** – including:
  - Risk understanding / catastrophe risk modelling
  - Financial planning / actuarial analytics
  - Product and programme design
- **Legal & Regulatory** – including:
  - Legal contracting of insurance and/or other risk transfer mechanisms
  - Regulatory systems to protect various parties and the system as a whole
  - Credit rating agencies
- **Provision of Risk Capital** – including:
  - Access to globally diversified risk markets for efficient access to capital
  - Access to broader capital markets for greater capacity
  - Access to specialty markets with a long history of taking unusual forms of risk

# Solutions to support humanitarian crisis response to tropical cyclones

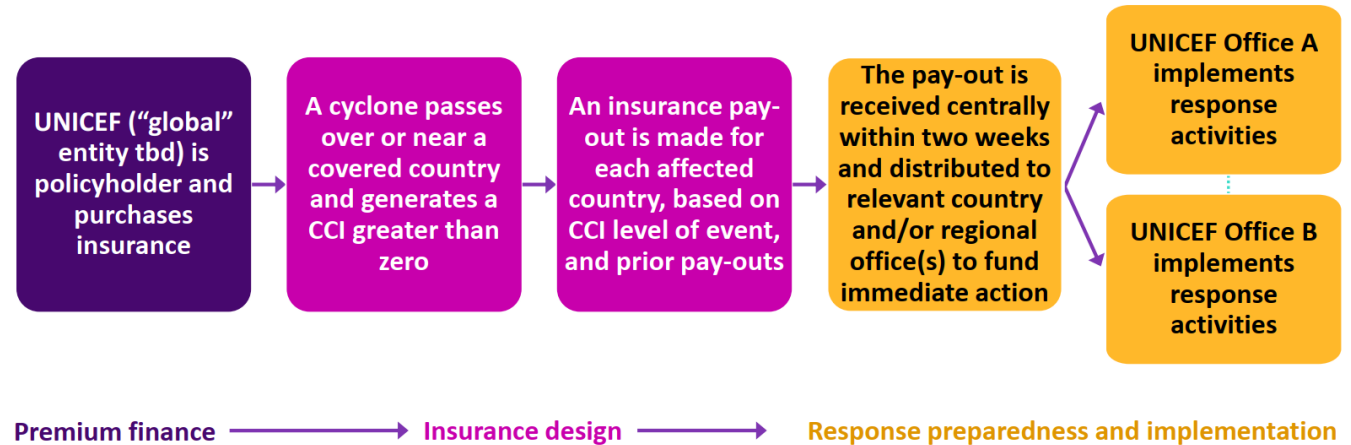
## Background:

Children and youth are a critically vulnerable population group that is among the most affected by disaster risk and climate change, including the effects of extreme weather events such as cyclones. In 2022, UNICEF's Children's Climate Risk Index estimated 400 million children are currently highly exposed to cyclones. In the context of UNICEF's increased recognition for climate action and need for innovative financing, UNICEF launched the Today and Tomorrow (T&T) Initiative to enhance its operational shock resilience through parametric risk transfer.

## The Tomorrow component of the T&T Initiative:

WTW designed an innovative parametric insurance programme for UNICEF that directs rapid post-disaster funding towards an estimated 13.5 million vulnerable children, youth, and parents, specifically mothers. The instrument has been a) tailored to reflect UNICEF's cyclone response needs for children and youth through child and youth-responsive exposure and risk analysis, b) incorporates the individual needs of the UNICEF country offices with respect to rapid financing; and c) pools cyclone risk across 8 Caribbean, African, Asian and Pacific Island countries. In addition, pay-out scheme covers both extreme tropical cyclones and the compounding impact of smaller tropical cyclone events.

## How does it work? *Illustrative example*



## The Child Cyclone Index (CCI):

- The CCI captures both number of children affected and the magnitude of impact based on child- and youth-responsive exposure and risk analysis:
- Step 1: "Exposure" database developed, comprising number of children (0-17) per each 100m grid cell in each country from the WorldPop database
- Step 2: For each live event, wind "footprint" (from Kinetic Analysis Corporation via WTW) is sampled for each exposure grid cell, and an index value (Child Cyclone Index, CCI) is calculated using the following
  - formula:  $CCI = [\text{wind speed in kt}]^2 * [\# \text{ of children}] * 10^{-6}$
- Step 3: CCI is aggregated at the country level to give a total CCI for a given event in a given country

Pay-out size and cross-country distribution are calculated based on the impact value per CCI unit per country

# Insurance product design for the city of Medellín

## Background:

Colombia ranks prominently among nations susceptible to climate impacts, with about 84% of its populace facing exposure to multiple climate-related dangers such as floods and landslides. Floods alone account for a significant portion of Colombia's economic losses, comprising 56.8%, followed by earthquakes at 11.3%, and landslides at 8.3%. Cities like Medellín, with dense populations, face heightened risks owing to their geographical features and erratic rainfall patterns typical of mountainous areas.

## Pre-arranged, trigger-based financing:

In a collaboration with Global Communities and Hannover Re, WTW led the development of novel disaster risk financing products to support emergency response actions of the Municipality of Medellín's Disaster Risk Management Agency (DAGR). As part of the product development, the team worked closely with DAGRD to understand the specific hazard context of Medellín, and the suitability of trigger-based risk financing for supporting their risk management responsibilities for earthquake, flood, and landslide perils; conducting data analysis and risk modelling to establish the frequency and impacts associated with these perils; identifying areas of the city where vulnerable populations are located; and exploring opportunities to tailor the product towards these groups.

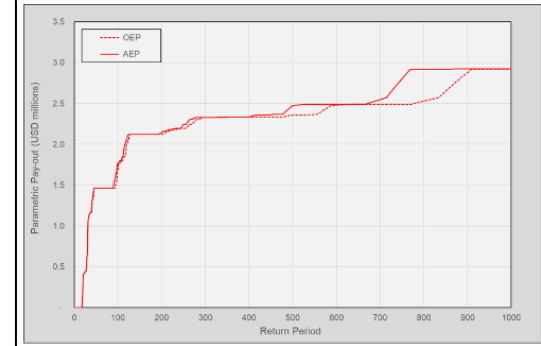
## How does it work? Illustrative example

As an example parametric structure, the earthquake parametric design involves:

- Determining the Modified Mercalli Intensity (MMI) per postcode,
- Determining the hazard loss rate,
- Multiplying loss rate by exposure and vulnerability weighting
- Multiplying the above overall loss rate by the cover limit
- Aggregate this across postcodes

MMI start	MMI end	Loss Rate
0.0	5.0	0.00%
5.0	5.5	5.00%
5.5	6.0	10.00%
6.0	6.5	15.00%
6.5	7.0	20.00%
7.0	7.5	25.00%
7.5	8.0	40.00%
8.0	8.5	55.00%
8.5	9.0	70.00%
9.0	9.5	85.00%
9.5	10.0	100.00%
10.0	10.5	100.00%

To trigger the earthquake parametric model, one of the postcodes across the municipality must experience ground shaking equivalent to MMI 5+



	Earthquake	Flooding	Landslide
<b>Historical Analysis</b>	<ul style="list-style-type: none"> <li>▪ Historical catalogue including 5 events that have impacted the Medellín metropolitan area</li> </ul>	<ul style="list-style-type: none"> <li>▪ SIATA rain gauge data covering the Medellín municipal area, over the time period 2011 – 2022</li> </ul>	<ul style="list-style-type: none"> <li>▪ SIATA rain gauge data covering the Medellín municipal area, over the time period 2011 – 2022</li> </ul>
<b>Modelling Analysis</b>	<ul style="list-style-type: none"> <li>▪ Proprietary earthquake shaking hazard model including 1,052 events with MMI ranging from 4.4 to 9.15</li> </ul>	<ul style="list-style-type: none"> <li>▪ Statistical approach using a fitted Gumbel distribution</li> </ul>	<ul style="list-style-type: none"> <li>▪ Statistical approach using a fitted Gumbel distribution</li> </ul>
<b>Real-time Trigger</b>	<ul style="list-style-type: none"> <li>▪ Shakemap provided by:</li> </ul>	<ul style="list-style-type: none"> <li>▪ Rain gauge data from:</li> </ul>	<ul style="list-style-type: none"> <li>▪ Rain gauge data from:</li> </ul>

SERVICIO GEOLÓGICO COLOMBIANO



## Product summary

# Protecting Belize's blue bond debt servicing needs from climate risks

## Background:

At the end of 2020, Belize was struggling to service its public debt, which had reached US\$2.1 billion. This was around the same time Belize suffered major flooding in the aftermath of Hurricane Eta while simultaneously battling the COVID-19 pandemic. Belize faced an overwhelming challenge. The country needed swift resources for disaster response while still meeting their debt servicing obligations and long-term sustainable development priorities.

## Belize's debt restructuring:

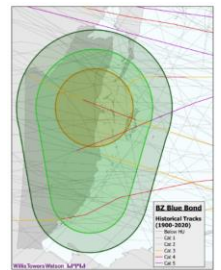
The Nature Conservancy's NatureVest unit, along with Credit Suisse, assisted the Government of Belize to restructure their outstanding privately-held debt, amounting to over US\$500 million, resulting in the issuance of a 20-year blue bond. The blue bond was protected by a Resilience Wrapper designed and placed by WTW, along with political risk insurance provided by the U.S. Development Finance Corporation.

## Solution - Resilience Wrapper:

WTW created a parametric structure to isolate and transfer the risk of default due to climate disasters. Using an innovative "inverted avocado" structure to capture the most important events, it differentiates (i.e., triggers for) the most impactful events (>20% GDP impact) during the historical period (including severe hurricanes; multiple hurricanes in the same season; and particularly wet hurricanes). If the policy is triggered, the pay-out replaces the next semi-annual debt serving payments due to be made by the Government of Belize. It was priced very favourably in the insurance market via a competitive process, and risk was transferred through a linked, but separate, transaction to the blue bond issuance.

## Outcomes: debt restructuring that includes a resilience wrapper resulted in Belize being able to...

- Use part of the debt relief to capitalise a conservation endowment fund and commit to spending more on ongoing marine protection to allow its marine protected areas to roughly double by 2026.
- Benefit from a direct debt reduction and reduction in the cost of capital.
- Cover its blue bond debt servicing obligations if a climate event triggers the parametric insurance pay-out.
- Benefit from S&P's increase in Belize's sovereign credit rating by three steps, from CC to B-.



# Parametric Index - Morocco FSEC

## Background:

FSEC, a public financial entity formed by Royal Decree, is tasked with managing, and financing, the “beneficiary” part of the catastrophe compensation regime, established by Law No. 110-14 and coming into effect on 1 January 2020. The law provides for the circumstances under which FSEC will pay compensation to individuals and/or householders in the event of an eligible catastrophe event. Development of the regime began after the devastating Al Hoceima earthquake in 2004.

## Transferring Earthquake Risk:

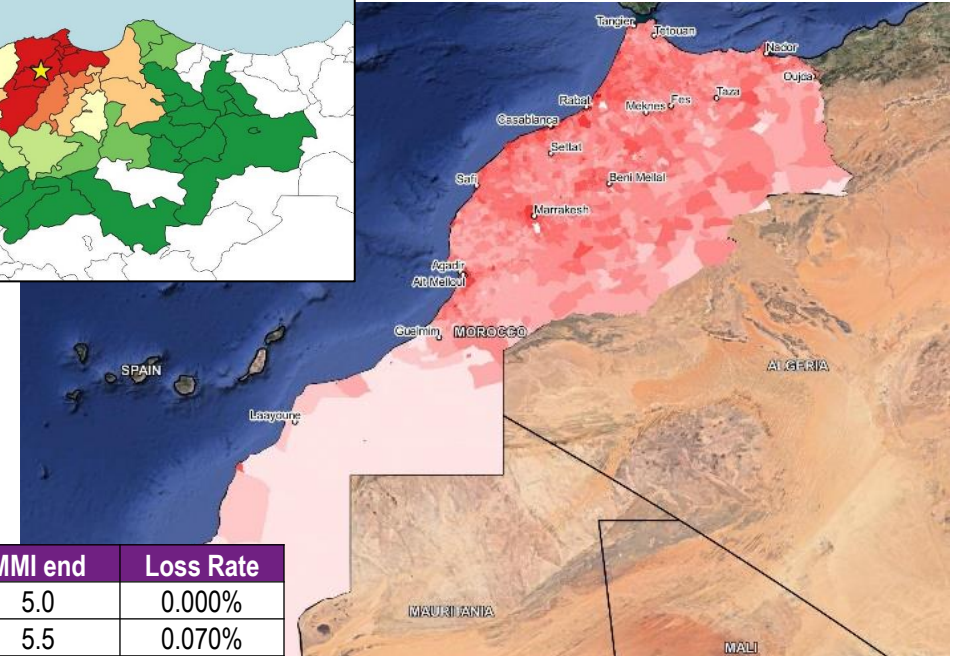
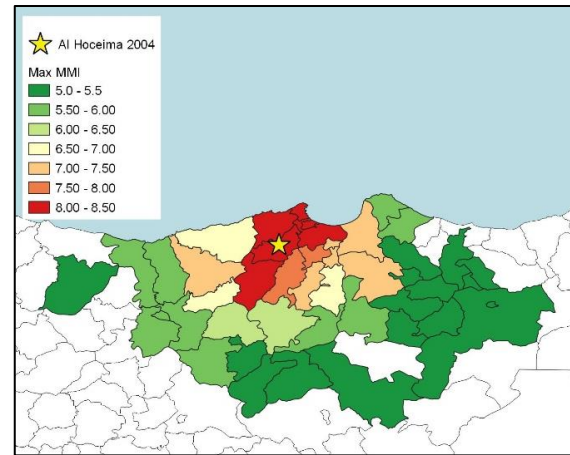
WTW was appointed for the purposes of structuring an appropriate parametric product and executing a risk transfer transaction. In close collaboration with FSEC, WTW designed and placed an Earthquake Parametric Index Loss (reinsurance) from ground shaking due to naturally occurring earthquakes within 3 months of appointment.

## Characteristics:

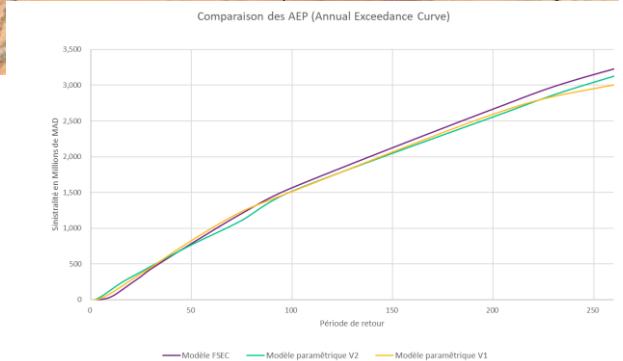
Policy operates on a parametric indexed loss basis at the national level, built up from losses calculated in each of the 1,540 Communes. WTW used its MENA EQ model for underlying risk analytics. The parameter for real-time pay-out calculation is Modified Mercalli Intensity (MMI) from the USGS ShakeMap product, which incorporates local information.

## The Ultimate Test:

In September 2023, a large earthquake struck central Morocco, causing widespread damage, especially in rural areas. The parametric structure captured the scale of resources needed by FSEC, which received a maximum payout of \$250mn within a week or so of the earthquake.



MMI start	MMI end	Loss Rate
0.0	5.0	0.000%
5.0	5.5	0.070%
5.5	6.0	0.325%
6.0	6.5	0.950%
6.5	7.0	2.650%
7.0	7.5	8.000%
7.5	8.0	13.000%
8.0	8.5	20.250%
8.5	9.0	23.000%
9.0	9.5	26.000%
9.5	10.0	31.825%
10.0	10.5	38.950%



# Best Practices

- From the problem definition, appointments of relevant partners with clear roles to leverage the strength on all side
- Regular meeting with all stakeholders to ensure engagement and alignment
  - Constant support to explain why the solution has been selected amongst others
- Not be afraid of repetition for education to have full buy in, including endorsement of regulators
- Transparency around pros and cons/limitations
- Modelling/structuring
  - If data is not sufficient it can encompass some enhancement of the current system
  - Backup/fallback methodology crucial
- Think through the insurance solutions, including the full deployment; i.e., BCP, alerting, etc.
  - Correct mapping of the payout
- Local actors key on both side public and private to ease the dialogue and execution



# Why Ghana?



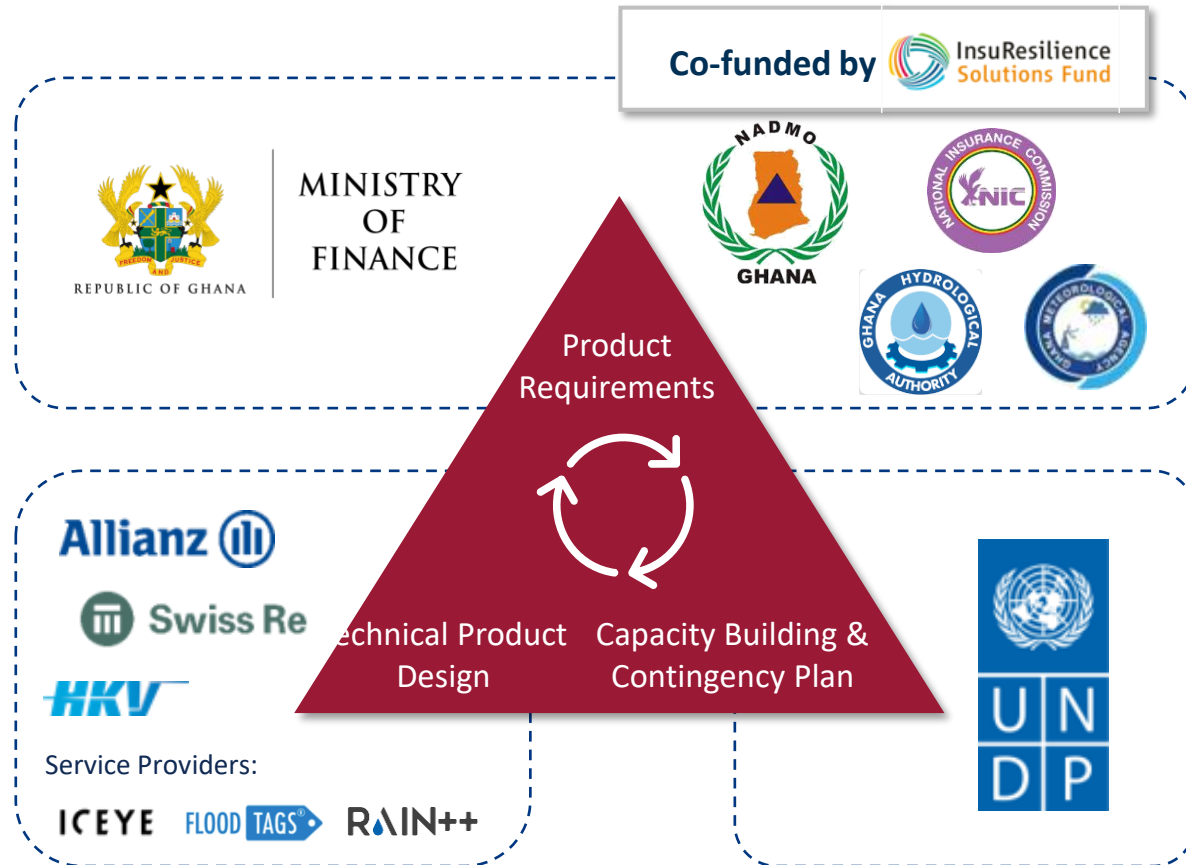
- Ghana is **increasingly vulnerable to the effects of climate change**, with 30+ major floods affecting more than 4.5 million people since 1955
- The **2015 flood event** affected **53,000 people** and caused major damage, amounting to **55 million USD**, with estimated 105 million USD reconstruction cost
- **Poor and vulnerable households** disproportionately suffer from disaster losses

## Project Target:

To enhance **Ghana's climate resilience** through a tailored **parametric flood cover** for Accra. This insurance solution aims to rebuild economic activity in **low-income urban areas** and to strengthen the capacity of NADMO and other government stakeholders.



# Project setup and insured assets





# A Parametric Solution

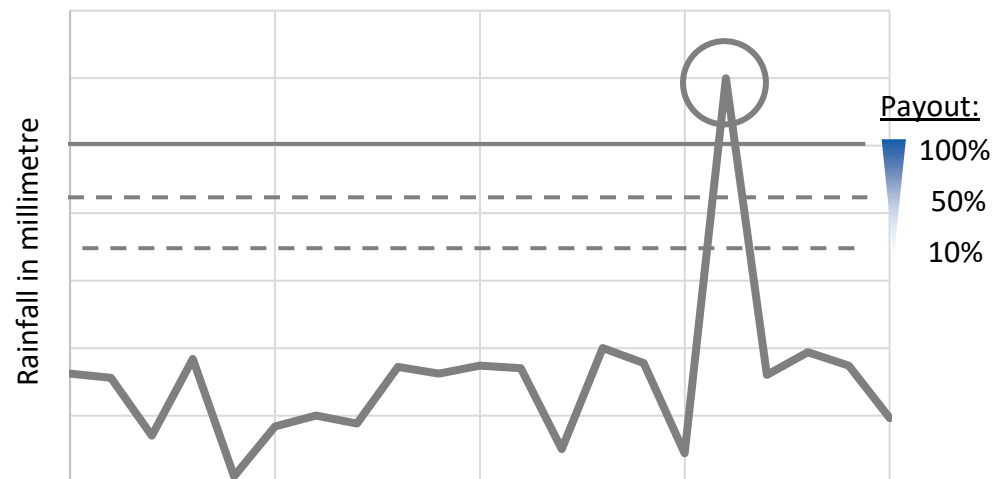


Parametric insurance relies on the **measurement** of a natural phenomenon or index (parameter)



Payout of pre-defined amount is made when agreed **threshold** of parameter/index is **exceeded**

## Illustrative example



## Benefits

- Allows for **fast payouts** (4-6 weeks)
- **No loss assessment** required after an insured event
- Otherwise, **uninsurable** risks can be insured
- **Transparency** to everyone, triggering event parameters easily accessible

# ICEYE - Radar Technology



Finish company ICEYE's satellites with **high-definition radar technology** are unique to detect flooding in densely populated urban areas.

- **32 specialized satellites**
- **6-8 overpasses** every day
- Ability to see **day or night, through clouds** and rain
- High-resolution up to **50 cm**
- First release of flood analysis is available **within 24 hours of flood peak**
- Data will be delivered for government response and recovery

The ICEYE logo is displayed in a bold, black, sans-serif font. It is positioned at the bottom left of the slide, partially overlapping a blue-toned satellite radar image of a flooded area.

**ICEYE**





# Pay-out & Beneficiaries

Stepped pay-out functions will be adopted, so that **higher pay-outs are triggered for more severe events**. Both options trigger full limit pay-out for an event similar 2015.

## Flood footprint product specificities:

Option	First pay-out return period (years)	Full pay-out return period (years)	Approx. triggered pay-out events (2000-2022)	Premium payments
Balanced	5	20	4	
Catastrophe	10	20	2	

## Beneficiaries – Poor & Vulnerable

- **1.2 mn people** living in **poor and vulnerable areas**
- Divided into **44'000 50m x 50m grid-points**. If pre-defined number across a given basin is flooded, then the pay-out is triggered.
- **Markets & transport hubs** are overweighted as they are key for reestablishment of economic activity.



# Overview of the Project Progress

