The Caribbean Catastrophe Risk Insurance Facility

Economics of Climate Adaptation

World Forum of Catastrophe Programmes

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CCRIF
The Caribbean Catastrophe Risk Insurance Facility

Climate Change Problem

- CCRIF has recently supported the first phase of a study of the economics of climate adaptation (ECA) for the Caribbean

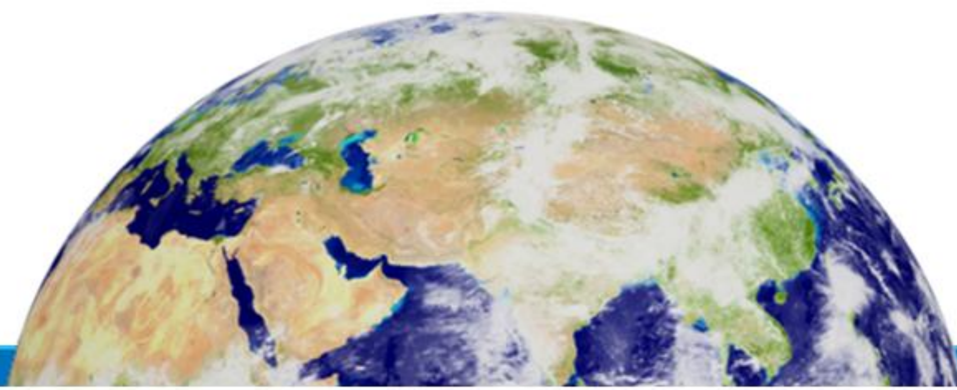
- Meaningful quantification of the impacts of CC on risk, and ways to cost-effectively adapt (risk reduction + risk transfer) – at national and sectoral level

- Climate change clearly brings variability to hydro-meteorological hazards (generally upward, particularly for catastrophe hazards)

Economics of Climate Adaptation (ECA) project

Key questions and objective of the Economics of Climate Adaptation approach

Questions	Methodology's objective
▪ How can we measure and predict the impact of climate change on our economies? ▪ How can we prepare to adapt to this impact?	▪ Provide decision makers with facts and a common approach to assess and address any location's 'total climate risk' in a cost-effective manner



Methodology overview

Our approach for total climate risk management

1 – Where and from what are we at risk?

- Identify most relevant hazard(s)
- Identify areas most at risk
  - Population (especially vulnerable population)
  - Economic value (assets, GDP)

2 – What is the magnitude of the expected loss?

Hazard scenarios
- Develop scenarios for future climate

Hazard
- Assess frequency and severity per scenario

Value
- Quantify population, assets, and income value at risk

Vulnerability
- Determine vulnerability of population, assets, and incomes

3 – How could we respond?

- Identify potential adaptation measures
- Determine basic feasibility of potential measures
- Determine societal costs and benefits (loss averted) of measures

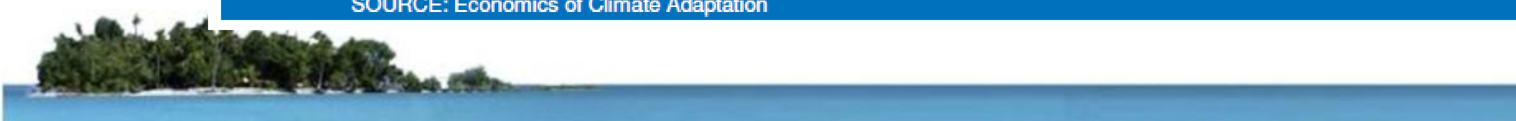
4 – How do we execute?

- Identify key barriers to implementation
- Determine actions required to implement measures

5 – What are the outcomes and lessons?

- Measure success based upon key performance metrics
- Incorporate lessons learned in next iteration of the total climate risk decision cycle

SOURCE: Economics of Climate Adaptation



Scope of project – countries and hazards

So far, we have examined eight countries and four hazards

Country scope

Additionally, we analysed the impact of climate risk on the agriculture sector in Belize and Jamaica

Hazard scope

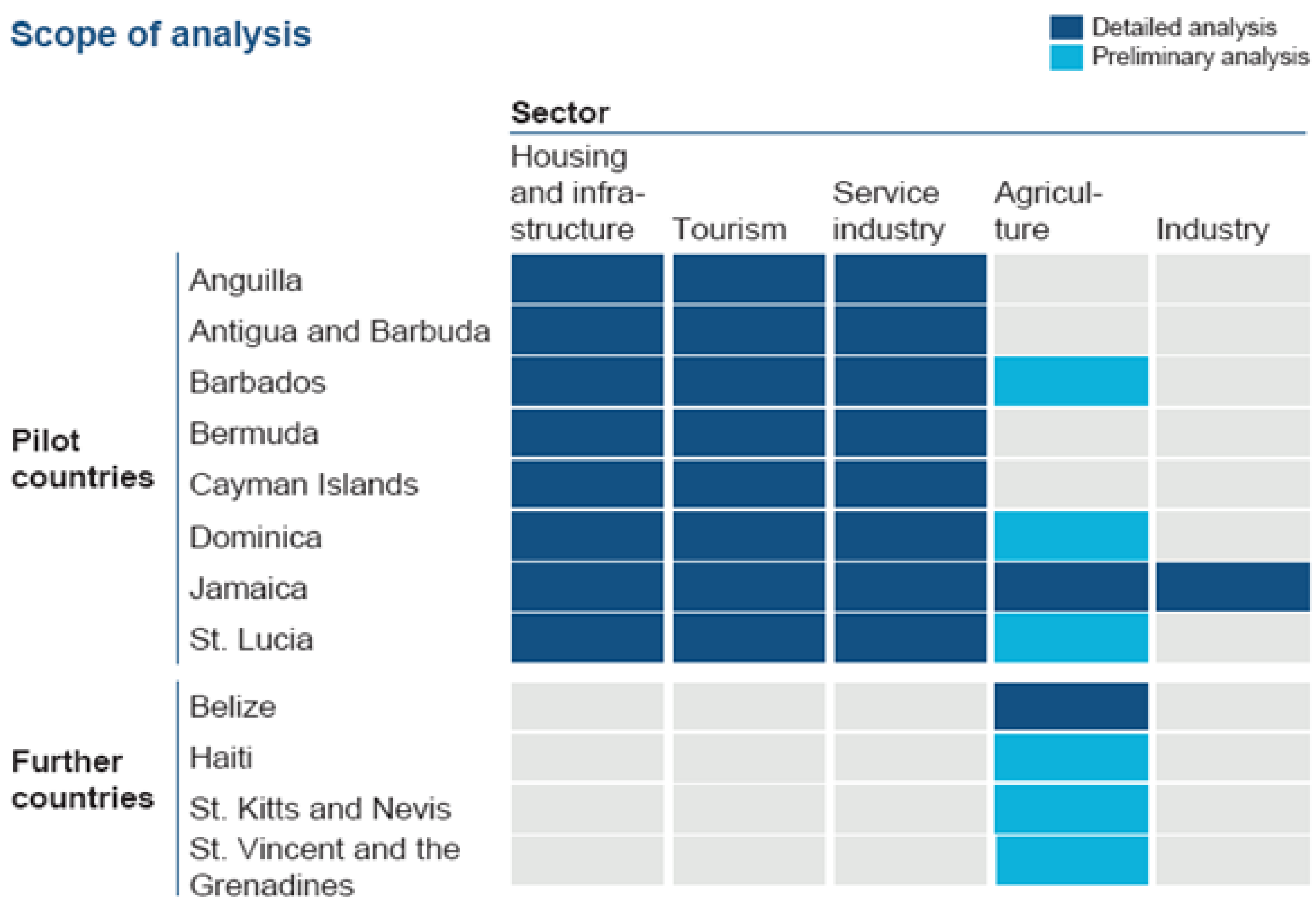
Wind

Coastal flooding/ storm surge

Inland flooding

Salinisation

Sector analysis - driven by importance to national economy



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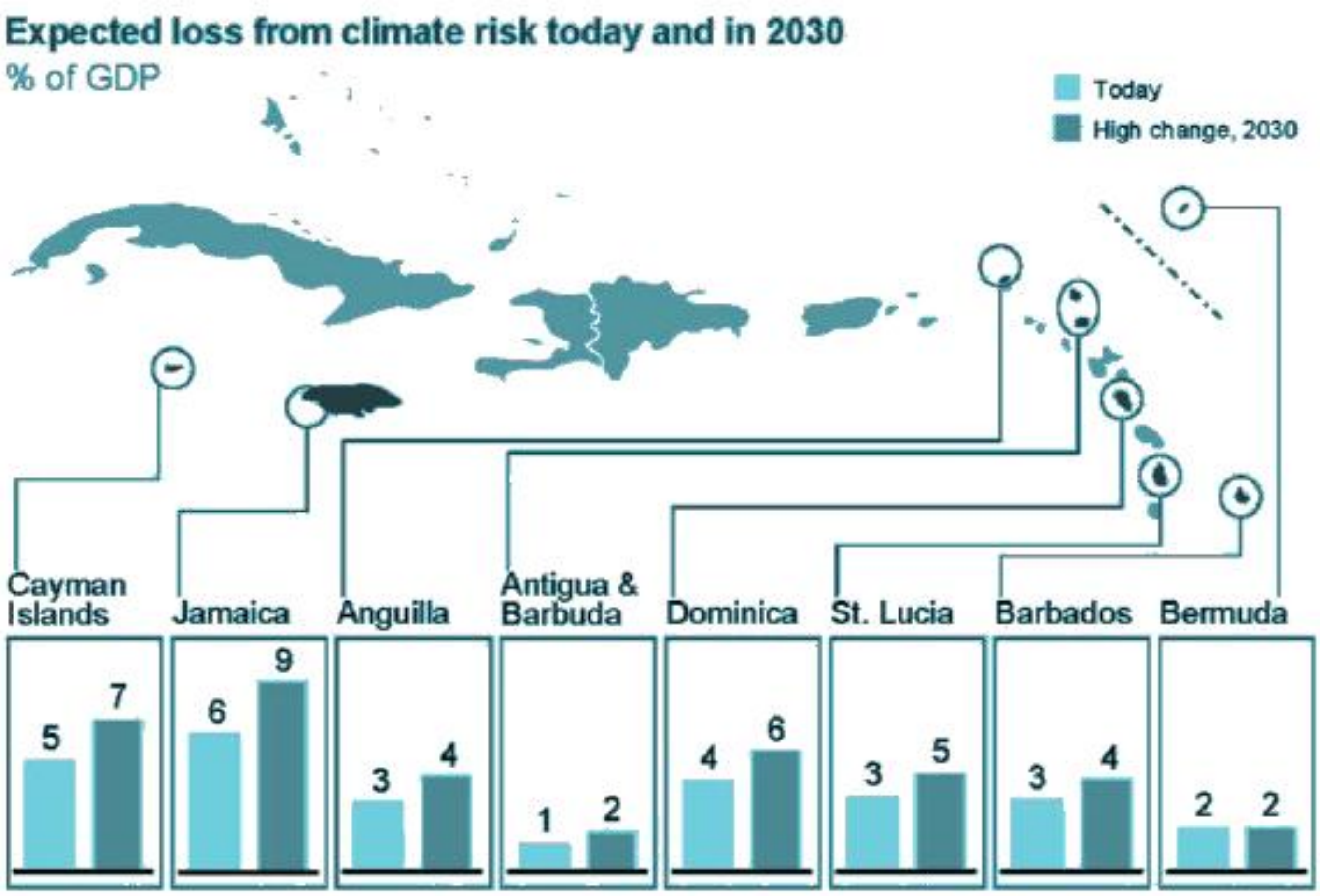
ECA results

- Climate change threatens Caribbean development
- Annual expected losses amount to up to 6% of GDP
- Varies significantly across pilot countries
  - From 1% of GDP in Antigua & Barbuda to 6% of GDP in Jamaica
- Could increase by 1 to 3% of GDP by 2030 (worst case scenario)
  - i.e. the absolute expected loss may triple
- **This economic damage is comparable in scale to the impact of a serious economic recession – but on an ongoing basis**

Expected loss from climate risk today and in 2030



Impacts of climate change on the risk profile

- Climate change can severely modify the risk profile of a country by impacting:
  - Local sea levels (greater risk in low-lying countries; accounts for about 45% of total damage in Cayman Islands)
  - Hurricane intensity (largest damage potential; up to 90% of overall damage)
  - Precipitation patterns
  - Temperature patterns
- In our high climate change scenario, sea levels may rise by up to 15mm/year and wind speeds may increase by around 5% as a consequence of the expected rise in sea surface temperature in the hurricane genesis region
- It is important to note that even small local changes may have large effects due to the non-linear correlations between climate and hazards
- **A 200-year event in Bermuda, for instance, might become a once-in-a-lifetime (75-year) event as a result of these seemingly small changes**

Variations in expected losses across the region

- Differences are driven by a diverse set of factors, including:
  - Topography/exposure to coastal hazards
  - Economic significance of particularly vulnerable sectors (e.g. residential assets)
  - Location (e.g. in “Hurricane Alley”)

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Adaptation measures

- **Risk Mitigation**
  - Measures aimed at reducing the damage
  - Includes asset-based responses (e.g. dikes, retrofitting buildings) & behavioural measures (e.g. enforcing building codes)
  - **In some countries these measures can cost-effectively avert up to 90% of the expected loss in 2030 under a high climate change scenario**

- **Risk Transfer**
  - Measures aimed at limiting the financial impact for people affected by transferring part of the risk to a third party (e.g. catastrophic risk insurance or the capital market)
  - Include both traditional insurance products and alternative risk transfer instruments (e.g. cat bonds)
  - Play a key role in the case of low-frequency, high-severity weather events such as once-in-100-year catastrophes

Effectiveness of risk mitigation

- For each of these adaptation measures, we quantified the benefits – that is, averted losses – as well as costs, and undertook a cost-benefit analysis

- There are significant differences in the share of the expected loss that can be averted cost-effectively across countries

- This is driven by:
  - Value of buildings
  - Importance of coastal flooding/storm surge

CBA results

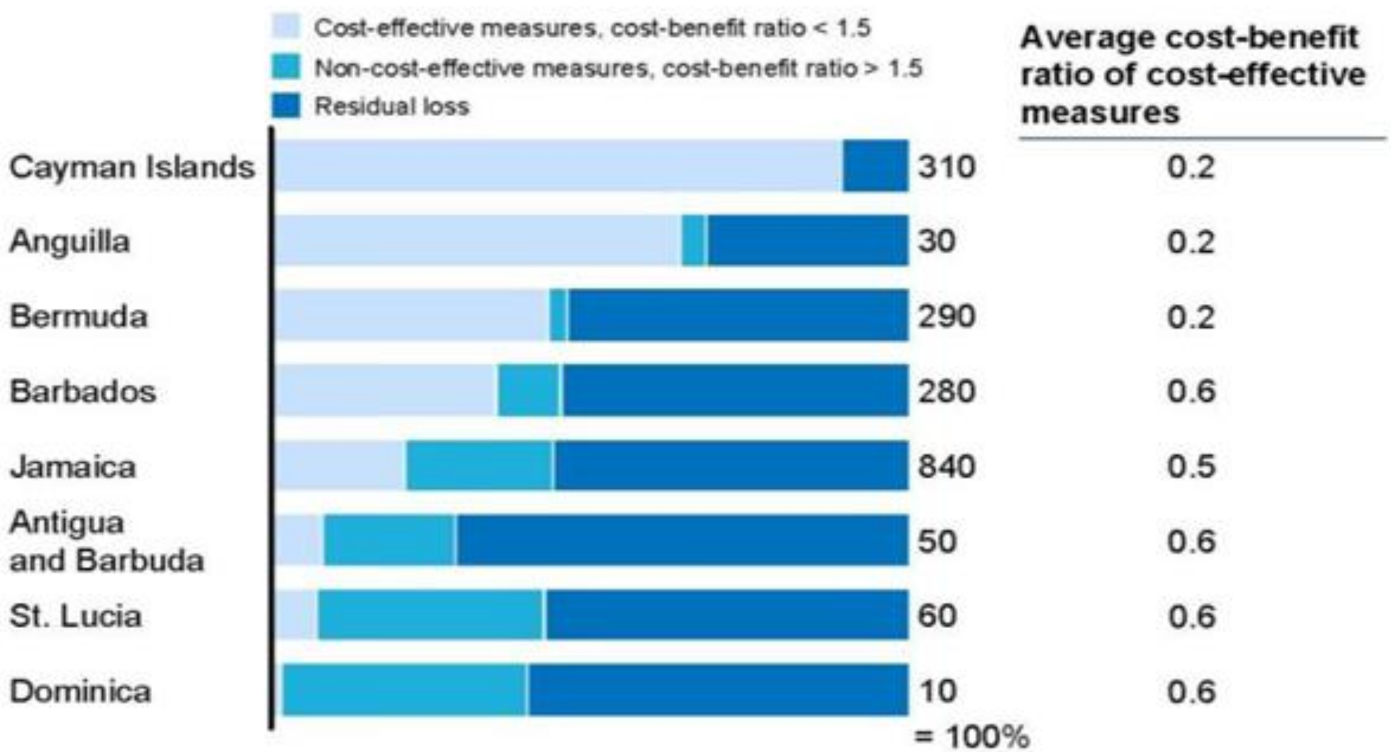
- The risk from coastal flooding/storm surge can be mitigated more cost-effectively than wind hazard
  - Low-lying countries such as Cayman Islands (where coastal flooding/storm surge accounts for around 45% of the damage) can therefore increase their resilience in a more economically effective manner than a mountainous country such as Dominica (where coastal flooding/storm surge accounts for only some 15% of the potential damage)
- Together, the results of the study illustrate the importance of a balanced portfolio of measures in each country
  - Using suitable risk mitigation initiatives to protect human lives
  - Building on risk transfer solutions to protect economic assets

Cost-benefit analysis

Effectiveness of the risk mitigation measures analysed

Expected loss (high climate change, 2030)

USD millions



ECA next steps

Potential next steps to turn these analyses and insights into action

Potential next steps

- Understand your risk profile today and in the future ☑
- Specify your 'risk appetite' in line with your development priorities ☑
- (Re-)prioritise risk mitigation and risk transfer measures based on your priorities ☑
- Calculate an adaptation business case incl. investment plan ☑
- Develop a roadmap incl. priority initiatives ☑
- Use roadmap and business case for funding discussions ☑
- Speed up implementation with additional funding and further increase resilience ☑

Output from ECA analysis

- Expected loss per hazard by scenario
- +
- Drivers of expected loss for each scenario
- +
- Cost-benefit curve of adaptation measures
- +
- Measures to cover residual risk

The end

Thank you

ECA brochure with preliminary results available