THE CARIBSAVE PARTNERSHIP AND CLIMATE CHANGE:
A SECTORAL APPROACH TO VULNERABILITY AND RESILIENCE

CREST; INNOVATORS IN COASTAL TOURISM CONFERENCE
STANFORD UNIVERSITY, SAN FRANCISCO
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Protecting and enhancing the livelihoods, environments and economies of the Caribbean Basin

Regional Knowledge Gaps

WS = warmer summers
WW = warmer winters
EE = increase in extreme events
SLR = sea level rise

LB = land biodiversity loss
MB = marine biodiversity loss
W = water scarcity

D = increase in disease outbreaks
TCI = travel cost increase from mitigation policy
PD = political destabilization
Major Impacts: Climate Change on Caribbean Tourism Sector

- Crucial interdependence: Tourism and Climate...
- **national economy, livelihoods, development, environment**
- Gradual and Extreme
- Regulatory policy, voluntary initiatives and costs

**Coastal Emphasis**
- Air temperature
- Sea surface temperature
- Sea level rise
- Coastal erosion
- Changes in levels of precipitation
- Extreme events: increase in intensity and frequency,
  - e.g. drought, flood, storm surge, (hurricane)
- Seasonality shifts
- Loss of Destination Aesthetics
Key Issues

- Supply – Destination / Physical Impacts
- Demand – Mitigation Policies
- Livelihoods – Economic Development - GDP
- Tourism Dependence
- Vulnerability (‘Hot Spot’) 
- Knowledge Gap
- Fragmented – work, geography, governance
- Capacity and Data
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SECTORAL RELATIONSHIP BETWEEN SUSTAINABLE DESTINATIONS & CLIMATE CHANGE

Sustainable Caribbean Tourism Destinations

Agriculture
Economic Development
Natural Resources
Energy
Security
Transport
Water
Climate
Infrastructure
Health
Waste Management

Simpson et al 2008a
The CARIBSAVE Partnership
Caribbean Community Climate Change Centre
University of Oxford
Association of Caribbean States
Caribbean Tourism Organization
Regional and International Organizations

- Multi-Sector
- Multi-Objective
- Multi-Donor
- USD $35 Million
- Links and Compliments ACS – STZC
- Long-Term Approach Established - Whole Region
- PRACTICAL STRATEGIES
- Inclusive and Critical Mass
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ACS = Geographic scope of CARIBSAVE
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Regional & International Organizations:
e.g. ACS, CTO, CDERA, UNEP, UNWTO, UNDP, WMO, UNECLAC, CANARI, IIED, CIMH, CHTA, CARICOM, CAST, OECS,

International Development Organizations and NGOs:
e.g. FCO, DFID, WWF, Travel Foundation, DANIDA, SITHSONIAN, WORLD BANK, IADB, CIDA, GTZ, SNV, Buccoo Reef Trust,

Central Action Group:
ACS, CTO, CCCCC, OXFORD UNIVERSITY + REPRESENTATIVES OF PARTNER ACTION GROUPS

Academic & Research Institutes:
e.g. UWI, TUFTS, UW, Leon, UMA, UNA, Limoge, W. Norway, Maastricht, Carolina, Lund,

Partner Countries and Private Sector:
e.g. All Partner Countries and e.g. CCAA, VIRGIN, SANDALS, Oil Companies, Green Globe, Scotia Bank
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Summary: CARIBSAVE Climate Change Analysis, Strategy Development, Implementation & Monitoring; component example

SECTORAL APPROACH TO CLIMATE CHANGE, TOURISM & LIVELIHOODS IN THE CARIBBEAN BASIN REGION

CLIMATE CHANGE MODELLING and SCENARIO BUILDING

VULNERABILITY & ADAPTIVE CAPACITY PROFILING & SOCIO-ECONOMIC ASSESSMENT

Regional National Destinational

BASELINE ATTRIBUTE DATA

SYNTHESIS & REFINEMENT

Sectoral Based Evaluation of Climate Change Impacts on Tourism & Livelihoods

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ADAPTATION & MITIGATION STRATEGY & POLICY DEVELOPMENT

CARBON MANAGEMENT & CARBON NEUTRAL TOURISM REGION

STRATEGY & POLICY IMPLEMENTATION INC. COMMUNITY-BASED ADAPTATION

Sectoral Based Capacity Building and Community Outreach

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Protecting and enhancing the livelihoods, environments and economies of the Caribbean Basin
Climate Change & Coral Reefs

- **Rising temperatures** is the greatest threat to Caribbean corals.

- For the parameters of climate change that are affecting corals, two can be quantified to differentiate impacts under 1.5 and 2.0°C globally averaged warming scenarios: **coral bleaching and ocean acidification**. There is also strong evidence that rising temperatures will increase **infectious diseases** in corals.

- The ecosystem services (fisheries and tourism) provided by coral reefs in the Caribbean are valued at **US$ 1.5-3.5 billion/annum**. +2.0°C will rapidly degenerate the corals, resulting in the loss of these ecosystems and Billions of US$.
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Climate Change & Agriculture

- In CARICOM countries, climate change will:
  - Decrease the average yields of **three key crops by 3-8%** (irrigated and rainfed rice, rainfed maize and rainfed cowpea)
  - Yield effects = agricultural **value fall between US $85 - $243 Mil p.a.**

Climate Change & Water Resources

- Global temperature increase of 1.5°C would severely impact water resources in a minority of CARICOM states, while +2.0°C would **severely impact the majority**
- Decreased precipitation, reducing surface water reserves and groundwater recharge; drought; saltwater intrusion
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Sea Level Rise (SLR) Trends

- Global temperatures and the SLR are linked
- SLR in the Caribbean has paralleled global trends over the last 40 years
- With a +1.5°C in mean global temperatures, the magnitude of SLR may slow versus recent observations
- +2°C in mean global temperature, the rapid increase in SLR will continue
Global SLR Projections

- Moderate to high GHG emission scenarios pose a major threat to the stability of the world’s ice sheets, introducing the possibility of rapid SLR on a decadal timescale up to 10x the rate observed a century ago.

- Accounting for rapid ice sheet melt (Greenland & Antarctic), recent studies have supplanted IPCC projections and forecast 1-2m SLR by 2100.
Caribbean SLR Projections

- Gravitational and geophysical factors will lead the region to be more seriously affected by SLR than most areas of the world
  - SLR in northern Caribbean may exceed global average by up to 25%
- Impact of tropical storms and hurricanes on coastlines, even at present levels, will be intensified as sea level rises
- SLR will continue for centuries after 2100, even if global temperatures are stabilized at 1.5°C or 2.0°C
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Protecting and enhancing the livelihoods, environments and economies of the Caribbean Basin
Digital Elevation Model of SLR and Storm Surge Inundation of Belize City, Belize (at 1-6m)
SLR Impacts: 1m

- Over 2,700 km\(^2\) land area lost (10% of The Bahamas)
  - Market value of undeveloped land lost is over US$ 70 billion

- Over 100,000 people displaced (8% of population in Suriname, 5% of The Bahamas, 3% Belize)
  - Cost to rebuild basic housing, roads and services (water, electricity) for displaced population approximately US$ 1.8 billion

- Annual GDP losses of at least US$ 1.2 billion (over 6% in Suriname, 5% in The Bahamas, 3% in Guyana and Belize)

- Over 1% agricultural land lost, with implications for food supply and rural livelihoods (4% in Suriname, 3% in The Bahamas, 2% in Jamaica)
- At least 16 multi-million dollar tourism resorts lost, with a replacement cost of **over US$ 1.6 Billion** and the livelihoods of thousands of employees and communities affected.

- Transportation networks severely disrupted
  - Loss of 10% of CARICOM island airports at a cost of **over US$ 715 million**
  - Lands surrounding 14 ports inundated (out of 50) at a cost of over **US$ 320 million**
  - Reconstruction cost of lost roads **exceeds US$ 178 million** (6% of road network in Guyana, 4% in Suriname, 2% in The Bahamas)
Vulnerability of Major Tourism Resorts and Montego Bay, Jamaica to SLR and Storm Surge
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Total Economic Impact of 1m SLR

- GDP loss = > US$ 1.2 billion per year (cumulatively US$30 billion if 1m SLR occurs in 2075)
- Permanently lost land value = US$ 70 billion +
- Reconstruction / relocation costs = $ 4.64 billion

SLR impact estimates are highly conservative

- Population and GDP are fixed at recent levels
- Coarse resolution of geospatial data masks the vulnerability of coastal infrastructure, natural areas and people to inundation from SLR in some areas
- Implications of SLR for accelerated coastal erosion could not be assessed in this study

NOTE: These figures are based on SLR scientific evidence and do not include other major economic impacts, such as losses in agricultural production, losses in GDP from areas outside inundated regions, costs of changing energy, increased storm or hurricane damage and related insurance costs, necessary water supply construction, increased health care costs and any non-market value impacts.
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ACTION – NOW

Interdisciplinary Approach – Unique and Innovative

- Collaborative Work – destinalional, local, national and regional
- Cross-Ministerial – multi-stakeholders
- Climate Science
- Physical Impacts and Vulnerability
- Tourism & Related Sector Impacts & Vulnerability
- Stakeholder, Socio-Economic, Livelihood and Gender Impacts and Vulnerabilities
- Government Policies, Practical Strategies, Community-based Adaptation, Implementation, M&E,

Water – Energy – Agriculture – Health – Biodiversity
Infrastructure – Comprehensive Disaster Management
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CARIBSAVE CC Analysis, Strategy Development, Implementation & Monitoring; component example

Selection of Linking Variables and Indicators

Tier 1:
- Humidity
- Surface air / land temperature
- Precipitation (timing, frequency and intensity, inc. dry periods)
- Sea level rise
- Sea surface temperature
- Storm surge incidence
- Sunshine (hrs per day)
- Wind speed

Tier 2:
- Coastal erosion and beach loss
- Flooding incidence and coastal inundation due to storm surge and precipitation
- Increased evaporation (soil erosion)
- Ocean acidity
- Seasonality shifts
- Water (availability and quality i.e. drought and salt-water intrusion into freshwater aquifers)

Tier 3:
- Agriculture and fisheries i.e. lack of locally grown food stuffs
- Biodiversity and habitat (changes and loss i.e. deforestation, marine and terrestrial species, coral bleaching)
- Human health (e.g. dengue fever, malaria, food poisoning)
- Run-off and soil erosion

Climate Modelling and Data Analysis (Coupled Climate Models)

Physical Impacts and Vulnerability Assessment

Tourism and Related Sectoral Impacts and Vulnerability Assessment

Stakeholder, Socio-Economic, Livelihood and Gender Impacts and Vulnerability Profile

Adaptive Capacity Assessment and Profile

Adaptation Strategy and Policy Recommendation and Development

Mitigation Strategy and Policy Recommendation and Development

Adaptation and Mitigation Strategy and Policy Implementation including Community-Based Adaptation

Monitoring and Evaluation

KEY
W – Water
E – Energy
A – Agriculture
H – Health
B – Biodiversity
IS – Infrastructure & Settlement
CDM – Comprehensive Disaster Management
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Pilots

- Eleuthera, The Bahamas
- Montego Bay, Jamaica
- Negril, Jamaica
- Western Barbados, Barbados
- Rodney Bay/Pigeon Causeway and Soufriere, St Lucia
Risk Atlas and Country Profiles: Phase 1

The Bahamas, Barbados, Dominican Republic, St. Kitts, Suriname, Belize, Antigua and Barbuda, Dominica, Jamaica, St. Lucia, Anguilla, Grenada, Nevis, St. Vincent and Grenadines, Turks and Caicos
Conclusions and Recommendations

For: Economic Dev., Investment, Insurance, Livelihoods

- Improve climate change predictions for evidence-based decisions
- Predict impacts on key sectors and implement adaptation measures
  - urgent improvement to spatial detail and resolution of data
  - immediate more detailed quantification of losses and damages
  - improved detail on coastal vulnerabilities and infrastructure
  - downscaling of climate change scenarios
  - characterisation of agriculture and crop varieties
  - assessment of water resources and management of supply
  - urgent adaptation and management actions for coral reefs
  - rapid reduction of CO₂ emissions
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A CC&T RISK ATLAS

- Livelihood Focus
- Pro-poor
- Insurance
- Investment
- Prioritisation
- CDM
- Environment and Biodiversity
- National Economic Development
- Effective Strategy Implementation
- Democratization of Science
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- Cross-sectoral - Inter-ministerial,
- Regional and International
- Cooperation and Collaboration is required

(Actually it’s Essential!!!)
‘For me, I am an Optimist… for there seems little point in anything else’

Winston Churchill

THANK YOU

www.caribssave.org

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Greatest Climate Change Impacts on Caribbean Reefs

1. Increased frequency and intensity of **coral bleaching**
   - June to October 2005, elevated water temperatures of 2°C caused severe and mass coral bleaching, with many areas exhibiting over 90% bleaching and over 50% mortality. There has been little or no sign of recovery.

2. Increased **infectious disease outbreaks** since the 1970s
   - Coral diseases have been a major factor in decreasing Caribbean reefs, with correlations made between summertime thermal stress and disease outbreaks, even at temperatures below those that cause mass bleaching.

3. Increased **acidification** of oceans
   - This reduces carbonate ion concentrations that corals use to build their calcium carbonate skeletons, slowing coral growth and processes that cement reefs together.