Caribbean Community Climate Change Centre

Integrating Climate Change into Business Strategy

34th Annual Caribbean Conference of Accountants

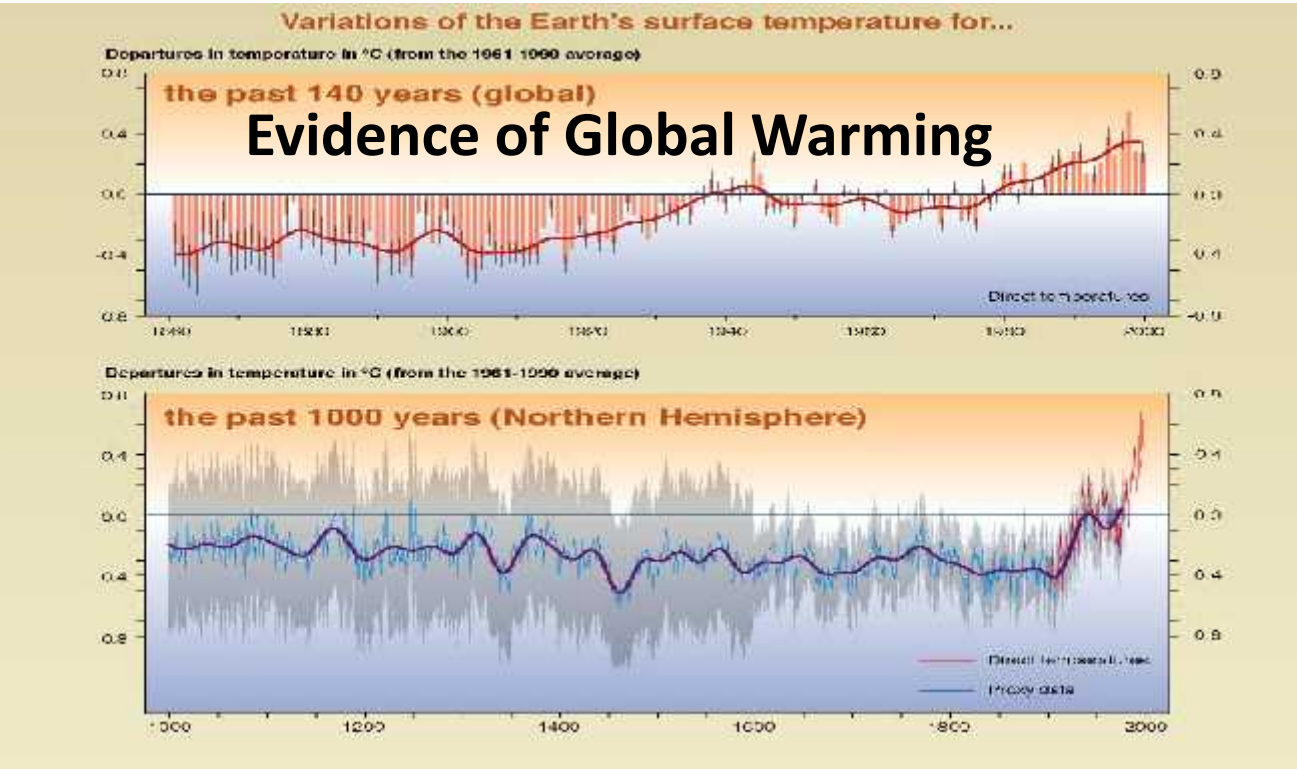
Belize City, Belize

25 June 2016

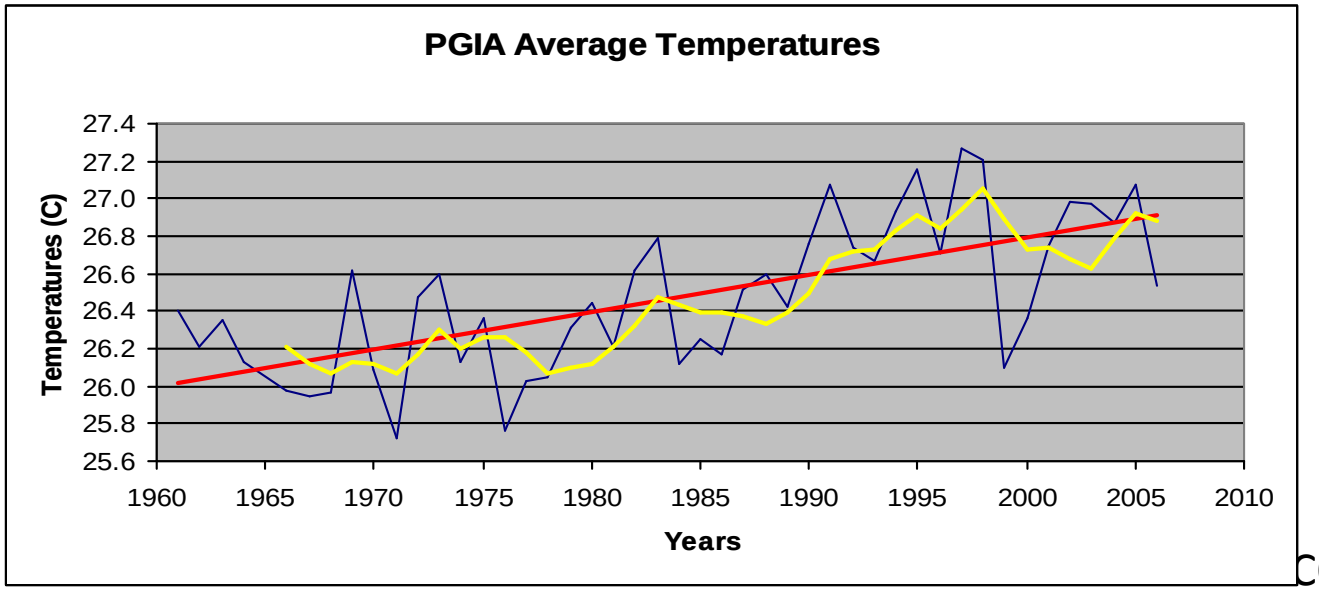
Carlos Fuller
International and Regional Liaison Officer
Caribbean Community Climate Change Centre

Evidence of Global Warming

Source: IPCC



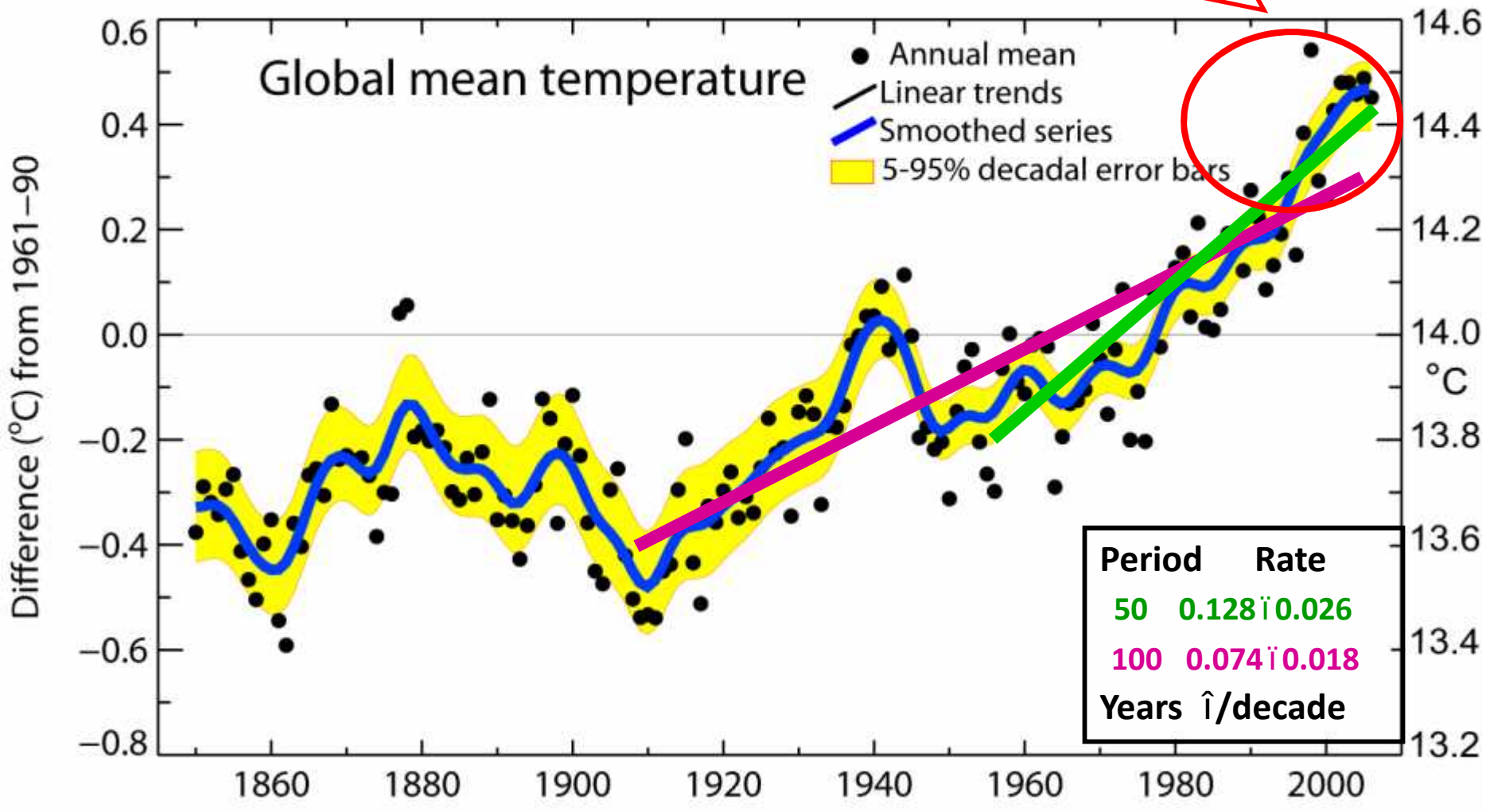
Source: NMS, Belize



CC

Global mean temperatr

Warmest 10 years:2015,2014,2013,
1998,2005,2003,2002,2004,2006, 2001



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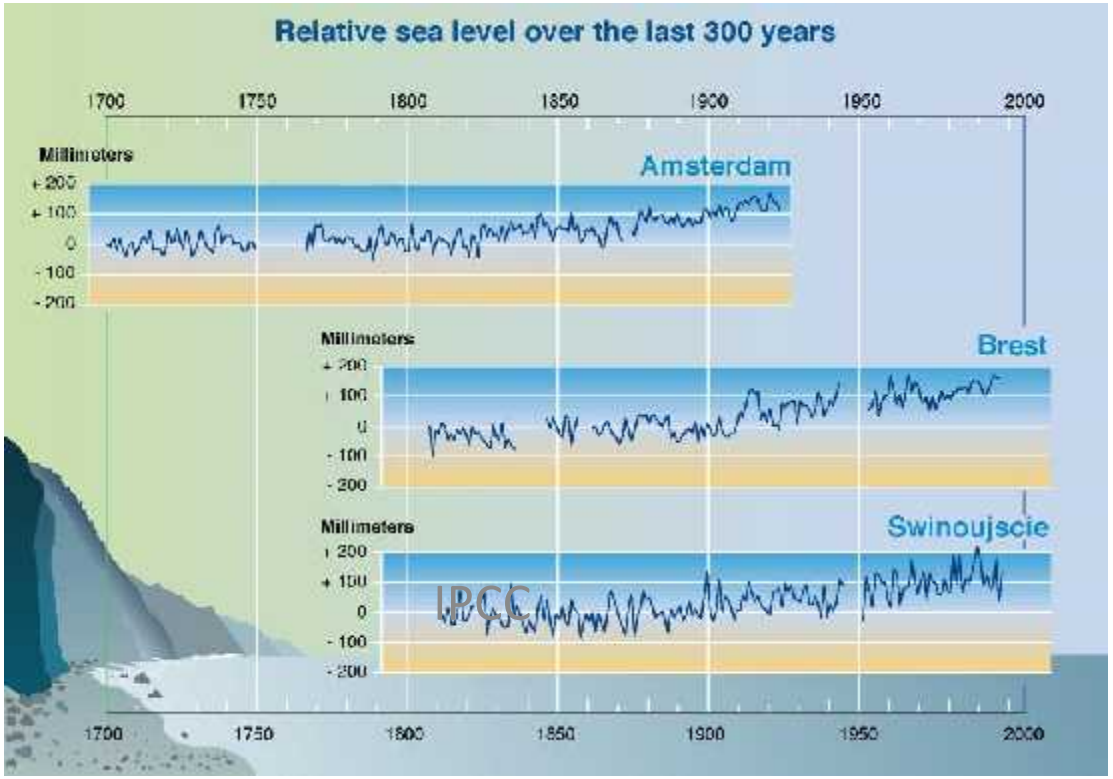
Sea Levels have risen

Guyana:

- Sea level rise is 5 times greater than global avg.
  - 10.2 mm per year from 1951-1979



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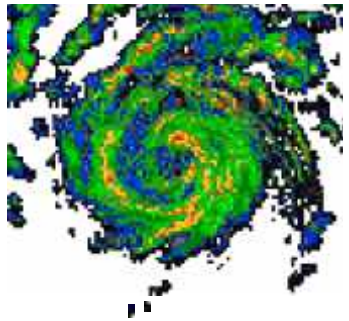
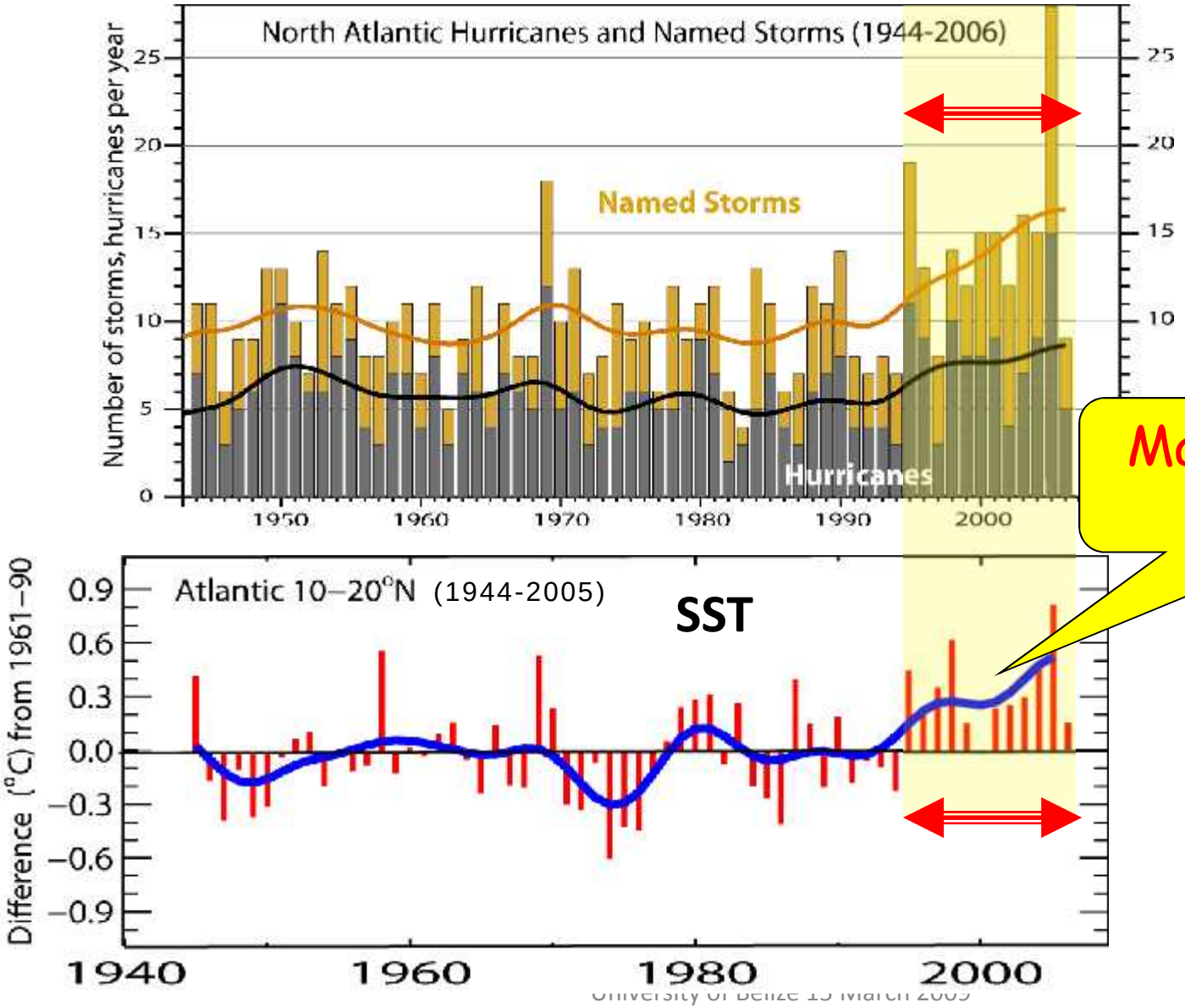
North Atlantic hurricanes have increased with SSTs





Marked increase after 1994

SOURCE: IPCC

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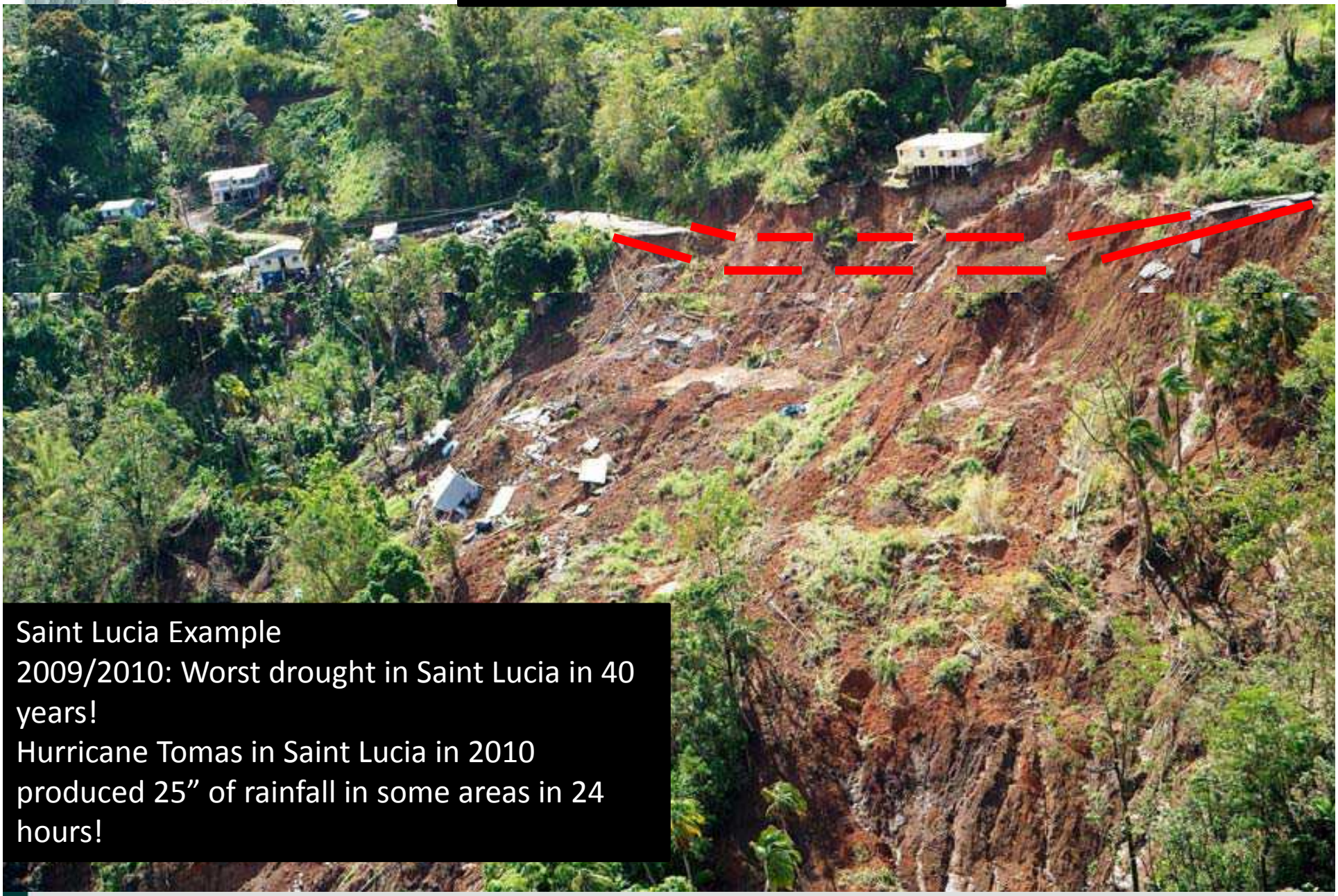
Changes in Rainfall Intensity



Saint Lucia Example
2009/2010: Worst drought in Saint Lucia in 40 years!
Hurricane Tomas in Saint Lucia in 2010 produced 25” of rainfall in some areas in 24 hours!

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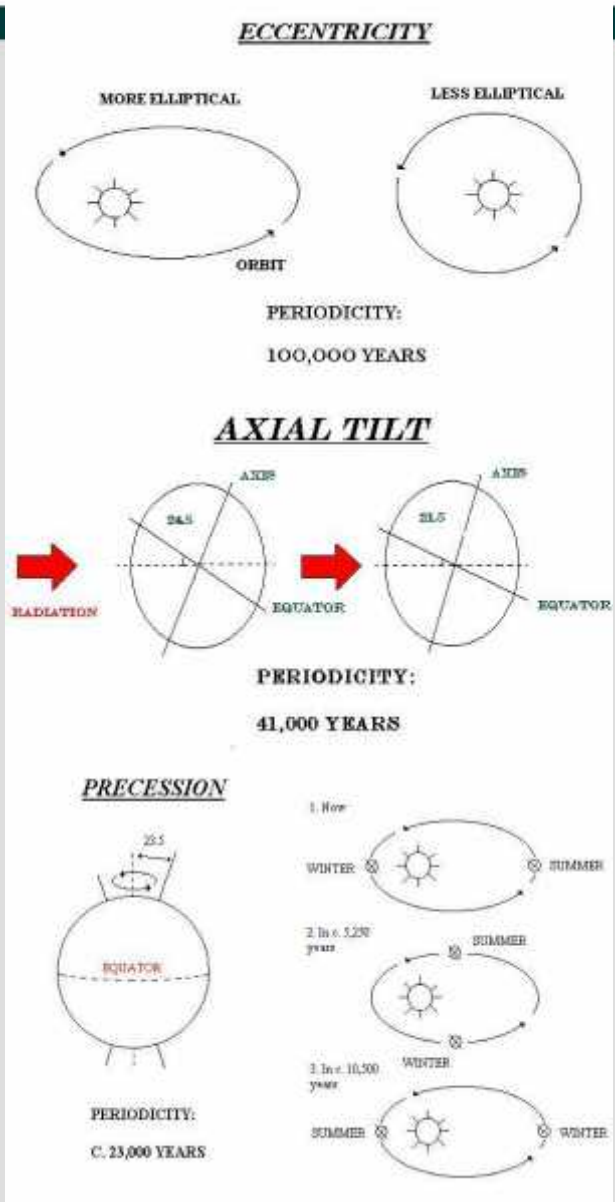
Main Drivers in Natural Climate Change – Long Term

- The Sun - Source of Heat Energy in Earth Atmosphere System – Solar Constant not Changing – Annual Solar Radiation Amount Entering Atmosphere Not Changing
- Earths Rotation – Milutin Milankovitch
  - Orbital Eccentricity – Shape of Orbit changes during a cycle of 100K years from Near Circular to Elliptical and back
  - Tilt of Axis of Rotation today about 23.5 deg But in a Cycle of 41K years Varies Between 21.5 – 24.5 deg
  - Precession – Earths Axis Wobbles like a Spinning Top – Points to Different Spots in Sky during Cycle of 23 - 26K years
- Chronology of Temp Change Established for 450K years through Oxygen Isotope Analysis & Statistical Analysis of Climate Sensitive Organisms show Good Correlation with above Three Processes



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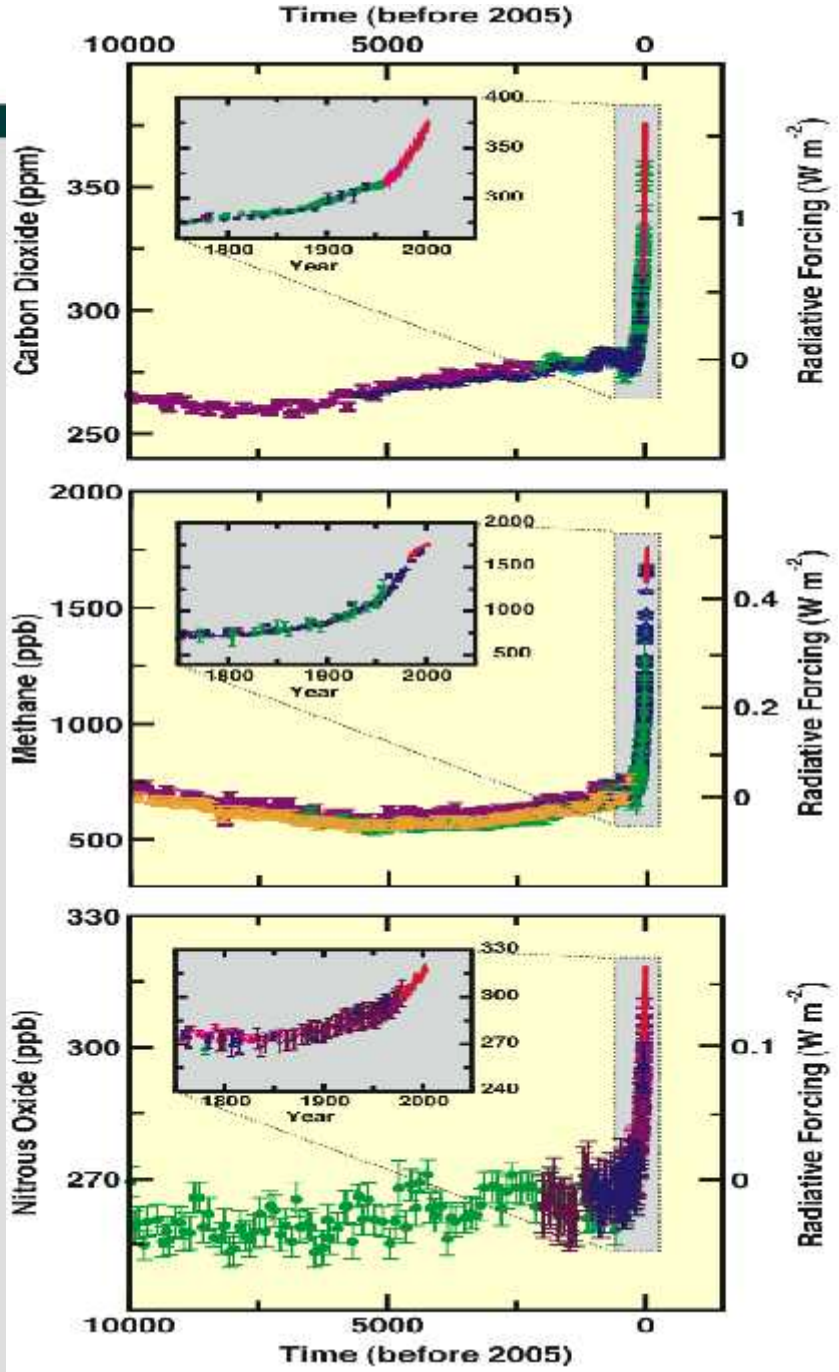
Human and Natural Drivers of Climate Change

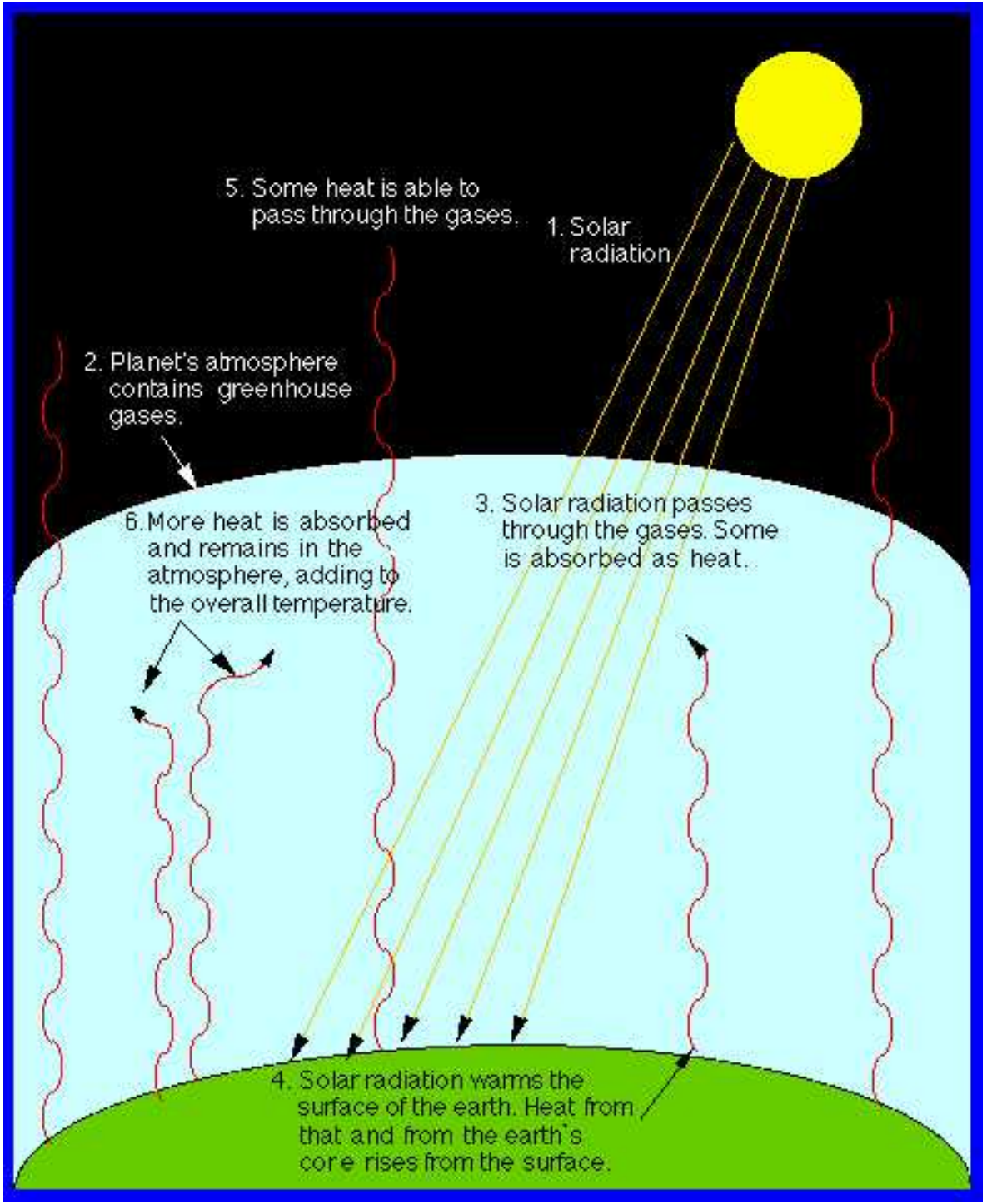
CO_2, CH_4 and N_2O Concentrations

- far exceed pre-industrial values
- increased markedly since 1750 due to human activities

Relatively little variation before the industrial era

SOURCE: IPCC




5. Some heat is able to pass through the gases.
1. Solar radiation
2. Planet's atmosphere contains greenhouse gases.
6. More heat is absorbed and remains in the atmosphere, adding to the overall temperature.
3. Solar radiation passes through the gases. Some is absorbed as heat.
4. Solar radiation warms the surface of the earth. Heat from that and from the earth's core rises from the surface.

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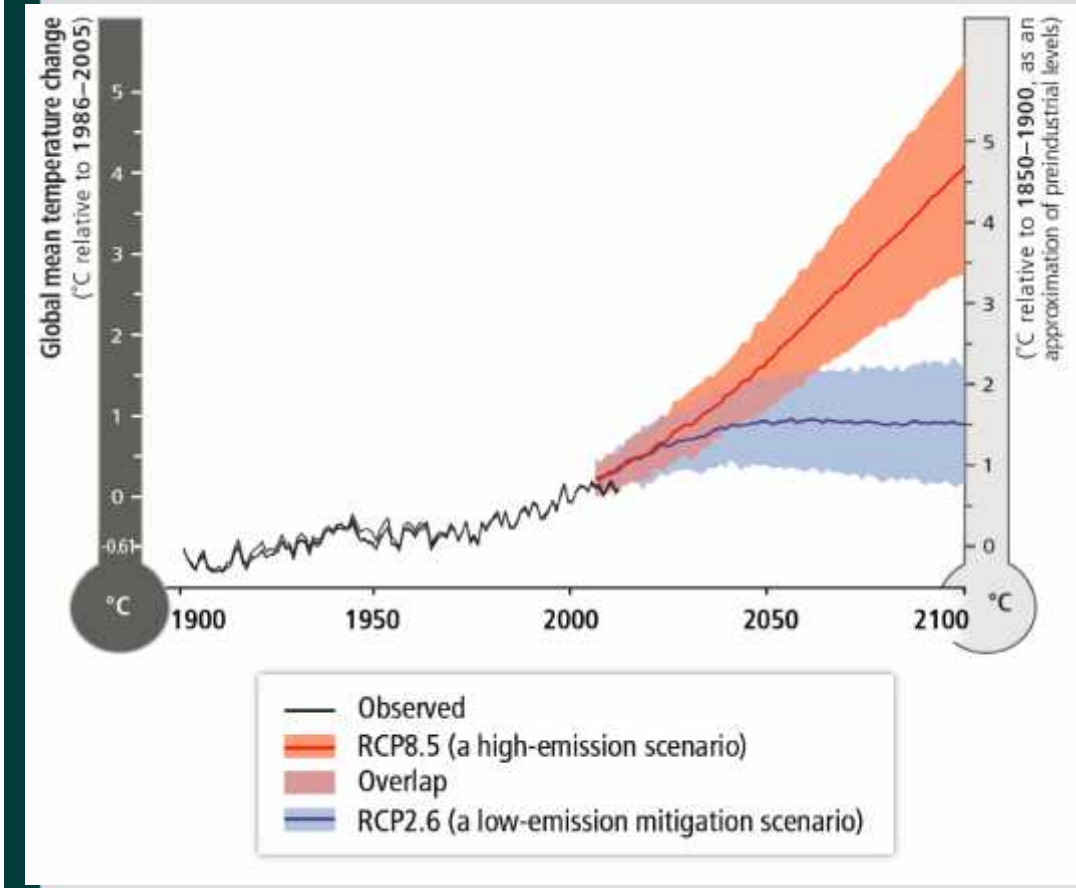
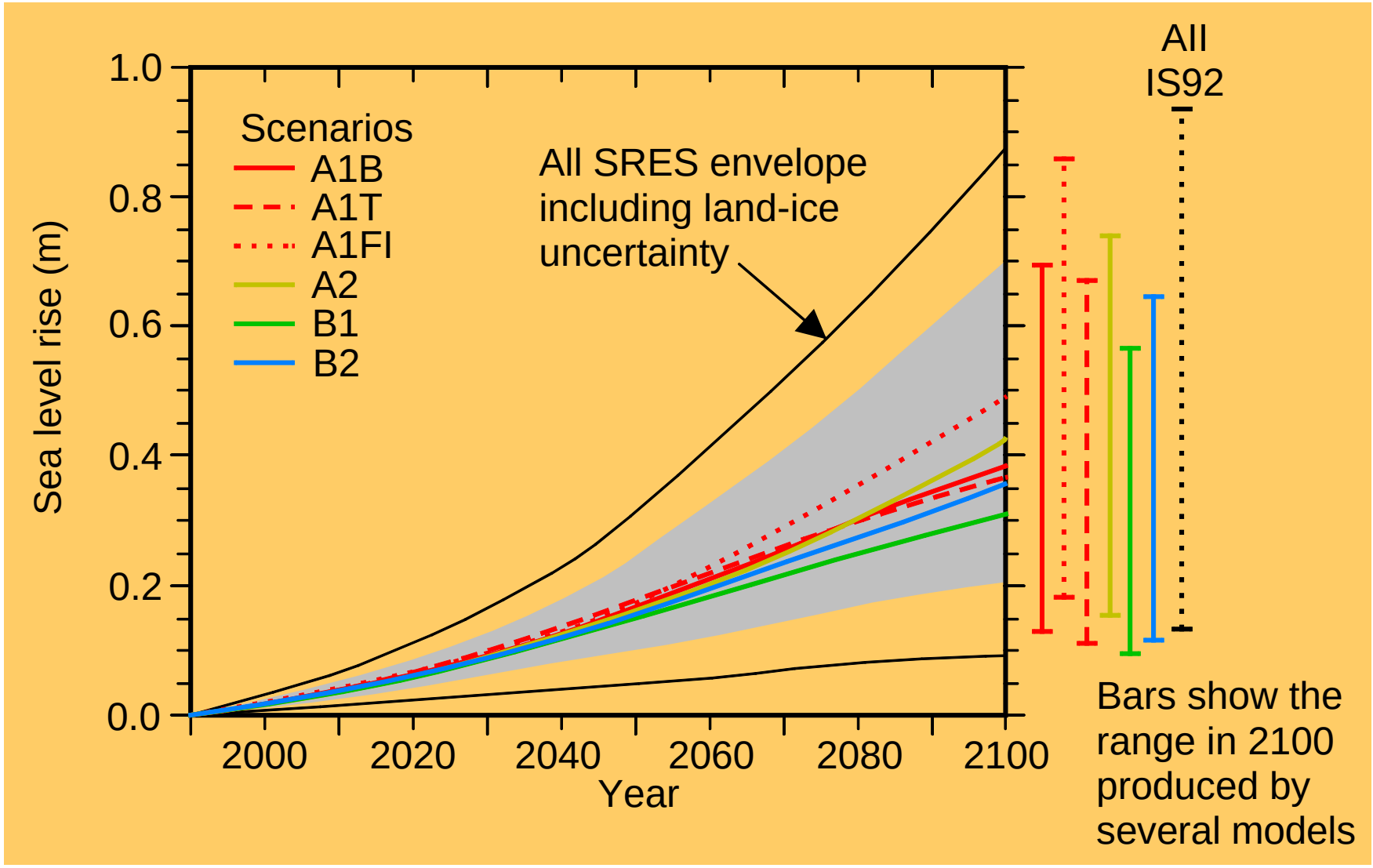
WGI AR5 - Temperature Projections



"Without additional mitigation… global mean surface temperature increases in 2100 from 3.7 to 4.8°C compared to pre-industrial levels"

- warming possible up to 7.8°C when including climate uncertainty.


Sea level rise (m)
1.0
0.8
0.6
0.4
0.2
0.0
2000
2020
2040
2060
2080
2100
Year
Scenarios
A1B
A1T
A1FI
A2
B1
B2
All SRES envelope including land-ice uncertainty
All IS92
Bars show the range in 2100 produced by several models

IPCC

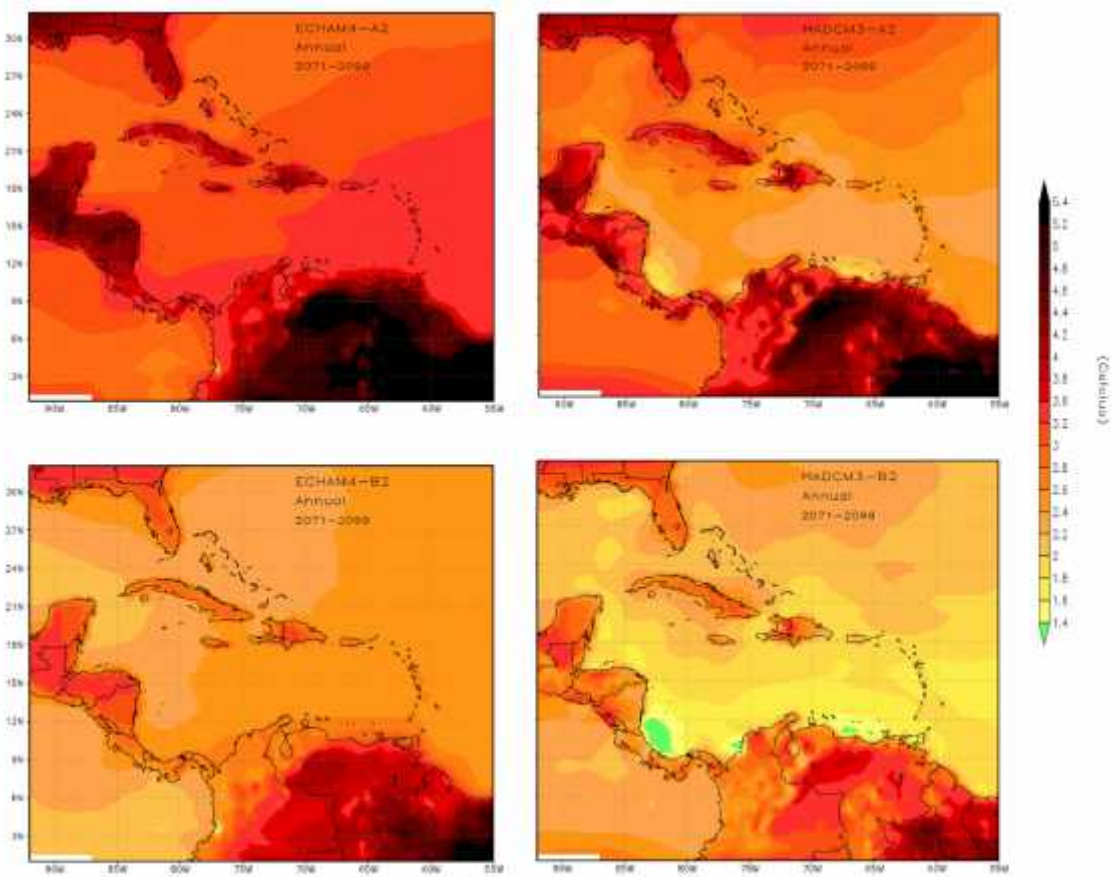
Results from the Regional PRECIS Model

Annual warming of between 1°C and 5°C by the 2080s

Greater warming in the NW Caribbean (Jamaica, Cuba, Hispaniola, Belize) than in the eastern Caribbean

Greater warming in the summer months than in the cooler and traditionally drier months of the year

- Mean changes in the annual surface temperature for period 2071-2099



HADCM3 – B2

Results from the Regional PRECIS Model

A drier Caribbean except for western Cuba , south Bahamas, Costa Rica and Panama

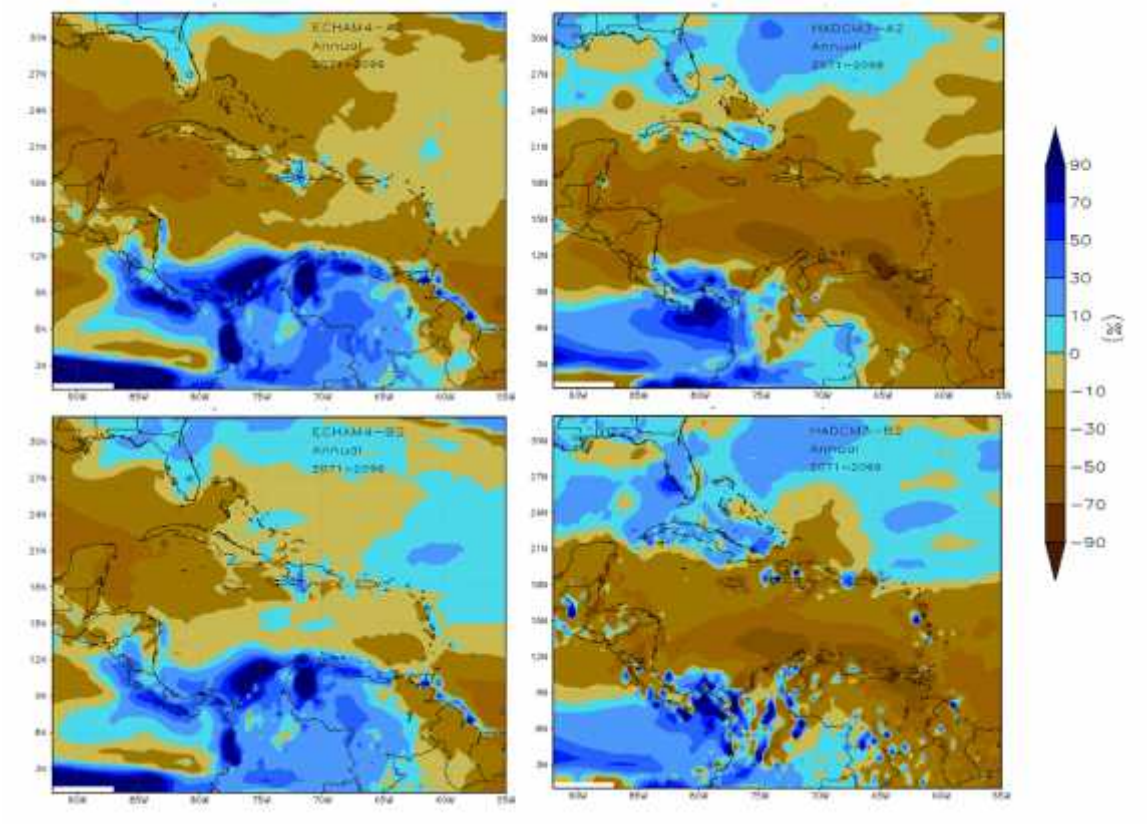
A pronounced north/south gradient in rainfall change during the dry season (January to April)

Wet season becoming drier

Annual mean changes in precipitation (%) for 2071-2099

ECHAM4 – A2

HADCM3 – A2



ECHAM4 – B2

HADCM3 – B2

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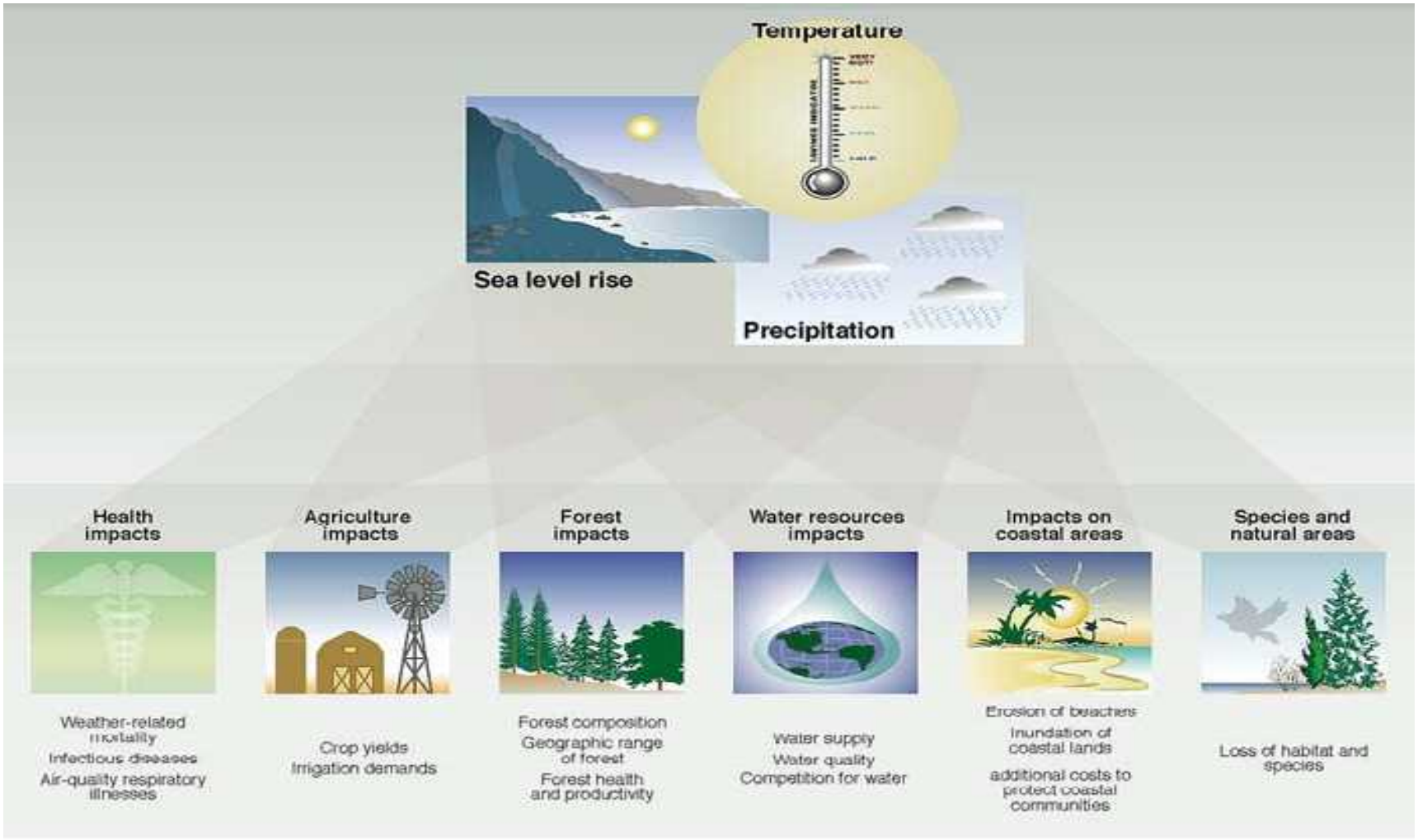
Guyana Projections to 2100

- Temperature rise of 1.2 – 4.2 °C
- Sea level rise of 0.40 – 0.61 metres
- Drier but more intense rainfall and longer dry spells

More adverse than beneficial impacts on biological and socioeconomic systems are projected



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Caribbean Coral Reefs

Increased thermal stress on Caribbean coral reefs in the next 20-30 years inevitable due to "committed" warming from GHG emissions already in the atmosphere

Under either the 1.5°C or 2°C warming scenarios, thermal stress on Caribbean coral reefs far exceeds current mass coral bleaching thresholds

Adaptation may allow some Caribbean coral reefs to avoid severe degradation from frequent bleaching events up to a 1.5C warming

Ocean chemistry changes anticipated when warming of 1.5°C above pre-industrial levels occurs (i.e., ~490 ppm atmospheric CO2) may remain adequate for reef growth, whereas at 2.0°C and 550 ppm Caribbean reefs may erode faster than they are built

Climate change and ocean acidification at 1.5°C will significantly degrade Caribbean coral reef ecosystems and the services they provide. This will be even more severe at 2.0°C. Beyond 2.0°C many Caribbean coral reefs will not survive.

The ecosystem services (fisheries and tourism) provided by coral reefs in the Caribbean are valued at between US $1.5 billion and 3.5 billion per annum.

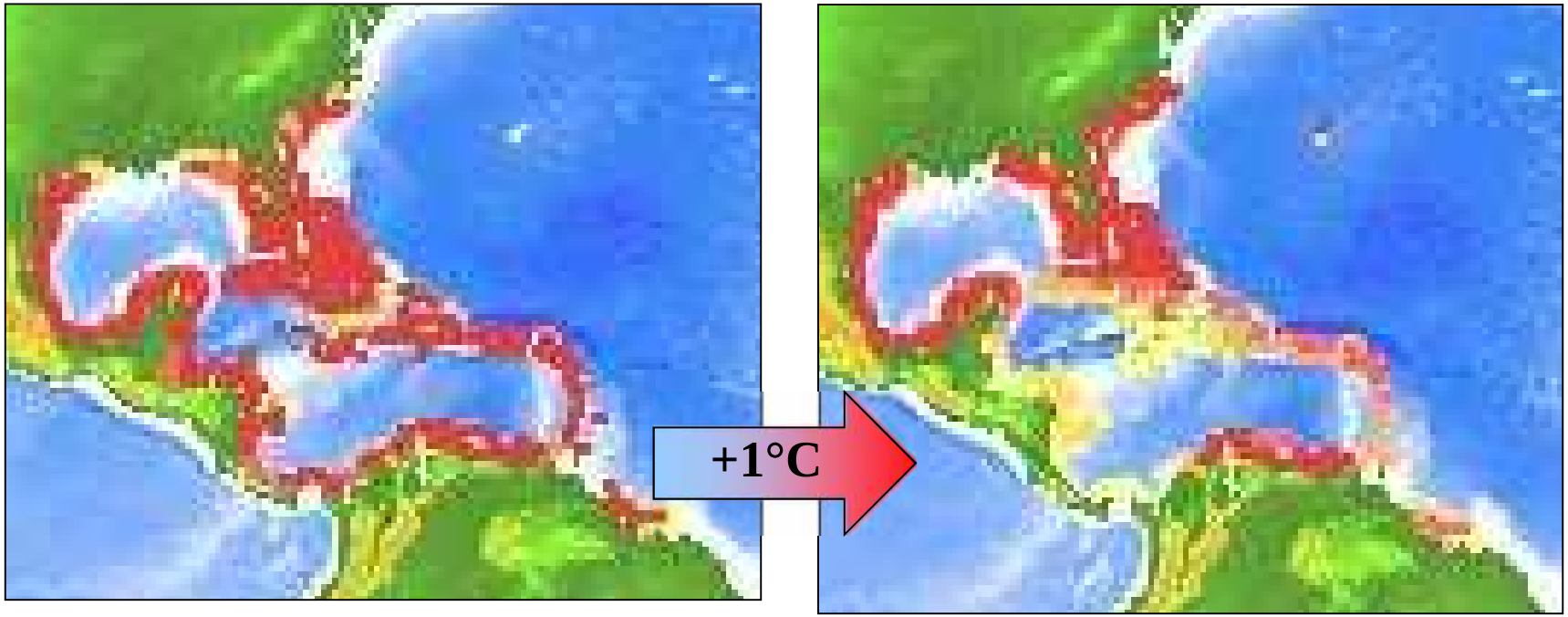
Source: Simpson, et. al., (2009) An Overview of Modelling Climate Change Impacts in the Caribbean Region with contribution from the Pacific Islands, United Nations Development Programme (UNDP), Barbados, West Indies

Yellow tail

Ocyurus chrysurus

Conséquences du réchauffement sur la biodiversité marine exploitée et impacts sur les pêcheries
Fabian BLANCHARD, Chercheur écologue halieute - Institut Française de Recherche pour l'Exploitation de la Mer (IFREMER - Guyane)

Habitat becomes less favourable



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Impacts of 1m SLR for CARICOM

- Over 2,700 km^2 land area lost (10% of The Bahamas) valued at 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 US $1.2 billion (over 6% in Suriname, 5% in The Bahamas, 3% in Guyana and Belize)
- 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
- Over 1% agricultural land lost, with implications for food supply and rural livelihoods (4% in Suriname, 3% in The Bahamas, 2% in Jamaica)
- 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)
- **Total Economic Impact:**
  - 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

Source: Simpson, et. al., (2009) An Overview of Modelling Climate Change Impacts in the Caribbean Region with contribution from the Pacific Islands, United Nations Development Programme (UNDP), Barbados, West Indies

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San Pedro, Belize

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Vulnerability Studies on Agriculture in Belize

- **DSSAT**
- Beans, corn and rice
- 2°C rise in temp, ±20% change in precipitation
- Result: 14- 19% decline in yield for beans
- Result: 10 - 14% decline in yield for rice
- Result: 22 – 17% decline in yield for corn

- **PRECIS, DSSAT4** and **Cropwat**
- Sugarcane and Citrus
- 2028 & 2050
- 1 & 2.5°C rise in temp
- ± 12 & 20% change in precipitation
- Result: 12-17% decline in yields for sugarcane
- Result: 3 – 5% decline in yields for citrus

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Forests Threatened

Higher Temperatures
Lower Humidity
More Forest Fires
More Pests and Diseases

- Belize: 1999-2000
- High temperatures & low humidity
- Pine bark beetle infestation
- 75% of nation's pine forest destroyed
- Poor forest management
- Climate change
- Impacts on timber industry and biodiversity
- Contributed to emissions of GHGs
- Increased erosion – poor water quality (rivers and sea)

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GHG Emissions in the Caribbean in 2007

Global Ranking	Country	CO_2 Emissions (thousands of metric tons)	Global Percentage (%)
69	Trinidad and Tobago	37,037	0.13
86	Jamaica	13,964	0.05
135	Suriname	2,439	0.01
138	Haiti	2,398	0.01
143	Bahamas	2,149	0.01
151	Guyana	1,507	0.01
154	Barbados	1,346	<0.01
177	Antigua and Barbuda	436	<0.01
178	Belize	425	<0.01
182	Saint Lucia	381	<0.01
186	St. Kitts and Nevis	249	<0.01
187	Grenada	242	<0.01
190	St. Vincent and the Grenadines	202	<0.01
200	Dominica	121	<0.01

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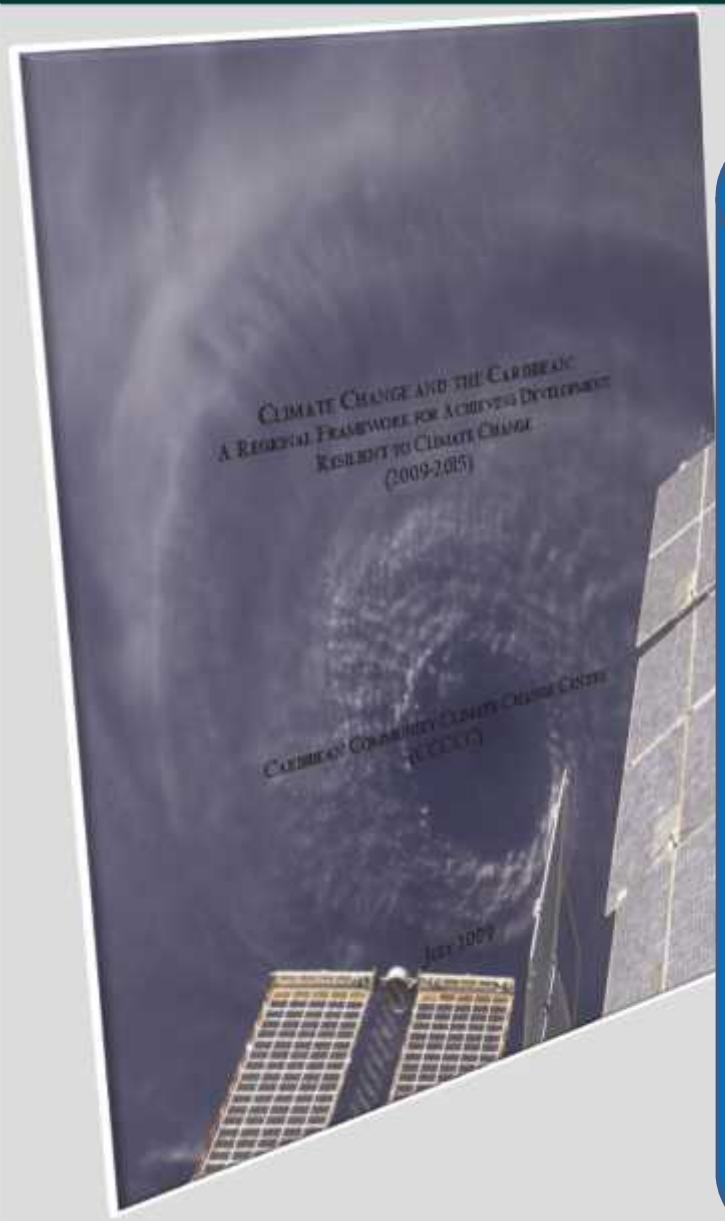
CARICOM's Response

- Endorsed by the CARICOM Heads of Government in July 2002
- An intergovernmental specialized agency of CARICOM with an independent management that is guided by
  - The CARICOM Council of Trade and Economic Development (COTED) on policy matters.
  - A board of directors with responsibility for strategic planning.
  - A technical secretariat headed by an Executive Director with responsibility for tactical planning.
- The Centre is mandated to coordinate the regional response to climate change and its efforts to manage and adapt to its projected impacts.
- The Centre possesses full juridical personality.
- Financially independent

- Operational since January 2004
- Located in Belmopan, Belize

The Regional Framework for Achieving Development Resilient to Climate Change (1 of 2)



The Regional Framework:

***"Establishes and guides the Caribbean's direction for the continued building of resilience to the impacts of global climate change by CARICOM States"*.**

Articulates the strategic direction for the region's response to climate change risks.

Approved by the CARICOM Heads of Government at their meeting in Georgetown, Guyana in July 2009

The Regional Framework for Achieving Development resilient to Climate Change (2 of 2)

Mainstreaming Climate Change into the SUSTAINABLE DEVELOPMENT AGENDA and work programmes of public and private institutions in all Caribbean Community countries at all levels

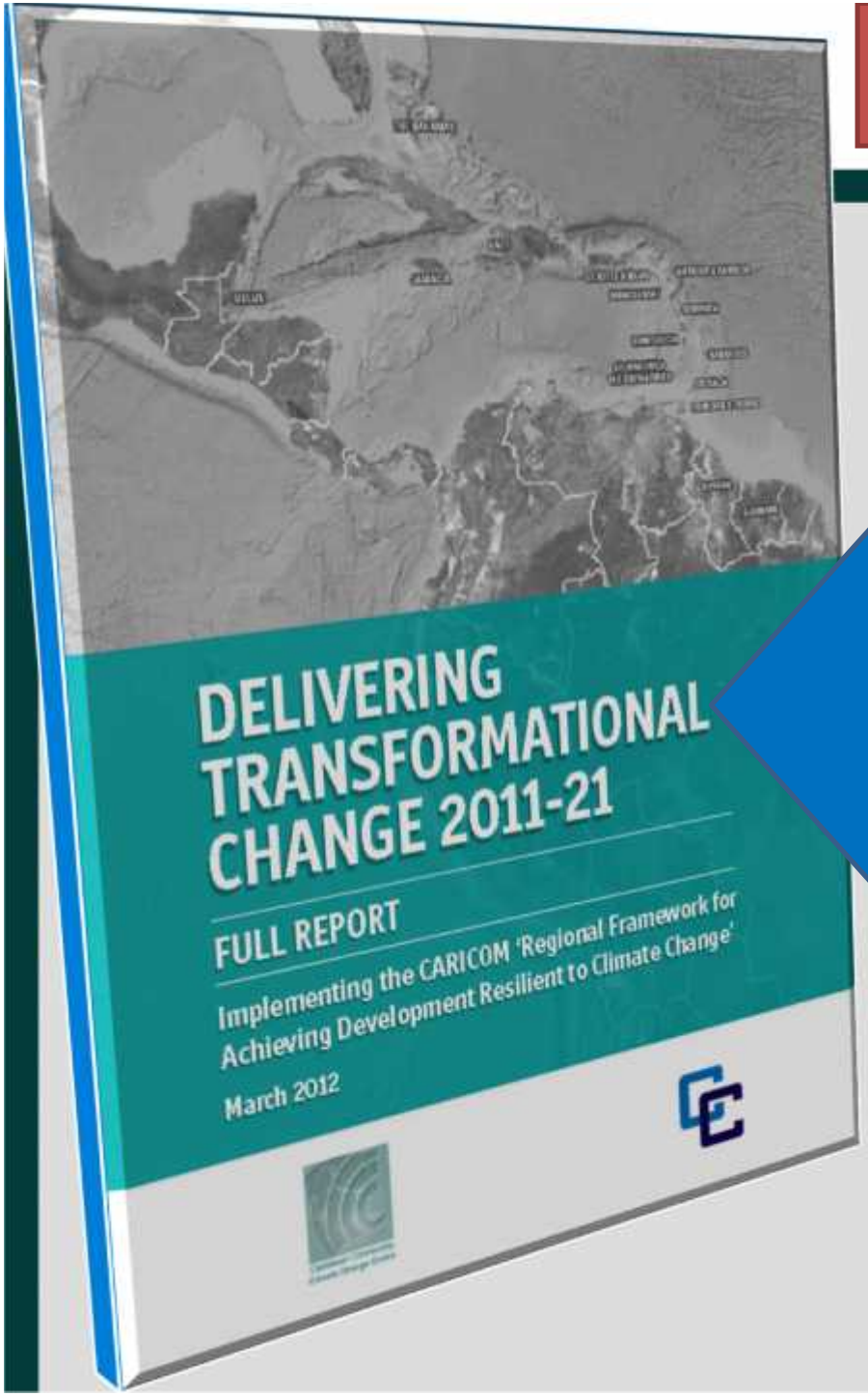
Promoting systems and actions to REDUCE THE VULNERABILITY of Caribbean Community countries to global Climate Change wherever possible

Promoting measures to DERIVE BENEFIT FROM THE PRUDENT MANAGEMENT of forests, wetlands, and the natural environment, in general, and to protect that natural environment

Promoting actions and arrangements to REDUCE GREENHOUSE GAS EMISSIONS, including those aimed at energy-use efficiency by increasingly resorting to low-emission renewable energy sources

Promote implementation of **SPECIFIC ADAPTATION MEASURES** to address key vulnerabilities in the Region.

The Implementation Plan



The Implementation Plan (IP) for the Regional Framework, defines the regional strategy for coping with Climate Change over the period 2012-2022

Approved by the 23rd Inter-Sessional Meeting of CARICOM Heads held in Suriname 8-9 March, 2012.

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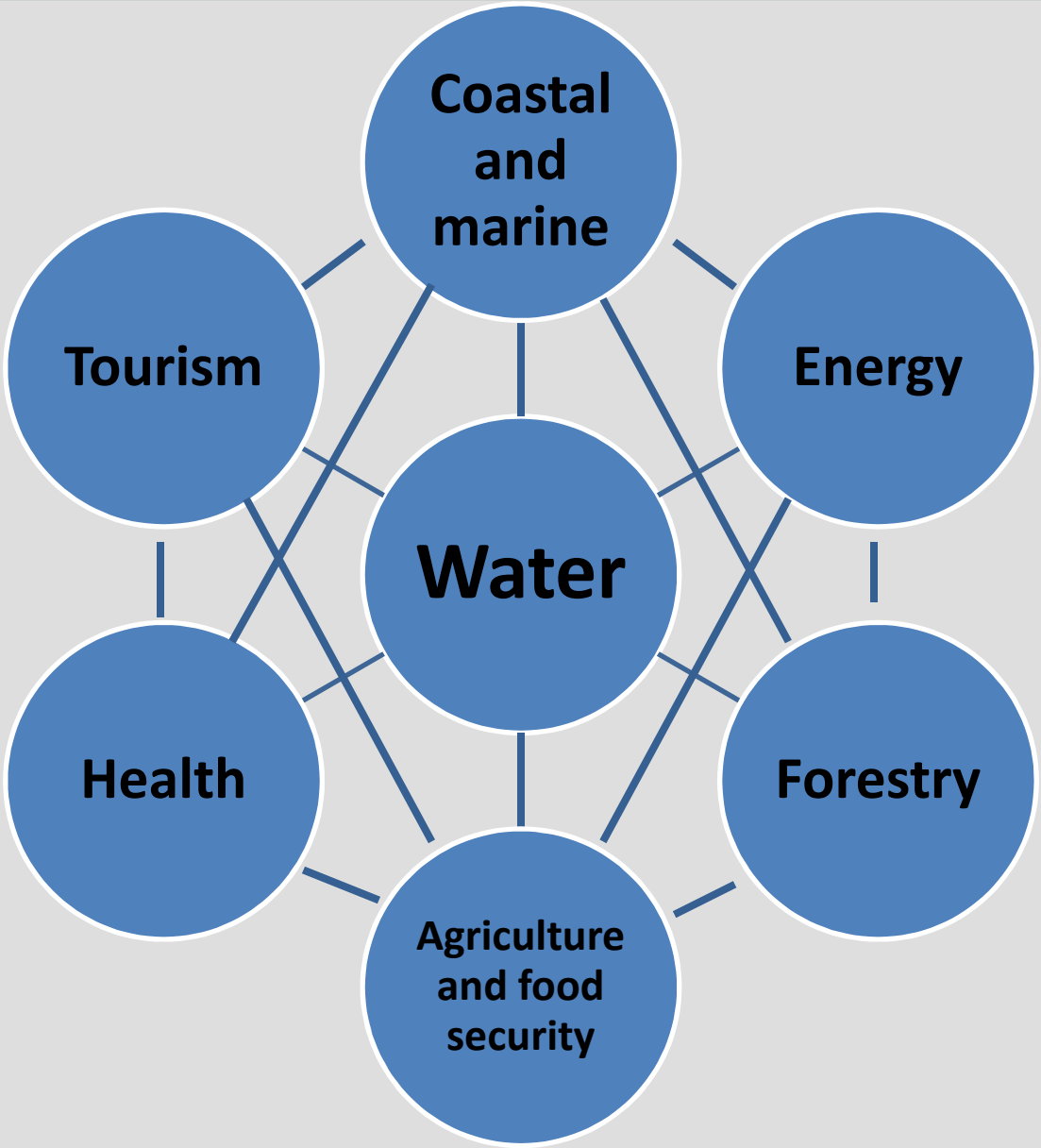
Sectors Identified in the Regional Framework



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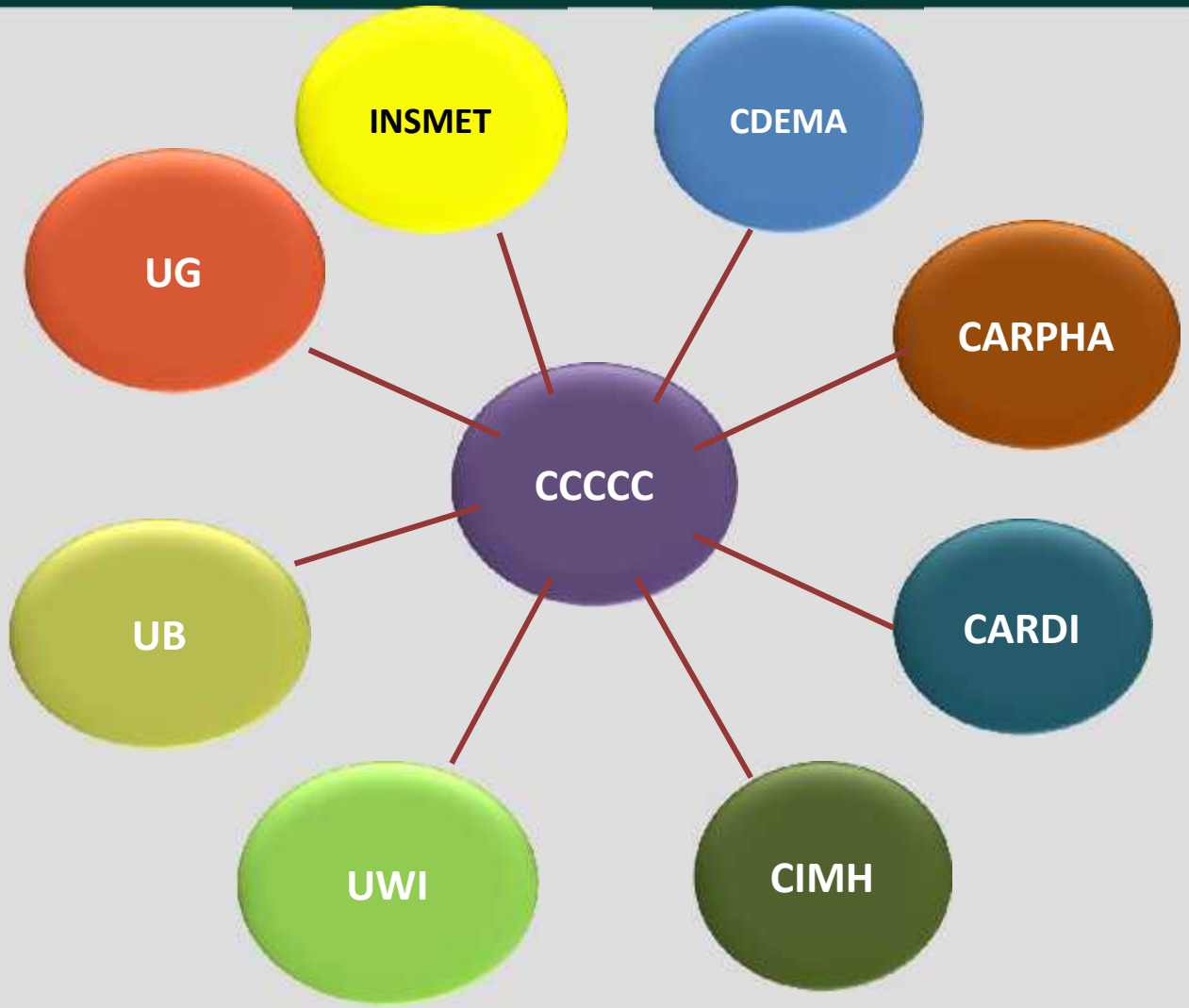
How is the IP being Implemented?



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Paris Agreement: Objectives

- Limit global warming to as far below 2°C above pre-industrial level as possible aiming for 1.5°C
- Increase ability of countries to adapt to climate change and foster climate resilience and low GHG emissions development **in a manner that does not threaten food production**
- Provide financial flows consistent with a pathway to low GHG emissions and climate resilient development

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Mitigation (Emission reduction)

- GHG emissions must peak as early as possible, then decline rapidly and achieve emission neutrality in the 2nd half of 2100.
- NDCs to be submitted every 5 years and should be more ambitious than previous one
- NDCs to include domestic actions to achieve targets
- NDCs to be published in a public registry
- Countries to be held accountable
- Countries encouraged to develop long-term low GHG development strategies
- REDD+ included

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Sustainable Development Mechanism

- Countries can establish national systems to enable public and private sectors to participate in mitigation activities
- Can be used by host country to meet its contribution or transferred to another country
- Robust accounting systems should be established
- Share of proceeds from actions to be used to administer system and to assist vulnerable countries in adaptation
- Framework for non-market approaches for sustainable development to foster adaptation and mitigation is also defined

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Adaptation

- Global goal on adaptation established to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change re. 2° C temp. goal
- Significant adaptation is required now
- More mitigation reduces need for adaptation
- More adaptation requires more resources
- Additional cooperation required to improve knowledge on climate and for systematic observations and early warning systems to support climate services and decision-making
- Parties to submit an Adaptation Communication

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Loss and Damage

- Cooperation to enhance understanding, action and support
  - Early warning systems
  - Emergency preparedness
  - Slow onset events
  - Events that may involve irreversible and permanent loss and damage
  - Comprehensive risk assessment and management
  - Risk insurance facilities, climate risk pooling and other insurance solutions
  - Non-economic losses
  - Resilience of communities, livelihoods and ecosystems
- Decision: Does not provide basis for liability or compensation

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Finance

- Developed countries to provide financial resources to developing countries for adaptation and mitigation striving to achieve a balance between both
- Support should take into account special needs, circumstances and constraints of SIDS
  - Public and grant-based resources for adaptation
- Developed countries to report biennially on the support provided, including projections of public resources to be provided
- Operating entities (GEF and GCF) of the Financial Mechanism to use simplified procedures for support to SIDS

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Technology

- Importance of technology for adaptation and mitigation
- Support for developing countries for collaboration in innovation, research and development , early stages of the technology cycle, and facilitating access to technology
- Incorporates the existing Technology Mechanism
  - Technology Executive Committee (TEC)
  - Climate Technology Centre and Network (CTCN)
- Technology framework established

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Capacity Building and Education, Training & Public Awareness

- Enhance capacity of those with the least capacity, ie SIDS to take effective climate change action
- Parties to cooperate to enhance education, training and public awareness to enhance action on climate change
- Paris Committee on Capacity Building established to address gaps and needs in developing countries

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Transparency

- Transparency framework established for action and support to build trust and confidence, and promote effective implementation
- Information to be provided by all countries:
  - Inventories of GHG emissions and sinks
  - Progress on achieving NDCs
  - Climate change impacts and adaptation
- Developed countries to provide information on:
  - Financial, technology transfer and capacity building support provided
- Developing countries to provide information on:
  - Financial, technology transfer and capacity building support required and received

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Global Stocktake & Compliance

- Stocktaking exercise to be undertaken every 5 years commencing in 2023
  - Using latest science
  - Will inform Parties regarding updating and enhancing action and support
- Implementation and compliance mechanism established
  - Facilitative, transparent, non-adversarial and non-punitive

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Opportunities to Integrate Climate Change into Business

ADAPTATION	MITIGATION
Agriculture – Reduced yields	Agriculture – More efficient use of fertilizers, tilling, capturing methane
Finance - Investments	Finance – Investments in low emissions strategies
Fisheries – Reduced catch	Fisheries – Energy efficiency
Forestry – Increase in forest fires & pests	Forestry – Carbon sequestration and conservation: Results based financing
Import/Export – Supply chain	Import/Export – More efficient transportation & energy efficient storage
Insurance – More exposure	Energy: Shift to non-fossil fuels ie. wind, Biomass/bio-fuels, geothermal, solar
Tourism – Loss in attractions and infrastructure at risk	Tourism – Energy efficiency
Manufacturing – Supply chain	Manufacturing – Energy efficiency and renewable energy
	Transportation – Alternate fuels, traffic management

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CCORAL

Caribbean Climate Online Risk and Adaptation TooL

risk. adaptation

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Objectives

- To provide an **online support system** for climate-resilient decision-making in the Caribbean
- To increase knowledge and understanding among decision makers on the relevance of climate variability and climate change to their **day to day activities**
- To provide a system that guides users in how to routinely apply a **comprehensive risk assessment and management process** to decision making

Target audience

- Open access and ready for use by all
- Focus on supporting CARICOM Government Ministries, Departments and Agencies, particularly those involved in **national development planning and finance**
- Other users include: NGOs, CSOs, universities, research institutions, private sector, financial services, development partners
- Usable by those that have **limited or no understanding of climate change** and its impacts.

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Enter CCORAL: select country/entire region

Information and links to data relevant to your country of interest and the Caribbean.

Screening exercise

Quick identification of whether your activity is climate-influenced, and a priority for further assessment.

Understanding climate influence on decisions:

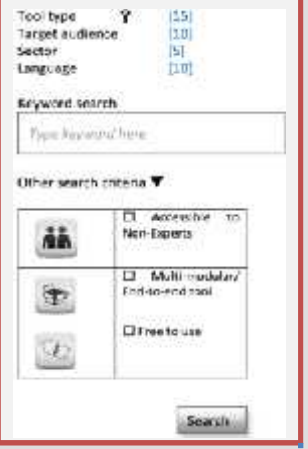
- ☐ Legislation
- ☐ National planning
- ☐ Strategy or policy
- ☐ Programme or project
- ☐ Budget prep /evaluation.

Guidance on how and why climate is relevant and can be integrated into the decisions organisations make. Information tailored to the experience of the user.

End-to-end CRM processes

Guidance on undertaking a complete climate risk management (CRM) process.

Toolbox: 70+ CRM tools



A searchable toolbox to find the most appropriate tools to support your project and experience.

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Screening Exercise

The screening exercise allows users to identify to what degree their activity/decision **is climate-influenced**, and whether it is a **high priority** for further investigation on climate impacts and adaptation.

This reduces the burden on the user and provides an **early exit** point for those activities which are **not high priority**

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How does it work?

- 10 questions – **yes or no** response
- **No prior knowledge** or expertise regarding climate change
- Based on the agreed method, each yes response scores 1 point (except question 10, which scores 3 points)
- CCORAL adds up the scores and gives you priority rating (l**ow, medium, high**)

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- ☐ Budget prep /evaluation.

Guidance on how and why climate is relevant and can be integrated into the decisions organisations make. Information tailored to the experience of the user.

End-to-end CRM processes

Guidance on undertaking a complete climate risk management (CRM) process.

Toolbox: 70+ CRM tools

A searchable toolbox to find the most appropriate tools to support your project and experience.

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Climate Change Centre

Enter CCORAL: select country/entire region

Information and links to data relevant to your country of interest and the Caribbean.

Screening exercise

Quick identification of whether your activity is climate-influenced, and a priority for further assessment.

Understanding climate influence on decisions:

- ☐ Legislation
- ☐ National planning
- ☐ Strategy or policy
- ☐ Programme or project
- ☐ Budget prep /evaluation.

Guidance on how and why climate is relevant and can be integrated into the decisions organisations make. Information tailored to the experience of the user.

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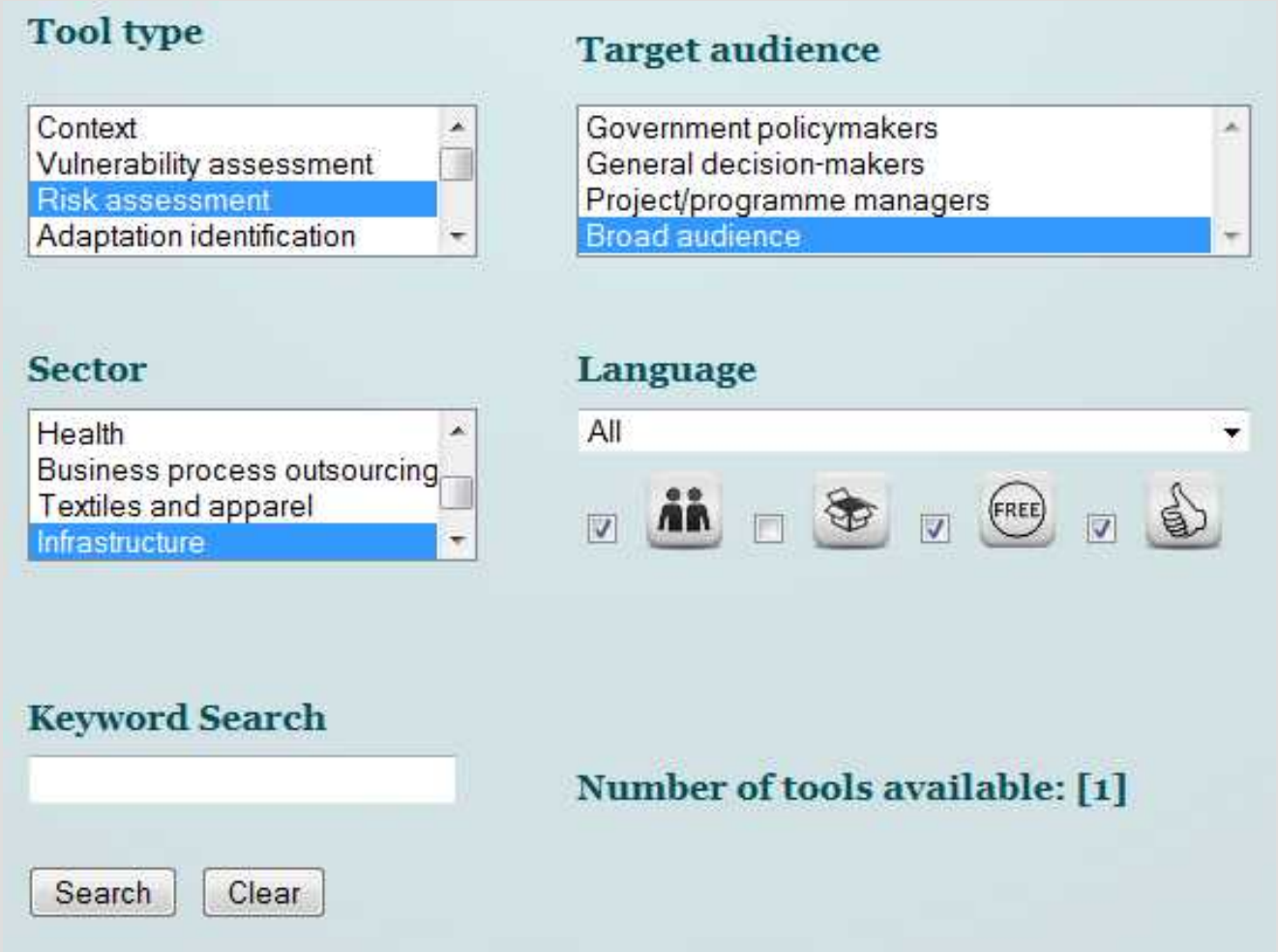
The CCORAL Toolbox

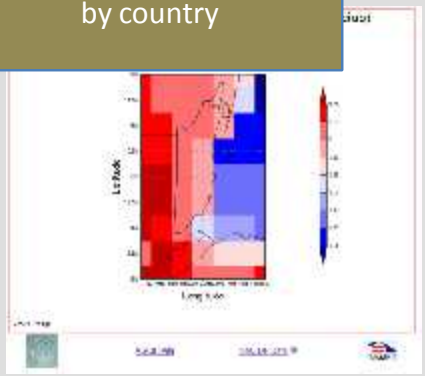
- 70+ CRM tools
- Easy search dashboard
- Use to:
  - ✓ Supplement CCORAL guidance
  - ✓ Find support material for a specific issue



Caribbean Community Climate Change Centre

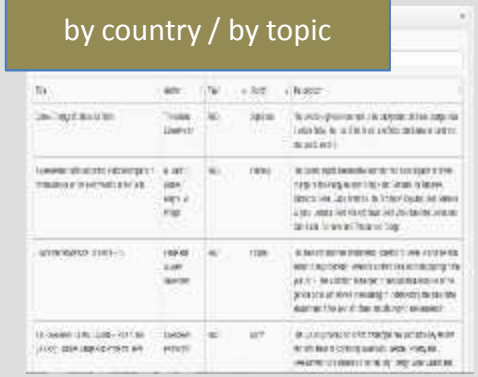
Databases in the Clearinghouse

Climate Projections
by country



Online Bibliographic and Link Database
by country / by topic

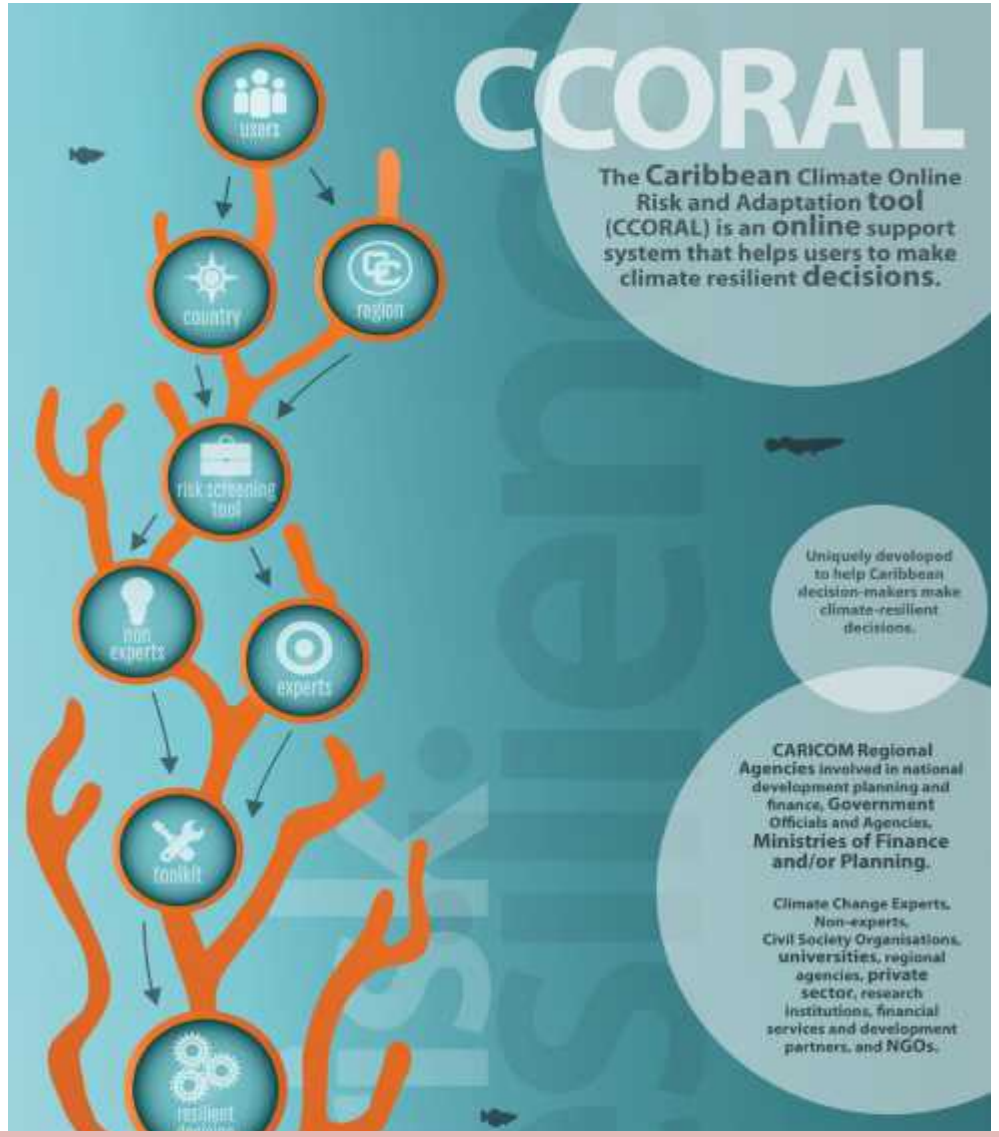
CCCCC Library and CD Catalogue
by country / by topic



National Data Sources
by country

Links to relevant databases on the web
by country / by topic

Database of past Projects in the Region



http://www.caribbeanclimate.bz (click on tools)

http://ccoral.caribbeanclimate.bz/