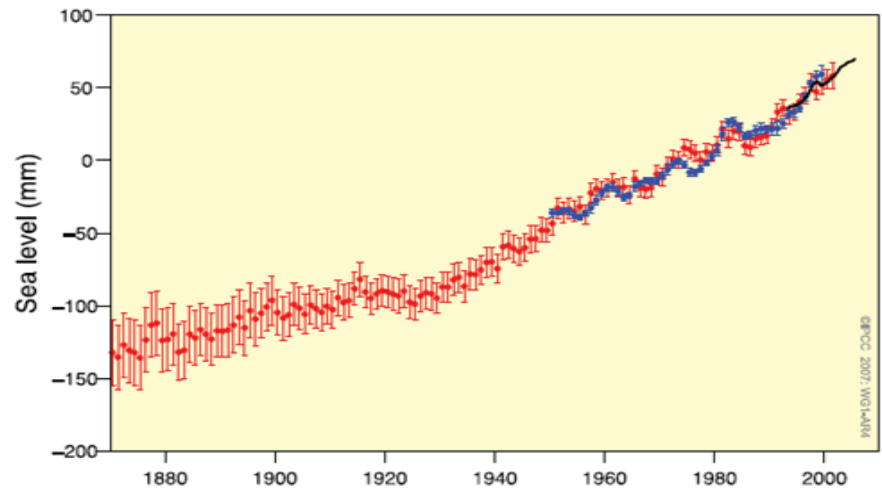
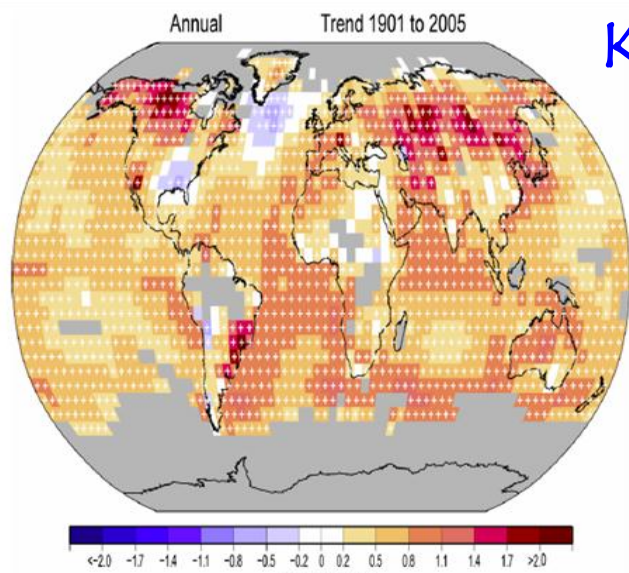


Minimizing the Risk of Making Poor Adaptation Choices in the Caribbean

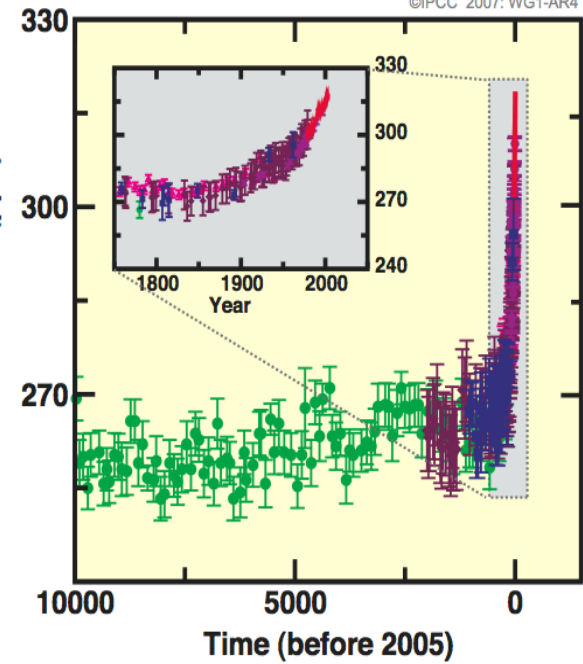
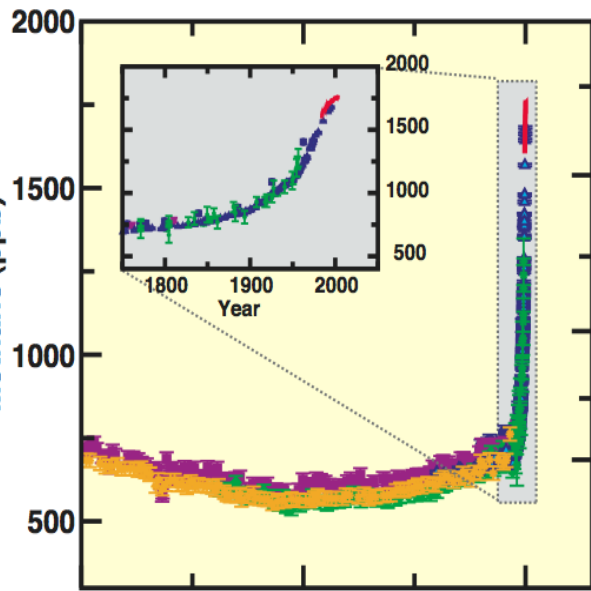
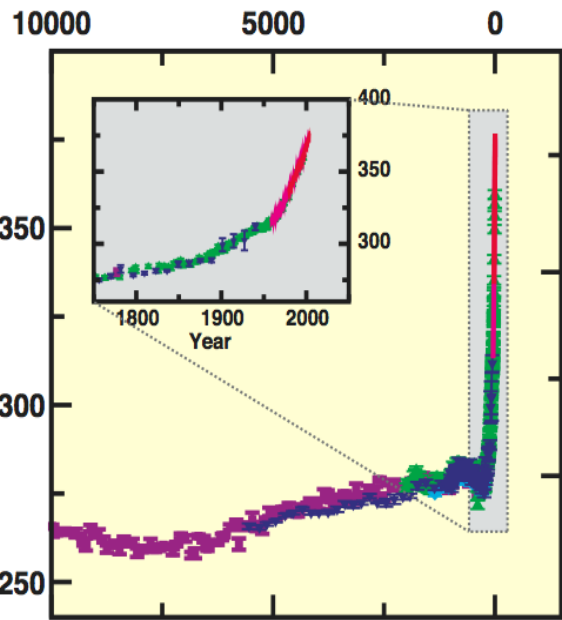
Leonard A. Nurse, PhD
University of the West Indies
Cave Hill Campus, Barbados

Coastal Area Climate Change Education (CACCE) Partnership
Center for Hemispherical Cooperation in Research and
Education in Engineering and Applied Science (CoHemis)
University of Puerto Rico - Mayagüez (UPRM)
February 1-3, 2012

Key drivers of change



Time (before 2005)



©IPCC 2007: WG1-AR4

The Context for Adaptation in the Caribbean

- Constitutes one of the most vulnerable group of countries to the adverse effects of global climate change.
- Exerts no control over the pace of GHG mitigation and generally have *low adaptive capacity*.
- Is already experiencing some negative effects of GCC (e.g. SLR; more intense *extreme events*; coral bleaching).
- Has no control over pace of GHG reduction (mitigation) → limited resources should be used mainly for *adaptation planning* & implementation, rather than *mitigation*.

The Context for Adaptation in the Caribbean

So what are the key adaptation challenges for the Region?

- According to the conventional wisdom, the most pressing constraints are:
 - ☐ Financial and human capacity constraints
 - ☐ Limited access to various technologies or access at high cost
 - ☐ Externally-driven agendas not in the best interest of SIDS
 - ☐ International climate change regime whose foundations are not built on the concerns of the most vulnerable, but responds to the dictates of the most influential (i.e. powerful and wealthy)
 - ☐ **Inadequate data and information**

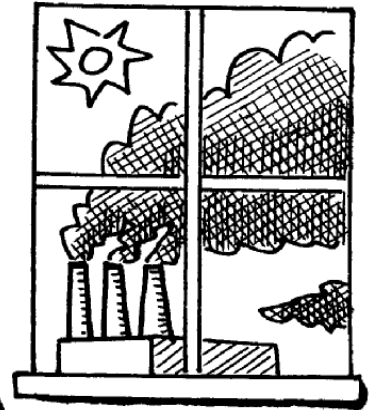
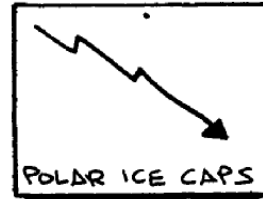
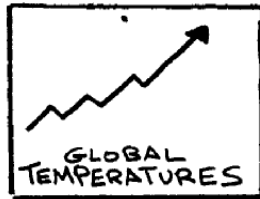
The Data Challenge

- In spite of substantial primary research in some disciplines over the last several decades, some glaring gaps still exist in the observational data record for certain critical parameters in many Caribbean countries, particularly with respect to:
 - ▣ (a) *Temporal span* and (b) *spatial coverage*.
- *Validated, quality-controlled*, observational data essential for assessing *magnitude* and *rates of change* across varying temporal and spatial scales, under a changing climate.
 - ▣ Data *availability* is uneven *within* and *among* countries in the Region
 - ▣ *Quality* varies from place to place – can mislead adaptation planners into making generalizations (sometimes invalid) about climate change risks, vulnerability and impacts across the Region.

Data & Information Requirements for Adaptation

- Even if we were able to overcome all of the foregoing constraints → there is strong evidence to support the view that there is often *insufficient validated information* on which to make sound adaptation choices.
- Validated information is required for:
 - ▣ evaluating the efficacy and appropriateness of options in the context of our region;
 - ▣ ensuring that adaptation strategies assist with alleviating present-day challenges, while building resilience to future, anticipated impacts; and
 - ▣ Minimizing the possibility of ‘*maladaptation*’.

SINCE WE CAN'T
AGREE TO DO
ANYTHING, LET'S
AGREE TO DO
NOTHING.



Adopting Strategic Approaches to Adaptation

- Sectoral measures → focused on reducing climate change impact on a *single* sector
- Multi-sectoral measures → interventions that span several sectors, e.g. energy, water resources, sanitation and health → adaptation choices implemented in a more integrated, equitable and sustainable manner.
- Cross-sectoral measures → relevant to a multiplicity of sectors, e.g.
 - ▶ education & training; public awareness & outreach
 - ▶ early warning systems; emergency plans, etc.
 - ▶ research and development
 - ▶ Monitoring and evaluation

Example of Multi-Sectoral Adaptation Initiative

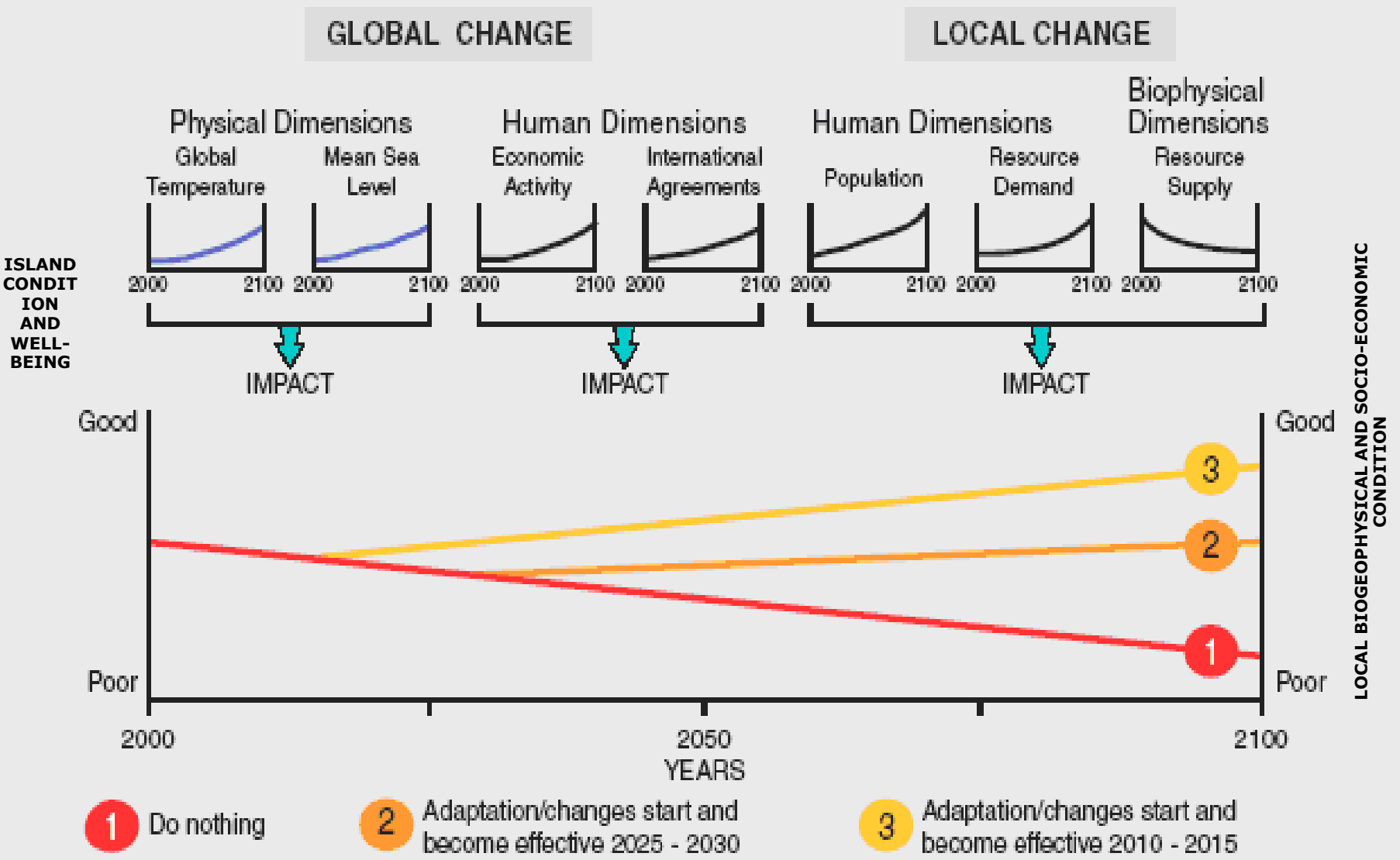
On September 22, 2011, Ocean Thermal Energy Corporation signed a MOU with Bahamas Electricity Corporation, for design, construction, and operation of the world's first commercial Ocean Thermal Energy Conversion (OTEC) plant. The facilities will include clean baseload (24/7) electricity production, as well as potable water and food production initiatives: aquaculture, mariculture & chilled soil agriculture.



Adopting Strategic Approaches to Adaptation

- No-regrets measures → justified on basis of current climate conditions → further justified under future climate change scenarios, e.g. water pollution control; improved irrigation schemes; recycling of waste water; conversion to non-fossil fuel based systems in the energy, industry and transportation sectors.
- Low-regrets → adaptations that can be effected at low/minimal costs → economic & financial loss marginal if the action proves unnecessary in the future; e.g incorporation of climate change risk into infrastructure design → builds resilience against current extreme climate events, as well as potential future events, while increasing costs only minimally.

The Importance of *Timing* of Adaptation Interventions (Source IPCC, 2007)



Getting Down to Basics: Data & Information Needs

- *How much do we know about the resources we have?*
 - ☐ What is the spatial distribution?
 - ☐ What is the abundance?
 - ☐ What is the status? Overexploited/underexploited; declining or expanding stocks; poor health or robust; seasonal or perennial
 - ☐ What do we know about the reproductive cycles of critical species?
 - ☐ What are the thresholds (*tipping points*) that signal system collapse?
- *Resource inventories* → essential pre-requisites for effective management and adaptation planning → need to be updated on ongoing basis.

The Need for Resource Inventories: An Example from the Caribbean Fisheries Sector

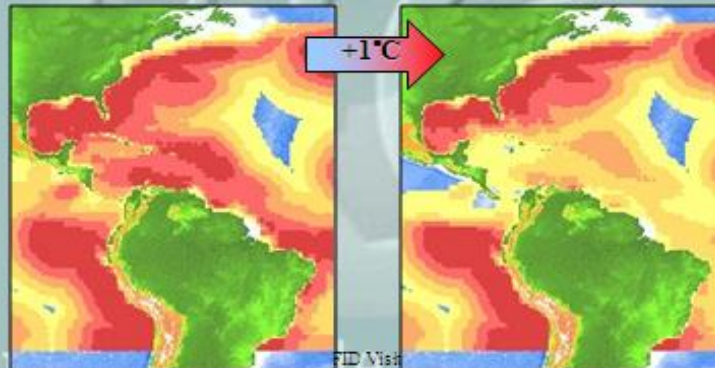
- There are 197 fish stocks (identified fisheries) under the jurisdiction of the Caribbean Fisheries Management Council.
- The status of 175 of these fisheries (88%) as of 2007 is 'unknown or undefined' (Agard et al, 2007 - Caribbean Sea Ecosystem Assessment)



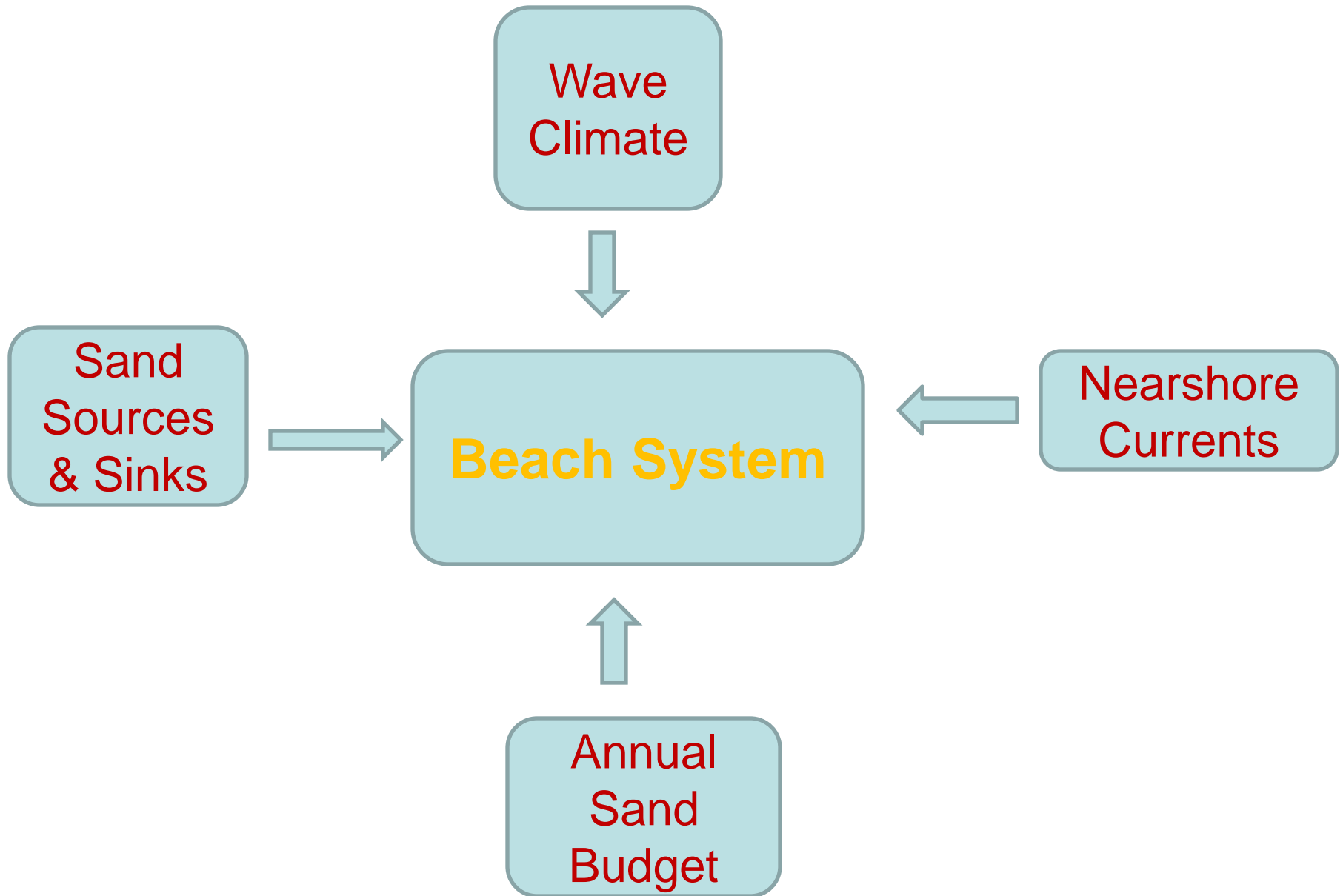
Dolphin fish

Coryphaena hippurus

Habitat becomes less favourable



$$\sum Q_{\text{source}} - \sum Q_{\text{sink}} - \Delta V + P - R = \textit{Residual}$$



Adaptation and Resilience

- There is evidence from the examination of limited case studies on islands that the likelihood of achieving desired adaptation outcomes increases where:
 - ☐ there is explicit recognition of the importance of concepts such as *carrying capacity* and thresholds in the design of the intervention
 - ☐ the strategy seeks to ensure maintenance and promotion of species *endemism, diversity, uniqueness* and *abundance*
 - ☐ the wisdom of traditional and local knowledge is judiciously combined with modern science to develop community-based adaptation interventions.

Allowing Adaptation to Work....

- While there is much self-interest in adaptation at all levels, past experience shows that individuals, groups and entities often ignore ‘agreed’ strategies, once an event or threat is perceived to have passed.
- To be successful, the implementation of any suite of adaptation measures must be regarded as an ongoing *process* that may have to be adjusted, if required, and enforced. This may require the use of various instruments and support systems, e.g.
 - Regulatory monitoring for compliance
 - Incentives – economic, fiscal and other types
 - Disincentives or penalties

The '*Human*' Component of Adaptation

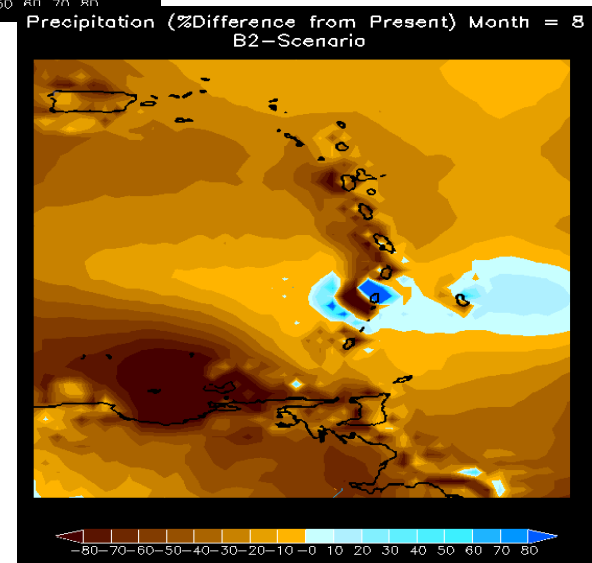
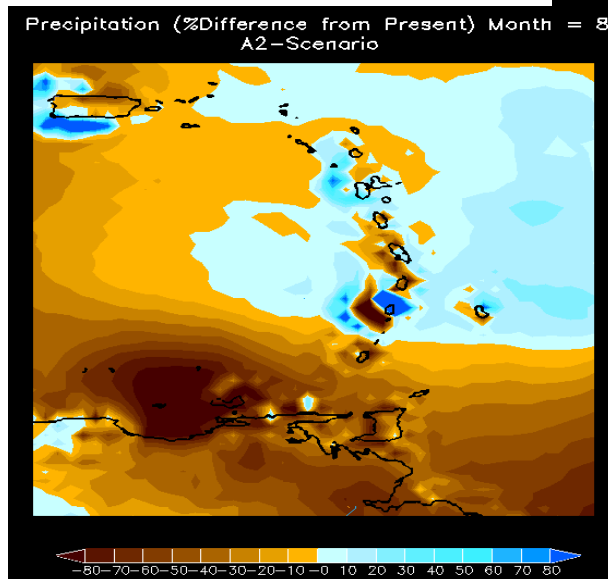
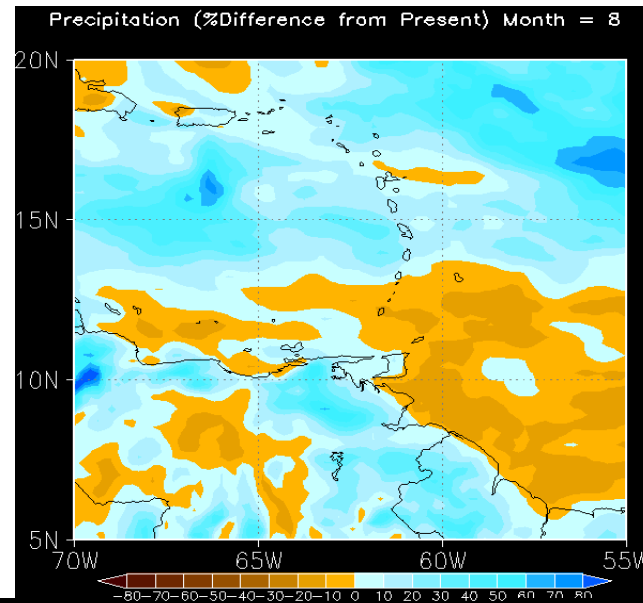
- It should be clear to all that adaptation programs will fail miserably, if critical 'human dimensions' are ignored.
- Adaptation interventions are not to be regarded as mere technological and scientific '*fixes*', devoid of a 'human face'. To be effective, there must be:
 - ▣ *Social and cultural acceptability* → greater chance of success than measures that are perceived as '*external*' to the norms & values of that society.
 - ▣ *Political acceptability* → required to garner resources and ongoing institutional support for the strategy.

Are We Collecting the 'Correct' Data

- Apart from the traditional focus on global mean 0T , rainfall and sea-level etc, the design of effective adaptation programs will also require reliable data from a *suite of non-climate* (but very important) variables , at regional and local scales.
 - ◇ Temporal and spatial changes in population
 - ◇ Crop yields (as distinct from total production)
 - ◇ *Sensitivity* of critical food crop staples (e.g. rice, beans, corn, yam, etc) to changing 0T , rainfall and soil salinity regimes
 - ◇ Temporal & spatial changes in climate-sensitive diseases (e.g. malaria, dengue)
 - ◇ What are the critical climate variables and thresholds that control reproductive behaviour, spawning & aggregation in different fisheries?

Model Runs based on:
HADCM3 (GCM)
ECHAM4 (GCM)
PRECIS (RCM)

Results:
25-30% decrease
in rainfall before
end of century



How do we evaluate rainwater harvesting as an adaptation measure under these scenarios?

Residents in Bequia, Grenadines, Awaiting Delivery of Water Transported by Barge From Mainland St. Vincent



Sea- Water Reverse Osmosis Desalination System - Paget Farm, Bequia, SVG: Implemented by CCCCC Under the Special Program on Adaptation Project (SPACC)



Operational September 2011; Serves 300 households. Previously only rudimentary storage with supplies barged from mainland.



Solar PV – Grid-connected; US\$1.54 m³, compared with US\$2.20 m³ on mainland Saint Vincent.

Looking Ahead.....

- Adaptation planning must be multi-dimensional, focused on people and designed to assist with achieving regional sustainable development goals
- Effective adaptation interventions require (a) updated resource inventories and (b) reliable data at appropriate scales, providing adequate temporal and spatial coverage
- To maintain stakeholder interest and support, adaptation must deal with present-day challenges, while strategizing for the medium and longer-term
- Adaptation is a process → ‘work in progress’ → long-term stakeholder commitment and allocation of resources





Muchas Gracias

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