Hazard Mitigation Measures against Storm Surge: Case Jamaica

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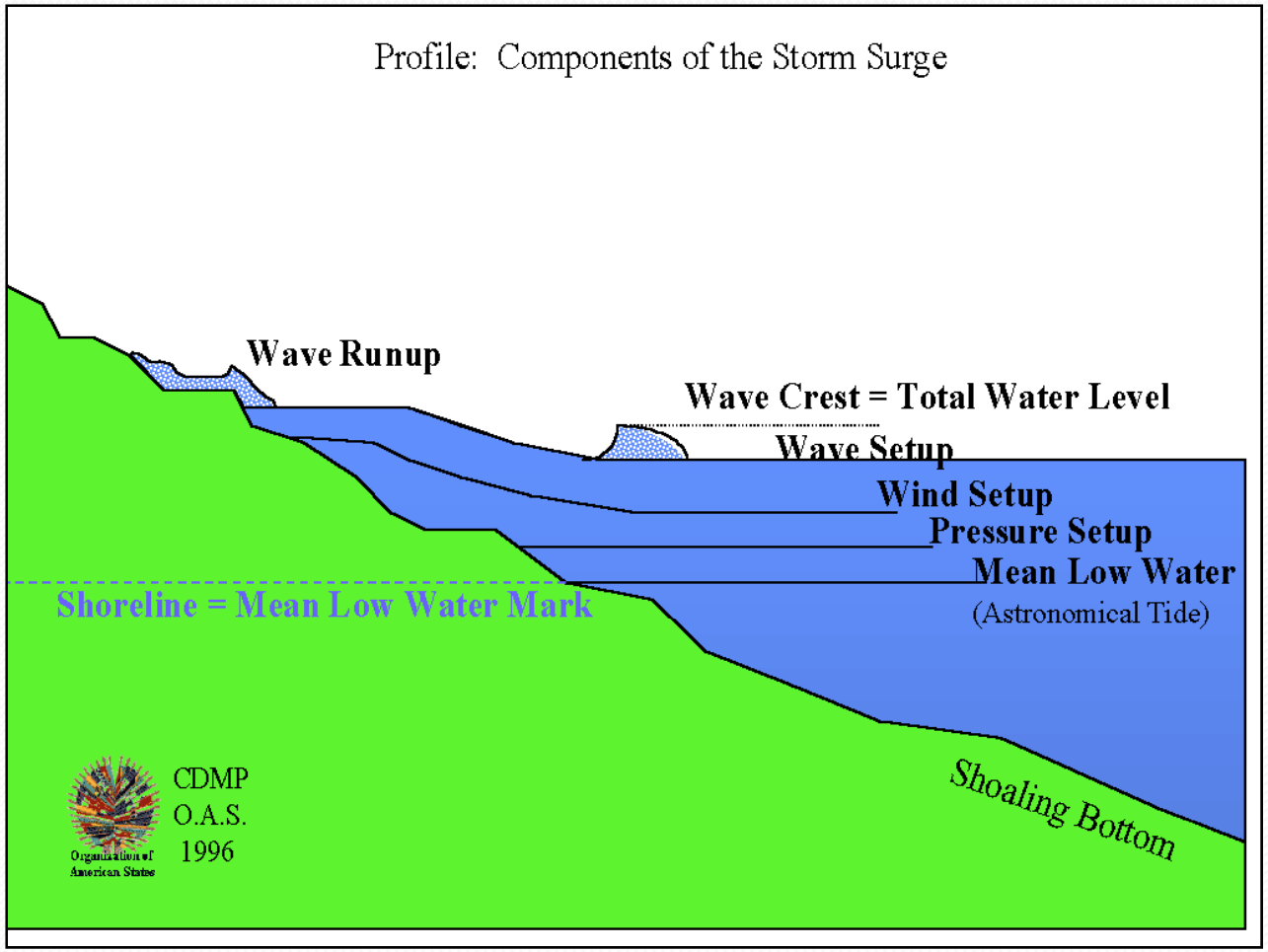
Components of Storm Surge

Influenced by:

- Reefs
- Continental Shelf
- Nearshore Steepness
- Beach slope
- Speed of Hurricane
- Global Sea Level Rise



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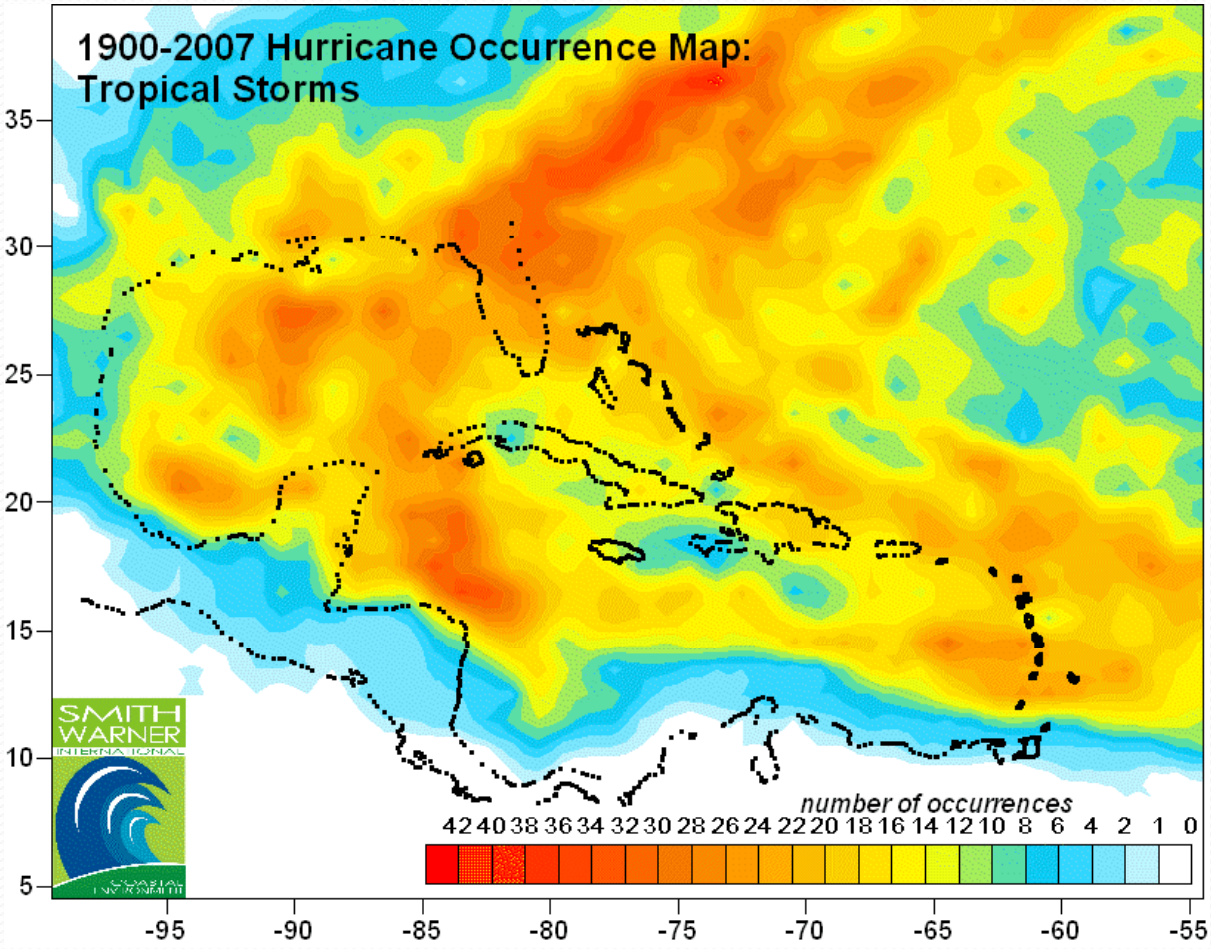
Hurricane Activity in the Caribbean



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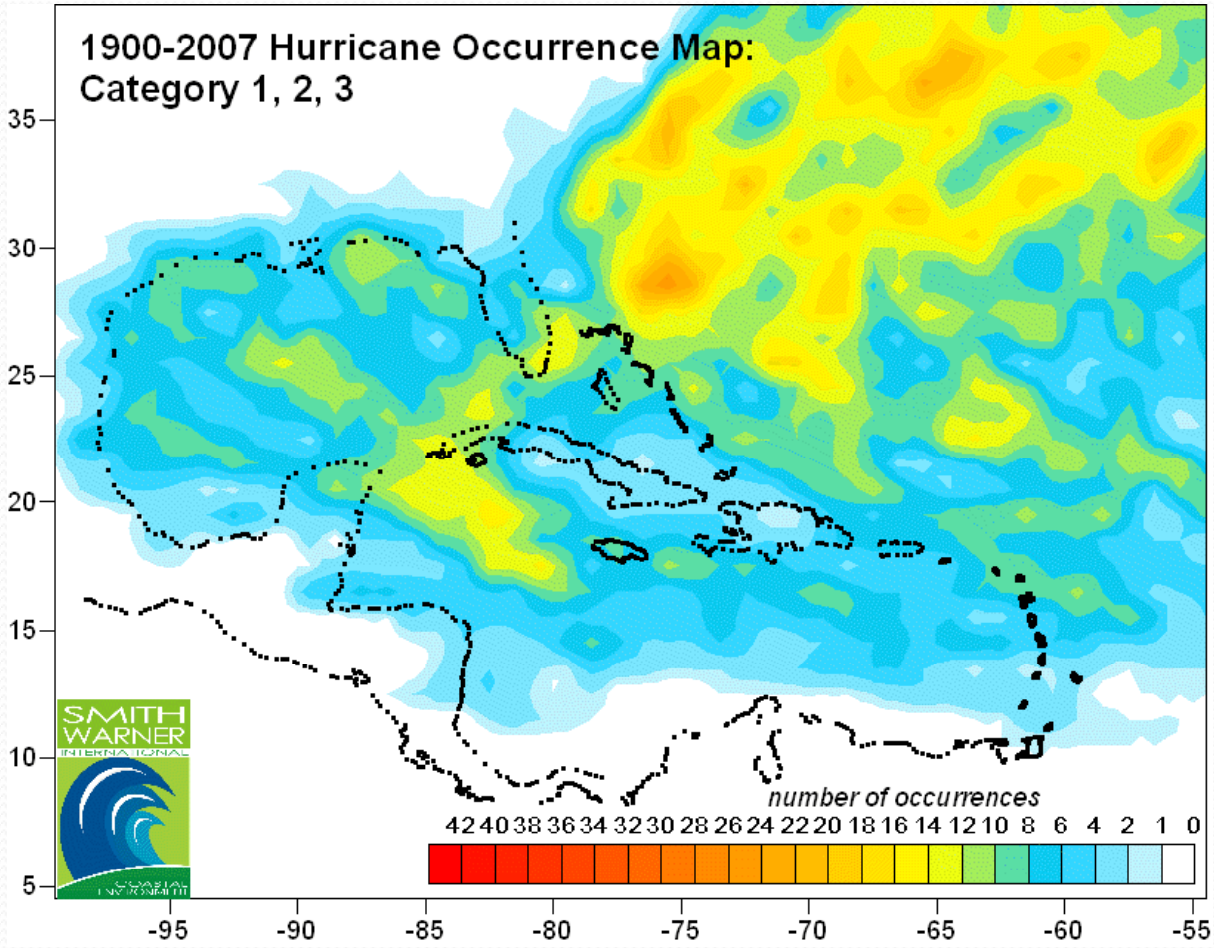

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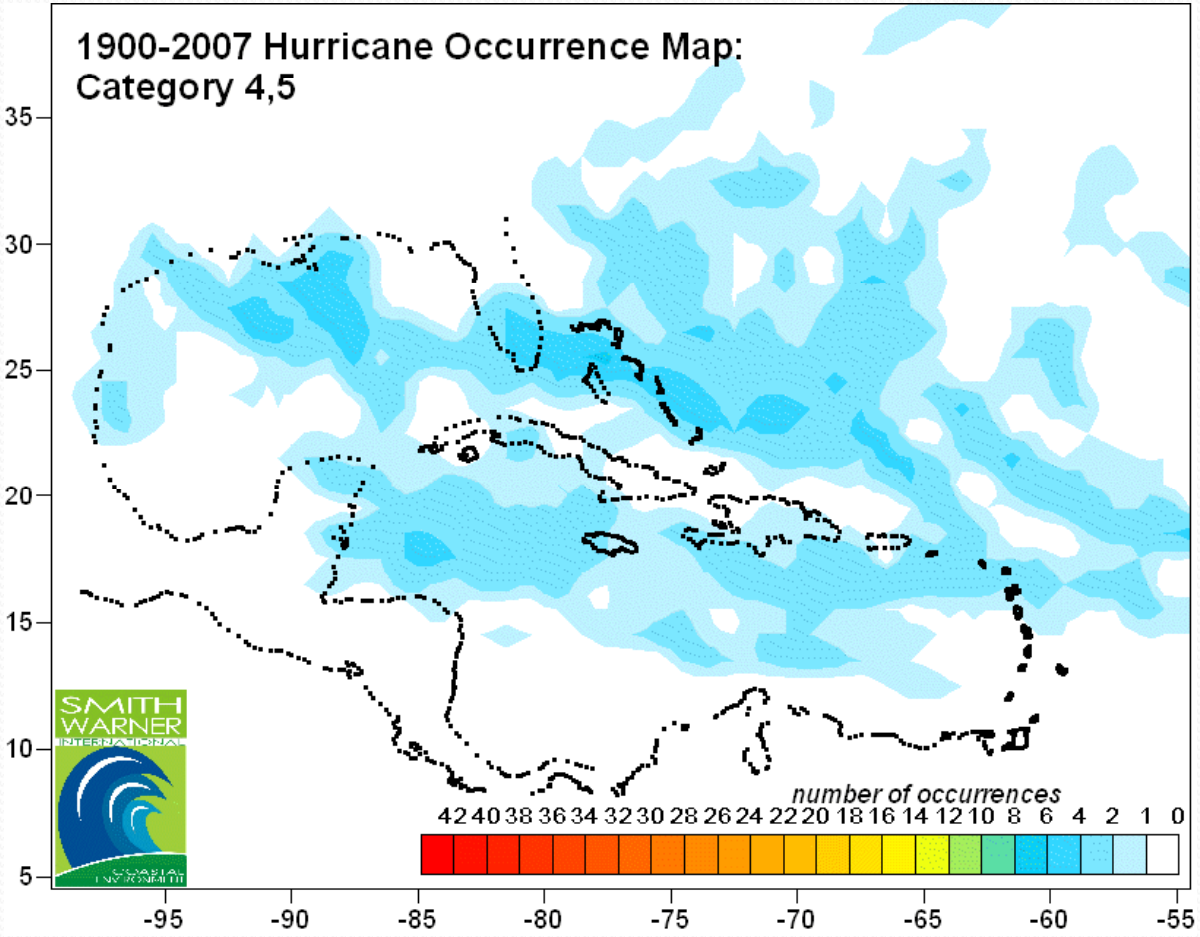

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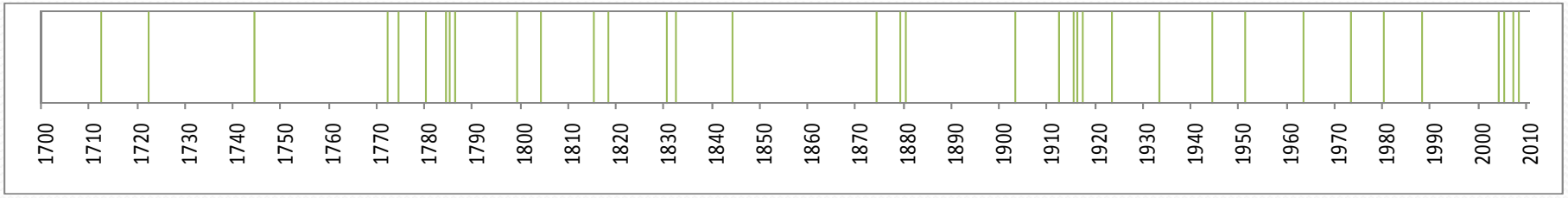
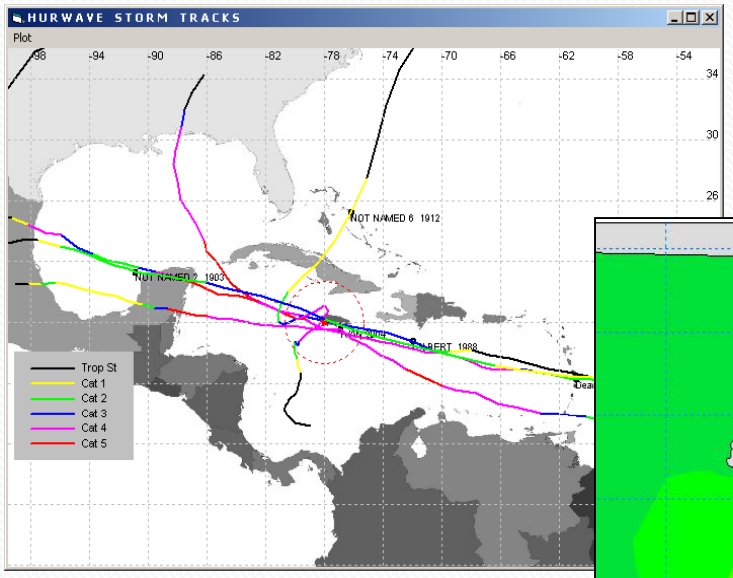
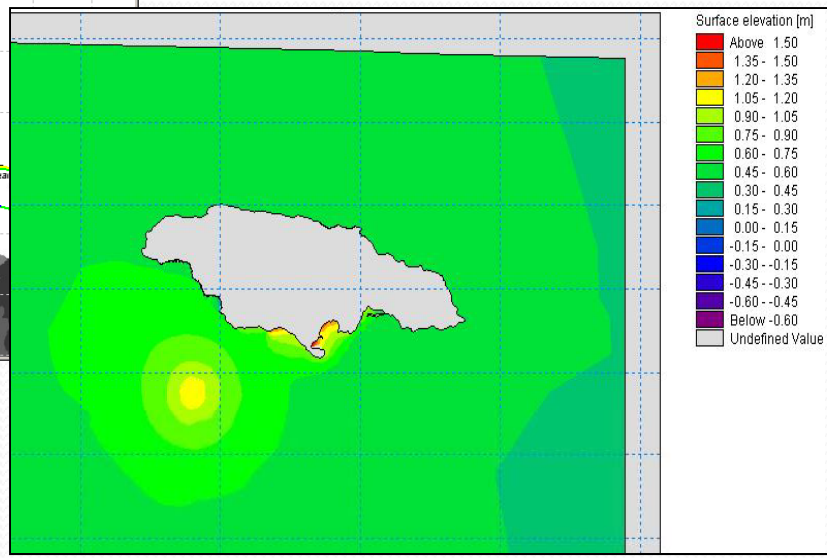


- 1912, Charlie (1950), Allen (1980), Gilbert (1988), Ivan (2004), Dean (2007) and Tropical Storm Gustav (2008).





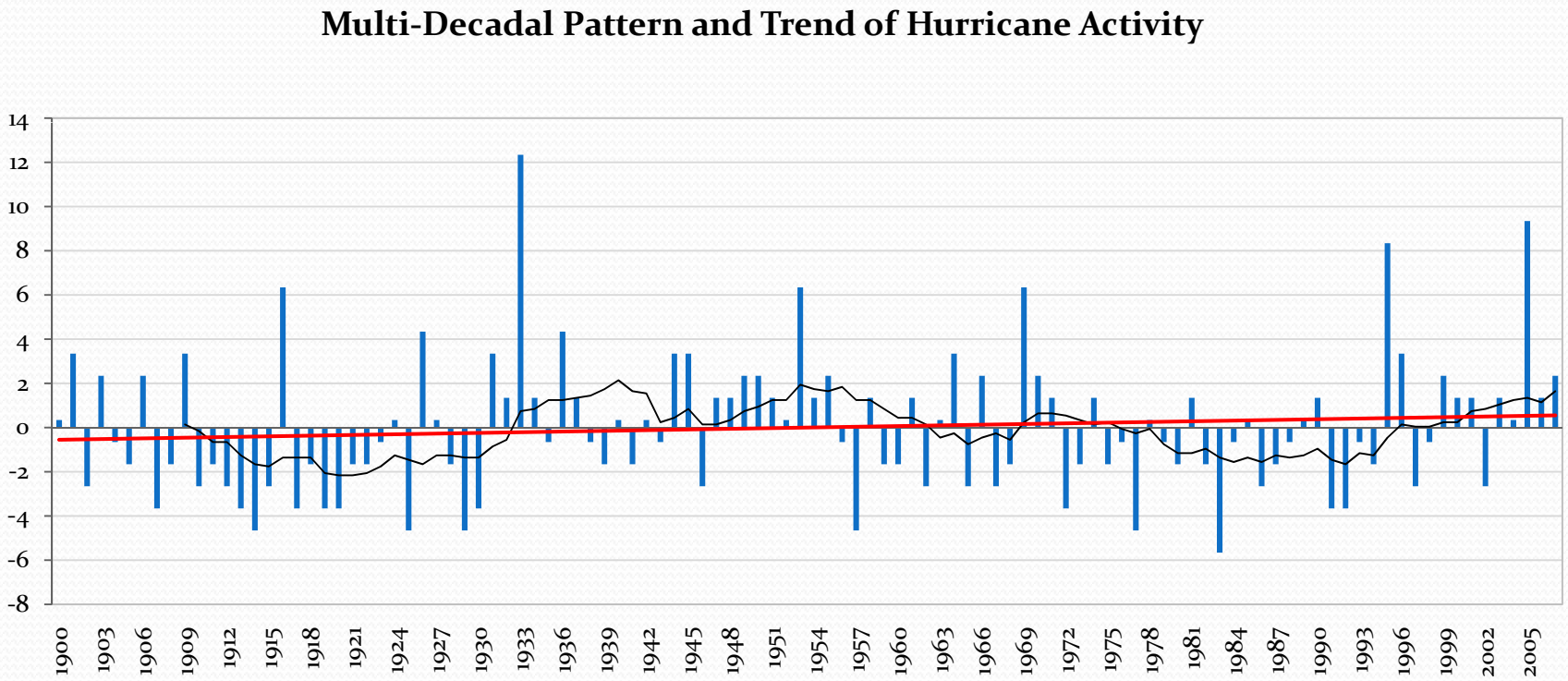
Storm Surge Damage

- Estimated **damages** from Storm Surge by Ivan (2004)
  - Housing J$123M
  - Tourism J$33M
  - Fishing J$13.2M
- Estimated **damages** from Storm Surge by Dean (2007)
  - Bauxite Ports US$26M
  - No data available for other sectors

Location	Max Storm Surge from Dean (2007)	Run-up Dist
Fort Augustus Prison	2.5-3.0m	90-100m
Port Henderson Beach	3m	80m
Hellshire Beach	3m	383m
Old Harbour Bay	3.5m	573m

Source: Ted Robinson and Shakira Khan

The Future?
Trends and Forecasts

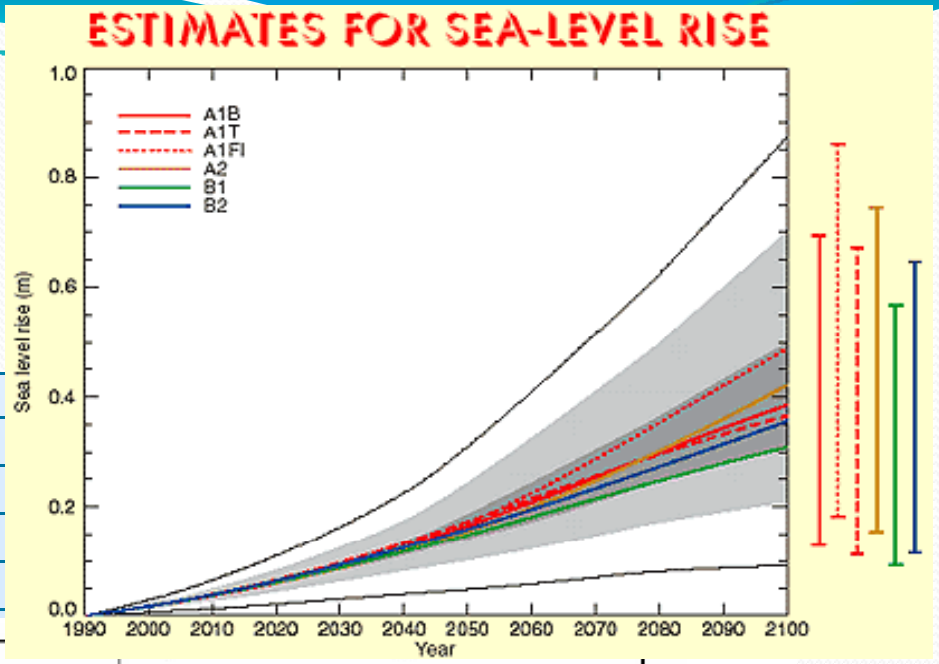


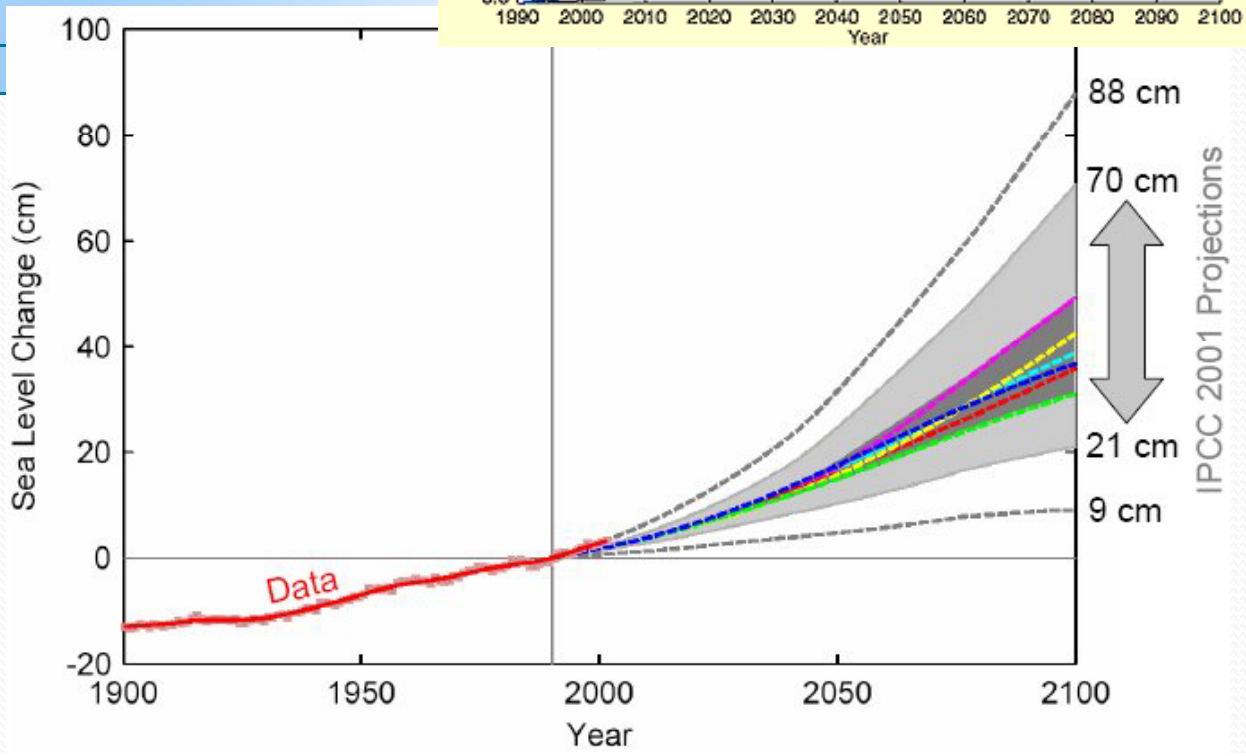
Multi-Decadal Pattern and Increasing trend of Hurricane Activity

Climate Change Predictions

Case	Sea Level Rise up to 2090 relative to 1999
B1 scenario	0.18 – 0.38
A1T scenario	0.20 – 0.45
B2 scenario	0.20 – 0.43
A1B scenario	0.21 – 0.48
A2 scenario	0.23 – 0.51
A1FI scenario	0.26 – 0.59

Ranges for the Caribbean





Model-based range excluding future rapid dynamical changes in ice flow.

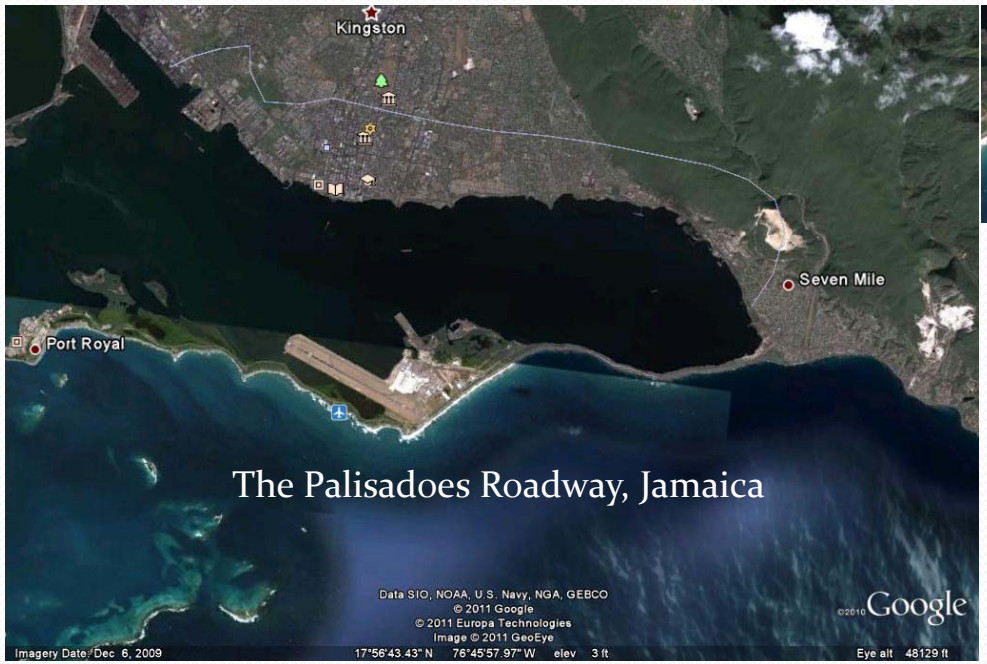
Mitigation:
Design and Construction

- 50-year Condition no longer appears valid for critical structures if DRM and CCA are to be mainstreamed into the planning process
- Use 150-year event for design of critical facilities and for disaster planning
- Setback limits need to evaluated based on specific site characteristics rather than standardized without scientific backup (e.g. 100ft)
- Geologic surveys need to be used to infer hurricane impacts greater than 100 years old
- Local Building Standards for Design and Construction of Structures in the Coastal Zone need to be established

Mitigation: Coastal Enhancement

- Paradigm shift in the approach to coastal protection

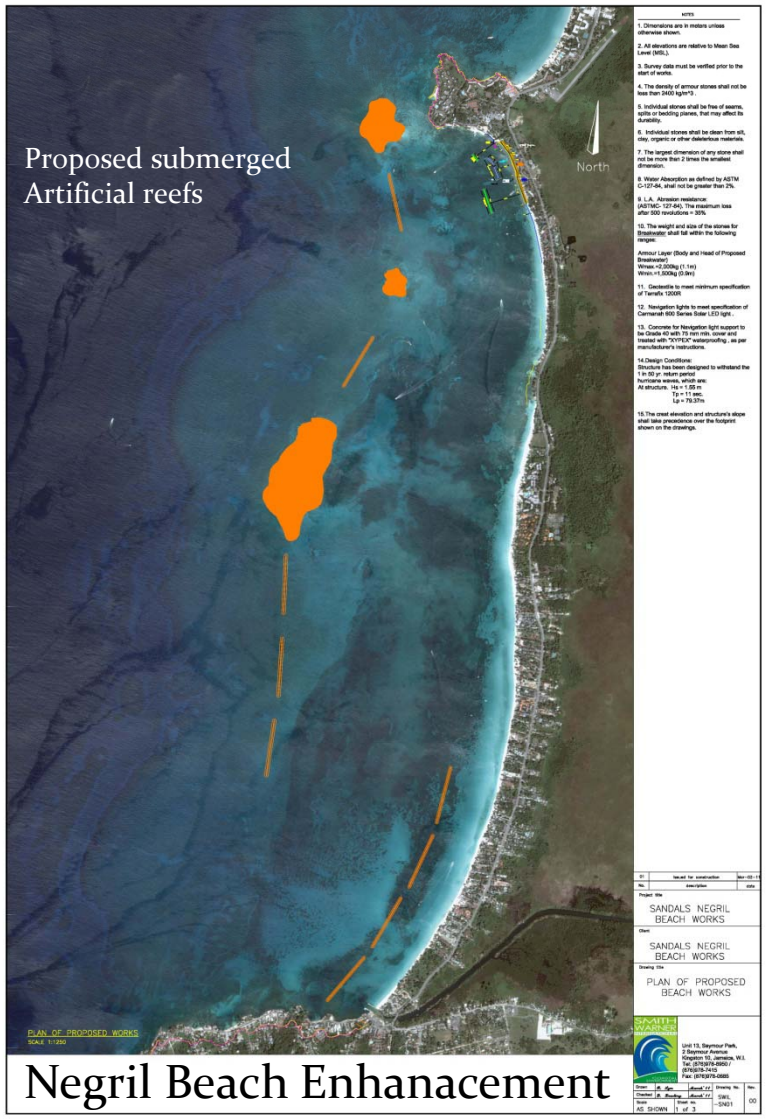
  Coastal Defense ✗ Coastal Enhancement ✓



- Encourage beach growth in front of coastal defense structures as this should be the first line of defense against storms and rising sea level

Mitigation:
Facilitate "Natural" Rebuilding

- We cannot leave the environment to heal on its own
- Damages in some instances are irreversible within a generational lifetime
- We must seek to help nature to heal itself through:
  - Reef regeneration initiatives
  - Artificial reefs
  - Replanting of seagrass
  - Enhancement and protection of mangroves and wetlands
  - Sound Coastal Zone Management Planning



Negril Beach Enhanacement

Mitigation:

Coastline as an Important Asset

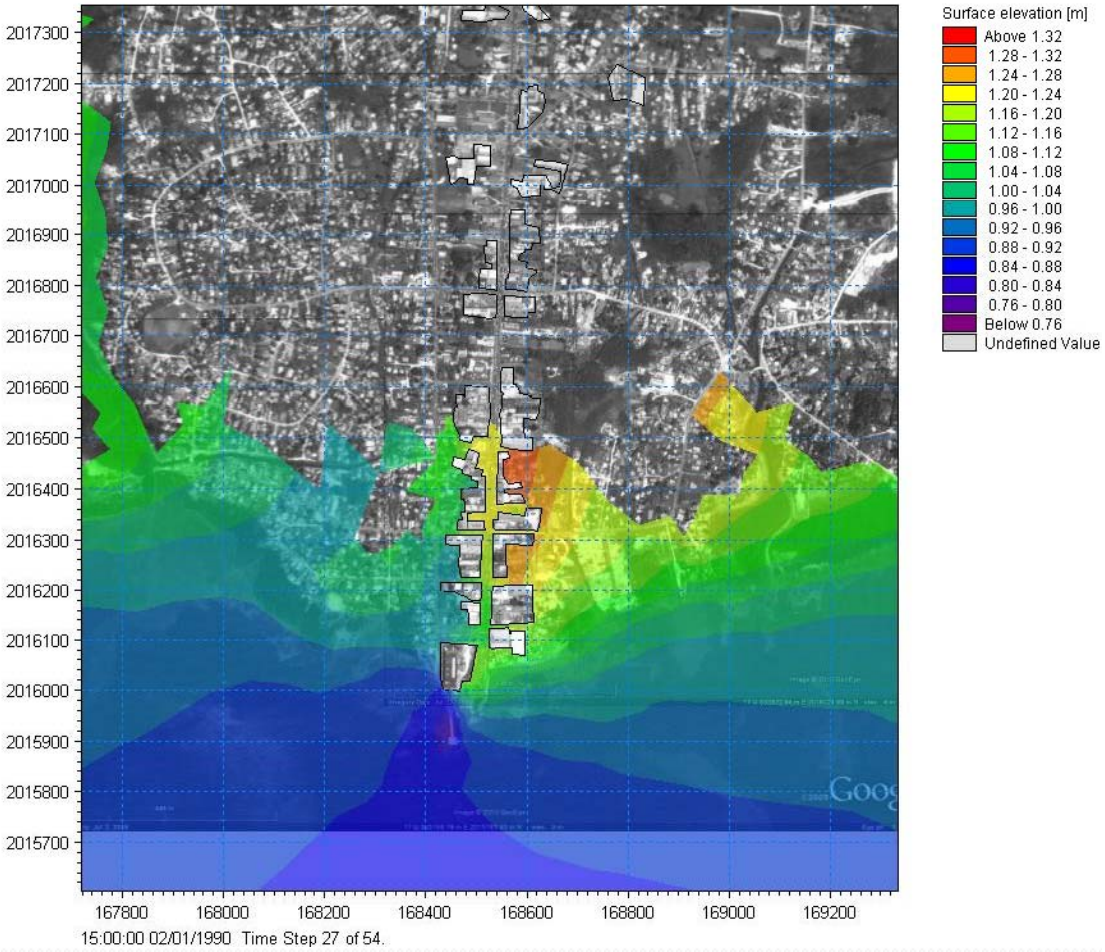
- Revised legislation to allow government to take “ownership” of coastline
- Fund suite of Baseline Studies to define shoreline/sea interactions
- Fund inventory, maintenance and development programs
- Identification and monitoring of all critical shorelines
- Increased coastal zone management planning activities

Climate Change Adaptation Strategies

- **Existing Thinking**
  - Protect and Enhance coastline to safeguard economic infrastructure
  - Increase public awareness to enhance the protection of coastal and marine ecosystems through: conservation; fishing limits, careful construction, etc.
  - Construct sea defences and beach reinforcement
  - Protect and conserve coral reefs, mangroves, sea grass and littoral vegetation
- **Anticipatory Approach**
  - Implement Integrated Coastal Zone Management Plans
  - Improve coastal planning and zoning through the CZMP process
  - Improve legislation for coastal protection and to support CZMP (make it LAW!)
  - Research and monitor coastal/marine processes, shoreline behaviour and coastal ecosystems
  - Build institutional capacity to facilitate the integration of climate change adaptation into development planning

Immediate Work Needs

- Upgraded storm surge and multi-hazard mapping for Kingston, Montego Bay and all other coastal towns
- Hazard, Vulnerability and Risk studies for all coastal towns
- Integrated Coastal Zone Management Plans for all coastal towns



Funding Opportunities

- Follow the "Barbados" model – They have accessed IADB funding to carry out CZM Planning for the entire island shoreline since 1991 up to the present time
- Initial thinking focused on understanding of the interactions of man-induced activities on the coastal zone, and preserving the coastline, through a recognition of the importance of the tourism sector
- Present paradigm now focuses on **Disaster Risk Management** and **Climate Change Adaptation**, for which a lot of funding is now available