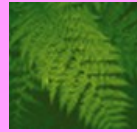




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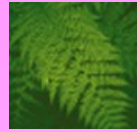


Climate Change in Small Island States: Vulnerability, Resilience and the Implications

CLITOP: International Conference on Climate Change Impacts on Tourism
Lisbon, Portugal 7-8 September 2007

MURRAY SIMPSON

- Senior Research Associate, Oxford University Centre for the Environment, UK
 - Extraordinary Associate Professor, Estonian University of Life Sciences
 - United Nations World Tourism Organization, Tourism Consultant
 - Principal, Sustainable Solutions Worldwide

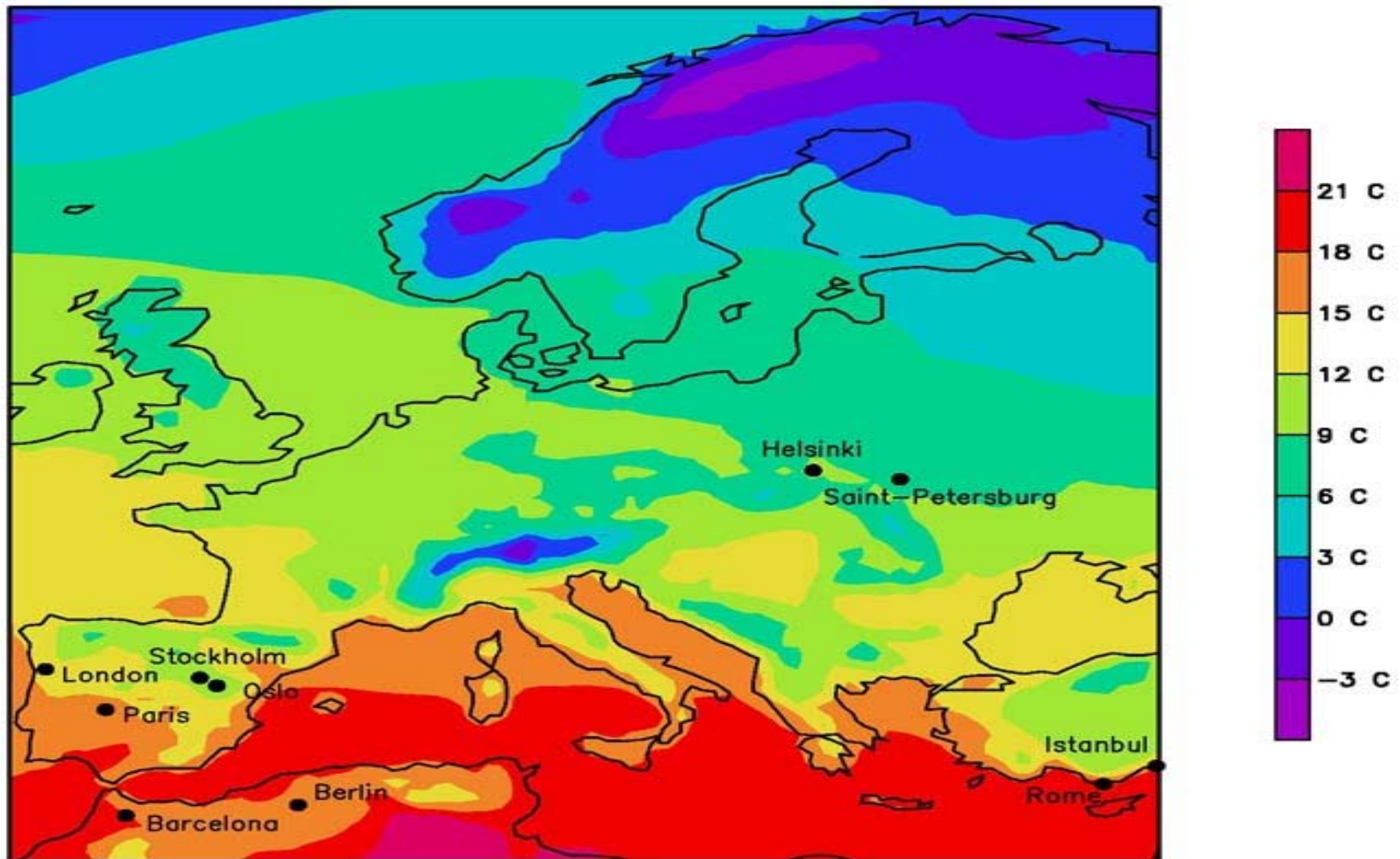


THE PRESENTATION

- SIS Tourism, Climate and Climate Change
- Vulnerability and Impacts in SIS
- Building Resilience / Actions Summary

The climate map of Europe 2071

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Photograph: Centre International de Recherche sur l'Environnement et le Développement and Ecole Nationale de la Météorologie, Météo-France. Hallegatte et al 2007

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SMALL ISLAND STATE TOURISM, CLIMATE AND CLIMATE CHANGE



DIRECT OBSERVATIONS OF RECENT CLIMATE CHANGE

- Fourth Assessment Report (FAR) (2007)
- Little climate variation before industrial era
- Since Third Assessment Report (TAR) (2001), progress in understanding how climate is changing in space and in time has been gained through:
 - improvements and extensions of numerous datasets and data analyses
 - broader geographical coverage
 - better understanding of uncertainties, and
 - a wider variety of measurements

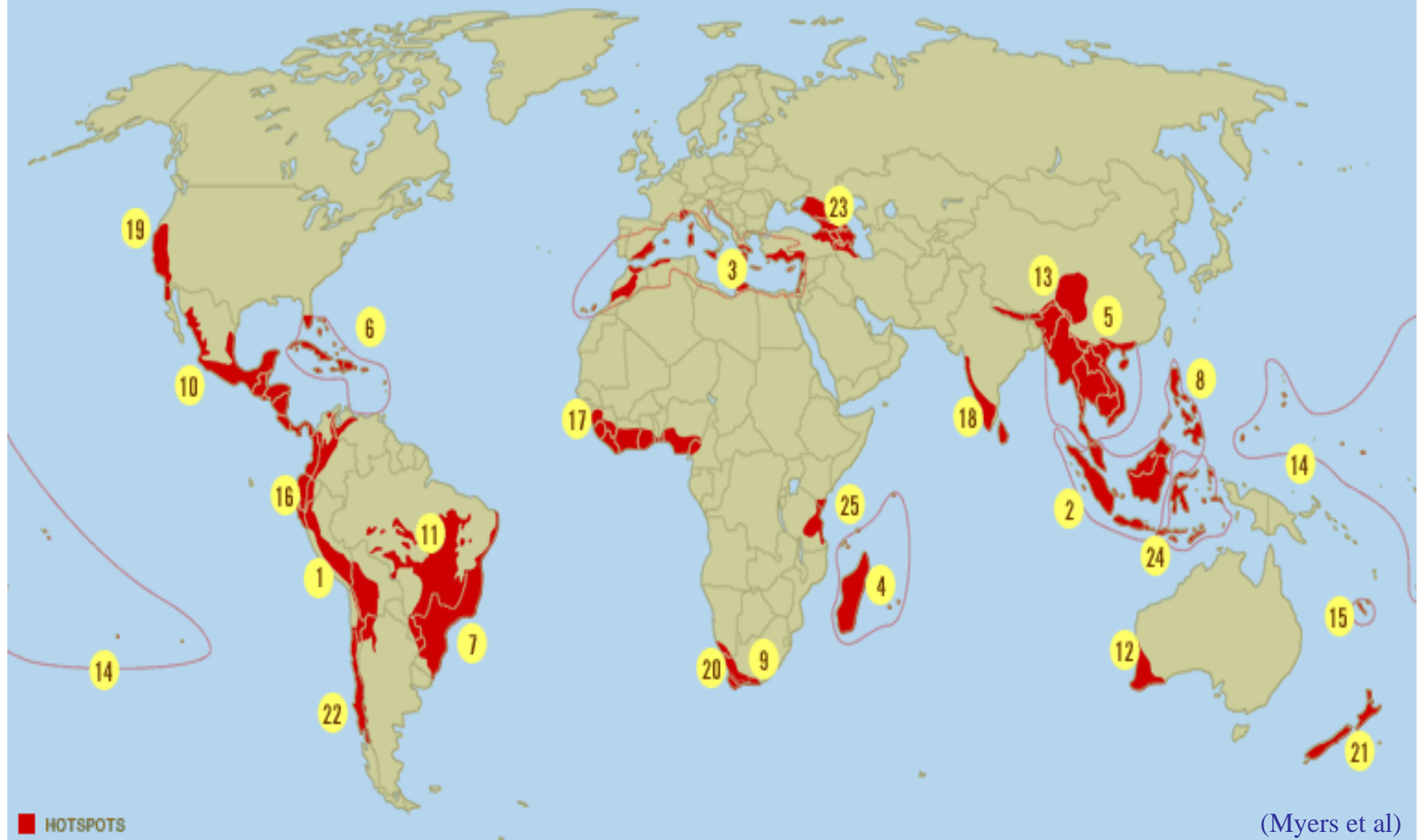


SIS TOURISM, CLIMATE AND CLIMATE CHANGE

- Crucial interdependence: Tourism and Climate -
(economy, livelihoods, environment)
- Tourist Flows
- Significant?: air temp, s.s. temp, sea level/erosion, precip.
changes, extreme conditions, seasonality
- Gradual vs Extreme
- Vulnerability and Resilience
- Adaptation and Mitigation (and Adaptive Capacity)

HOTSPOTS & SIS

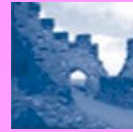
Global Biodiversity Hotspots



Climate Change and Tourism: Four Possible Categories

- Direct impacts of a changed climate
- Indirect impacts related to climate induced environmental change
- Indirect impact of mitigation policies on travel costs and travel patterns
- Consequences of overall impacts of climate change on societies (lifestyles, economic growth, development patterns, political stability)

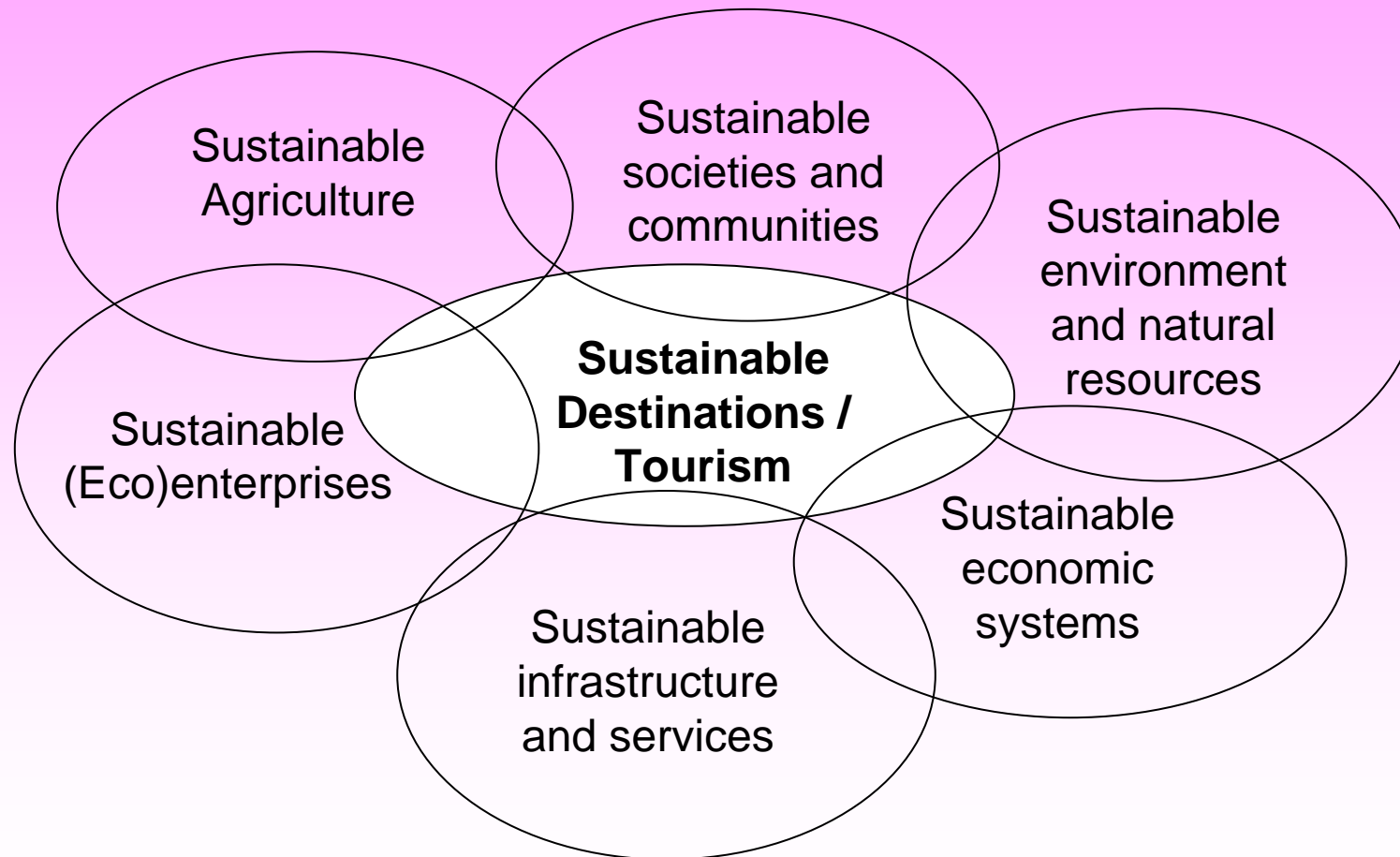
Ceron and Scott 2007



Impacts, Adaptation and Mitigation, and Sustainability

- Agriculture
- Coastal Issues and Marine Fisheries
- Biodiversity
- River Flooding and Drainage
- Water Resources and Quality
- Built Environment and Housing
- Transport
- Utilities and Infrastructure
- Health
- Employment and Socio-Economics
- Financial Services
- Food and Drink
- Tourism and VE: flow, attractiveness, season, activity existence

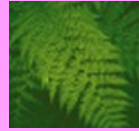
THE INTEGRATED RELATIONSHIP BETWEEN SUSTAINABLE DESTINATIONS, TOURISM & SUSTAINABLE DEVELOPMENT



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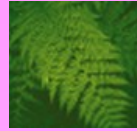


VULNERABILITY & IMPACTS IN SMALL ISLAND STATES (& COASTAL ZONES)



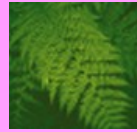
Small Island States (& Coastal Zones) #1

- Anticipated and expected climate change impacts :
 - **Sea level rise**
 - Saline intrusion into freshwater aquifers
 - Coastal flooding and erosion
 - **Increased temperatures**
 - Heat stress
 - Coral bleaching
 - Biodiversity loss (UNESCO)
 - Increased emergence of vector borne diseases



Small Island States (& Coastal Zones) #2

- **Changes in rainfall patterns**
 - Droughts or floods
 - Decreased fresh water availability/ secondary industries
- **Increased intensity of storm activity**
 - Direct damage of infrastructure/comms/services
 - Loss of lives
- **Direct damage to tourism plant and natural resources**
 - Coral reefs
 - Beaches



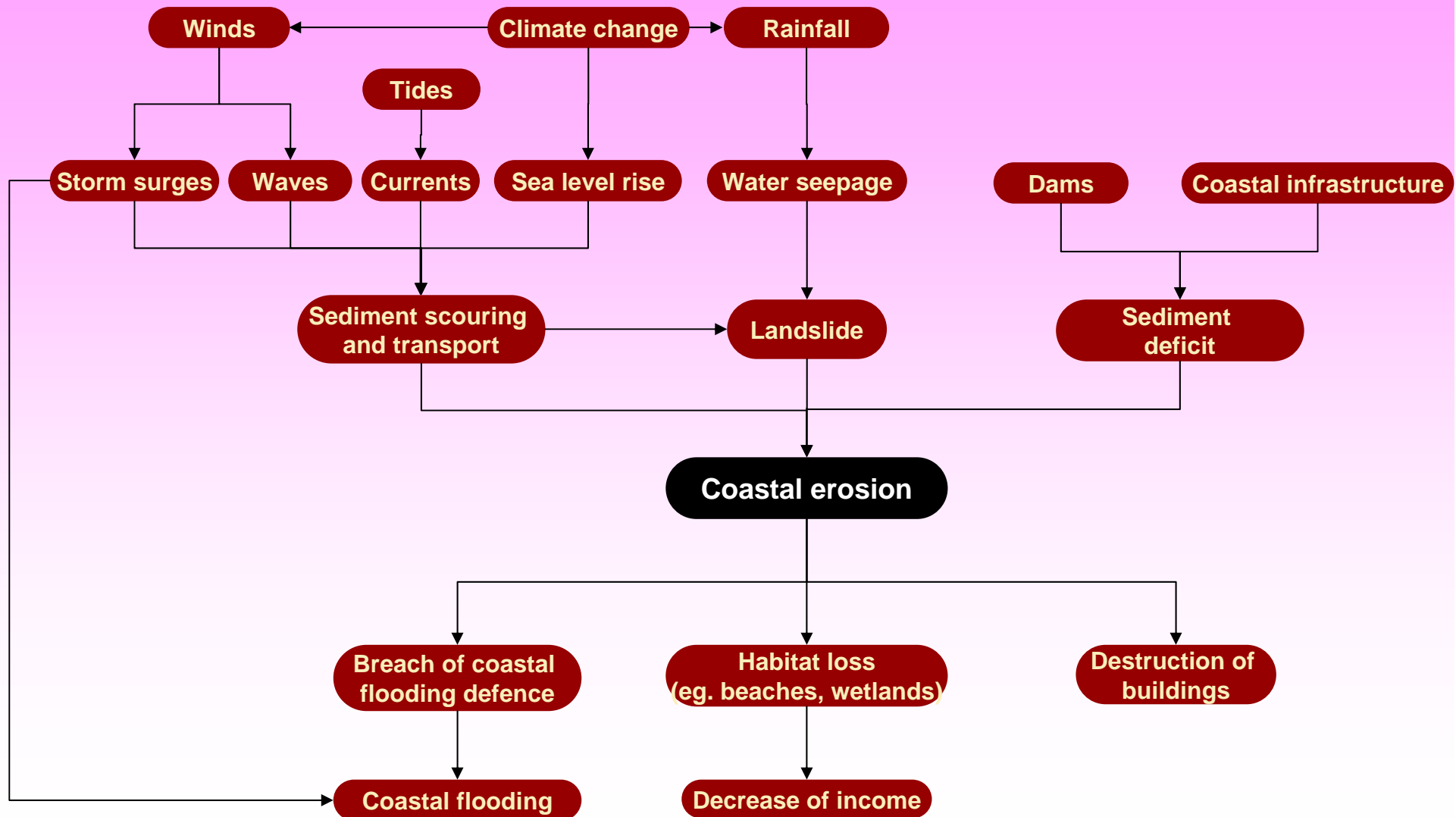
Small Island States (& Coastal Zones) #3

- **Loss of attractiveness of the region as a destination**
 - Impacts on health – emergence of dengue, malaria,
 - Reduced dive tourism if coral reefs are damaged
 - Milder Winters in the North
- **Loss of employment in the industry / Livelihoods issue**
- **Insurance costs in vulnerable areas**
- **Increased operating costs (e.g. water and energy i.e. a/c)**

Small Island States (& Coastal Zones) #4

- **Seasonality Shifts**
- **Push-Pull**
- **Changes in visitation patterns and flows**
- **Low Carbon Future**
 - government policies
 - voluntary actions
 - emission reduction policies – e.g. taxes, offsets, fuel prices
 - renewable energy (lower energy use)
 - enviro-guilt

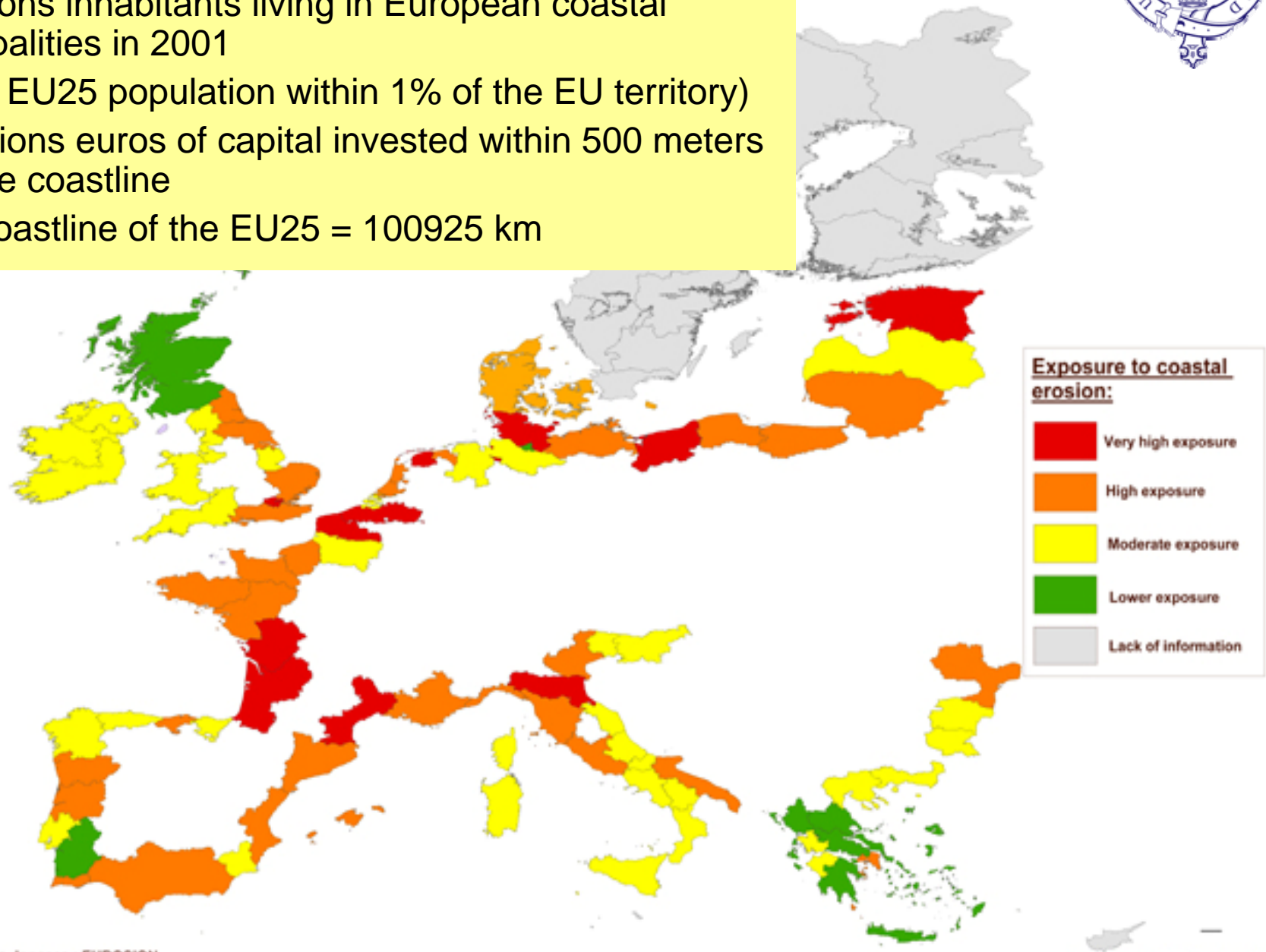
Coastal erosion – causes and effects



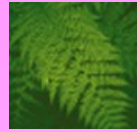
Exposure of European regions to coastal erosion



- 71 millions inhabitants living in European coastal municipalities in 2001
- 16% of EU25 population within 1% of the EU territory)
- 500 billions euros of capital invested within 500 meters from the coastline
- Total coastline of the EU25 = 100925 km







Coral Bleaching

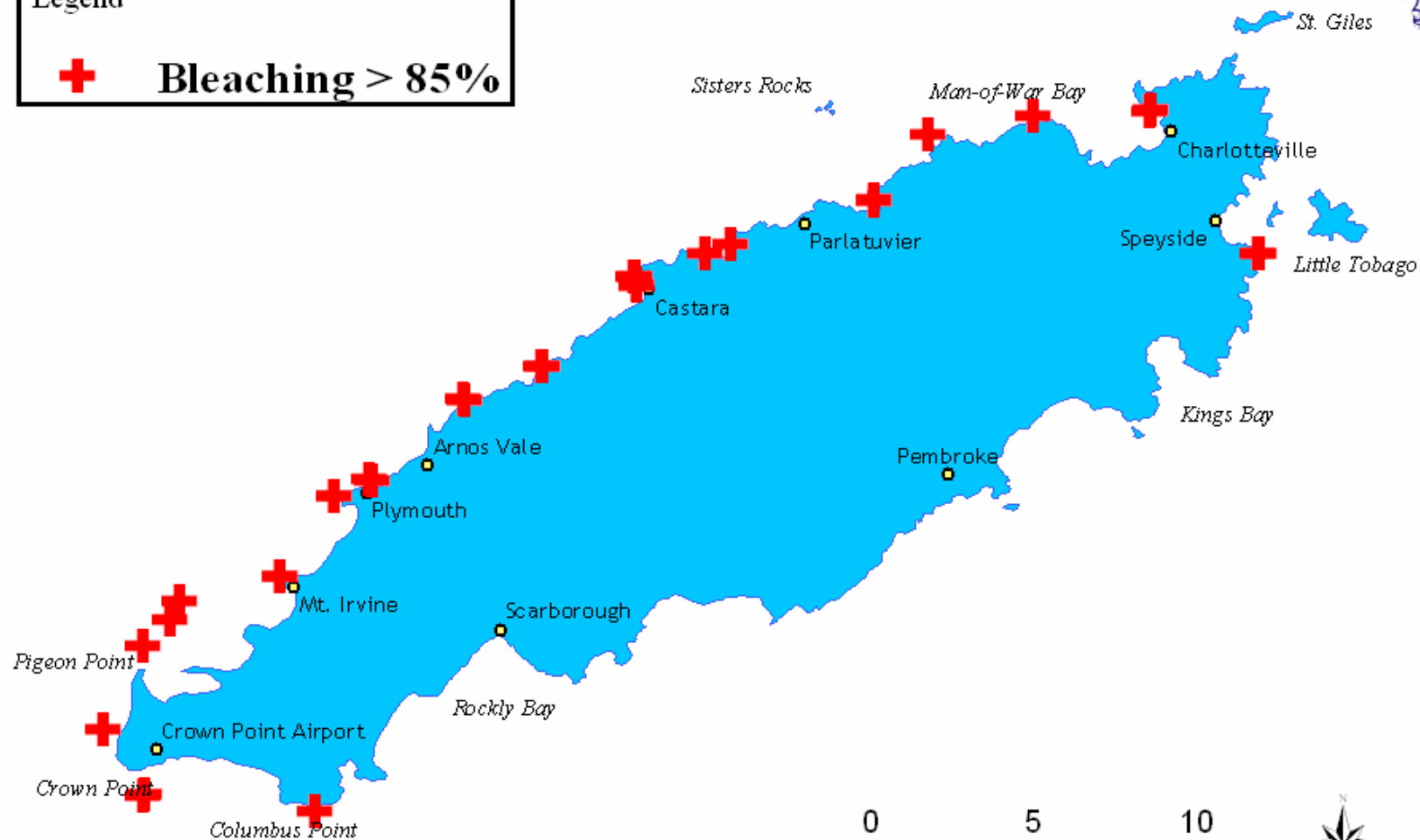
- Worst mass bleaching event for many years possibly ever. Caribbean coast reefs particularly affected (70 -90%).
- Dive operators suggest the reefs on the Atlantic side not so bad
- The bleaching associated with high sea surface temperatures affecting the eastern Caribbean, temperatures as high as 31 C and 32 C reported (measurements up to 31 C. verified).

(Buccoo Reef Trust)



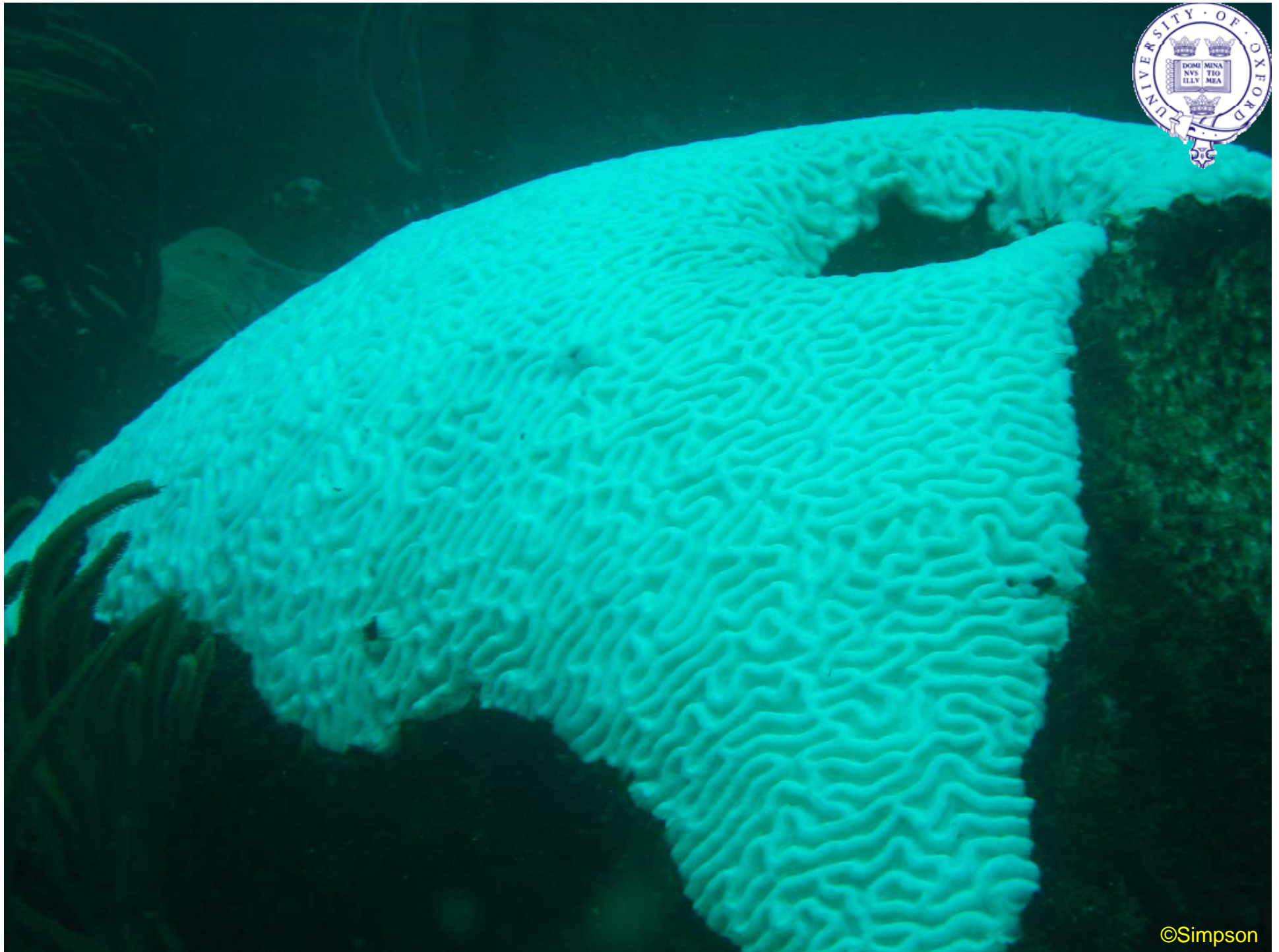
Legend

+ Bleaching > 85%



(Buccoo Reef Trust)







Hurricanes

- Northern hemisphere oceans Annual Mean = 55 more than double tropical storms observed in the Southern hemisphere (25 AM).
- Approx. 50 hurricane strength events form globally each year, around one third make landfall.
- Exceptional Activity:
 - Seasonal records set by 2004 and 2005 hurricane seasons combined;

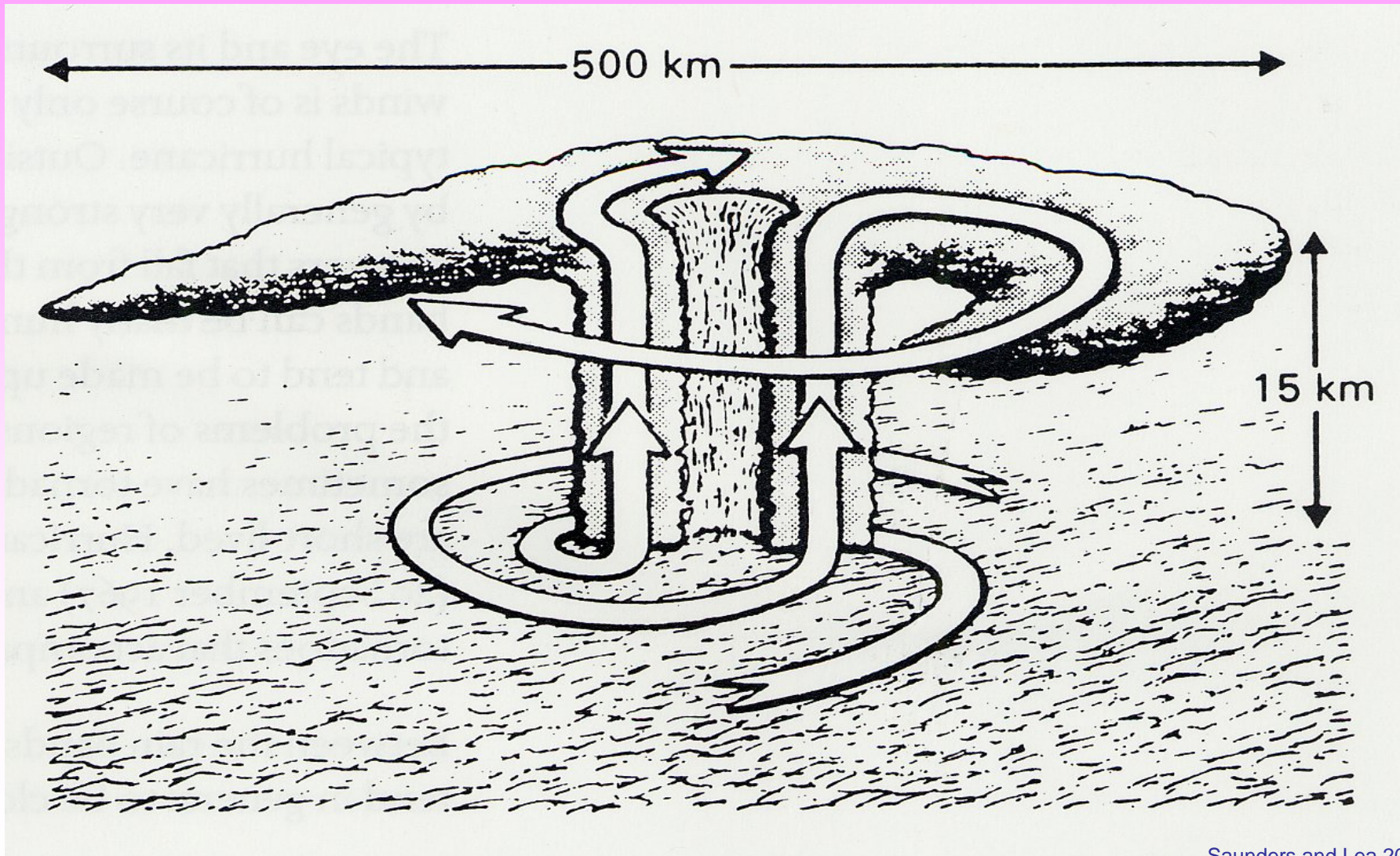
Highest 2-year total for number of Atlantic tropical storms (42) 200% up.

Highest 2-yr total for number of Atlantic hurricanes (24) 200% up.

EXCEPTIONAL ACTIVITY?

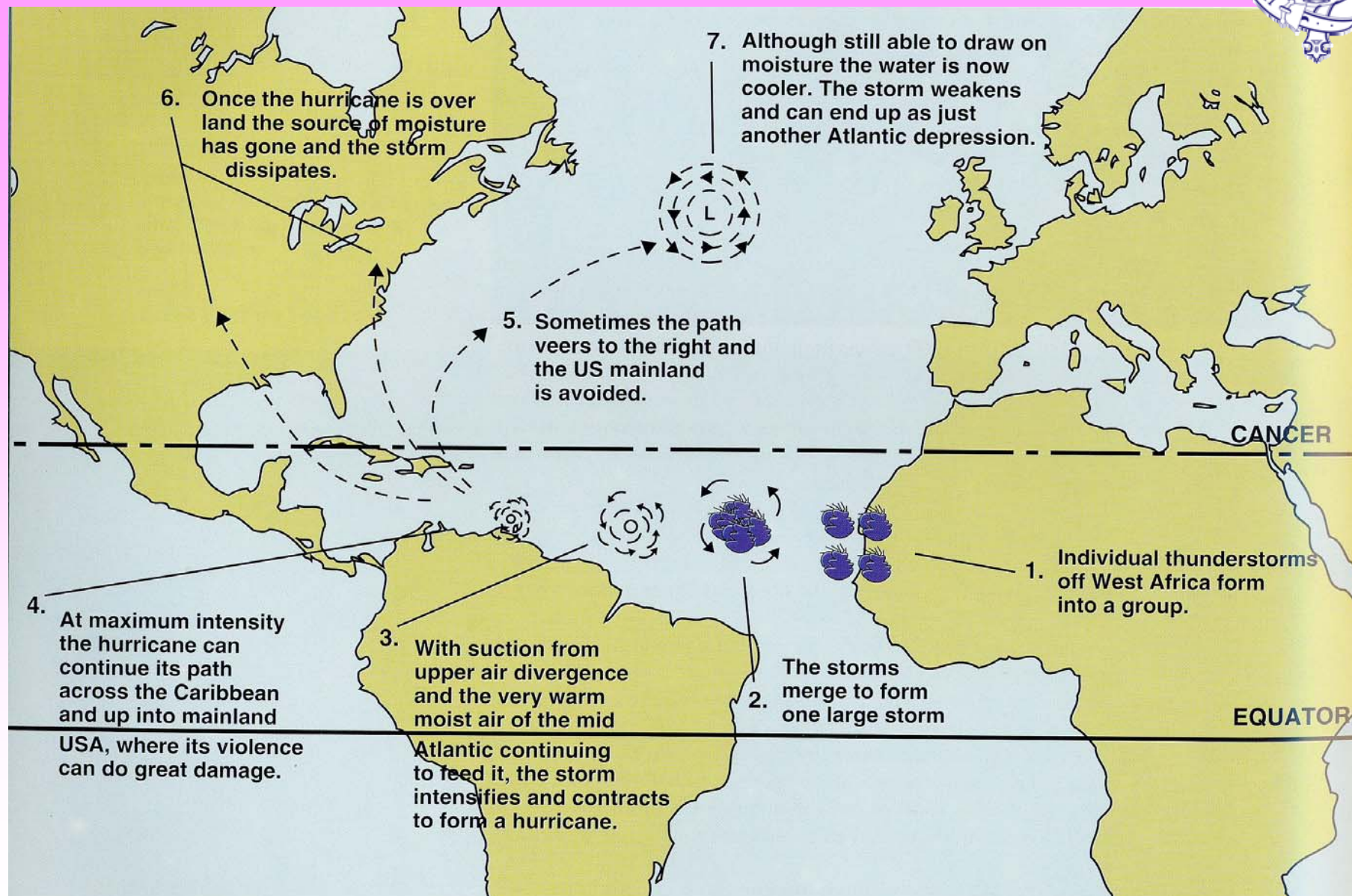


Basic Anatomy of a Hurricane: Dimension, Cloud Pattern and Wind Circulation



Saunders and Lea 2006

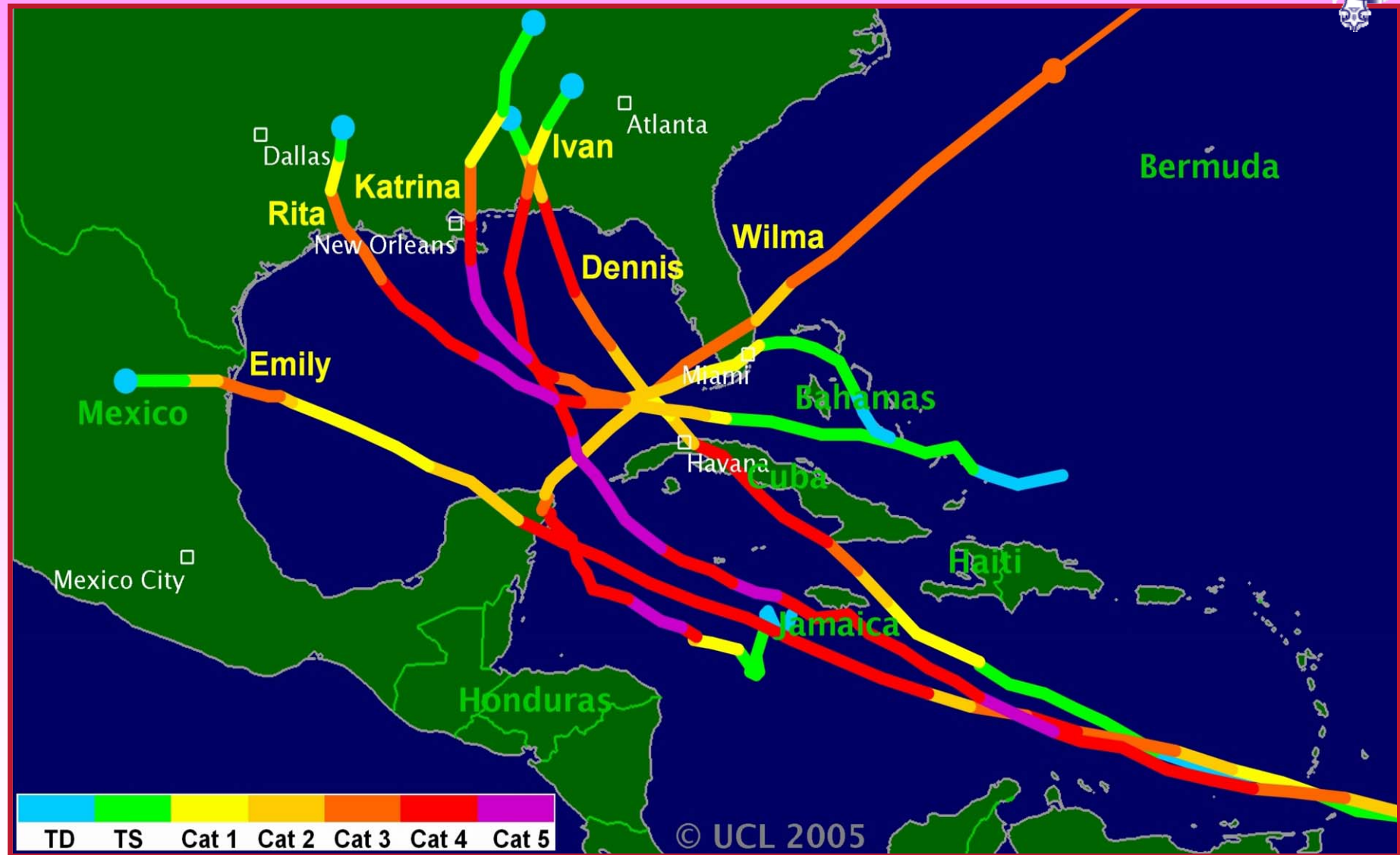
Atlantic Hurricane Life Cycle

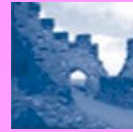
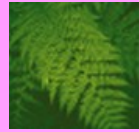


Saunders and Lea 2006



Major Gulf Hurricanes in 2004/5





2004 & 2005 Unusual for Gulf Hurricanes?

Number of Major Hurricanes in the Gulf in 1 Year

- 2005 had five intense hurricanes in the Gulf of Mexico.
- Model (Poisson Model) probability of five or more Gulf intense hurricanes in same year is 1 in 1000.

Number of Major Hurricane Gulf Landfalls in 2 Years

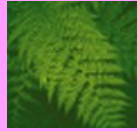
- Two occurrences of four intense hurricane landfalls in consecutive years. These are 2004/5 and 1915/6.
- Model (Poisson) probability of four or more intense hurricane landfalls in 2 yrs is 1 in 200.

Anomalies: Sea Surface Temp./ Tradewinds / Pressure Predictions

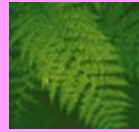
Poisson, Saunders and Lea 2006



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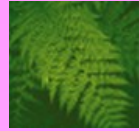


BUILDING RESILIENCE IN SMALL ISLAND STATES (& COASTAL ZONES)



SIS, eCLAT and UNWTO

- Djerba Declaration and eCLAT
- Technical Seminars / Conferences; NATO, ISB, ESF, EFIEA, IHDP, NL, Paris, Slovenia
- SIDS/GEF; Fiji, Maldives, Seychelles, Jamaica, Bahamas
- UNWTO Report and Davos – 2nd International Co
- Stakeholders and Destinations



SOME BARRIERS TO ADAPTATION & BUILDING ADAPTIVE CAPACITY

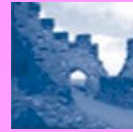
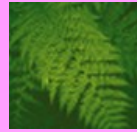
Lack of:

- Knowledge / Data
- Awareness
- Incentives
- Government Legislation
- Finance
- Extended Planning Horizons
- Technology
- Willingness to Act

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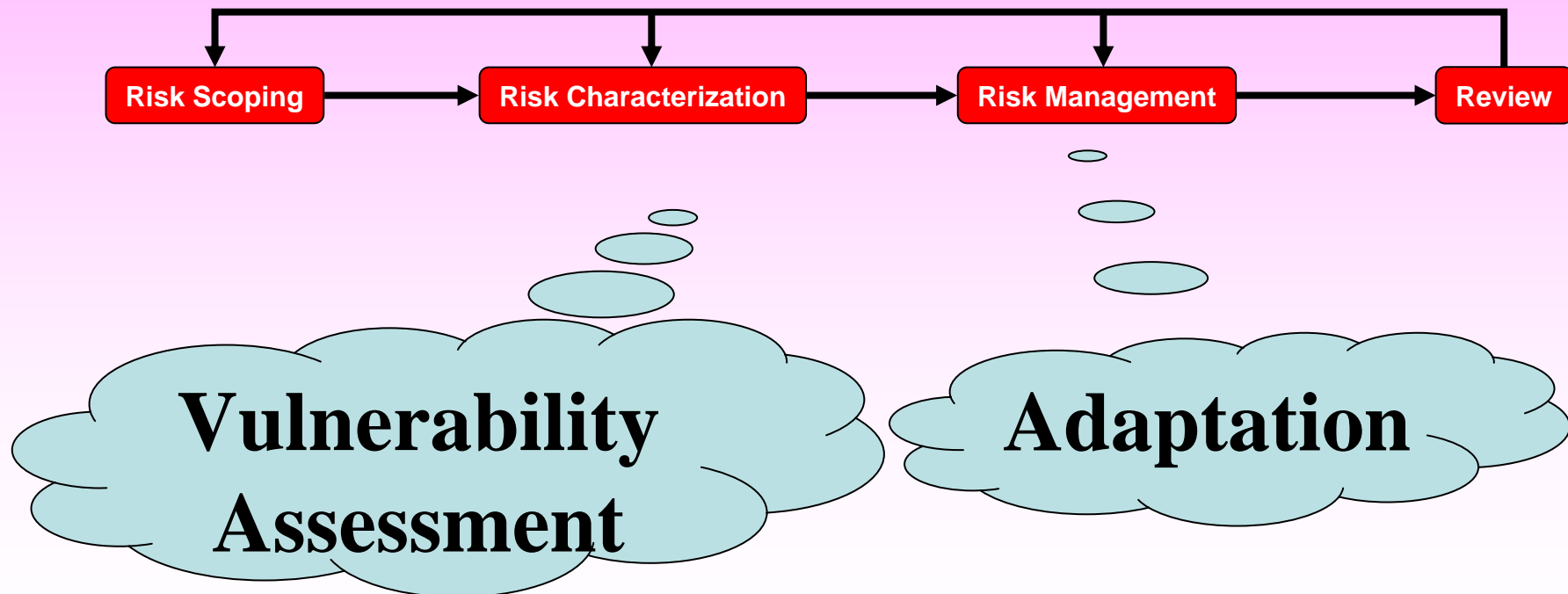


ACTIONS SUMMARY



‘Climate Proofing’(!?!?!?)

Risk-based Approach to Adaptation





Actions #1

- More Information, More Research
- More Action: Economically & Environmentally Sustainable
- Engagement and Collaboration of all Stakeholders (inc. Public, Ministries/Depts., Private, NGO, Community)
- Data Requirements: climate and biodiversity data, snow making
- Product Diversification
- Strengthen 'shoulder seasons'
- Policies and National Development Agenda

Simpson 2006; UNWTO 2003



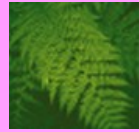
Actions #2

- Harmonization and Coordination
- Awareness Raising and Capacity Building
- Education, Information (sharing) and Involvement: all levels; school children > industry > workers > government ministries
- Hazard Mapping
- Natural Disaster Management Office and Plans (Early Warning, Response and Post)



Actions #3

- ICZM – Planning, Regulation and Monitoring
- Mangrove, Coral Reef, Rainforest Protection
- Reforestation and Afforestation
- Improved Land and Marine Use Management
- Energy / Water Conservation, Water Harvesting
- Enforcement – building codes, e.g. setbacks,



Implementation Principles

- Inclusive, transparent and participatory
- Existing information and resources to be used
- Local experts should work along side and at times lead their international counterparts
- Outcomes should have high relevance to key stakeholders, add value to current and planned initiatives, and be sustainable
- Replicable and transferable methods, tools and findings

Simpson 2006; Becken 2007



“In Nature there are Neither Rewards Nor Punishments –
there are Consequences”

Robert G. Ingersoll 1881

(Orator, and advocate of science, reason, and the rights of women and African-Americans)

THANK YOU

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