

# 18th

## SESSION IOCARIBE

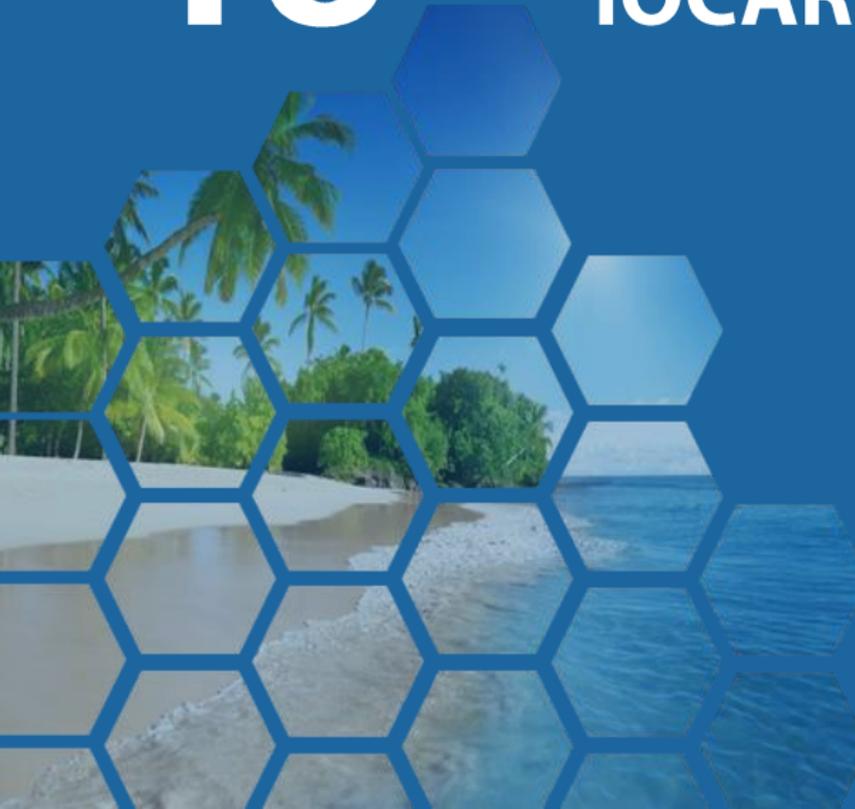


**unesco**

Intergovernmental  
Oceanographic  
Commission

Sub-Commission for the Caribbean  
and Adjacent Regions

Subcomisión para el Caribe y  
Regiones Adyacentes



## A WARMING OCEAN: IMPACTS AND SOLUTIONS FOR TRINIDAD AND TOBAGO

**RAHANNA JUMAN, DEPUTY DIRECTOR, INSTITUTE OF  
MARINE AFFAIRS**

Brasilia, Brazil  
April 23–25, 2025

# CLIMATE PREDICTIONS FOR TRINIDAD & TOBAGO FOR 2100

AIR TEMPERATURE	ANNUAL RAINFALL	MONTHLY RAINFALL	SEA SURFACE TEMPERATURE	SEA LEVEL RISE
RCM Projections End of Century	RCM Projections End of Century	GCM Projections End of Century	GCM Projections End of Century	RCM Projections End of Century
 2.4 - 3.6°C	 22% - 30%	+ 7mm  - 40mm	 0.9°C - 3.1°C	 75 - 126cm

# Climate impacts

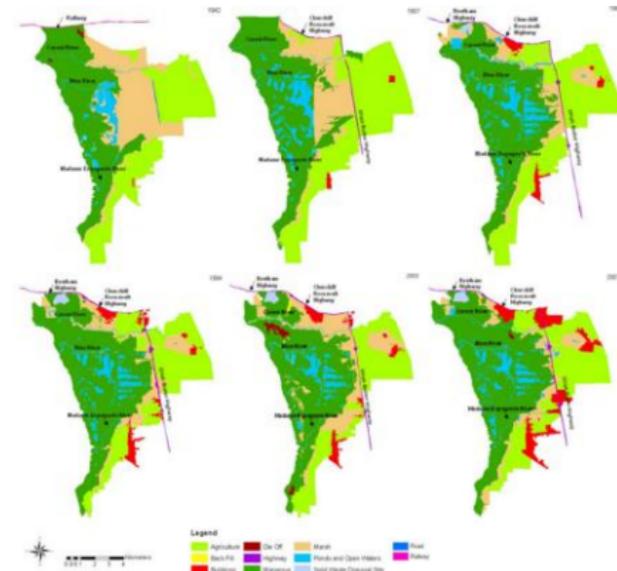
## Coastal Erosion/ Shoreline change



## Extreme weather events/ flooding and damage to coastal infrastructure



## Change in wetland community



# Monitoring for Reef Resilience

CORAL  
RECRUITMENT



HARD CORAL  
COVER



HARD CORAL  
DIVERSITY



CORAL  
DISEASE



STRUCTURAL  
COMPLEXITY



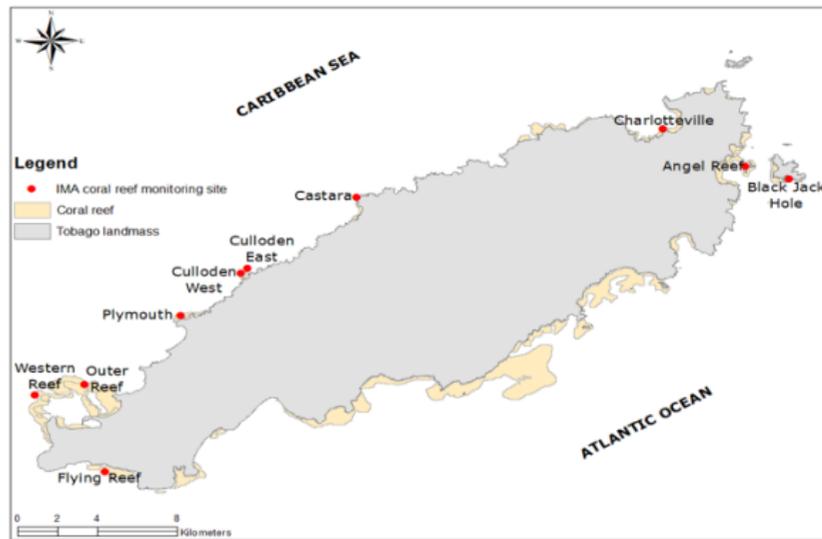
ALGAE  
COVER



HERBIVORE  
BIOMASS



COASTAL  
DEVELOPMENT  
INDEX



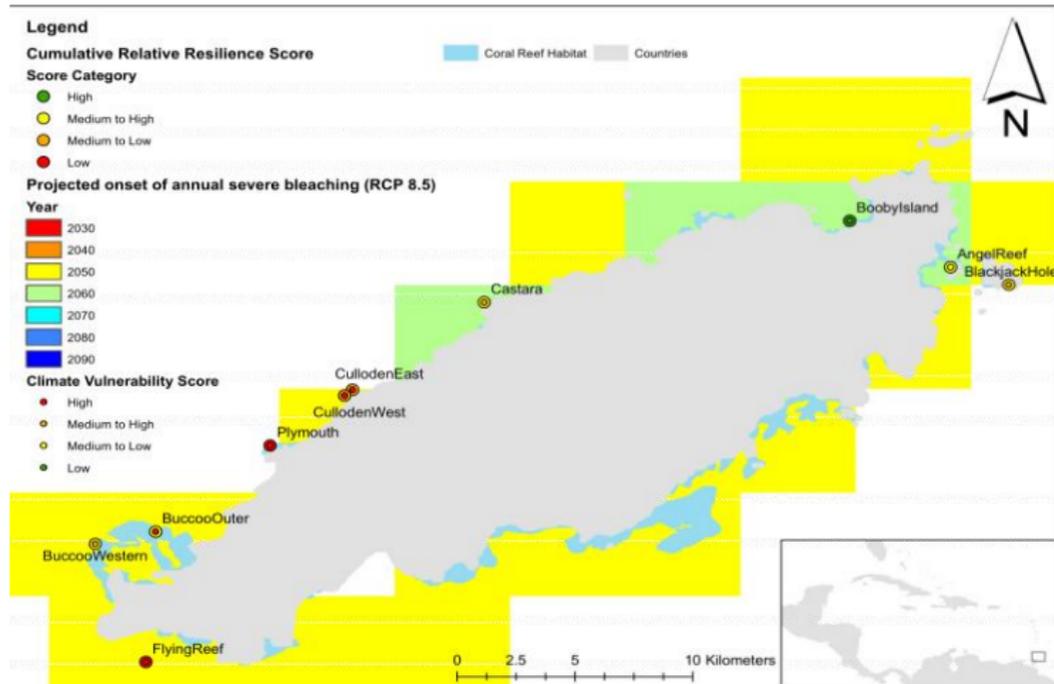
# Coral Reef Vulnerability

Booby Island Reef has lowest vulnerability because of high resilience/ low exposure

Flying Reef has high vulnerability because of low resilience/ high exposure

Exposure to coral bleaching

		Resilience			
		High	Med - High	Med - Low	Low
Exposure to coral bleaching	Low	Low	Med-Low	Med-Low	Med-High
	Med - Low	Med-Low	Med-Low	Med-High	High
	Med - High	Med-Low	Med-High	High	High
	High	Med-High	High	High	High



# Mass coral bleaching Tobago 2023 - 2024

## 2024 MASS BLEACHING EVENT:

- Record-breaking heat stress – Bleach Alert Level 5
- Between 70 – 80 % bleaching related impacts
- Up to 100 % bleaching impact of mountainous star, boulder brain, and great star corals
- Reporting of bleaching through the MARINE RESILIENCE NETWORK (MRN)

## NEXT STEPS:

- Implementing recovery measures through the MRN
- Assessing survival
- Re-assessing target sites for restoration
- Exploring ex-situ coral rearing facilities



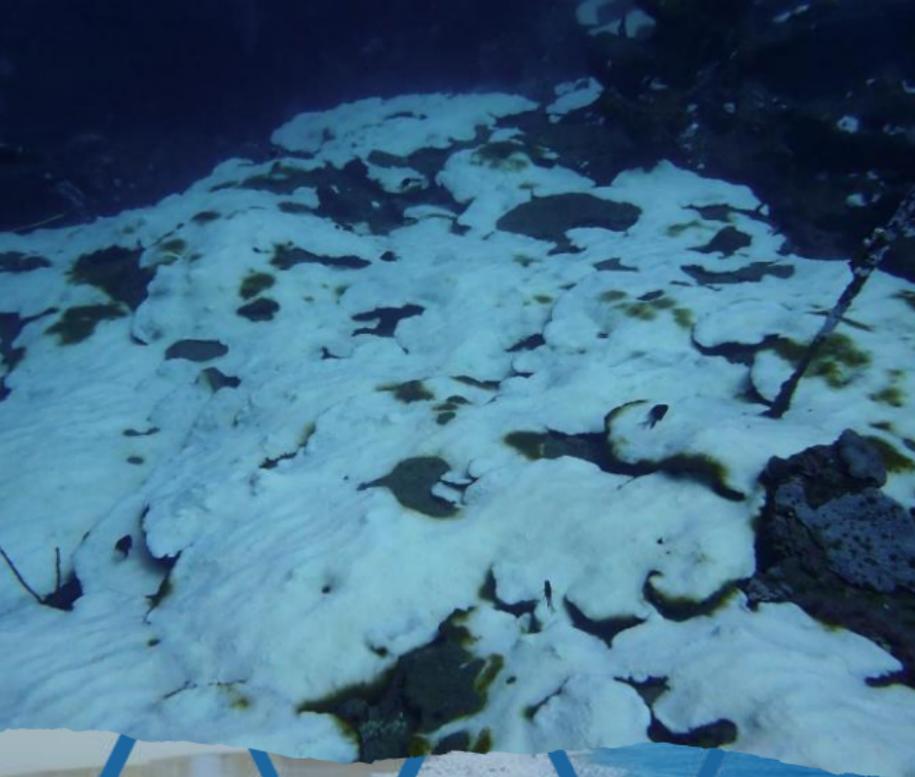
An underwater photograph of a coral reef. The water is clear and blue. In the foreground, there is a large patch of coral that has turned a pale, yellowish-brown color, indicating bleaching. Several small, striped fish are swimming around the coral. A white callout bubble with a green border is in the top left corner.

Reporting of  
widespread  
bleaching

An underwater photograph of a coral reef, similar to the one on the left. The coral appears to be mostly dead or bleached. A blue hexagonal pattern is overlaid on the bottom left of the image.

**Buccoo MPA**  
**100% mortality of Staghorn**





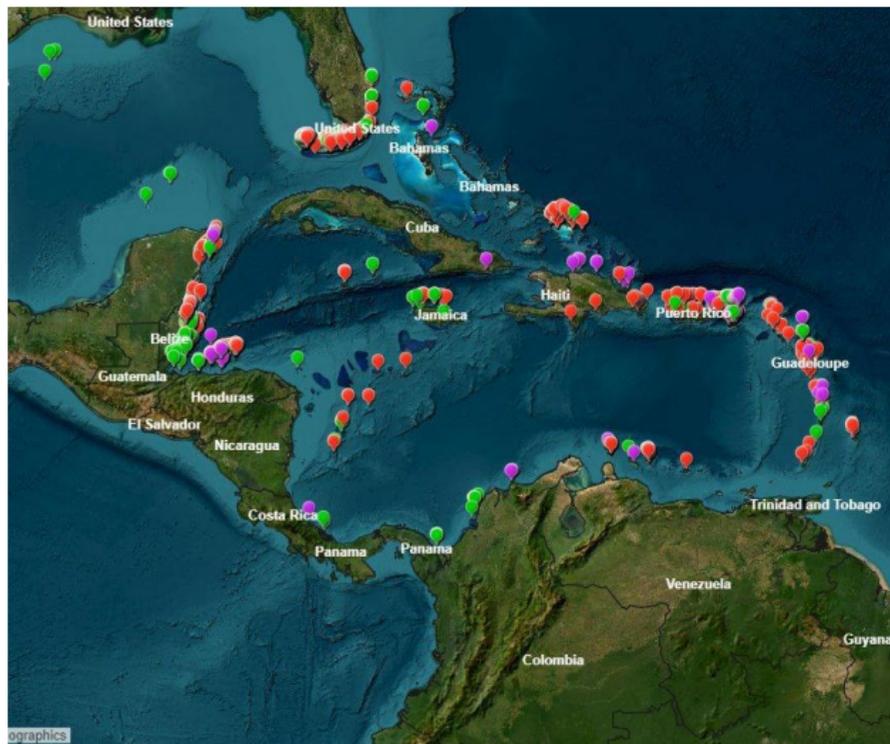
**Culloden Reef  
Bleached, not dead**



**Angel Reef**  
**Fully bleached, not dead**

# Stony Coral Tissue Loss Disease in the Caribbean

- **SCTLD first observed in Florida in 2014**
- **Highly virulent coral disease**
- **Exact cause unknown- bacterial assemblage/ virus and bacteria**
- **Spread to ~ 33 countries in the Caribbean**
- **~ 190,000,000 corals lost in The Bahamas since 2019/2020**
- **Not yet reported in Tobago**
- **Grenada closest island with disease**
- **T&T will be the last to get SCTLD**
- **We can learn from the mistakes of others if we act now**



# MARINE RESILIENCE INITIATIVE, MARIN TOBAGO

Restoring and sustaining Tobago's marine ecosystems



Sub-Commission for the Caribbean  
and Adjacent Regions

Subcomisión para el Caribe y  
Regiones Adyacentes

## Project Goal

To conserve the marine biodiversity of Trinidad and Tobago's coral reefs, seagrasses and mangrove forests through restoration, conservation and stewardship

#1

- BUILDING  
**SUSTAINABLE**  
OCEAN  
RESILIENCE

#2

- **RESTORATION**  
OF TOBAGO'S  
MARINE  
BIODIVERSITY

#3

- OCEAN  
STEWARDSHIP



INSTITUTE OF  
MARINE AFFAIRS

## OBJECTIVE:

TO RESTORE CORAL POPULATIONS USING LARVAL-BASED PROPAGATION STRATEGIES WITHIN TOBAGO MPAS FOR THE PURPOSE OF EXPEDITING CORAL RECOVERY AND THE PRESERVATION OF REEF

### Year 1:

- Building in house capacity
- Finalising partnerships (SCORE)

### Year 2:

- Restoration of NE Tobago site (one spawning event)
- 1 to 2 species

### Year 3:

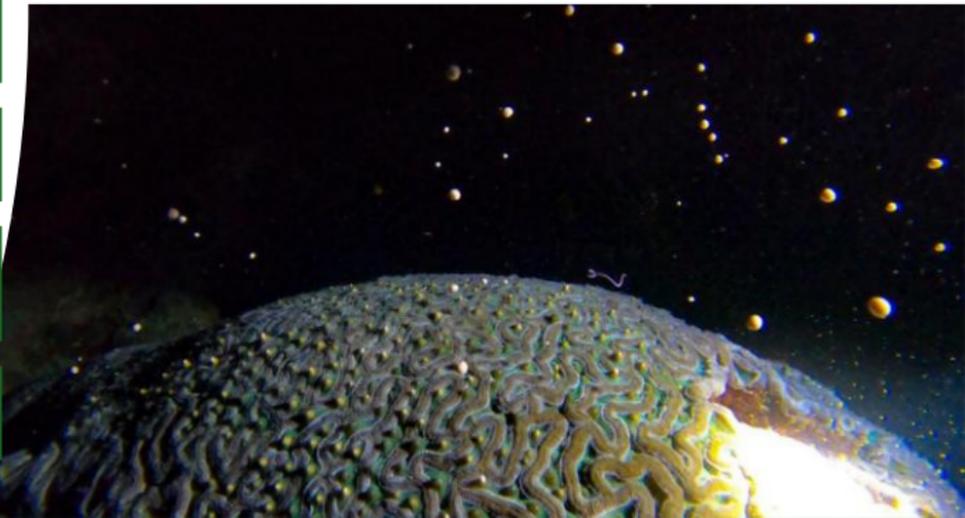
- Restoration of two SW Tobago sites
- 2 to 3 coral species

### Year 4:

- Restoration of 1 NE and 2 SW site
- 2 to 3 coral species
- Critically endangered Acropora species

### Year 5:

- Monitoring and maintenance
- Back up restoration year



# Sargassum Forecasting

- Sentinel 2 and 3 Imagery
- Maximum Likelihood Analysis
- Trajectory Modelling
- Development of time-frame for forecasting
- Ground-Truthing
- Sensitization Webinar
- Citizen Science – Signage on Beaches

Matura Beach, April 2025



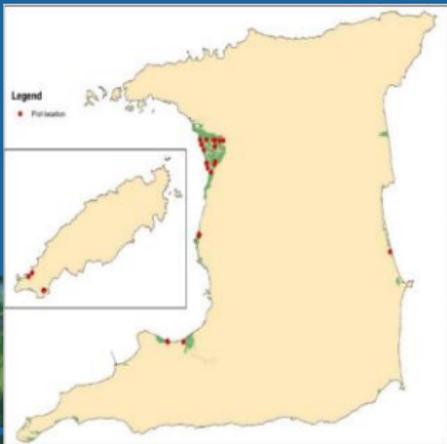
Sub-Commission for the Caribbean and Adjacent Regions

Subcomisión para el Caribe y Regiones Adyacentes



Speyside, April 2025

# Quantifying Mangrove Blue Carbon



Structural measurements



Tree height

Terrestrial Laser Scanner



Sediment coring



Carbon analyser



3 D structure

## Total aboveground carbon in mangrove forests in Trinidad and Tobago

	Carbon (Mg)	Mg/ha
Trinidad	851,869.25	122.66
Tobago	23,508.26	120.20

On average, approximately 19 times more carbon is stored in the soil than the above ground biomass for Trinidad and Tobago's mangrove forests.

# Piloting a Blue Carbon Credit System in Trinidad and Tobago



Sub-Commission for the Caribbean  
and Adjacent Regions

Subcomisión para el Caribe y  
Regiones Adyacentes

## Objective:

To design a high-quality blue carbon credit scheme which aims to improve the digital mapping, Monitoring, Reporting and Verification of ecosystem services, promotes management and ownership of natural capital, and creates a practical opportunity for livelihood enhancements and revenue generation.

## Main Activities

Component 1: Ecological and socio-economic assessments

Component 2: Mangrove Rehabilitation and Management Plan

Component 3: Development of Blue Carbon Credit Scheme

Component 4: Stakeholder Engagement



# Other initiatives to address a warming ocean

- Implementing the Integrated Coastal Zone Management Policy
- PROCARIBE+ - Developing a Marine Spatial Plan for the Gulf of Paria
- Mangrove Restoration Projects
- South Oropouche River Basin Project -aims to increase the resilience of the South Oropouche River Basin's population and ecosystems to flooding, sea level rise and expected increasing water deficit events



# 18th

## SESSION IOCARIBE

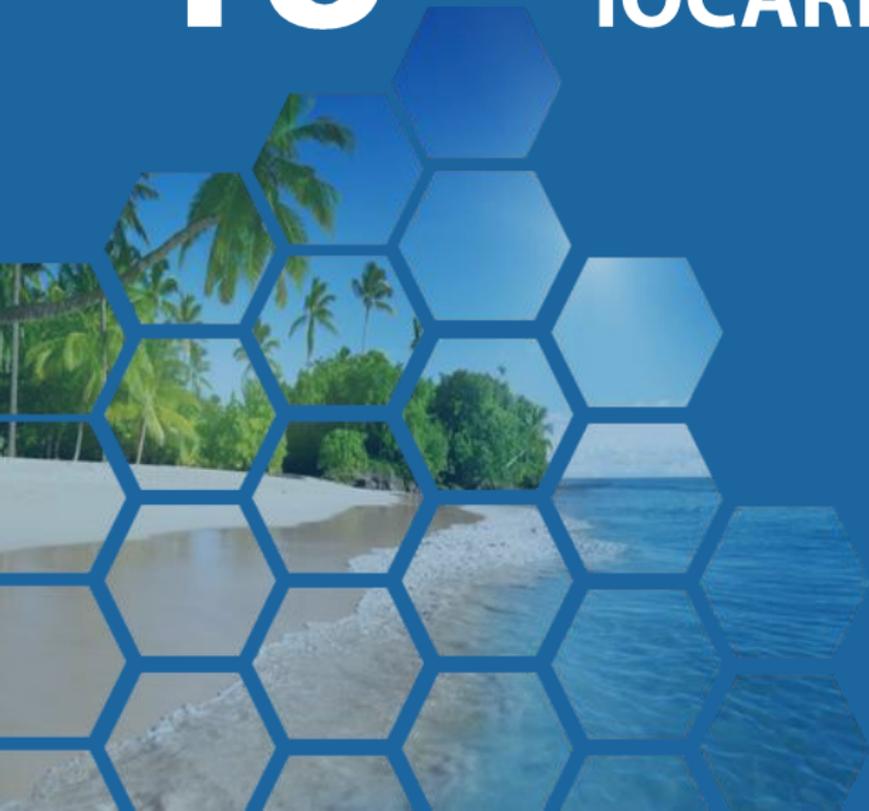


**unesco**

Intergovernmental  
Oceanographic  
Commission

Sub-Commission for the Caribbean  
and Adjacent Regions

Subcomisión para el Caribe y  
Regiones Adyacentes



**THANK YOU  
MUCHAS GRACIAS  
MERCI BEAUCOUP**