



CONSEJO DE
CAMBIO CLIMÁTICO

PUERTO RICO

GRUPO DE TRABAJO: ECOLOGÍA Y BIODIVERSIDAD

Juan L. Torres - Pérez

Sofía Burgos

Susan Silander

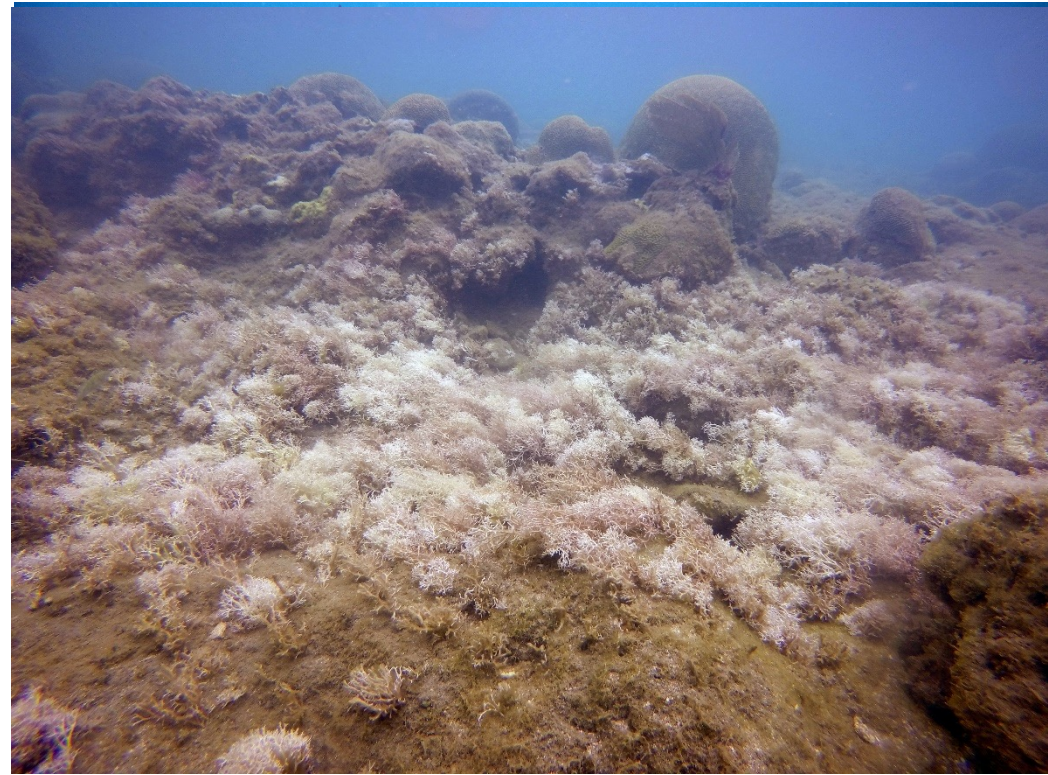


Coral Reefs and Other Coral Habitats

Juan L. Torres-Pérez, PhD
NASA Ames Research Center

PR-CCC.ORG

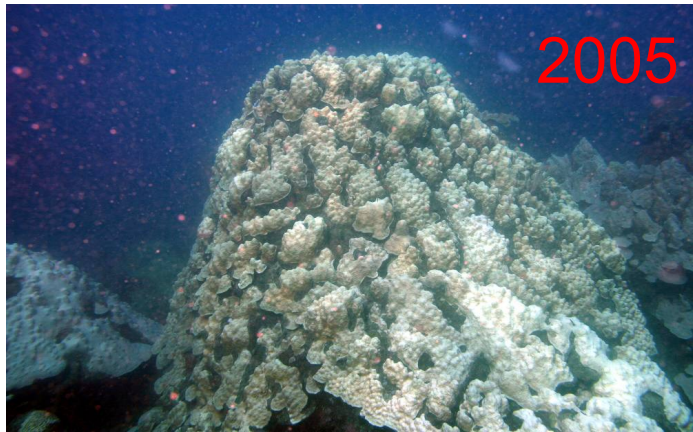
- Coral reefs are the most biodiverse marine ecosystem in the World
- Reefs have been recognized by FEMA as highly valuable natural structures which need restoration investment to increase coastal protection
- Annual value of flood risk reduction provided by coral reefs in the US is estimated in \$1.8B in 2010 US \$ (Storlazzi et al 2019)



Climate Change Factors that negatively affect coral reefs and other coral habitats

- **Ocean acidification** – decreases calcification leading to slower growth rates, more fragile or malformed skeletons and shells reducing competitive ability of reef-building species
 - There is **NO** data for Puerto Rican species
- **Ocean circulation** – changes in patterns of anticyclonic eddies are believed to affect coral bleaching events by bringing unusually warm waters to coastal zones (i.e., 2005 bleaching event)
- **Precipitation** – changes in precipitation patterns can bring heavier and more frequent rainfall events affecting the influx of terrestrial sediments to coastal coral reefs
- **Sea Level Rise** – ~1cm/yr in La Parguera and San Juan (Mercado 2016); remains to be seen whether corals can keep up with this increase

Sea surface temperature – Thermal anomalies are now more frequent, intense, and widespread; 2000-2020 – hottest decades in the recorded history of mankind



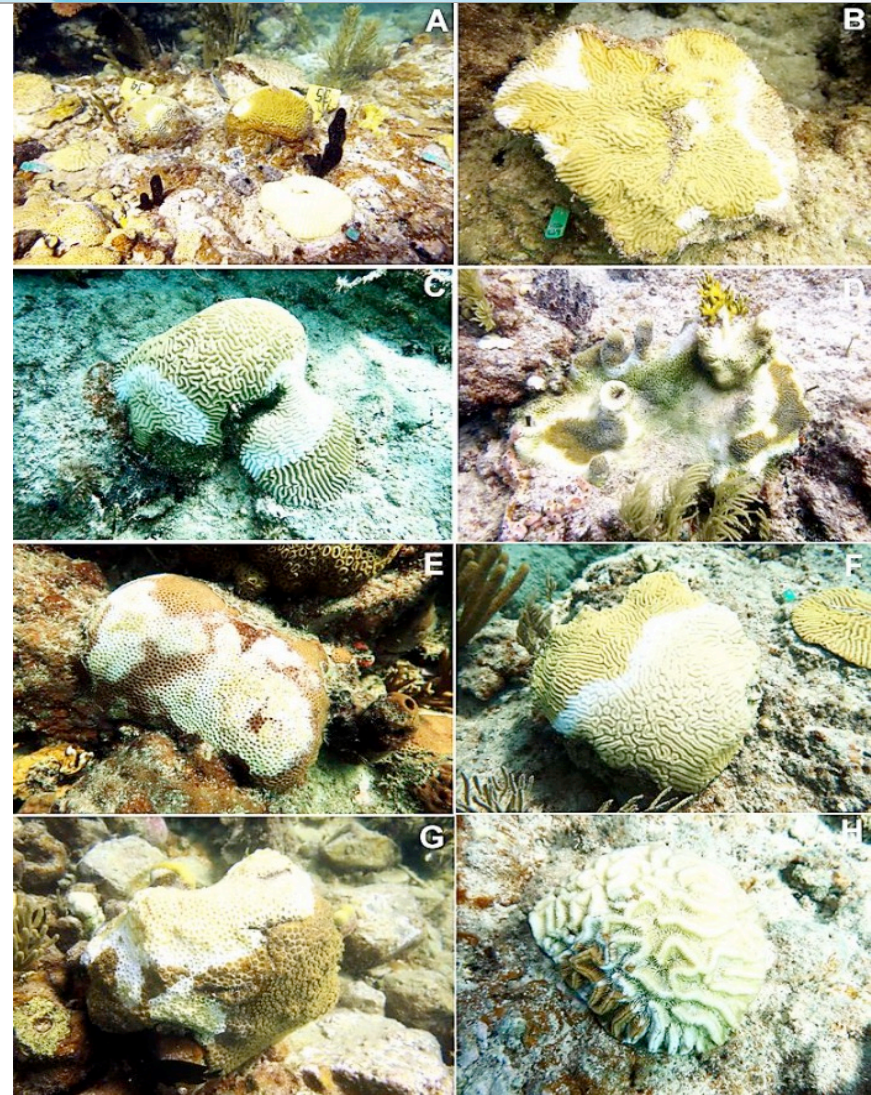
2005 Coral Bleaching Event



Photos (Hector
Ruiz and Juan
Torres-Pérez)

SCTLD: a new threat

- 2014 - First reported in Florida
- 2018 – First reported in Quintana Roo, Mexico
- 2019 – First reports from USVI and PR (Culebra)
- Now practically around the whole PR archipelago
- White-plague type disease
- Spread rate of ~3-4cm/d



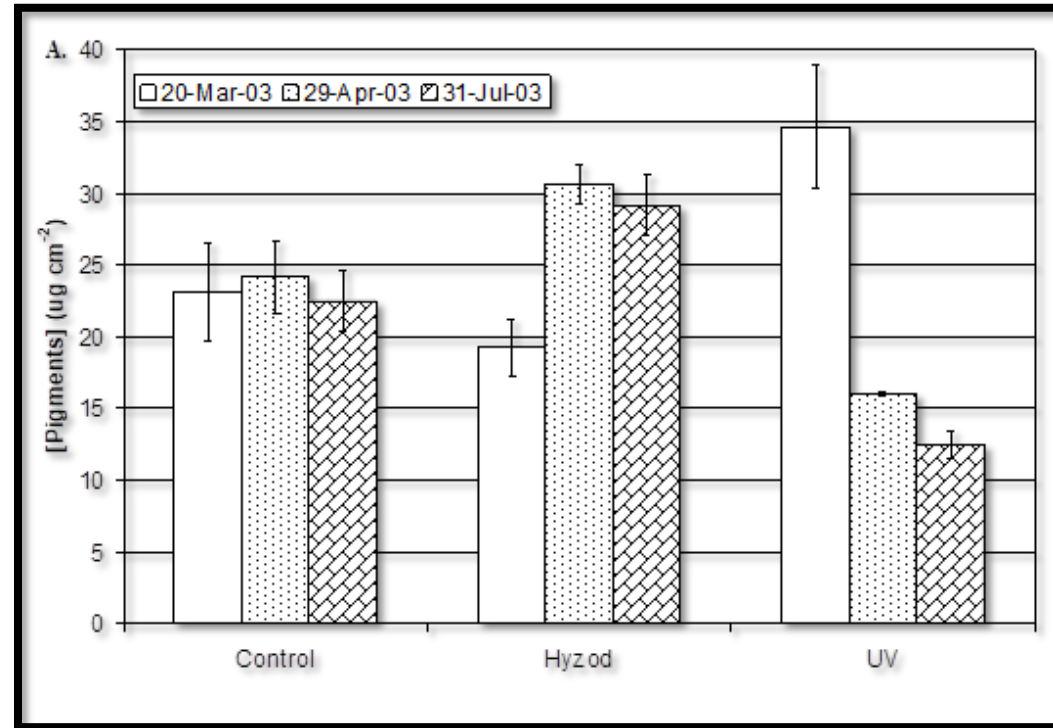
Weil et al 2019

Key points

- Any effects of climate change on the watersheds in PR will also have downstream effects on the coastal and marine ecosystems including reefs
- Effects of human activities (agriculture, development, and others) are likely exacerbated by climate-related factors (sea level rise, acidification) further affecting the functioning and services of coastal and marine ecosystems including reefs
- Hurricanes Irma and María changed the landscape on land and underwater. The predicted increase in these systems with climate change will be a critical driver affecting the form and function of coastal and marine ecosystems including reefs

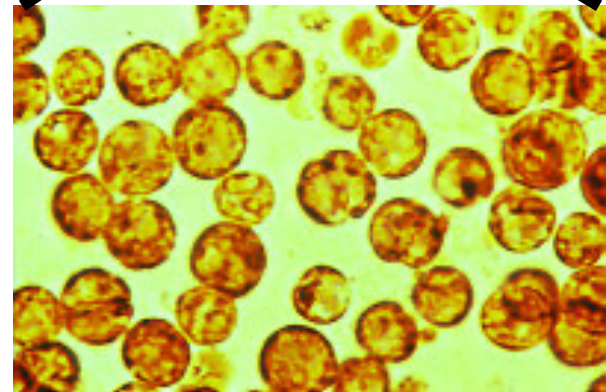
Key recommendations

- Conduct more research on anticyclonic eddies and potential effects on coral bleaching
- Development and implement funded research to understand differential and synergistic effects of UV radiation and temperature on coral-zooxanthellae symbiosis and bleaching



Torres-Pérez et al 2014

- Develop and implement studies on synergistic effect of suspended/dissolved matter (local) and climate (temperature, UV, acidification) factors on coral growth and resiliency
- Conduct research on specific zooxanthellae clades present in PR that might be resistant to climate factors



- Conduct research on species and ecosystem vulnerability, resilience, and adaptive capacity
- Conduct research on local species response to ocean acidification
 - Most is based on studies conducted elsewhere
- Need for more local research on species and ecosystem response to climate factors in PR





CLIMATE
CHANGE
COUNCIL
PUERTO RICO

¡MUCHAS GRACIAS!

PR-CCC.ORG