



Preparing and Responding to Natural Disasters

Examples, challenges, and opportunities

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Ex. 1 – Regional Resilience Partnership



GeoRED - Geospatial Resilient Economic Development

Welcome to GeoRED, a geospatial data platform designed to assist the communities of the Coastal Bend, Texas in practicing smart growth practices by providing regional hazard, modeling, and economic development data. Begin by using the interactive map tools to explore data layers available in each category below.

[Learn More](#)

- Learn about the Hazard Impact and Planning Tool**
GeoRED can be used by decision-makers and the public to build resilience to weather events, flooding and other disruptions.
- Learn about the Social Vulnerability Tool**
Community resilience and social vulnerability are intensely local. GeoRED builds specialized local data into resilience assessments.
- Learn about the Economic Development Tool**
Coastal Bend partners depend on a strong economy - learn how GeoRED can help strengthen economic resilience.
- Learn about the Environmental Resilience Tool**
GeoRED can be used to identify areas of priority concern to build environmental resilience, such as those listed in the Texas Coastal Resiliency Master Plan.

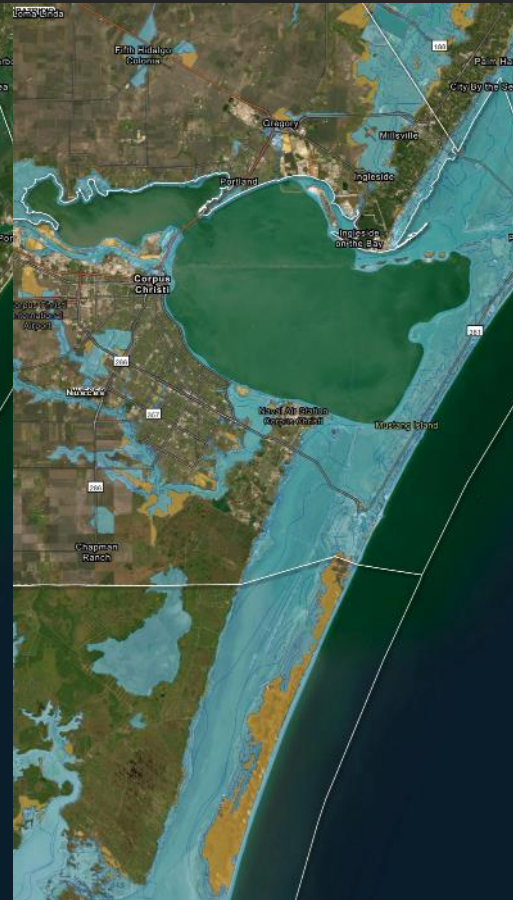


Selected GeoRED data layers

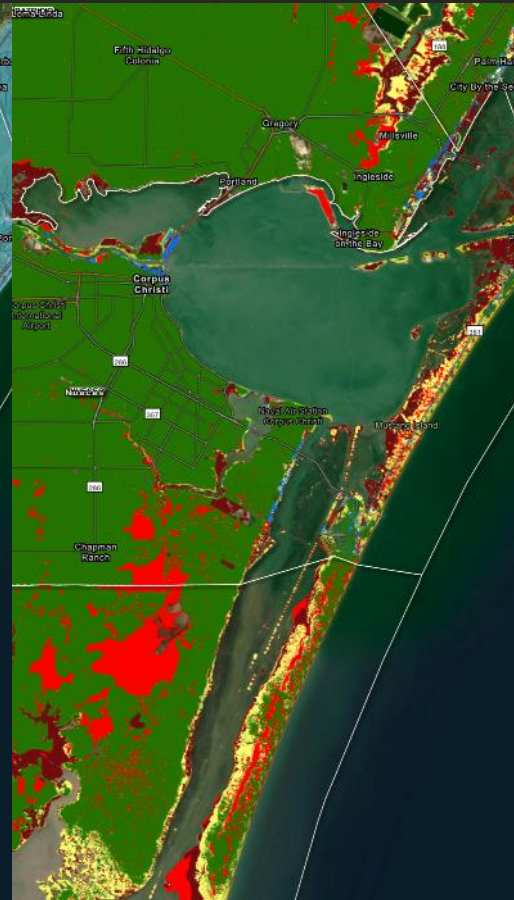
Visual



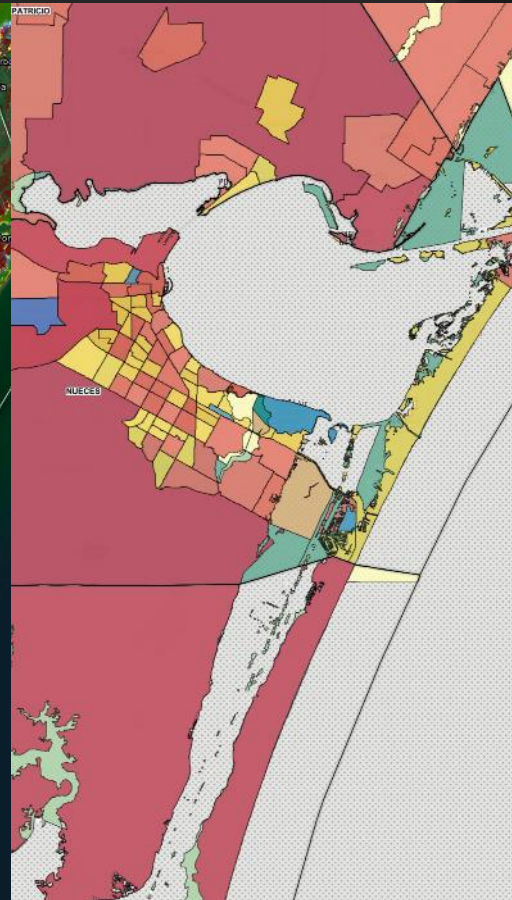
FEMA Flooding



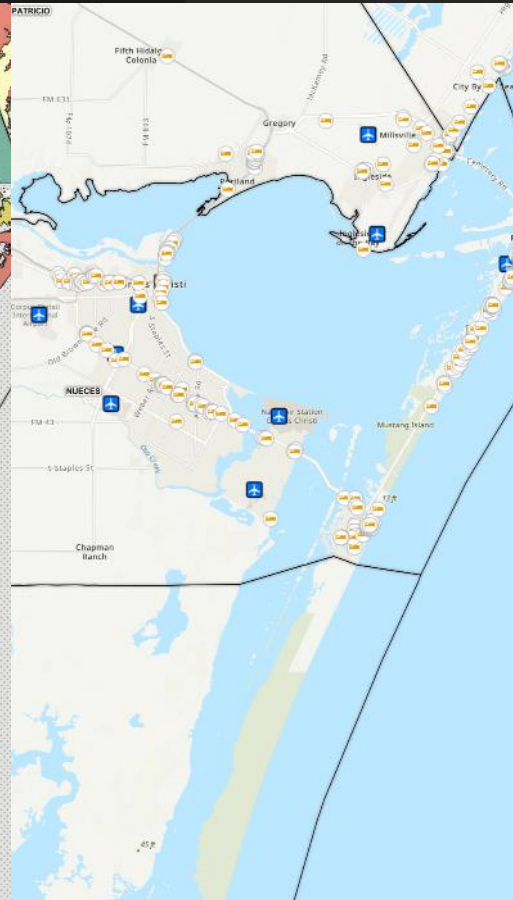
Geohazards



Social Vulnerability



Transport



Ex. 2 – HRI's Student Workshop for International Coastal and Marine Management (SWIMM)

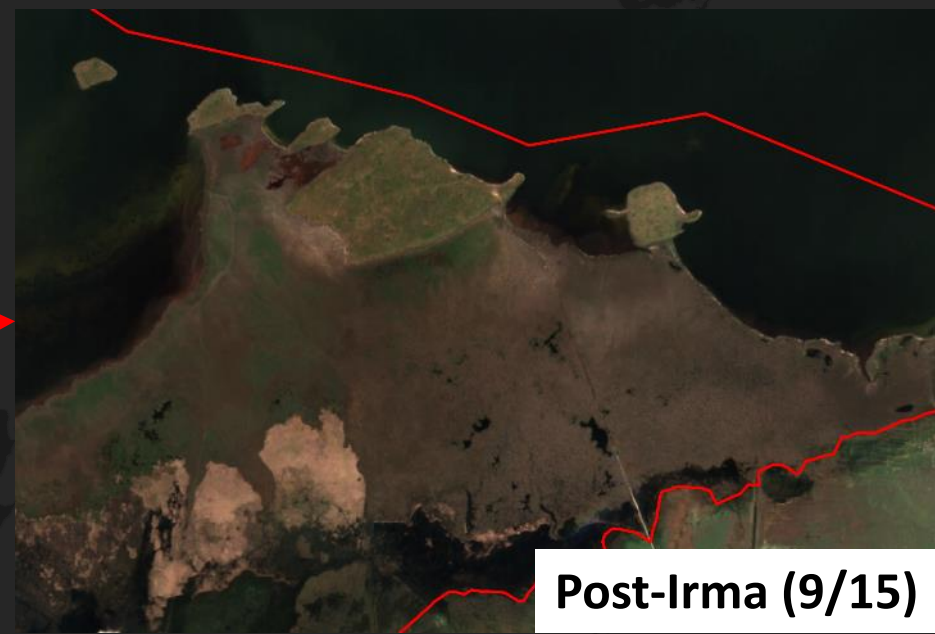
Brings together graduate students from Cuba, Mexico, and the United States to:

- interact professionally
- build lifelong friendships and basis for collaboration
- develop solutions/responses to common environmental challenges



Source: Luis Daniel Martínez Hernández, Kuxtali Films

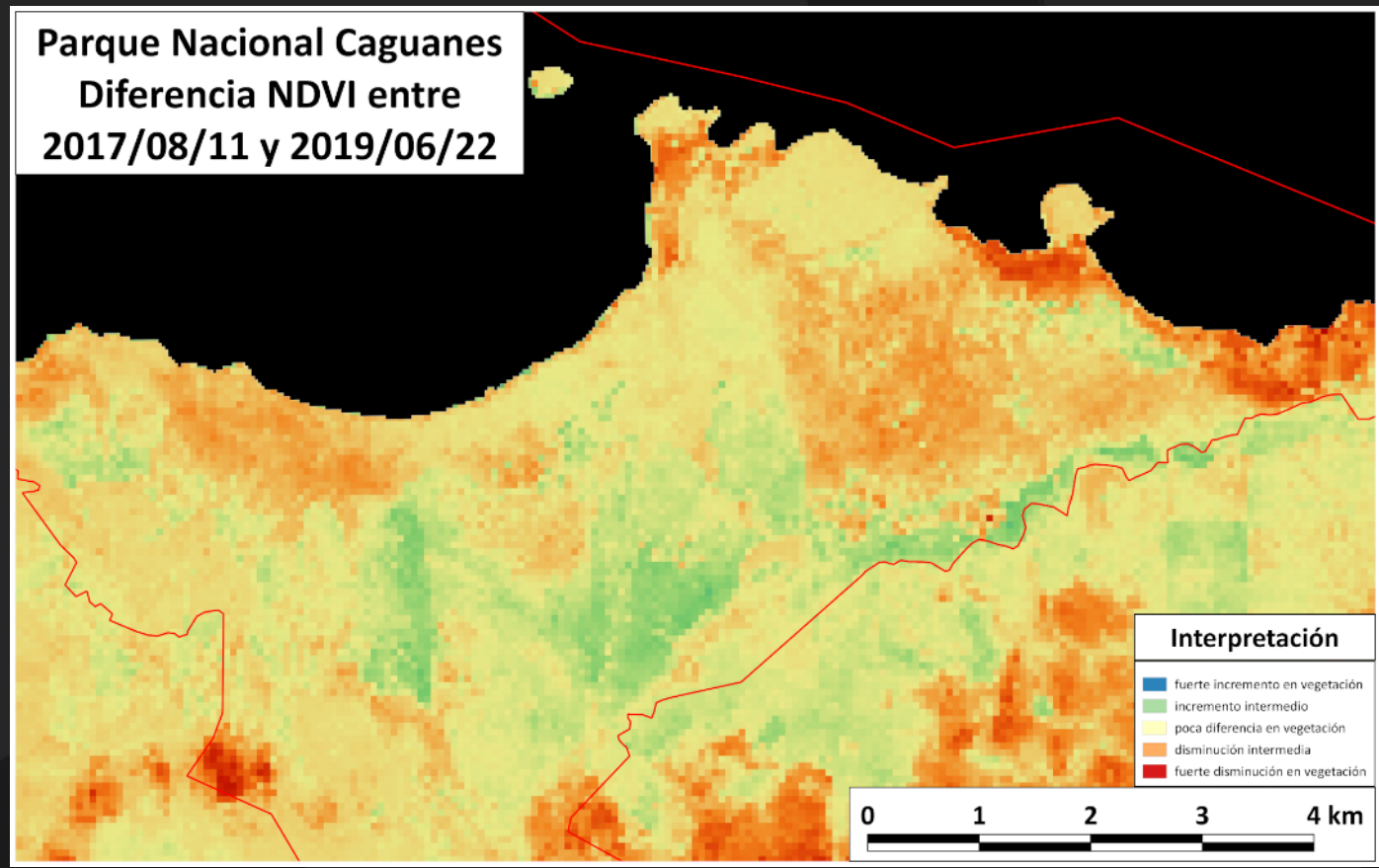
4th Workshop – Caguanes NP, Cuba 2018



Satellite imagery hybrid solution



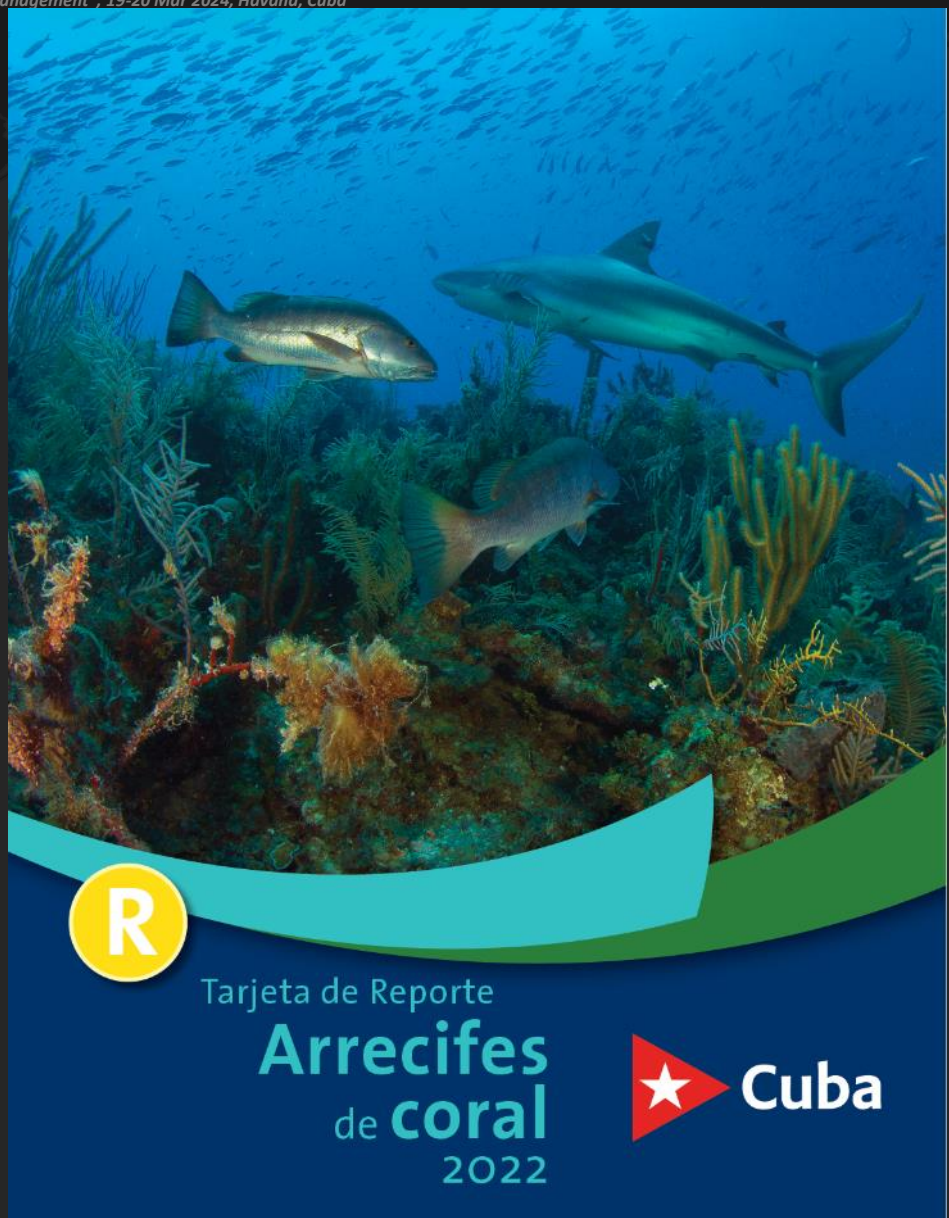
- ESA Sentinel-2 raw imagery data reaches 700-900 MB per scene and requires computing resources
- Process locally at TAMU-CC and send PNC staff processed data images that are only a few MB in size



Ex. 3 – SWIMM socio-ecosystem report cards 5th and 6th Workshops

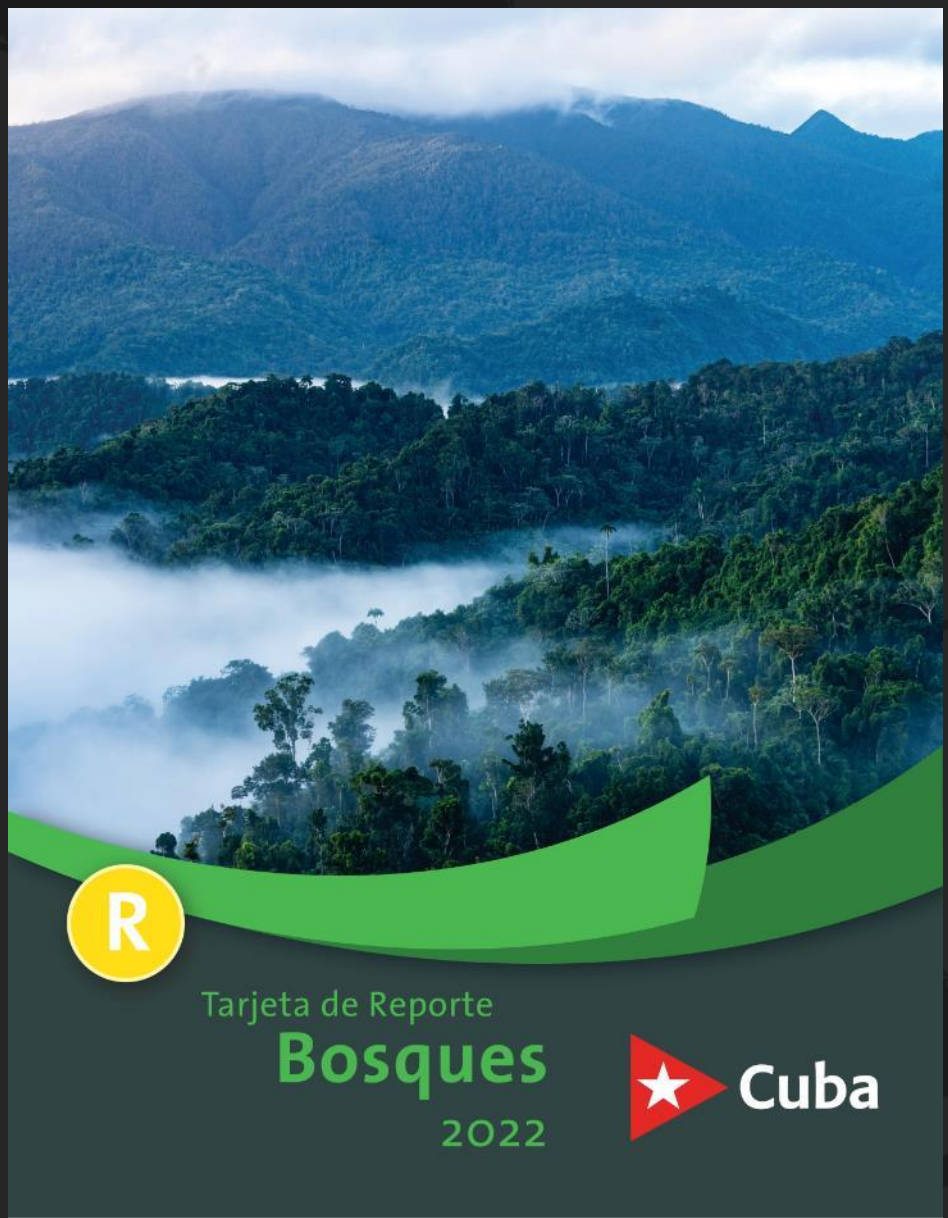


6th SWIMM leads to Report Cards in Cuba



R

Tarjeta de Reporte
**Arrecifes
de coral**
2022



R

Tarjeta de Reporte
Bosques
2022



Most important impacts of SWIMM

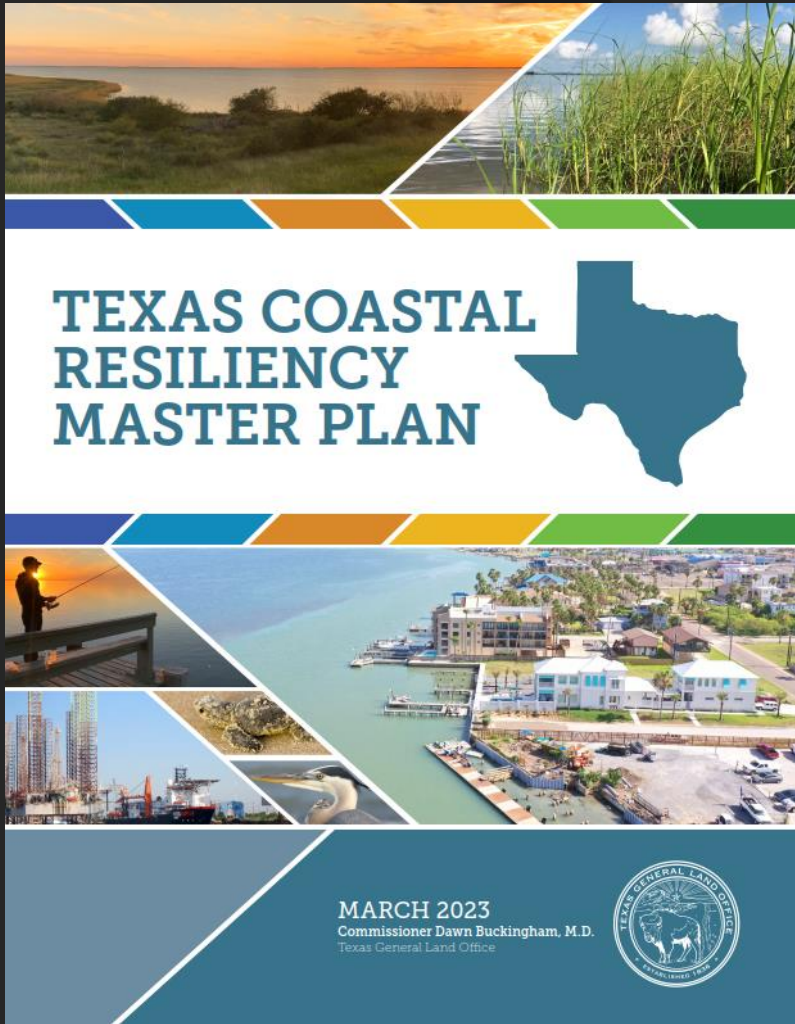
- Planting seeds for the future via lifelong friendships and collaborations
- Teaching the empathy, patience, and mutual respect needed for international collaboration
- Cultural exchange and science diplomacy that keeps us going



Source: Edgar De La Garza, Harte Research Institute for Gulf of Mexico Studies

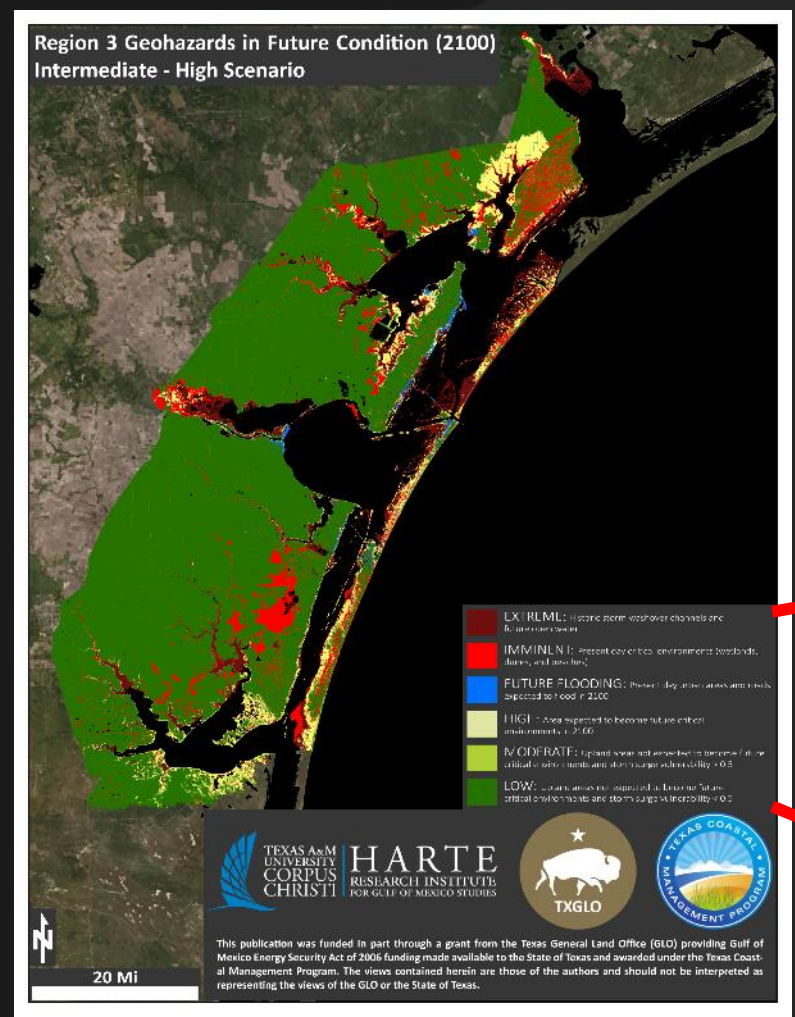
Ex. 4/5 – Texas Coastal Resiliency Master Plan

- Statewide plan to prepare Texas coast for a resilient and sustainable future
- Similar to Cuba's "Tarea Vida" plan
- Geohazards maps and living shorelines examples



Ex. 4 – Geohazards maps

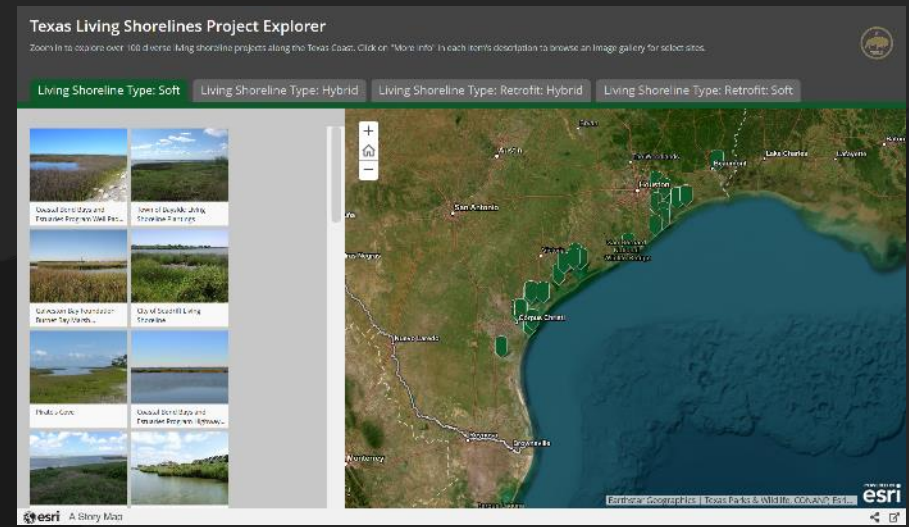
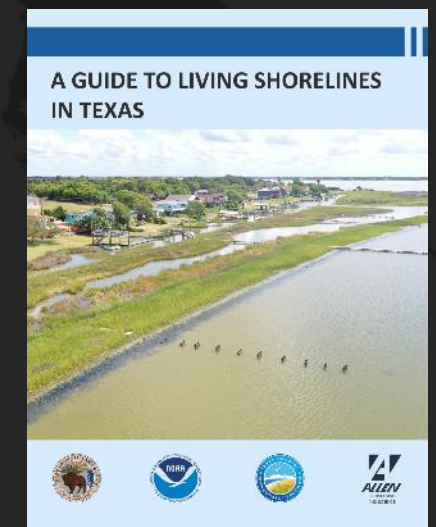
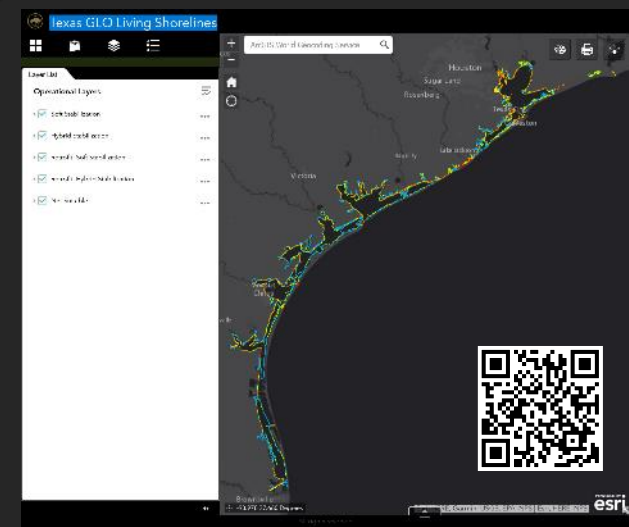
- maps show current and future (2100) coastal hazards and vulnerabilities
- landscape change model (SLAMM) + coupled hydrodynamic storm surge and wave model (ADCIRC and SWAN)



 **EXTREME:** Historic storm washover channels and future open water
 **IMMINENT:** Present day critical environments (wetlands, dunes, and beaches)
 **FUTURE FLOODING:** Present day urban areas and roads expected to flood in 2100
 **HIGH:** Area expected to become future critical environments in 2100
 **MODERATE:** Upland areas not expected to become future critical environments and storm surge vulnerability > 0.5
 **LOW:** Upland areas not expected to become future critical environments and storm surge vulnerability < 0.5

Ex. 5 – Living shorelines

- shoreline protection and stabilization techniques that use nature and work with it
- similar to focus of Cuba's "Tarea Vida" on protecting/using natural ecosystems to increase coastal



Challenges ☹️ & Opportunities 😊

- Internet connectivity and computing resources are limited in Cuba
- Training and collaboration opportunities impeded by political situation
- Data not easily available for geospatial efforts
- Other resources are constrained, too

- Work on increasing capacity, but in meantime, hybrid models like post-Irma imagery for PNC may help
- Work through Mexico where possible for training and collaboration efforts
- Bidirectional learning exchanges for similar efforts like Cuba's "Tarea Vida" and Texas' Coastal Resiliency Master Plan
- Continuous science diplomacy efforts like SWIMM program

