

Coastal Resilience 2.0

CoastalResilience.org

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Coastal Resilience

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[LAUNCH MAPPING PORTAL](#)

A global network dedicated to
enhancing human and natural
coastal communities

[Explore Our Work](#)



Christine Shepard

The Nature Conservancy

cshepard@tnc.org

Approach and Network

Decision support tool platform

Apps

...that address disaster risk reduction using
nature-based solutions to coastal hazards
& climate change



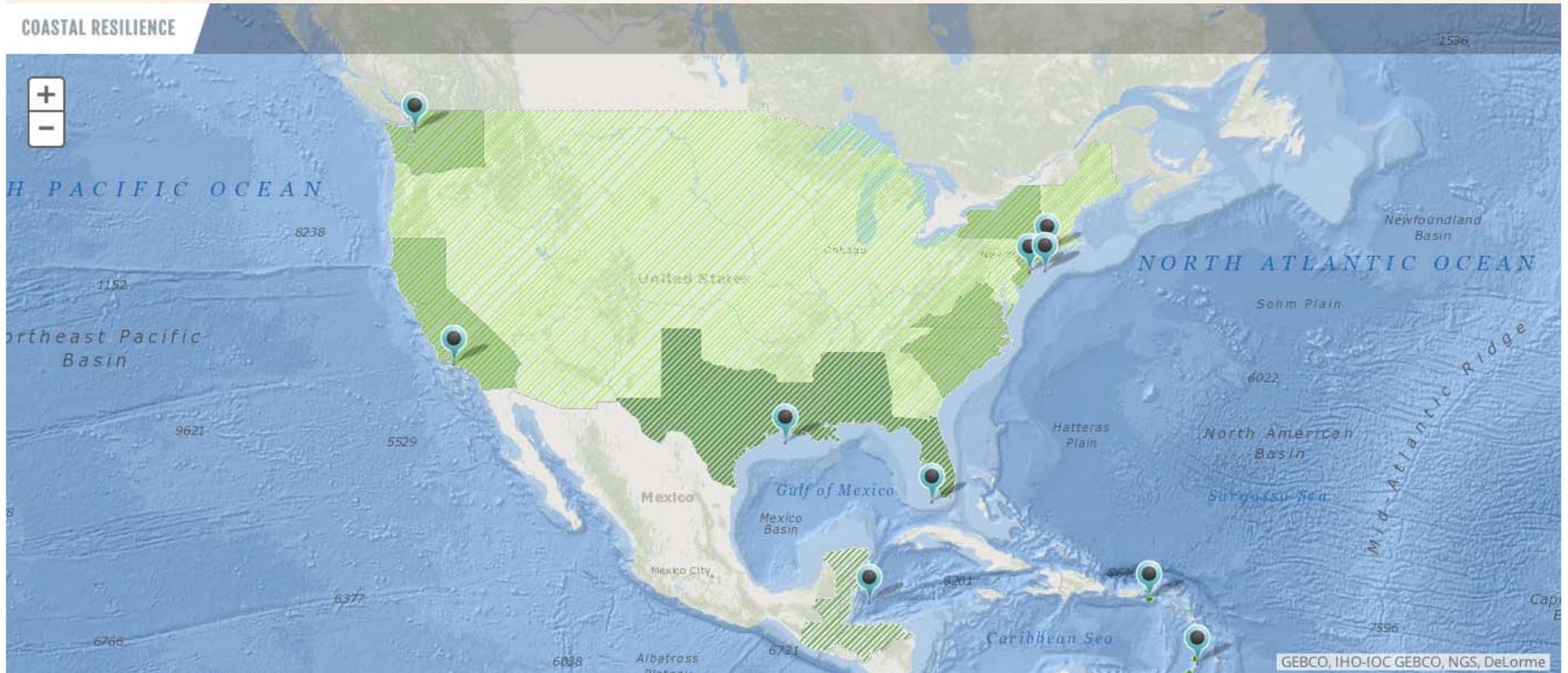
Coastal Resilience

Approach



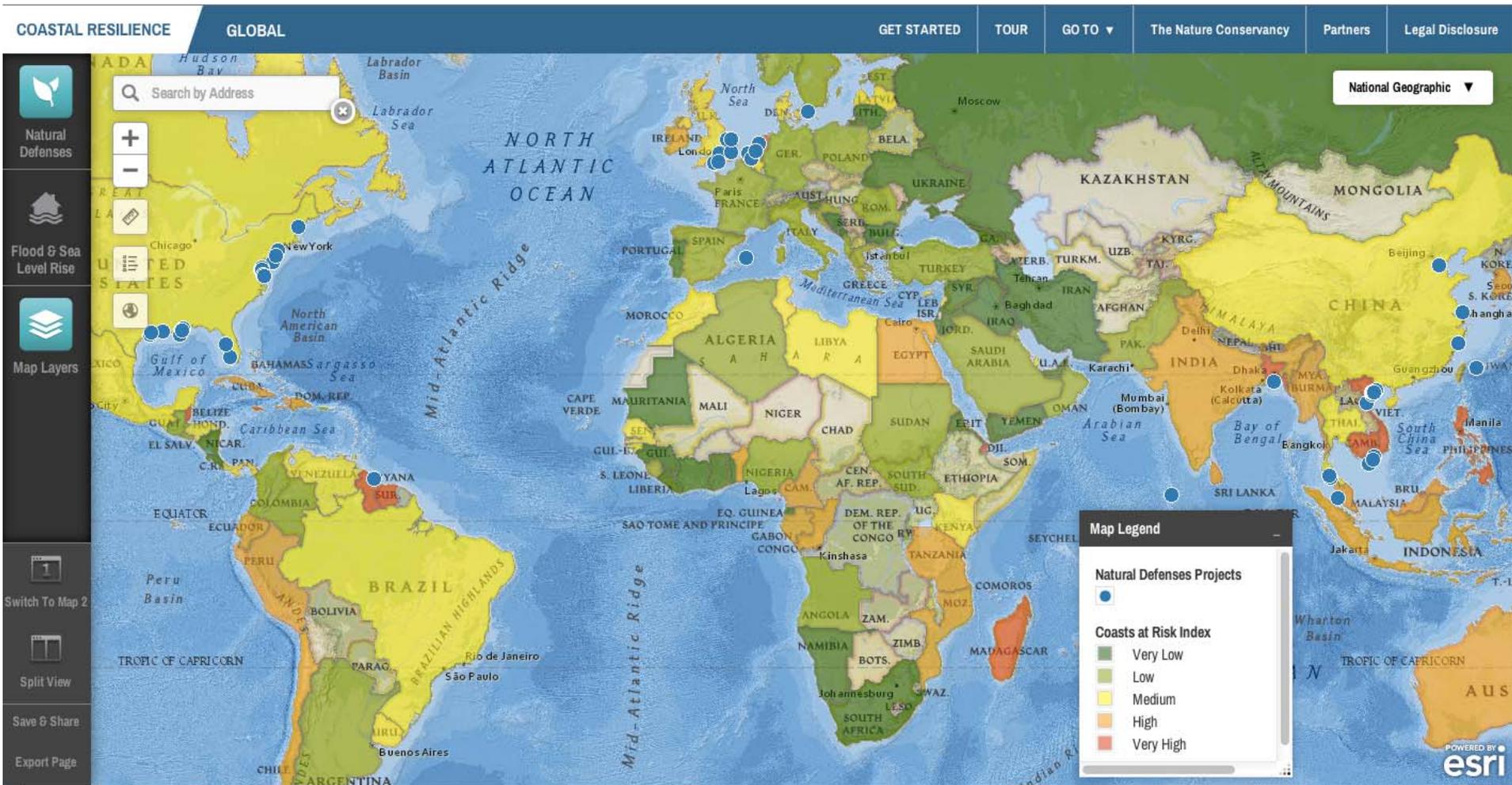
Coastal Resilience

Network



Coastal Resilience mapping portal

maps.coastalresilience.org



Mapping tool platform with apps



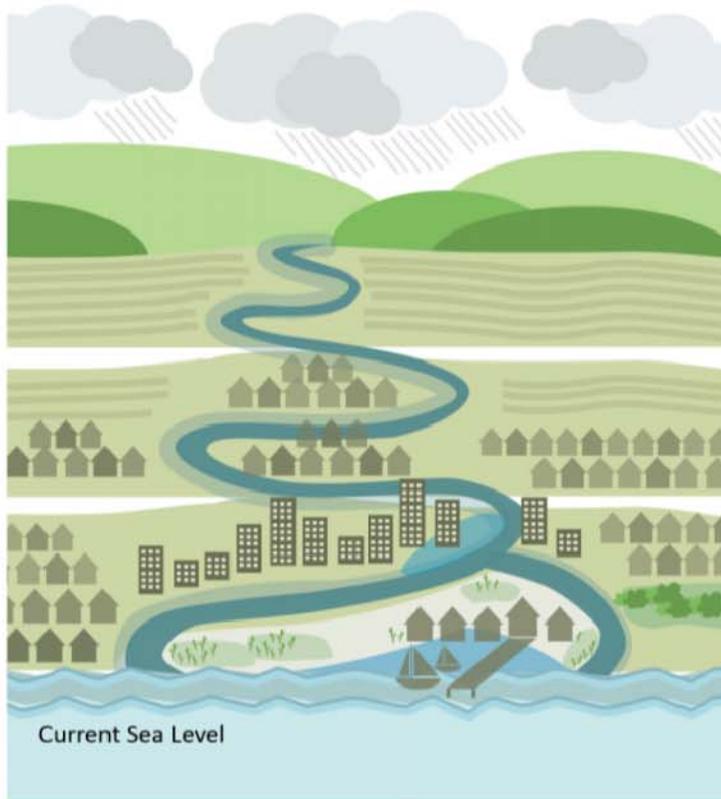
Coastal Resilience

Tool & Apps

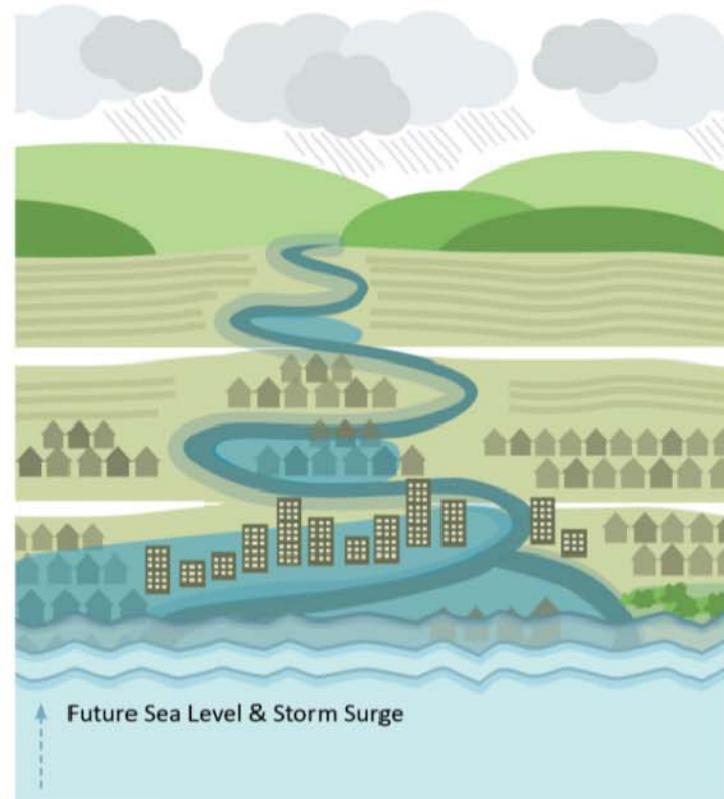
The image displays the Coastal Resilience web application interface. At the top, a navigation bar includes the following links: COASTAL RESILIENCE, GULF OF MEXICO, GET STARTED, TOUR, GO TO (with a dropdown arrow), The Nature Conservancy, Partners, and Legal Disclosure. On the left side, a vertical toolbar contains several tool icons and labels: Map Layers, Coastal Defense, Restoration Explorer, Risk Explorer, Community Planning, Future Habitat, Switch To Map 2, Split View, Save & Share, and Export Page. The main area is a map of the Gulf of Mexico region, showing the Gulf of Mexico, the Yucatan Peninsula, and parts of Louisiana, Texas, and Florida. Major cities like Austin, Houston, New Orleans, Baton Rouge, Tallahassee, Jacksonville, Orlando, Tampa, Miami, and Havana are labeled. The map is set to a 'Topographic' style. The Esri logo is visible in the bottom right corner, with the text 'POWERED BY esri'.



Current coastal and floodplain inundation scenario



Future coastal and floodplain inundation scenario



Coastal Resilience

Flood & Sea Level Rise app



COASTAL RESILIENCE | NEW YORK & CONNECTICUT | GET STARTED | TOUR | GO TO ▾ | The Nature Conservancy | Partners | Legal Disclosure

Flood & Sea Level Rise

1. Select the geography:

- Westchester, Nassau Co. North, NY
- NYC, Nassau Co. South, NY
- Suffolk Co. North, NY
- Suffolk Co. South, NY
- Connecticut

2. Select the time and amount of flooding:

Year: 2020 2050 2080

Sea Level Rise: Low Medium High

Storm Surge: None Category 2 Category 3

Layer Properties:

Map Legend

NYC, Nassau Co. South, NY Current None Category 2

- Highest mapping confidence
- Medium mapping confidence
- Lowest mapping confidence

Coastal Resilience

Risk Explorer app



Risk Explorer

Entire Gulf

Risk = Exposure x Vulnerability
Choose your variables to see your risk.

Exposure is scored using seven bi-geophysical variables

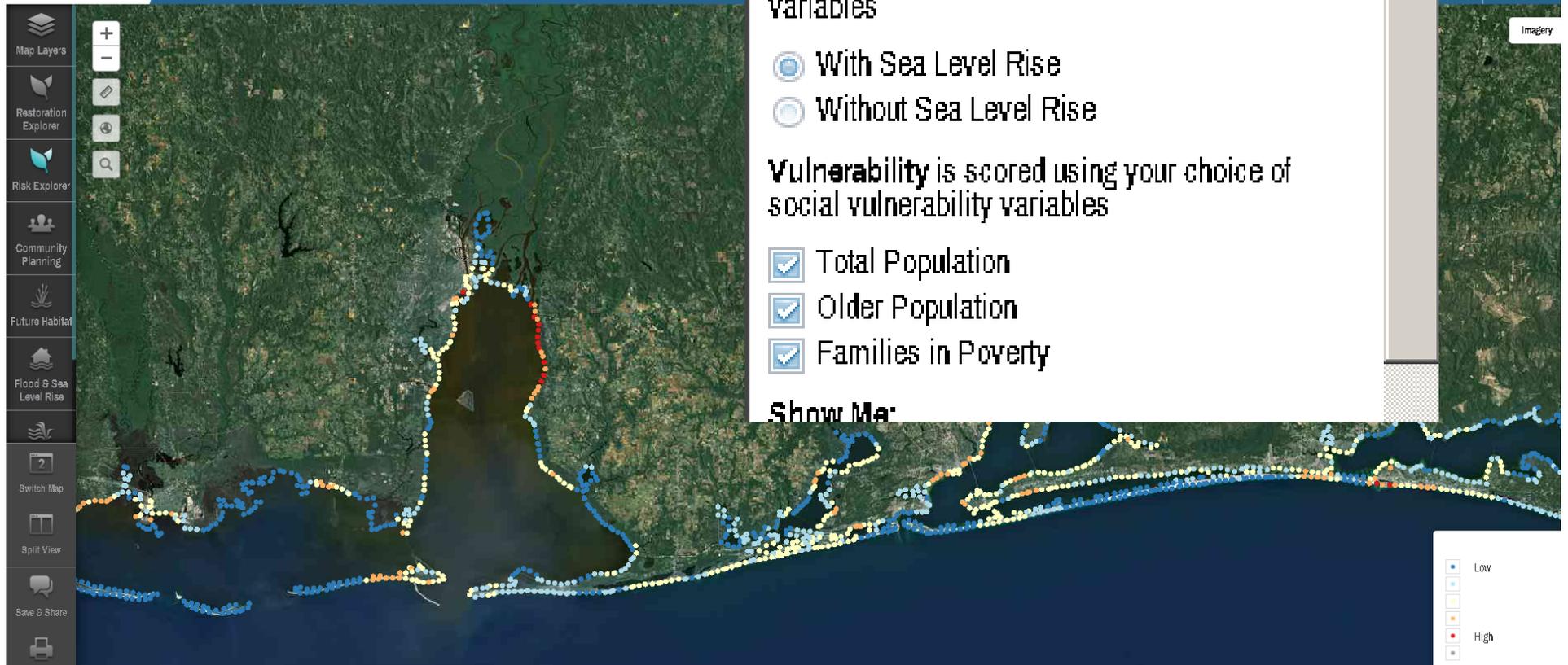
- With Sea Level Rise
- Without Sea Level Rise

Vulnerability is scored using your choice of social vulnerability variables

- Total Population
- Older Population
- Families in Poverty

Show Map

COASTAL RESILIENCE GULF OF MEXICO



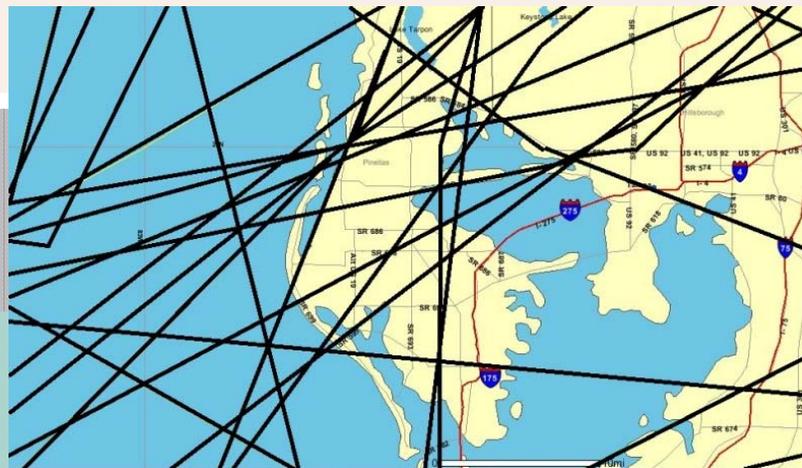
RISK= Exposure X Vulnerability



Hazard extent,
likelihood and/or
magnitude



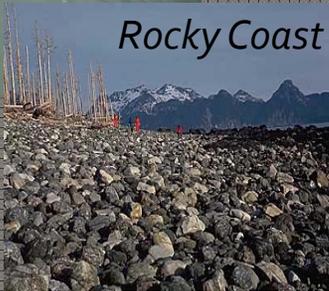
Social, ecological or
economic vulnerability
to hazards



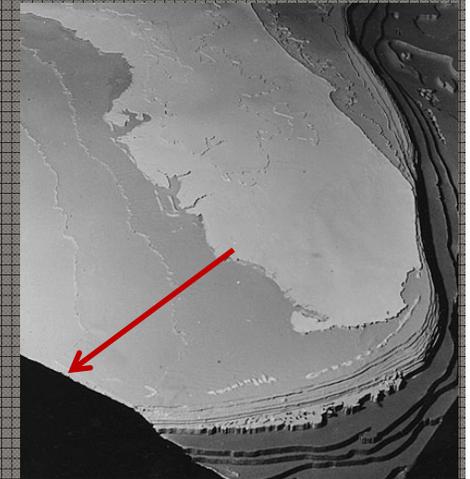
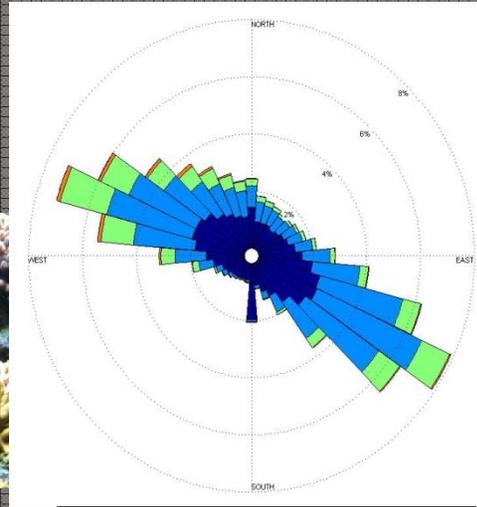
Exposure Score based on 7 variables



Sandy Beach



Rocky Coast

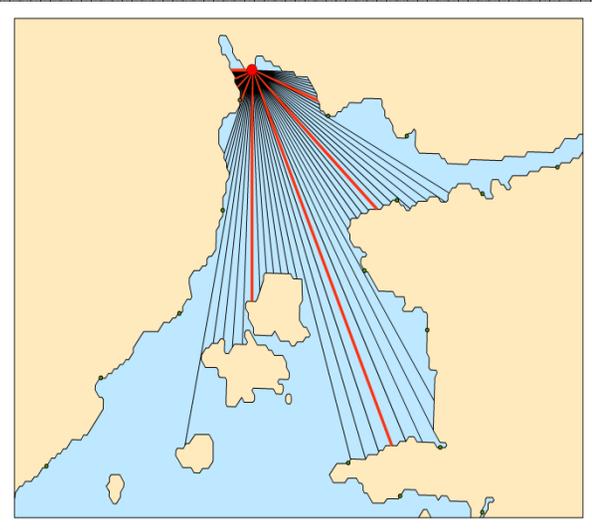


GEOMORPHOLOGY

COASTAL HABITATS

WIND EXPOSURE

SURGE POTENTIAL



WAVE EXPOSURE

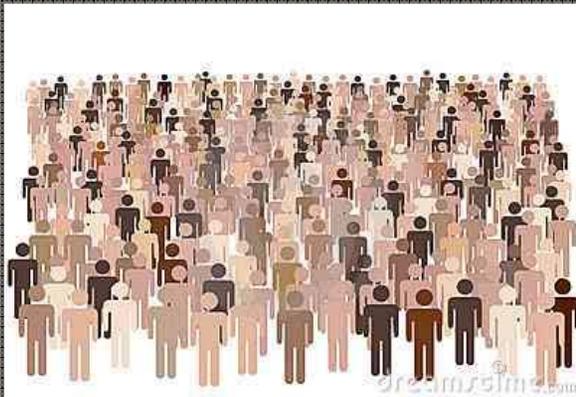


RELIEF



SEA LEVEL RISE

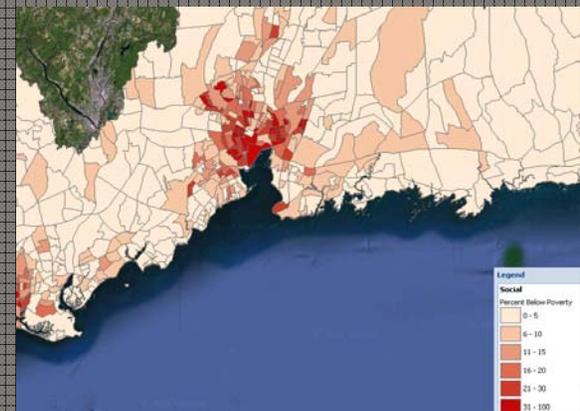
Vulnerability Score based on 3 variables



TOTAL POPULATION



**NUMBER OF
PEOPLE OVER
AGE 65**



**NUMBER OF FAMILIES
LIVING IN POVERTY**

Risk Explorer

COASTAL RESILIENCE

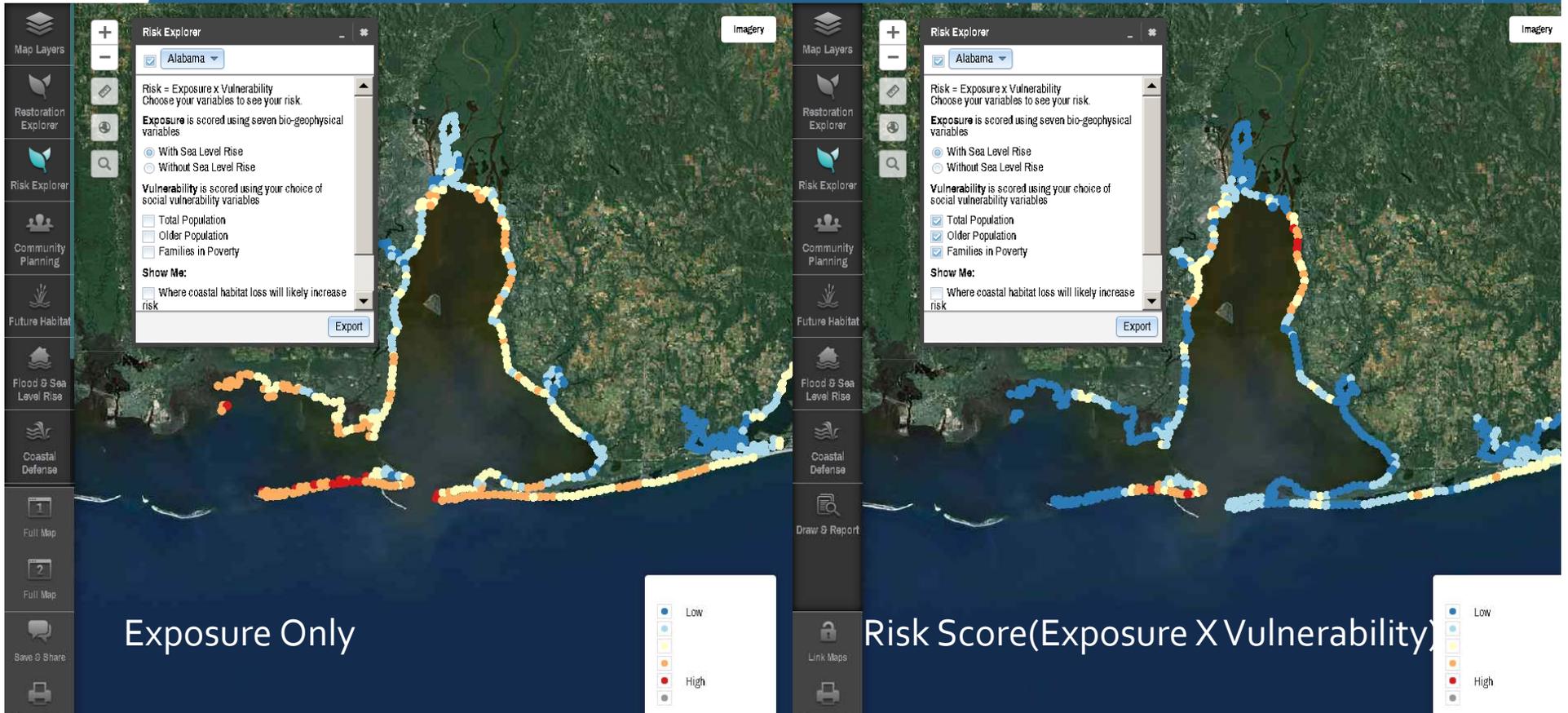
GULF OF MEXICO

GET STARTED

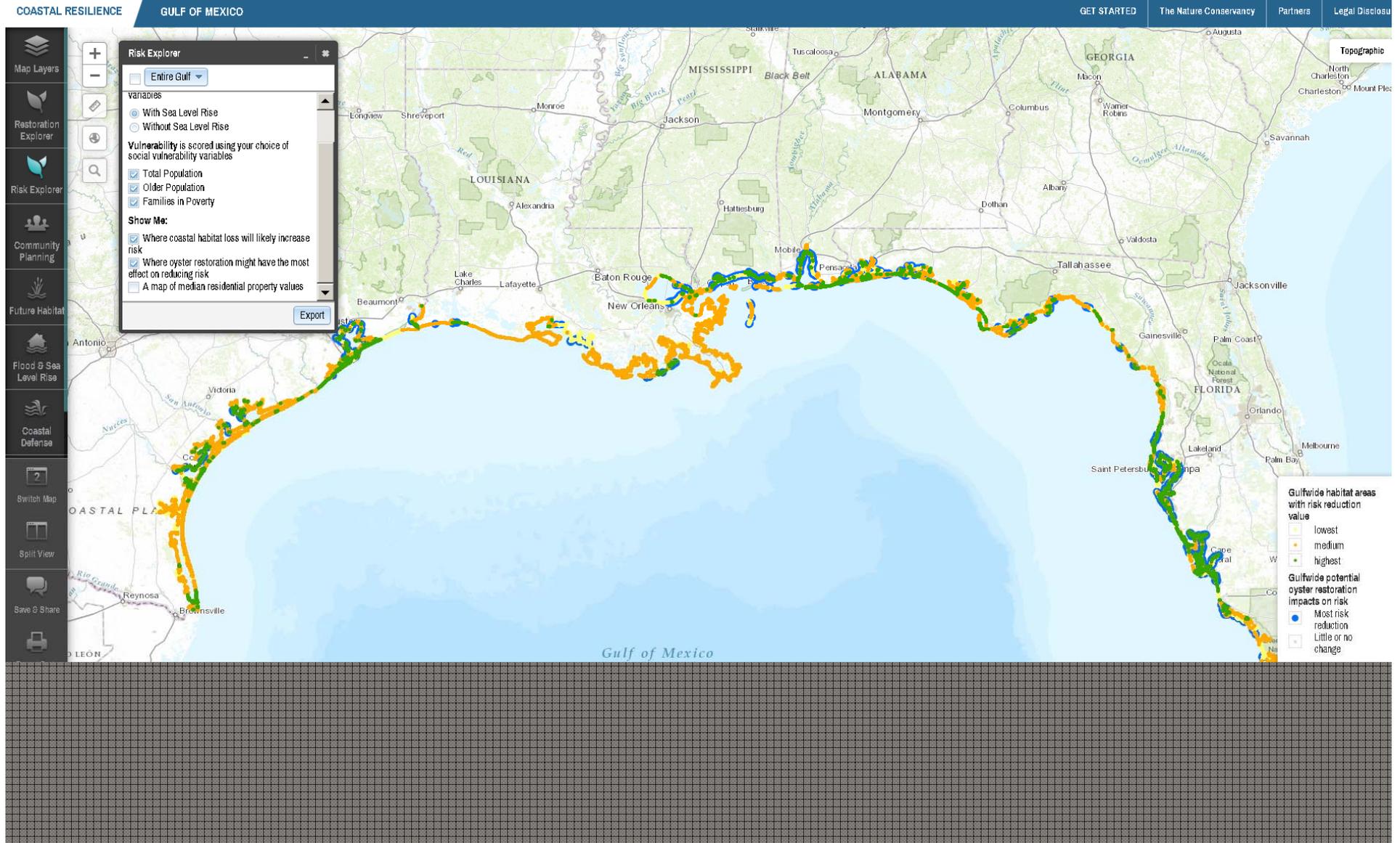
The Nature Conservancy

Partners

Legal Disclosu

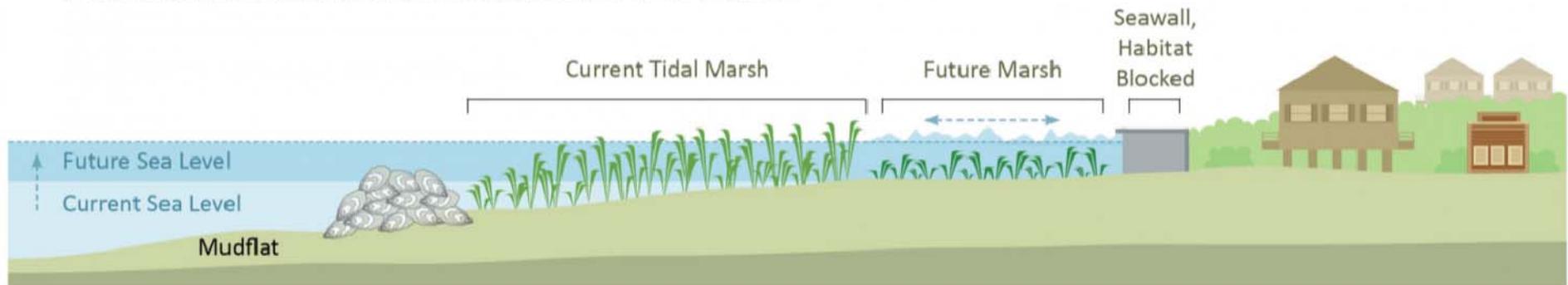


Green areas are habitat areas with high risk reduction value
Blue areas are potential oyster restoration areas with risk reduction value





Vulnerable Habitat: Tidal Marsh advancement blocked as sea level rises



Resilient Habitat: Tidal marsh advances landward as sea level rises



Coastal Resilience

Future Habitat app



COASTAL RESILIENCE | **GULF OF MEXICO** | GET STARTED | TOUR | GO TO ▾ | The Nature Conservancy | Partners | Legal Disclosure

Search by Address

Map Layers

- Coastal Defense
- Future Habitat**
- Restoration Explorer
- Switch To Map 2
- Split View
- Save & Share
- Export Page

Topographic ▾

Map Legend

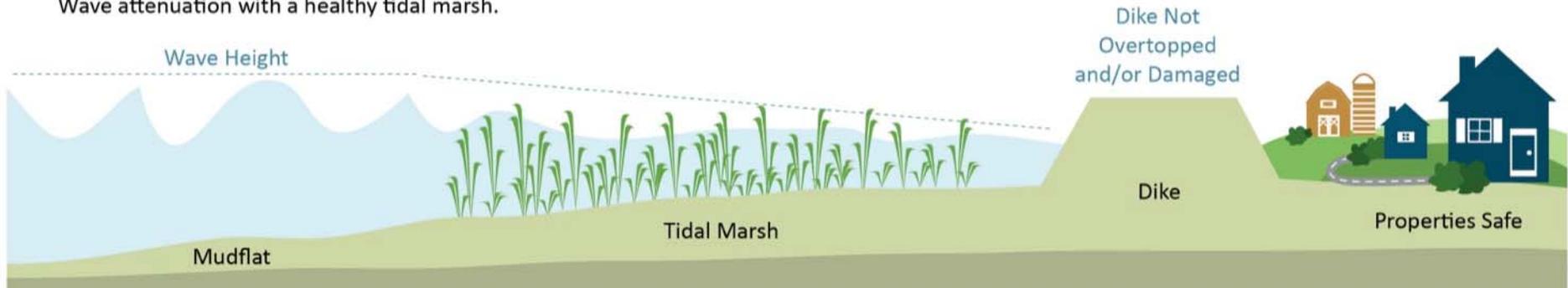
esri



Coastal Defense

Coastal Defense quantifies how natural habitats (oyster reefs, tidal marshes, seagrass ...) protect coastal areas by reducing wave-induced erosion and inundation. It uses standard engineering techniques to help you estimate how and where to restore or conserve critical habitat, and increase the resilience of your coastal community and infrastructure.

Wave attenuation with a healthy tidal marsh.



Wave attenuation with a degraded tidal marsh.



Coastal Resilience

Coastal Defense app



COASTAL RESILIENCE | **PUGET SOUND, WASHINGTON** | GET STARTED | The Nature Conservancy | Partners | Legal Disclosure | Tour

Map Layers | Coastal Defense | 1 Map 1 | 2 Map 2 | Split View | Save & Share | Export Page

Search by Address: [Search Icon] [Input Field] [Close Icon]

Topographic [Dropdown Arrow]

A topographic map of the Puget Sound region in Washington state. The map shows the coastline, major cities like Vancouver, Seattle, and Tacoma, and various mountain ranges including the Vancouver Island Ranges, Skagit Range, and Wenatchee Mountains. Elevation contours are visible, with labels such as 891 m, 1260 m, 2602 m, and 2160 m. A search bar is located in the top left, and a 'Topographic' dropdown menu is in the top right. A sidebar on the left contains map controls and navigation options. The Esri logo is in the bottom right corner.

Coastal Resilience

Coastal Defense app



The screenshot shows the Coastal Resilience web application interface. The browser address bar displays `dev.maps.coastalresilience.org/gulfmex/`. The navigation bar includes "COASTAL RESILIENCE", "GULF OF MEXICO", and links for "GO TO", "GET STARTED", "TOUR", "The Nature Conservancy", "Partners", and "Legal Disclosure".

The left sidebar contains a "Map Layers" menu with options: "Coastal Defense", "Restoration Explorer", "Risk Explorer", "Community Planning", "Future Habitat", "Flood & Sea Level Rise", "Switch To Map 2", and "Split View".

The main "Coastal Defense" panel includes:

- Units:** Radio buttons for "Feet" and "Meters" (selected).
- GIS Base Layers:** A checked box for "Land Points".
- Instructions:** Text explaining that input panels on the right are used to set model parameters and that the "Run Scenario" button is used to see how wave attenuation changes.
- Waves/Winds/Water:** Dropdowns for "Wind Type" (Most Common), "Wave Definition" (WindWave), and "Water Level" (MHHW).
- Reef Shape:** A dropdown for "Reef Type" (Trapezoid) and input fields for "Height" (1), "Base Width" (12), and "Crest Width" (8).
- Depth Profile:** A graph showing "Depth (Meters from MSL)" on the y-axis (ranging from -2 to 0) and "Distance from Shore (meters)" on the x-axis (ranging from 180 to 0). A yellow shaded area represents the reef profile, and a blue vertical line indicates the reef location at approximately 100 meters from shore. A slider above the graph allows changing the reef location.
- Buttons:** "Run Scenario", "Select New Profile", and "Choose another site".

The background is a satellite map of a coastal area with a reef location marked by a blue vertical line and yellow dots along the shore.

Coastal Resilience

Restoration Explorer app

COASTAL RESILIENCE GULF OF MEXICO GET STARTED TOUR GO TO ▾ The Nature Conservancy Partners Legal Disclosure

The screenshot displays the Restoration Explorer app interface. On the left is a vertical sidebar with icons for Map Layers, Coastal Defense, Future Habitat, Restoration Explorer (active), and Switch To Map 2. The main map area shows a topographic map of Alabama with a restoration score overlay. A control panel titled 'Restoration Explorer' is overlaid on the map, featuring a state selector set to 'Alabama', a 'Toggle Restoration Score on or off' checkbox, and several sliders for Ecological and Socioeconomic variables. A 'Map Legend' window is also visible, showing a color scale from yellow (Low) to dark blue (High). The map shows higher scores (yellow and green) in the northern and central coastal regions, and lower scores (dark blue) in the southern coastal regions.

Restoration Explorer

Alabama ▾

Toggle Restoration Score on or off

Ecological Variables (weight):

- Depth Score**
Low Medium High
- Salinity Score**
Low Medium High
- Historic Oyster Reef Score**
Low Medium High
- Spat Settlement Score**
Low Medium High

Socioeconomic Variables (weight):

- Job Dependence Score**
Low Medium High
- Project Permit Feasibility Score**
Low Medium High
- Shoreline Erosion Score**
Low Medium High

Methods

Map Legend

Restoration Explorer - Alabama

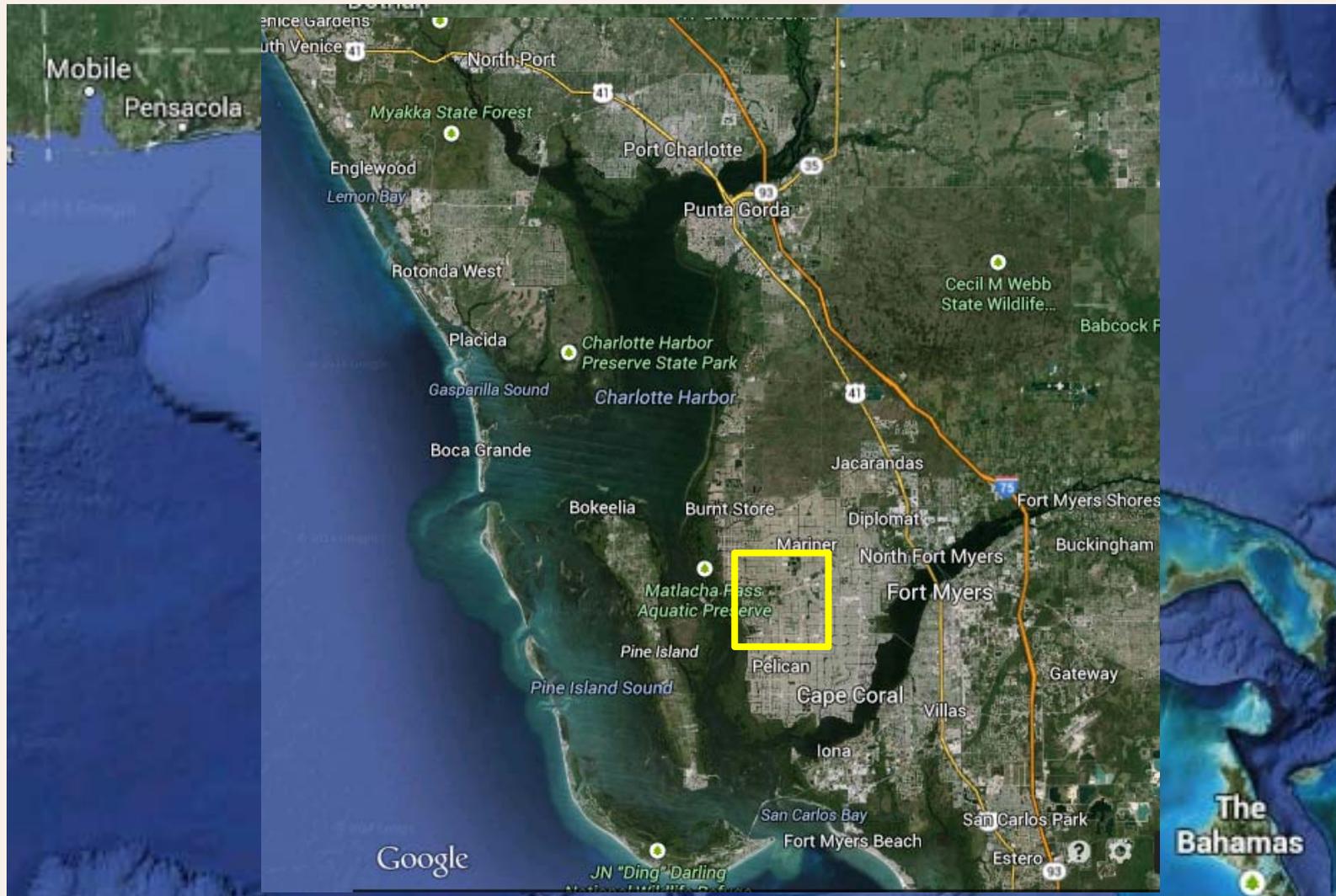
- Low
- High

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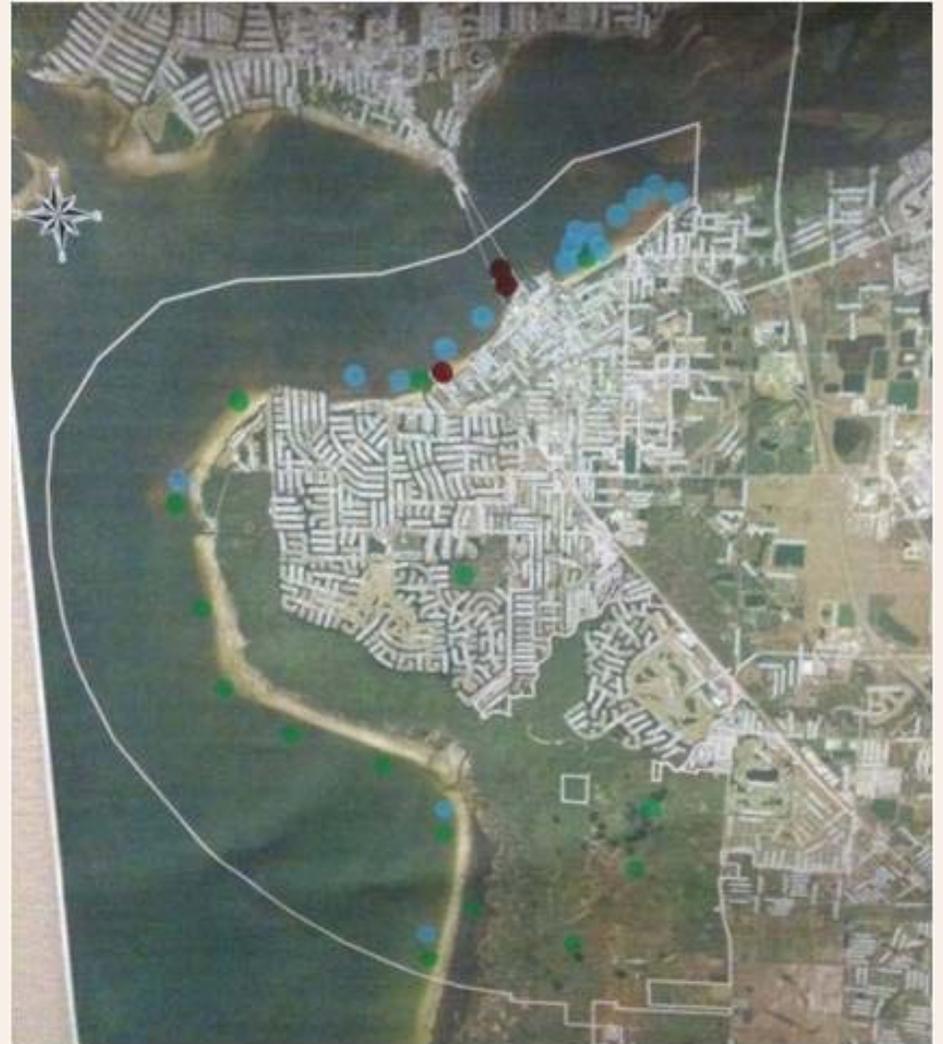
Project overview

- Advance the *Coastal Resilience* framework in Galveston Bay, TX and Charlotte Harbor, FL
 - Build a locally-relevant decision support tool and work with the communities to identify hazard reduction and climate adaptation strategies.
 - » Add locally-relevant land management, ecological and socio-economic data.
 - Leveraged existing resources including; NOAA's SLR Viewer.

Charlotte Harbor, Florida



Initial workshop



Developed Community Planning App

The screenshot displays the web application interface for the Gulf of Mexico region. The browser address bar shows the URL maps.coastalresilience.org/gulfmex/. The main navigation bar includes 'COASTAL RESILIENCE', 'GULF OF MEXICO', and several utility links: 'GET STARTED', 'TOUR', 'GO TO', 'The Nature Conservancy', 'Partners', and 'Legal Disclosure'. On the left, a vertical sidebar contains menu items: 'Coastal Defense', 'Restoration Explorer', 'Risk Explorer', 'Community Planning' (which is highlighted), and 'Future Habitat'. Below these are controls for 'Switch To Map 2', 'Split View', 'Save & Share', and 'Export Page'. The central map area shows a detailed view of the coastline from Longboat Key to Naples, with numerous colored markers representing critical infrastructure. A 'Community Planning' panel is open on the left, showing a 'Filter Map Layers' section with a 'Clear All' button and a list of layers including 'Charlotte Harbor', 'Habitats', 'Boundaries', 'Bathymetry', 'Critical Infrastructure' (checked), 'Mobile Home and RV Parks', 'Critical Facilities', 'Critical Infrastructure' (checked), 'HealthCare Facilities', 'Shelters', 'Evacuation Routes', 'Roads', 'Evacuation Zones', and 'Punta Gorda Public Works'. A 'Map Legend' panel on the right lists infrastructure types with corresponding icons: CALL CENTER, COAST GUARD, ELECTRIC POWER PLANT, ELECTRIC SUBSTATION, HAZARDOUS MATERIALS FACILITY, LOCAL GOVERNMENT FACILITY, PUBLIC WATER SUPPLY, RADIO COMMUNICATIONS TOWER, SOLID WASTE FACILITY, STATE GOVERNMENT FACILITY, and WASTEWATER FACILITY. The map also features a search bar, a 'Streets' dropdown menu, and an 'esri' logo in the bottom right corner.

Follow-up workshop

Preparing for Change:
Building Resilient Communities

Charlotte Harbor Event & Conference Center
75 Taylor Street
Punta Gorda, FL 33950

October 25, 2013, 9am-5pm
AICP CM7 & CFM CM6

The Nature Conservancy
Protecting nature. Preserving life.
nature.org

ATM HAZARD REDUCTION & RECOVERY CENTER
TEXAS A&M UNIVERSITY

Preparing for Change:
Building Resilient Communities

In regions facing both severe weather conditions and burgeoning population, the impact of disaster is great. In an era of financial austerity, planning becomes essential. This workshop will provide cost-effective solutions which mitigate harm and provide the path to recovery. Featuring real data and interactive technology, instructors will use survey data from Florida coastal communities to demonstrate how floodplain managers and natural resource managers can design and implement interventions in their own communities, ultimately creating stronger communities.

LEARNING OBJECTIVES:

Part 1: The Problem- Coastal Communities at High and Growing Risk

- Disasters magnify processes that are already taking place in your community
 - Understand the current and future problems our communities face
 - Discover ways to mobilize your organization and community to address climate change and hazard sensitivity into local planning decisions
- Resilience can be built in to existing plans using already-available tools
 - Be able to evaluate the vulnerabilities in your community by using existing community characteristics
 - Be able to use the Coastal Resilience decision support tool to assess future risk conditions and vulnerabilities

Part 2: The Solution- Increasing our Resilience

- Increasing resilience to disasters builds better communities (whether coastal or inland)
 - Understand the components of resilience and the Disaster Resilience Index
 - Mitigation actions and policies for climate change/variability should be treated the same.
 - Assess mitigation and recovery techniques that are common to coastal and inland communities as well as those that are effective, but often overlooked
 - Be able to use the Coastal Resilience decision support tool to assess future risk conditions and vulnerabilities
 - Identify the ways communities can adaptively learn from past disasters
 - Mobilize community assets (capacity) to strengthen the community's response

ACTIVITY 2: SOCIAL VULNERABILITY

Social vulnerability is much like physical vulnerability, except it is focused on social factors and processes that generate vulnerability in terms of a person's or group's capacity to anticipate, cope with, resist and recover from the impact of a natural hazard. These factors include:

- Race/ethnicity,
- gender,
- education,
- poverty,
- age, and
- housing tenure

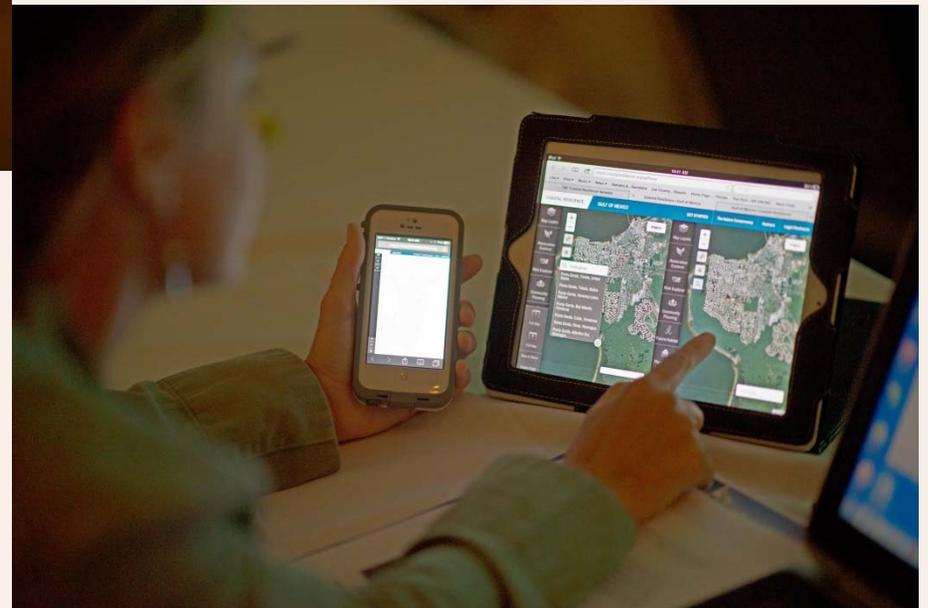
Social vulnerability will rarely be uniformly distributed among the individuals, groups, or various populations in a community. As a consequence we can develop mapping tools to identify areas with higher concentrations of socially vulnerable populations. Socially vulnerable populations are more likely to suffer from the damaging effects of hazards.

Poverty. Click on the **Map Layers App** and expand the "Florida" folder by clicking on the (+). Check the box next to "Social and Economic" and expand the "Social and Economic" layer. Check the box next to "Percent population living in poverty" and zoom into the Charlotte Harbor area. See Figure 8 below.

Figure 8. Percent Population living below the poverty line



Follow-up workshop









Panel Moderated by John Davis of WGCU/NPR

Preparation of Reef Materials Oyster Mat & Volunteer Update

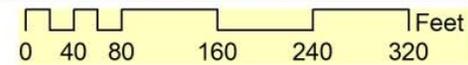
As of May 31, 2014, 750 oyster mats were completed with the help of 1,148 volunteers who donated a total of 1,690 hours to the project!



Trabue Harborwalk Oyster Reef Creation Project off Adrienne Street Pier, Punta Gorda, FL Conceptual Project Design May 2014



Each proposed reef area is approx. 12 feet x 36 ft (432 sq. ft.;
48 sq yds; or 0,01 acres)



Partners



Thank you!

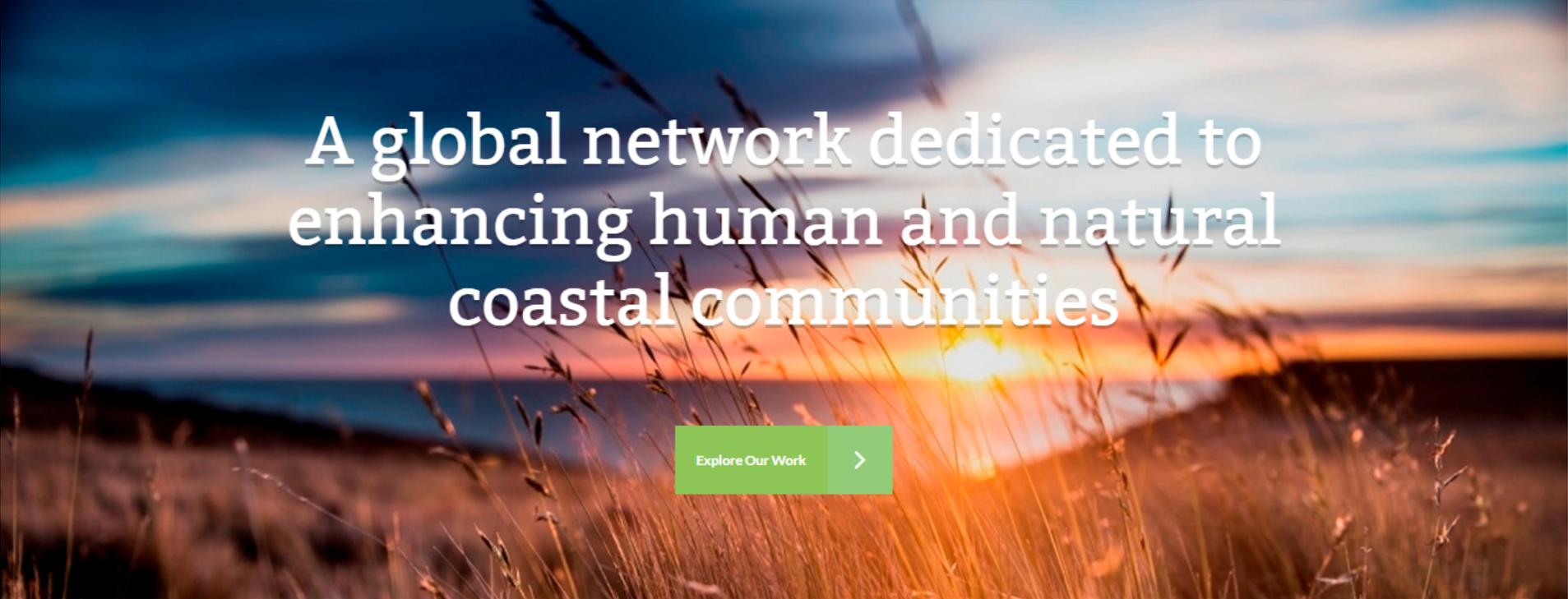
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