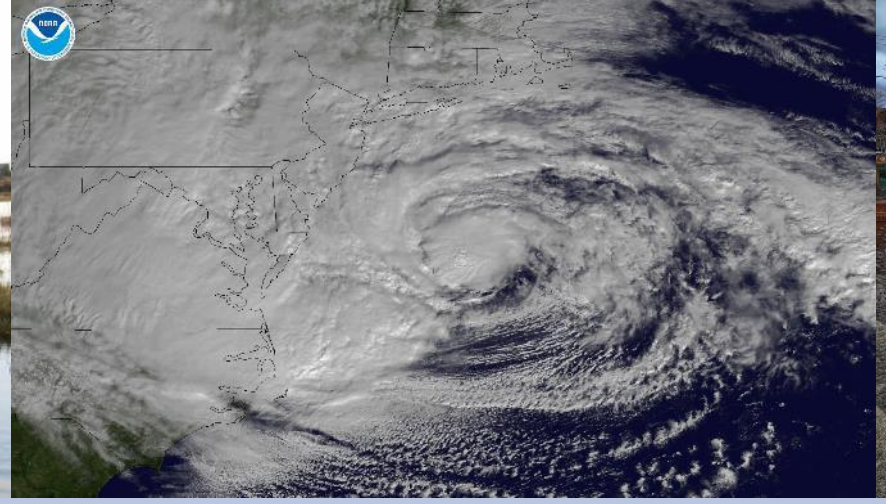




Environmental Justice and Coastal Resiliency

Nicole Carlozo
Maryland Department of Natural Resources
Chesapeake & Coastal Service

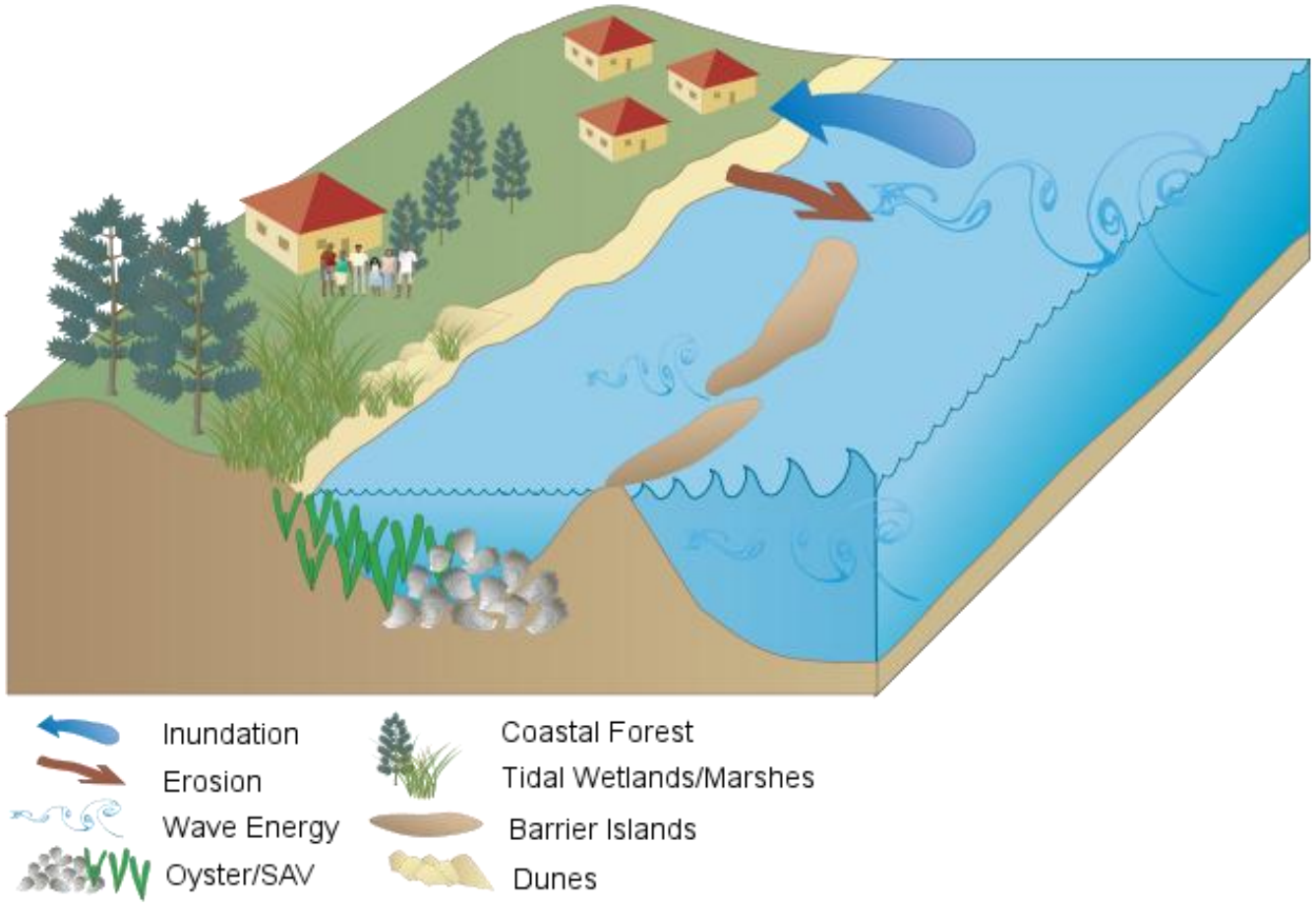
MCCC Mitigation Working Group
March 16, 2017

The Nature Conservancy
Protecting nature. Preserving life.™

Maryland Department of Natural Resources

NOAA

Coastal Resiliency Assessment



Where are natural features reducing risk for coastal communities?

Where are the state's vulnerable coastal communities?

Protect/restore coastal habitats that will enhance resiliency.

“Natural Features”

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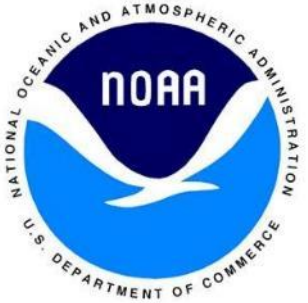
Dunes and Beaches	**Vegetated Features (e.g., Marshes)**	**Oyster and Coral Reefs**	**Barrier Islands**	**Maritime Forests/Shrub Communities**
Benefits/Processes Breaking of offshore waves Attenuation of wave energy Slow inland water transfer	**Benefits/Processes** Breaking of offshore waves Attenuation of wave energy Slow inland water transfer Increased infiltration	**Benefits/Processes** Breaking of offshore waves Attenuation of wave energy Slow inland water transfer	**Benefits/Processes** Wave attenuation and/or dissipation Sediment stabilization	**Benefits/Processes** Wave attenuation and/or dissipation Shoreline erosion stabilization Soil retention

US Army Corps 2015, *Use of NNBF for Coastal Resilience*

Coastal Resiliency Partnerships



Coastal Resiliency Evaluation

Terms & Definitions

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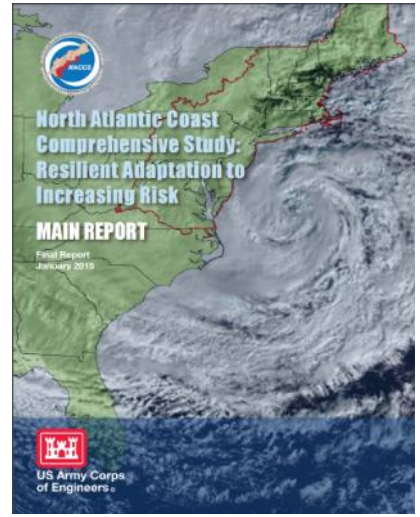
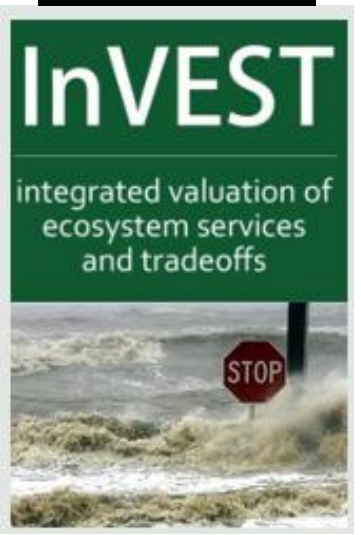
Resiliency – The ability of a community to prepare for, respond to, and recover from a coastal hazard event.

- **Where are the people?**
  - Are there demographic/social metrics or community characteristics that limit community resiliency?
- **Where are the hazards?**
  - Identify physical parameters that contribute to erosion and inundation risk.
- **Where are the habitats?**
  - Identify natural features that provide risk-reduction benefits.

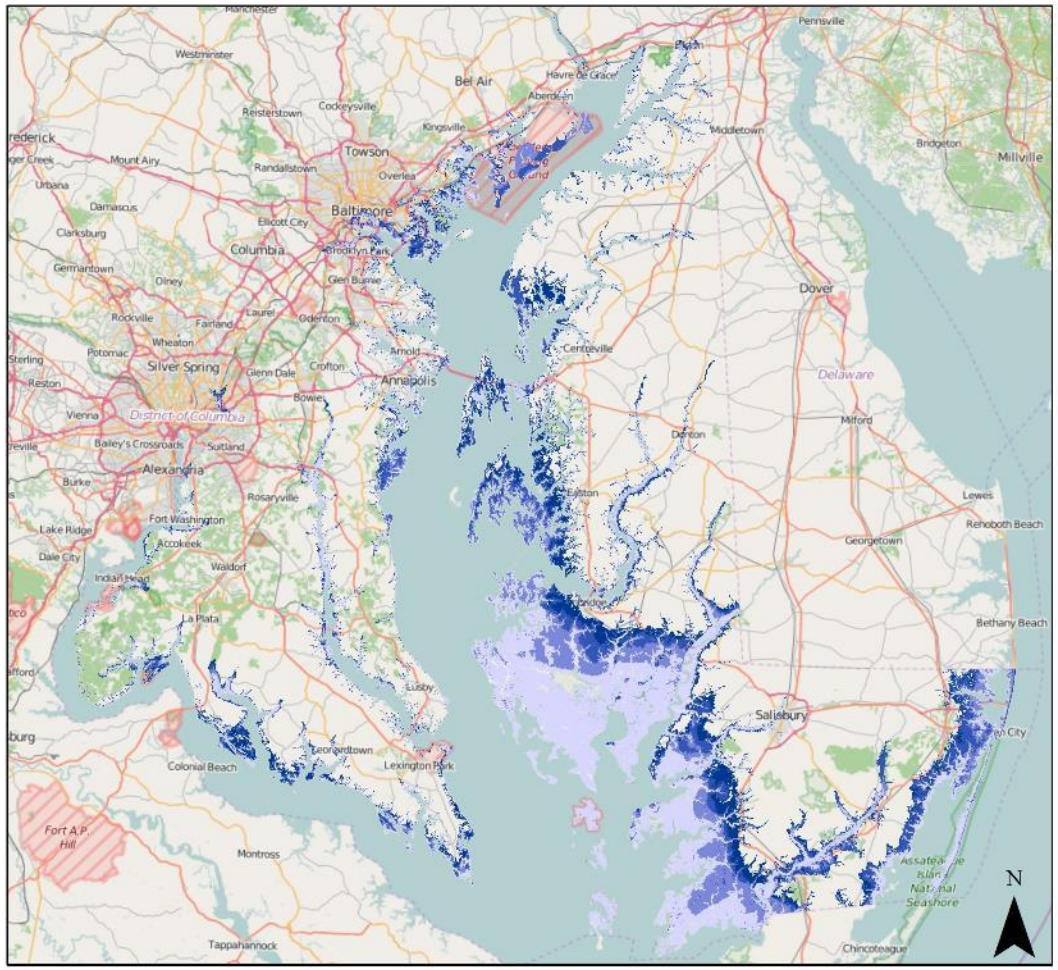
US Army Corps of Engineers
BUILDING STRONG®

natural capital PROJECT





Study Area



Furthest
extent of flood hazard event:

Hurricane Events Category 1-4

Sea, Level, and Overland Surges
from Hurricanes Model

Landscape Scale – Coast

Vulnerability Metrics (Census Block Groups)

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- **Population Density**
- **Age (≤17, ≥65)**
- **% Population Income Below Poverty**
- **% Population Non-proficient English Speakers**
- Social Isolation (Religion, Housing Tenure, Living Alone, Vehicle)
- Race
- % Female Population
- Education
- Storm-related Damage: Casualties/ Property Loss
- Mobility: Vehicle, Disabled
- Occupation / Single Sector Economic Reliance

Resources

- ❑ EPA EJ Screening Tool
- ❑ NACCS
- ❑ MDP Vulnerable Populations
- ❑ MD Park Equity Tool
- ❑ Oxford Community Vulnerability Study
- ❑ National Adaptation Forum
- ❑ Census Bureau / Block Groups

Community Flood Risk Areas

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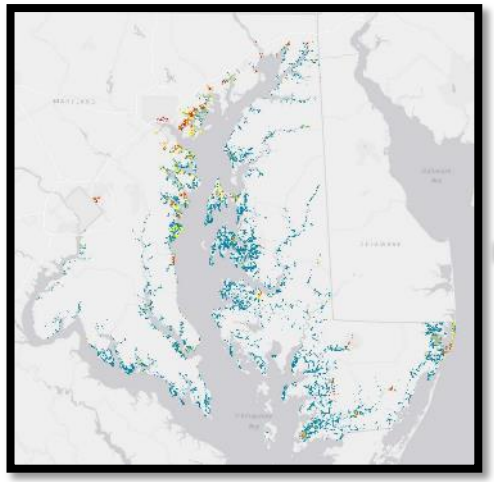
- Residential areas less equipped to prepare for, respond to, or recover from coastal hazard events.
  - Population Density (Residential Focus)
  - Social Vulnerability (Age, Income, Language Proficiency)
  - Probability of Exposure (Floodplain)

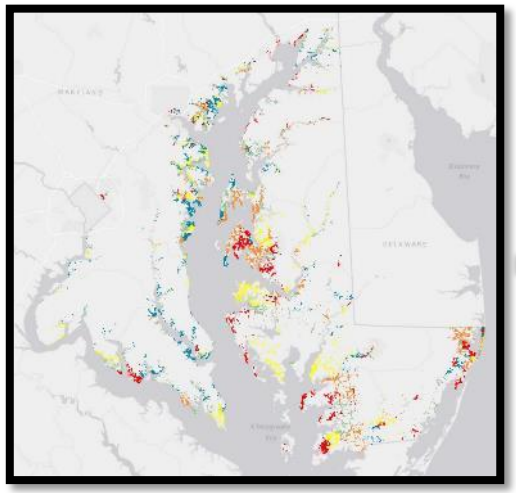
Risk Areas
(PDI + SVI) X (Probability of Exposure)

- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

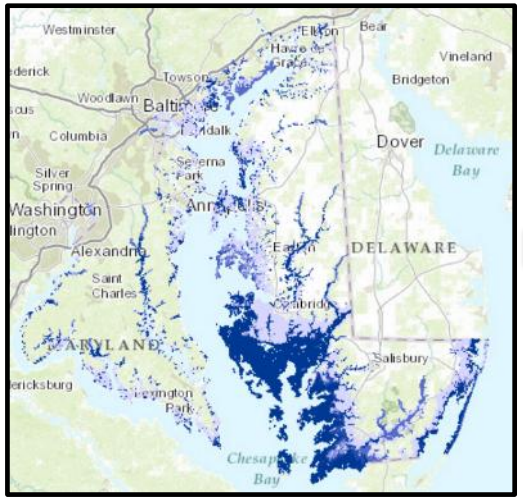
Population Density

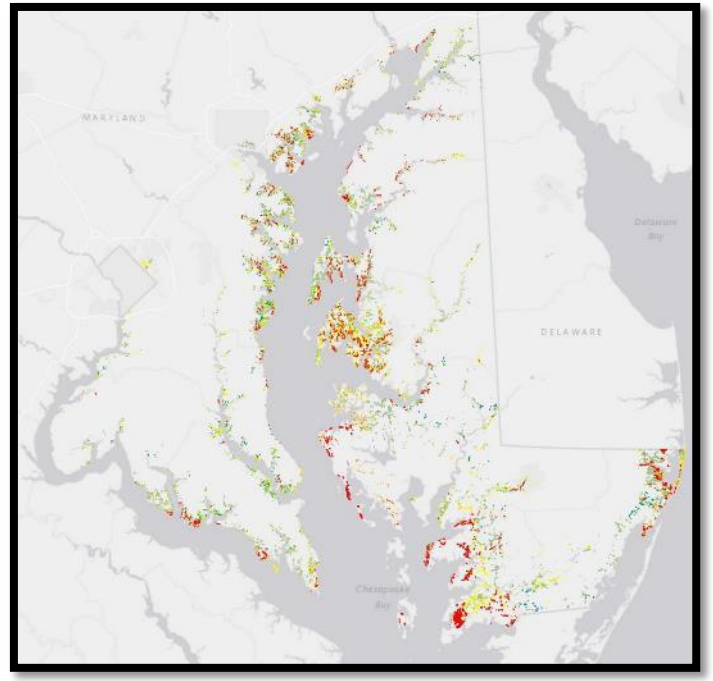


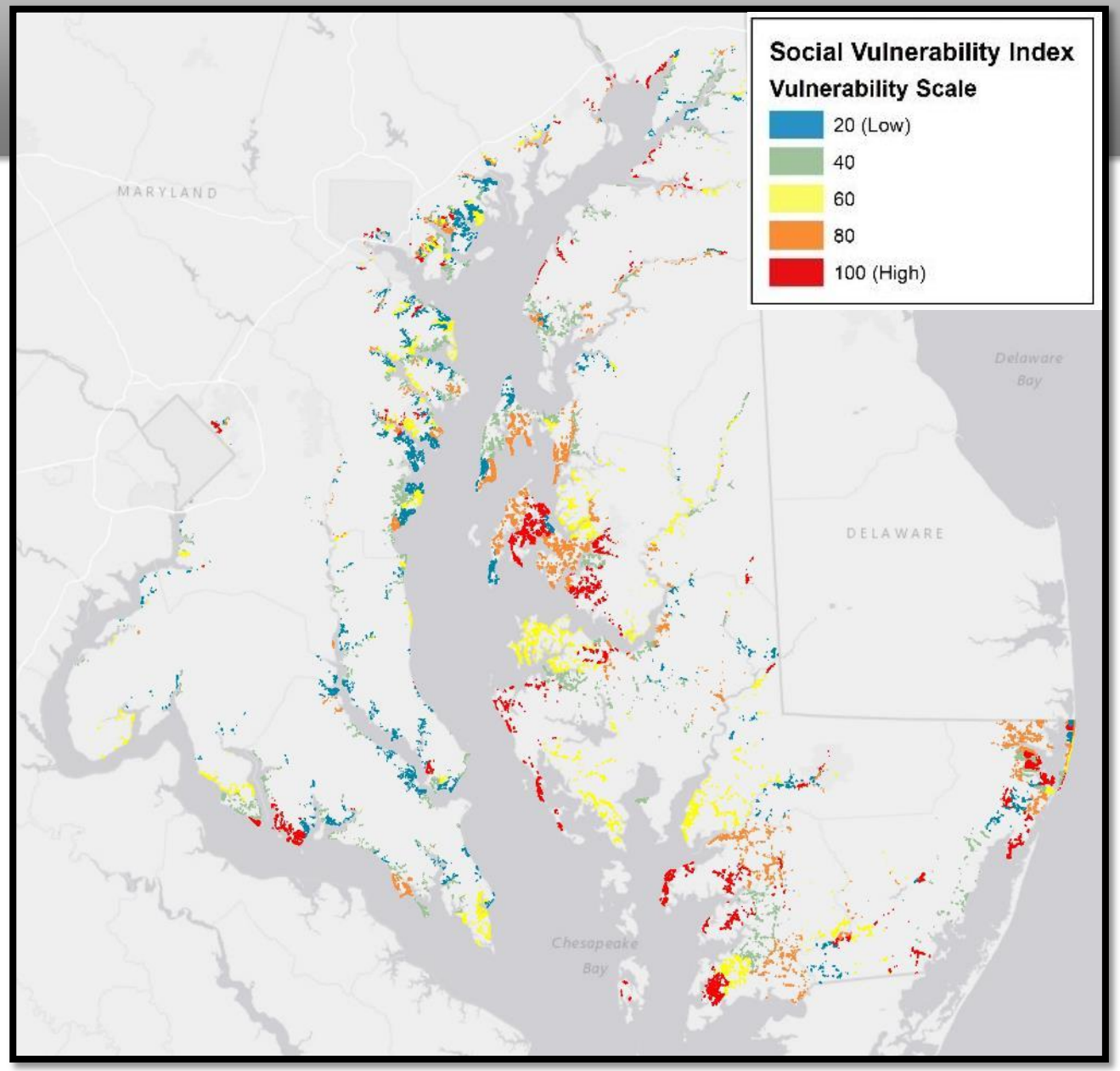
Social Vulnerability



Exposure Probability







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Social Vulnerability Index:

- US Census Bureau Block Groups
- 2013 American Community Survey, 5-year estimate
  - % Population ≤17 or ≥ 65 yrs old
  - % Population with Income Below Poverty
  - % Population of non-proficient English Speakers
- 5 Quantile Re-Classification

A Closer Look at Annapolis:
Community Flood Risk

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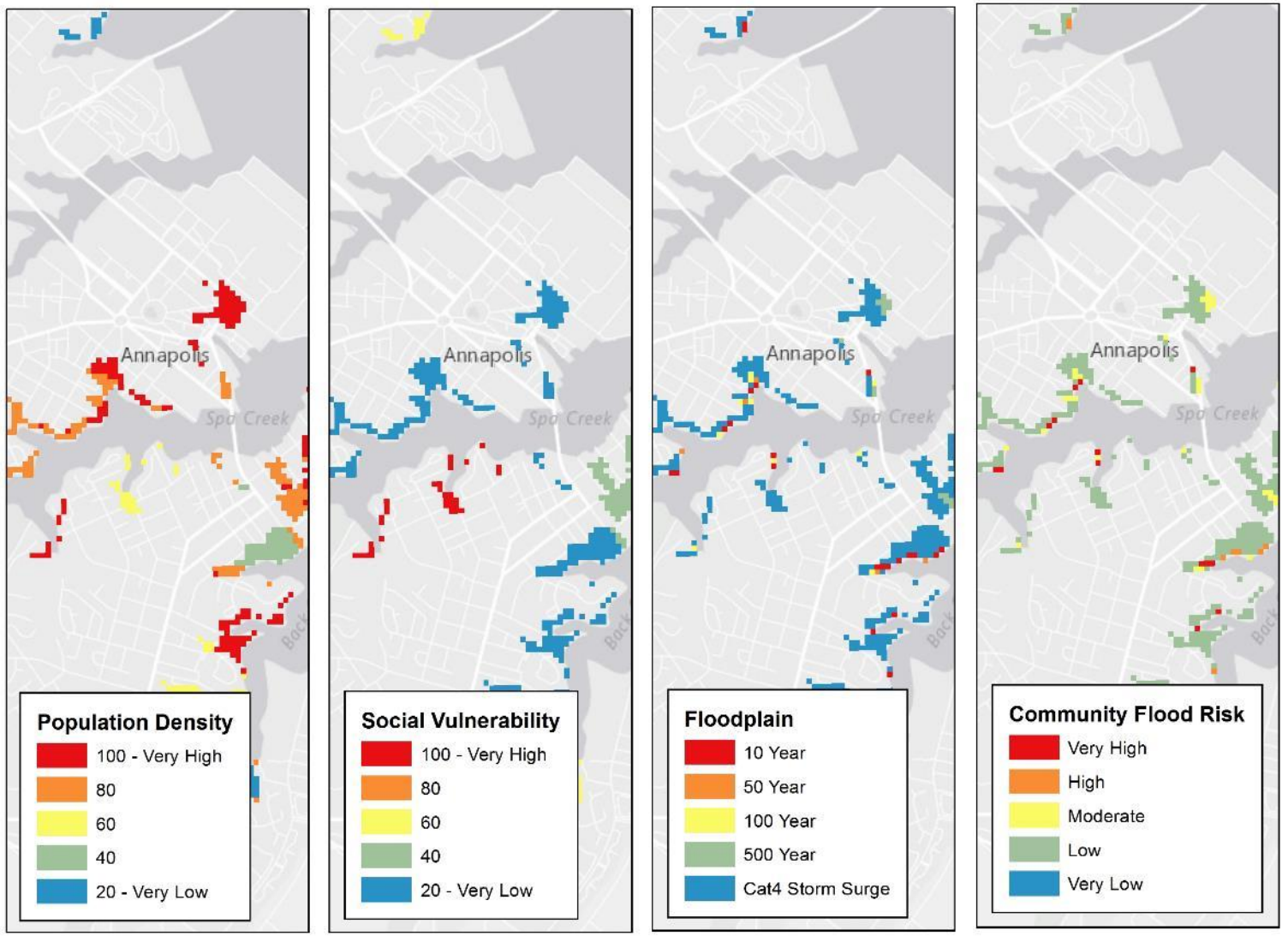
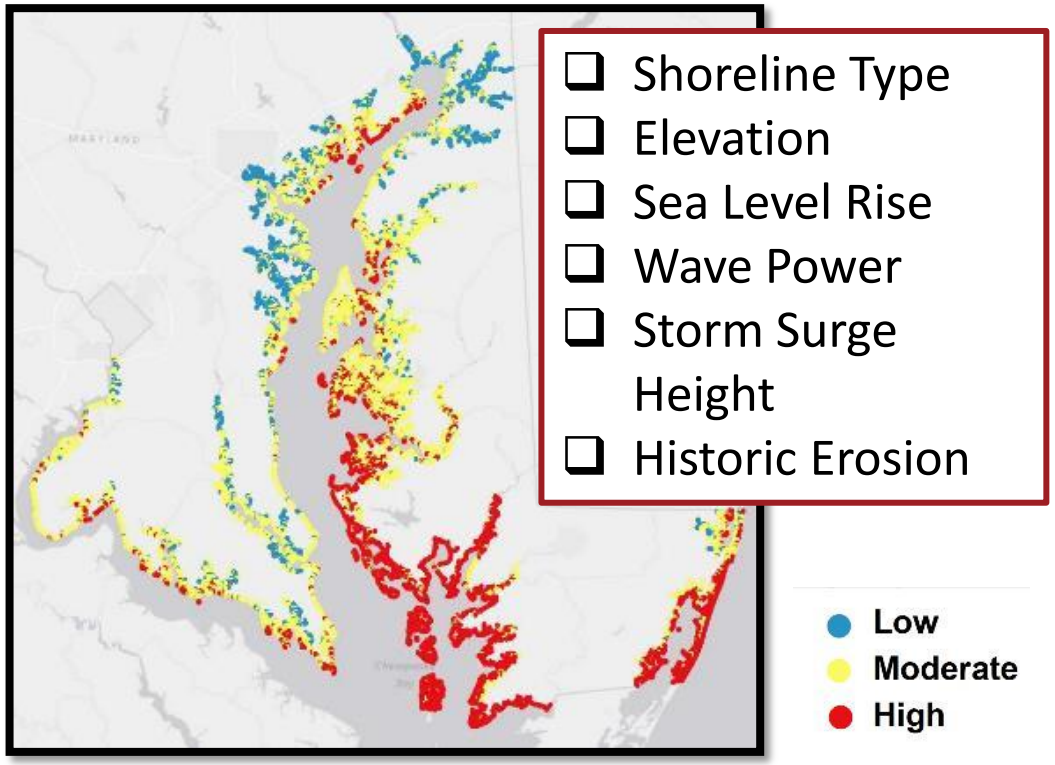
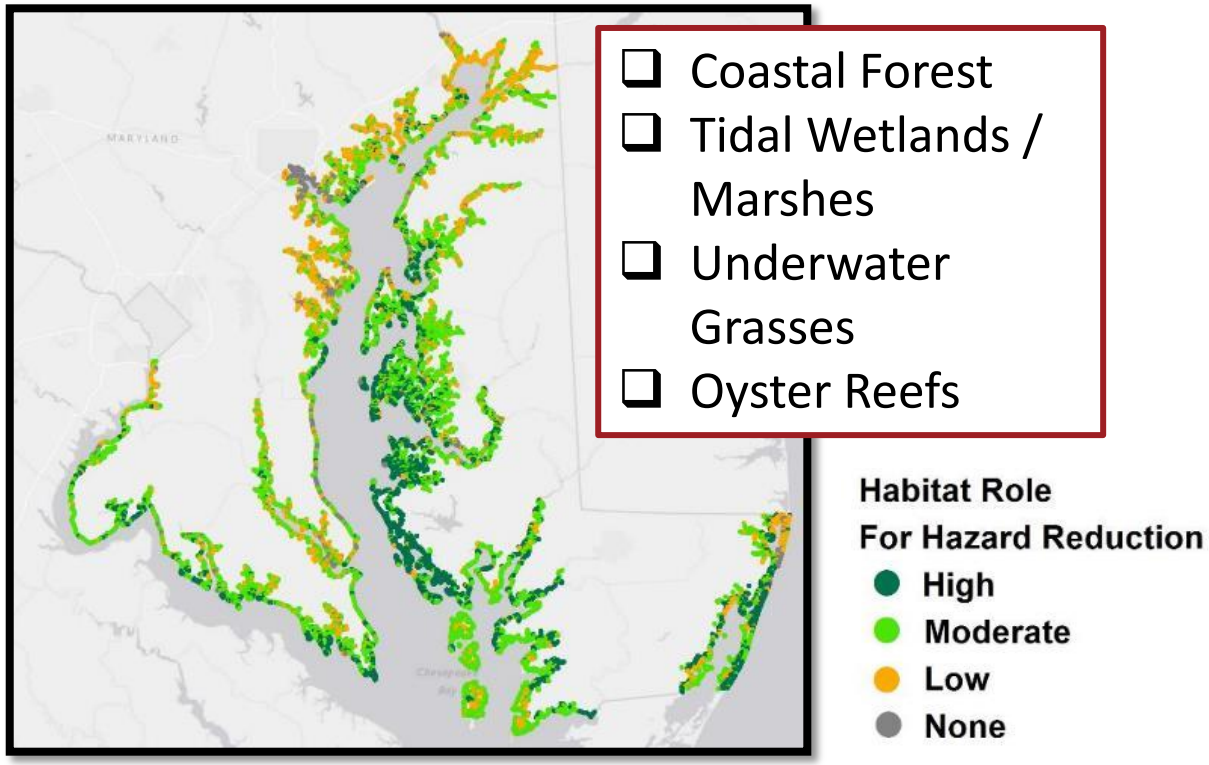
- Focus on residential land use limits applicability to commercial/industrial areas.
- Demographics are not weighted, leading to greatest influence by floodplain layer.
- Risk based on flood inundation, not SLR



Coastal Exposure and Habitat Role

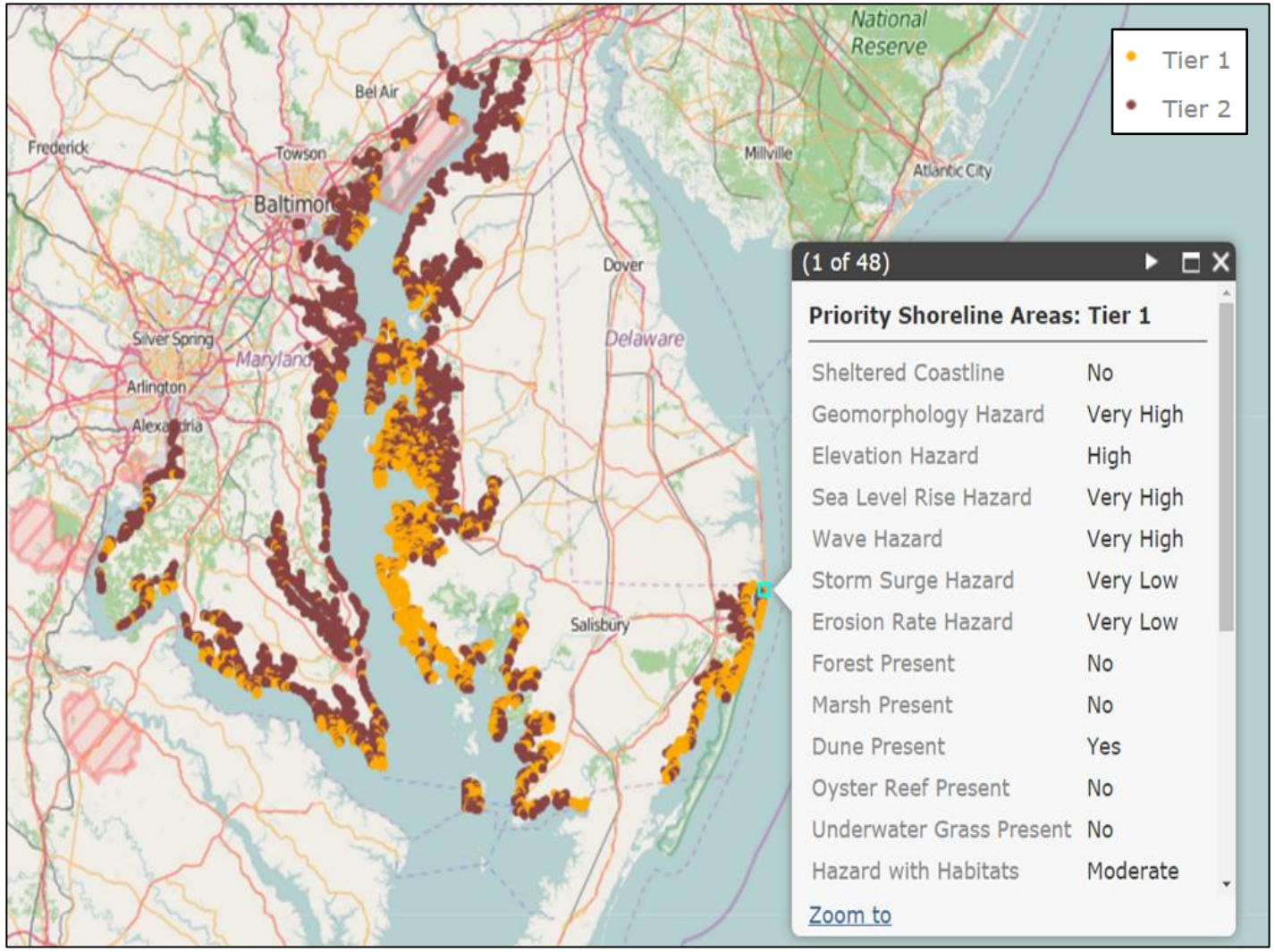
- Where do Habitats Reduce Exposure to Coastal Hazards?
  - Identify High, Moderate, Low Hazard Shorelines based on physical characteristics.
  - Evaluate Habitat Role in Reducing Exposure based on habitat presence/protectiveness.



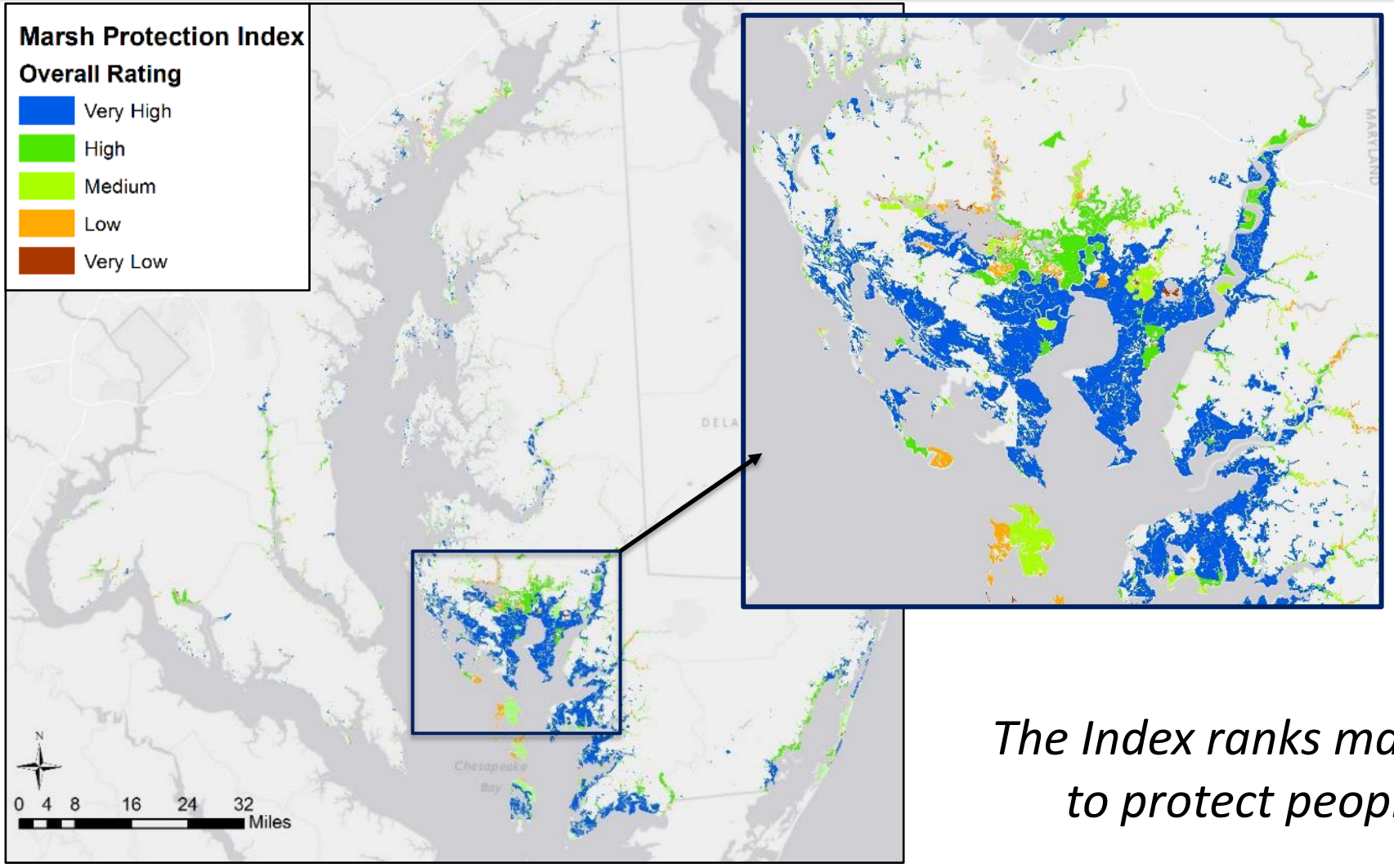


Priority Shoreline Areas

- Tier 1 Shorelines
  - High Habitat Role
  - Within 2km of Risk Area
  - 22% of shoreline
  - Conserve/Maintain/Enhance
- Tier 2 Shorelines
  - Moderate Habitat Role
  - Within 2 km of Risk Area
  - 40% of shoreline
  - Restore



Marsh Protection Potential Index



- ❑ Marsh Size (Area)
- ❑ Proximity to Hazards (High, Moderate, Low, or Floodplain)
- ❑ Proximity to people (Residential Areas – High density / social vuln.)
- ❑ Persistence (SLR and Migration)
- ❑ Proximity to Other Coastal Habitats

The Index ranks marshes based on their ability to protect people from coastal hazards.

Want to Learn More?

MARYLAND DEPARTMENT OF NATURAL RESOURCES

Coastal Resiliency Assessment
Training Manual

June 2016

Chesapeake & Coastal Service

NOAA

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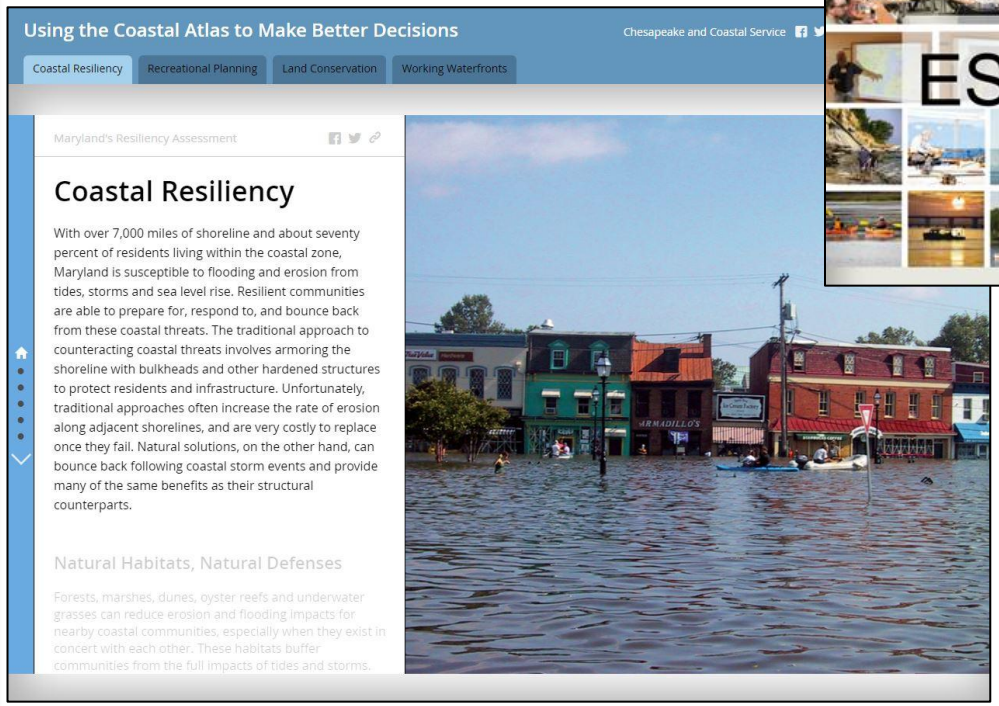

For more information, visit:
http://dnr.maryland.gov/ccs/coastalatlas/Pages/CoastalResiliencyAssessment.aspx

Or email nicole.carlozo@maryland.gov

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