



Maryland's Coastal Resiliency Assessment

Photo Credit: Wanda Diane Cole

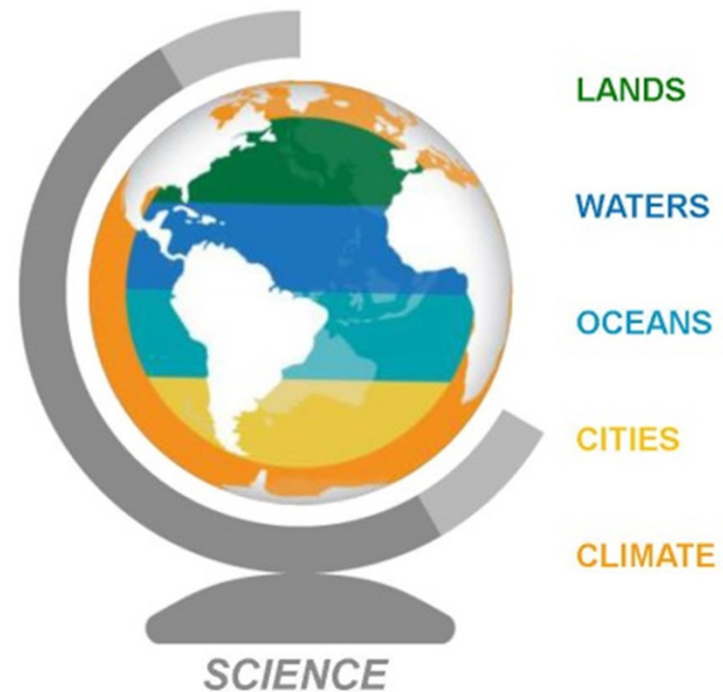
MAFSM Conference
10/20/2016





The mission of The Nature Conservancy is to conserve the **lands** and **waters** on which all life depends.

- Science based
- Non-confrontational
- Pragmatic solutions
 - Partnerships
 - Members
- On the ground
 - Public policy





The Nature Conservancy in Maryland/DC

Maryland chapter chartered : 1977

District of Columbia added : 1996

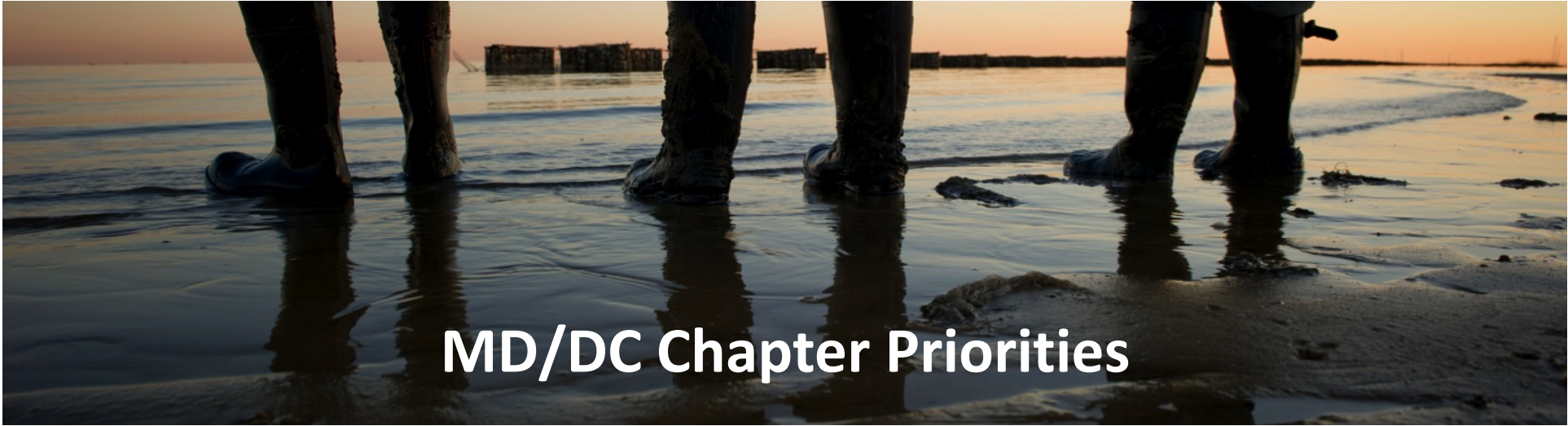
Acres owned : >22,000

Total acres protected : >75,000

Largest private preserve in MD : Nassawango Creek

DC urban program launched : 2015

Number of chapter members : 33,000



MD/DC Chapter Priorities

CLEAN WATER

Stormwater Pollution



Nutrient Pollution



CLIMATE RESILIENCE

Forest Connectivity

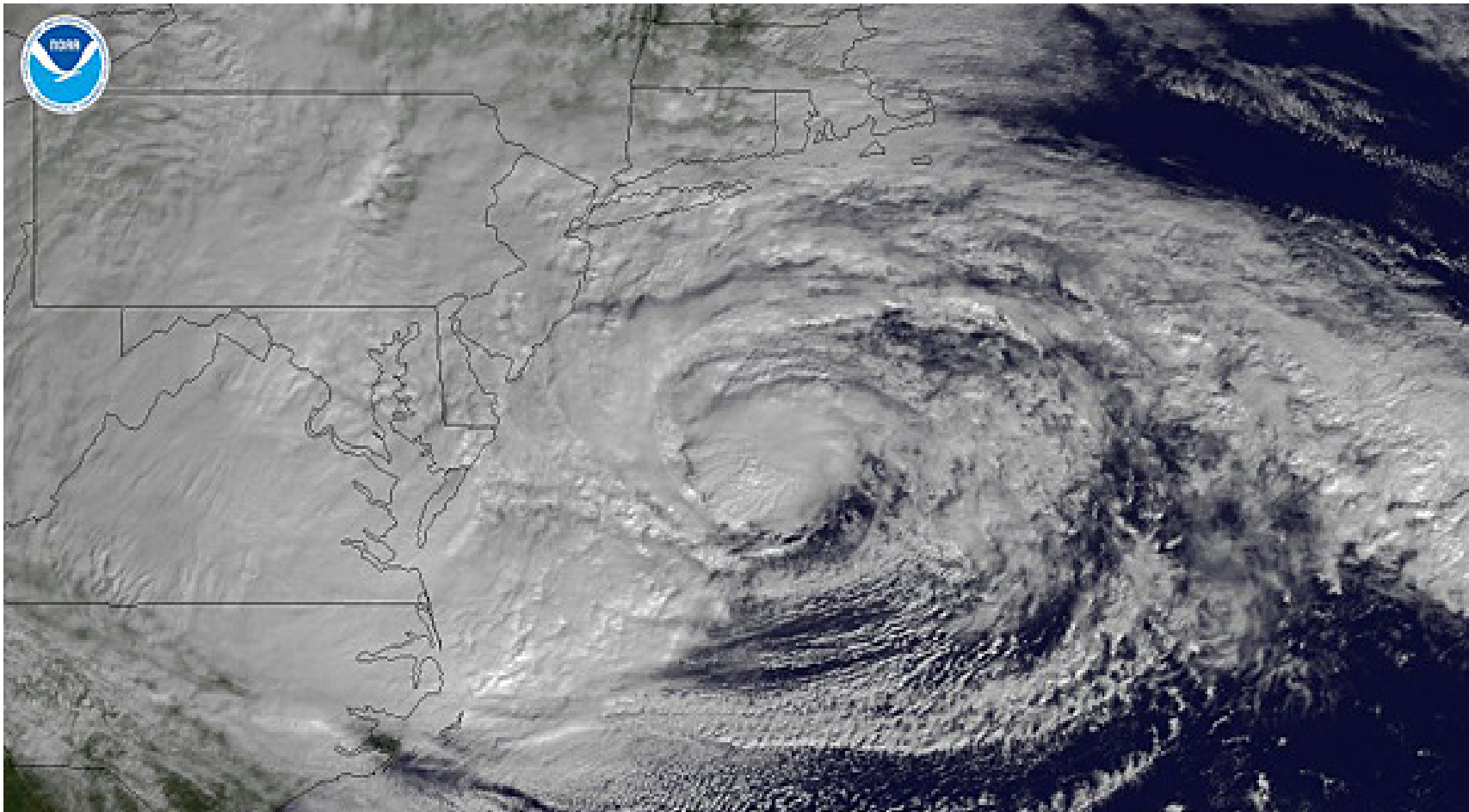


Coastal Resilience



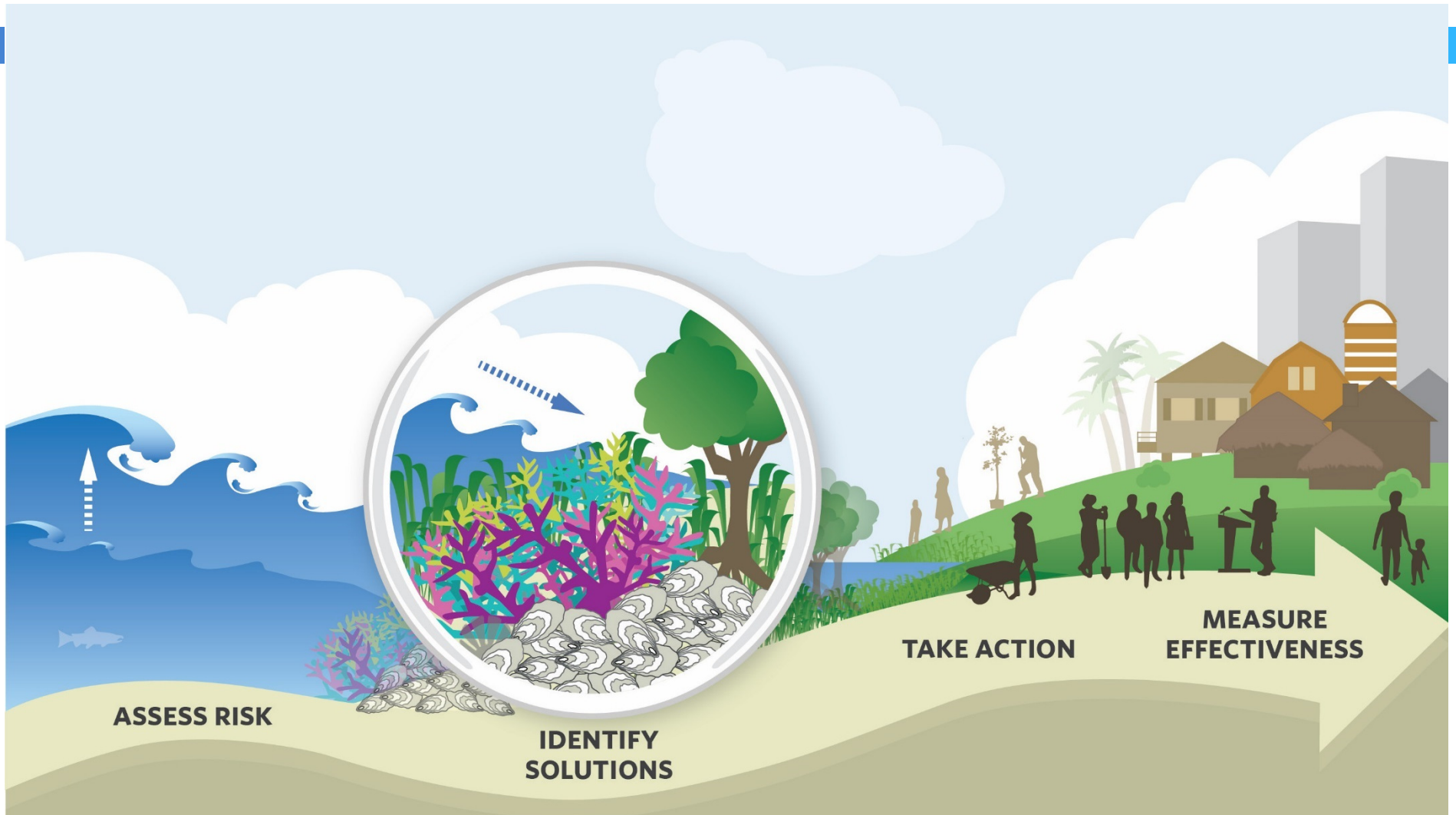
Coastal Resilience

MD Planning Context



Coastal Resilience

The Nature Conservancy's Approach





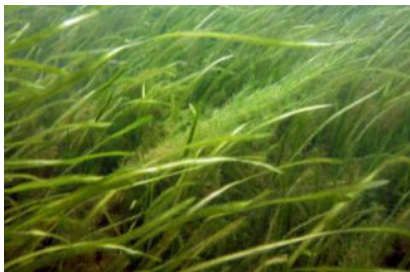
Contact us at coastalresilience@tnc.org, discover the tool at maps.coastalresilience.org, and follow us @CoastResilience

**PARTNERS
INCLUDE:**



Global Disaster Preparedness Center

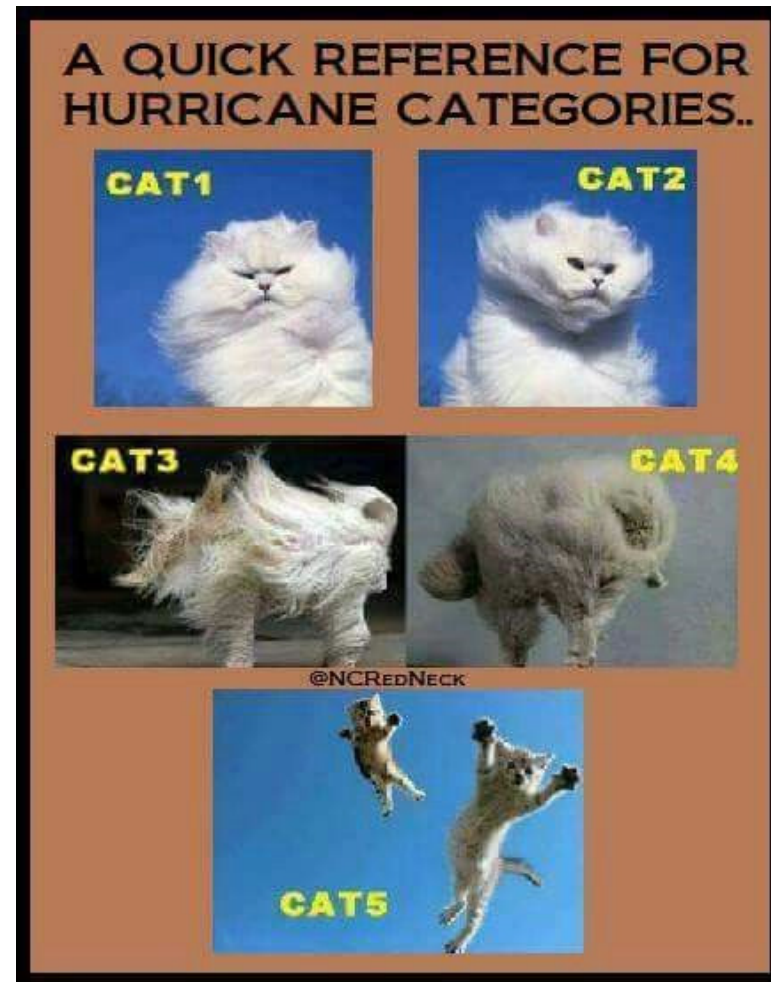
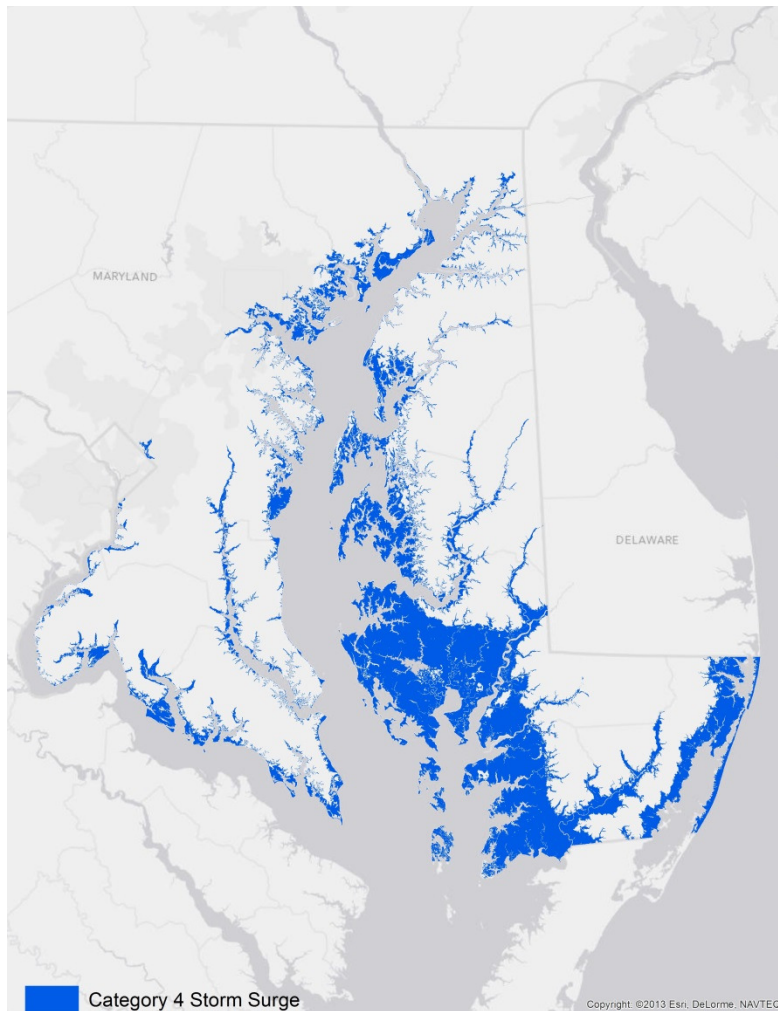




- Identify locations where natural habitats can provide risk-reduction benefits to coastal communities
 - Hazards = coastal flooding and erosion
 - Habitats = forest, marsh, dune, underwater grass, oysters

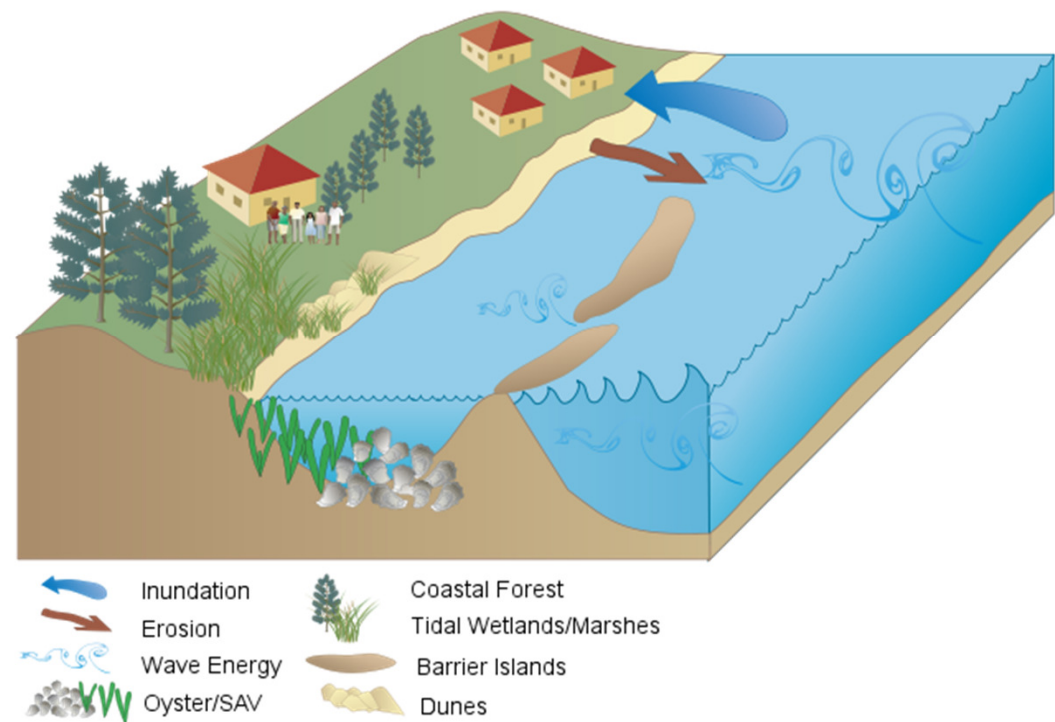
Coastal Resilience

MD Study Area



General Approach:

- Where are the hazards?
- Where are the habitats?
- Where are the people?



General Approach:

- Where are the hazards?
- Where are the habitats?
- Where are the people?

Methods:

- ⑩ Spatial analysis (GIS)
- ⑩ Scientific literature
- ⑩ Local experts

- MD Department of Natural Resources – Chesapeake and Coastal Service
- The Nature Conservancy - MD/DC Chapter
- NOAA – project funding
- The Natural Capital Project
- Steering Committee – state , federal, non-profit
- Advisors - state, federal, academic

Map Layers on the Maryland Coastal Atlas

dnr.maryland.gov/ccs/coastalatlus/

- Shoreline Hazard Index
- Hazard Reduction by Habitats
- Community Flood Risk Areas
- Priority Shoreline Areas
- Marsh Protection Potential Index

nature
climate change

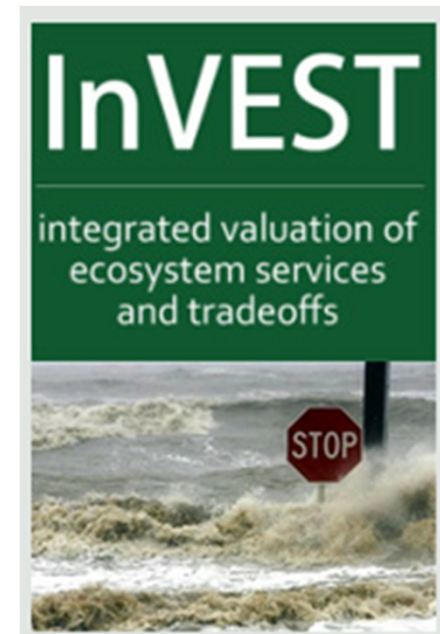
LETTERS

PUBLISHED ONLINE: 14 JULY 2013 | DOI: 10.1038/NCLIMATE1944

Coastal habitats shield people and property from sea-level rise and storms

Katie K. Arkema^{1*}, Greg Guannel², Gregory Verutes³, Spencer A. Wood², Anne Guerry², Mary Ruckelshaus², Peter Kareiva⁴, Martin Lacayo² and Jessica M. Silver²

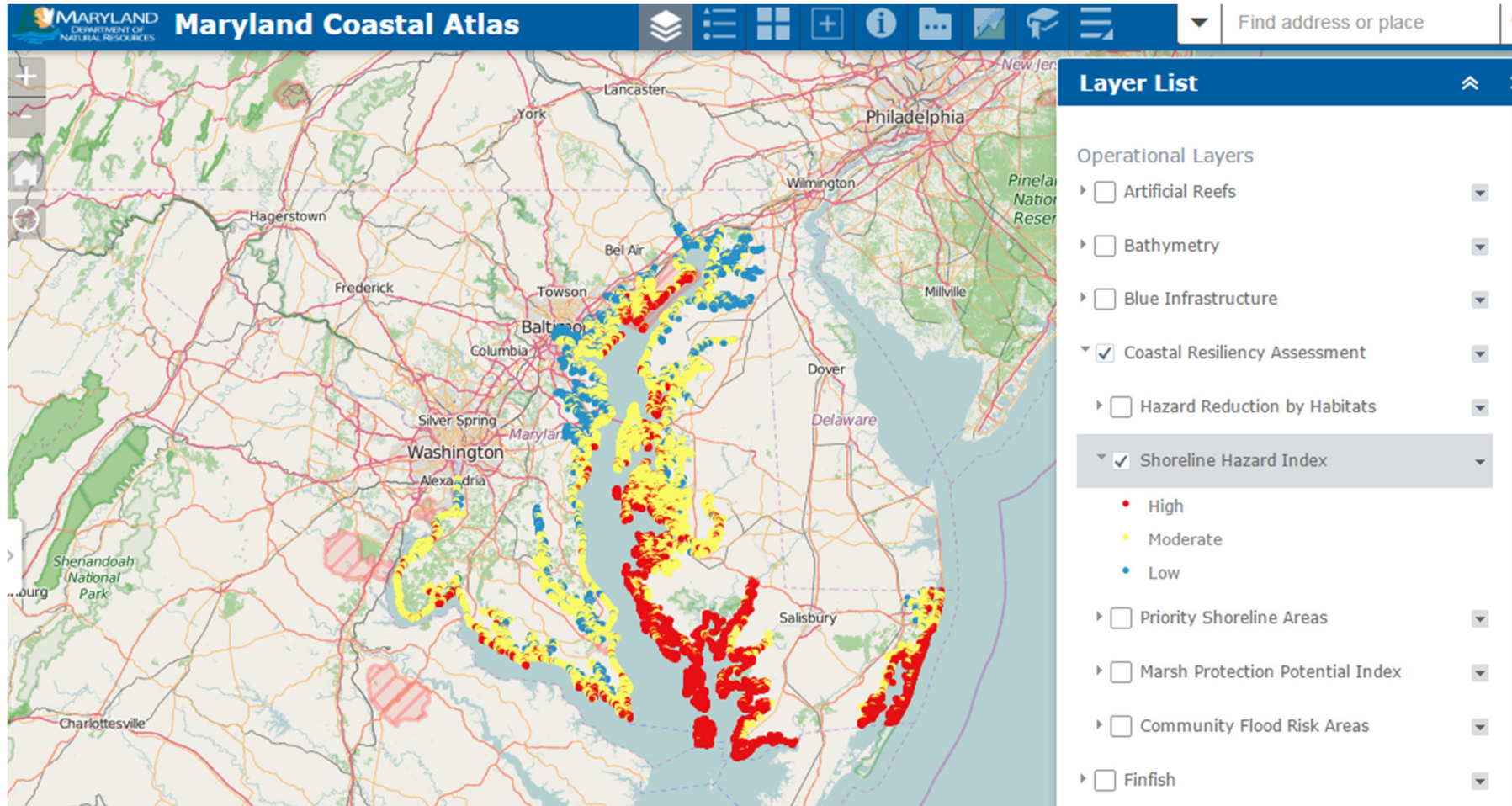
- MD Shoreline Hazard Index
- MD Hazard Reduction by Habitats



Coastal Vulnerability Model

Coastal Resilience

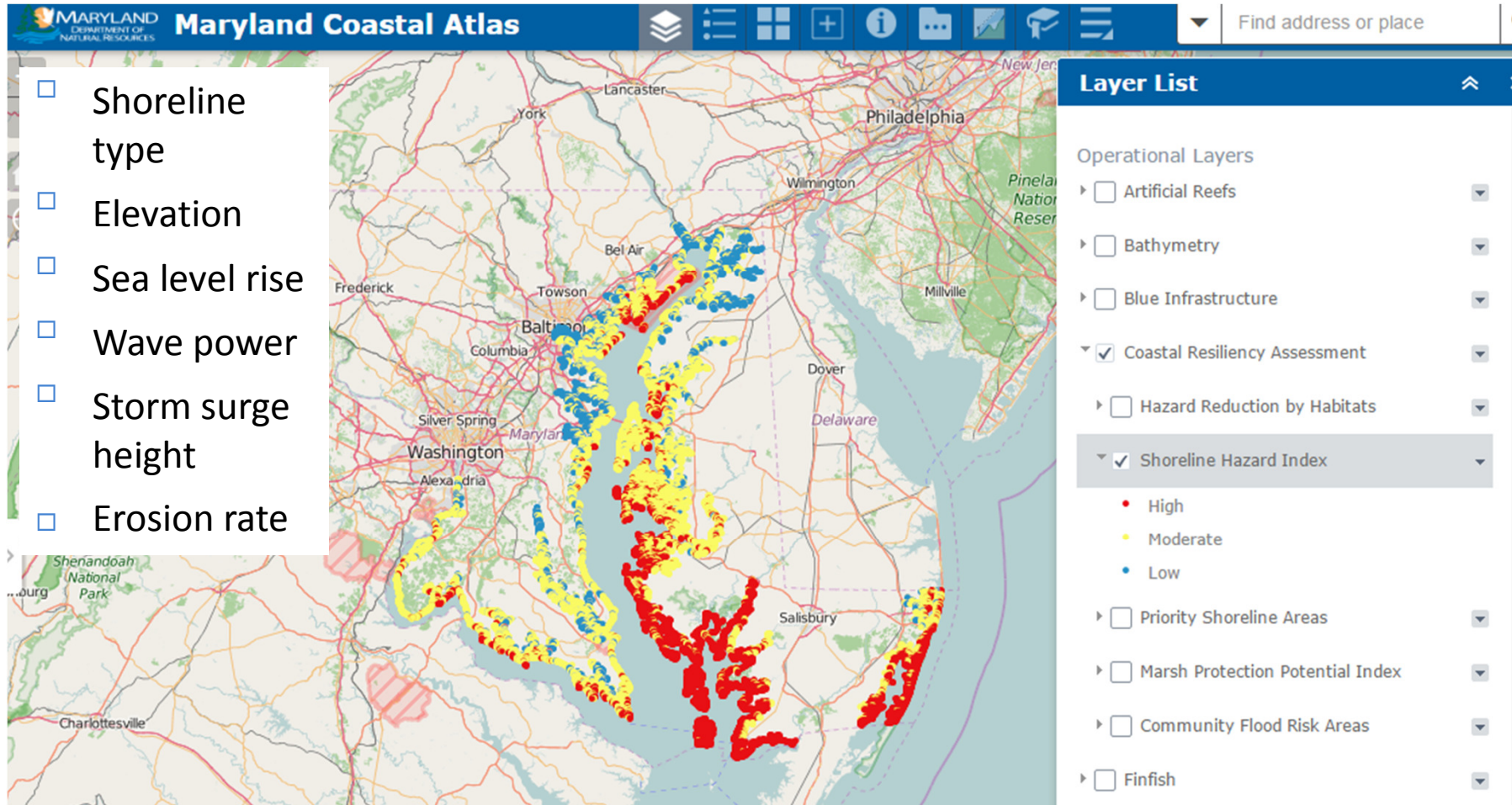
MD Shoreline Hazard



dnr.maryland.gov/ccs/coastalatlus/

Coastal Resilience

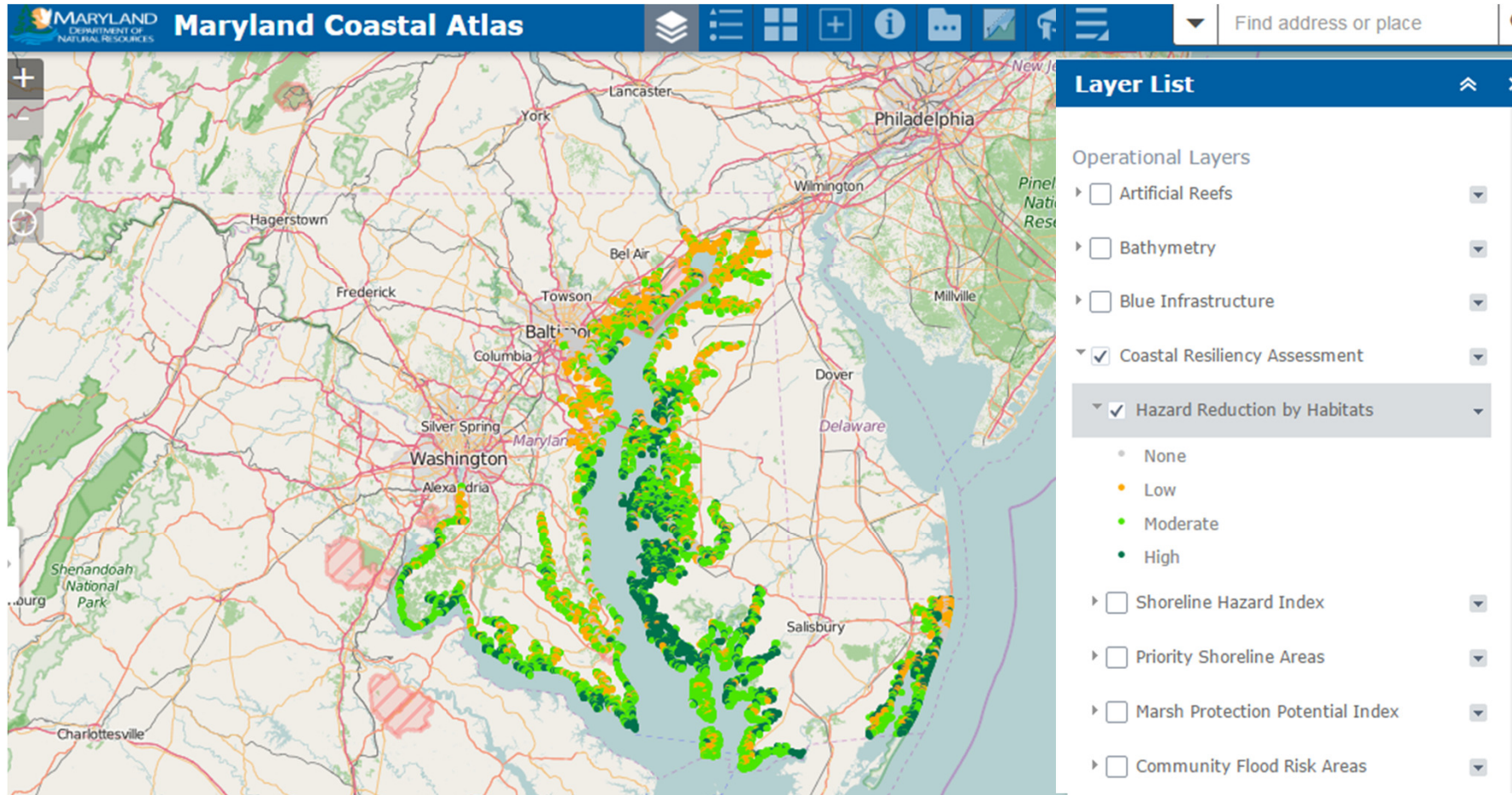
MD Shoreline Hazard



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Coastal Resilience

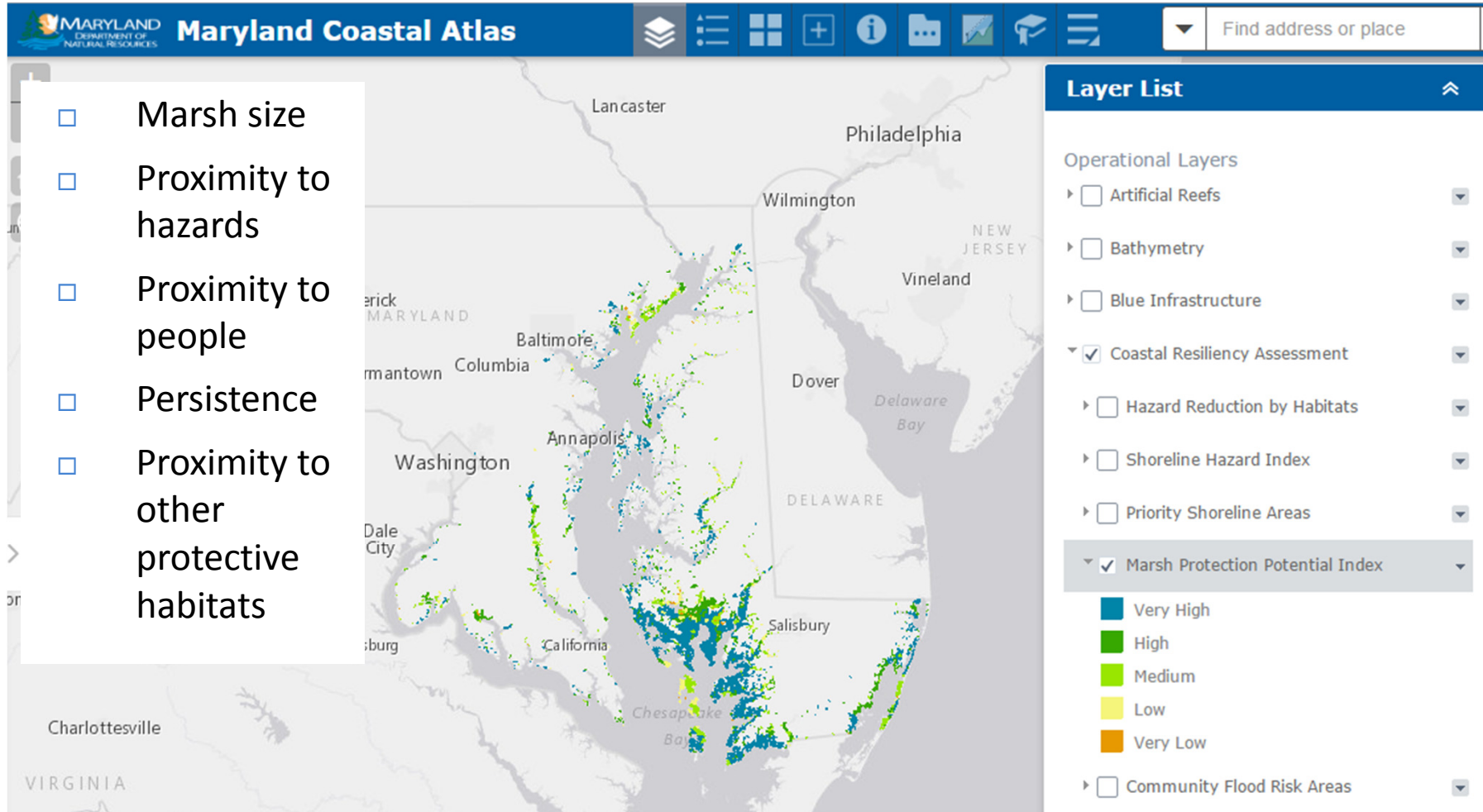
MD Hazard Reduction by Habitats



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Coastal Resilience

MD Marsh Protection Potential

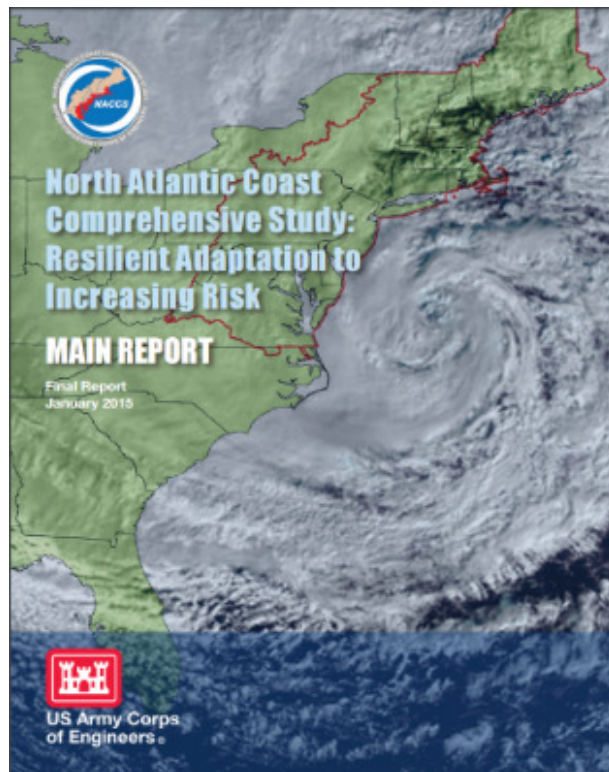


dnr.maryland.gov/ccs/coastalatlus/

Coastal Community Resiliency Goal



1. Evaluate the risk reduction benefits of existing natural features
2. Establish priorities for conservation and restoration to enhance **resiliency of communities** impacted by coastal hazards.

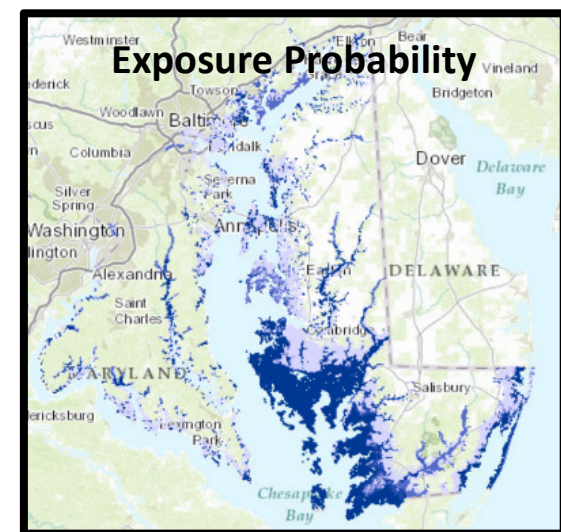
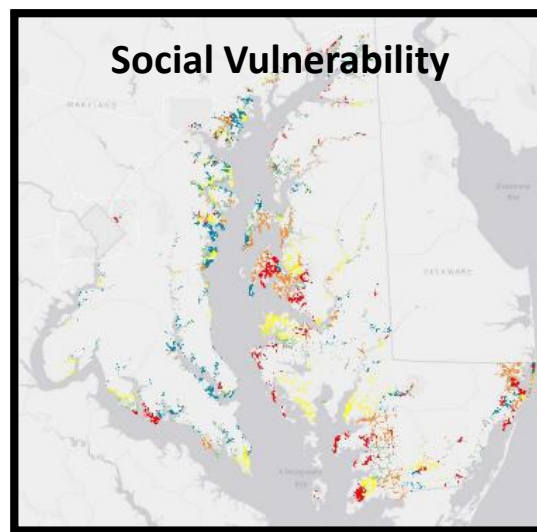
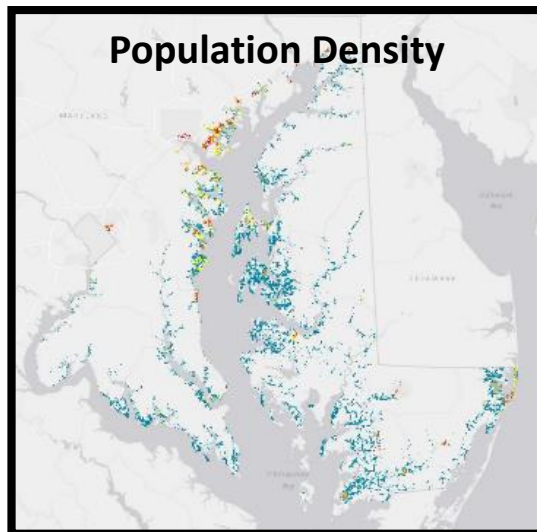


Resiliency – *The ability of a community to prepare for, respond to, and recover from a coastal hazard event.*

Community Flood Risk Areas

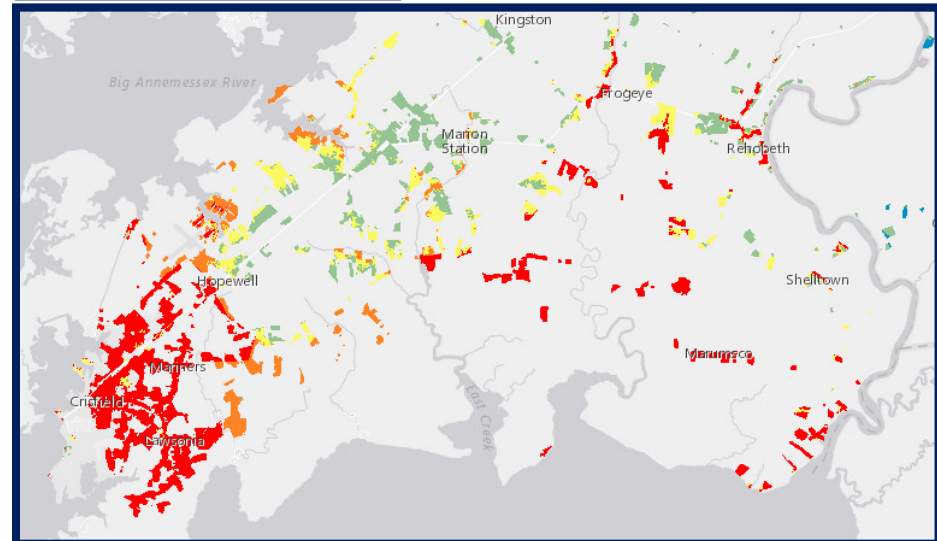
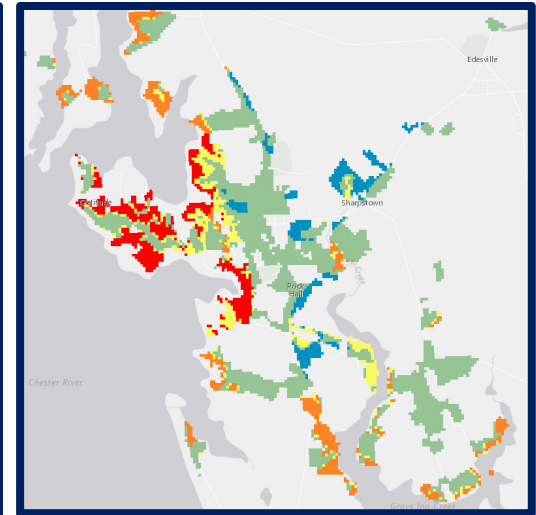
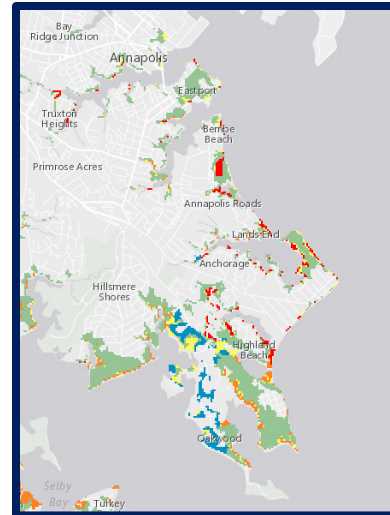
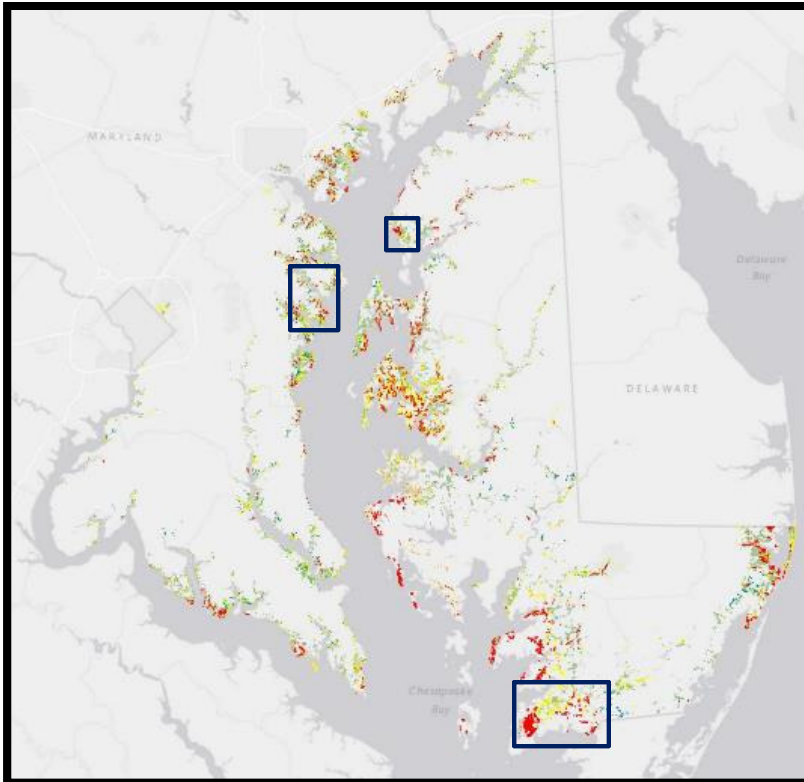


- Residential areas less equipped to prepare for, respond to, or recover from coastal hazard events.
 - Population Density (Residential Focus)
 - Social Vulnerability (Age ≤ 17 or ≥ 65 , Income below poverty, Language Proficiency)
 - Probability of Exposure (Floodplain – 10, 50, 100, 500yr)



2013 ACS Census Data (block groups), 2015 MES Floodplain data

Community Flood Risk Areas



Risk Areas

(PDI + SVI) X (Probability of Exposure)

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

High and Moderate Priorities

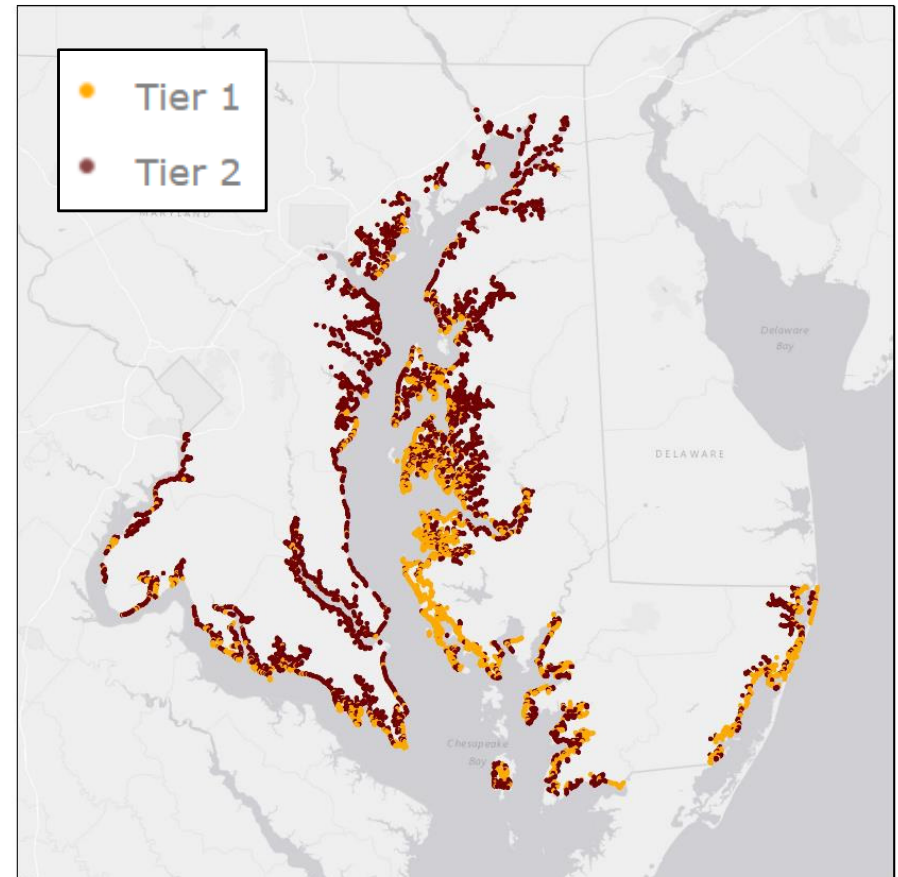


- **Tier 1 Shorelines**

- 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 – action depends on site conditions (hazard level, development level)



Maryland's Coastal Atlas



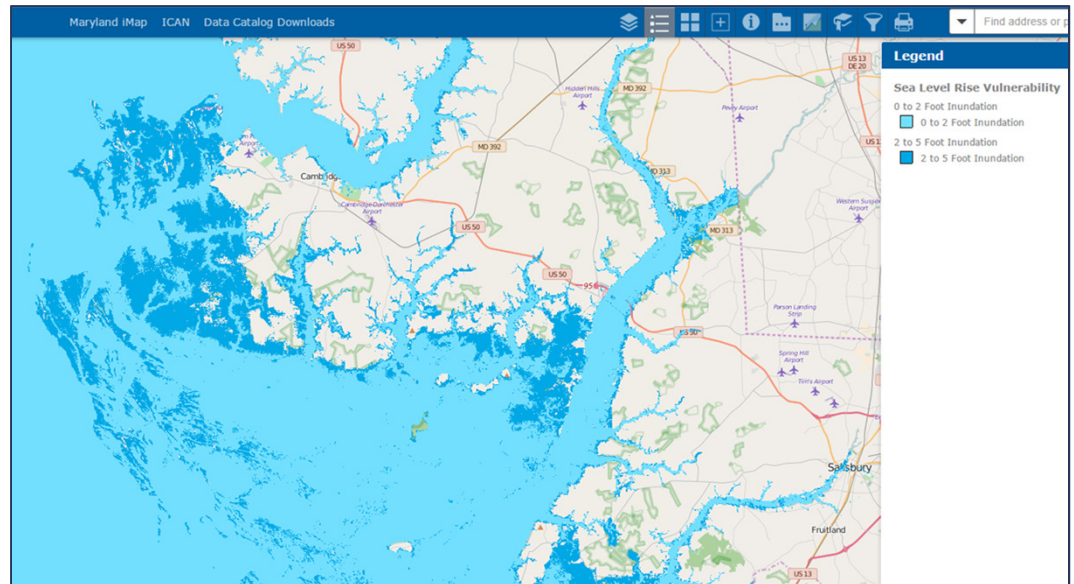
dnr.maryland.gov/ccs/coastalatlus/

Climate Change Data Layers:

- Sea Level Rise Vulnerability
- Storm Surge Areas
- Wetland Adaptation Areas
- Shoreline Inventory
- Historical Shorelines/Shoreline Rates of Change
- 100 & 500 Year Floodplains

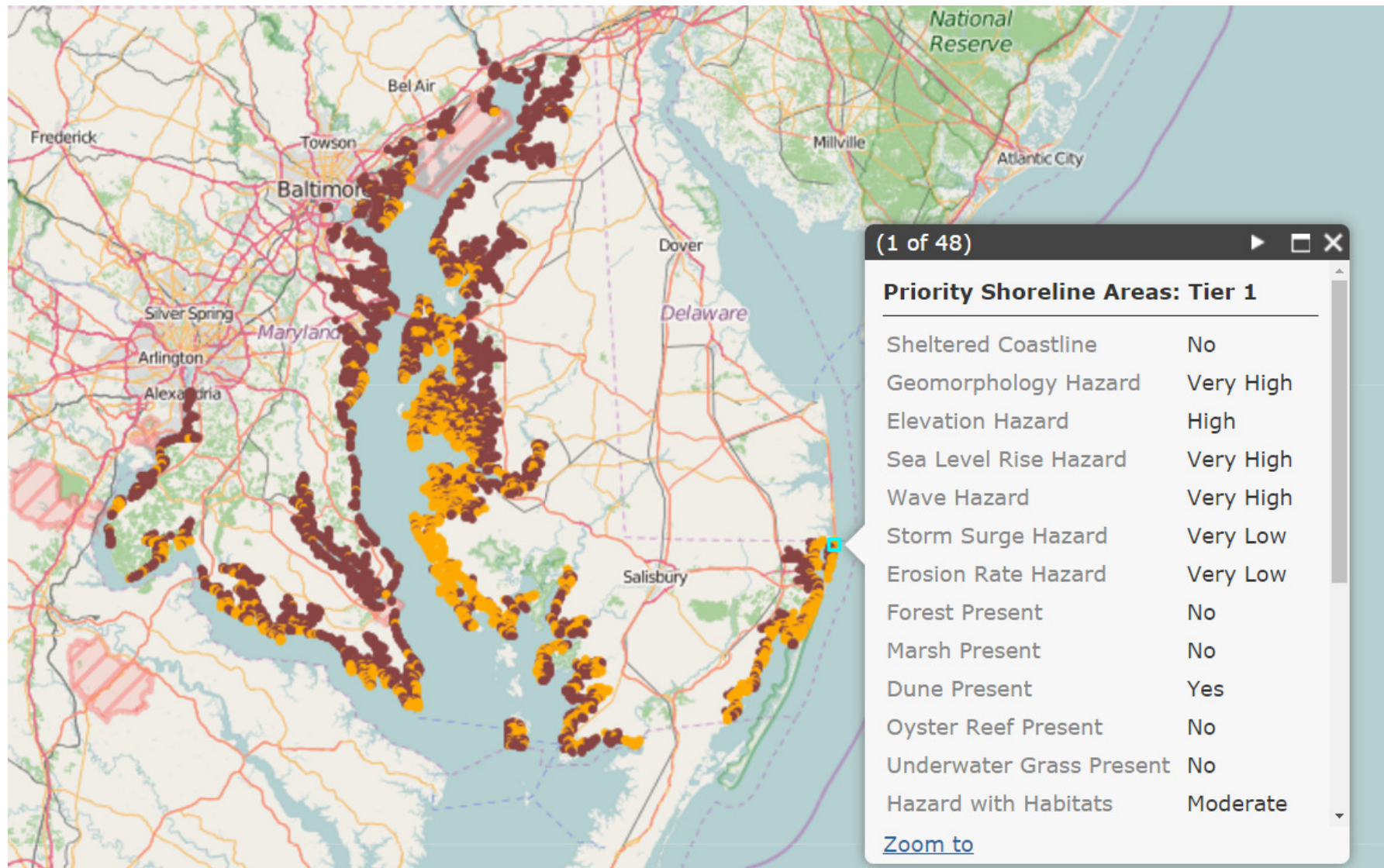
Coastal Resiliency Data Layers:

- Priority Shoreline Areas
- Shoreline Hazard Index
- Hazard Reduction by Habitat
- Marsh Protection Potential Index
- Community Flood Risk Areas

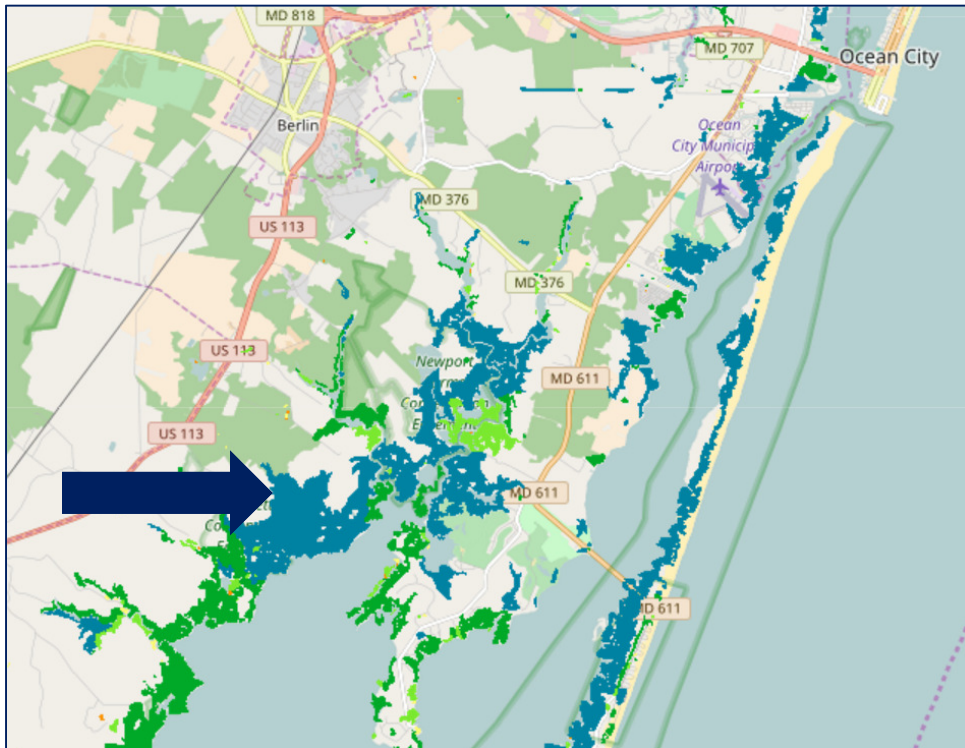


Data Access: Coastal Atlas

dnr.maryland.gov/ccs/coastalatlus/



Exploring Resiliency Data



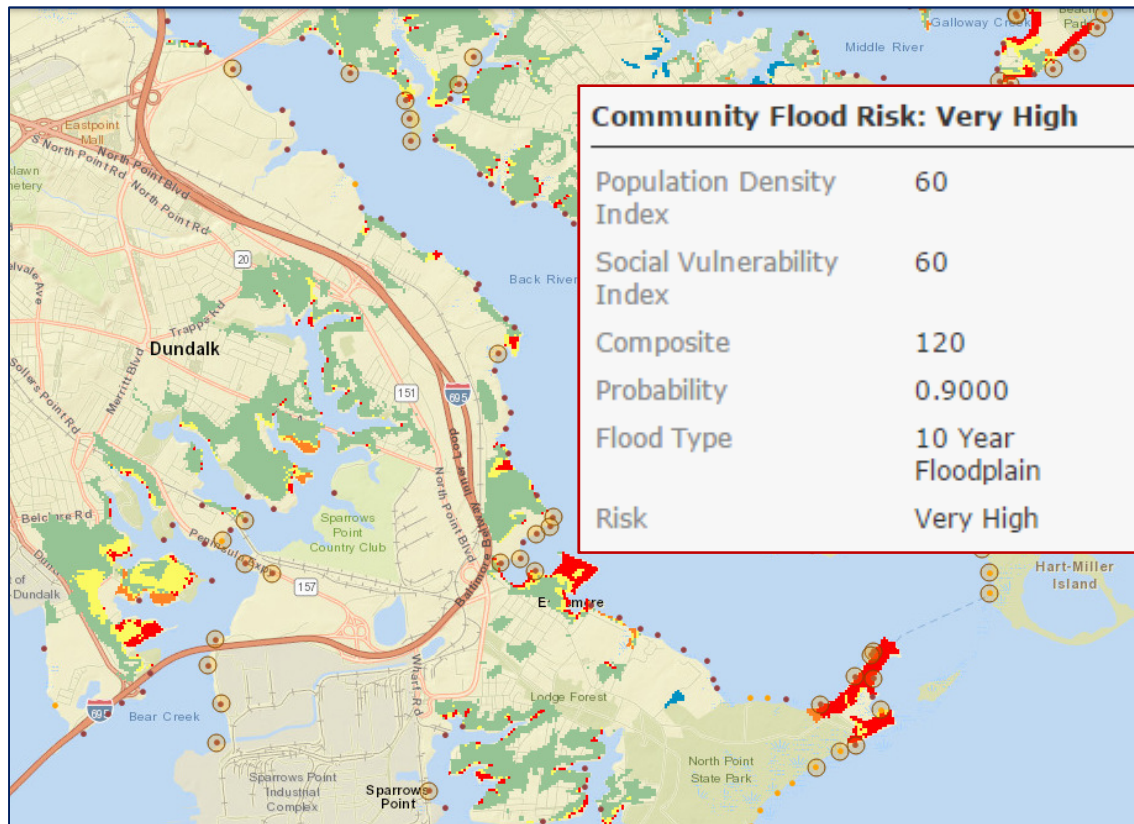
Very High Protection Potential: Score 17 out of 25	
Habitat Score	2
Persist Score	2
Area Score	4
People Score	4
Hazard Score	5
Total Score	17
Overall Rating	Very High

The Index ranks marshes based on their ability to protect people from coastal hazards. Conservation/restoration decisions should be made following site level analysis.

Targeting Mitigation through Data Queries



*Selection of data based on Program priorities or objectives.
Personalized Queries available upon request.*



Legend ⤴ ✕

Conservation Priorities based on Community Flood Risk_Query Result

- Tier 1
- Tier 2

Coastal Resiliency Assessment

Priority Shoreline Areas

- Tier 1
- Tier 2

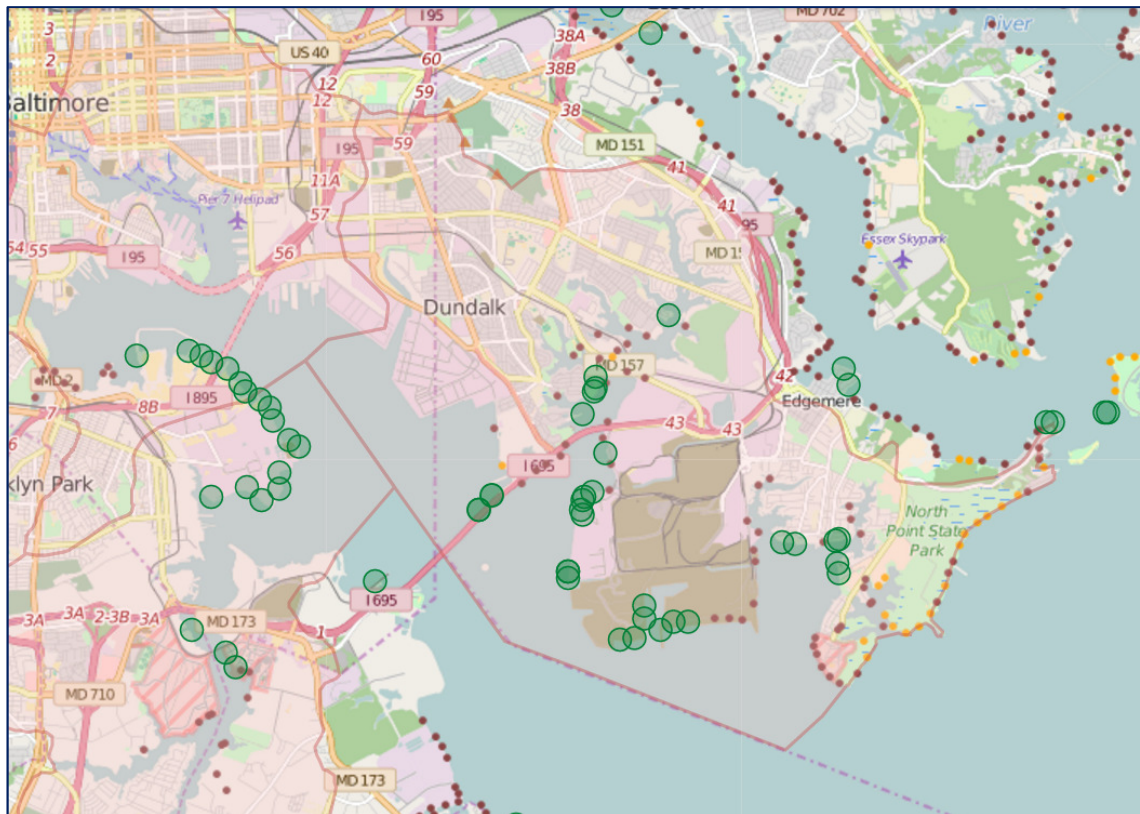
Community Flood Risk Areas

- Very High
- High
- Moderate
- Low
- Very Low

Targeting Mitigation through Data Queries



*Selection of data based on Program priorities or objectives.
Personalized Queries available upon request.*



Legend

Creation Opportunities _Query Result



Trust Fund Water Quality Priorities _Query Result



Coastal Resiliency Assessment

Priority Shoreline Areas

- Tier 1
- Tier 2

State Data Integration



- **DNR Land Acquisition Program**
 - GreenPrint Ecological Scorecard
 - Conservation Targeting
 - Resilience Easements

- **2016 State Hazard Mitigation Plan**
 - Coastal Hazards Risk Assessment
 - High Priority Mitigation Implementation Strategy: Coastal Restoration to Mitigate Hazards for Vulnerable Communities



AUGUST 2016

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Want to Learn More?



Coastal Resiliency Assessment Training Manual

June 2016



A screenshot of an ESRI Story Map titled "Citizen Engagement through Participatory Mapping (PGIS)". The page header includes the title "Using the Coastal Atlas to Make Better Decisions" and the "Chesapeake and Coastal Service" logo. Below the header are navigation tabs for "Coastal Resiliency", "Recreational Planning", "Land Conservation", and "Working Waterfronts". The main content area features a grid of images showing people participating in mapping workshops. The text on the page explains that Maryland relies on local experts to share their knowledge and stories about where Maryland's water and shoreline are in high demand. It describes how the Geographic Information System (GIS) is used in participatory GIS (PGIS) mapping workshops, where local experts share their knowledge about where, when, and how people enjoy certain areas. Participants draw polygons on a projected map image that represent general and dominant footprints of where activities take place. The text also mentions that four workshops have been held as part of an ongoing effort to collect recreational use data across Maryland. A list of locations is provided: Atlantic Ocean, Western Maryland, Choptank River, and Potomac River.

For more information:
[http://dnr.maryland.gov/ccs/Pages/
CoastalResiliencyAssessment.aspx](http://dnr.maryland.gov/ccs/Pages/CoastalResiliencyAssessment.aspx)



Questions?

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Thanks to NOAA and our Steering committee!