

The Science to Implementation Pathway for Resilient Coastal Ecosystems

Resilient Coastal Wetland and Coastal Communities

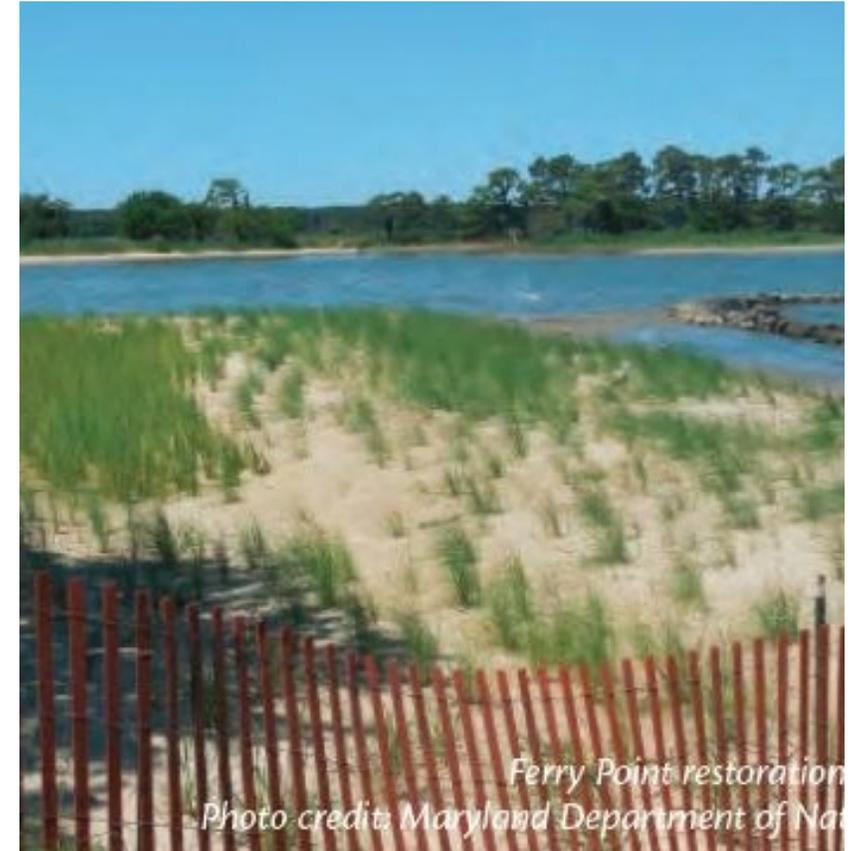
EPA Multi-Regional Workshop 5/24 – 5/25

Christine Conn, Ph.D.
Chesapeake and Coastal Service

Building Resilience to Climate Change Policy



“It is the policy of the Maryland Department of Natural Resources to make sound investments in land and facilities and to manage its assets and natural resources so as to better understand, mitigate and adapt to climate change.” (2010)



Marsh Migration Mapping

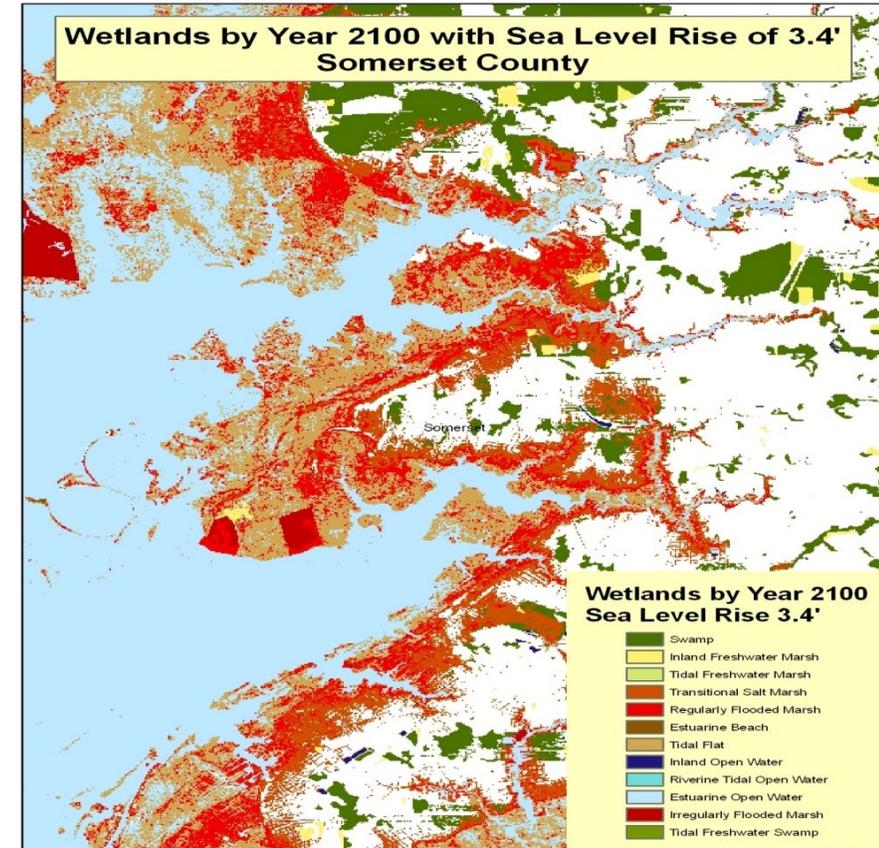


GIS based Sea-Level Affecting Marshes Model (SLAMM) assessed for 2050 and 2100 sea-level rise scenarios

Data Considered: Elevation, accumulation of sediments, wetland accretion and erosion rates, and sea level rise.

Resulting marsh migration areas were prioritized

Habitat Features Considered: Large continuous wetland areas, wetland diversity, new wetland areas, breeding marsh-dependent birds, future wetland areas by year 2100, existing non-wetland hydric soils, and Maryland's Green and Blue Infrastructure Assessments.

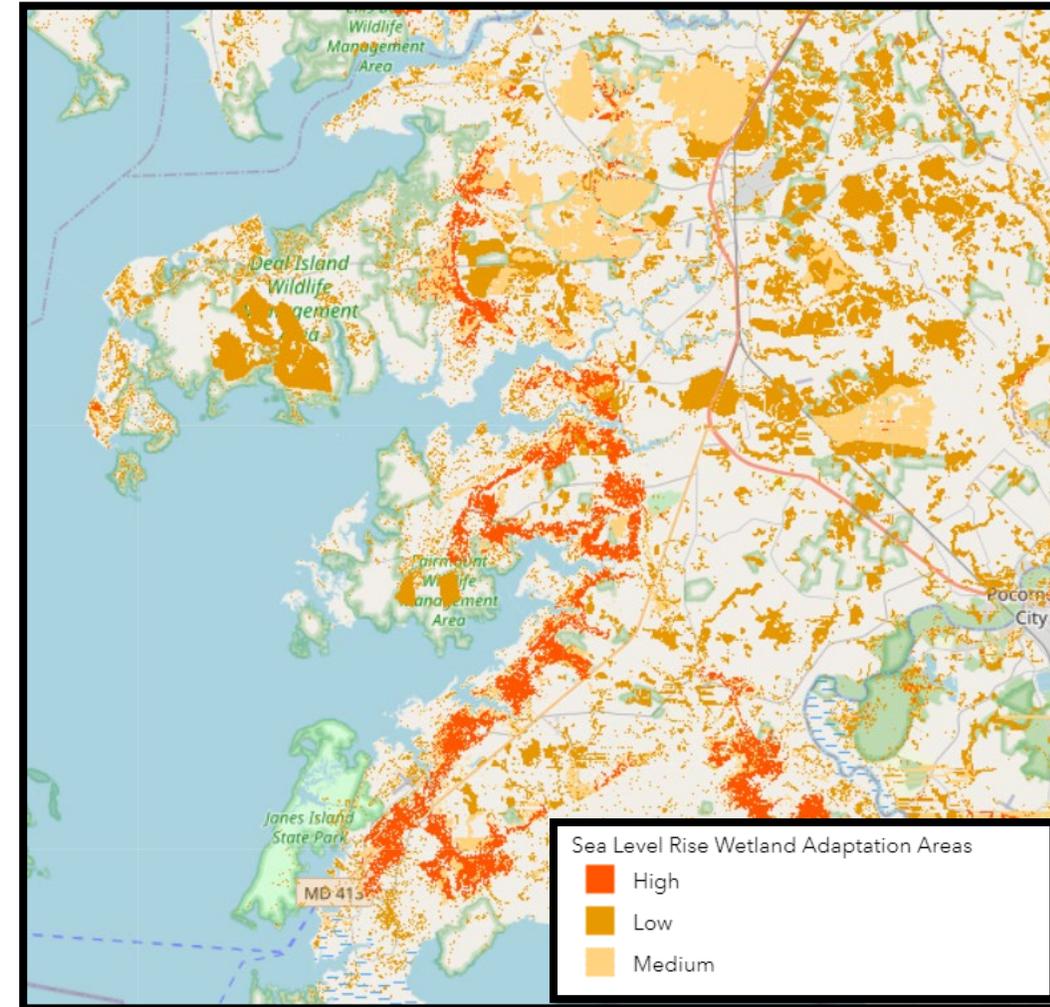


Identifying Wetland Adaptation Areas (WAA)



Low, Medium and High Priority Wetland Adaptation Areas were mapped:

- Top two tiers (medium and high priority areas) of the Wetland Adaptation Areas were selected as conservation priorities.
- WAAs on a property may trigger consideration for Coastal Resilience Easements.



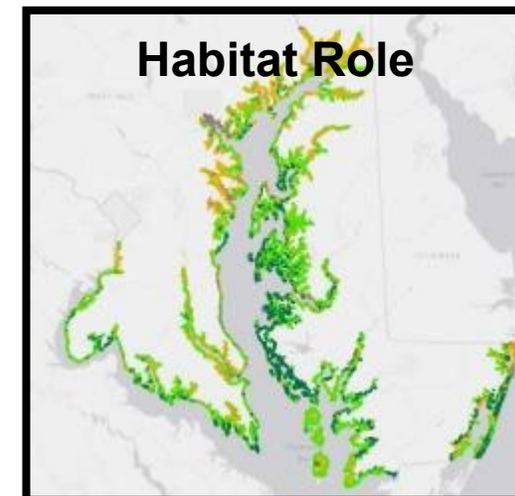
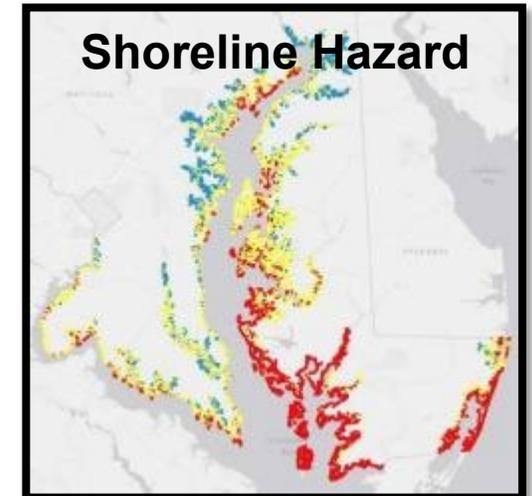
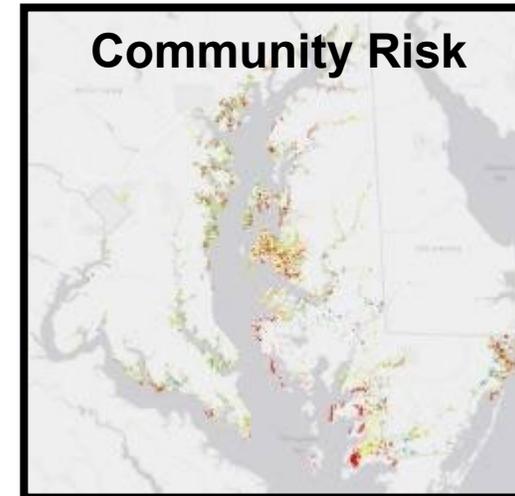
Coastal Resiliency Assessment



Proactively identify, protect, and enhance coastal habitats that provide risk reduction benefits to residents impacted by coastal hazards.

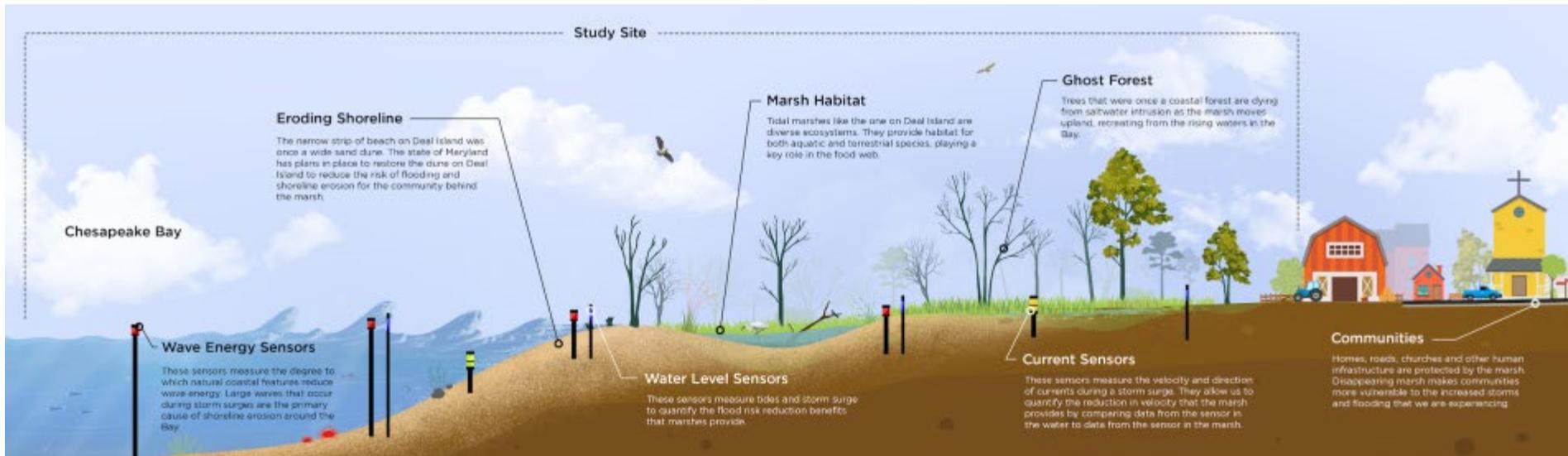
- Identify flood-prone vulnerable communities
- Identify shorelines prone to coastal flooding and erosion
- Identify shorelines with protective coastal habitats
- Develop DNR shoreline priorities for natural solutions

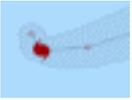
<https://dnr.maryland.gov/ccs/coastalatlus/Pages/CoastalResiliencyAssessment.aspx>





Upcoming: Ecological Effects of Sea Level Rise (SLR)



-  Sea-level rise
-  Extreme events
-  Marsh migration and conservation
-  Management actions

Coastal Flood Hazards Modeling with site-level data to inform statewide coastal protection mapping.

Scenario-based simulations can compare the benefits of various management actions.

<https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/md/Pages/EESLR-Study.aspx>



Accounting for Maryland's Ecosystem Services (AMES)



Ecosystem services are any benefit that people receive from the environment

Air Pollution Removal	Nitrogen Removal
Carbon Sequestration	Biodiversity/Wildlife Habitat
Groundwater Recharge	Surface water Recharge
Stormwater Mitigation/Flood Prevention	

Valuation reflects the many different investments in protecting or replacing the environment

- In a market
- Cost of restoration
- Avoidance costs
- Through mitigation fees
- Cost to regulate

<https://dnr.maryland.gov/ccs/Pages/Ecosystem-Services.aspx>



The Coastal Atlas: Delivering Decision Support Data



Using the Coastal Atlas to Make Better Decisions

Beneficial Use Coastal Resiliency **Land Conservation** Recreational Planning Working Waterfronts

Targeting and Ranking Land Conservation

DNR's [Land Acquisition and Planning Unit](#) coordinates evaluation all potential land acquisitions based on a thorough screening process. The goal is to be more strategic with available funding; to target land conservation based first on ecological priorities; and to create a more transparent process supported by science.

CCS assists during this screening process by reviewing properties for climate change considerations, including:

- Sensitivity of lands to climate change impact at both spatial and temporal scale (e.g. examining the property's vulnerability to sea level rise and storm surge)

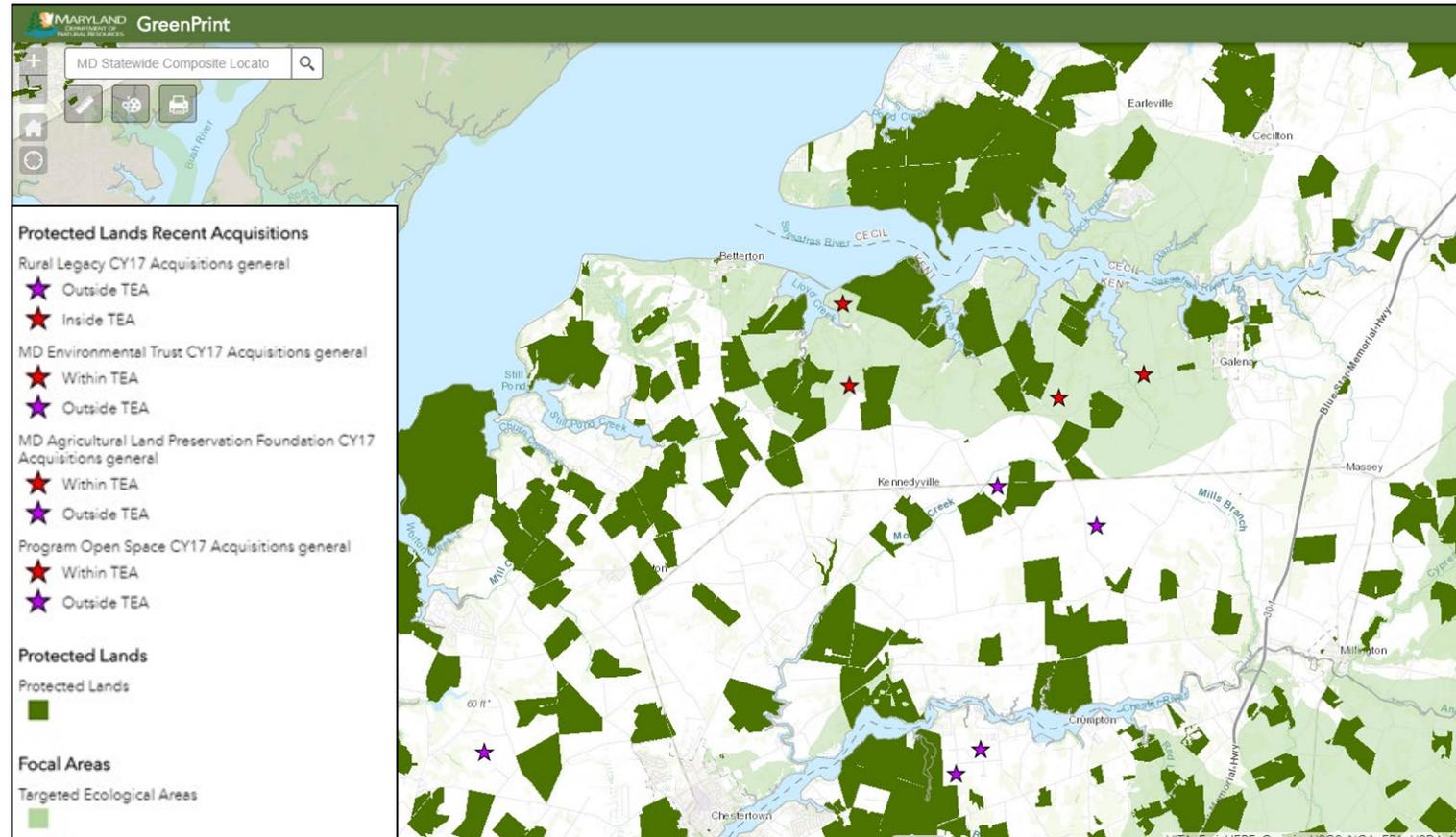
A screenshot of the Maryland Coastal Atlas web application. The browser address bar shows "Coastal Atlas Demo" and "astalatlus/WAB/index.html". The application header includes "Maryland Coastal Atlas" and navigation links for "Maryland iMap", "ICAN", and "Data Catalog Downloads". The main map area displays a satellite-style view of a coastal area with overlaid blue layers representing sea level rise vulnerability. A "Layer List" panel on the right side of the map shows several layers, with "Sea Level Rise Vulnerability" checked and expanded to show sub-layers for "0 to 2 Foot Inundation", "2 to 5 Foot Inundation", "5 to 10 Foot Inundation", "Sea Level Rise Vulnerable Wetlands", "Sea level Rise Wetland Adaptation Areas", "Shellfish", "Shoreline Inventory", "Shoreline Rates Of Change", and "Storm Surge". A video player at the bottom of the screenshot shows a play button and a 00:45 duration.

<https://dnr.maryland.gov/ccs/coastalatlus/Pages/default.aspx>

GreenPrint: Delivering Conservation Priorities



- Identifies Targeted Ecological Areas (TEAs)
 - most ecologically valuable areas in the state
- Conservation Priorities
 - Aquatic/Terrestrial Biodiversity
 - Green Infrastructure Network
 - Water Quality
 - Important Fisheries
 - Climate Resilience
- Accountable, Transparent, and Ecologically Defensible Investment Decisions



<https://geodata.md.gov/greenprint/>

DIY Parcel Evaluation Tool



- Target audience is land trusts and other conservation partners
- Ratings based on land acquisition criteria
 - Ecological values
 - Climate resilience benefits
 - Public land management

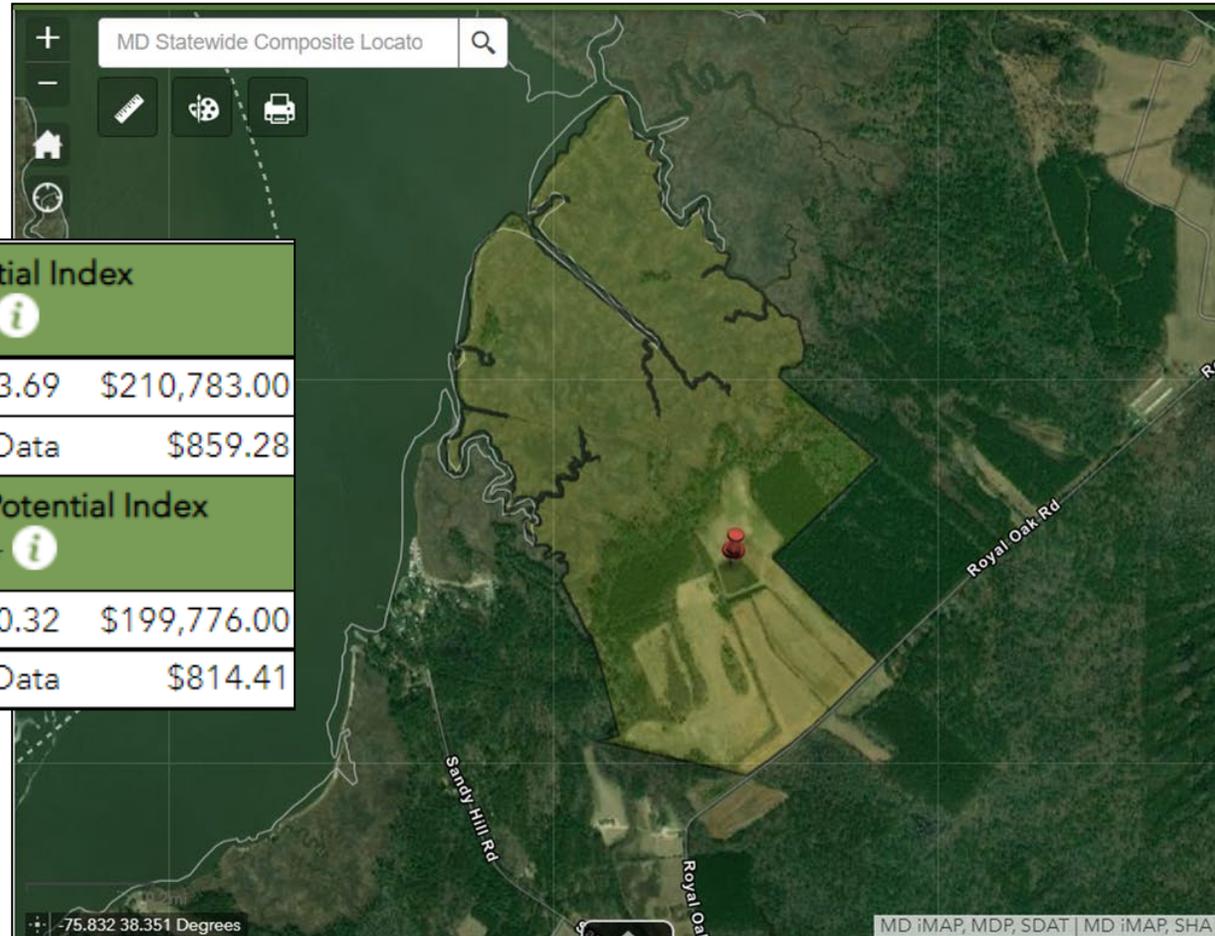
The screenshot displays the 'Parcel Evaluation' tool interface. On the left is a map showing a parcel highlighted in yellow, situated near a waterway labeled 'WICOMICO'. On the right is a detailed assessment report titled 'Conservation Benefits Assessment'. The report includes a 'Print Report' button and the following information:

Parcel Analyzed
Account ID: 2303006166
Tax Map: 0034
Parcel ID: 0004
Parcel size: 246.65 acres
Targeted Ecological Area: 75.39 acres

Ratings are partially based on field surveys, but not all parcels have been surveyed. The data used to rate parcels are updated as new information is gathered and processed. Ratings may not reflect the most recently gathered data available or the parcel's actual ecological value if surveys have not been conducted.

Benefits Rating	Ecosystem Services
Habitat Connectivity ⓘ	★★★★★
Rare Species & Wildlife Habitat ⓘ	★★★★★
Support of Aquatic Life ⓘ	★★☆☆☆
Forests Important for Water Quality Protection ⓘ	★★★★☆
Targeted Ecological Area ⓘ	YES
Coastal Community Resiliency ⓘ	★★★★★
Future Wetland Habitat ⓘ	★★★★★
Proximity to Protected Lands ⓘ	★★★★★

Parcel Scale Ecosystem Service Assessment

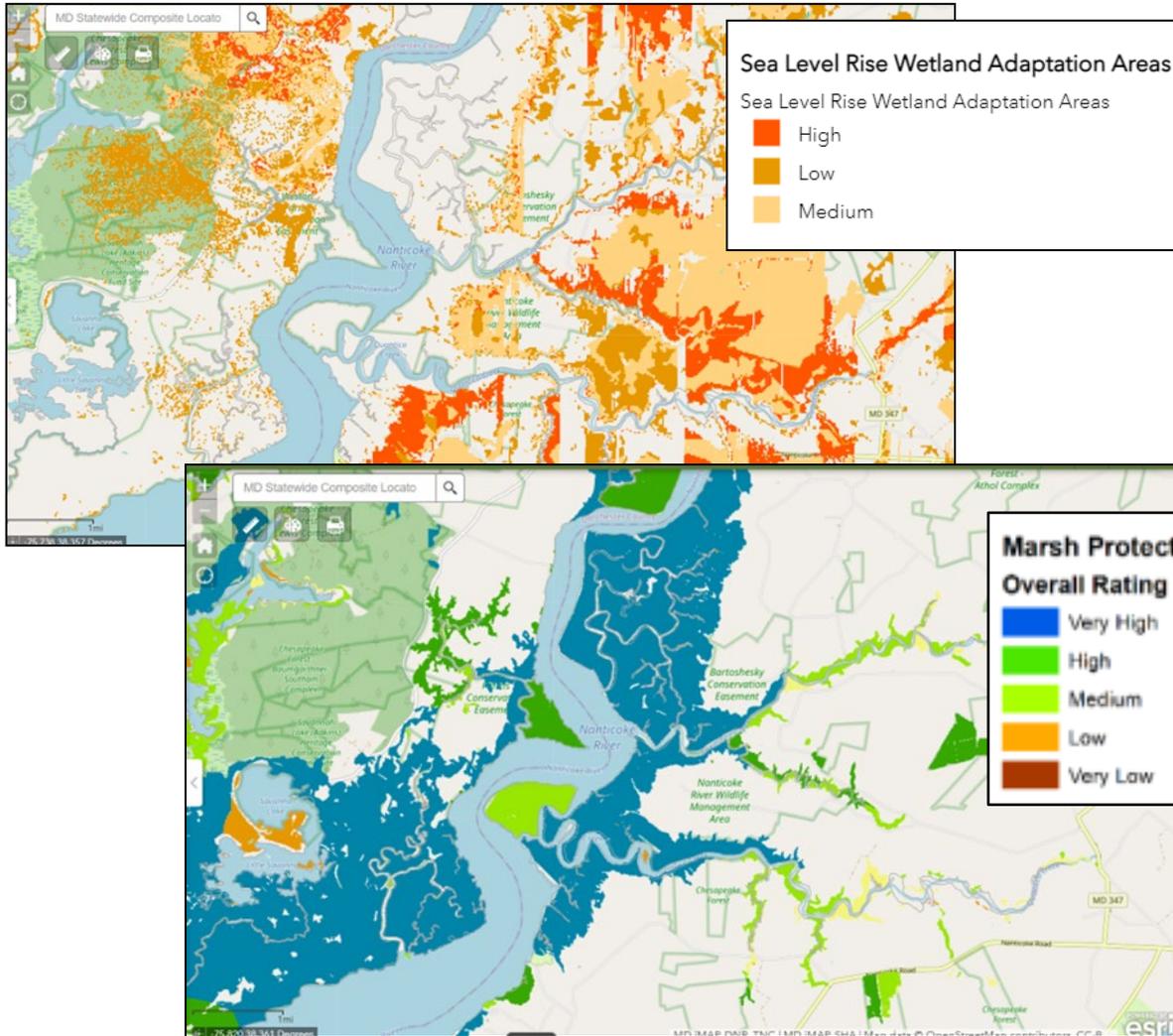


Stormwater Mitigation Potential Index (1 = low to 5 = high)* <i>i</i>		
Annual Parcel-Level Values*	3.69	\$210,783.00
Annual Per-Acre Values**	No Data	\$859.28
Wildlife Habitat and Biodiversity Potential Index (0 = low to 100 = high)* <i>i</i>		
Annual Parcel-Level Values*	90.32	\$199,776.00
Annual Per-Acre Values**	No Data	\$814.41

Parcel Evaluation <i>^</i> <i>x</i>		
Annual Per-Acre Values**	0.96	
Air Pollution Removal: Particulate Matter(PM _{2.5}) (kg per year) <i>i</i>		
Annual Parcel-Level Values*	53.06	\$314.88
Annual Per-Acre Values**	0.22	\$1.28
Carbon Sequestration (mT per year) <i>i</i>		
Annual Parcel-Level Values*	43.54	\$8,212.45
Annual Per-Acre Values**	0.18	\$33.48
Groundwater Recharge (m ³ per year) <i>i</i>		
Annual Parcel-Level Values*	20487.56	\$78,201.00
Annual Per-Acre Values**	83.52	\$318.80
Nitrogen Uptake Potential Index (1 = low to 3 = high)* <i>i</i>		
Annual Parcel-Level Values*	1.00	\$148,832.00
Annual Per-Acre Values**	No Data	\$606.73
Stormwater Mitigation Potential Index (1 = low to 5 = high)* <i>i</i>		
Annual Parcel-Level Values*	3.69	\$210,783.00
Annual Per-Acre Values**	No Data	\$859.28
Wildlife Habitat and Biodiversity Potential Index (0 = low to 100 = high)* <i>i</i>		
Annual Parcel-Level Values*	90.32	\$199,776.00
Annual Per-Acre Values**	No Data	\$814.41
Surface Water Protection <i>i</i>		
Annual Parcel-Level Values*	No Data	\$0.00

<https://dnr.maryland.gov/ccs/Pages/Ecosystem-Services.aspx>

GreenPrint Scorecard Captures Climate Resilience Benefits



MARYLAND DEPARTMENT OF NATURAL RESOURCES		POS Stateside Scorecard		Final Score	
Property:	XXXXXXXXXXXXXXXXXXXX	County:	XX	Final Score 32	
		Map / Parcel:			
		In Targeted Ecological Area?	No		
Land:	Ecological Value (Total available points = 85, capped at 50)				
	A. Wildlife Habitat Connectivity (0 - 10 points)				
	B. Rare Species (0 - 10 points)				
	C. Support of Aquatic Life (0 - 10 points)				3.2
	D. Forests Important for Water Quality Protection (0 - 10 points)				3.2
	E. In a Targeted Ecological Area (TEA) (25 points)				
	F. Restoration Opportunity (0 - 10 points)				
	G. Climate Change Adaptation: Future Wetland Habitat (0 - 10 points)				1
				Pre-cap score:	10.7
				Capped at:	50.0
				Final subtotal score:	16.7
People:	Enhancing Public Access and Recreational Opportunities (Total available points = 85, capped at 50)				
	A. Creation of New Opportunity (0 - 40 points) - If yes, project only eligible for additional points in D, E, and F				
	B. Expansion/Connection of Existing Recreational Opportunity (0 - 25 points)				
	C. Land Management: Inholding or Adjacency of Existing Protected Area (0 - 40 points)				
	D. Buffer to Existing Recreational Lands/L areas Landscape Protection (0 - 25 points)				
	E. Coastal Community Resiliency to Climate Change Impacts (0 - 10 points)				1
	F. Historic or Cultural Importance (0 - 10 points)				
				Pre-cap score:	11
				Capped at:	50
				Final subtotal score:	15
				Final Score: Total of Land + People	31.8
				(Maximum 100 points)	

Coastal Resiliency Easement



Standard Easement Provisions:

- 100-foot stream buffer
- Implementation of a Soil Conservation and Water Quality Plan within one year
- No conversion of woodland areas

Coastal Resiliency Easements:

- Implementation of a **Coastal Resiliency Management Plan (CRMP)** within two years



Coastal Resiliency Management Plan (CRMP)



Delineation of a wetland adaptation buffer to allow wetland migration

- 2050 Sea-level Rise projections,
- 2100 Wetland Adaptation Areas
- Field indicators of tidal influence and increased soil salinity

Management recommendations within the buffer

- No conversions
- No fertilizer or pesticide applications
- Viable restoration opportunities
- Seeding and planting guidance appropriate to soils, salinity levels and tidal influences
- Control of Phragmites and other invasives
- Others as needed

Science Needs



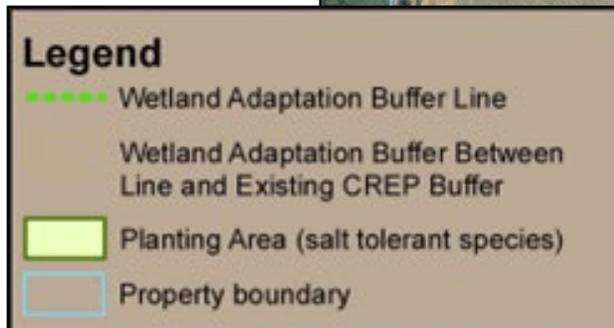
Coastal Resiliency Management Plan (CRMP)



Updated at least every ten years:

- Changes to the ecology of the property
- updated sea-level rise models
- new management techniques
- any unforeseen issues

**Science
&
Policy
Needs**



Targeted Resiliency Areas



- Landscape scale focus areas for conservation and restoration
- Produces nature-based project portfolios that yield
 - Resilience and additional water quality, GHG, habitat and social vulnerability benefits
- Connects federal, state and local efforts to harness nature for risk reduction
- Project pipeline poised for new funding opportunities

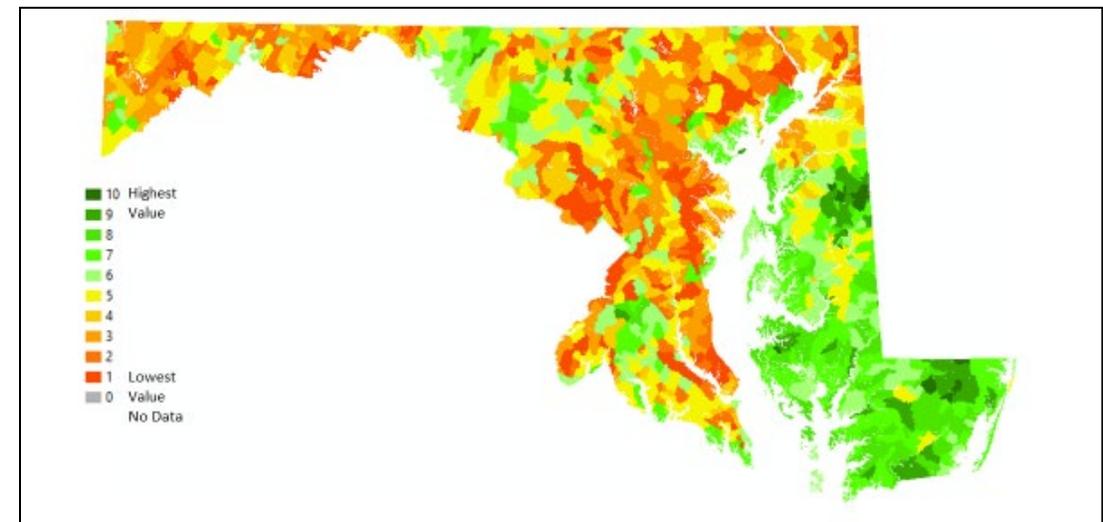
DNR Priority Assets

Important ecosystems, resource-based economies, state lands

Climate Change Impact Areas

Exposure to Inland and Coastal flood and sea level rise

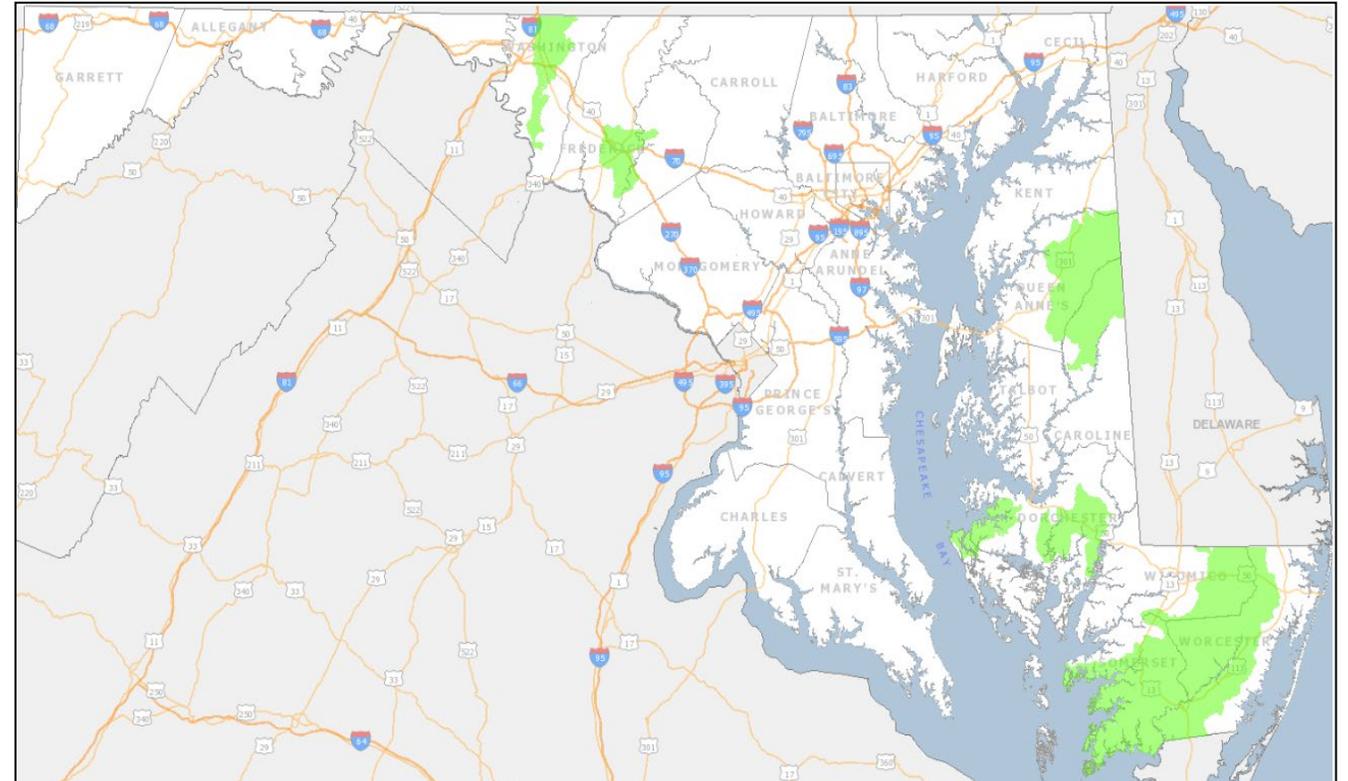
Opportunities for Natural and Nature Based Feature Projects
Conservation and Restoration Suitability



Candidate Targeted Resiliency Areas (TRAs)



- 2 TRAs will be selected
 - Inland/western shore
 - Coastal/eastern shore
- Technical and community outreach provided
- Project portfolios and funding strategies developed by June 2023

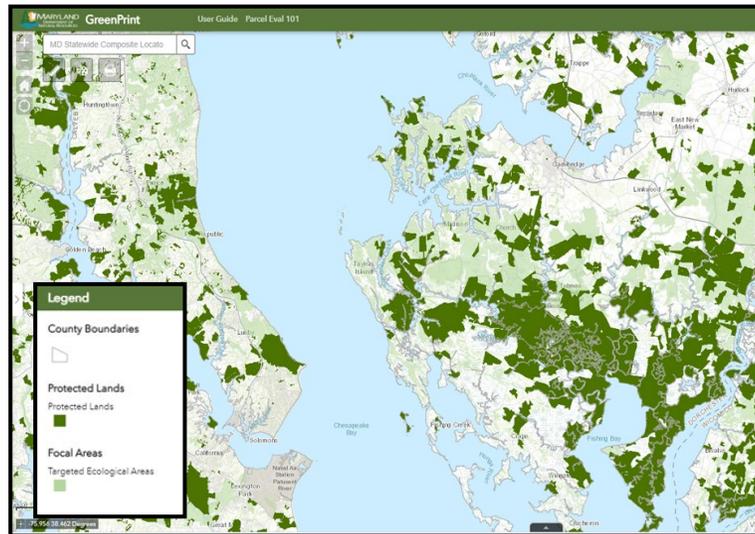


Strategic Frameworks Attract Investment



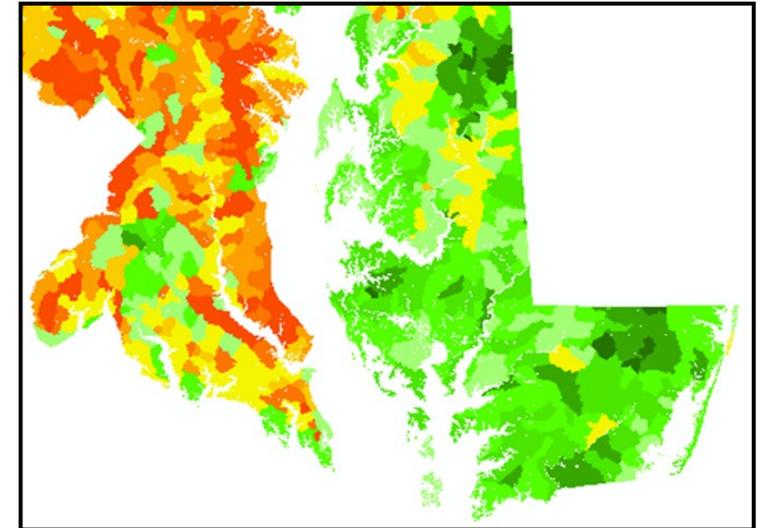
GreenPrint Targeted Ecological Areas

- Conservation Focus



Targeted Resiliency Areas

- Resiliency and Restoration Focus



Funding and Partnership Attractor

Good Investments in Good Planning
Collaboration Achieves Mutual Goals



Contact Information
Christine Conn
Christine.conn@maryland.gov