Mapping the Co-Benefits of Conservation and Restoration Opportunities across Maryland

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DNR has a large suite of data that allows for identification of conservation and restoration opportunities, as well as prioritization of opportunities based on relative value of existing or potential co-benefits.

In this presentation we will outline

- Conservation Targeting Conservation prioritization data
- Restoration opportunity targeting data
- Restoration co-benefit data
- Climate resiliency co-benefit data
- What this data can show us about existing MET properties
- How this data could be used to guide future planning and decision making

Conservation Opportunities and Prioritization

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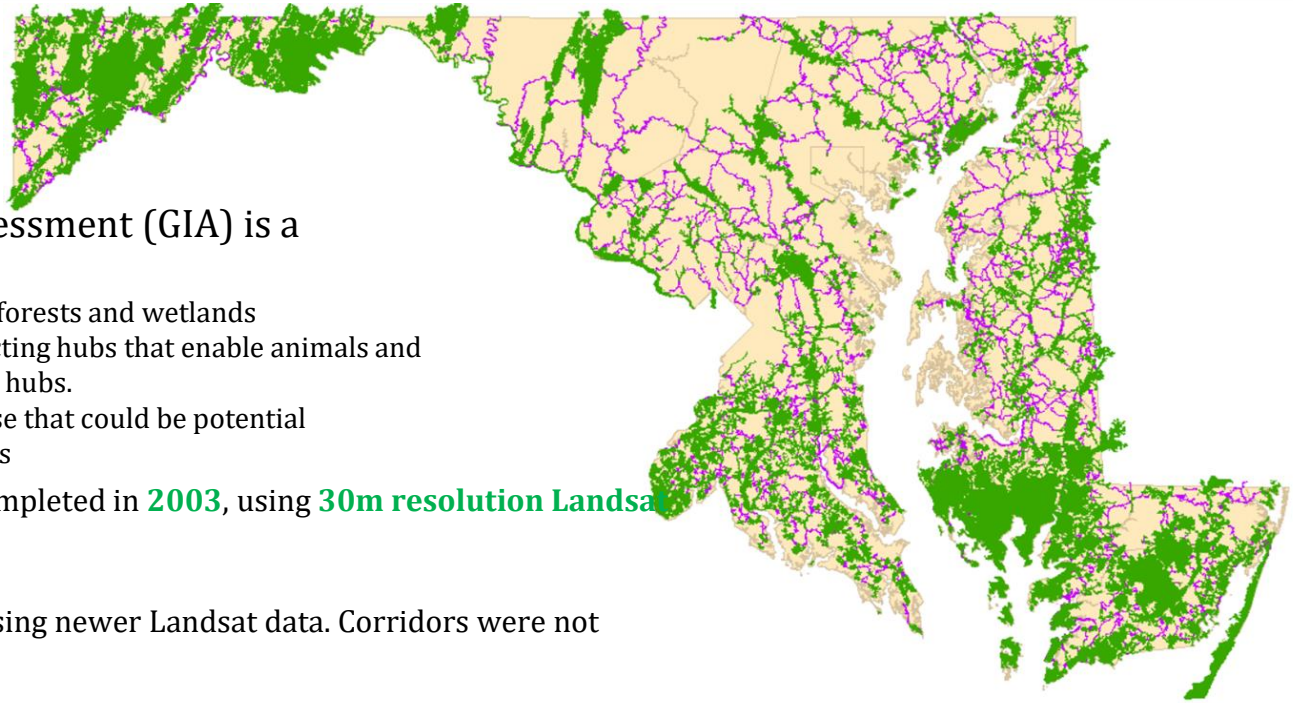
Maryland's Green Infrastructure Assessment

Maryland's Green Infrastructure Assessment

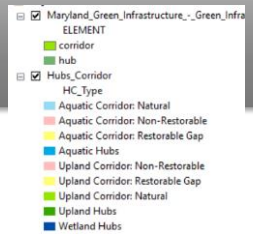


- The Green Infrastructure Assessment (GIA) is a connected network of:
  - **Hubs** - large contiguous blocks of forests and wetlands
  - **Corridors** – linear features connecting hubs that enable animals and plant propagules to move between hubs.
  - **Gaps** – areas of non-natural landuse that could be potential candidates for restoration activities
- Original GIA hubs and corridors completed in **2003**, using **30m resolution Landsat** landcover landuse data.
- GIA hubs were updated in **2010**, using newer Landsat data. Corridors were not remapped at that time.
- For the 2010 update, the definition for forest hubs we updated based on Wildlife and Heritage Services FIDS criteria -> **> = 50 acres contiguous Forest, contain > = 10 acres of forest interior habitat**

Maryland's Green Infrastructure

- Update analysis is the Chesapeake Conservancy Landcover Landuse dataset, which is based on **1m lidar** and aerial imagery, collected in **2018/2019**
- Definition of wetlands was updated to reflect changes to forest criteria made in 2010 – **50 acres** of contiguous wetland – was not possible to isolate only unmodified wetlands using dataset
- Hub and corridor type (upland, wetland, aquatic) will be retained
- For enhanced restoration targeting. GI gaps will differentiate between restorable and non- restorable cover
- In process of being added to Maryland iMap and the GreenPrint Online map-geodata.md.gov/greenprint/

Maryland's Green Infrastructure



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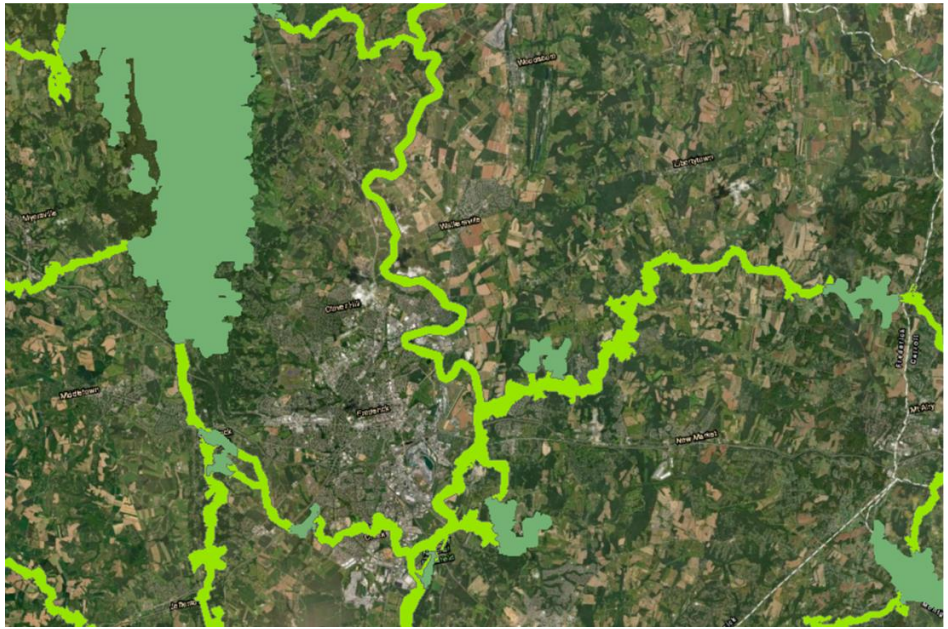
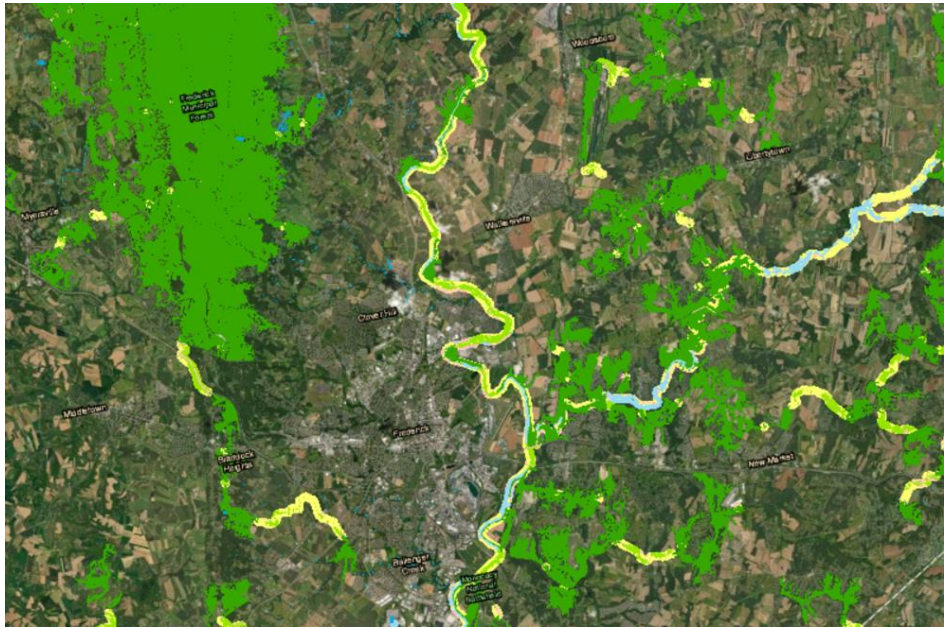
Original GI Hubs and Corridors



New GI Hubs and Corridors



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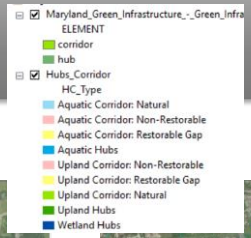
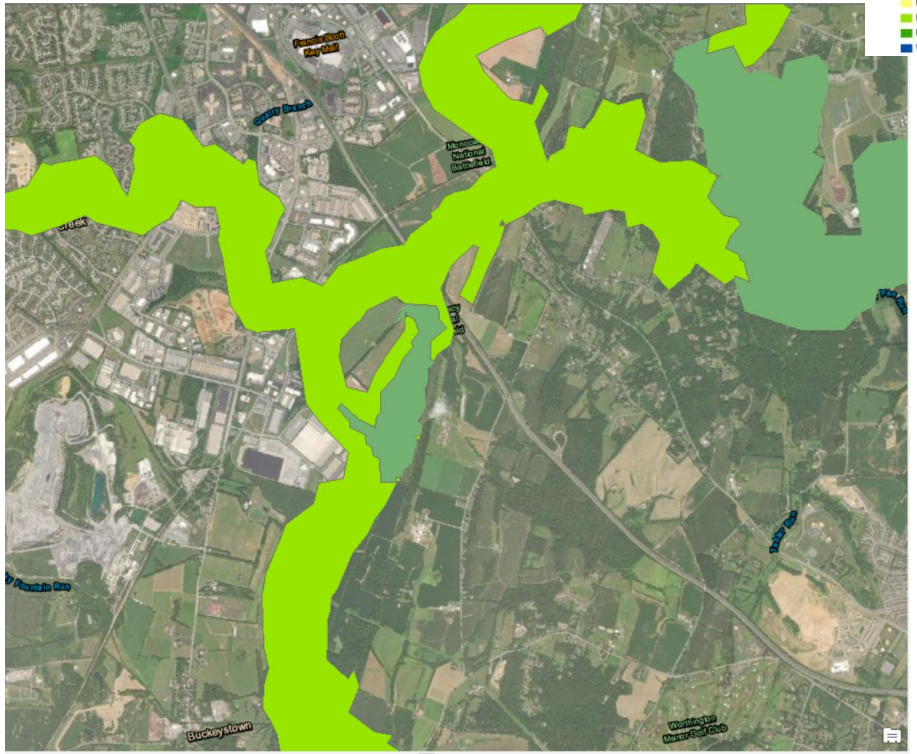
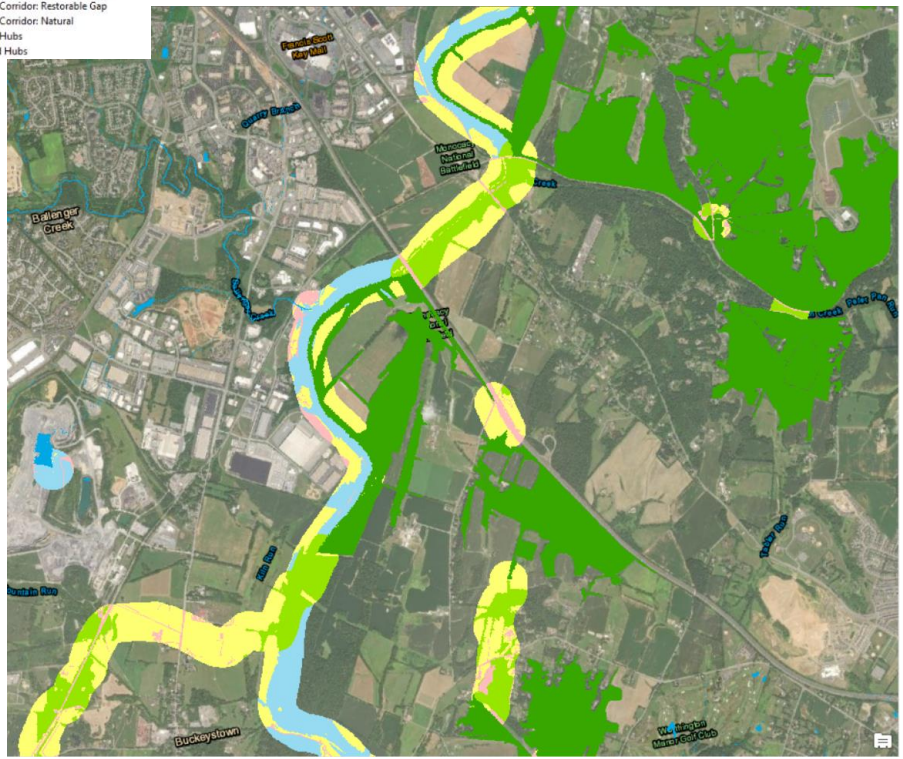


Original GI Hubs and Corridors



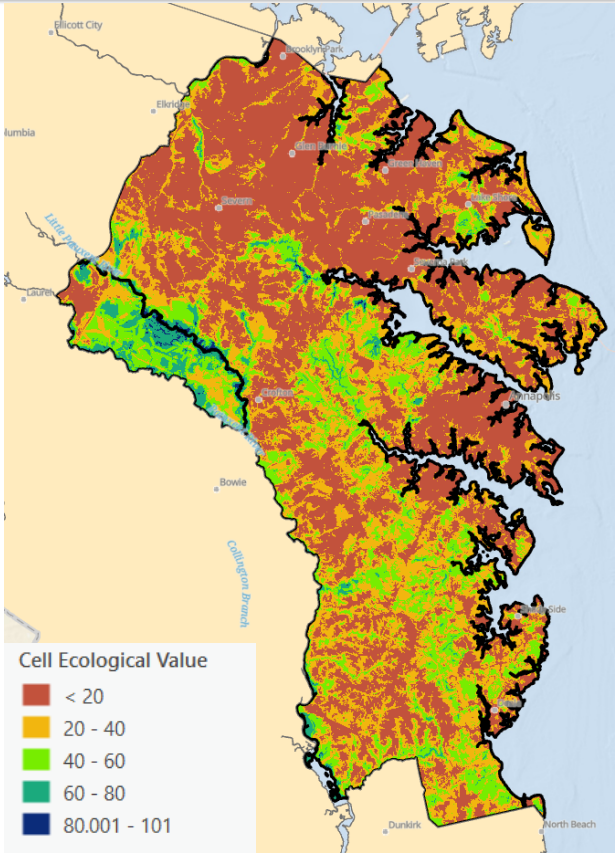
New GI Hubs and Corridors



Maryland's Green Infrastructure: Ecoscore

An important function of the Green Infrastructure Assessment is to provide maps which government agencies and private land trusts can use to help focus their efforts on strategic locations.

To further assist protection efforts, habitat conditions, biological data, connectivity, size and other information were assessed within each hub and corridor. These data were used to assign an **ecological score** for each hub and corridor to help prioritize limited conservation funding.



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Mapping the Co-benefits Of Conservation

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Parcel Evaluation Tool

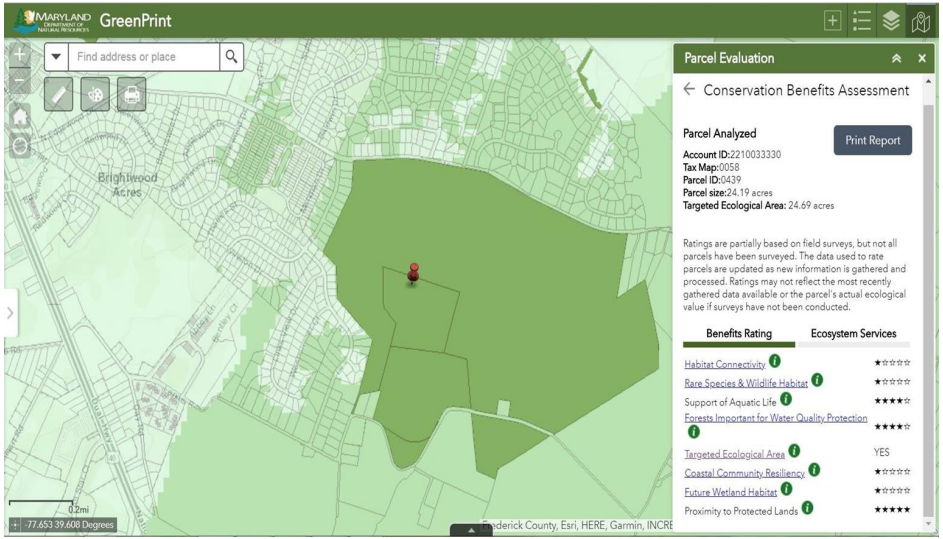
MD DNR Parcel Evaluation Tool

- The **Parcel Evaluation Tool** provides a ***Conservation Benefits and Ecosystem Service Assessment Report Card*** for every land parcel in Maryland

- Report card values reflect many of the ecological priorities established for Stateside Program Open Space (POS)

- Additionally, land trusts have asked for this information to help them target and evaluate lands for protection, as well as to document conservation values for tax benefits

- Tool compliments existing internal DNR parcel evaluation process



Two components:

1) **Conservation Benefit Assessment**

1) **Ecosystem Service Assessment**

MD DNR Parcel Evaluation Tool

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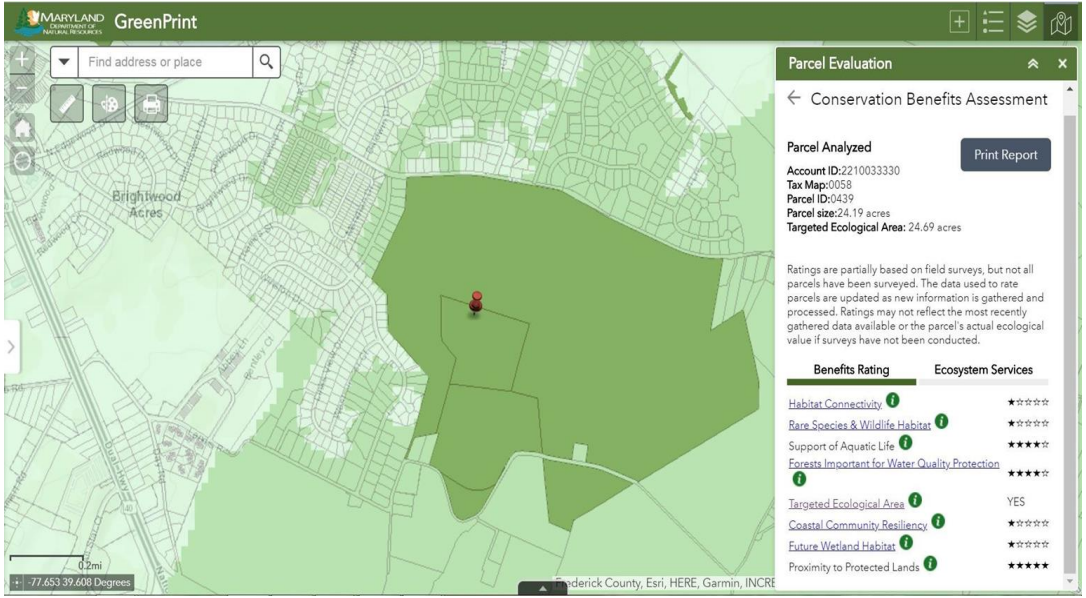
Two components:

1) Conservation Benefit Assessment

1) Ecosystem Service Assessment



NOAA

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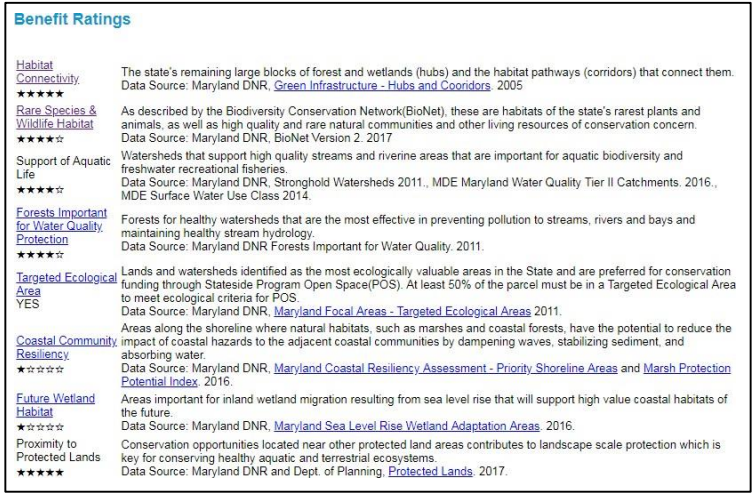
Conservation Co-Benefits Assessment

Conservation Benefit Assessment

Conservation Benefit Assessment

- Provides a “star” benefit rating (1= low to 5 = high) for each of seven categories of ecological benefit
- Benefit rating valuation methods were developed in consultation with experts from units across DNR
- Values are used by the DNR to score lands acquired by the state



Benefit Ratings

Habitat Connectivity ★★★★★	The state's remaining large blocks of forest and wetlands (hubs) and the habitat pathways (corridors) that connect them. Data Source: Maryland DNR, Green Infrastructure - Hubs and Cooridors. 2005
Rare Species & Wildlife Habitat ★★★★☆	As described by the Biodiversity Conservation Network(BioNet), these are habitats of the state's rarest plants and animals, as well as high quality and rare natural communities and other living resources of conservation concern. Data Source: Maryland DNR, BioNet Version 2. 2017
Support of Aquatic Life ★★★★☆	Watersheds that support high quality streams and riverine areas that are important for aquatic biodiversity and freshwater recreational fisheries. Data Source: Maryland DNR, Stronghold Watersheds 2011., MDE Maryland Water Quality Tier II Catchments. 2016., MDE Surface Water Use Class 2014.
Forests Important for Water Quality Protection ★★★★☆	Forests for healthy watersheds that are the most effective in preventing pollution to streams, rivers and bays and maintaining healthy stream hydrology. Data Source: Maryland DNR Forests Important for Water Quality. 2011.
Targeted Ecological Area YES	Lands and watersheds identified as the most ecologically valuable areas in the State and are preferred for conservation funding through Stateside Program Open Space(POS). At least 50% of the parcel must be in a Targeted Ecological Area to meet ecological criteria for POS. Data Source: Maryland DNR, Maryland Focal Areas - Targeted Ecological Areas 2011.
Coastal Community Resiliency ★☆☆☆☆	Areas along the shoreline where natural habitats, such as marshes and coastal forests, have the potential to reduce the impact of coastal hazards to the adjacent coastal communities by dampening waves, stabilizing sediment, and absorbing water. Data Source: Maryland DNR, Maryland Coastal Resiliency Assessment - Priority Shoreline Areas and Marsh Protection Potential Index. 2016.
Future Wetland Habitat ★☆☆☆☆	Areas important for inland wetland migration resulting from sea level rise that will support high value coastal habitats of the future. Data Source: Maryland DNR, Maryland Sea Level Rise Wetland Adaptation Areas. 2016.
Proximity to Protected Lands ★★★★★	Conservation opportunities located near other protected land areas contributes to landscape scale protection which is key for conserving healthy aquatic and terrestrial ecosystems. Data Source: Maryland DNR and Dept. of Planning, Protected Lands. 2017.

Conservation Benefit Assessment

- **Habitat Connectivity** (★★★★★)
  - The state's remaining large blocks of forest and wetlands (hubs) and the habitat pathways (corridors) that connect them.
  - *Data Source:* Maryland DNR, Green Infrastructure - Hubs and Corridors. 2005

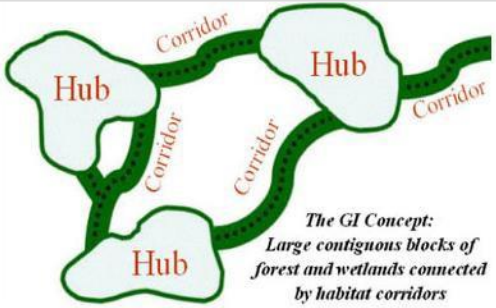


Photo Source: dnr.maryland.gov

- **Rare Species & Wildlife Habitat** (★★★★★)
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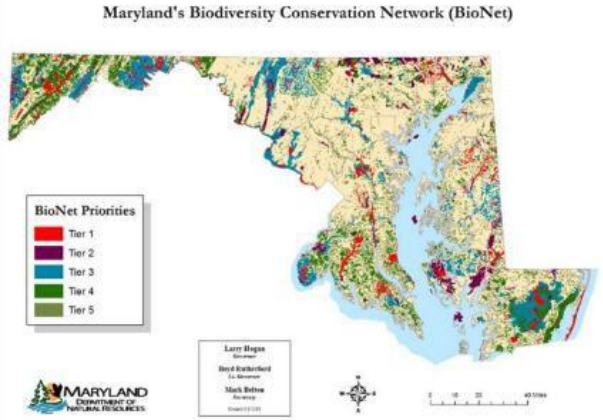

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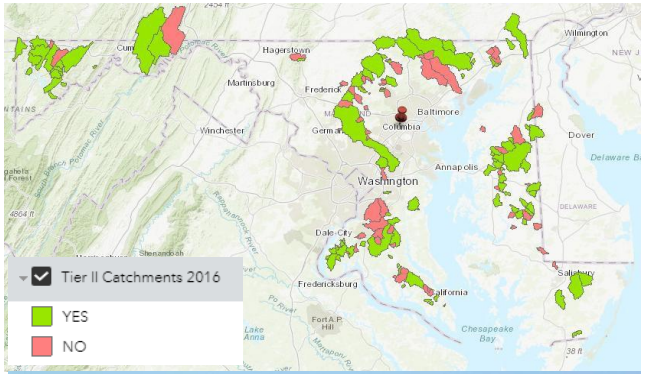
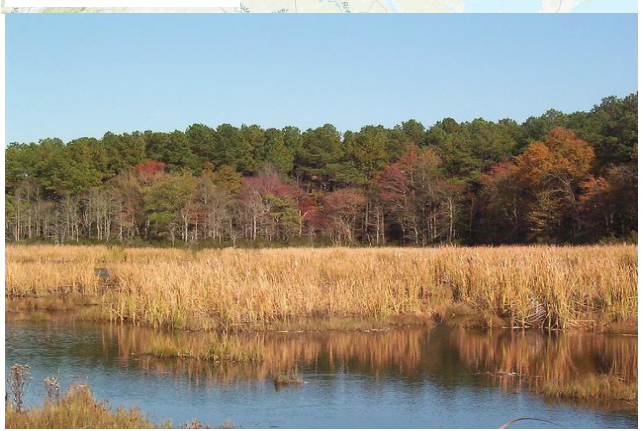
Conservation Benefit Assessment

- **Support for Aquatic Species** (★★★★★)
  - Watersheds that support high quality streams and riverine areas that are important for aquatic biodiversity and freshwater recreational fisheries.
  - *Data Source:* Maryland DNR, Stronghold Watersheds 2011., MDE Maryland Water Quality Tier II Catchments. 2016., MDE Surface Water Use Class 2014.

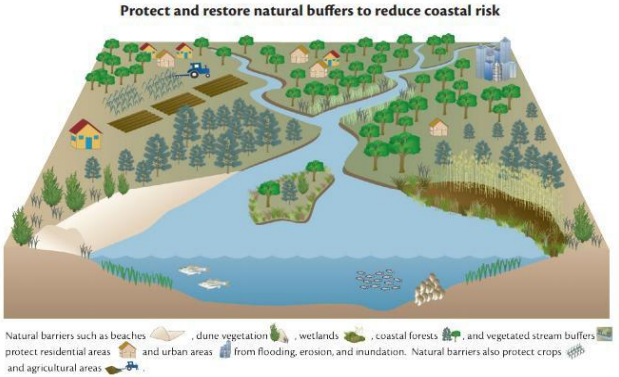


- **Forests Important for Water Quality Protection** (★★★★★)
  - Forests for healthy watersheds that are the most effective in preventing pollution to streams, rivers and bays and maintaining healthy stream hydrology.
  - *Data Source:* Maryland DNR Forests Important for Water Quality. 2011.



Conservation Benefit Assessment

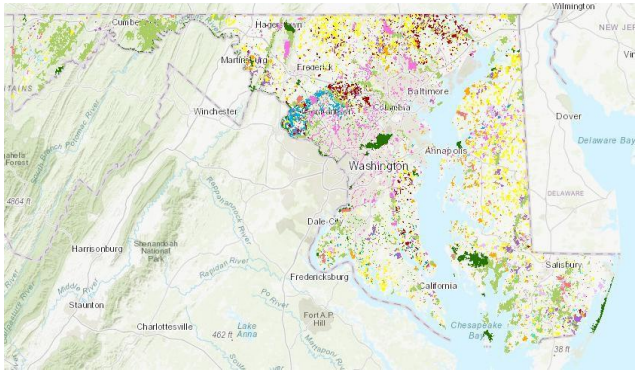
- **Coastal Community Resiliency**
  (★★★★★)
  - Areas along the shoreline where natural habitats, such as marshes and coastal forests, have the potential to reduce the impact of coastal hazards to the adjacent coastal communities by dampening waves, stabilizing sediment, and absorbing water.
  - *Data Source:* Maryland DNR, Maryland Coastal Resiliency Assessment - Priority Shoreline Areas and Marsh Protection Potential Index. 2016.



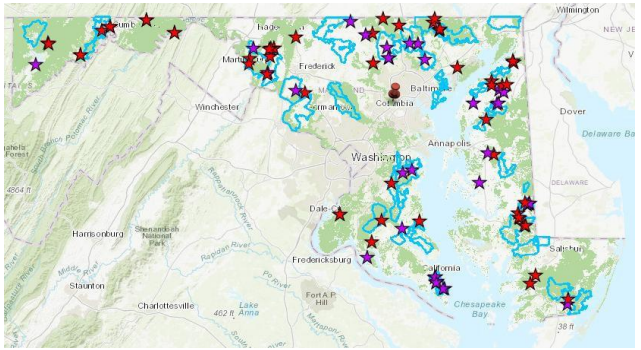
- **Future Wetland Habitat**
  (★★★★★)
  - Areas important for inland wetland migration resulting from sea level rise that will support high value coastal habitats of the future.
  - *Data Source:* Maryland DNR, Maryland Sea

Conservation Benefit Assessment

- **Protected Lands** (★★★★★)
  - Conservation opportunities located near other protected land areas contributes to landscape scale protection which is key for conserving healthy aquatic and terrestrial ecosystems.
    - *Data Source:* Maryland DNR and Dept. of Planning, Protected Lands. 2017.



- **Targeted Ecological Area** (YES or NO)
  - Lands and watersheds identified as the most ecologically valuable areas in the State and are preferred for conservation funding through Stateside Program Open Space(POS). At least 50% of the parcel must be in a Targeted Ecological Area to meet ecological criteria for POS.
  - *Data Source:* Maryland DNR, Maryland Focal Areas - Targeted Ecological Areas 2011.



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Ecosystem Service Assessment

What are Ecosystem Services

Broadly definition:

"*Benefits gained by people from the environment*"

Practical definition, for inclusion in decision making:

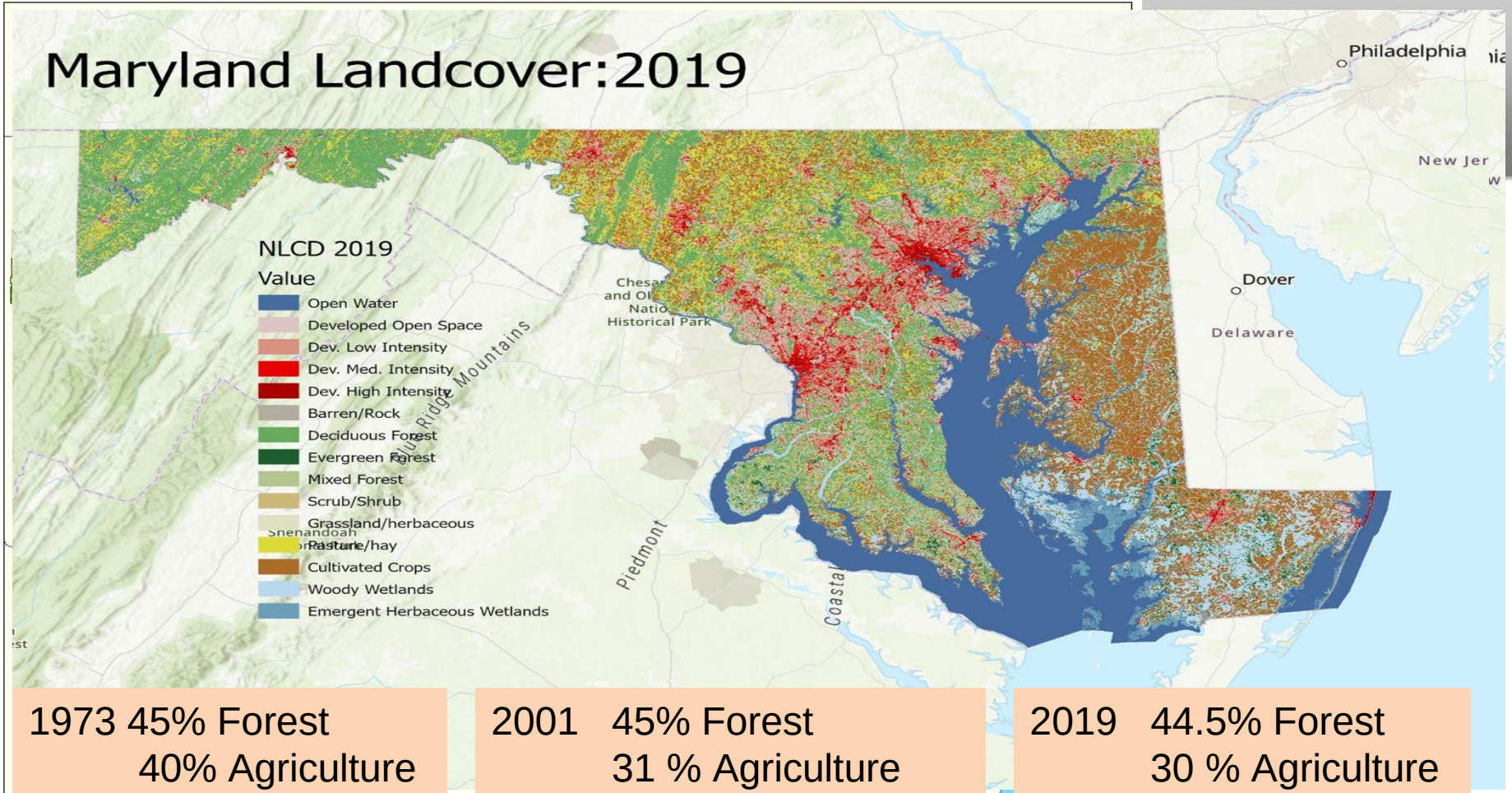
"*Benefits gained by people from the environment that are not already being paid for in a market and are contributing to a marginal increase in human well-being*"

- MD DNR has developed 30m resolution geospatial data to quantify Ecosystem Services (ES) across Maryland's existing forest and wetland areas
  - Forest Extent - 1 m LiDAR forest cover (UMD/NASA) downscaled to 30 m
  - Wetland Extent- NWI (2006) + MD DNR wetlands, polygons converted to 30 m pixel

- ES vary spatially across the landscape in both
  - the biophysical supply of the service (e.g. amount of carbon sequestered)
  - the amount that people benefit (e.g. number of people and value of infrastructure vulnerable to flooding)

- We consider both sources of variation when mapping ES in Maryland

Maryland Landcover:2019



1973 45% Forest
40% Agriculture
10% Developed

2001 45% Forest
31 % Agriculture
19% Developed

2019 44.5% Forest
30 % Agriculture
21% Developed

The Eco-Price Method for Valuing Ecosystem Services

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- Ecosystem services are paid for in many different ways

- We look at the many different ways society invests in protecting or replacing the environment
  - In a market
  - Cost of restoration
  - Avoidance costs
  - Through mitigation fees
  - Cost to regulate

This method assesses the **Social Value** for decision making which is not the same as **Market Value**

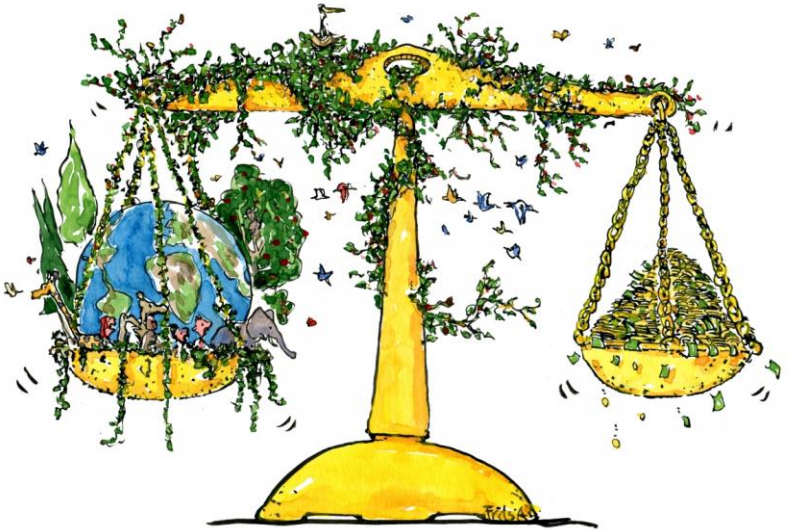

Image credit: Frits Ahlefeldt, Hiking.org

Eco-Price Method Example Nitrogen Removal

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- **Price Signals**
  - Bay Restoration Fund
    - It costs, on average $13.33 per lbs of nitrogen load reduction
  - Nutrient Trading in the Chesapeake Bay Watershed
    - $3.80 per lbs nitrogen on the PA market
  - Maryland BMP Cost Share
    - $1.80 per pound of nitrogen reduction
  - Average cost for BMP implementation/maintenance
    - 14.50 per pound nitrogen reduction
- Average: $8.36 per pound of N

Photo Source: Pinchot Institute, 2010

Ecosystem Service Assessment

Ecosystem Service Assessment

- Values can be used:
  - by DNR to evaluate lands acquired by the state
  - Calculate the cost of impacts to activities on existing state lands
  - To estimate the benefits of ecological restoration
    - working to leverage data available through the Maryland Watershed Resources Registry (WRR) , which ranks lands based on potential for upland, riparian, wetland, and stormwater infrastructure restoration.

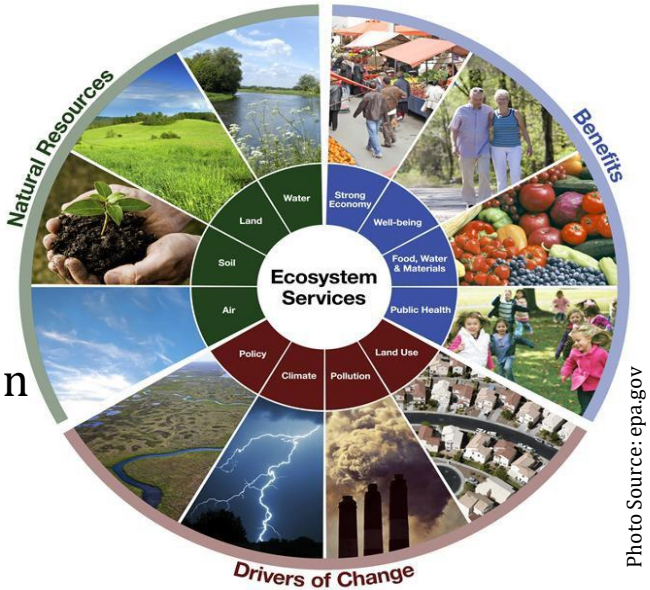

Photo Source: epa.gov

NOTE: Ecosystem service monetary values are meant to inform decision making and tradeoffs but do not imply market value or value to be paid by the state for land acquisition

Ecosystem Service Assessment

Ecosystem Service Assessment

- Assessment considers 7 ecosystem services provided by forests and wetlands across the state
- Parcel Eval. tool report card provides quantitative values for the **biophysical** quantity of the benefit , as well as the resulting **economic** value of each service
- Quantification methods leverage existing ecological models and datasets

Ecosystem Service Assessment

Ecosystem Service Name *(and biophysical unit)(range)*	Annual Parcel-Level Values*		Annual Per-Acre Values**	
	Biophysical	Economic	Biophysical	Economic
Air Pollution Removal: Carbon Monoxide (CO) *(kg per year)(0-1.35 kg per acre per year)*	2.56	$3.77	0.31	$0.46
Air Pollution Removal: Nitrogen Dioxide(NO_2) *(kg per year)(0- 9.01 kg per acre per year)*	41.86	$13.54	5.09	$1.65
Air Pollution Removal: Sulfur Dioxide(SO_2) *(kg per year)(0- 6.67 kg per acre per year)*	5.53	$0.43	0.67	$0.05
Air Pollution Removal: Ozone (O_3) *(kg per year)(0-34.35 kg per acre per year)*	167.27	$244.96	20.33	$29.77
Air Pollution Removal: Particulate Matter(PM_{10}) *(kg per year)(0-8.34 kg per acre per year)*	25.91		3.15	
Air Pollution Removal: Particulate Matter($PM_{2.5}$) *(kg per year)(0-1.80 kg per acre per year)*	9.86	$652.89	1.20	$79.34
Carbon Sequestration *(mT per year)(0-4 mt per acre per year)*	6.03	$839.24	0.73	$101.99
Groundwater Recharge *(m3per year)(445 - 1236 m3 per acre per year)*	654.08	$3,631.00	79.49	$441.27
Nitrogen Uptake Potential Index *(1 = low to 3 = high)**	1.00	$296.00	No Data	$35.97
Stormwater Mitigation Potential Index *(1 = low to 5 = high)**	2.43	$7,291.00	No Data	$886.06
Wildlife Habitat and Biodiversity Potential Index *(0 = low to 100 = high)**	83.19	$8,720.00	No Data	$1,059.72
Surface Water Protection	No Data	$0.00	No Data	$0.00
Total Annual Economic Value	No Data		No Data	$2,658.03

Ecosystem Service Assessment

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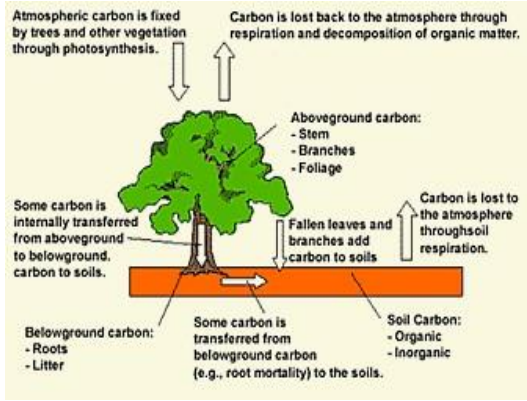
Absolute Values:

- **Air Pollution Removal** (kg/yr)
  - Trees remove pollution from the air that would otherwise contribute to human health problems, such as asthma and cardiovascular stress.
  - *Data Source: US Forest Service iTree Landscape Tool*

- **Carbon Sequestration** (mT/yr)
  - Ecosystems take up carbon and store it in their biomass, offsetting some of the emissions from human activity and helping to reduce climate change.
  - *Data Source: US Forest Service iTree Landscape Tool; DNR*

i-Tree Landscape

Photo Source: nrs.fs.fed.us



https://landscape.itreetools.org/

Photo Source: cleanwateraction.org

Ecosystem Service Assessment

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Absolute Values:

- **Groundwater Recharge** (m^3/yr)
  - Ecosystems allow for water to percolate through the soil and recharge aquifers, which Maryland relies on for 50% of its drinking water supply.
  - *Data Source:* USGS "Estimated Mean Annual Natural Groundwater Recharge, 2002" for MRB1 Catchments (mid- Atlantic)

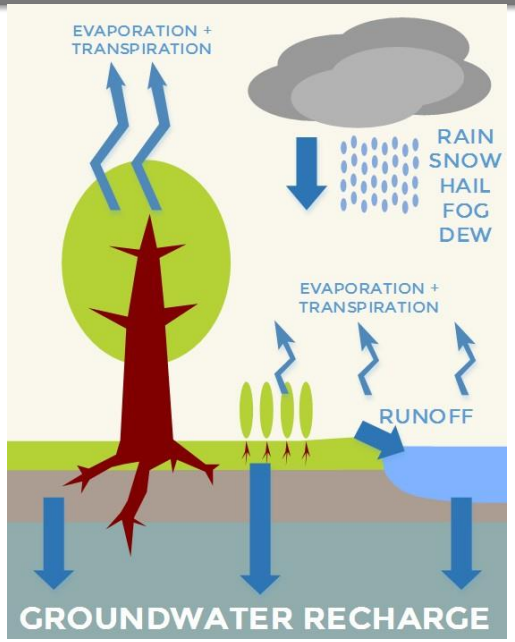

Photo Source: upgro.org

USGS science for a changing world
Water Resources NSDI Node

https://water.usgs.gov/GIS/metadata/usgswrd/XML/mrb_e2rf1_recharge.xml

Ecosystem Service Assessment

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Relative (Index) Values:

- **Wildlife Habitat and Biodiversity Potential Index**
  (1=low to 100=high)
  - Certain forests and wetlands are better able to support wildlife and more likely to support rare and threatened species. These are typically ecosystems that are less impacted by people.
  - *Data Source:* Maryland DNR, BioNet Version 1

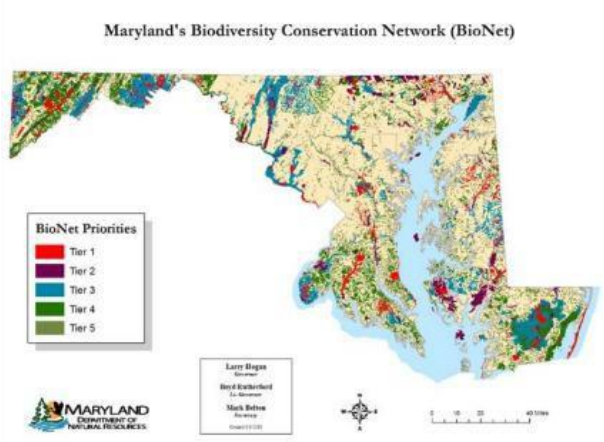

Photo Source: dnr.maryland.gov

Ecosystem Service Assessment

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Relative (Index) Values:

- **Nitrogen Uptake Potential Index** (1=low to 5=high)
  - Nitrogen pollution is critically important to the health Chesapeake Bay. Forests and wetlands remove nitrogen through taking it up in their biomass and soils.
  - *Data Source:* USGS Spatially Referenced Regression on Watershed Attributes Model (SPARROW)

Photo Source: dnr.maryland.gov

USGS science for a changing world

National Water-Quality Assessment (NAWQA) Project

https://water.usgs.gov/nawqa/sparrow/#

Ecosystem Service Assessment

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Relative (Index) Values:

- **Stormwater Mitigation/Flood Prevention Potential Index** (1=low to 5=high)
  - Forests and wetlands absorb rainfall, lessening the amount of runoff that would otherwise cause erosion, need to be treated by stormwater systems, or cause flood damage.
  - *Data Source:* Modified version of the Maryland Watershed Resources Registry (WRR) Stormwater Preservation Model

Photo Source: smithsonianmag.org

watershed resources registry

http://watershedresourcesregistry.com/detailsHp.html

Ecosystem Service Assessment

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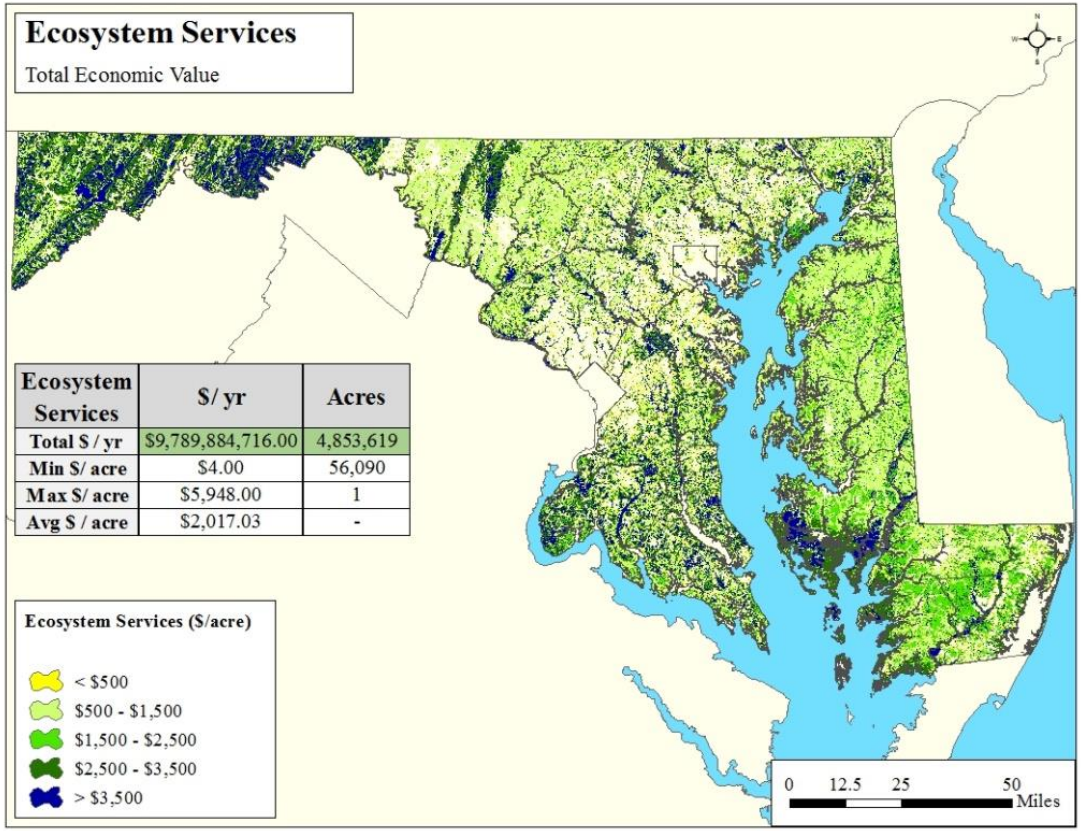
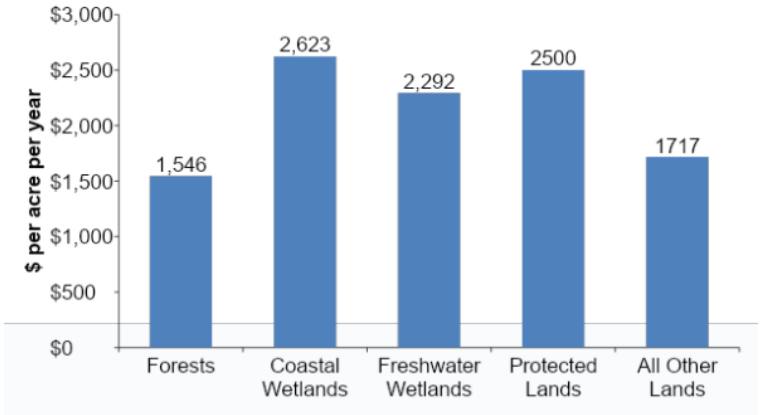


Ecosystem Services	$/ yr	Acres
Total $ / yr	$9,789,884,716.00	4,853,619
Min $/ acre	$4.00	56,090
Max $/ acre	$5,948.00	1
Avg $ / acre	$2,017.03	-



Restoration Opportunities and Prioritization

Potential Restoration Opportunities

Mapping Potential Restoration Opportunities Across Maryland

- DNR and Chesapeake Conservancy have created a suite of geospatial data identifying ecological restoration opportunities across the state, including :
    - Upland tree planting
    - Riparian tree Planting
    - Inland wetland Restoration
    - Coastal wetland Restoration

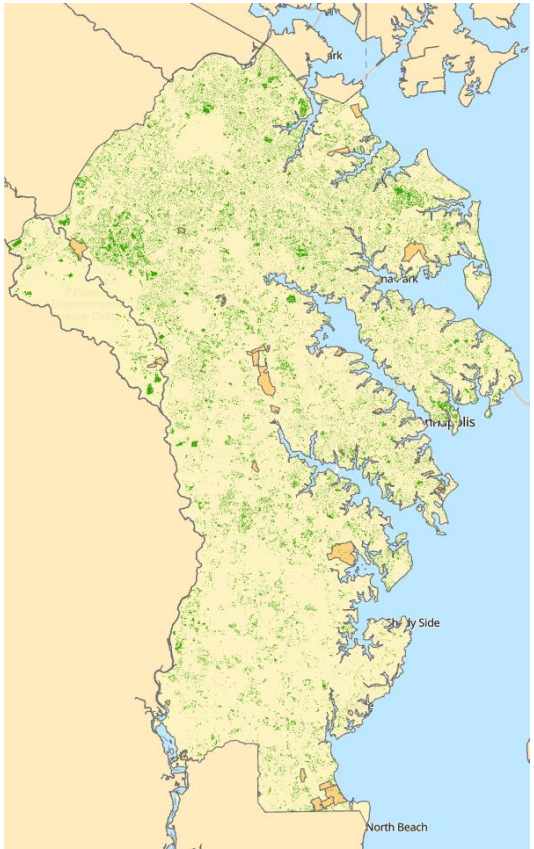
- Used the most recently available Chesapeake Conservancy 2018/2019 1m LCLU data

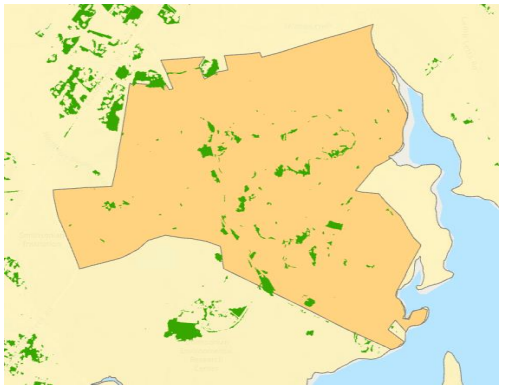
- Restoration Opportunity layers are not ranked based on ecological and geomorphological suitability for the restoration type

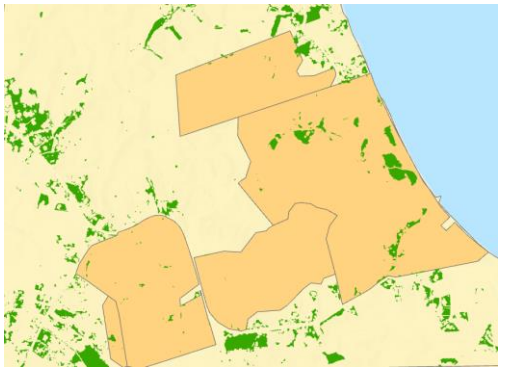
- Rather, opportunities can be prioritized using a series of subsequent data layers that score opportunities based on their relative potential ecological co-benefits and climate resiliency benefits

Tree Planting Opportunities

- Leveraged Chesapeake Conservancy "Plantable Area" data, created as part of the the Maryland Forest Technical Study
- We can look at different thresholds to narrow down potential tree planting opportunities
- This map looks at contiguous areas greater than 1 acre
- Note, this data does not include planting opportunities on agricultural lands

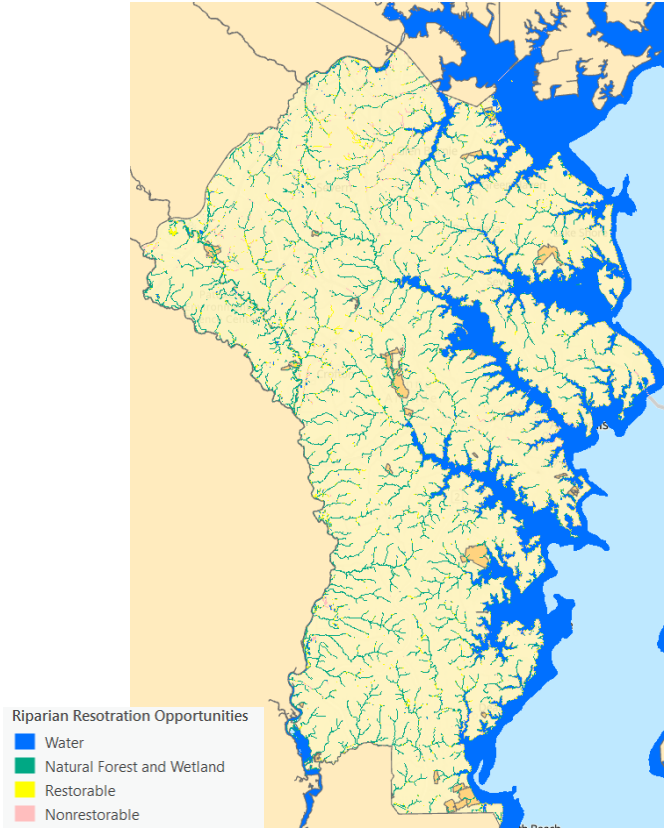


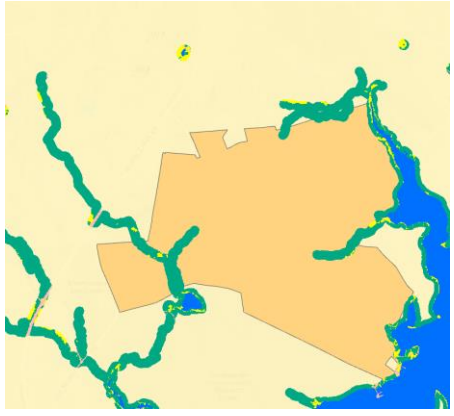




Riparian Tree Planting Opportunities

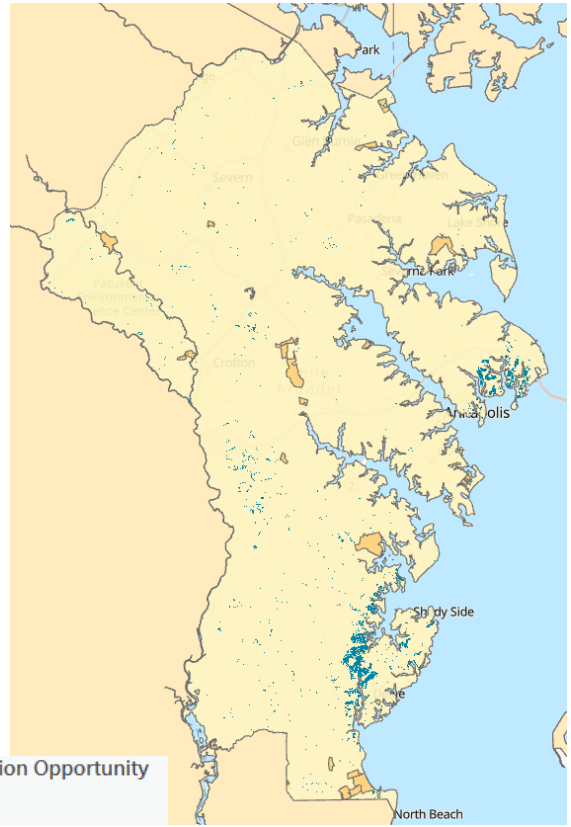
- **Leveraged Chesapeake Conservancy "Riparian Land Cover" dataset**
- **Provides 1m land cover within a 100 ft buffer from stream lines.**
- **Reclassified landcover into 4 classes:**
  - Water
  - Existing natural forest and wetland
  - Restorable land cover (low veg and shrub/scrub)
  - Non-restorable (barren and impervious)

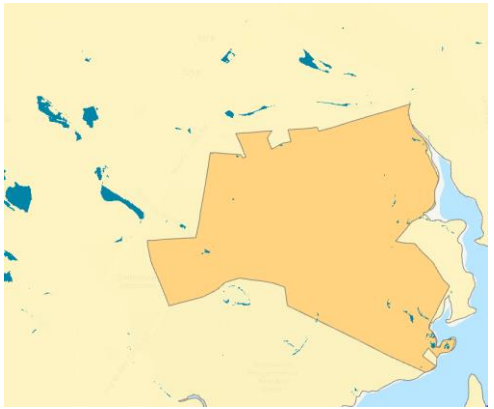


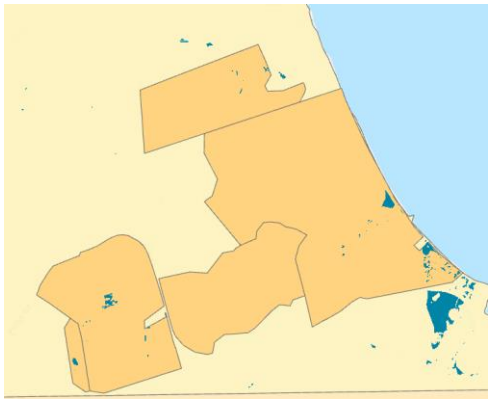


Inland Wetland Restoration Opportunities

- **Leveraged the "absolute factors" of the Watershed Resources Registry (WRR) model, to consider :**
  - Soil type
  - Size of parcel
  - Prior land-use







Coastal Wetland Restoration Opportunities

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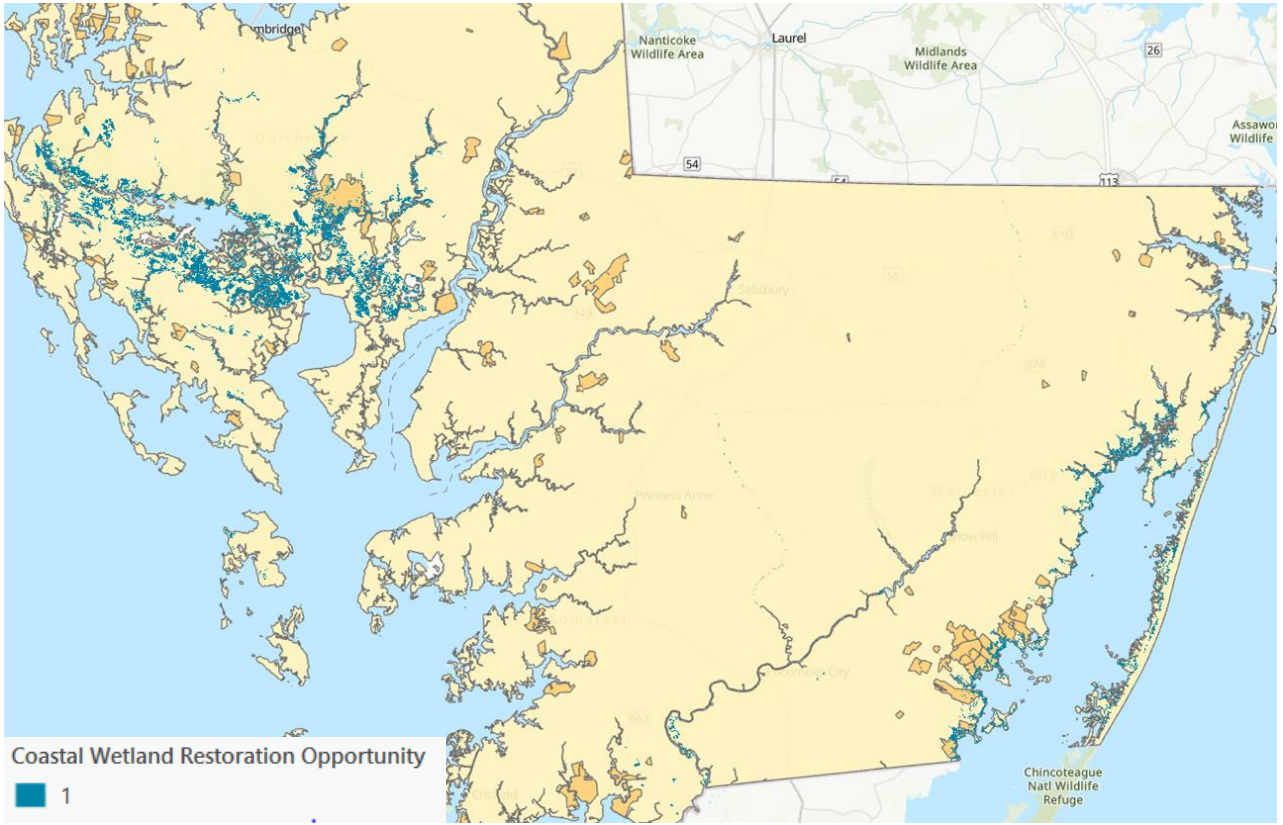
- Created a tidal wetland layer from the 1m LU data
- Looked at updated SLAMM model outputs for Upland to Wetland conversions and drowned wetlands for 2050, 2070, and 2100.
- Areas expected to convert from UPland to wetland, but NOT drowned by 2070 identified as opportunities.
- Layer shows opportunities > 0.5 acres



Potential
Co-benefits of Restoration

Potential Ecological Co-benefits of Restoration Opportunities

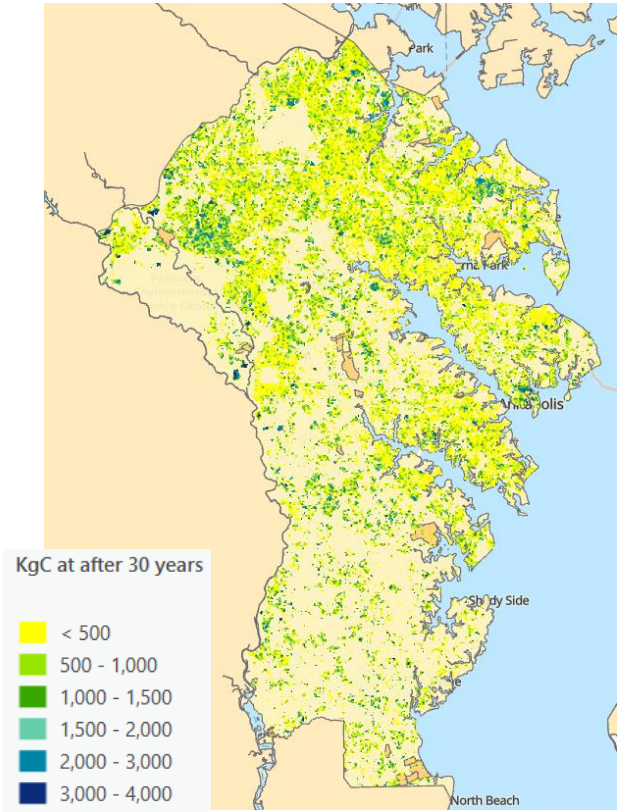
- Develop and implement a restoration co-benefit scoring approach that is consistent with the Ecosystem Service Valuation methodology developed by DNR for select restoration practices
    - Carbon sequestration
    - Air quality benefits
    - Flood mitigation
    - Water supply protection
    - Wildlife habitat

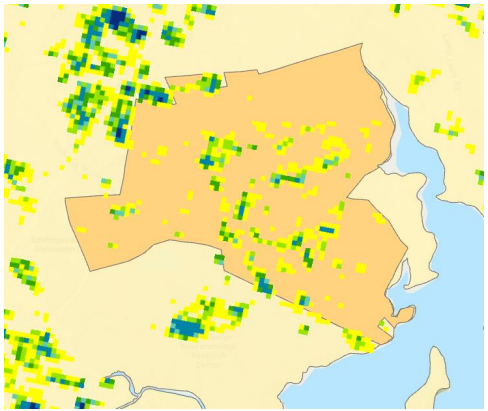
Also mapping climate resilience and social vulnerability

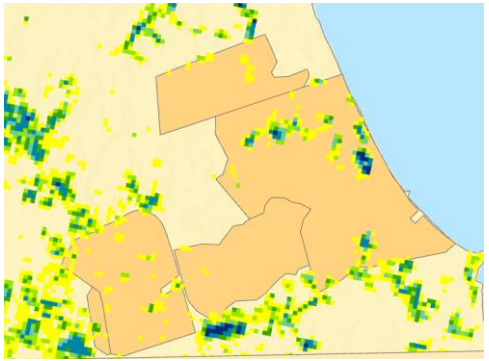
Quantification is non-monetary

Carbon Sequestration Potential Carbon (kg in 30 year)

- Combined the plantable area analysis with UMD model of potential carbon sequestration through tree planting over different time periods (showing 30 years year)
- Larger planting opportunities with better site conditions will sequester more carbon
- Doesn't consider planting densities or species (assumes native species community similar to nearby sites)

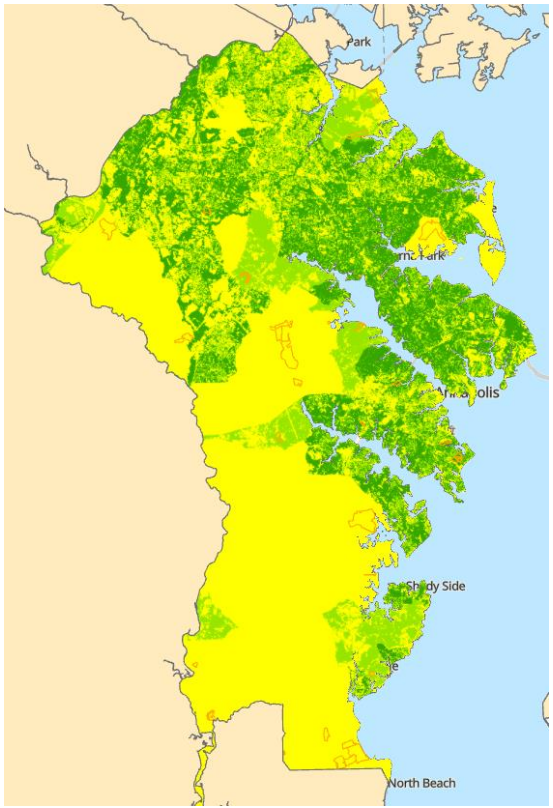


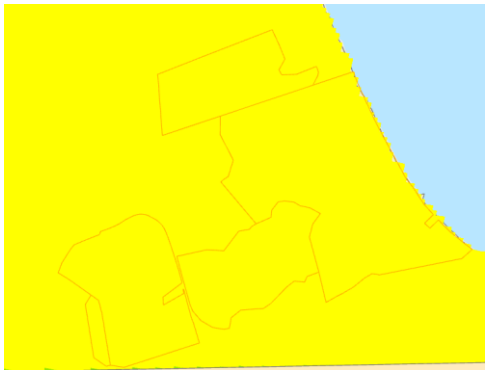


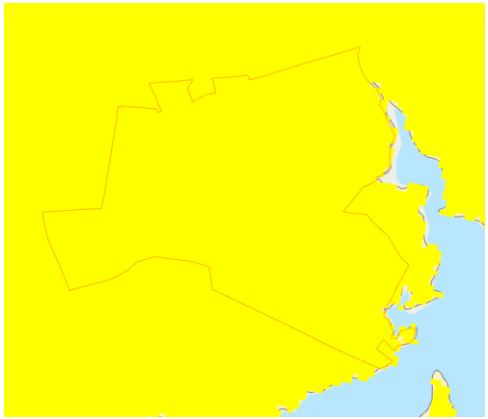


Air Quality

- Based on the i-Tree Landscape tool for air pollutant removal rates by tree canopy and the economic value of that removal from avoided health costs in nearby population (based on census block)
- We applied those rates to the tree planting opportunity areas







Wildlife Habitat Potential

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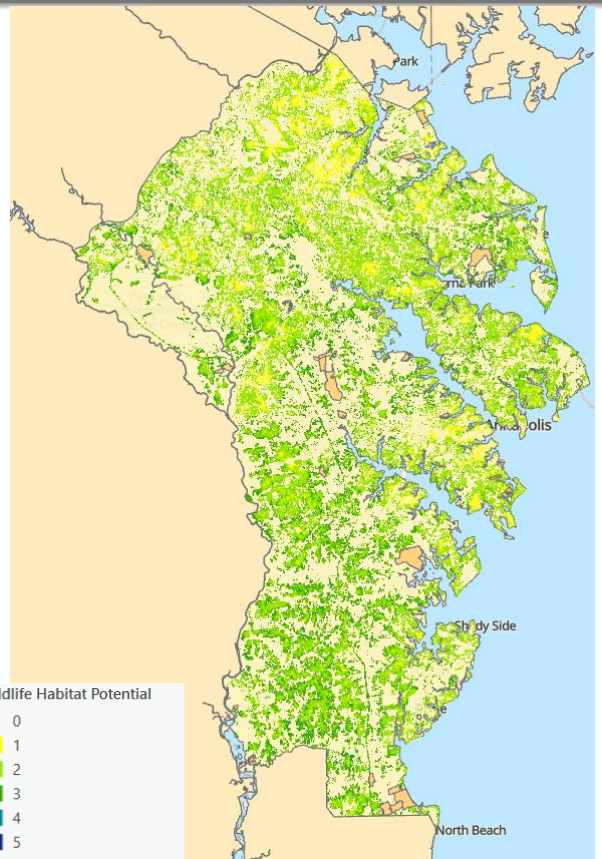
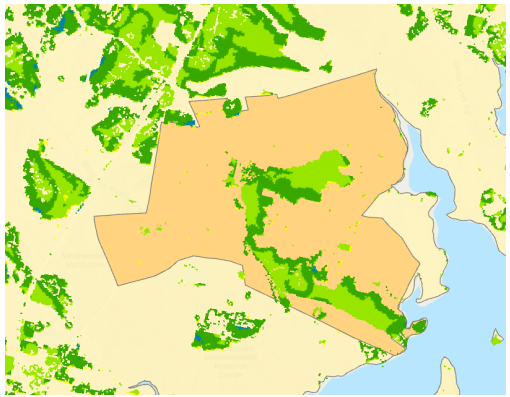
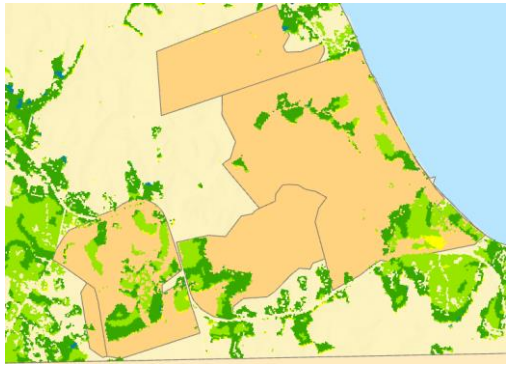
Areas that are not currently forest or wetlands, but are located closer to existing habitat are given higher ranks, proximity to developed lands brings down the score

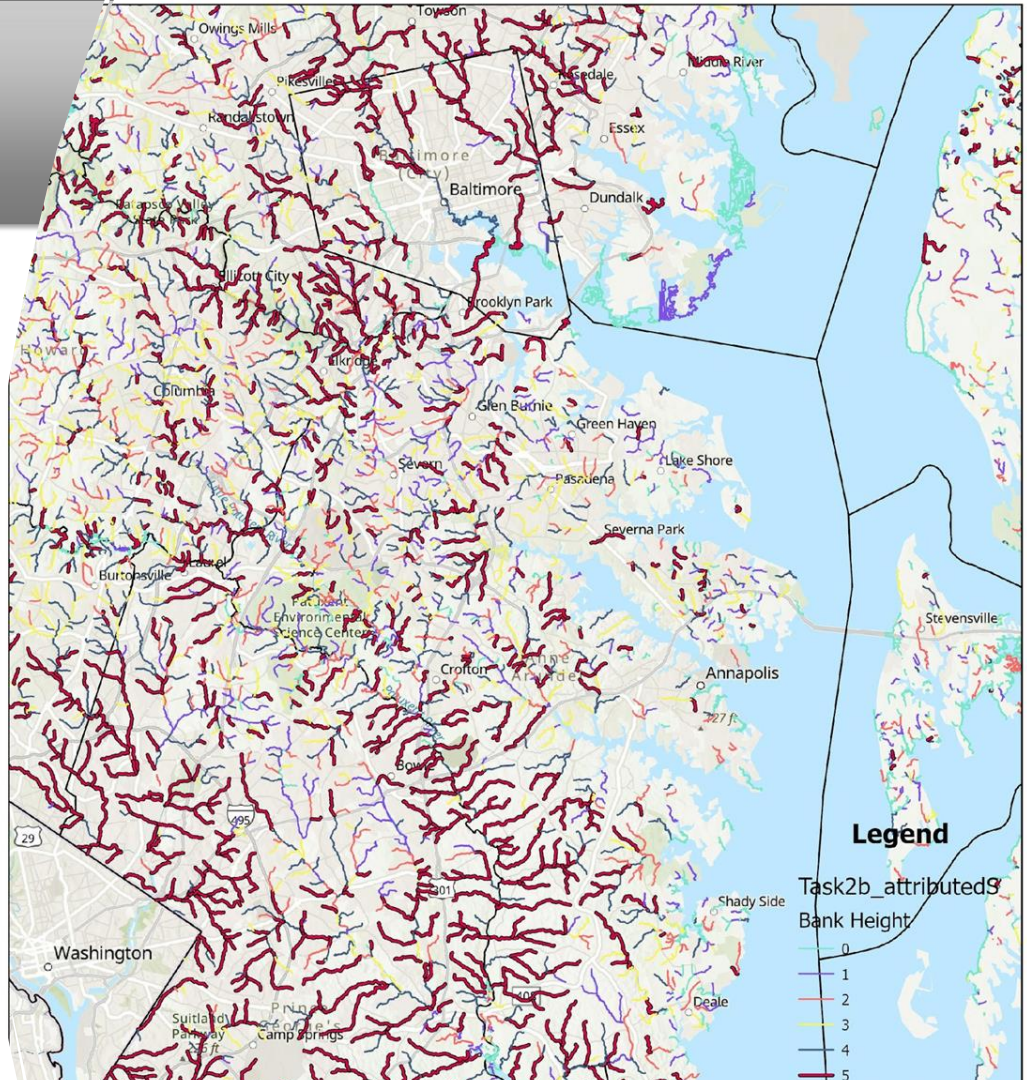






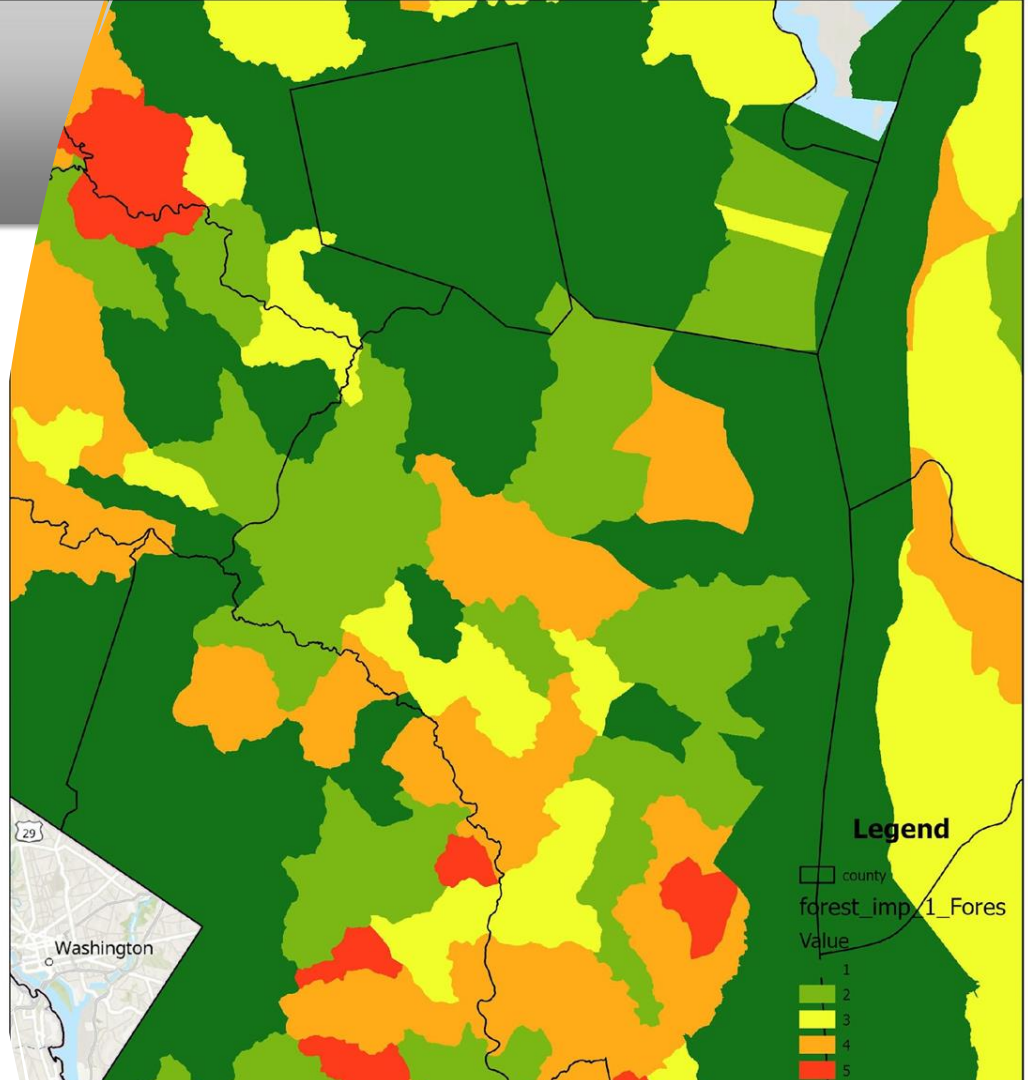
Stream Bank Height Analysis

- Used EPA FACET- Floodplain and Channel Evaluation Tool
- Categorized bank height by stream order and ranked
- Category 5 have the highest bank heights relative to the stream order
- Need to field verify



Vulnerable Watersheds

- Looks are recent change in forest and impervious area
- Combination of decrease in forest area and increase in impervious area creates a higher score
- Meant to look at watersheds approaching “tipping points” for ability to support aquatic species



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Mapping and Scoring Climate Resiliency Benefits of Restoration

Mapping and Scoring Climate Resiliency Co-benefits

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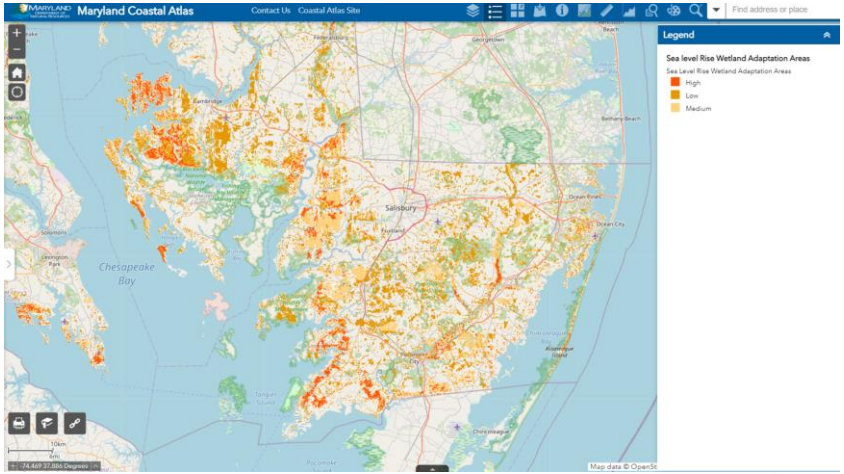
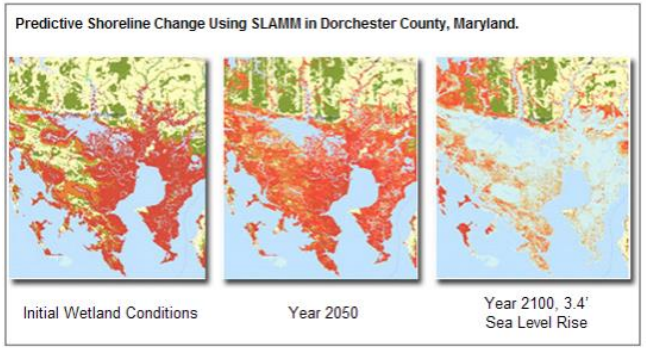
- Develop and implement a climate resiliency benefit scoring for both restoration opportunities and existing natural infrastructure in coastal and inland areas

- Incorporate both human and ecological components of resilience in an integrated scoring approach for inland areas

- **For coastal areas,** use existing DNR assessments for identifying areas vulnerable to sea level rise and storm surge to include:
  - the Coastal Resiliency Assessment
  - the Sea Level Affecting Marsh Migration (SLAMM) model

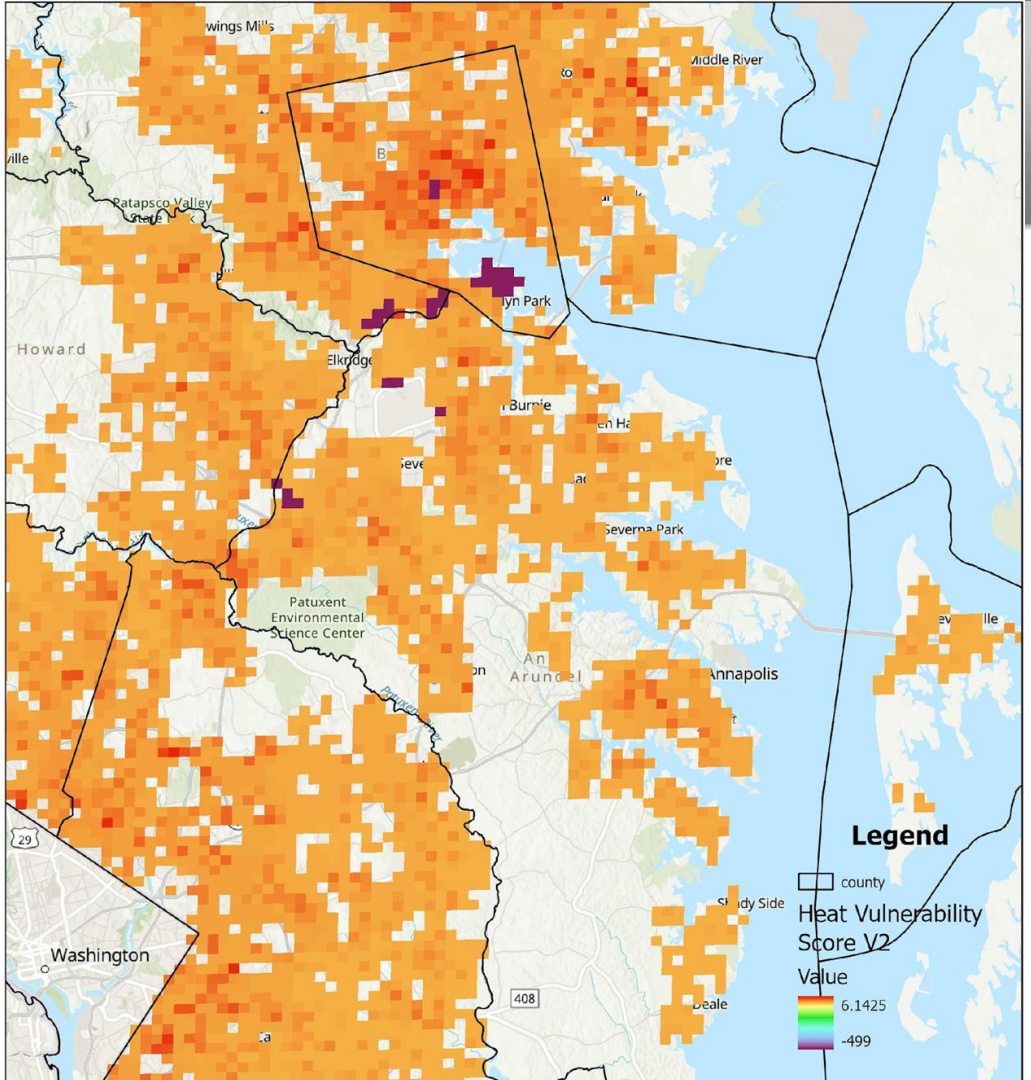
- **For inland areas,** leverage best available spatial data, including:
  - inland areas vulnerable to extreme precipitation and riverine flooding.
  - future flood risk and hydrography/flow accumulation models





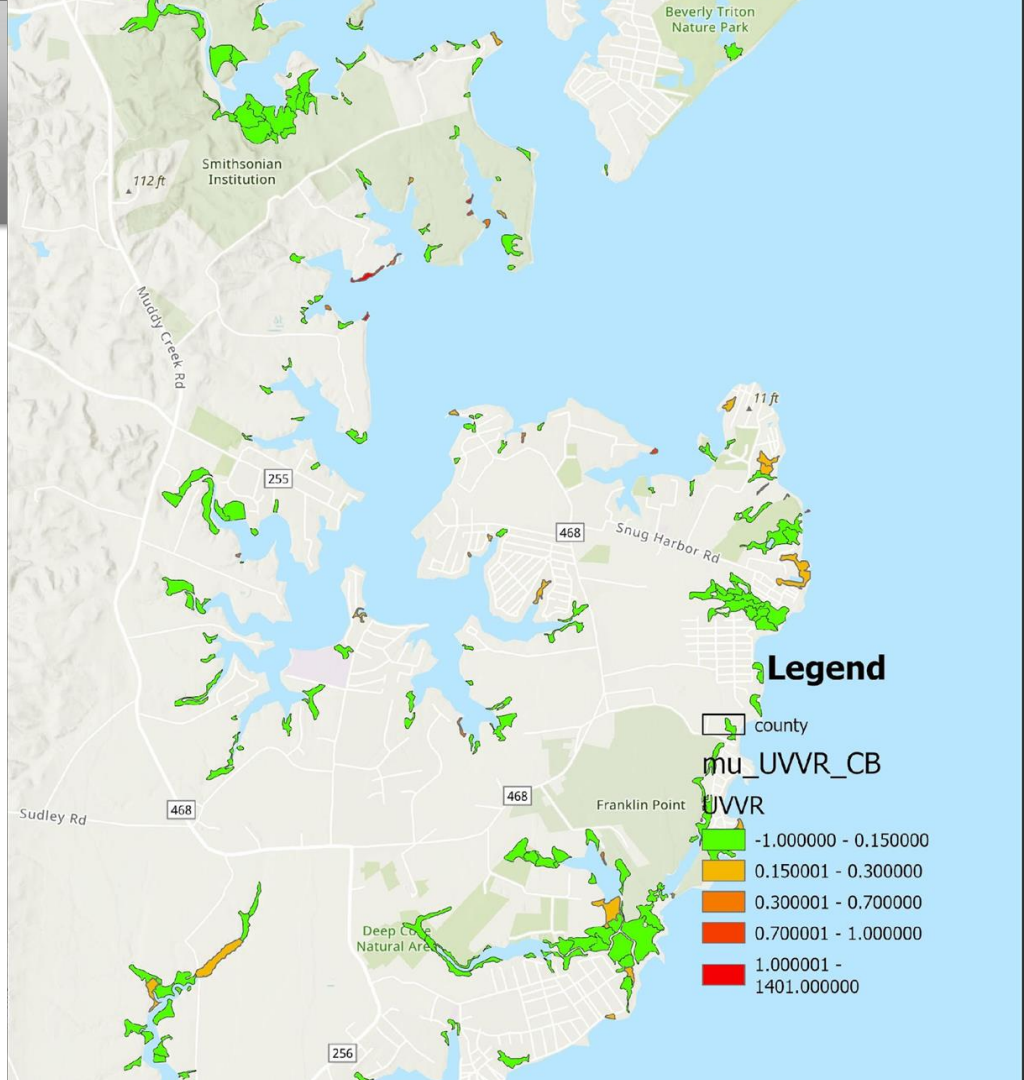
Heat Vulnerability

- Combination of dangerous heat days from recent years (2019, 2020, 2021) and the CDC Social Vulnerability Index
- Factors have some correlation, but does identify particular problem areas within developed regions
- Could help target tree planting programs



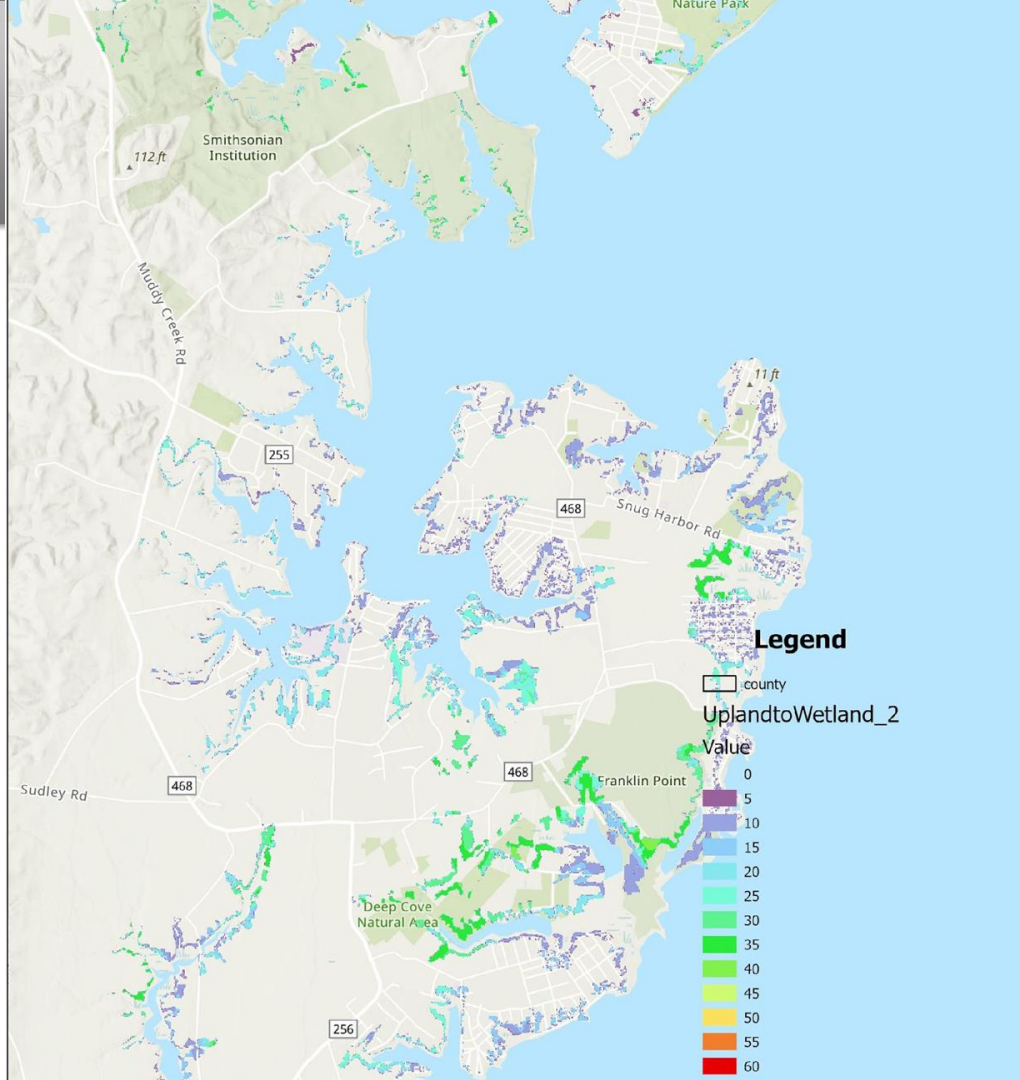
Marsh Health

- Displaying the USGS Unvegetated to Vegetated Ratio (UVVR)
- Indicates how healthy the marsh is
- Combined with other factors (elevation) the lifespan of the marsh can be estimated
- DNR is integrating UVVR into an updated Marsh Protection Index



Marsh Migration

- DNR partnered with TNC and GMU to run the SLAMM (Sea Level Affecting Marshes Model)
- Used this output to update Wetland Adaptation Areas for the state
- Limited on the Western Shore compared to ES, but lower AA does have upland areas projected to convert to marsh



Bringing it All Together

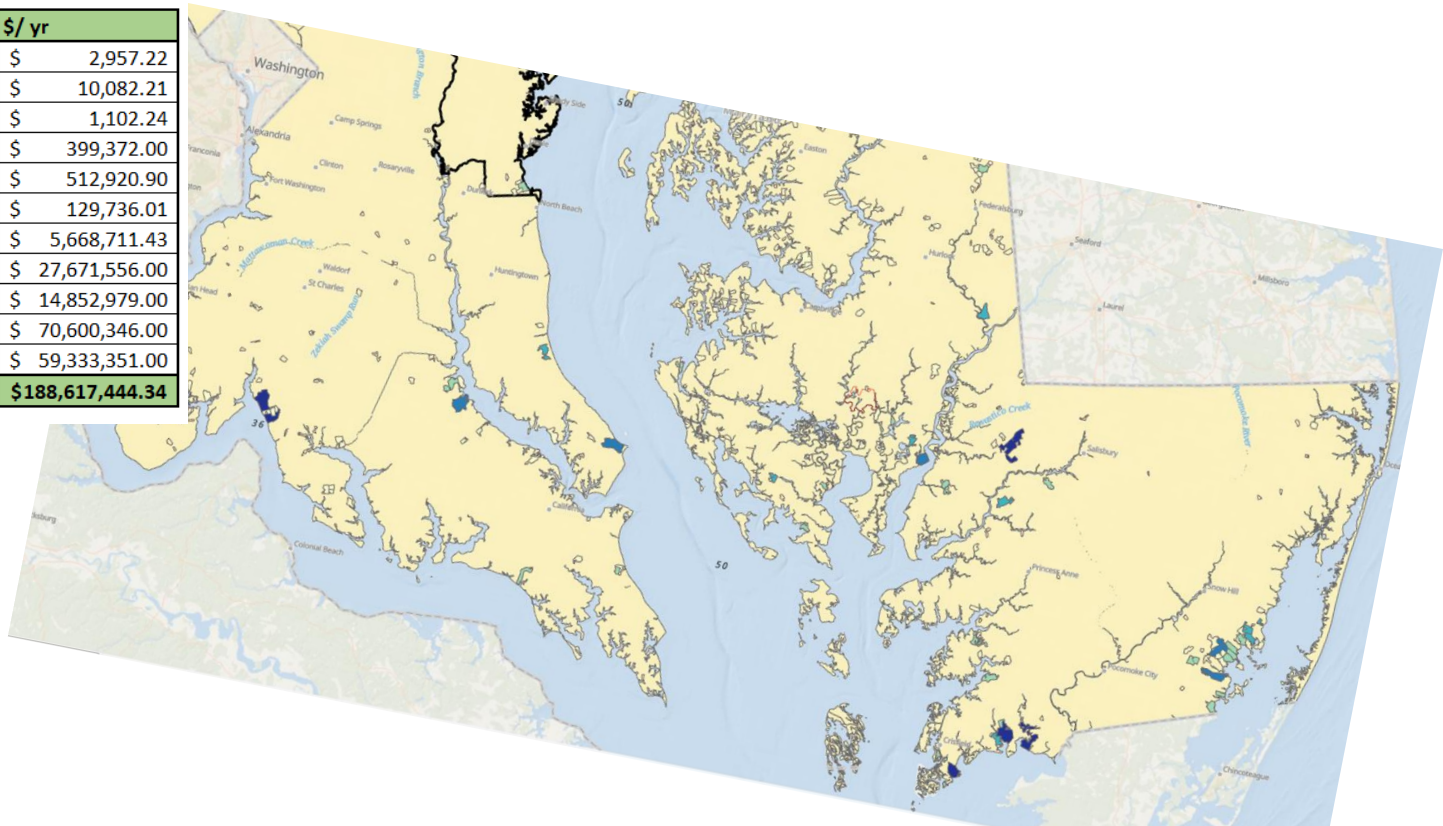
Existing MET properties: Landcover Distribution

Landcover Type	MET Acres
Water	4,991.54
Wetland	8,675.75
Tree	15,220.61
Scrub Shrub	53.31
Low Vegetation	6,759.37
Barren	64.81
Impervious Sturctures	23.61
Impervious Other	90.61
Impervious Roads	46.75
Trees over Impervious Structures	2.65
Trees over Impervious Other	19.45
Trees over Impervious Roads	24.18

GI Feature Type	MET Area (acres)
Upland Hubs	43,239.78
Wetland Hubs	9,816.77
Aquatic Hubs	360.43
Upland Corridor: Natural	1,730.00
Aquatic Corridor: Natural	261.12
Upland Corridor: Restorable Gap	1,515.81
Aquatic Corridor: Restorable Gap	135.19
Upland Corridor: Non-Restorable	104.94
Aquatic Corridor: Non-Restorable	8.45

Existing MET properties: Ecosystem Services

ES	Biophysical	$/ yr
CO (kg/yr)	30,916.56	$ 2,957.22
NO2 (kg/yr)	248,252.56	$ 10,082.21
SO2 (kg/yr)	95,339.87	$ 1,102.24
O3 (kg/yr)	1,539,019.69	$ 399,372.00
PM 2.5 (kg/yr)	47,160.45	$ 512,920.90
PM 10 (kg/yr)	338,159.31	$ 129,736.01
Carb Sequ (mt/yr)	32,079.08	$ 5,668,711.43
Groundwater (m3)	10,067,161.64	$ 27,671,556.00
Nurient Uptake Index		$ 14,852,979.00
Stormwater Mitigation Index		$ 70,600,346.00
Wildlife Habitat Index		$ 59,333,351.00
All ES		**$188,617,444.34**



Existing MET Properties:
Co-Benefits of Conservation

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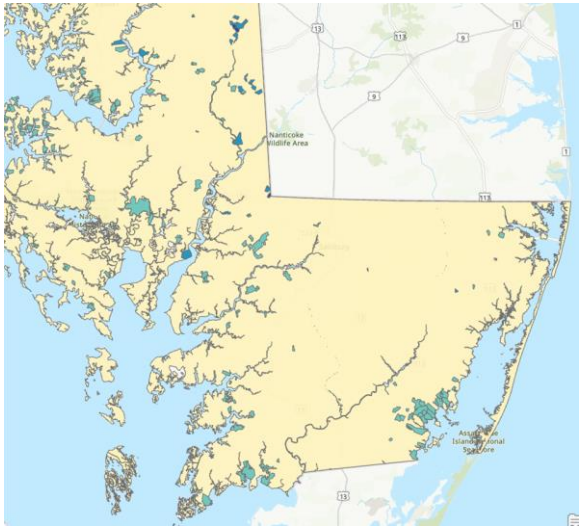
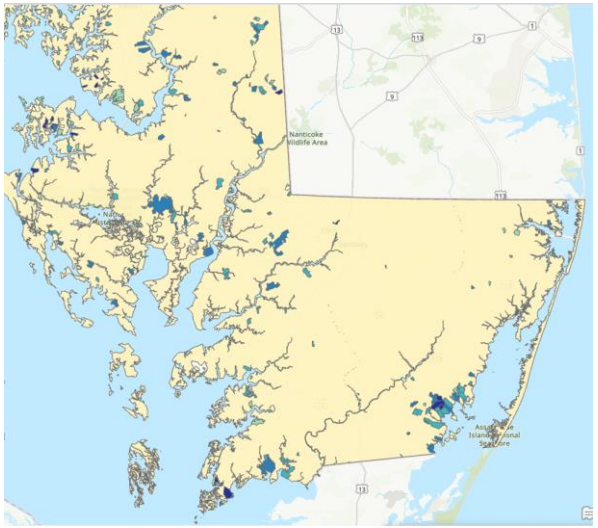
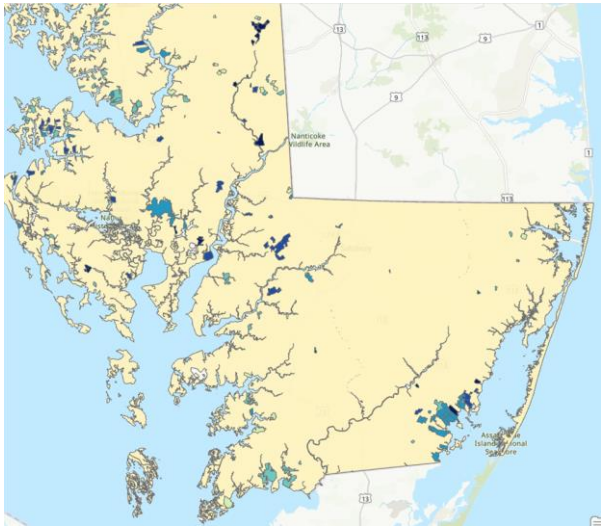
Aquatics



Habitat Connectivity



Rare Species



Existing MET Properties: Co-Benefits of Conservation

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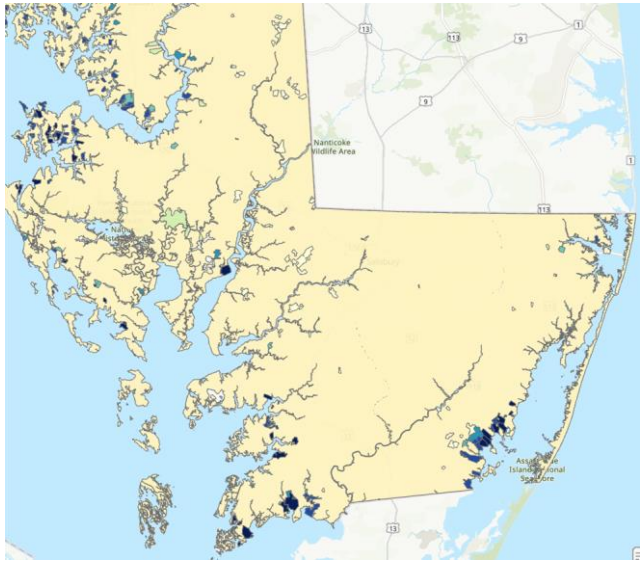
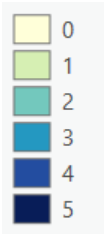
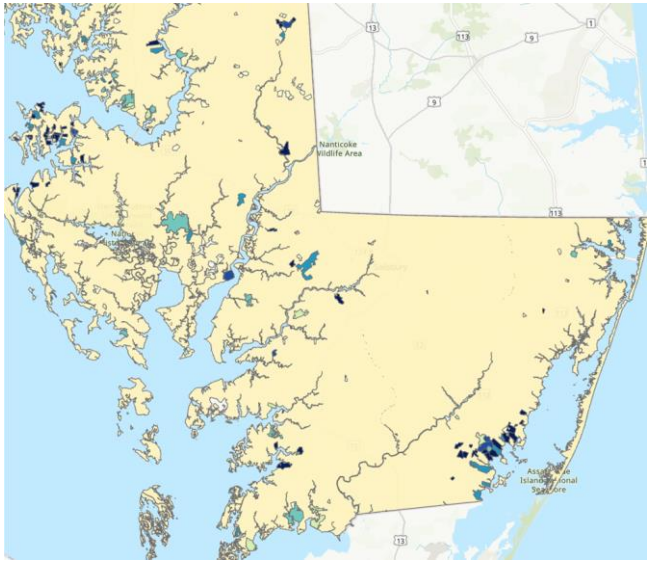
Climate Resiliency

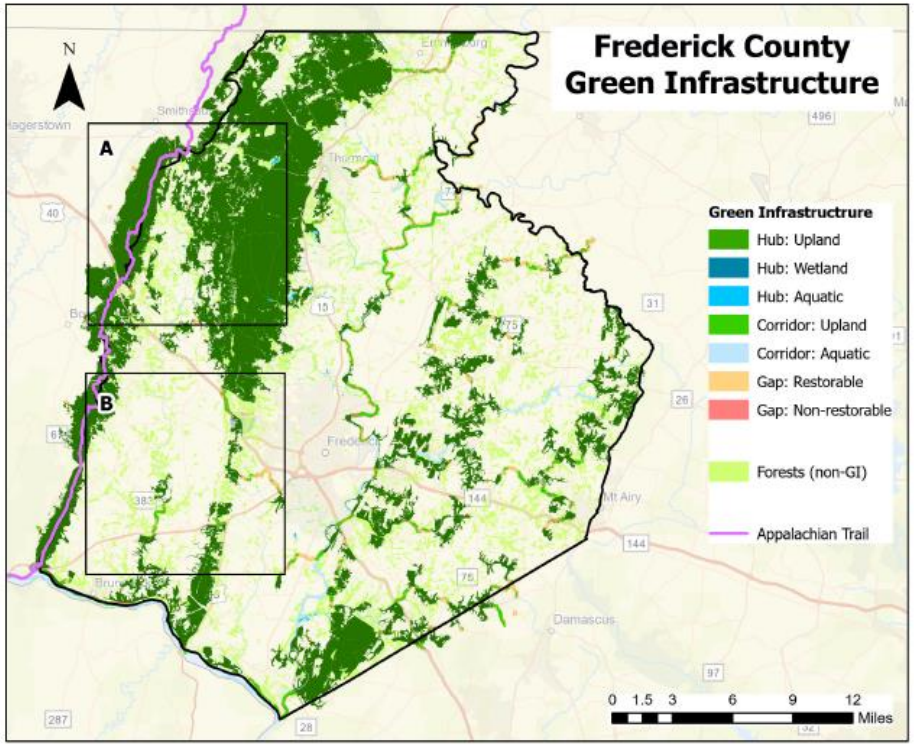




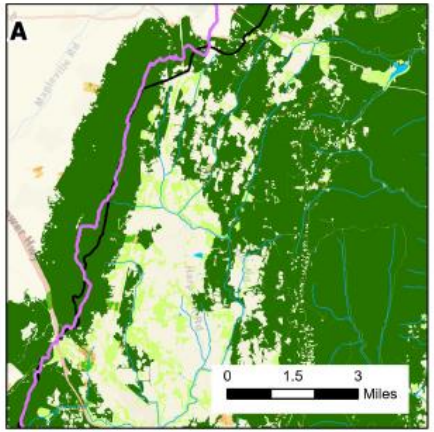
Climate Change Adaptation Areas

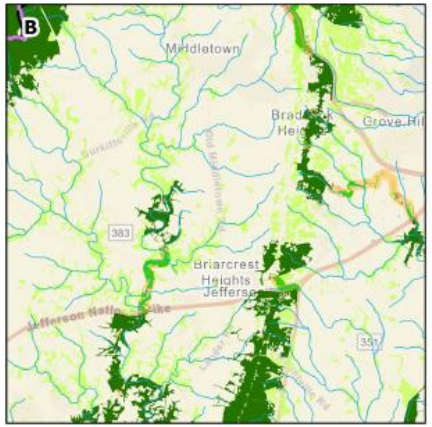


Conservation Opportunities: Landscape-level Considerations



Thinking about important GI hub and corridor features





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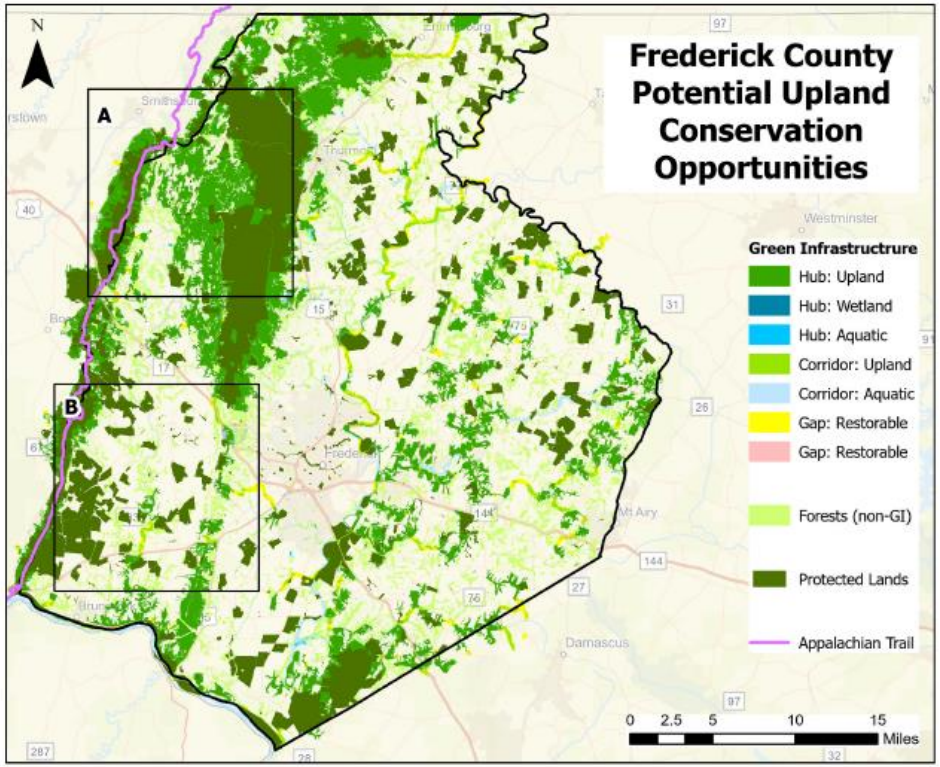
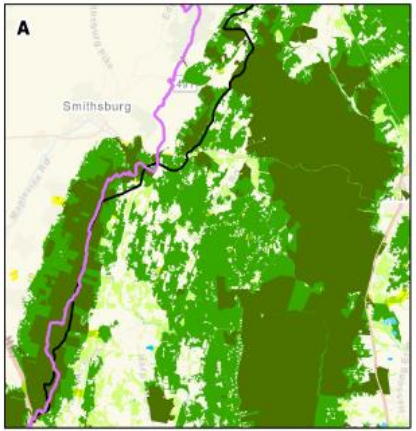
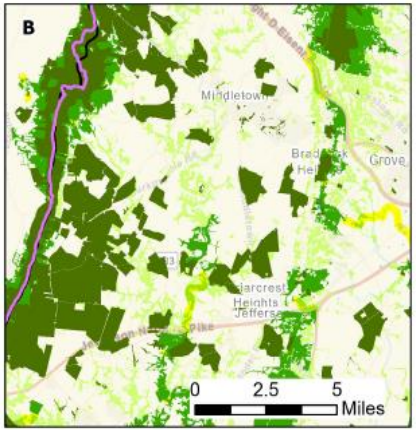


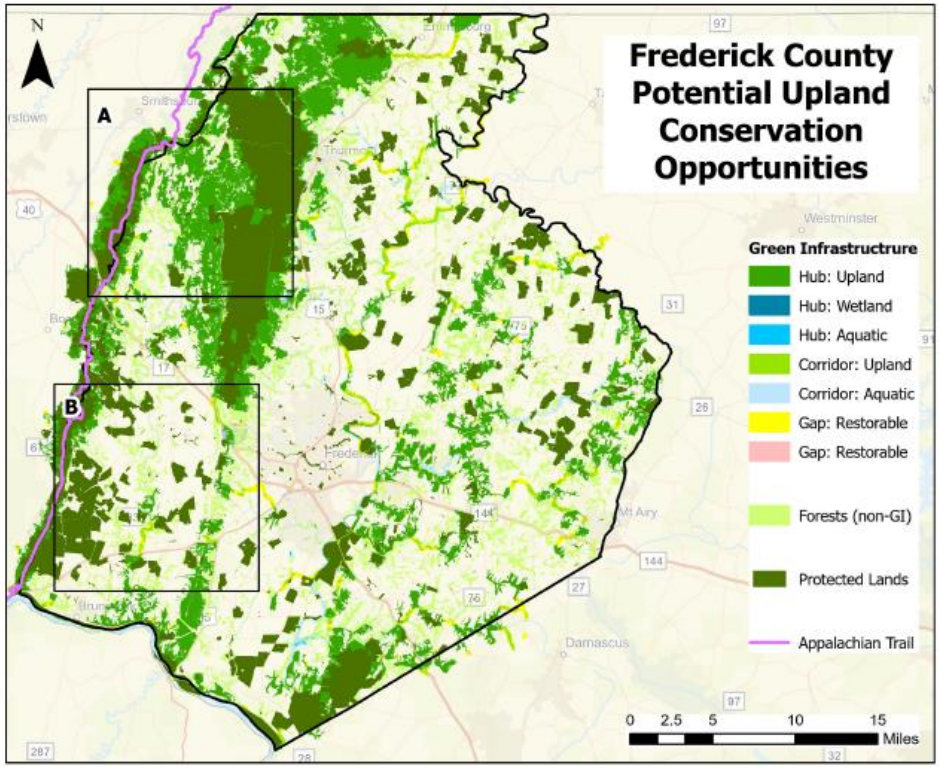
Data Use Ideas:

- Project scale: Unprotected GI, Bionet, high eco-score, high conservation co-benefit potential
- Landscape Scale: prioritize natural areas important to connectivity





Conservation Opportunities: Landscape-level Considerations



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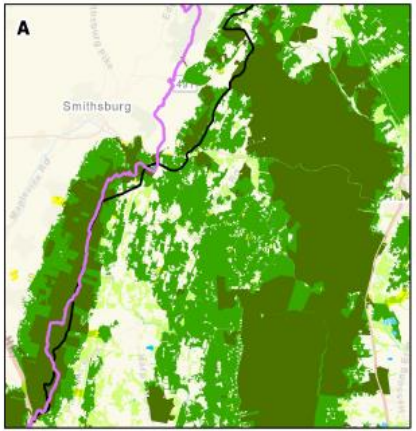

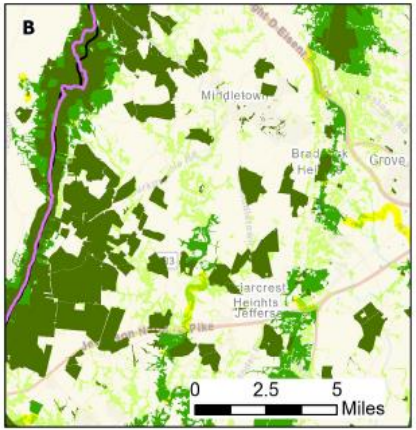

Restoration Co-benefits: Site-level Considerations

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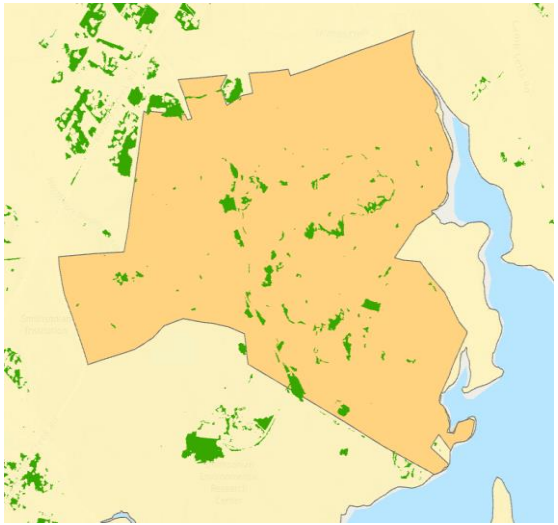
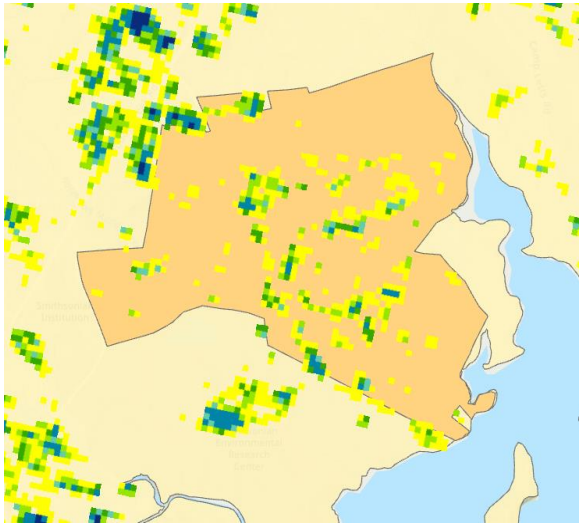
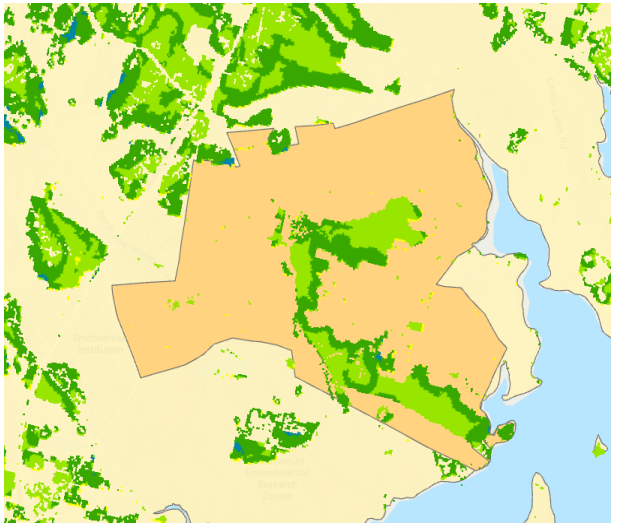
Plantable Area Opportunities



Carbon Sequestration Potential



Wildlife Habitat Potential



Restoration Co-benefits: Landscape-level Considerations

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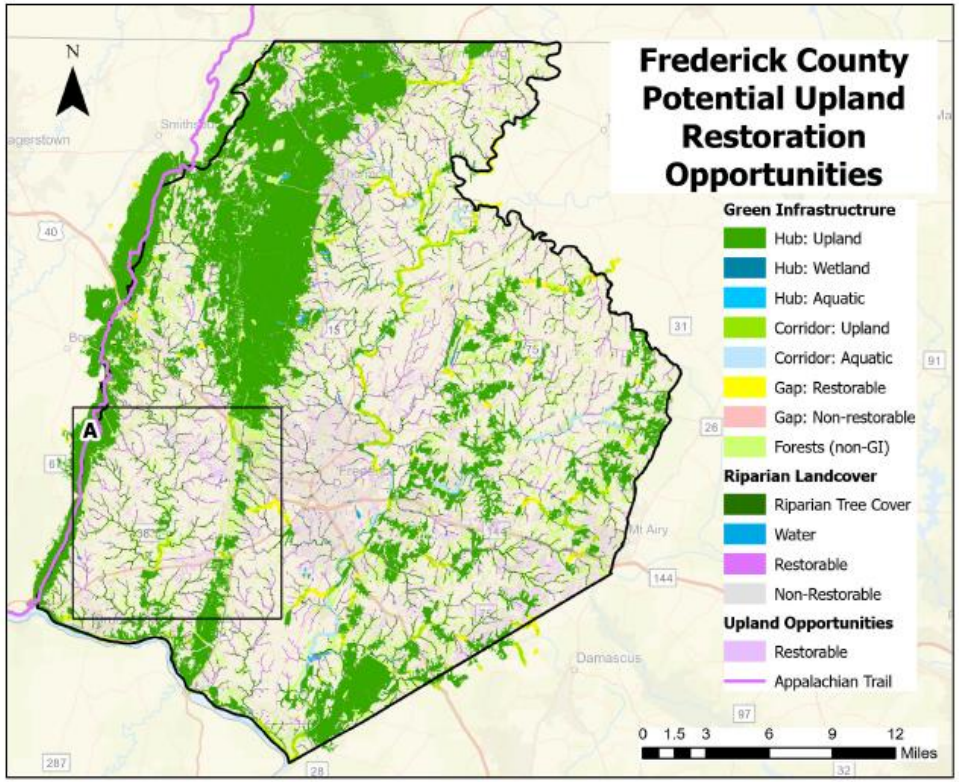

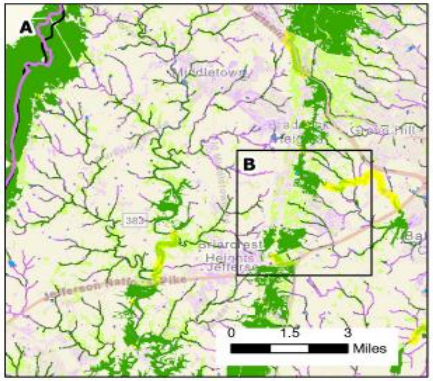

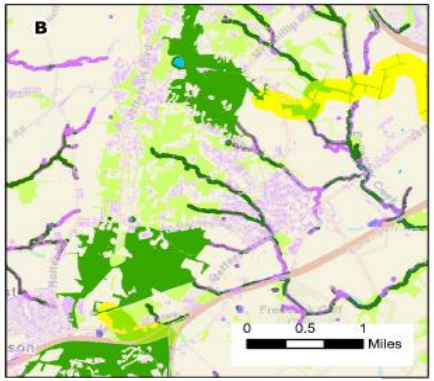

GI Feature Type	MET Area (acres)
Upland Corridor: Restorable Gap	1,515.81

Restoration Opportunity	MET Acres
Plantable Area**	1,090.00
Riparian Restoration	6,812.67
Inland Wetland	10,573.12
Coastal Wetland	148.73

** Plantable area doesn't include agricultural land; however agricultural areas ARE partially captured via inclusion in the Riparian Restoration layer.

Summary

Conservation Benefits

Parcel Evaluation Tool: Ecological Benefit Ratings & Ecosystem Services

Maryland's Green Infrastructure *

Restoration Benefits

Mapping Restoration Opportunities Across Maryland

Mapping and Scoring Potential Restoration Co-Benefits

Mapping and Scoring Potential Restoration Climate Resiliency Benefits

Taken together, these advancements will ensure that our decision making processes incorporate the latest understanding of how our investments can help to reduce impacts of a changing climate, maximize resiliency and other co-benefits

Summary

Conservation

- Parcel Evaluation Tool on the Maryland GreenPrint Mapper
  - Program Open Space Investments –Totaled >$100 million
  - Outreach events to Land Trust Community/local governments

Restoration

- Creating a tool to evaluate the ES benefits of ecological restoration
- Help to prioritize restoration opportunities/grant funding
- Guide restoration requirements (fee in lieu, Critical Area)

Education and Awareness

- Mapping and valuing ecosystem services allows this information to be used for decision making by the state and an informed public

More Information

- The GreenPrint Map and Parcel Eval
  http://geodata.md.gov/greenprint/

- Chesapeake & Coastal Service Ecosystem Service Website
  http://dnr.maryland.gov/ccs/Pages/Ecosystem-Services

- Maryland Ecosystem Service Webinar
  https://www.youtube.com/watch?v=56mDu3lH0- 0&feature=youtu.be

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