Accounting for Maryland's Ecosystem Services

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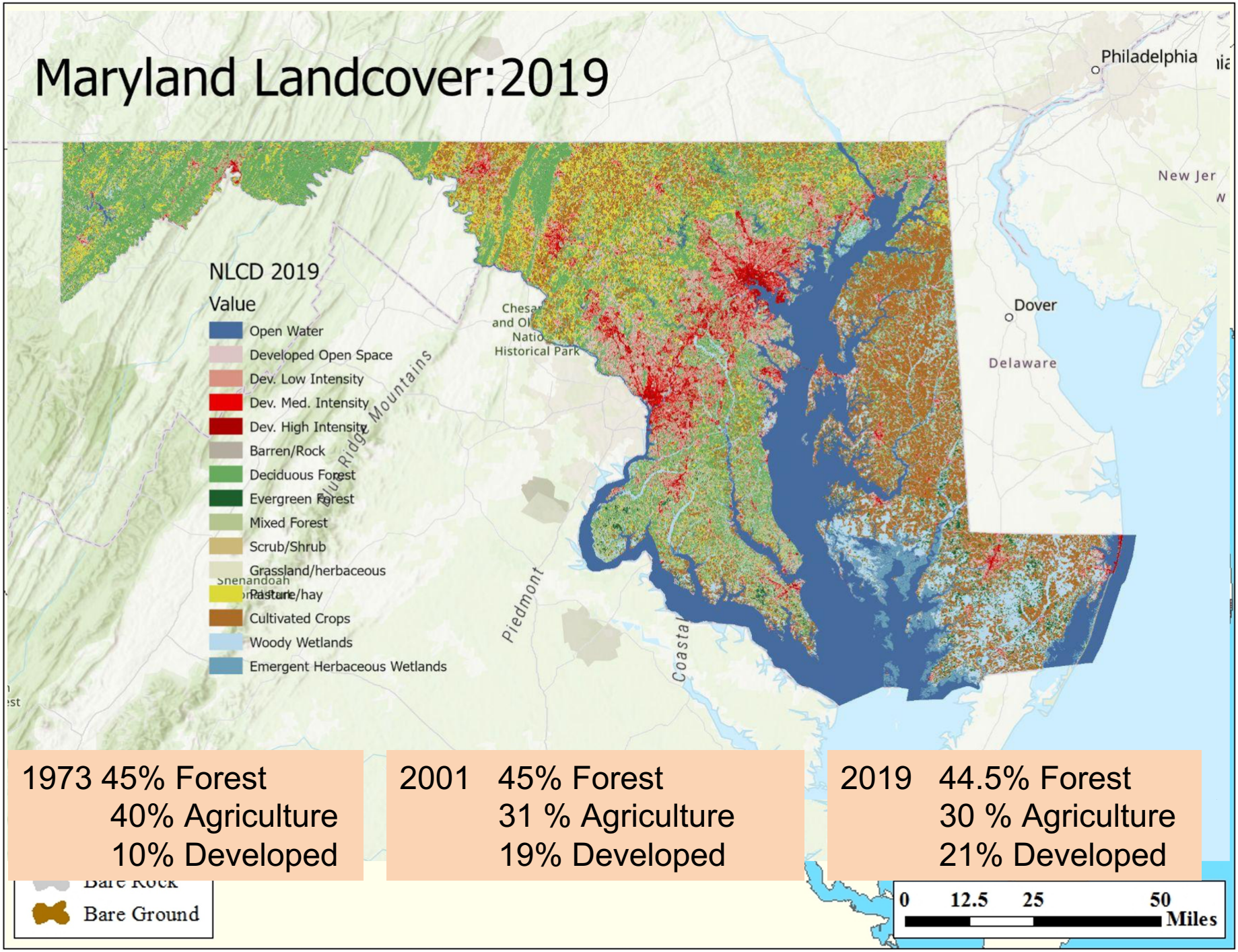
Ecosystem Services

Broadly- "*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 information to quantify Ecosystem Services from natural lands and restoration opportunities



1973 45% Forest
40% Agriculture
10% Developed

2001 45% Forest
31 % Agriculture
19% Developed

2019 44.5% Forest
30 % Agriculture
21% Developed

State of Ecosystem Services in Government

- Many federal agencies have efforts to quantify ecosystem services (e.g. EPA's EnviroAtlas, FEGS, USGS's SoLVES, USDA OEM, NOAA, NESP Guidebook)
- Few states have similar efforts within state government (Oregon's Willamette Partnership)
- Maryland has maintained interest in ES (2011 Ecosystem Service Working Group Report)
- **Charge: Create tool to allow ES to be integrated into State of Maryland decision making**

Valuation Methodology: Eco-Price

- Ecosystem services are paid for in many different ways
- People view responsibility for providing ecosystem services to be a collective obligation
- We look at the many different ways society invests in protecting or replacing the environment
  - In a regulatory market
  - Cost of restoration
  - Through mitigation fees
  - Cost to regulate

Assesses the Social Value for decision making

≠ Market Value

Mapping Ecosystem Services

- Ecosystem Services vary spatially across the landscape
- ES vary in the biophysical supply of the service (e.g. amount of carbon that is sequestered, water being recharged to aquifers)
- ES vary in the way and 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 Ecosystems

- Results Presented at 30 m Pixel Scale
- 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

Ecosystem Services Mapped

Air pollution mitigation- USFS i-Tree landscape

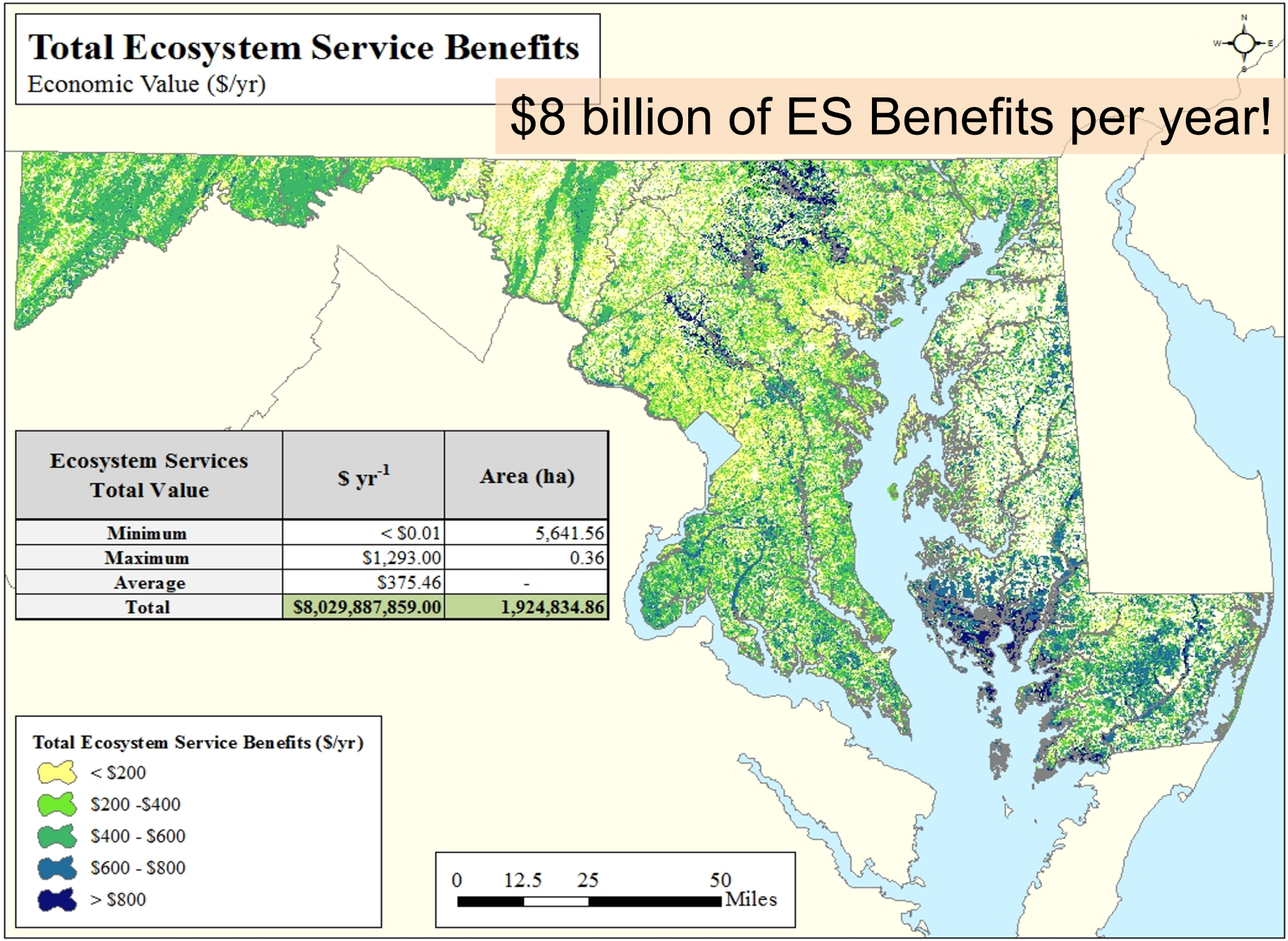
Carbon sequestration- USFS i-Tree and MD DNR

Groundwater recharge- USGS National Hydrography Dataset (1 km)

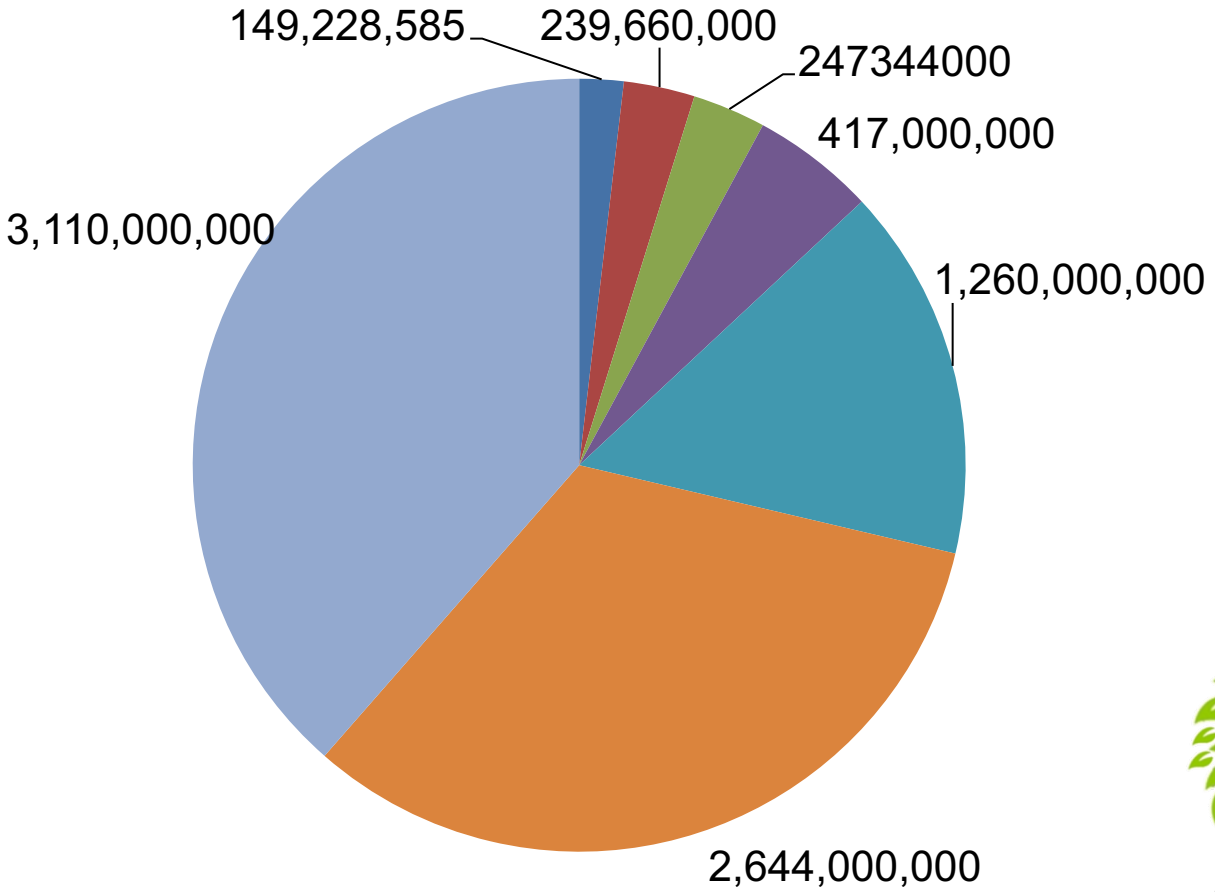
Nitrogen Removal- USGS SPARROW model w/ literature removal rates by loading/ecosystem type

Flood Prevention/Stormwater mitigation- Index of Mitigation Potential (EPA/MD DNR)

Wildlife- Habitat Quality Index, MD DNR

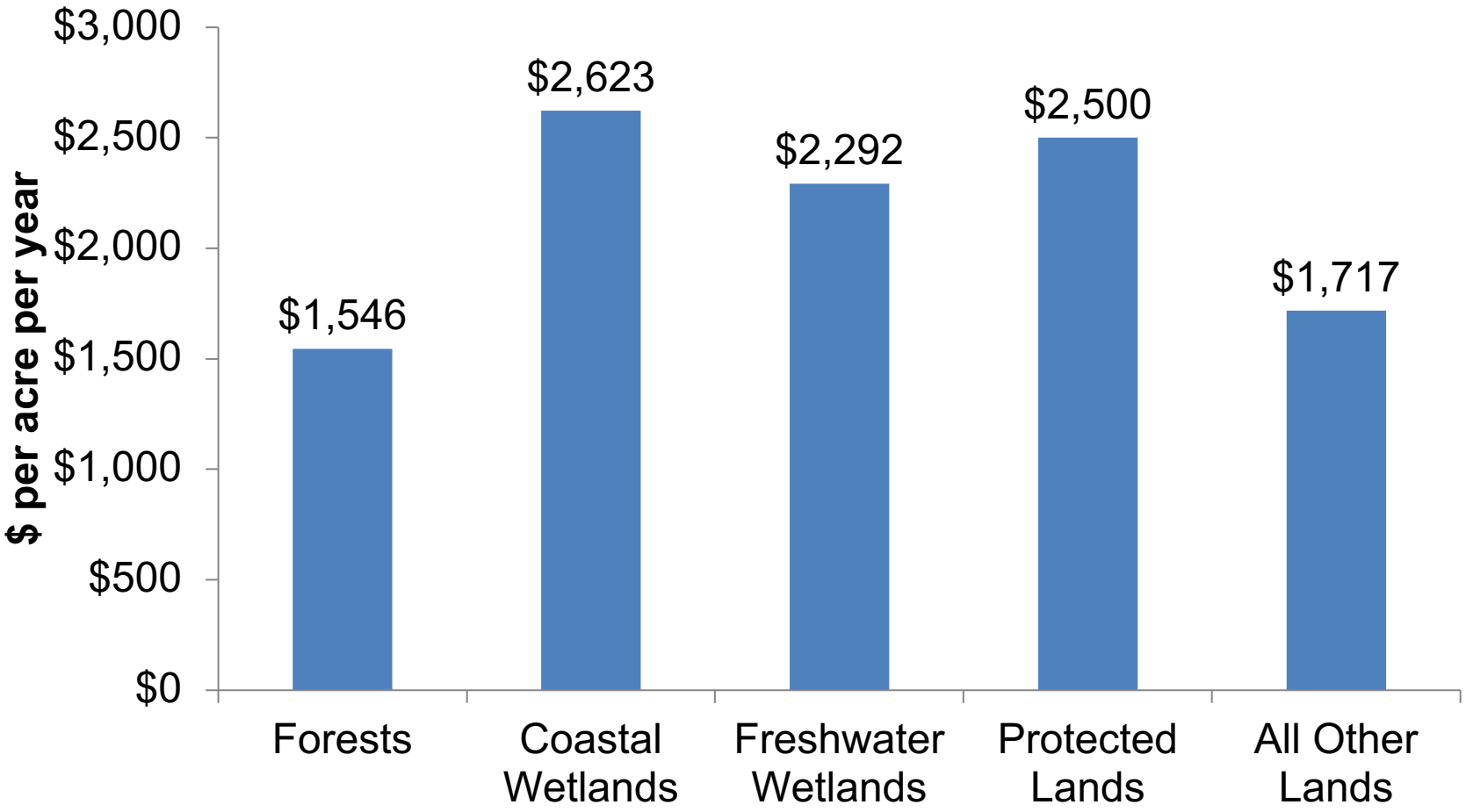

Total Ecosystem Service Benefits
Economic Value ($/yr)
$8 billion of ES Benefits per year!
N
W
E
S
Ecosystem Services Total Value | $ yr-1 | Area (ha)
Minimum | < $0.01 | 5,641.56
Maximum | $1,293.00 | 0.36
Average | $375.46 | -
Total | $8,029,887,859.00 | 1,924,834.86
Total Ecosystem Service Benefits ($/yr)
< $200
$200 -$400
$400 - $600
$600 - $800
> $800
0 12.5 25 50
Miles

Ecosystem Service Totals



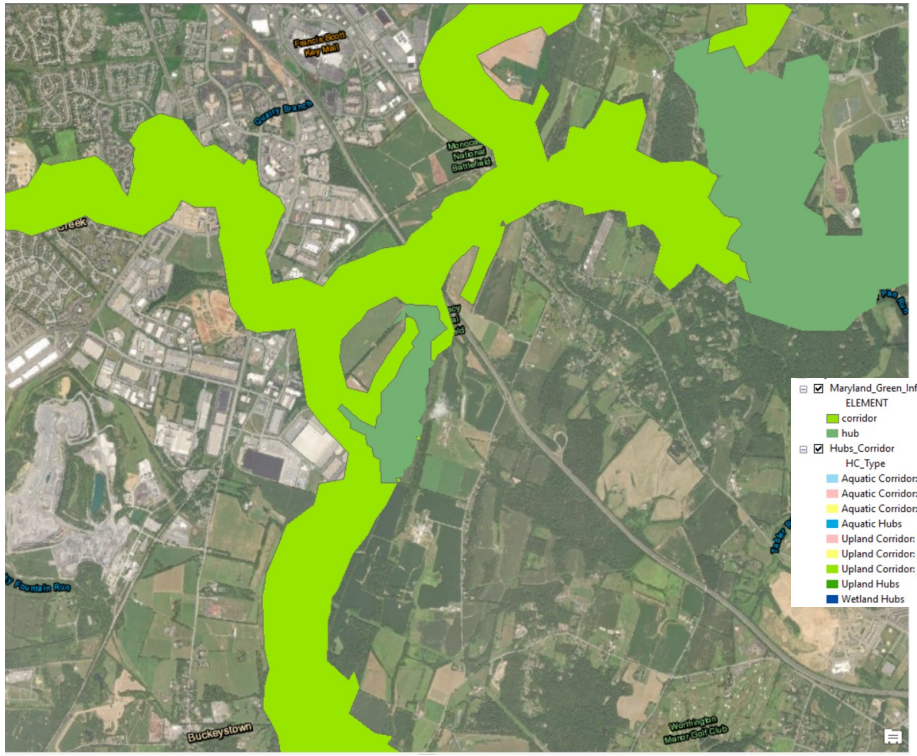
Units= $ per year

Land Use Comparisons

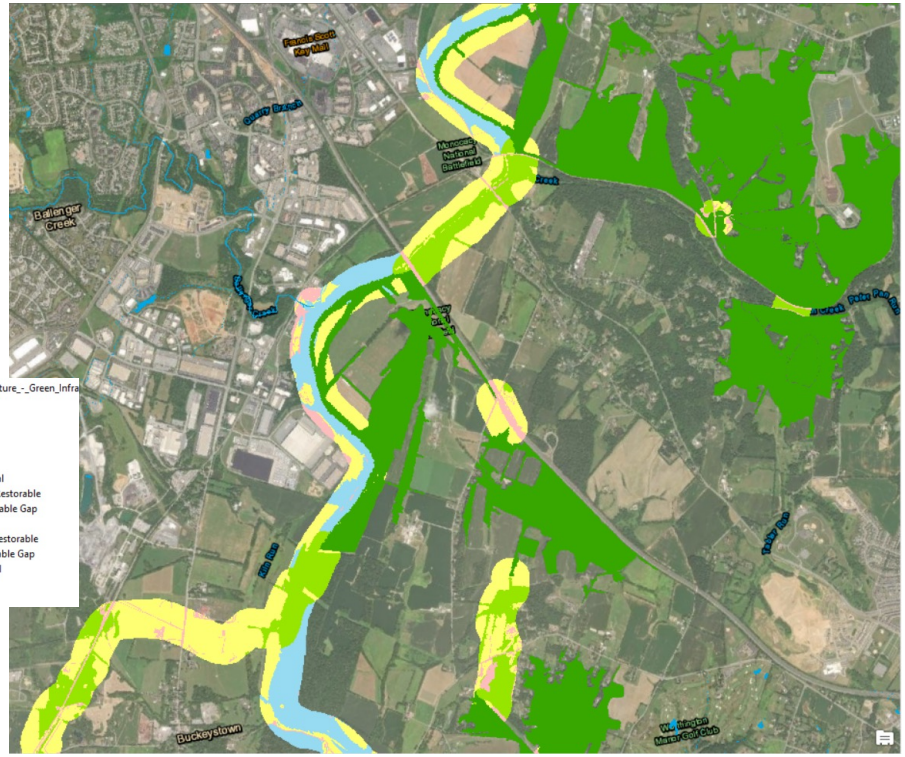


New Project
Updating Maryland's Green Infrastructure

Existing GI Hubs and Corridors



New GI Hubs and Corridors



Collaboration with the Chesapeake Conservancy Conservation Innovation Center

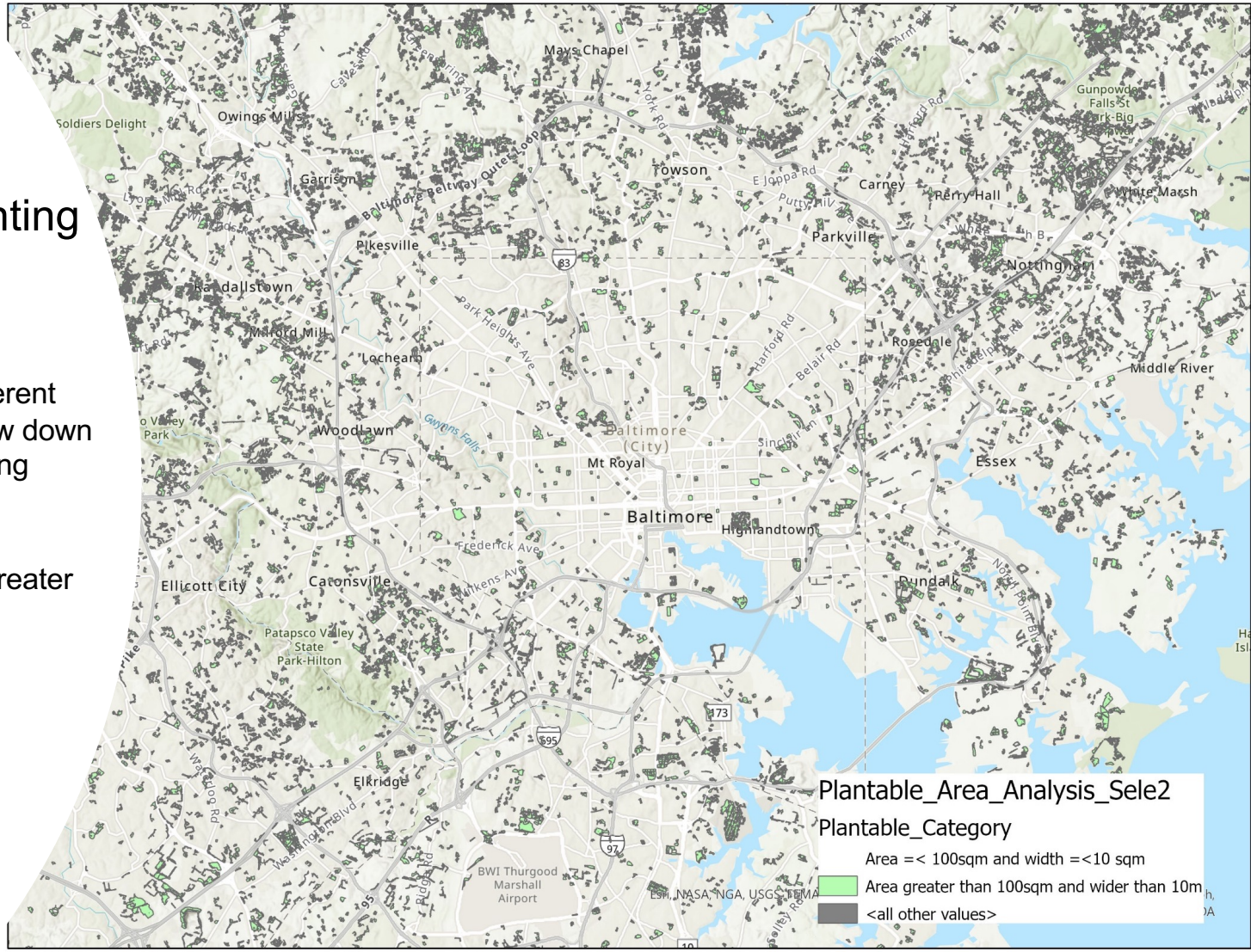
Mapping and Scoring Potential Restoration Co-benefits

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

Also mapping climate resilience and social vulnerability

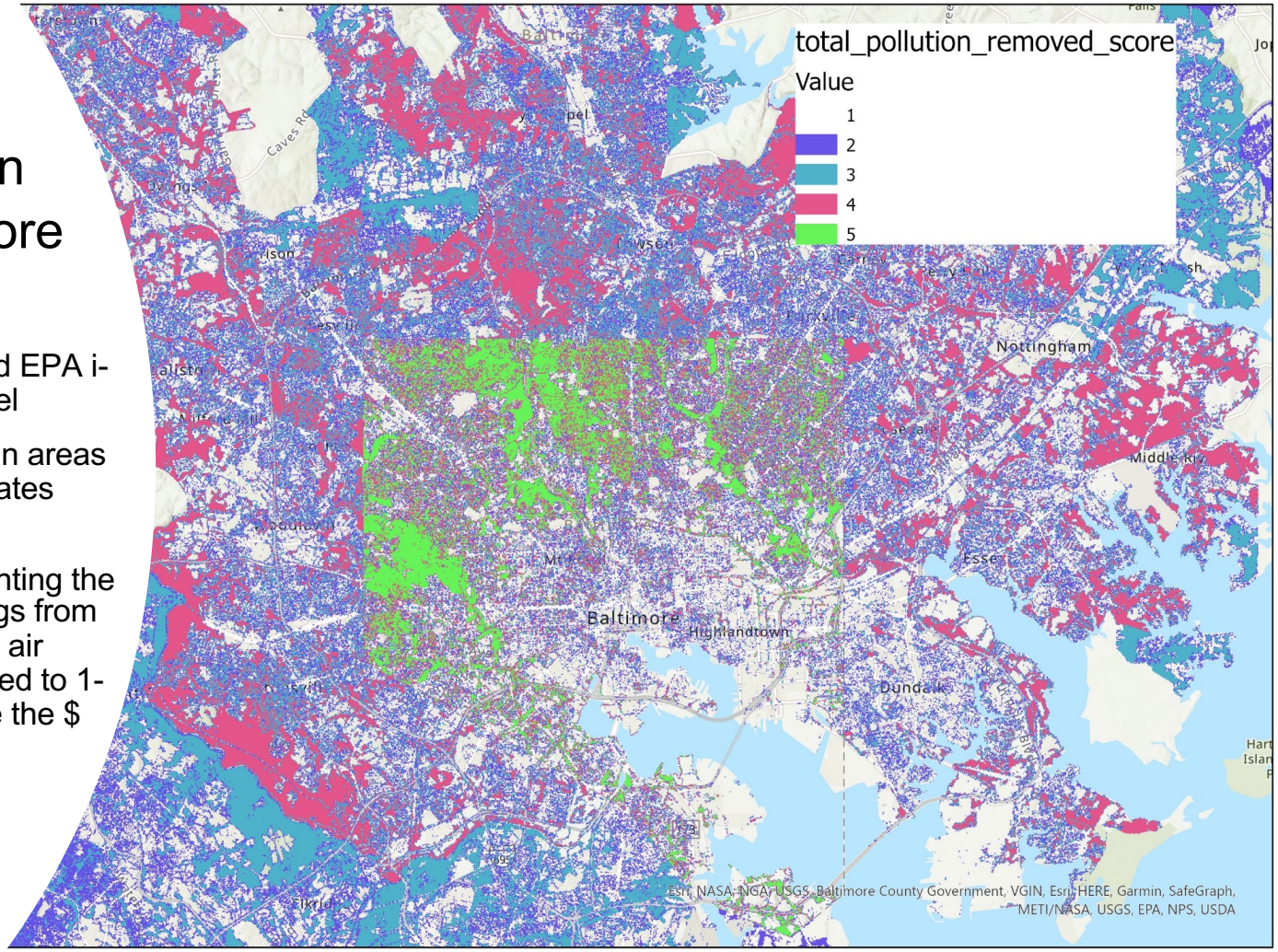
Identify Tree Planting Opportunities

- We can look at different thresholds to narrow down potential tree planting opportunities
- This map looks at contiguous areas greater than 1 acre



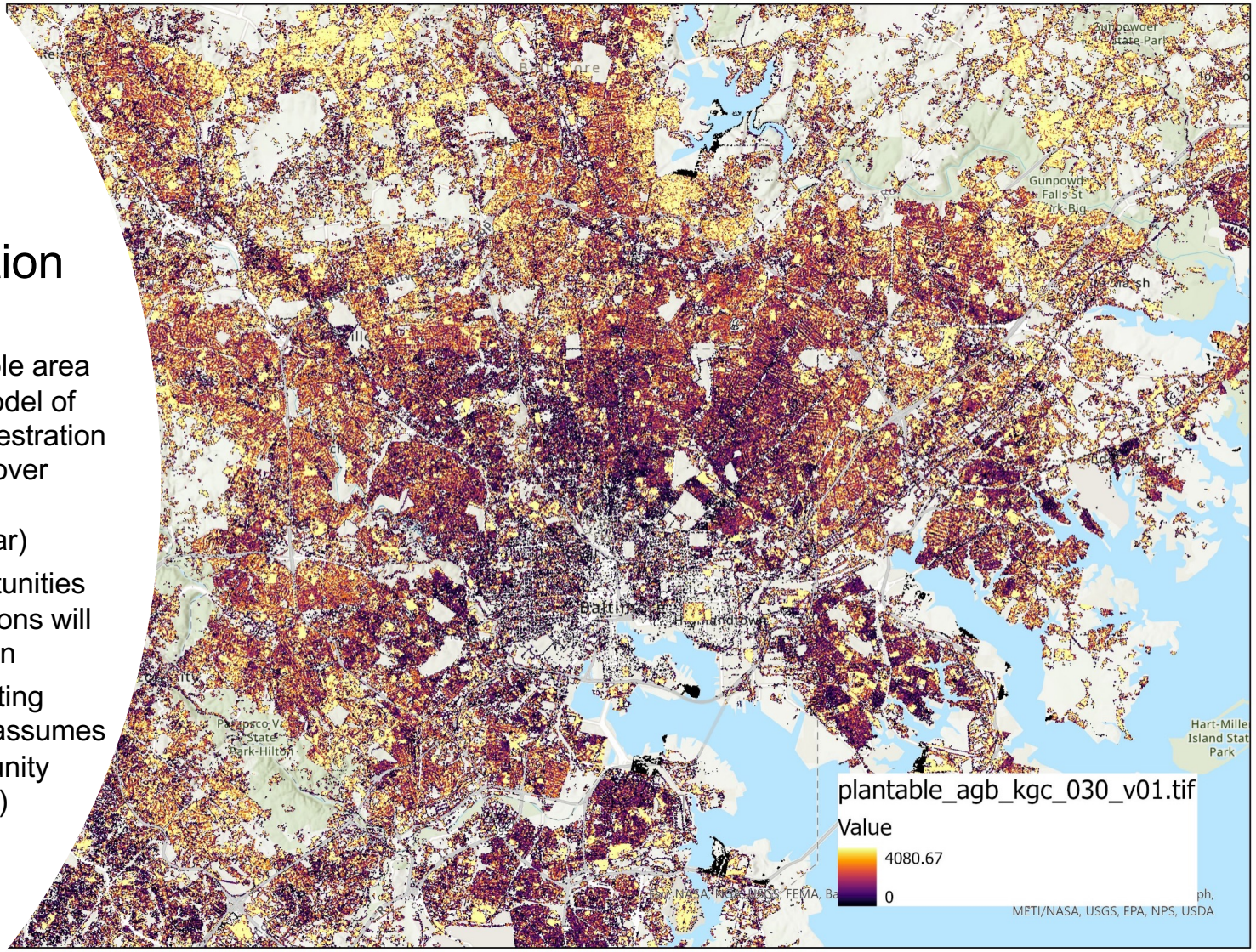
Air Pollution Removal Score

- Draws from USFS and EPA i-Tree Landscape model
- Tree plantings in urban areas with higher pollution rates scores higher
- Dollar values representing the potential health savings from tree canopy removing air pollutants are converted to 1-5 score (we also have the $ layer)



Carbon Sequestration

- 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)



Integrating Ecosystem Services in the Maryland DNR

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

Thank You!

Websites:

- http://geodata.md.gov/greenprint/
- http://dnr.maryland.gov/ccs/Pages/Ecosystem-Services.aspx

Webinar

- https://www.youtube.com/watch?v=56mDu3lH0-0

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