COAST **Card** for the Potomac Watershed

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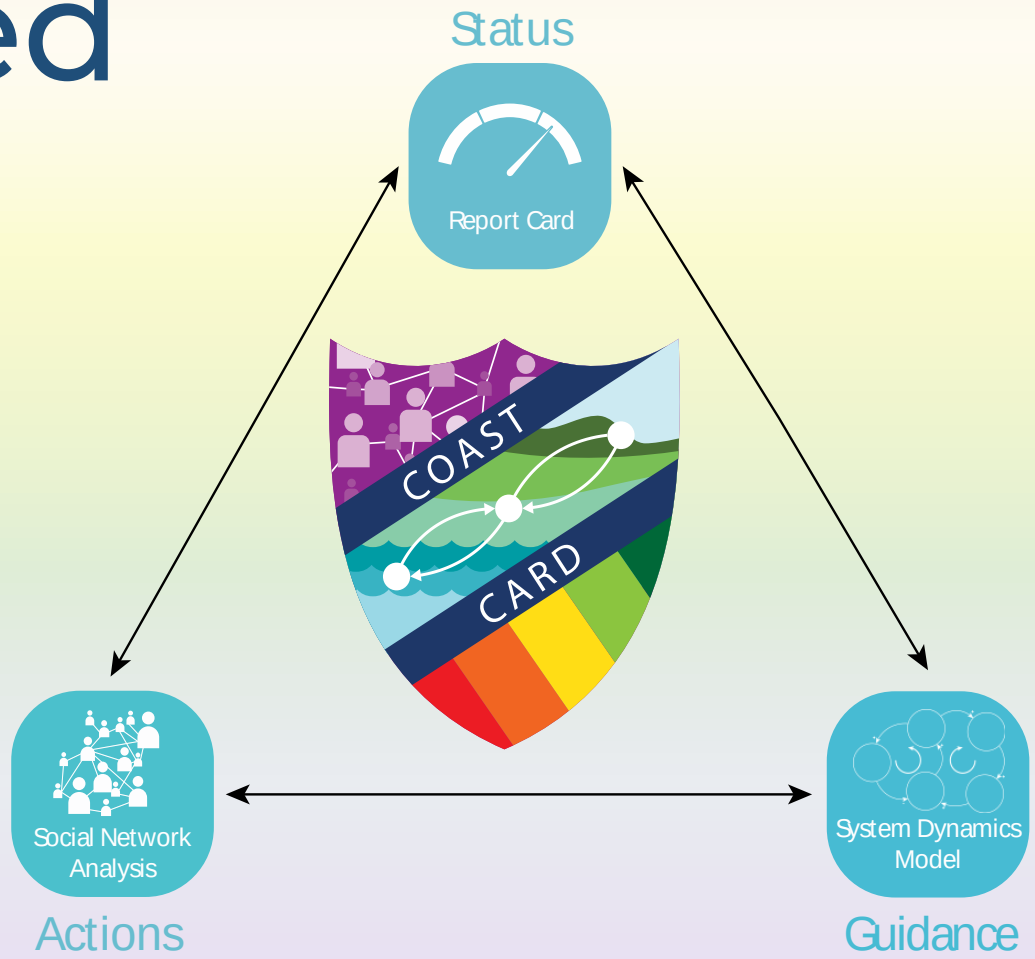
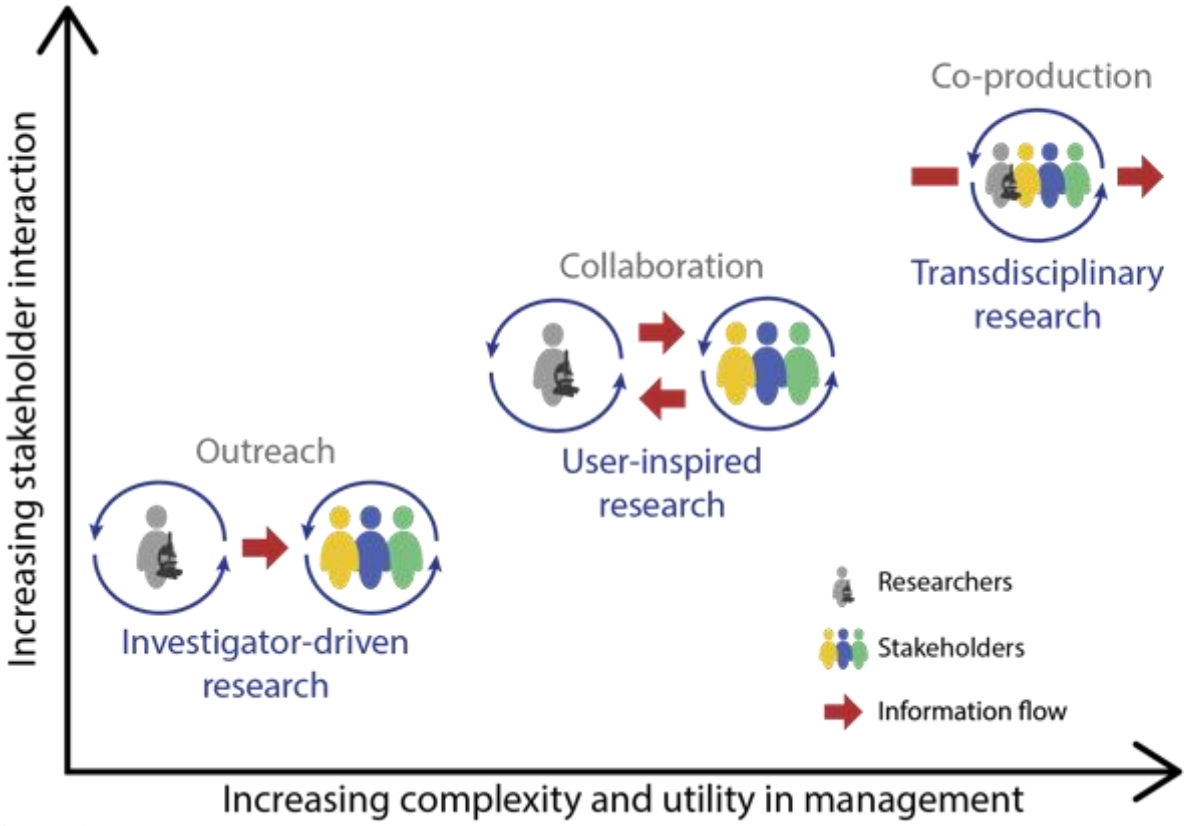
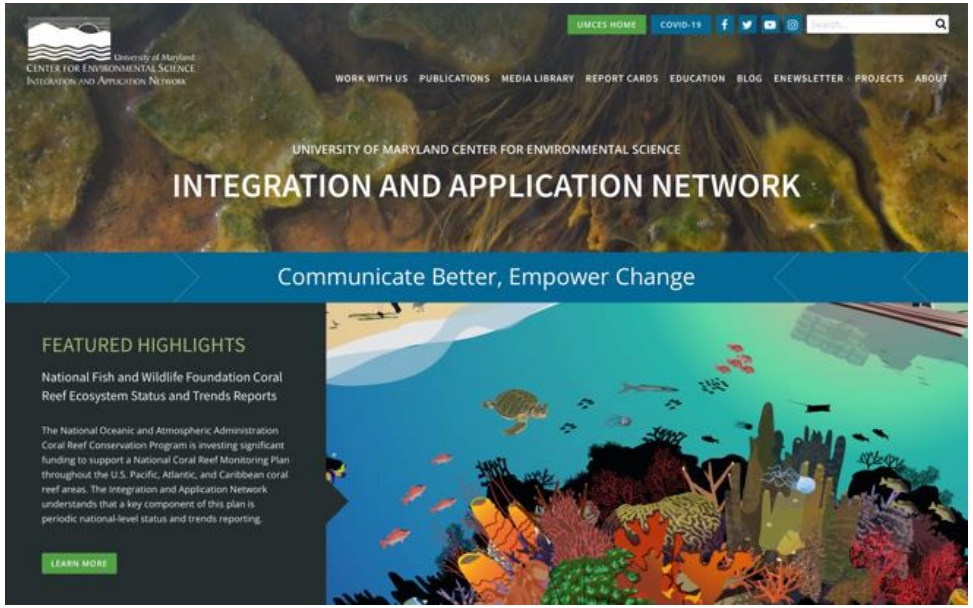
09 September 2022

Metropolitan Washington Council of Governments Water Resources Technical Committee meeting



Integration and Application Network





Coastal Ocean Assessment for Sustainability and Transformation

COAST Card is a transdisciplinary research program funded through the Belmont Forum

- The Belmont Forum is a consortium of research funders that have targeted funds toward research that actively integrates stakeholders into a co-design/co-development process with researchers.
- It is committed to fostering solutions to global sustainability challenges through innovative transdisciplinary research.

Coastal Ocean Assessment for Sustainability and Transformation

The Belmont Forum approach to transdisciplinary research

- Integration of stakeholders and multidisciplinary researchers
- Establish communication pathways
- Co-creation of new knowledge

(IAN Press. 2017/Belmont Forum 2017)

COAST Card is an innovative stakeholder-driven tool that monitors, forecasts, and reports the effectiveness of management decisions on coastal and ocean sustainability.

COAST Card uses a three pronged approach to improve sustainability management practices:

Status		*Social-environmental Report Card*
Actions		*Social Network Analysis*
Guidance		*Systems Dynamic Modeling*

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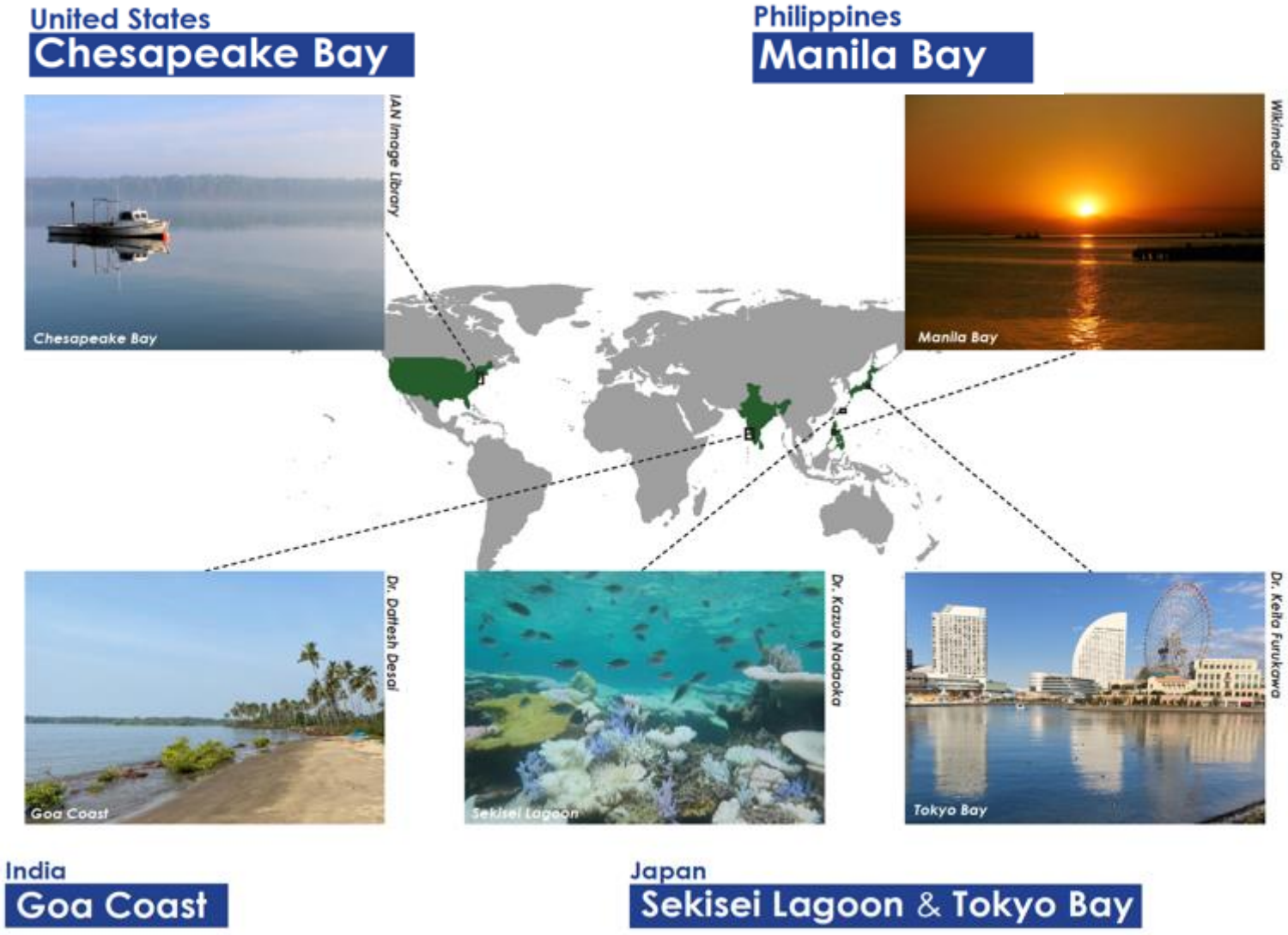
COAST Card is a transnational partnership

Coastal Ocean Assessment for Sustainability and Transformation

COAST Card study sites



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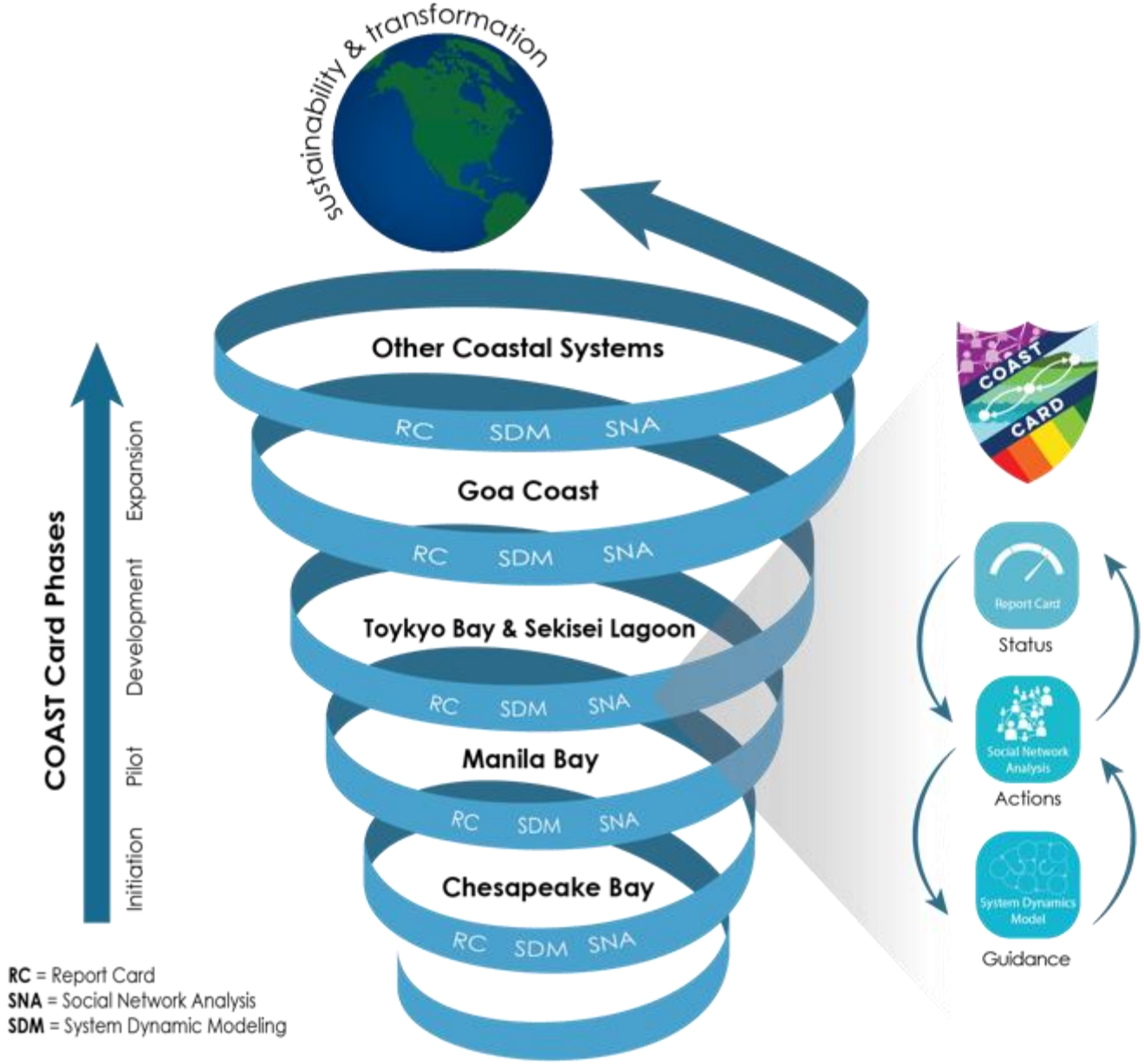
COAST Card process

Inclusive stakeholder Engagement is vital



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Scoping Meetings were initially held

Help Shape the Future of the Potomac Watershed!

People, land and water are all connected!

- Drop in to share your opinion of current conditions of the Potomac Watershed and what you hope it will look like in the future
- Help inform an assessment on the social, economic, and environmental aspects of the land and waterways in your area
- Participate in designing publically available materials for all users of the Potomac Watershed

Join us anytime between noon and 8:00pm on July 21st outside of Hood College's Whitaker Campus Center.

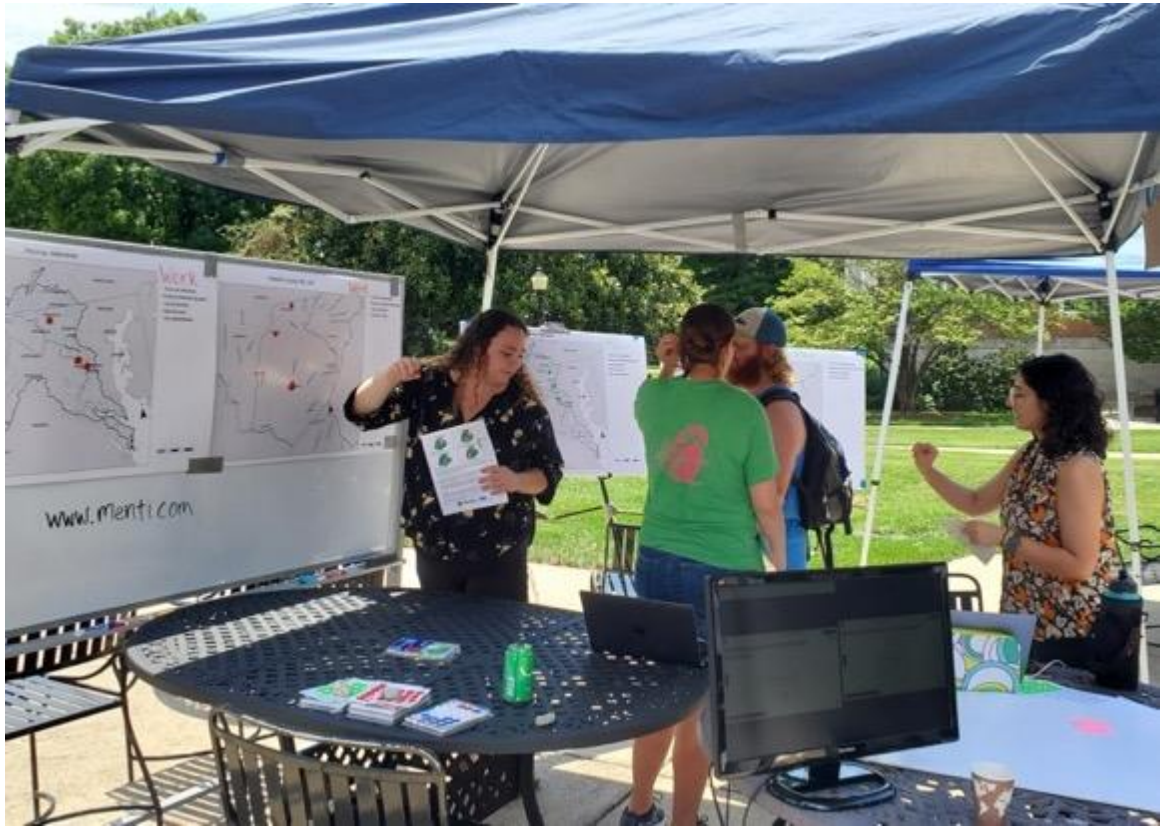
Food and beverages are available!

Register Here!

*Due to current COVID-19 case numbers, this event will be held outdoors in a covered environment. In the event of rain, the event will be held inside the Whitaker Campus Center. We will provide masks and ask that you social distance while in attendance. Thank you!

Why should you care?

Developing a shared understanding using mental and cultural models



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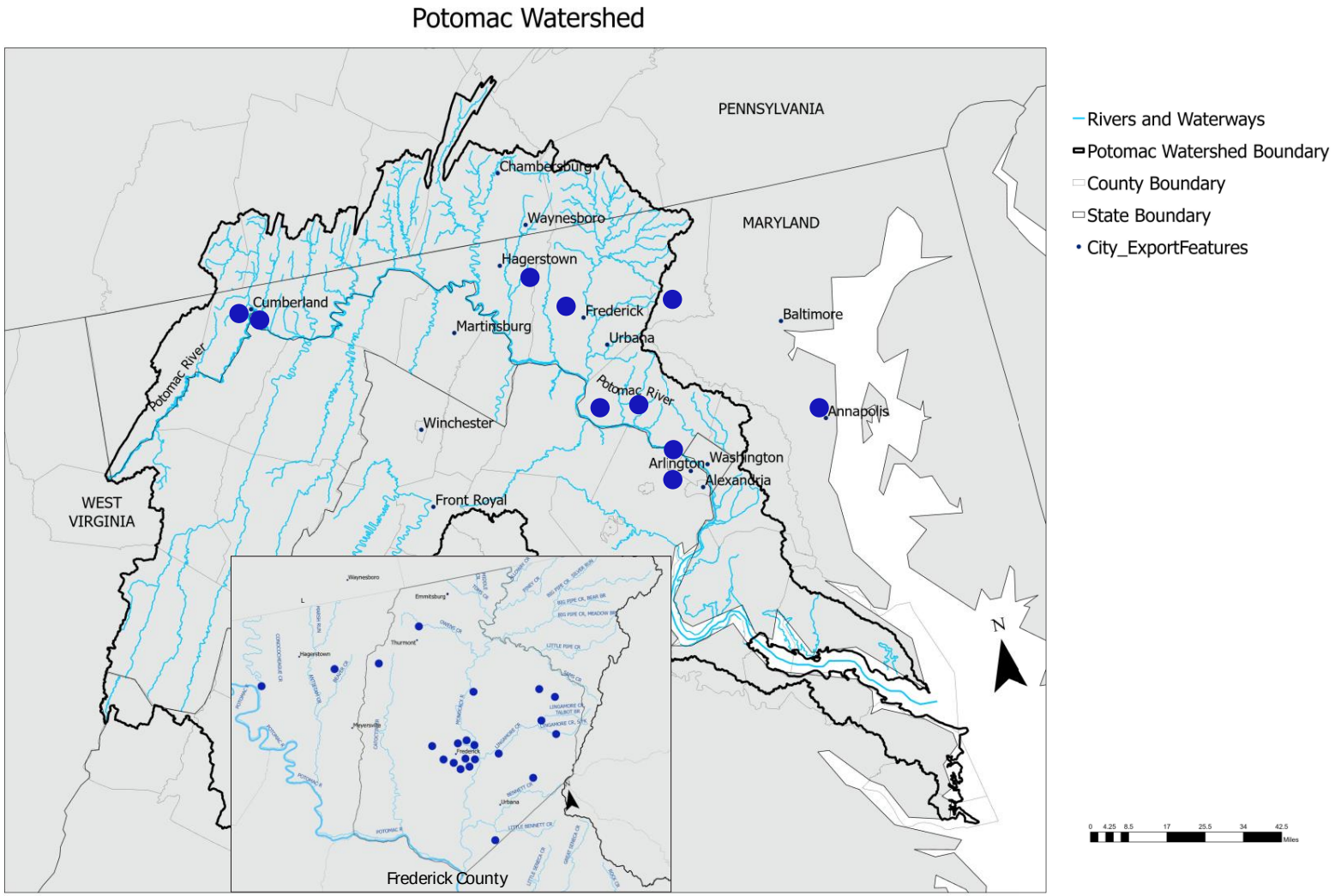
People live, work, and play in the Watershed



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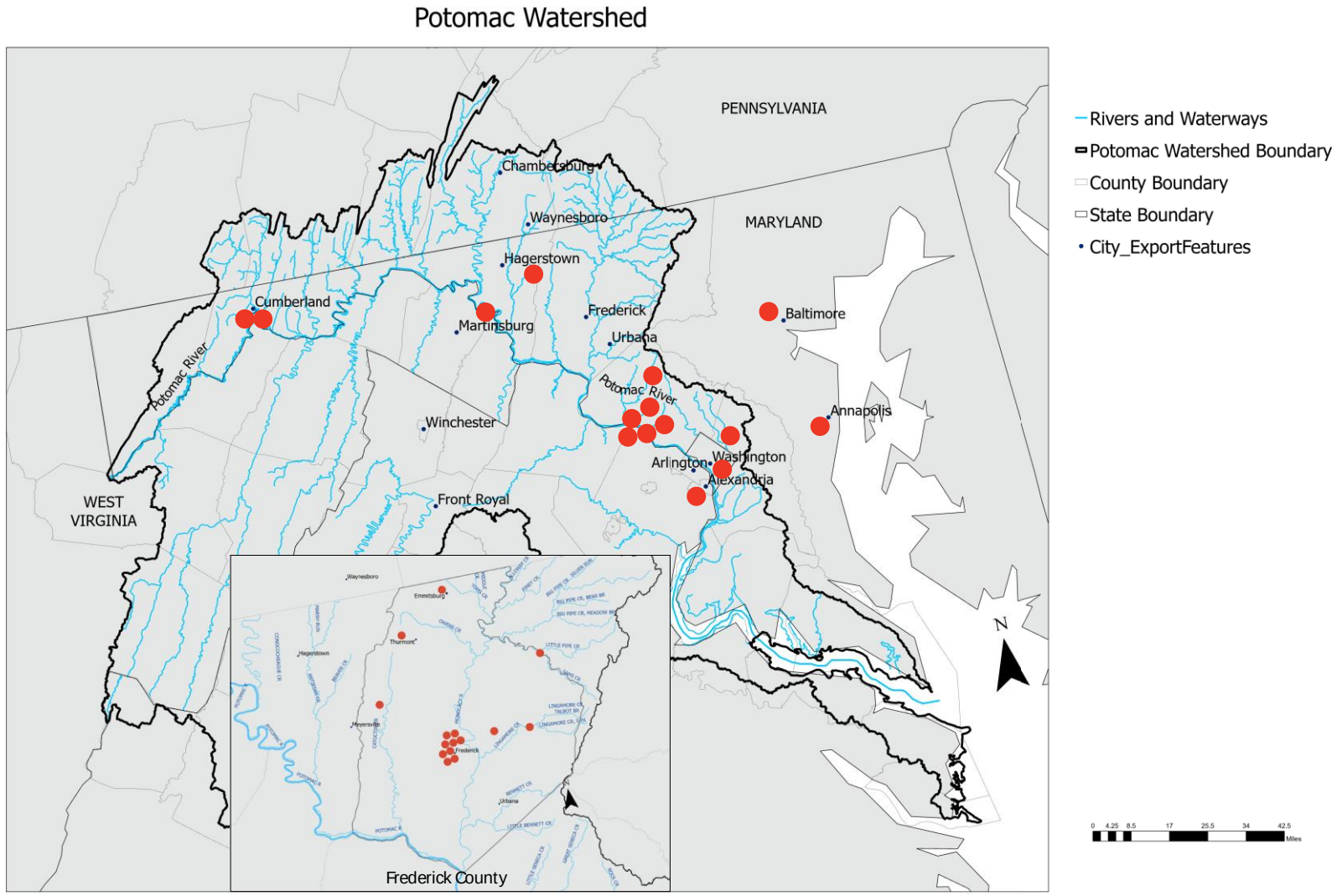
People live, **work**, and play in the Watershed



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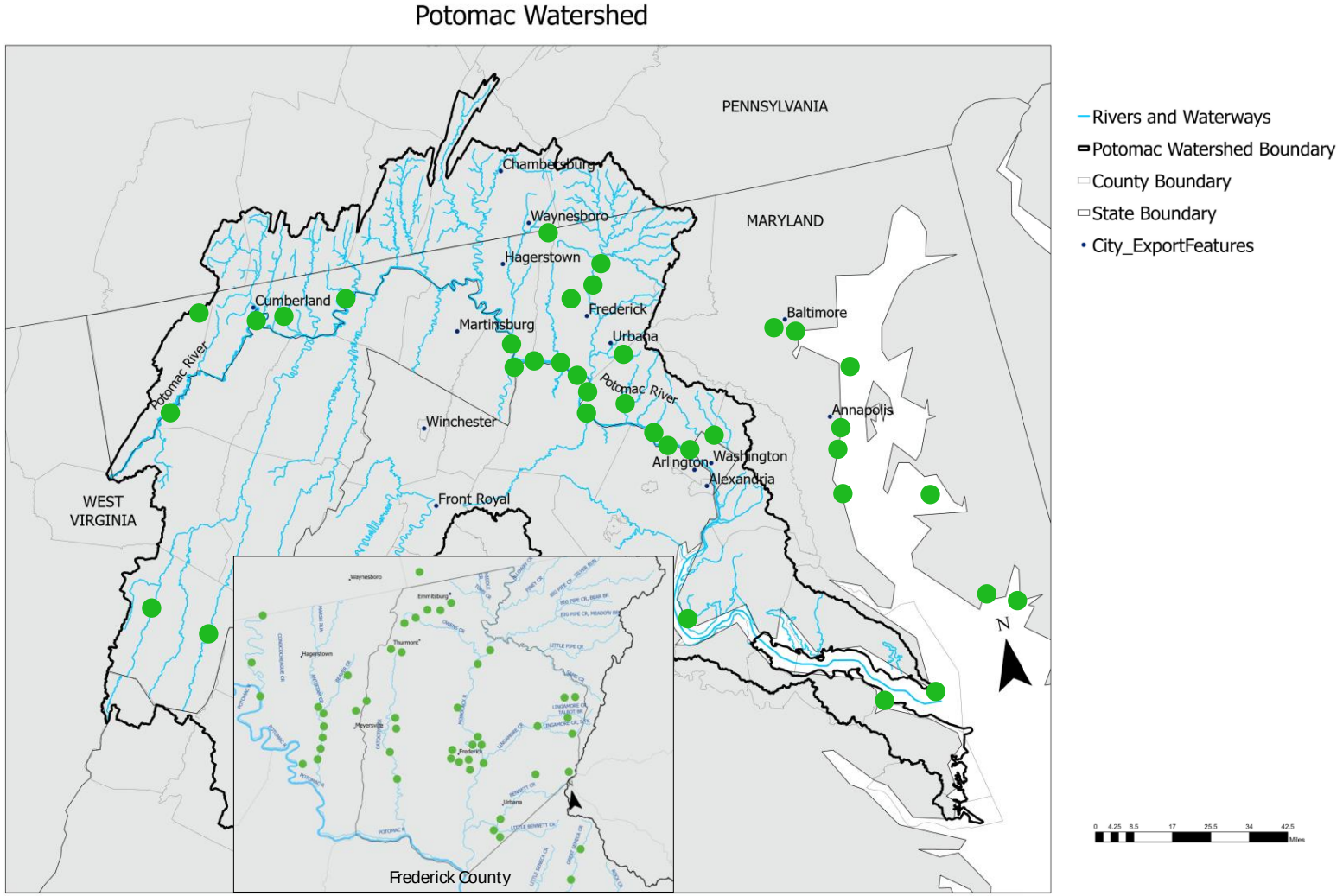
People live, work, and play in the Watershed



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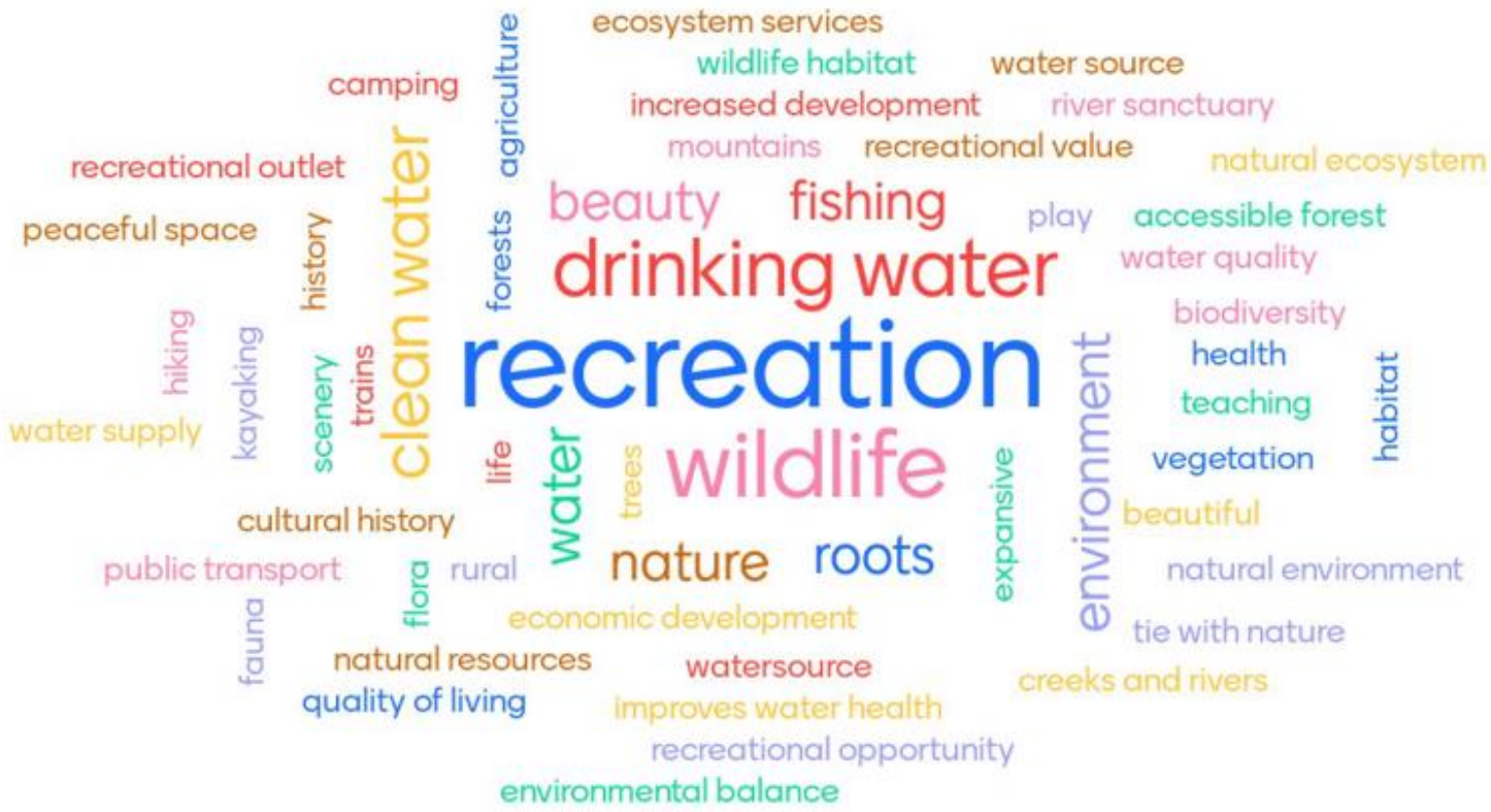
People value the watershed in different ways



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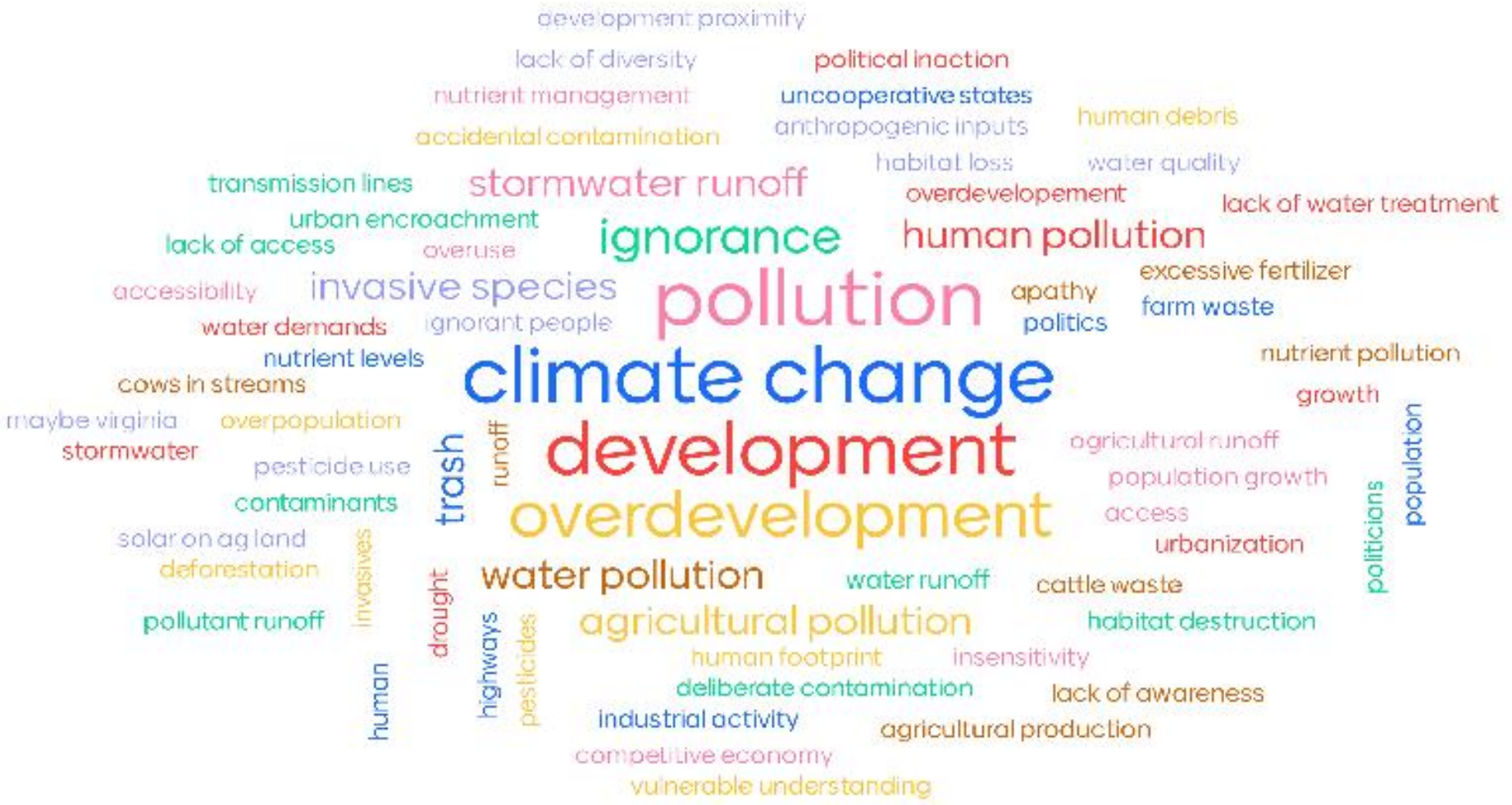
And they know the **threats** to these values



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How are we doing?

Identifying indicators for a holistic and inclusive socio-environmental report card

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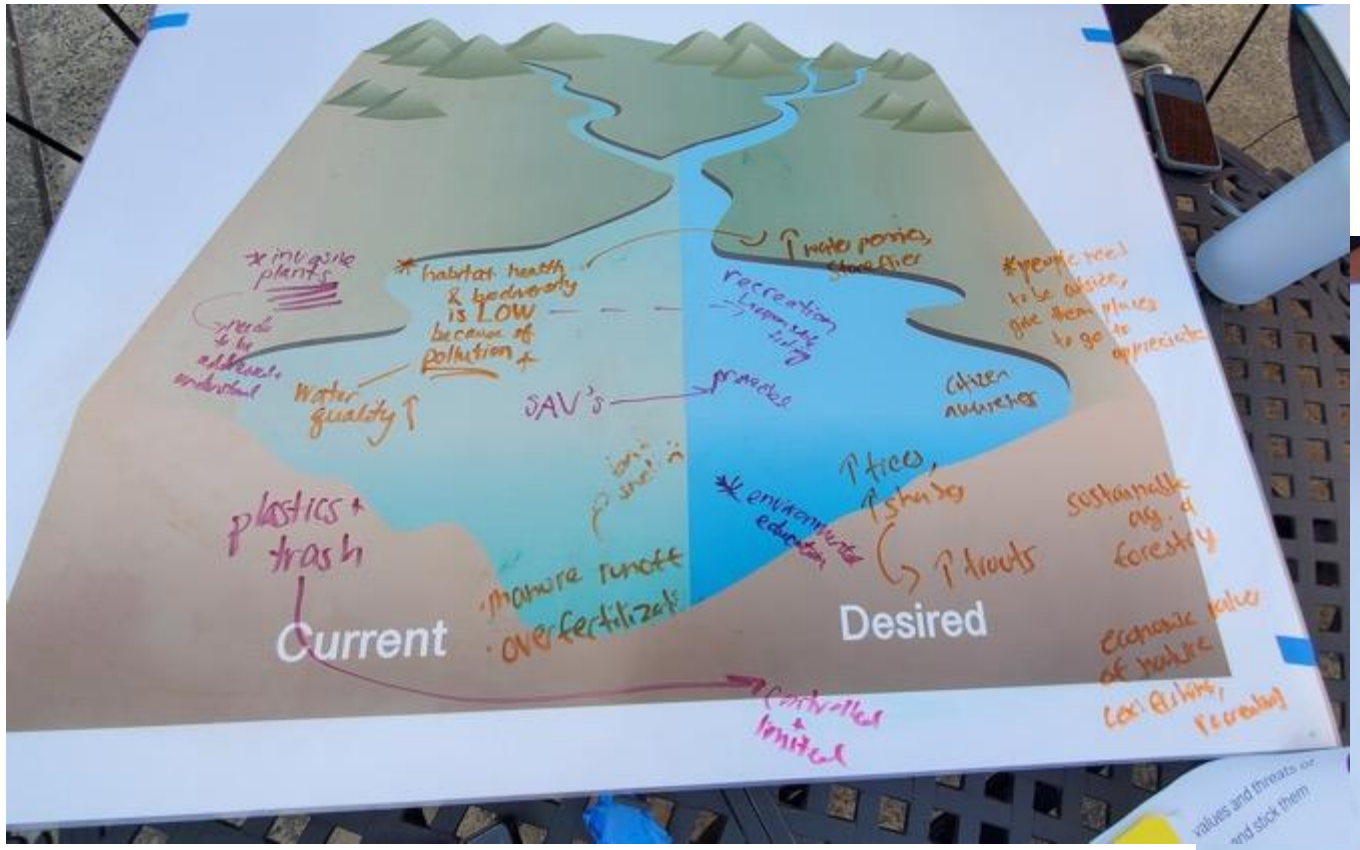

habitat health & biodiversity is LOW because of pollution
water quality
SAV's
plastics + trash
Current
Desired
recreation
citizen awareness
people need to be outside, give them places to go to appreciate
sustainable ag. & forestry
economic value of nature (eco-tourism, recreation)


Environmental
Economic
Cultural
Governance
wealth disparities
hurricane
recreation (economic)
development in watershed
awareness of entire vulnerability
policy established for protecting watershed

Suggested Indicators for the four categories

Societal

- Recreation
  a. Swimability/beach action values
  b. Fishing access
  c. Bicycling access
  d. Camping and hiking areas
- Culture
  a. Accessibility to historical sites
  b. Preservation of Indigenous and local histories
- Citizen awareness

Governance

a. Protected and conserved natural areas
b. Infrastructure safety rating with coastal and river inundation
c. Port infrastructure
d. K-12 environmental education in the region
e. Public transportation access
f. Funding
g. Environmental Justice
h. Management practices and implementation
- Environmental stewardship

Economic

- Near-water development acreage
- Wages
- Affordable housing
- Renewable energies
- Wealth disparity
  - % of households in poverty
- Flood insurance affordability

Environmental

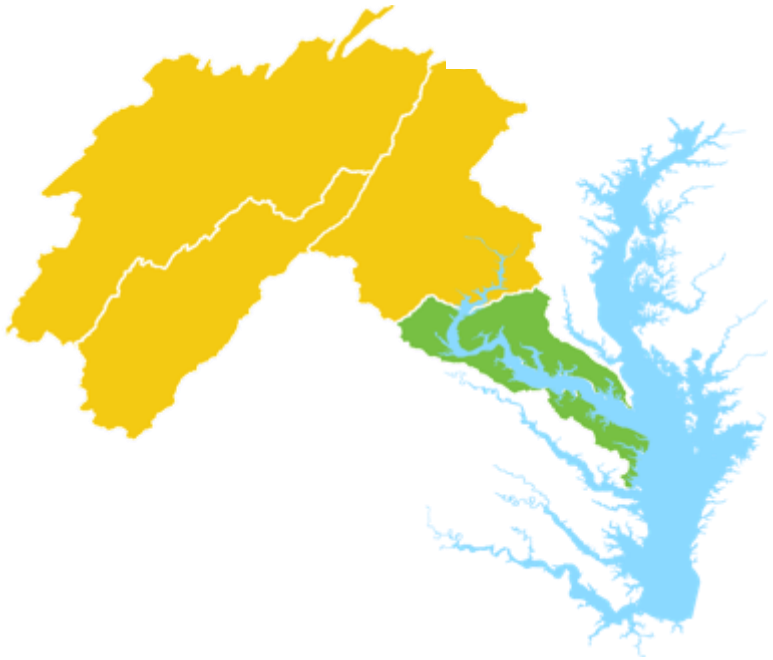
- Water Quality

a. Flooding and drainage
  i. Population changes within the floodplain
  ii. Flood frequency (river and coastal)
  iii. Viability of storm-water drainage systems
b. Flora & Fauna
  a. Riparian buffer zone
  b. Tree canopy
  c. Invasive species
  d. Fish inventory
c. Plastics/trash/litter
d. Urban heat

Using indicators from the Chesapeake Bay Watershed Report Card

Ecological

Economic



Societal

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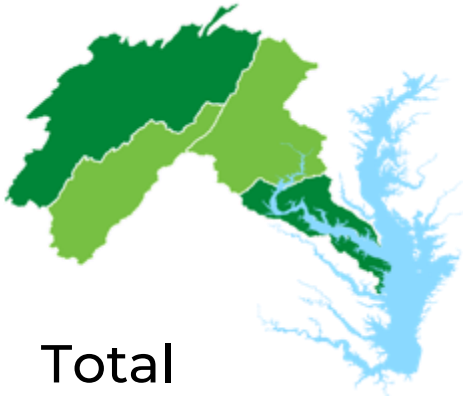
Water Quality Index for the Potomac and Shenandoah River Watershed

Water Quality Index

Total Phosphorus



Total Nitrogen

Turbidity

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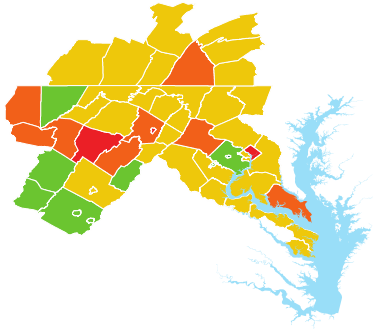
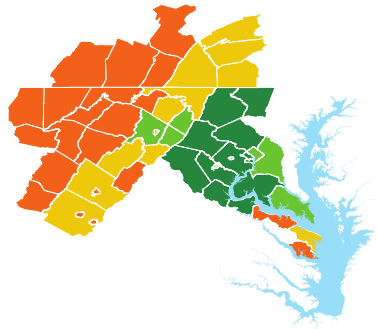
Economic data for the Potomac and Shenandoah River Watershed

Jobs Growth



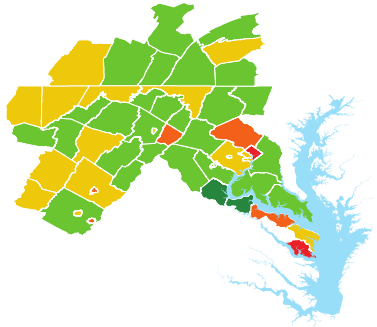
Household Income



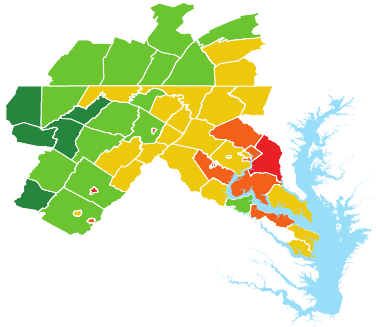
N

$

Income Inequality



Housing Affordability



Health scale

Very good

100%

A

80

B

60

C

40

D

20

F

0

Very poor

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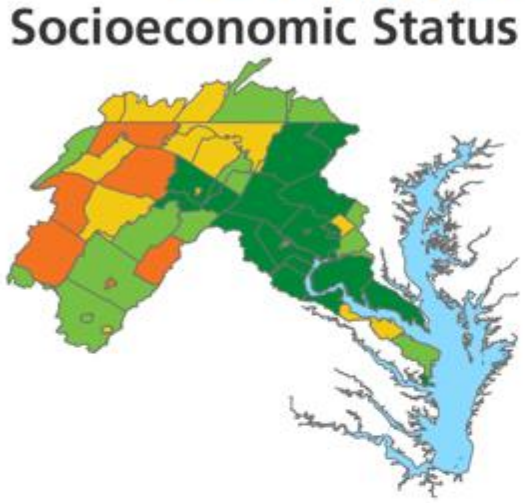
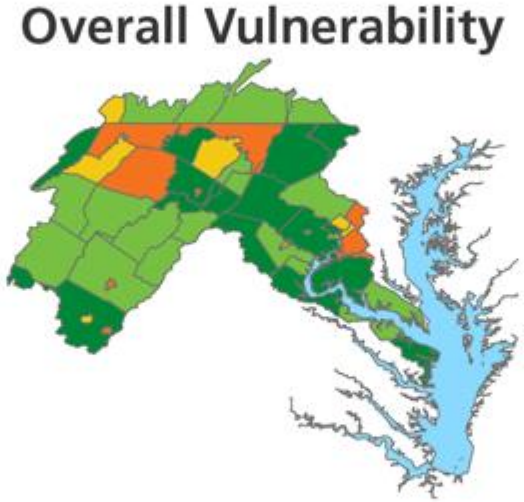
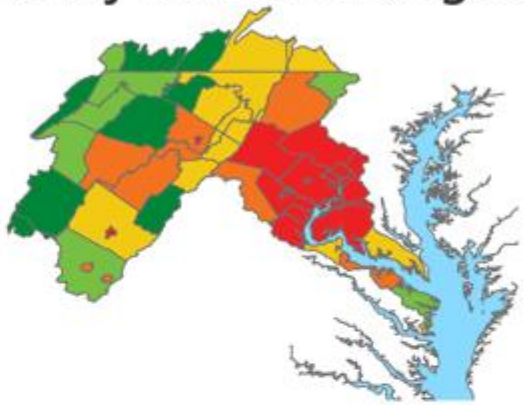
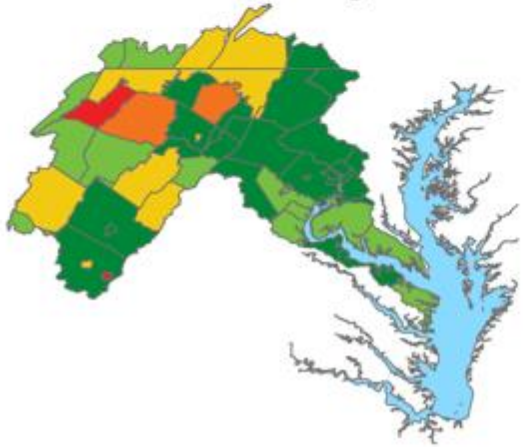
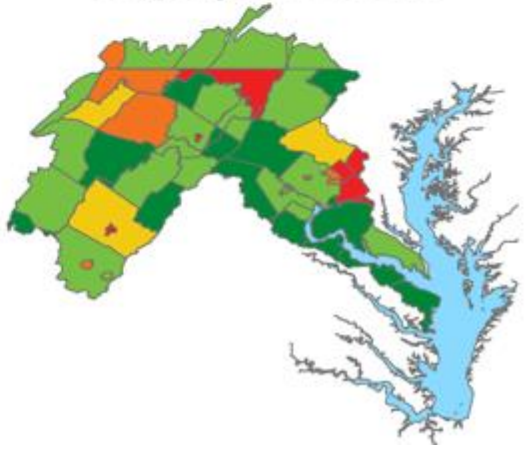
Social Vulnerability Index for the Potomac and Shenandoah River Watershed



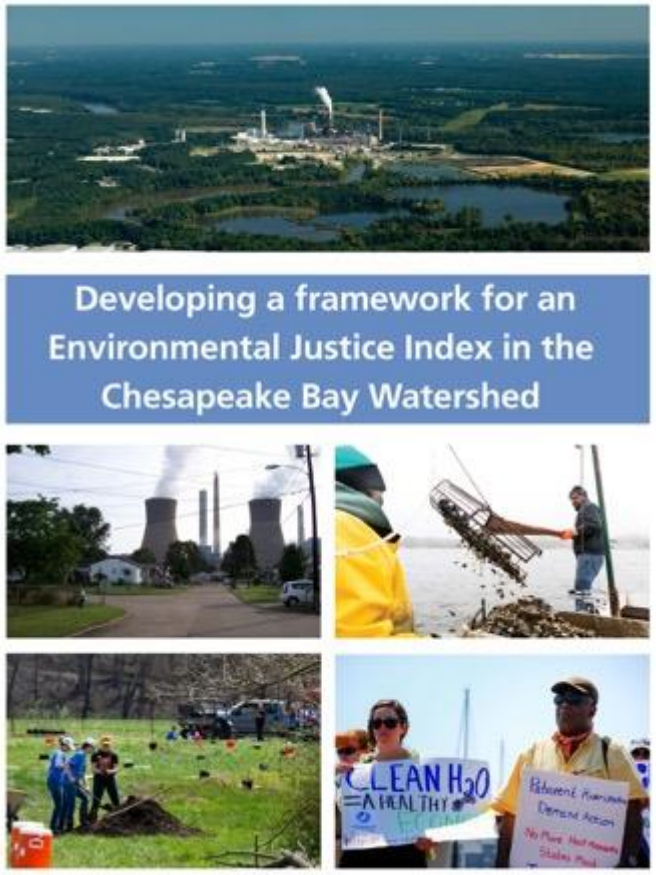








Related efforts: Incorporating indicators for socio-environmental justice



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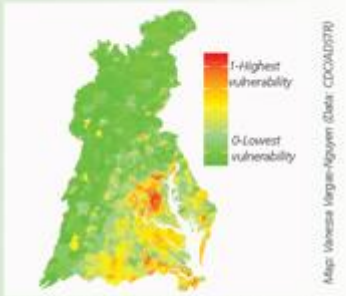
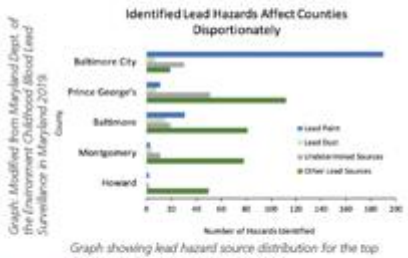
Indicators of Race

Decades of environmental justice research have demonstrated that race is the largest contributing factor in the environmental disamenities and burdens throughout minority communities. These injustices include health disparities, housing differences, hazardous waste, climate change, and accessibility to clean water. Present studies on environmental justice have often focused on major racial groups (Black, Asian, Native American, Pacific Islander, Latinx, and white). Therefore, there is a need to expand racial analysis to include racial subgroups given that racial groups are not monolithic and can have differing experiences relating to environmental justice.



Map of 2018 social vulnerability index based on percentage of minority for the Chesapeake Bay watershed.

Lead Exposure

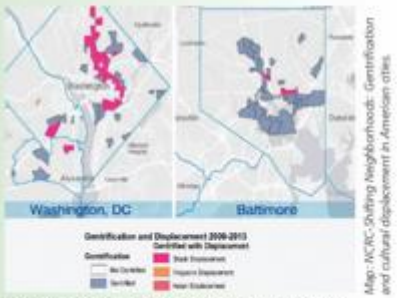


Graph showing lead hazard source distribution for the top five most impacted counties in Maryland.

Lead-based paint was once commonly used in buildings before it was banned for consumer use by the federal government in 1978. The Centers for Disease Control and Prevention (CDC) determined that a blood lead concentration level of above 5 µg/dL could result in significant health risks including neurological effects, intellectual disabilities, risk of high blood pressure, and kidney damage. Marginalized areas in Maryland have a high percentage of people, particularly children, with blood lead concentrations exceeding the CDC's threshold. Identifying lead exposure as an indicator can address one of the many social and health inequalities.

Housing Gentrification

Systemic racism has manifested itself in the form of housing segregation and disparate facilities and amenities among BIPOC communities for decades. Unfortunately, the infrastructure and safety of BIPOC and low-income neighborhoods are not prioritized, and are even ignored. This foundation of segregation has been built upon by gentrification, further marginalizing people of color and people in poverty who are not afforded access to necessary amenities. Therefore, an indicator that examines the present-day gentrification occurring in the Chesapeake Bay watershed will assist in identifying where to provide targeted assistance and support to gentrified communities.



Map showing gentrification and displacement in Baltimore, MD and Washington, DC.

Proximity to Hazardous Waste Sites

Sparrows Point Industrial Complex along the Patapsco River.

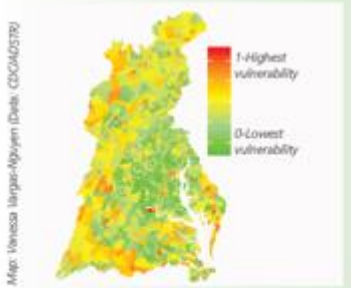
From the very beginning of the environmental justice movement, it has been understood that the zoning of hazardous waste sites was racially motivated, and continues to disproportionately threaten the health and well-being of BIPOC communities. Despite awareness of these inequalities and passage of reactive legislation, BIPOC communities are still being exposed to hazardous waste. Therefore, by comparing the locations of brownfields, Superfund sites, and hazardous waste sites to socioeconomic data, groups that are being disproportionately affected in the Chesapeake Bay watershed can be identified.

Drinking Water Quality

Access to drinkable water is integral to the survival of humans. In 2001, EPA set 10 µg/L as a standard for arsenic, nitrate, and phosphate levels to define what is "healthy water." Municipal water supplies maintain these standards with EPA oversight, but small community water systems, such as private wells, are more vulnerable to unhealthy levels of chemicals. In Maryland, private well water makes up 20% of the water supply, and many minorities rely on these small community water systems. Therefore, an indicator analyzing access to adequate drinking water is necessary.

Access to safe drinking water is a serious environmental justice issue.

Below Poverty Level



Map of 2018 social vulnerability index based on below poverty level status for the Chesapeake Bay watershed.

Nearly 10% of people in the State of Maryland live below the poverty line. It is well-understood that these groups of people are disproportionately subjected to environmental injustices with a diminished ability to respond to these injustices, relocate, access green space, or acquire proper medical care. Despite this knowledge, investments in these underserved groups have not been made. Therefore, considering and weighting the percentage of watershed residents in poverty will be critical as an indicator for comparison with environmental and equity indicators.

Proximity to Water Treatment Plants

Wastewater treatment plants are facilities used to separate sewage and water so that they may be returned to the environment. However, research has shown that gases released by these facilities can have adverse respiratory and digestive health effects on nearby residents. These gases also have negative odors that repel businesses, reduce economic growth, and decrease property values. These sites are purposely located near marginalized communities, disproportionately threatening the health of these groups. Therefore, by pairing this indicator with community demographics and locations we can identify those groups who are placed at a socioeconomic disadvantage.

Photo: Jane Thomas, UMCES-IAN

Back River wastewater treatment plant in Maryland.

Coastal Flooding

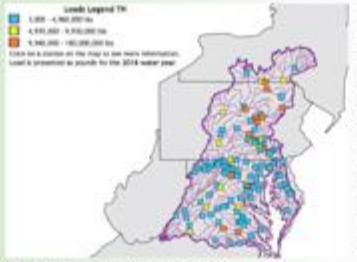
Forty percent of the human population inhabits low-lying coastal communities around the world. Climate change has increased the frequency and risk of flooding in these communities. Coastal areas around the Chesapeake Bay are particularly vulnerable to flooding with dual impacts of land subsidence and sea level rise. Socially vulnerable individuals living in coastal areas are disproportionately exposed to flood risks, amplifying their social vulnerabilities. A coastal flooding indicator could be instrumental in identifying areas where flood risk is unevenly impacting marginalized communities and help in developing more equitable adaptation strategies.

Photo: Flickr-Will Parson/Chesapeake Bay Program (CC-BY-SA 2.0)

Virginia's Eastern Shore is vulnerable to flooding.

Agricultural Pollution

Agriculture comprises about 25% of land use in the Chesapeake Bay, and causes runoff of agriculture pesticides/fertilizers such as nitrogen and phosphorus into waterways. Minority and low-income communities should be protected from disease-causing pollutants that are a result of agriculture practices. Monitoring sources of pollution is expensive and rarely accurate; therefore instead of directly monitoring these sources, phosphorus and nitrogen yields assessment can provide insight into the presence of agricultural runoff as it relates to the downstream effects on marginalized communities.



Map: USGS National Water Information System web tool/web tool (CC0)

Map of total nitrogen (TN) yields in Chesapeake Bay Watershed.

Agricultural Waste: Air Quality

Agriculture and animal husbandry are among the largest contributors to ammonia in the atmosphere. Due to the large amount of agriculture in Chesapeake Bay watershed, it is vital to assess how ammonia presence in the air impacts air quality and in turn the health of marginalized communities. Inhalation of this chemical poses a variety of respiratory threats and can even lead to respiratory distress and failure. However, a data collection challenge exists in that the complex calculations, modeling, and estimates that need to be made at the county, state, and watershed levels often require constant updating.

Photo: Flickr-Chesapeake Bay Program (CC-BY-NC 2.0)

Industrial poultry agriculture houses can reduce air quality.

Air Pollution

Pollutants such as ozone and particulate matter have severe impacts on human health, which can lead to increased amounts of hospitalization and death. Populations worldwide have been affected by air pollution, and the Chesapeake Bay region is no different. Baltimore City, for instance, experienced a weighted average of 14.2 unhealthy ozone days from 2016 to 2018. There has been a rush to find solutions to control the problems of air pollution. Urban trees have proven to improve air quality and temperature. An increase in tree canopy has also been correlated with a decreased in crime in a study done for Baltimore City. Both air pollution and urban trees can be powerful indicators for environmental justice.

Photo: Flickr-Chesapeake Bay Program-Will Parson (CC BY-NC 2.0)

Runner running along vegetated roadway along the Chenango River.

Air Pollution: Carcinogenic Risk

Racial and ethnic minorities are exposed to greater levels of air pollution, particularly in neighborhoods with high levels of segregation. This air toxicity can be linked to a large amount of both short-term and long-term health impacts. The 2014 National Air Toxics Assessment of Cancer Risk characterizes carcinogenic health risks based on individual exposure to 140 air pollutants. The EPA's framework for assessing and managing these risks includes unit risk estimates, inhalation reference concentrations, and risk characterization. A lifetime cancer risk indicator will highlight the health risks and identify toxic air pollutant sources that should be prioritized in environmental justice remediation.

Photo: Adrian Jones, UMCES-IAN

Chalk Point Power Plant on the Patuxent River.

Commercial Fishing

Since the early colonists' arrival, the Chesapeake Bay region was known for its unique fish species and seafood heritage. These historical natural communities and marine occupations are a critical part of the Chesapeake Bay story. In the 1900s, however, disease, overfishing, and other factors led to a historical decline in the Bay's top seafood industries. The rapid decline of wild fish populations has caused unanticipated fluctuations in harvest, resulting in high price demand and economic hardship for commercial watermen. A commercial fishing indicator could depict coastal communities' ability to respond to the rapid decrease in fishing abundance while addressing lower educational attainment and lack of occupation diversity.

Photo: Flickr-Steve Droter/Chesapeake Bay Program (CC BY-NC 2.0)

Fisherman dredging for oysters.

Recreational Fishing

Recreational fishing has the potential to promote mental health, wellbeing, and physical health through local community engagement and access to natural spaces. Unfortunately, the lack of free public access to fishing sites and annual fishing license fees are barriers to equitable recreational fishing. Therefore, recreational fishing may be an environmental justice indicator in which low-income communities are disadvantaged due to a lack of funds to obtain a state fishing license or to enter a facility to fish.

Photo: Flickr-Chesapeake Bay Program (CC BY-NC 2.0)

Stanley Cuffee fishes off Ocean View Fishing Pier in Norfolk, Virginia

Access to Marine Mammals

The Chesapeake Bay watershed is home to dense and diverse human communities and wildlife communities, including bottlenose dolphins. Similar to access to green space, exposure to these animals can improve mental health and well-being. Dolphin presence is also an indicator of a healthy Bay ecosystem. However, viewing these interesting creatures is dependent on either having waterfront access or a boat, both of which are often related to socioeconomic status. Therefore, an access to marine mammals indicator based on reported sightings via the Chesapeake Dolphinwatch could be used for outdoor engagement and access to green space.

Map: chesapeakedolphinwatch.org/Google (Fair Use)

Map of reported dolphin sightings in the Chesapeake Bay in April 2021.

Proximity to Green Space

Green spaces are any piece of land that is undeveloped and accessible to the public, including parks, community gardens, playgrounds, public seating areas, and public plazas. As urban communities have a distinct lack of access to natural spaces, green spaces are crucial locations that can provide a space for physical exercise, improvements to mental health, and safety within city limits. However, socioeconomic factors and regularity of maintenance can lead to varying levels of safety and accessibility. Ensuring necessary maintenance and equitable access to green spaces has the potential to improve physical and mental health for marginalized communities.

Photo: Flickr-Dawnmigue Clark/Chesapeake Research Consortium (CC-BY-NC 2.0)

The Festival del Rio Anacostia at Bladensburg Waterfront Park in Prince George's County, Maryland.

Environmental Financing for BMPs

Best management practices (BMPs) are a multi-million-dollar effort throughout the Chesapeake Bay watershed to improve water quality. BMPs have large-scale additive impacts on Bay and human health regionally on a per-project basis. However, individual BMP impacts are most often recognized at local scales, and BMPs are most likely to be funded or installed in voting districts and predominantly white neighborhoods. Therefore, analyzing BMP projects' geospatial and economic distribution by comparing locations to demographics will help quantify the discrepancy between communities receiving BMP funding.

Map: Crystal Nichols, Data: Maryland Trust Fund
Photo: Amanda Rockler

Map and example of restoration projects in Maryland.

Governance

The 1960s environmental justice movement has gone mainstream, sparking debate about restoring equity to a historically imbalanced system. Research has been devoted to the physical environment and the uneven distribution of climate change impacts. However, there has been less focus on the individuals and communities and their lack of voice in decision-making. In the Chesapeake Bay region, people of color make up less than 10% of those who make rules and regulations, excluding them from the decision-making process that determines resource allocation, infrastructure, and interventions executed on their behalf. Improving the political and practical agency of these communities through inclusive governance and zoning approaches is essential.

Photo: Wikimedia-Martin Falbisoner (CC BY-SA 2.0)

Maryland State House building.

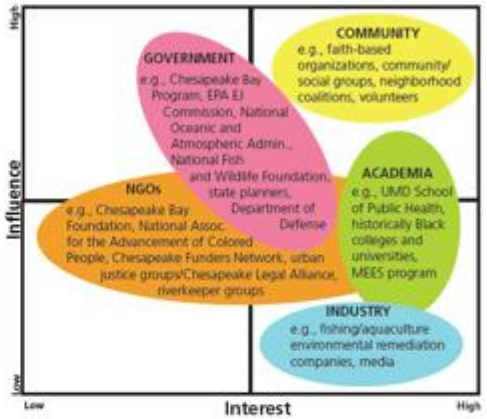
Engaging with communities is critical

Without insight from communities, a report card is meaningless from an EJ standpoint. It is important to note that while we can make maps and develop indicators, they would lose significance if not placed in the proper perspective. Reaching out to stakeholders whose voices have not been represented can contribute experiential knowledge and provide better indicators for environmental justice in the Chesapeake Bay watershed.

An essential step in the course was to identify stakeholders to be engaged in the co-creation of meaningful indicators for communities across the Bay.

Course participants conducted a stakeholder mapping exercise by assigning different groups into a matrix of low to high interest and low to high influence. The resulting four quadrants represent various communication and engagement strategies.

Groups in the high interest/high influence quadrant can be influential environmental justice champions. Stakeholders in the high interest/ low influence quadrant need to be empowered, while the low interest/ high influence group needs to be engaged to develop alignments to the EJ cause. Groups in the low interest/low influence quadrant need support and encouragement to participate.



The stakeholder map identifies stakeholder groups and their perceived influence and interest in environmental justice issues. Non-governmental organization (NGO), University of Maryland (UMD), Marine, Estuarine & Environmental Science (MEES).

Incorporating diverse knowledge

We held three listening sessions with a select number of stakeholders and obtained feedback regarding our initial suite of potential environmental justice indicators. Some essential feedback included the following:

- Develop an understanding of the cultural and environmental history of our region
- Highlight environmental justice data gaps
- Develop indices that are unique to the Chesapeake region, and
- Listen to diverse community members and build trust

Developing an Environmental Justice Index is a challenging endeavor. The class laid the groundwork through researching indicators and thresholds, identifying existing data and data gaps, preparing a survey, and holding stakeholder listening sessions. Geospatially layering natural science data with social science determinants can inform some aspects of an EJ index, but it is only a start. A critical next step will be to engage with marginalized and vulnerable communities and incorporate their local knowledge and lived experiences into the report card.

Environmental Justice is a global issue

A vision for the socio-environmental values of various iconic waterways is being developed as part of a transnational and transdisciplinary research program. This effort is part of the Coastal Ocean Assessment for Sustainability and Transformation (COAST Card) program, funded by the Belmont Forum. Each location has unique challenges and desired outcomes, but some common themes transcend the geographic and cultural differences.

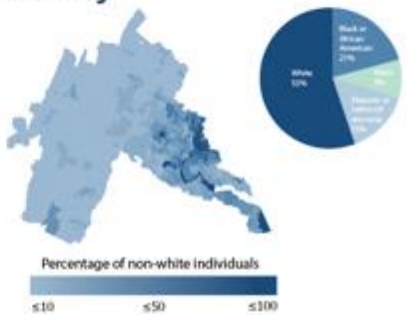
One common theme for the vision is social equity and was expressed in various ways (e.g., environmental justice, fair and meaningful participation in decision-making, equitable resource management, collaborative engagement). It represents a common human desire for fair and equitable socio-environmental governance.

The five COAST Card locations are the following: Chesapeake Bay (USA), Manila Bay (Philippines), Tokyo Bay and Sekisei Lagoon (Japan), and Goa coast (India). Map adapted from COAST Card newsletter 1.

Potomac watershed as a case study

COAST Card is a new generation of report cards that merges three tools: socio-ecological network analyses; socio-environmental report cards; and system dynamics models. The project brings together researchers from the USA, Japan, Philippines, Norway, and India.

In the Chesapeake Bay, COAST Card will be first developed for the Potomac Watershed, using Environmental Justice as an essential guiding principle. An Environmental Justice Index will be co-developed with stakeholders throughout the watershed. This framework will be scaled up to the Chesapeake Bay watershed and adapted to all the other project sites.



Map: Percentage of non-white individuals in population of the Potomac River watershed. Chart: Racial composition of Potomac River watershed community. Map/chart: Dylan Taillie (Data: Census.gov)

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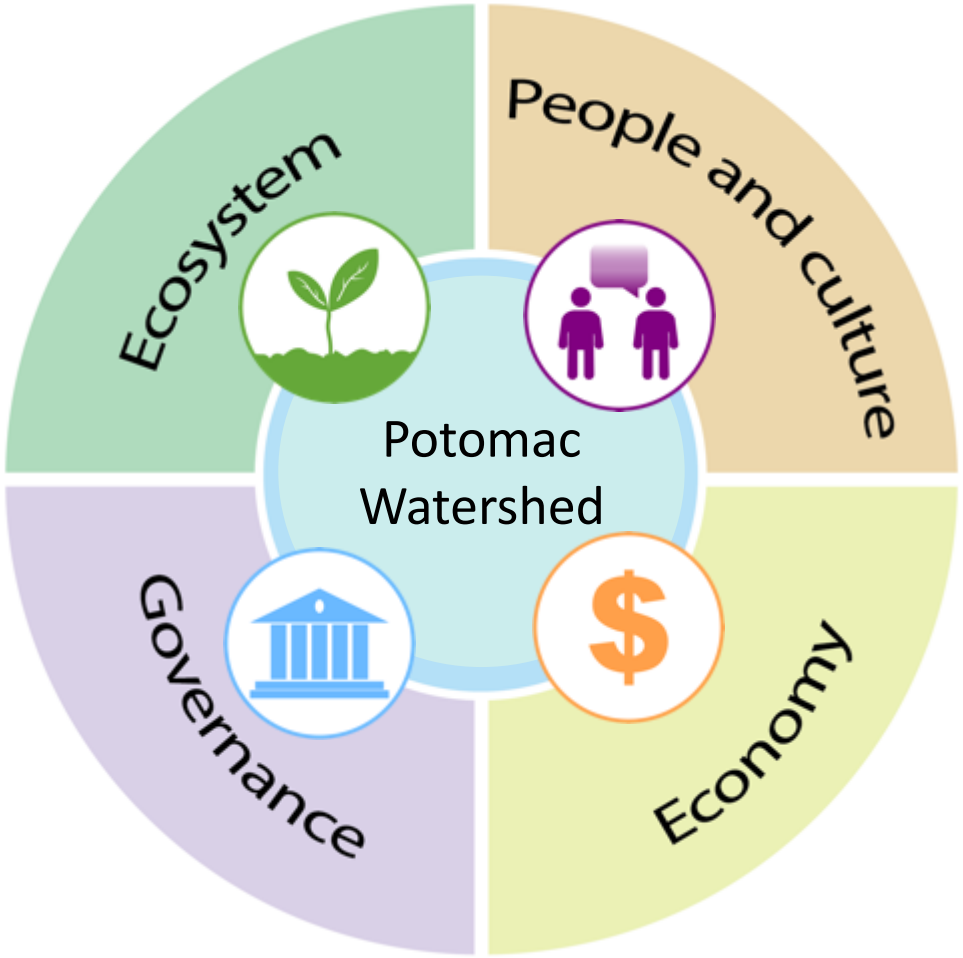
Next steps: Co-producing holistic socio-environmental report card by 2024



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Who’s interested?

Leveraging relationships and optimizing collaborations using social network analysis

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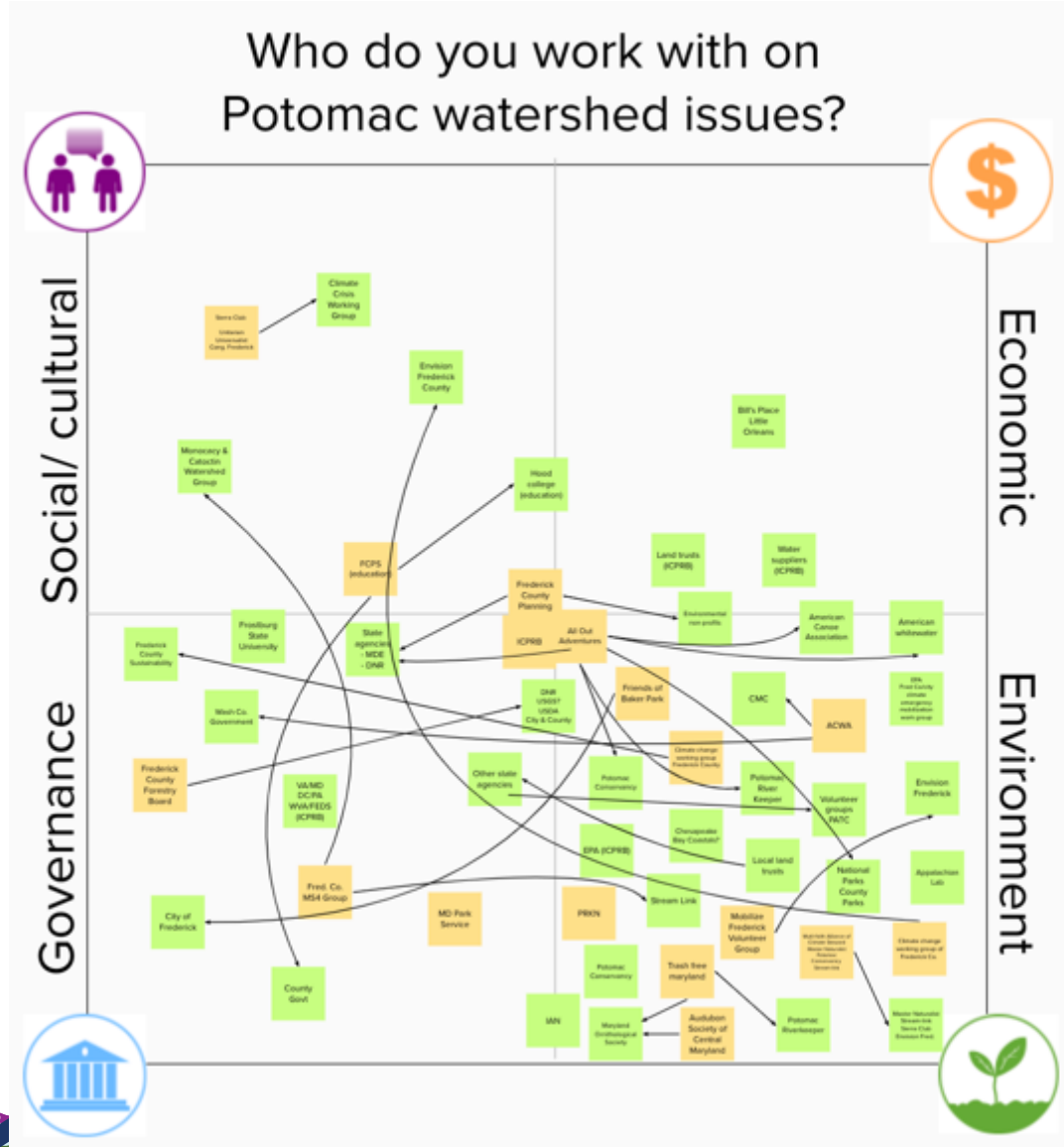
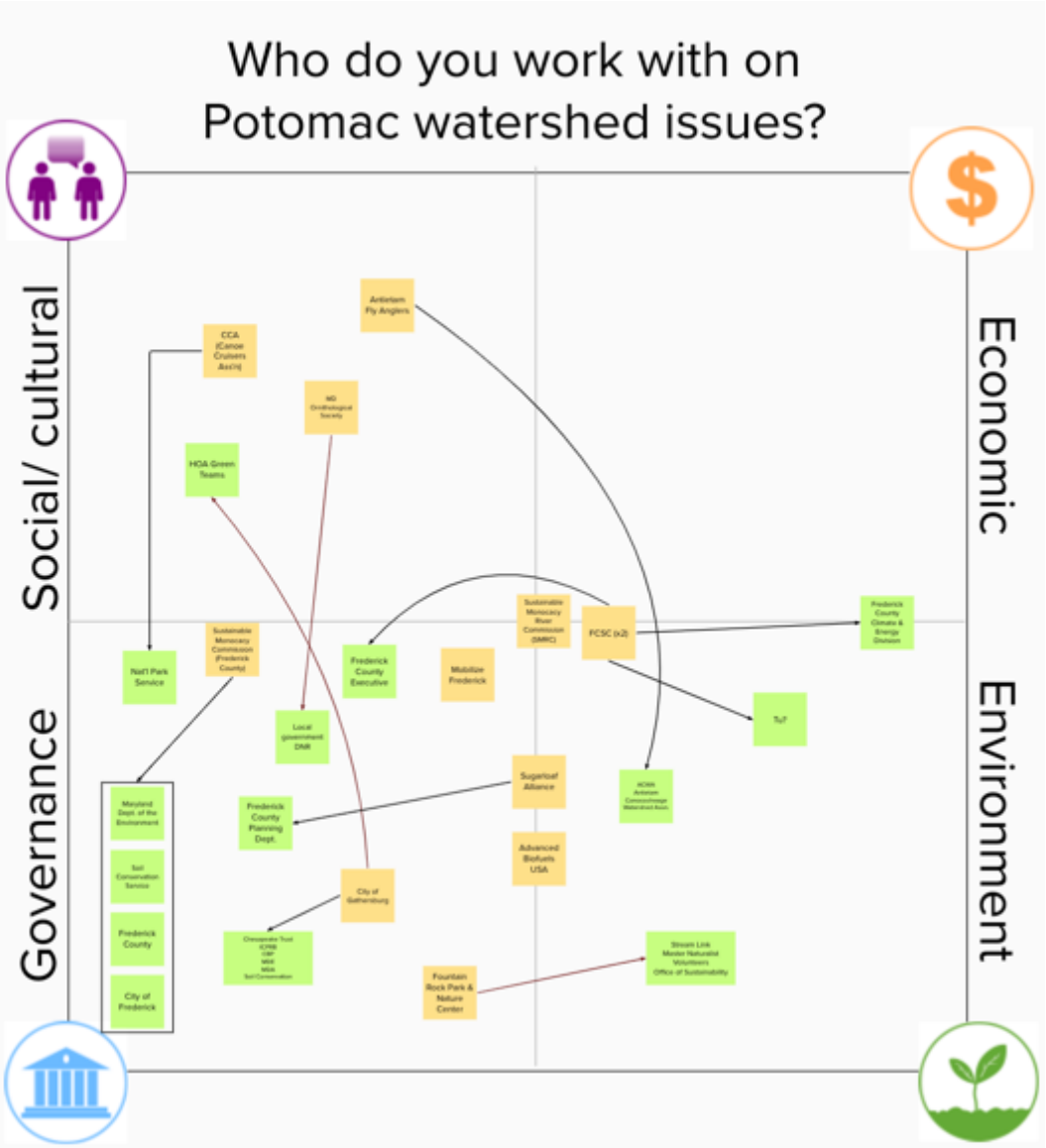
Who do you **work with** on Potomac watershed issues?
SOCIAL/CULTURAL
ECONOMIC
GOVERNANCE
ENVIRONMENT
CCA
Anticosti Fly Anglers
MD Ornithological Society
FCSC
TU
DNR
Advanced Biofuels USA
Maryland Dept. of the Environment
Soil Conservation Service
Frederick County
City of Frederick


Who do you **wish to work with** on Potomac watershed issues?
Social/Cultural
Economic
Governance
Canoe Club
Hikers
Fly Fishers
MD Ornithological Society
Advanced Biofuels USA
Chesapeake Council FFI
Schools
Farmers
Chamber of Commerce
MD DNR
Carroll County
City Green Teams
Alliance for the Chesapeake Bay
Sierra Club
Stream-Link
Sweet Growth Alliance
UMCES
USGS
River Keeper





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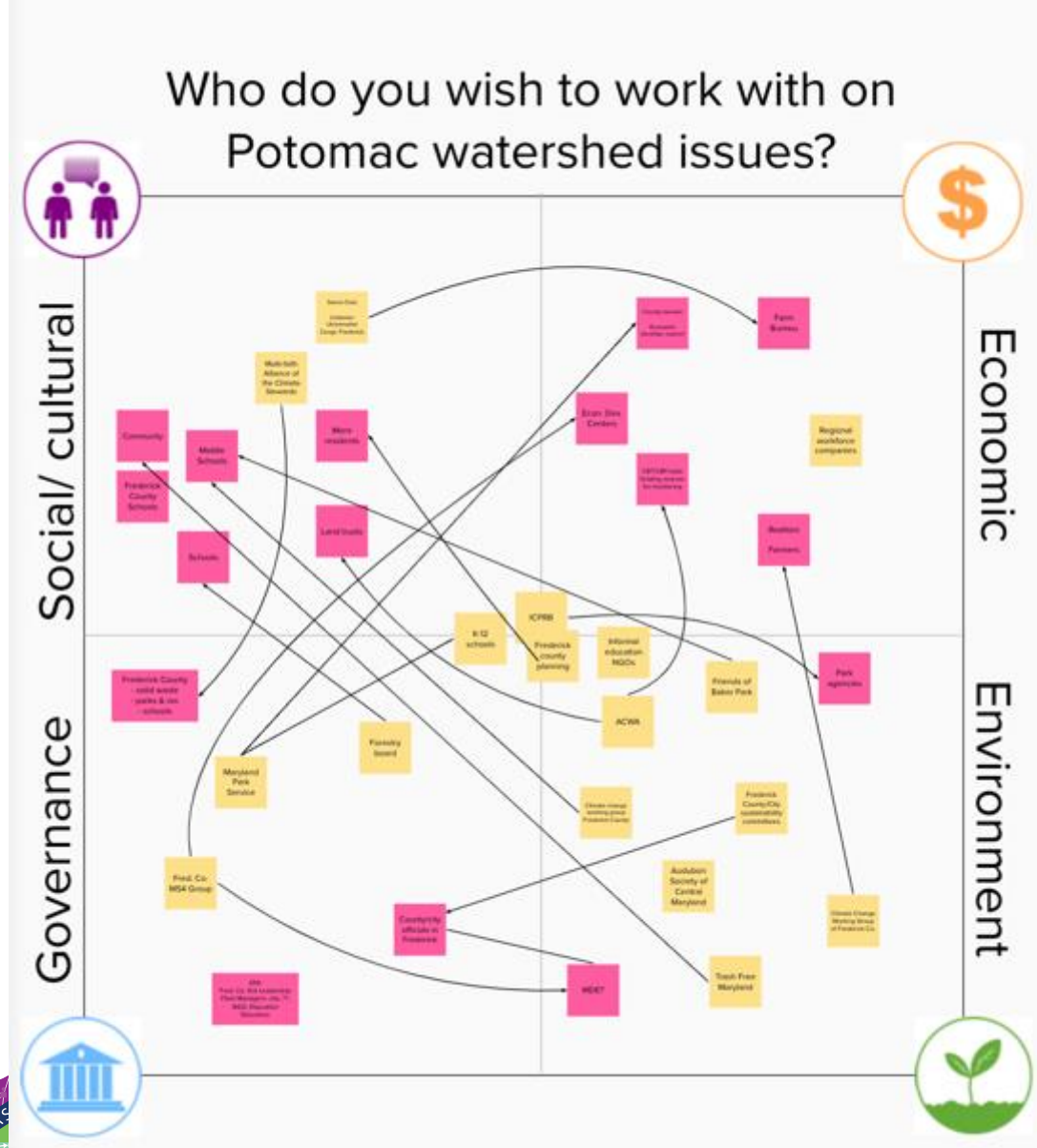

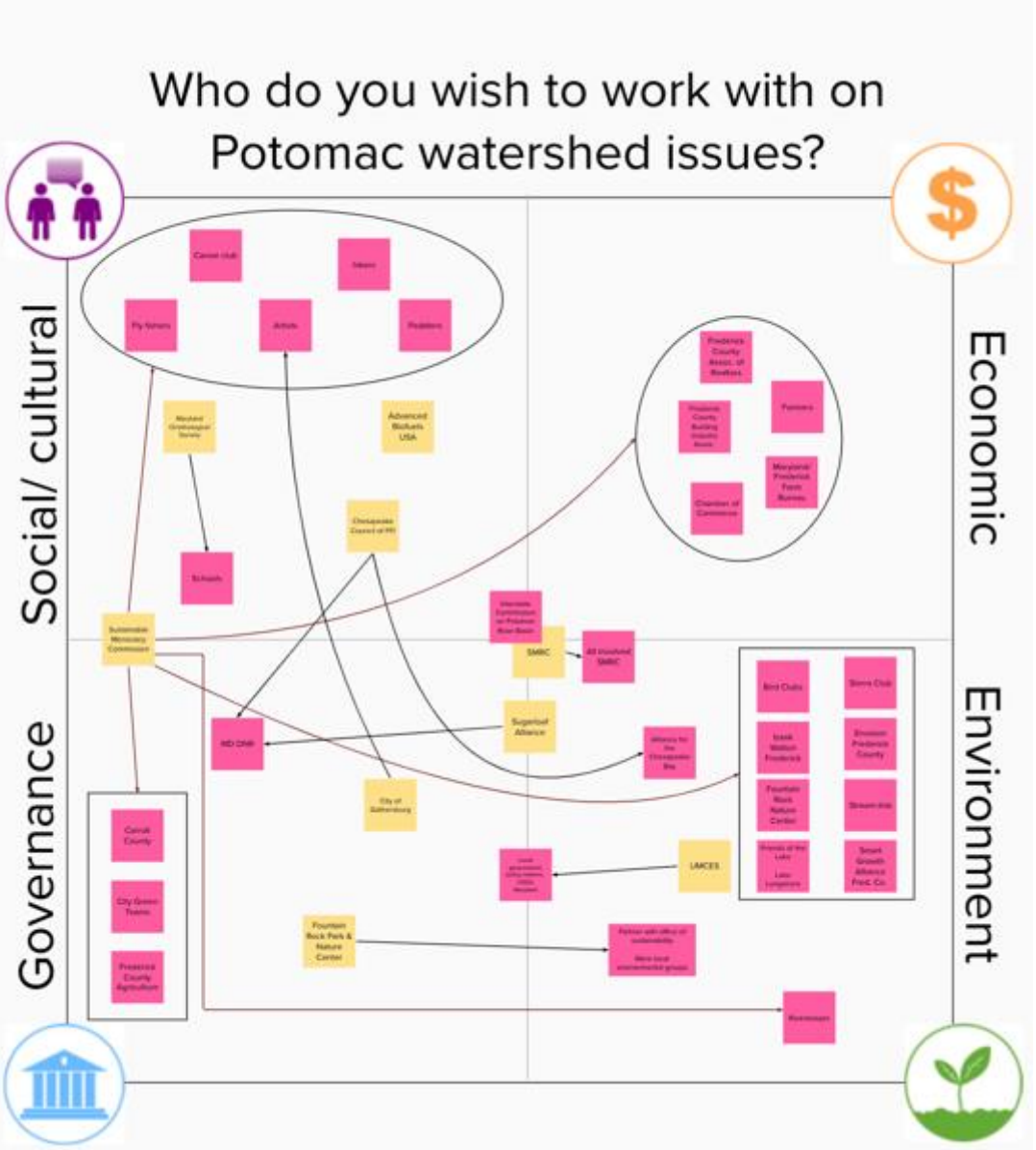

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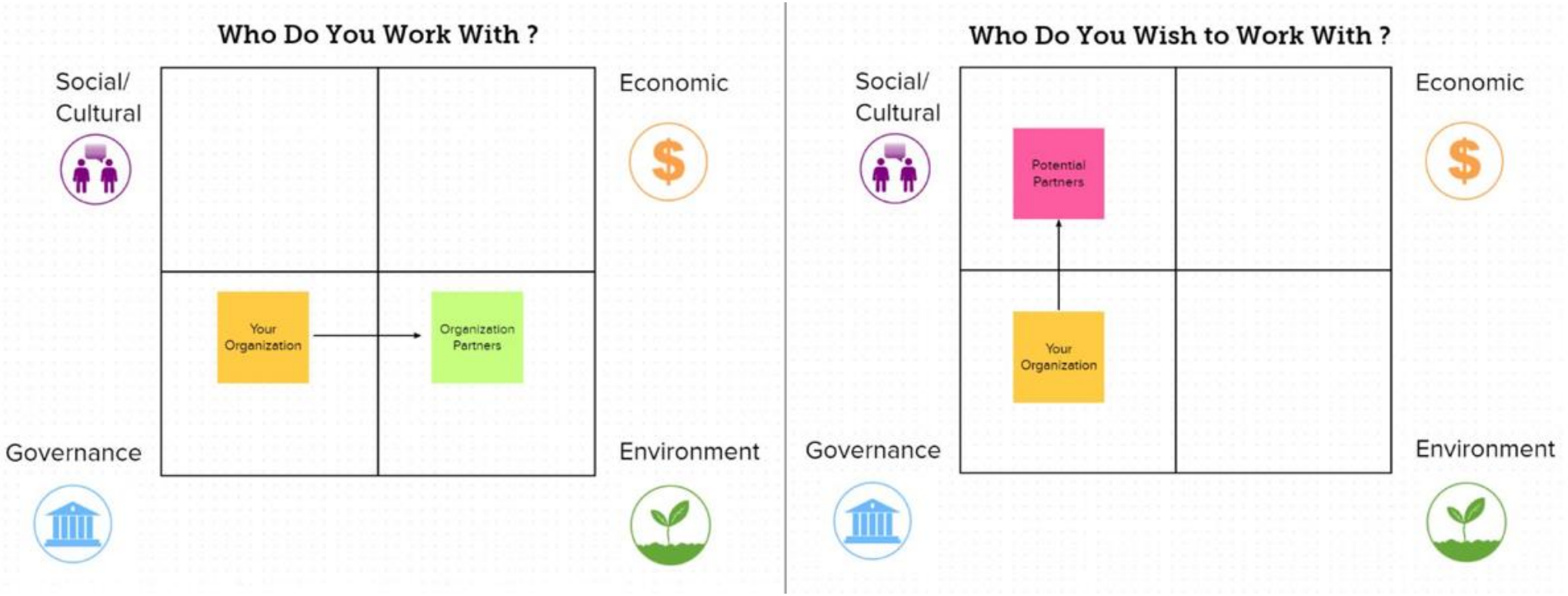
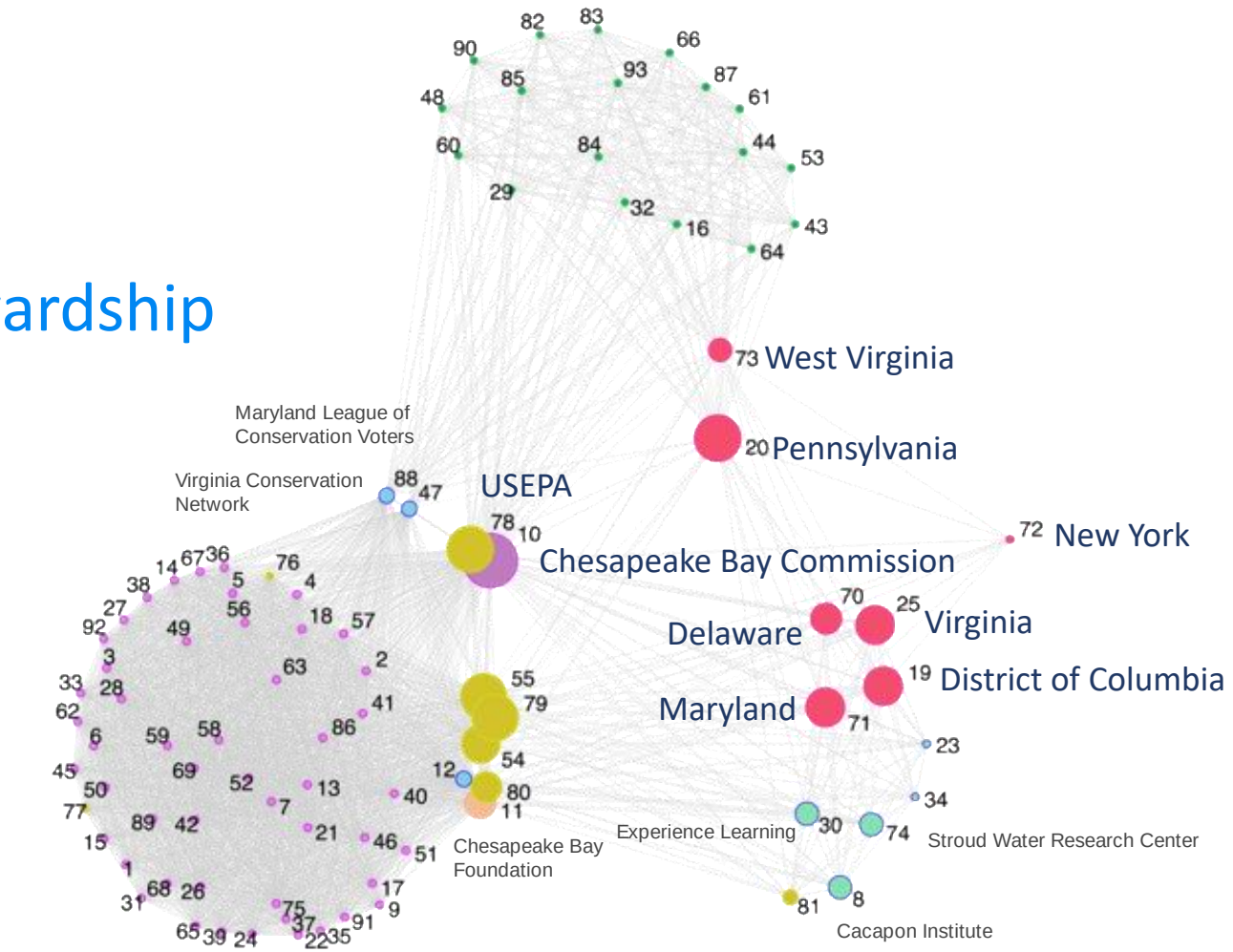
Stakeholder mapping summary



Next steps: SNA to help identify collaborative opportunities and targeted partnerships

Stewardship



Public Access

Environmental Literacy

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Where do we go?

Developing a shared vision using mental and cultural models

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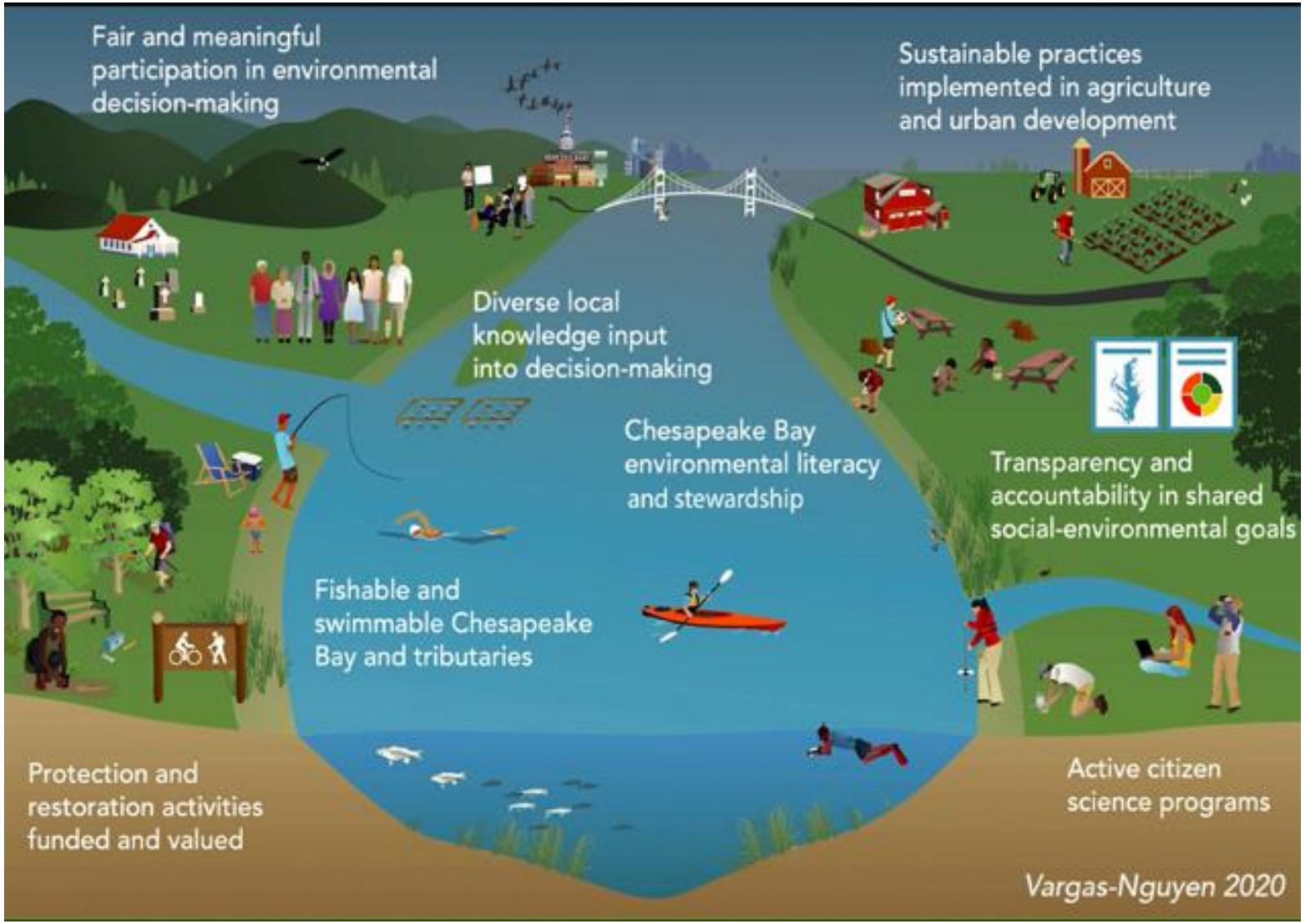
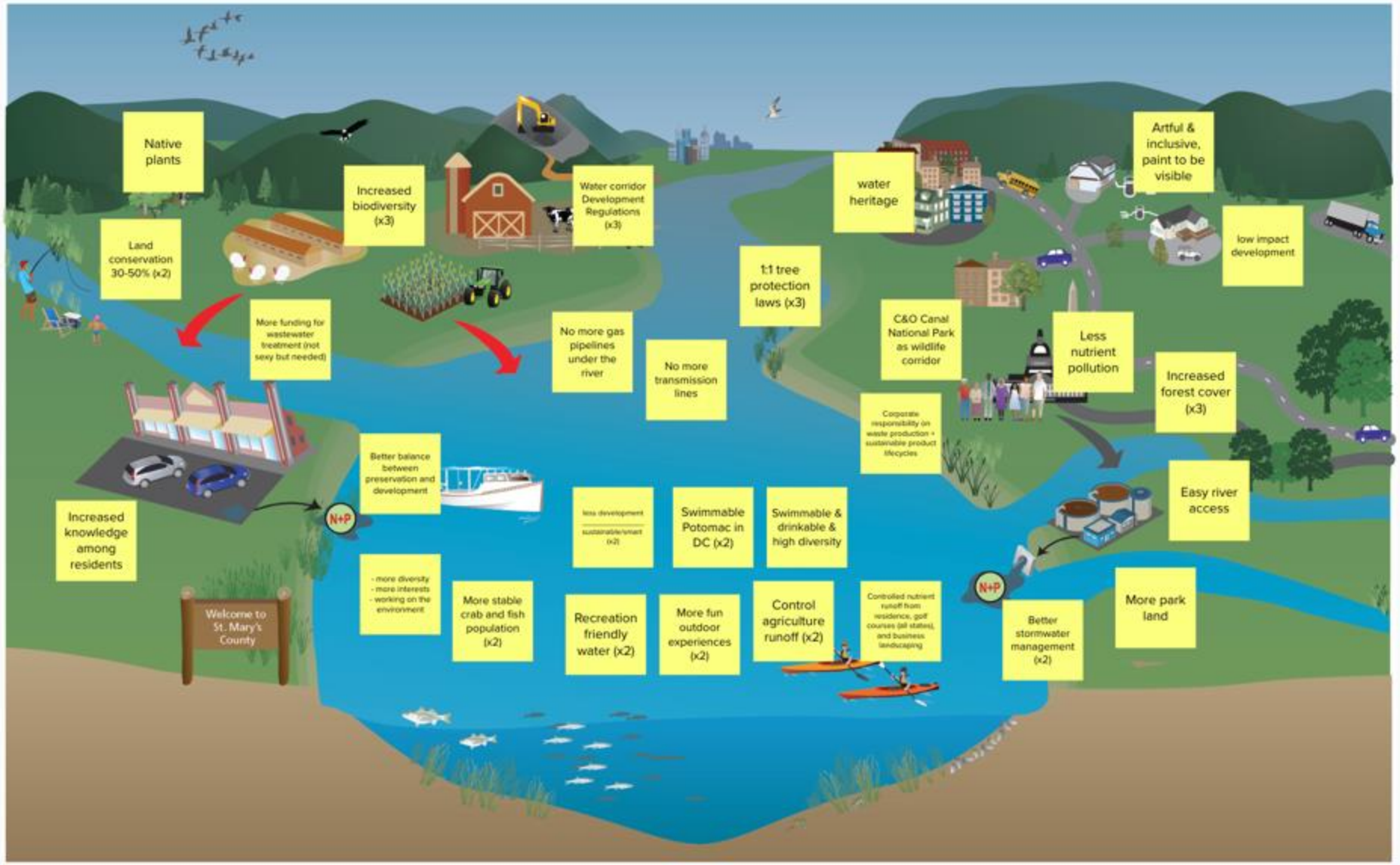
Re-imagining report cards requires a new, expanded shared vision



How do you envision a sustainable Potomac?



What can we do?

Prioritizing management actions using system dynamics models

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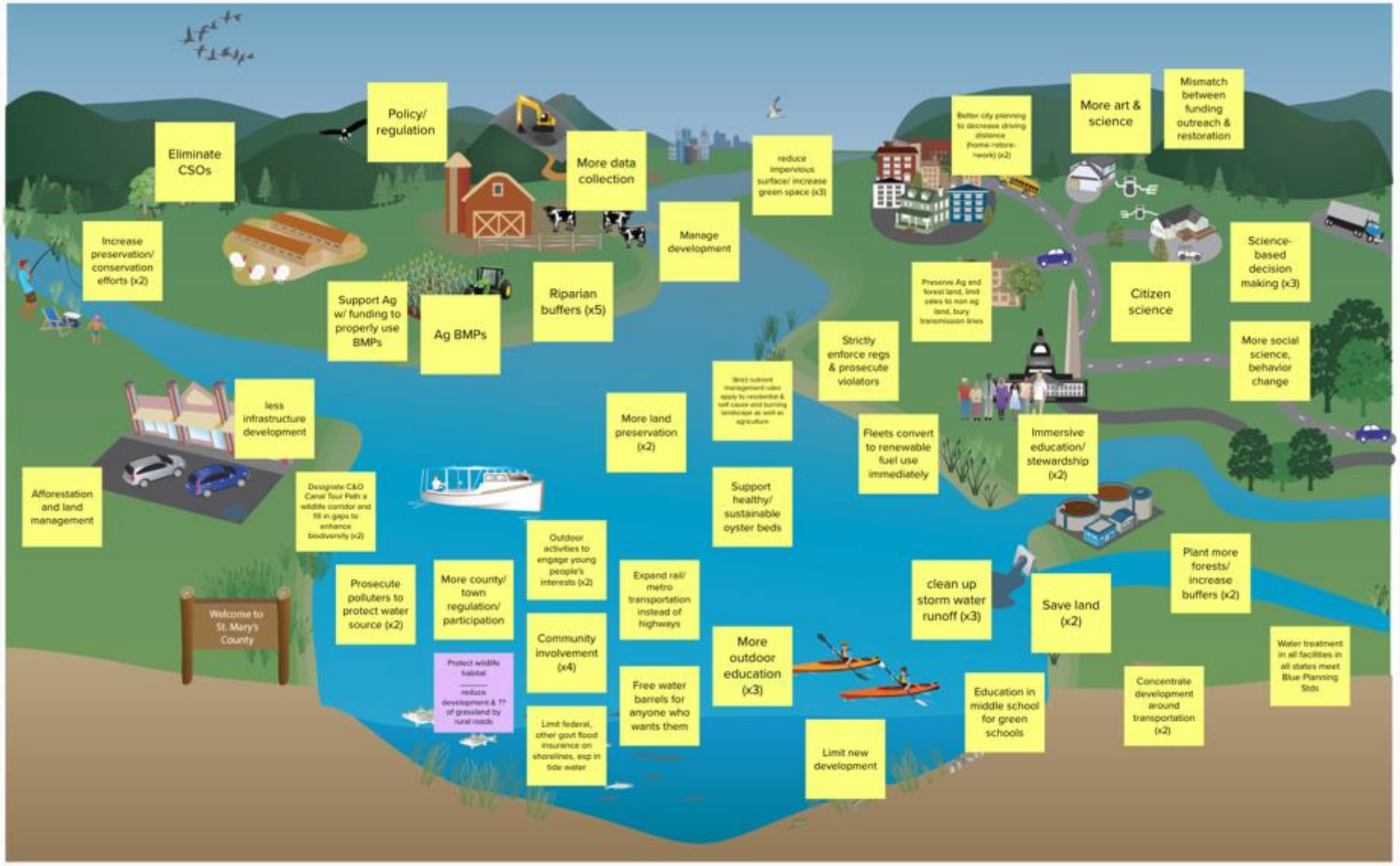
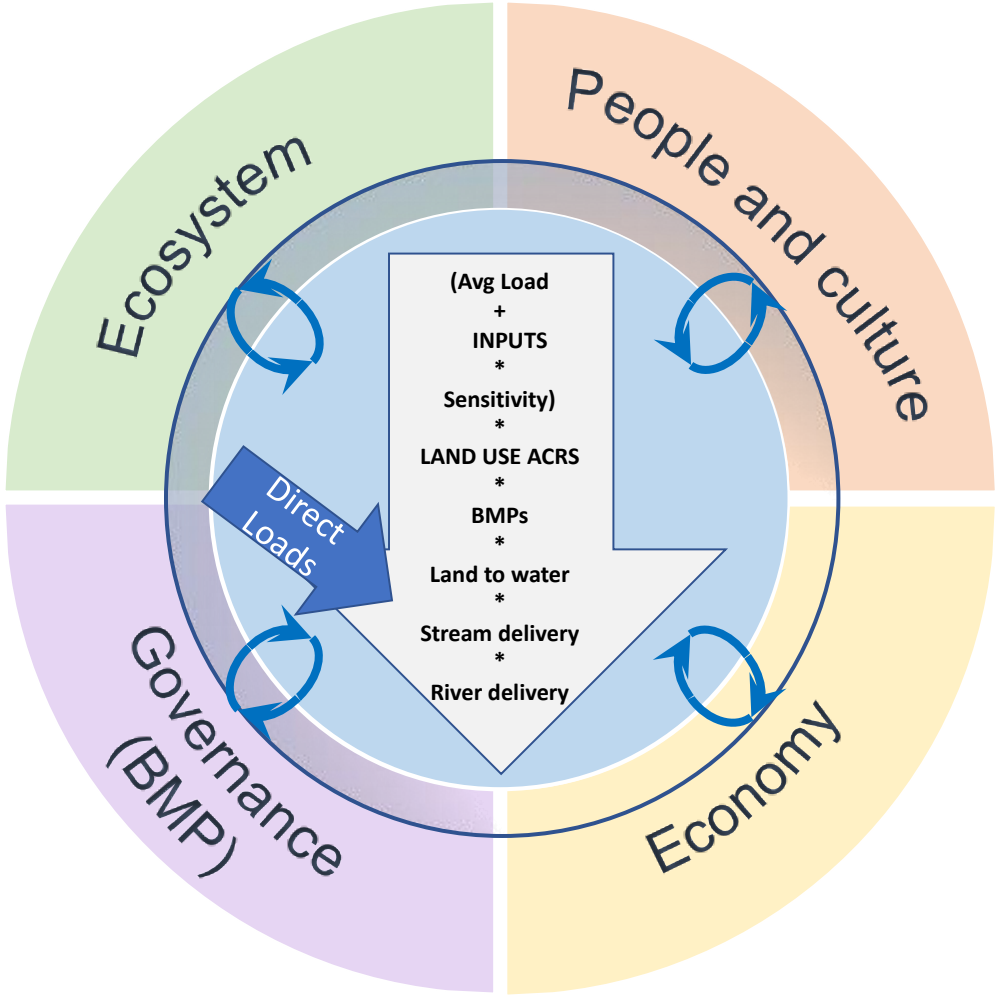
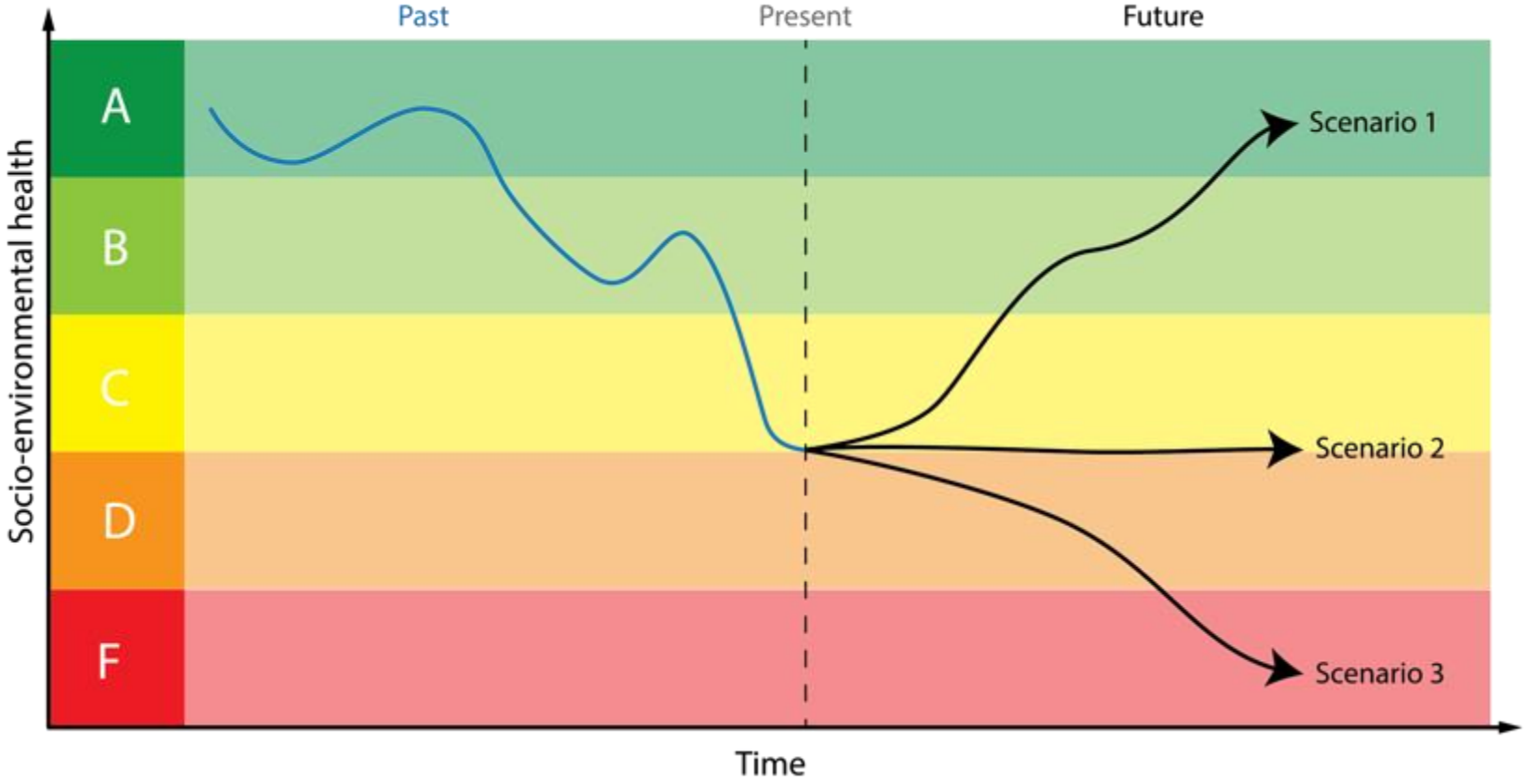
What can be done?



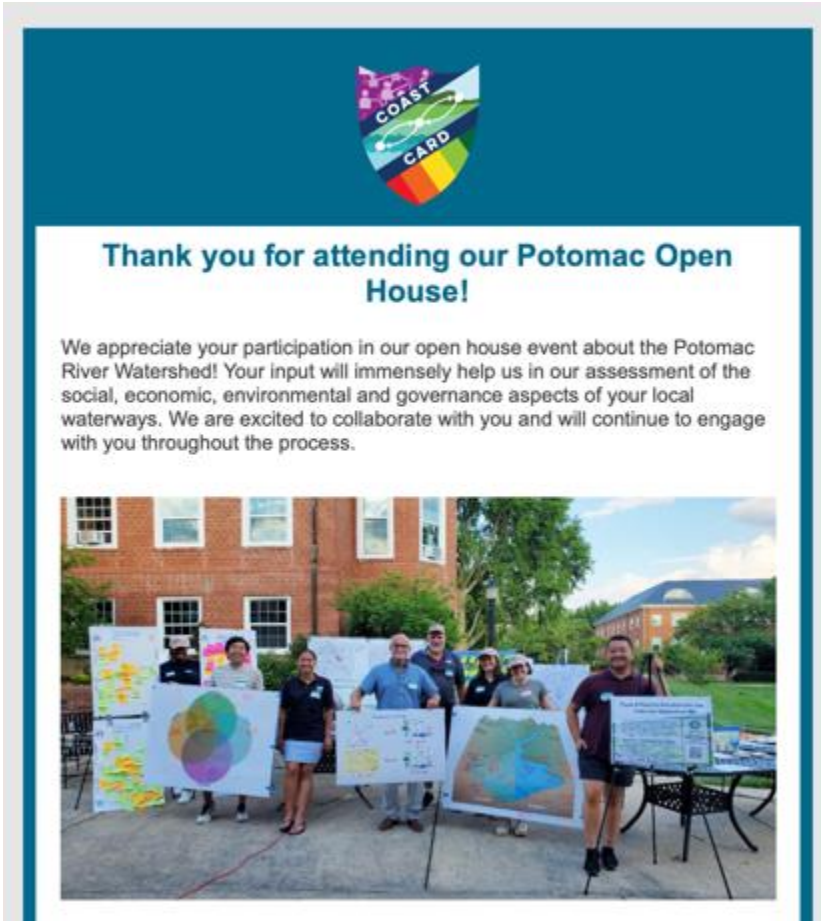
Next steps: Modelling to develop management scenarios



Next steps: Recommend actions to raise the grade

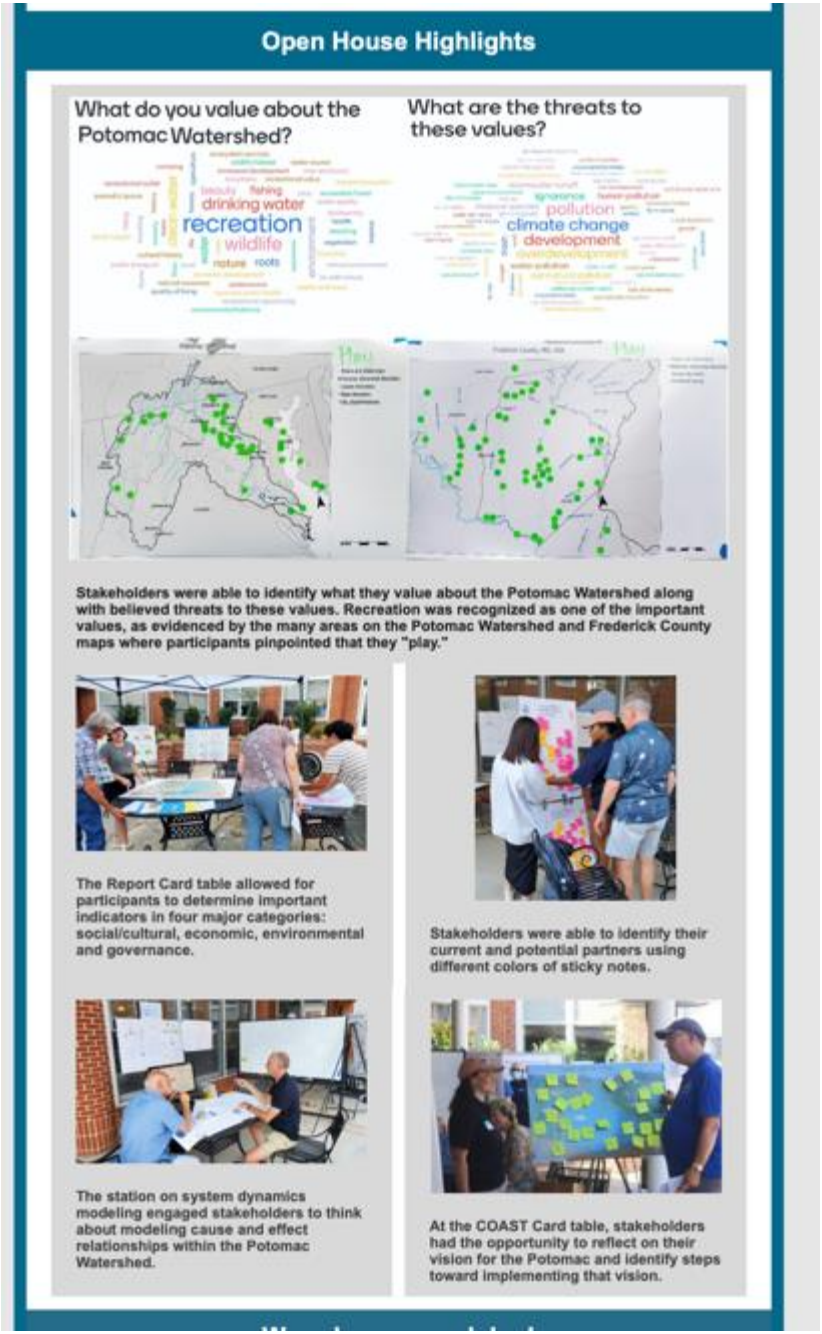


E-newsletter was sent to Open House attendees



Thank you for attending our Potomac Open House!

We appreciate your participation in our open house event about the Potomac River Watershed! Your input will immensely help us in our assessment of the social, economic, environmental and governance aspects of your local waterways. We are excited to collaborate with you and will continue to engage with you throughout the process.



Open House Highlights

What do you value about the Potomac Watershed?

What are the threats to these values?

Stakeholders were able to identify what they value about the Potomac Watershed along with believed threats to these values. Recreation was recognized as one of the important values, as evidenced by the many areas on the Potomac Watershed and Frederick County maps where participants pinpointed that they "play."

The Report Card table allowed for participants to determine important indicators in four major categories: social/cultural, economic, environmental and governance.

Stakeholders were able to identify their current and potential partners using different colors of sticky notes.

The station on system dynamics modeling engaged stakeholders to think about modeling cause and effect relationships within the Potomac Watershed.

At the COAST Card table, stakeholders had the opportunity to reflect on their vision for the Potomac and identify steps toward implementing that vision.

We value your opinion!

If you haven't had the chance yet, please complete our survey using the QR code or the link below so that we can continue to improve.

Survey Link

Questions?

Please contact Vanessa Vargas-Nguyen at vvargas@umces.edu.

Meet COAST Card

The Coastal Ocean Assessment for Sustainability and Transformation is a Belmont Forum-funded international and transdisciplinary program that aims to foster solutions to global sustainability challenges by merging socio-environmental report cards, social network analyses, and system dynamics models. It builds on the framework that we are using and developing in the Chesapeake Bay and is emulated in Manila Bay in the Philippines, Tokyo Bay and Ishigaki Island in Japan, and the Goa Coast in India.

Learn More

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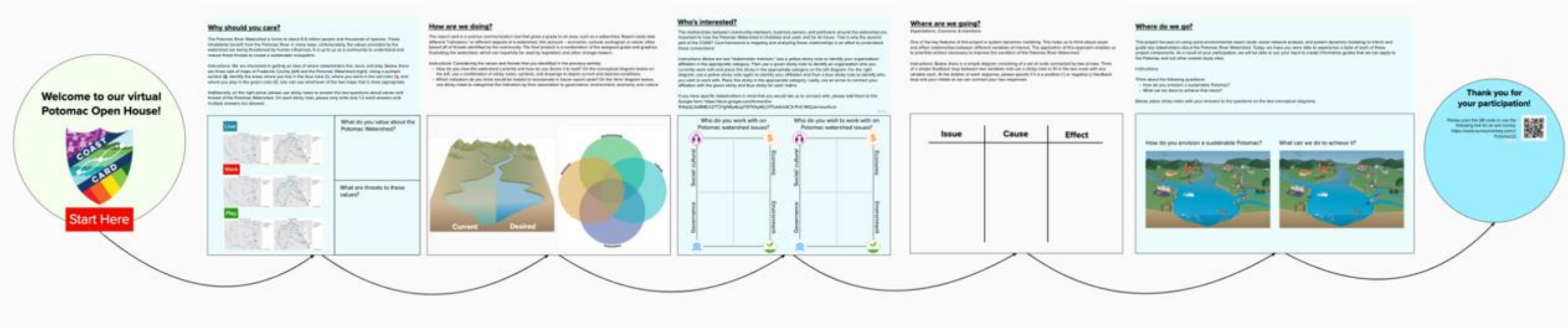
Coastal Ocean Assessment for Sustainability and Transformation

A Virtual Open House was developed to solicit more input



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Potomac COAST Card Next steps

- Continue engaging with stakeholders and partners through social media and e-newsletters - Finalize Frederick County Open House newsletter
- Open House in Shenandoah county and St. Mary's county in 2023 (Revisit the Virtual Open House)
- Convene stakeholder workshops. Meetings, and listening sessions to co-develop the Potomac COAST Card as needed - report card, SNA, and SDM efforts
- Continue linking efforts with the international COAST Card partnership – USA Team will host in October 2024 (tentative)

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