Charles County, MD
Climate Adaptation Report Card

Presentation to ARWG
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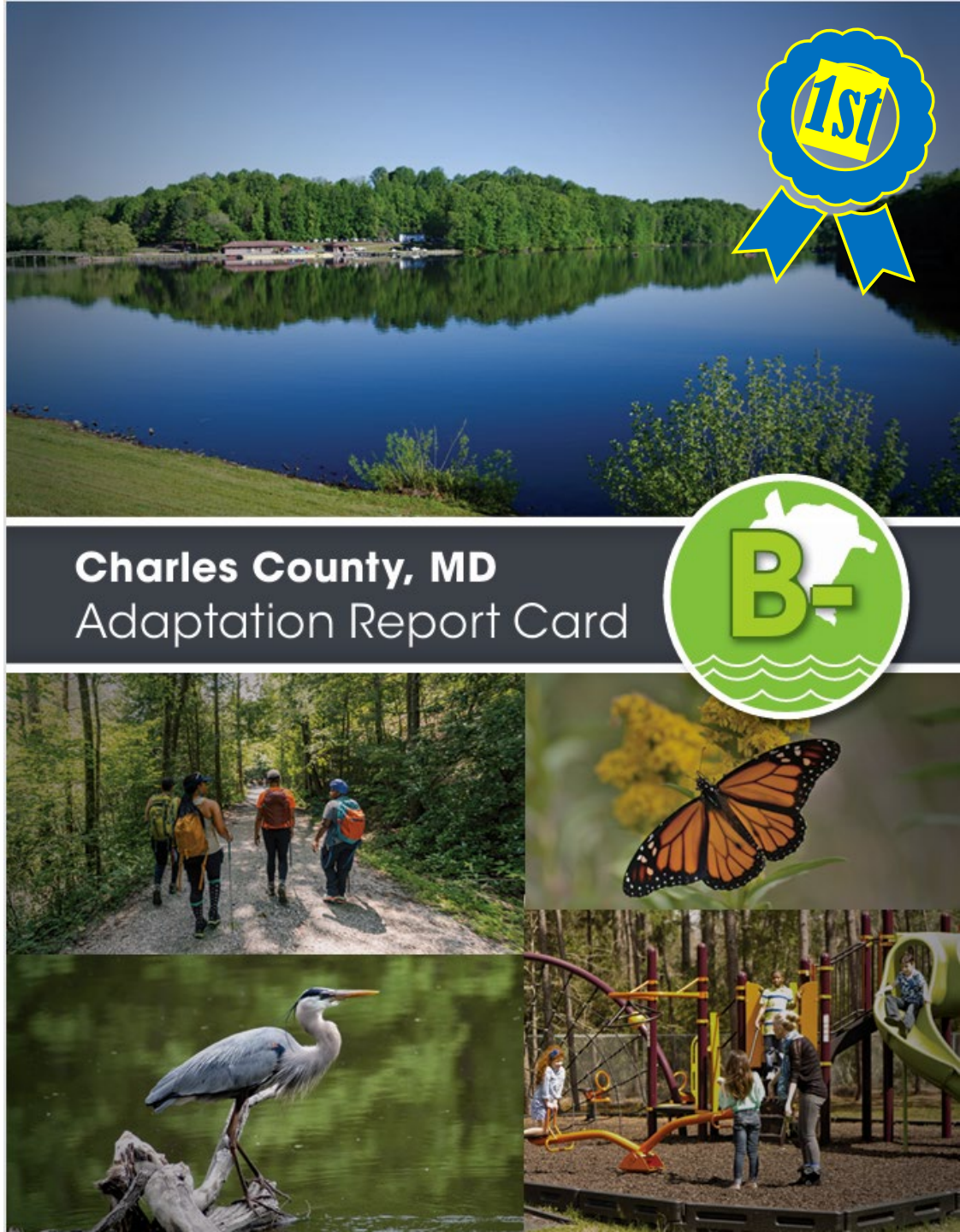
INTEGRATION AND APPLICATION NETWORK

Resilience Authority of Charles County, Maryland, Inc.

Adaptation Report Cards

- Assess current ability to withstand climate change events
- Tell us what we are doing well
- Tell us where investment is needed
- Guide prioritization
- Track progress

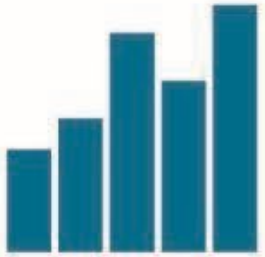


Adaptation Report Card Process

1 CONCEPTUALIZE

2 CHOOSE INDICATORS

3 DETERMINE THRESHOLDS



4 CALCULATE GRADES

5 COMMUNICATE

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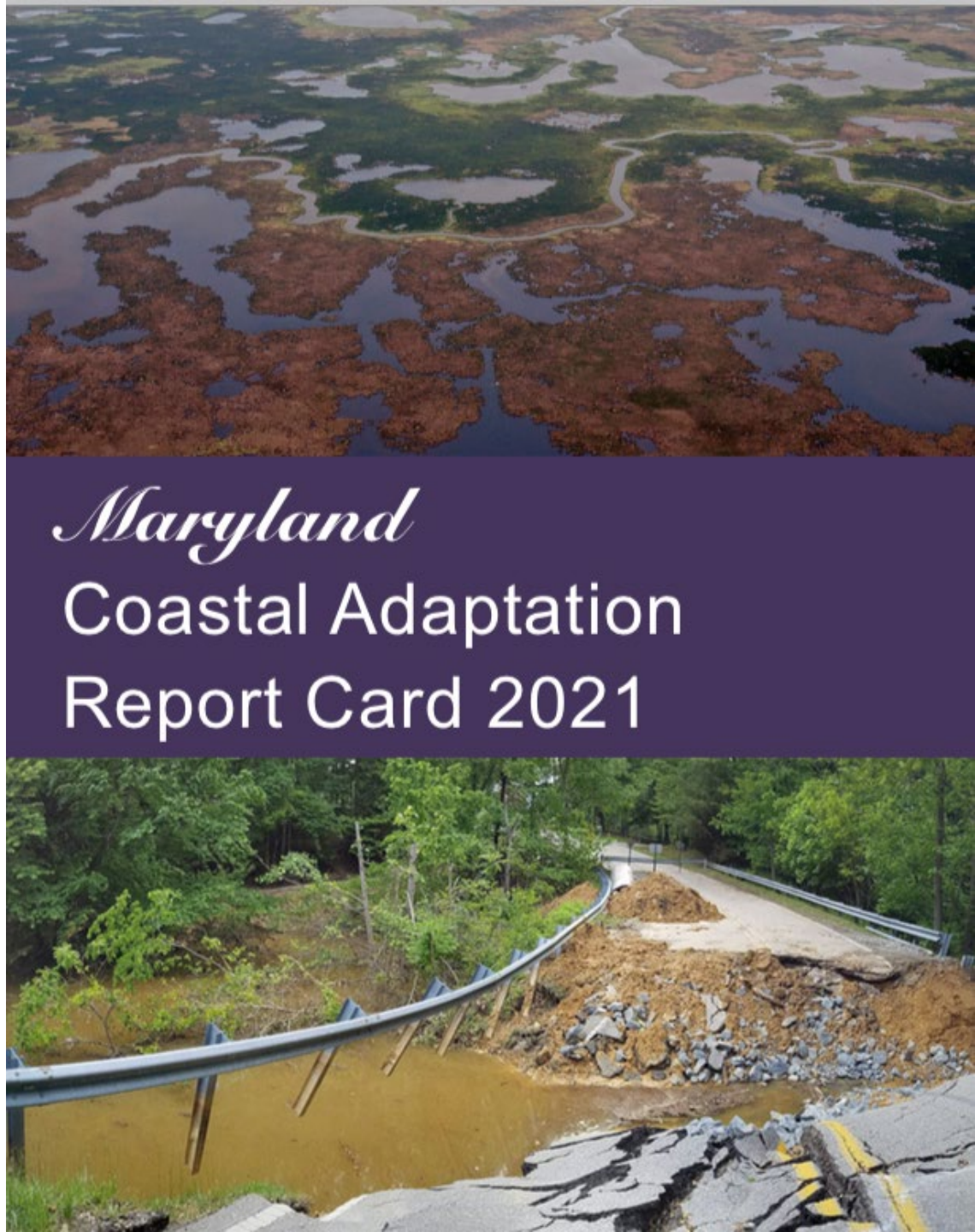
Resilience Authority of Charles County, Maryland, Inc.

State-level indicators of resilience (2021)

- Wetland extent
- Forest cover
- Shoreline erosion
- Beneficial use of dredge materials
- Critical facility locations
- Community rating system
- Floodplain population
- Freeboard height
- Flood mapping
- Nuisance flood planning
- Repetitive flood loss properties
- Flood loss coverage
- Green infrastructure
- Preserved farmland
- Business disruption



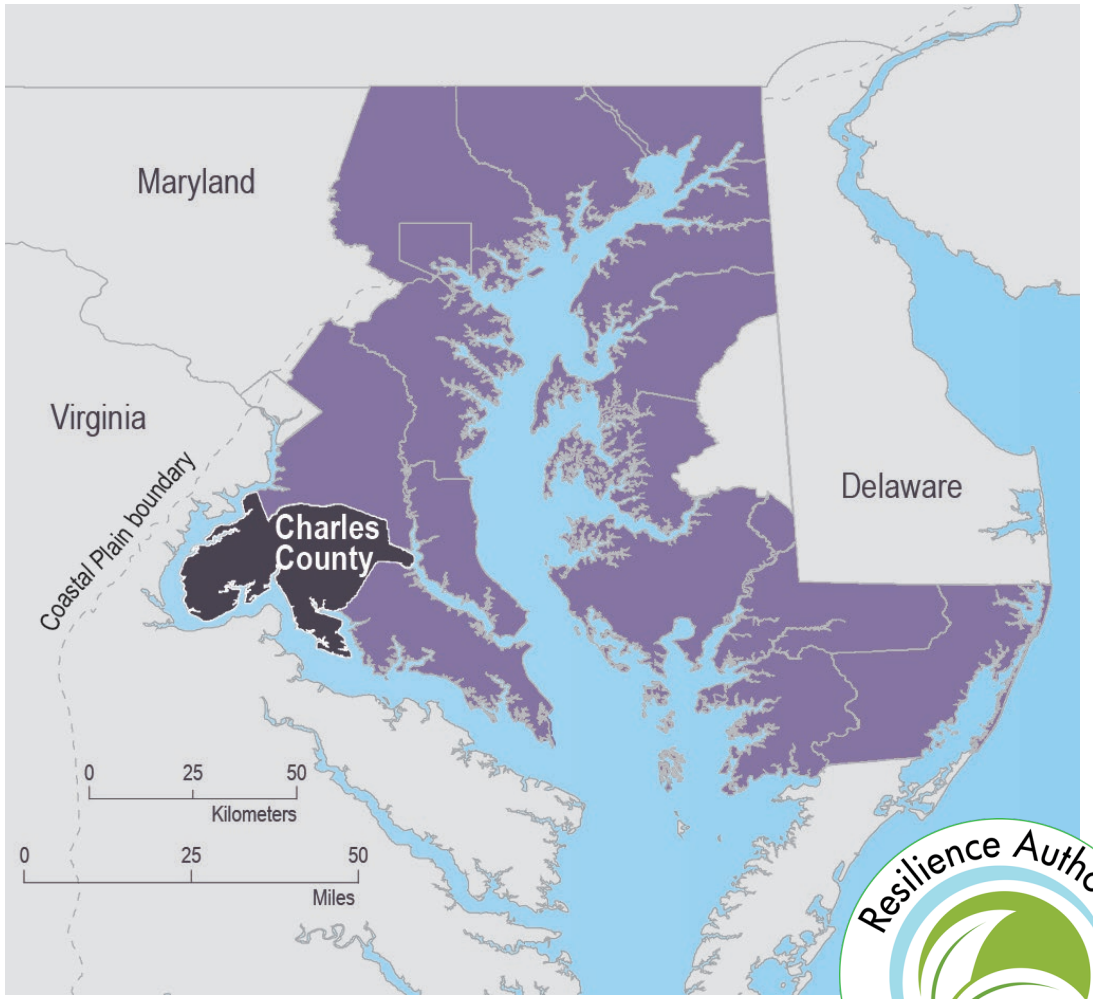
Moving from State -> Charles County

- Not all indicators will be
  - Applicable
  - Measurable
- New indicators may be warranted
  - Different community concerns
  - Different threats
  - Different priorities
  - Better/more refined data

Moving from State -> Charles County

Charles County is

- Very forested
- Fewer wetlands
- Planned development



State-level RC -> Charles County RC

- Kept some indicators
  - Critical facility locations
  - Flood mapping
  - Repetitive flood loss properties
  - Business disruption
- Refined some indicators
  - Forest cover
  - Shoreline erosion -> Living Shorelines
  - Preserved farmland -> Preserved open space

Added new indicators

Resilience Indicators:

- Pervious Surface
- Protected habitat
- Protected waters
- Water quality
- Heat tolerance
- Park equity
- Tree equity
- Air quality
- Groundwater management
- Road flood mitigation

Vulnerability Indicators:

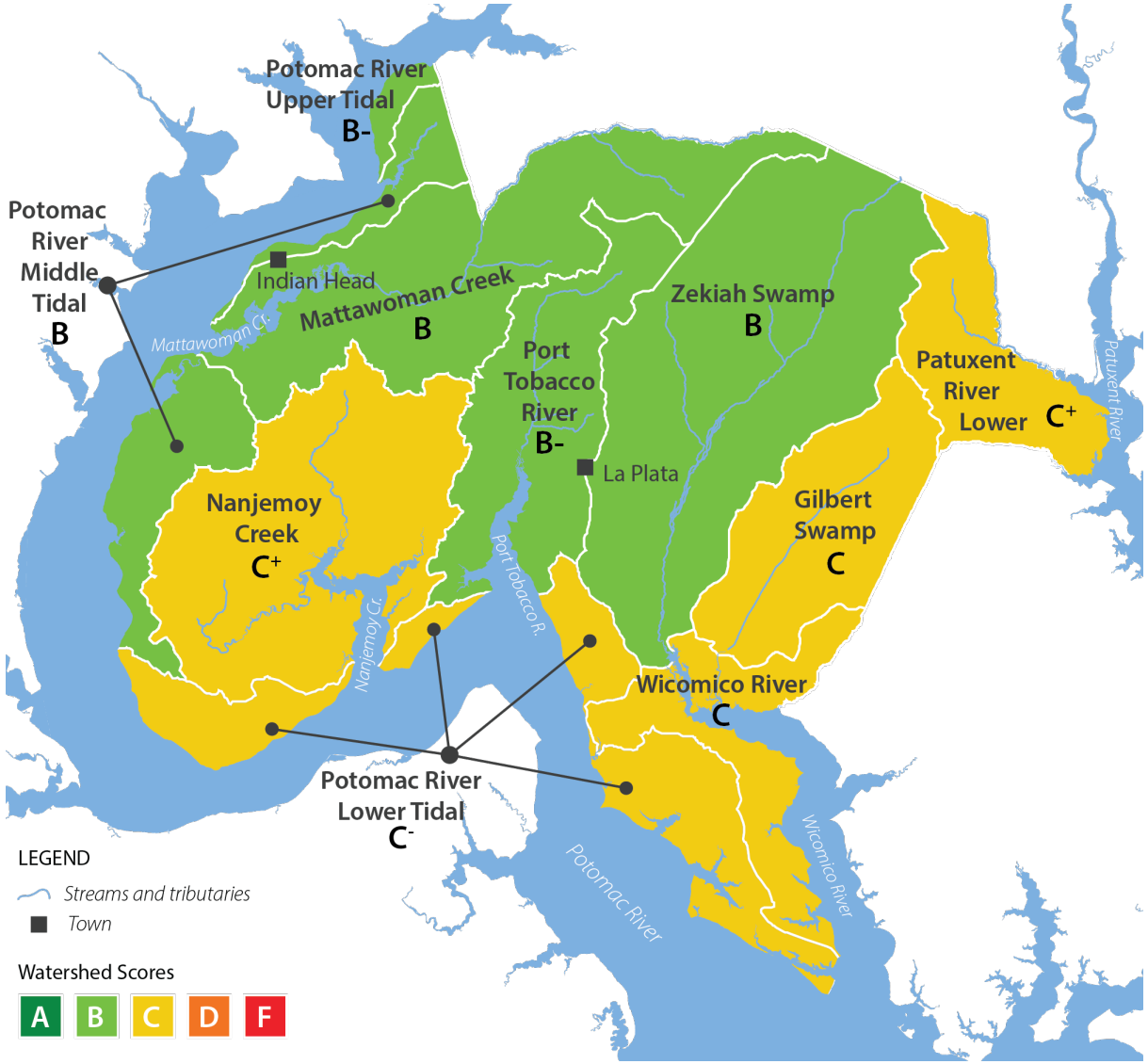
- Extreme temperatures
- Heat-related illness
- Drought
- Shoreline erosion
- Road flood risk
- Riverine flooding
- Extreme weather
- Flood frequency
- Hurricanes

Results: Resilience Indicators

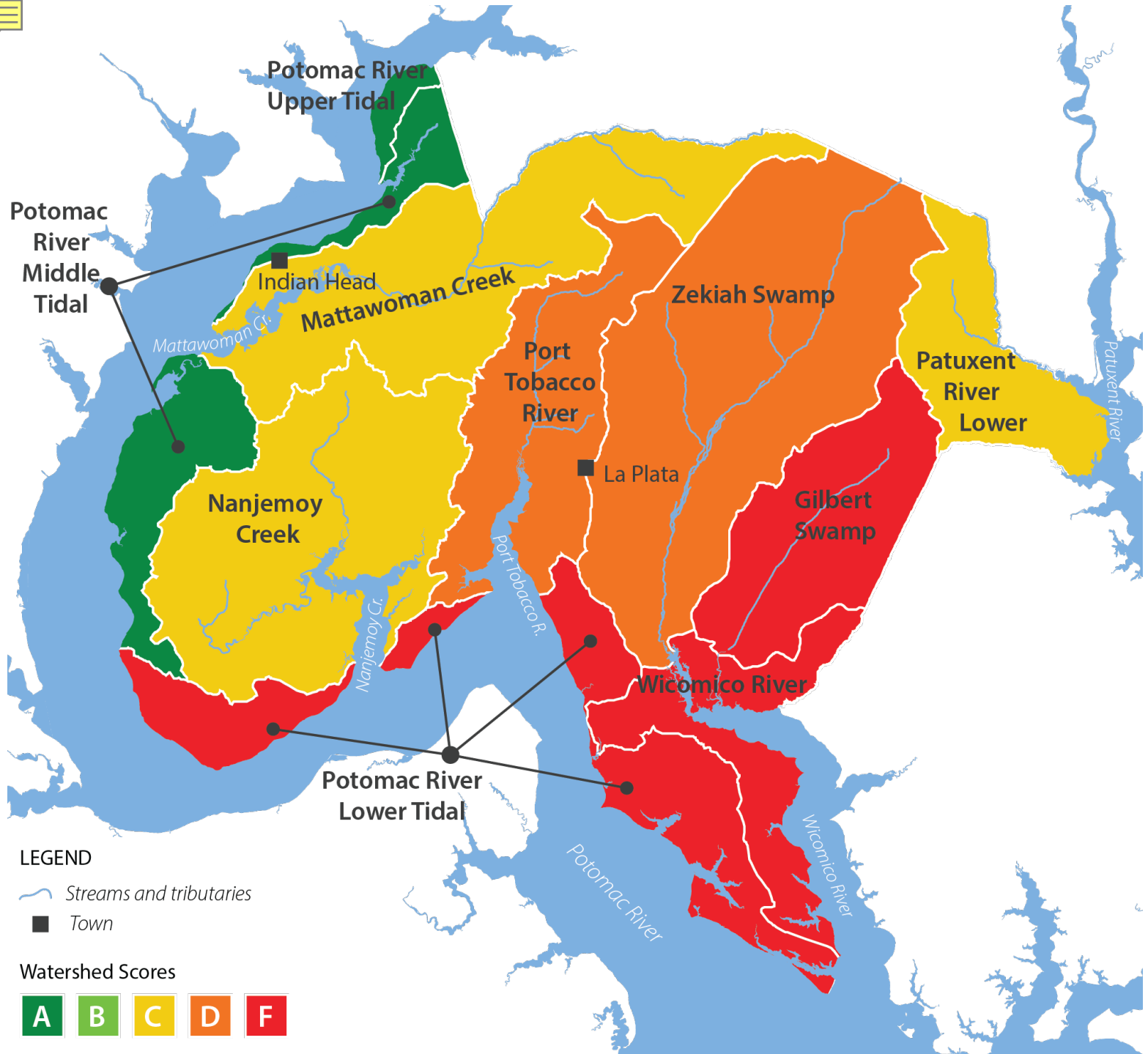
Results: Resilience Indicators

- Across categories
  - B scores
  - Doing fairly well
- Particularly good scoring indicators:
  - Pervious surfaces
  - Water quality
  - Air quality
  - Preserved open space
  - Groundwater management
  - Critical facilities
- Poorer scoring indicators:
  - Protected waters
  - Park equity
  - Property mitigation

Also scored some indicators at sub-watershed level

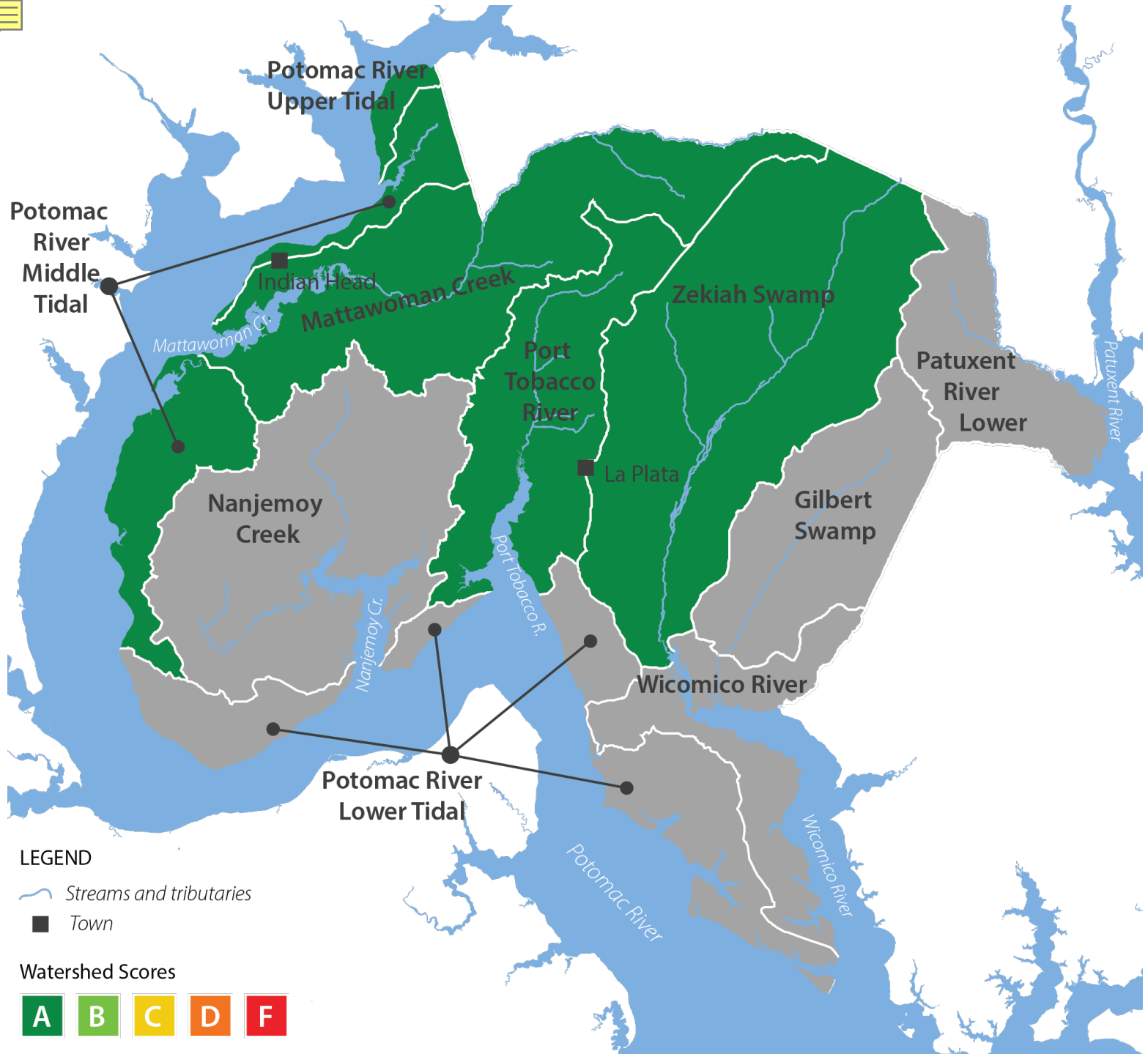


- Environment Category
  - Forests
  - Pervious surface
  - Living shorelines
  - Protected habitat
- Human Well-being
  - Tree equity
  - Park equity
  - Heat tolerance



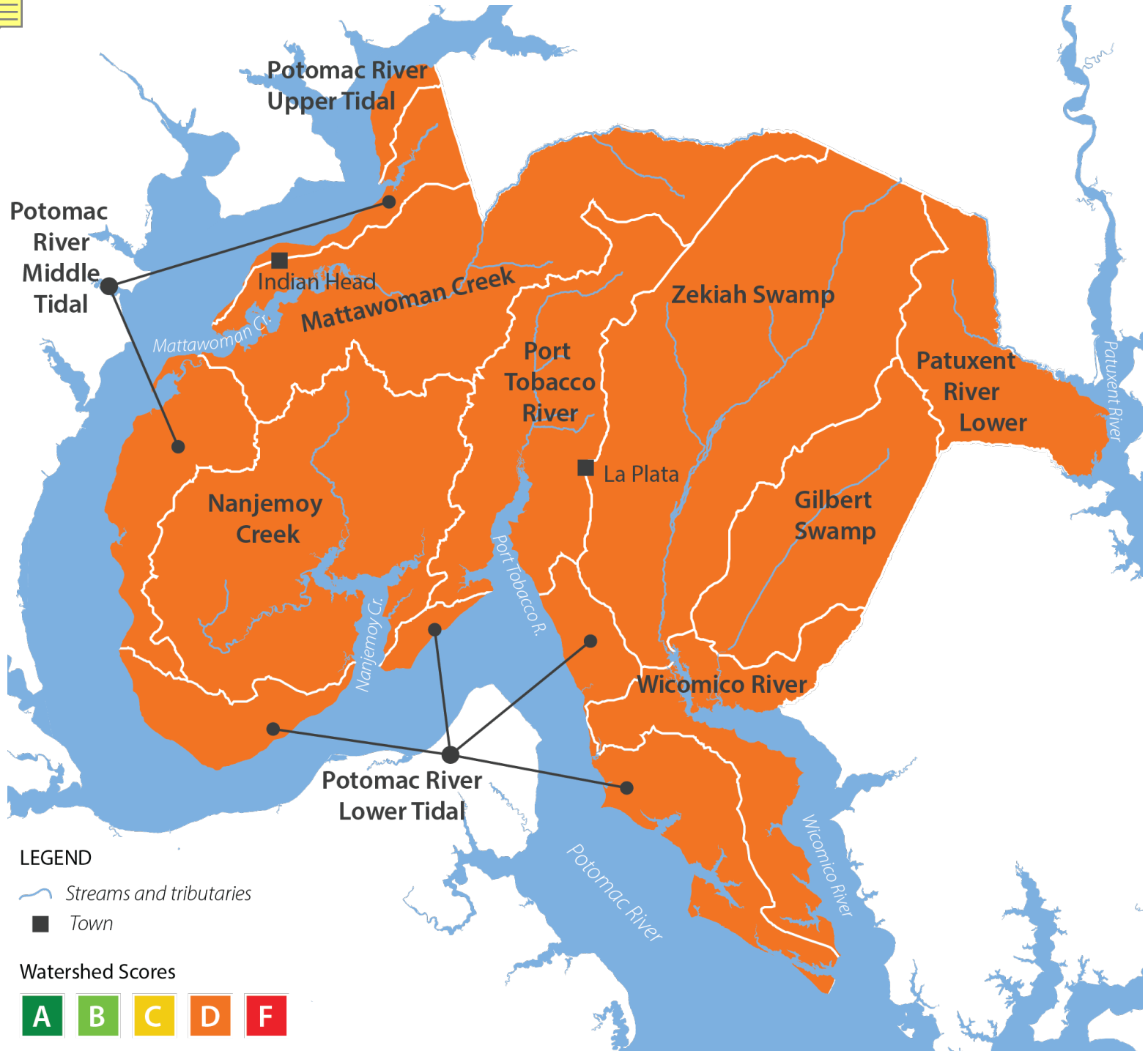
Protected Habitat

- Most variable indicator across watersheds
- Scores range A through F



Tree equity

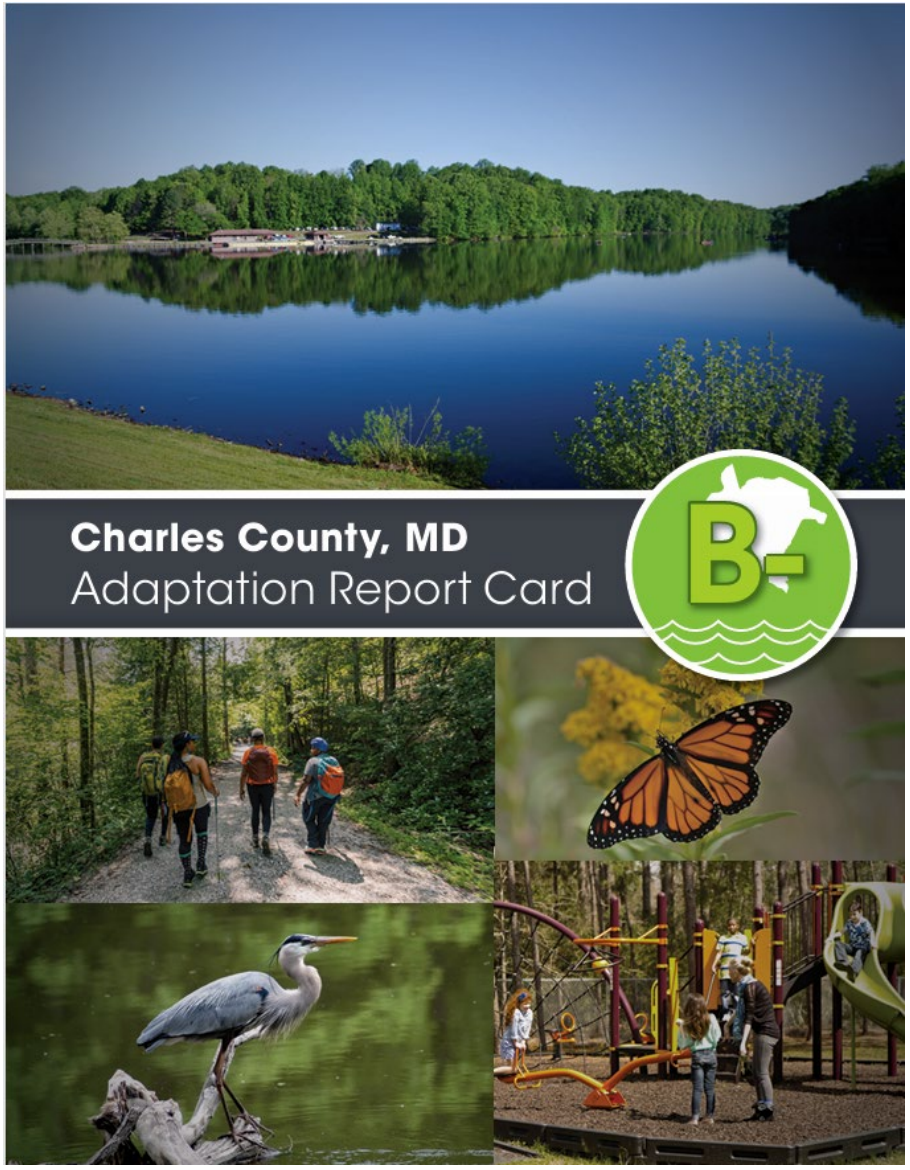
- Consistently good scores
- Missing data



Park equity

- Consistently poor scores
- County already taking action!

Charles County: First to Assess Vulnerability



Charles County: First to Assess Vulnerability

- Vulnerability indicators correspond to resilience indicators

County Vulnerability Indicator	County Resilience Indicator
Extreme Temperatures	Heat Tolerance
Heat-related Illness	
Drought	Groundwater Management
Shoreline Erosion	Living Shorelines
Road Flood Risk	Road Flood Mitigation
Riverine Flooding	Flooding (Category)
Extreme Weather	
Flood Frequency	
Hurricanes	

Charles County: First to Assess Vulnerability

- Vulnerability indicators correspond to resilience indicators
- Inform prioritization of actions

County Vulnerability Indicator	County Resilience Indicator
Extreme Temperatures	Heat Tolerance
Heat-related Illness	
Drought	Groundwater Management
Shoreline Erosion	Living Shorelines
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Flood Frequency	
Hurricanes	

What's next?

What's next?

Will the Charles County Report Card be an inspiration for next State-level assessment?

County Vulnerability Indicator	County Resilience Indicator
Extreme Temperatures	Heat Tolerance
Heat-related Illness	
Drought	Groundwater Management
Shoreline Erosion	Living Shorelines
Road Flood Risk	Road Flood Mitigation
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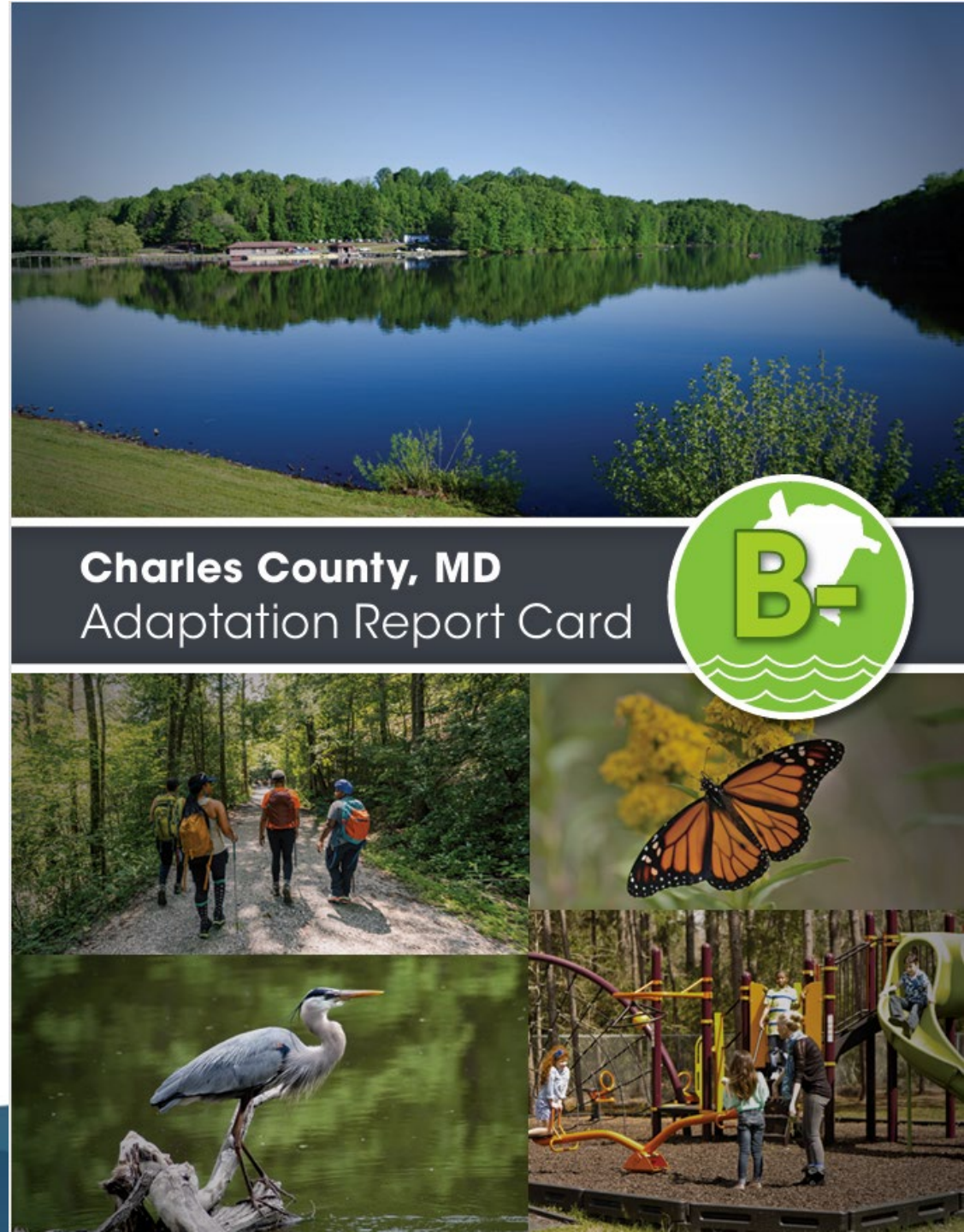
Hurricanes	

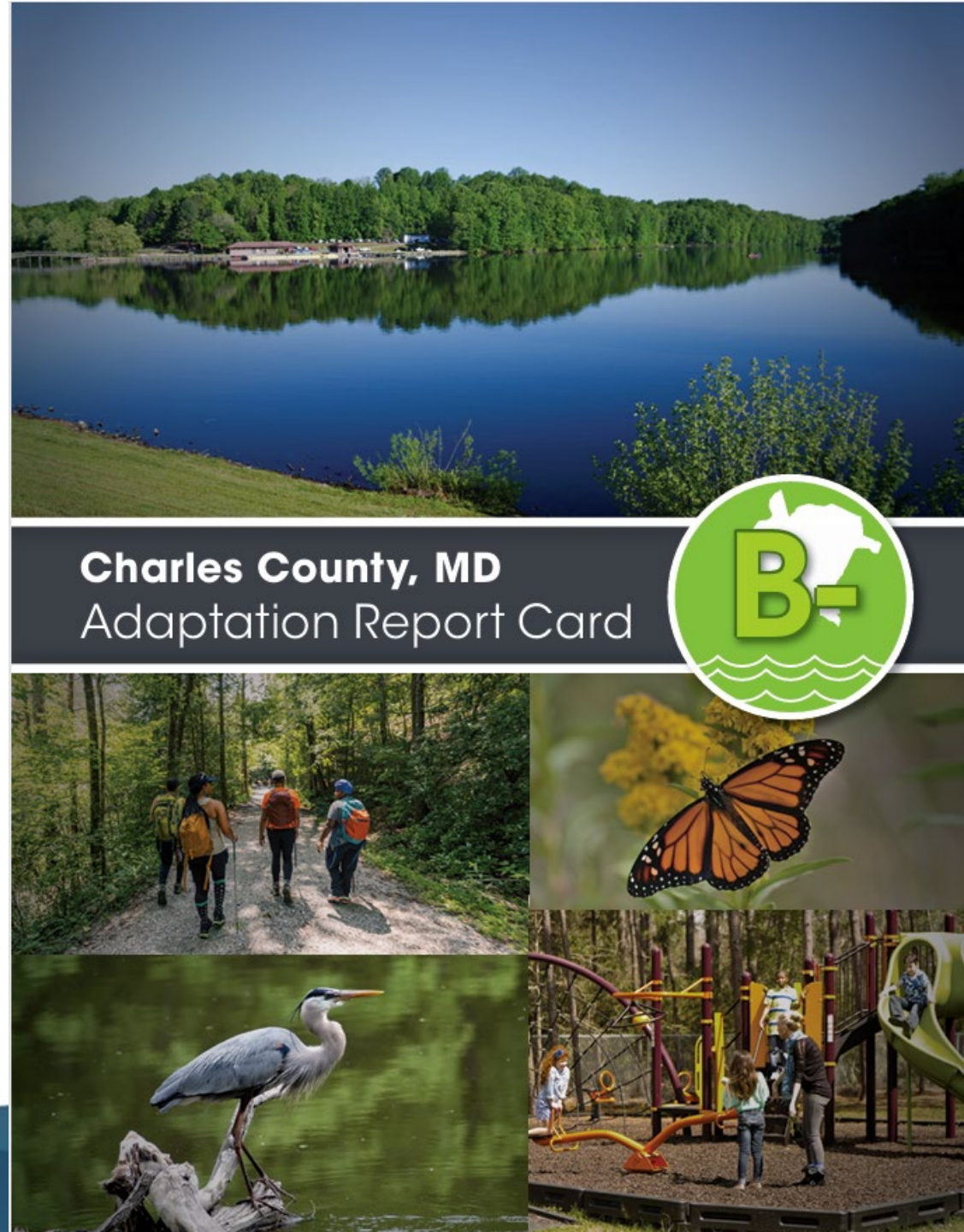
What's next?

Will the Charles County Report Card be an inspiration for next State-level assessment?



What's next?

Beginning analysis of which socioeconomic indicators most influence resilience scores

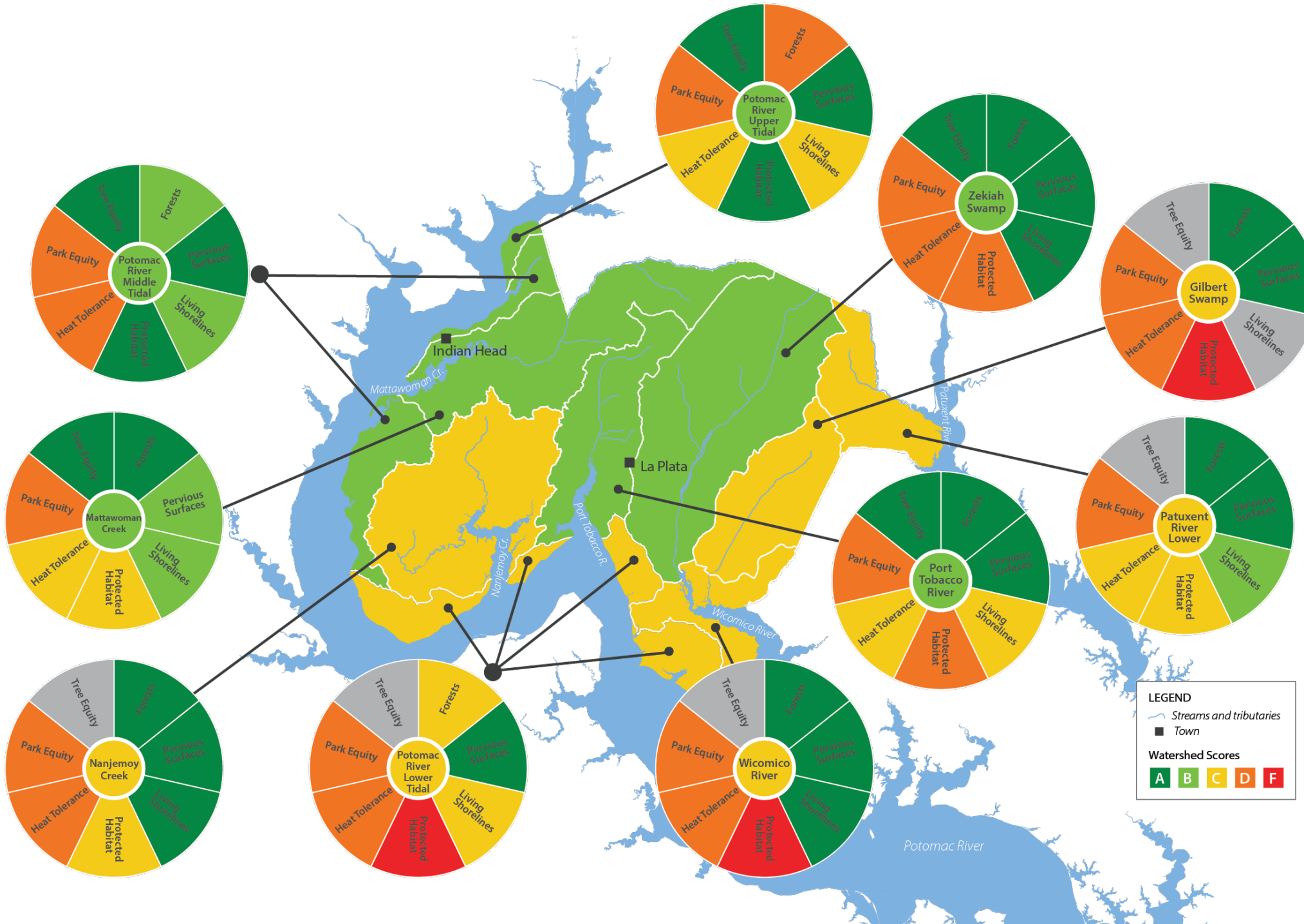


Thank you!!!

- https://www.charlescountymd.gov/government/climate-adaptation-report-card
- https://arccoastalresilience.org/

Charles County Report Card- Inspiration for next State-level assessment?

State Resilience Indicator	State Vulnerability Indicator	County Vulnerability Indicator	County Resilience Indicator
Heat Tolerance	Extreme Temperatures	Extreme Temperatures	Heat Tolerance
	Heat-related Illness	Heat-related Illness	
Groundwater Management	Drought	Drought	Groundwater Management
Shoreline Erosion	Shoreline Erosion	Shoreline Erosion	Living Shorelines
Road Flood Mitigation	Road Flood Risk	Road Flood Risk	Road Flood Mitigation
Flooding (Category)	Riverine Flooding	Riverine Flooding	Flooding (Category)
	Extreme Weather	Extreme Weather	
	Flood Frequency	Flood Frequency	
	Hurricanes	Hurricanes	


Potomac River Upper Tidal
Zekiah Swamp
Gilbert Swamp
Potomac River Middle Tidal
Mattawoman Creek
Patuxent River Lower
Port Tobacco River
Nanjemoy Creek
Potomac River Lower Tidal
Wicomico River
Tree Equity
Forests
Pervious Surfaces
Living Shorelines
Protected Habitat
Heat Tolerance
Park Equity
Indian Head
La Plata
Mattawoman Cr.
Nanjemoy Cr.
Port Tobacco R.
Wicomico River
Patuxent River
Potomac River
LEGEND
Streams and tributaries
Town
Watershed Scores
A
B
C
D
F

Indicators of Resilience

- Across categories
  - B scores
  - Doing fairly well
- Particularly good scoring indicators:
  - Pervious surfaces
  - Water quality
  - Air quality
  - Groundwater management
  - Preserved open space
  - Critical facilities

Indicators of Resilience

- Within categories
  - Some indicators doing more poorly
- Environment
  - Protected Waters
  - Protected Habitat
- Human well-being
  - Park equity
  - Tree equity
  - Heat tolerance
- Flooding:
  - Property mitigation

Indicators of Resilience

- Environment
  - Protected Waters
  - Protected Habitat
- Human well-being
  - Park equity
  - Tree equity
  - Heat tolerance
- Flooding:
  - Property mitigation

- Need more focus to improve resilience, but are they high vulnerability?

Corresponding Resilience and Vulnerability Scores

Resilience Indicator	Vulnerability Indicator
Heat tolerance	Extreme temperature
	Heat-related illness
Groundwater management	Drought
Living shorelines	Shoreline erosion
Road flood mitigation	Road flood risk
Flooding (category)	Riverine flooding
	Extreme weather
	Flood frequency
	Hurricanes

Score	
A	Meets goals
B	
C	
D	
F	Fails to meet goals

Meets Goals

A	B	C	D	F
(81–100)	(61–80)	(41–60)	(21–40)	(0–20)

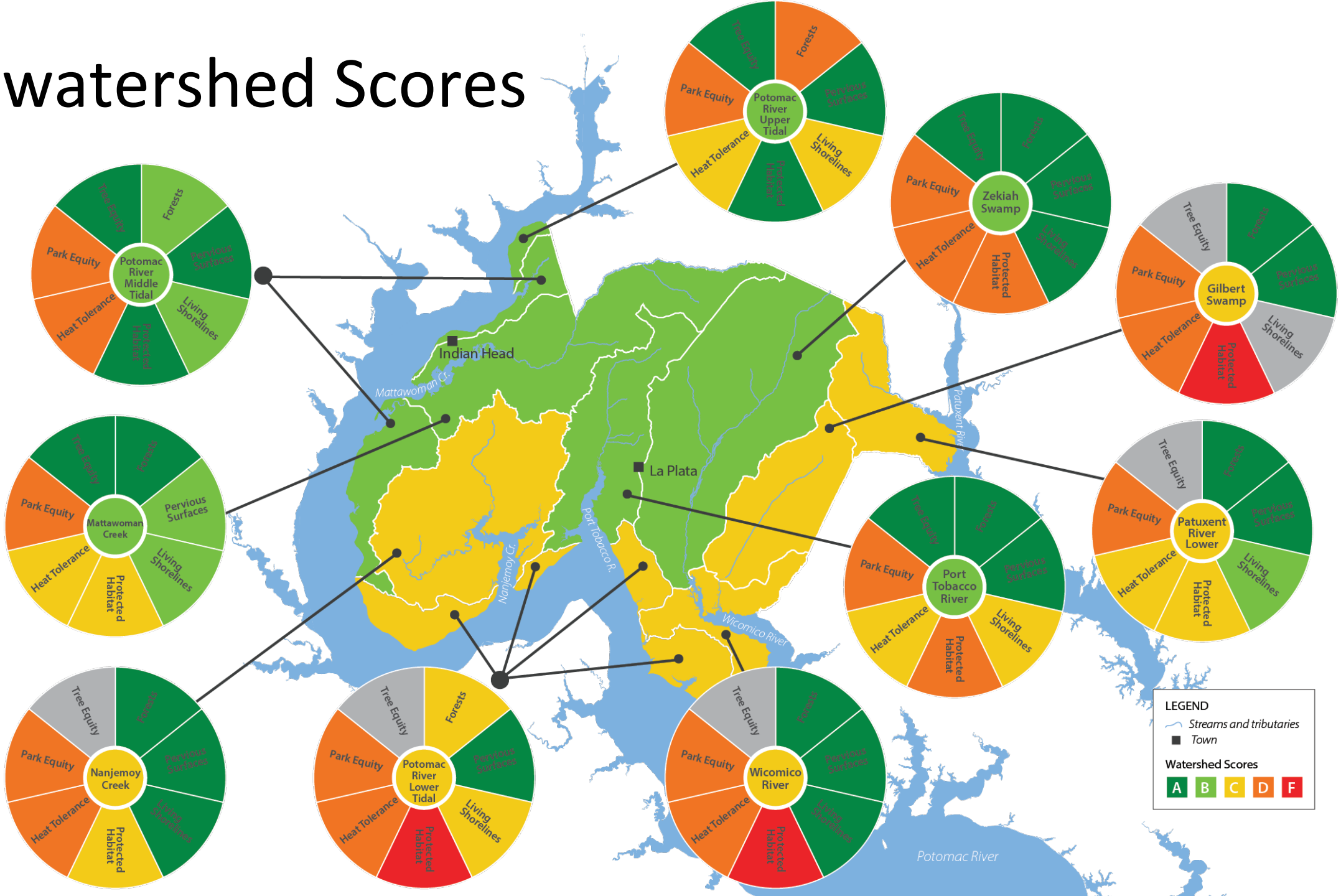
Does Not Meet Goals

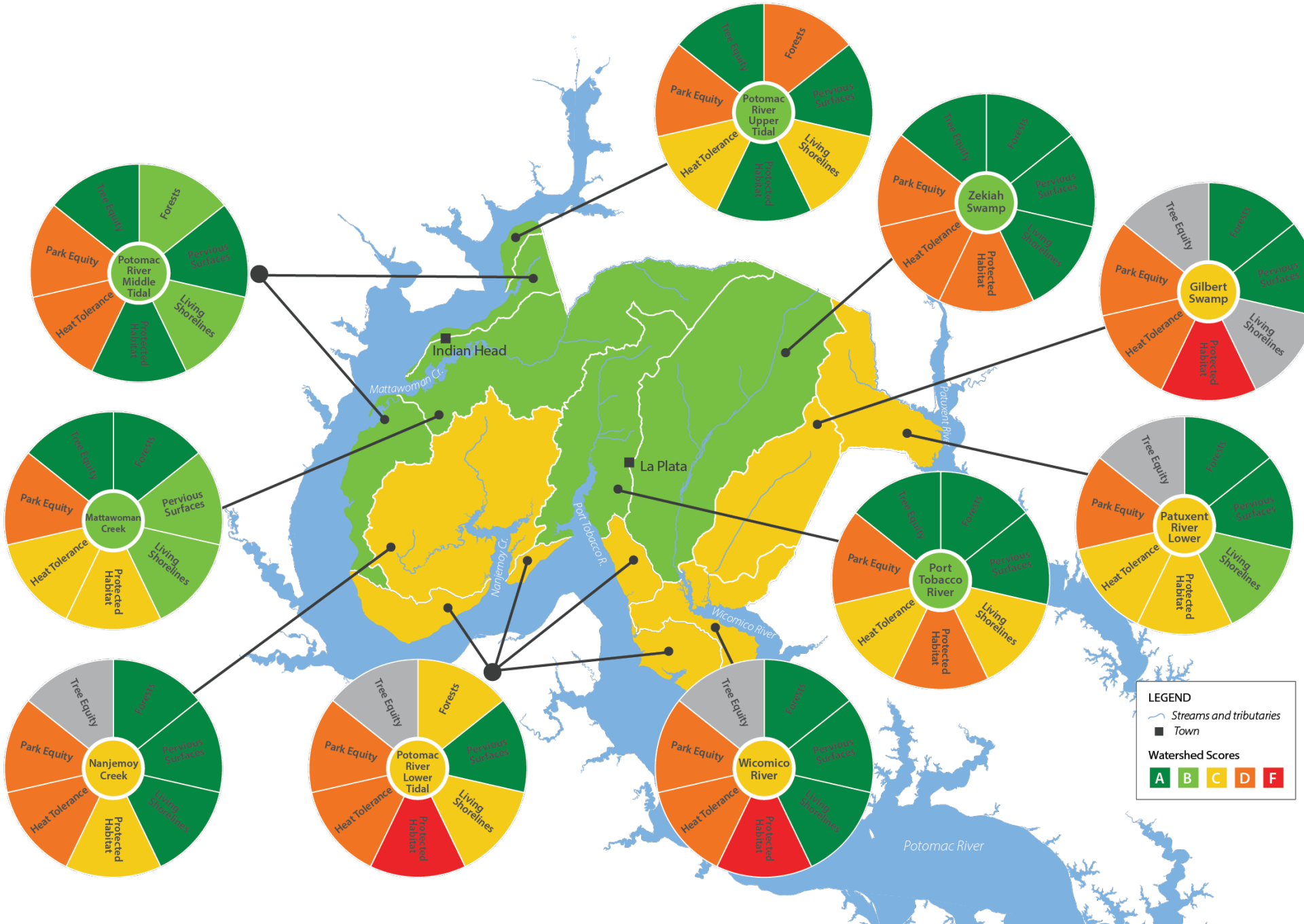
What's next?

- Release event

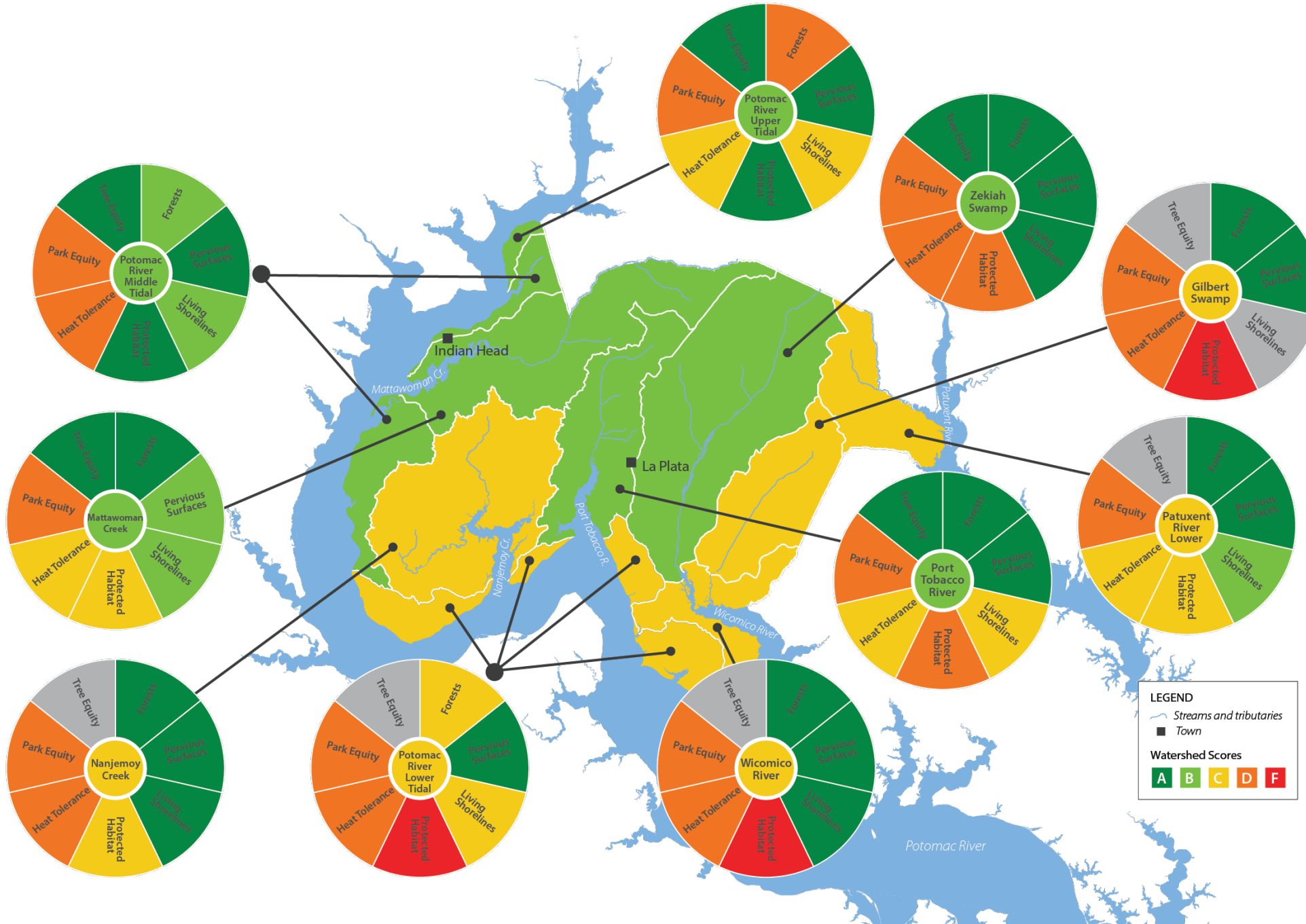
- Questions?
- klaumann@umces.edu

Subwatershed Scores





- Sub-watershed indicators
  - Forests
  - Tree equity
  - Pervious surfaces
  - Living shorelines
  - Protected habitat
  - Heat tolerance
  - Park equity



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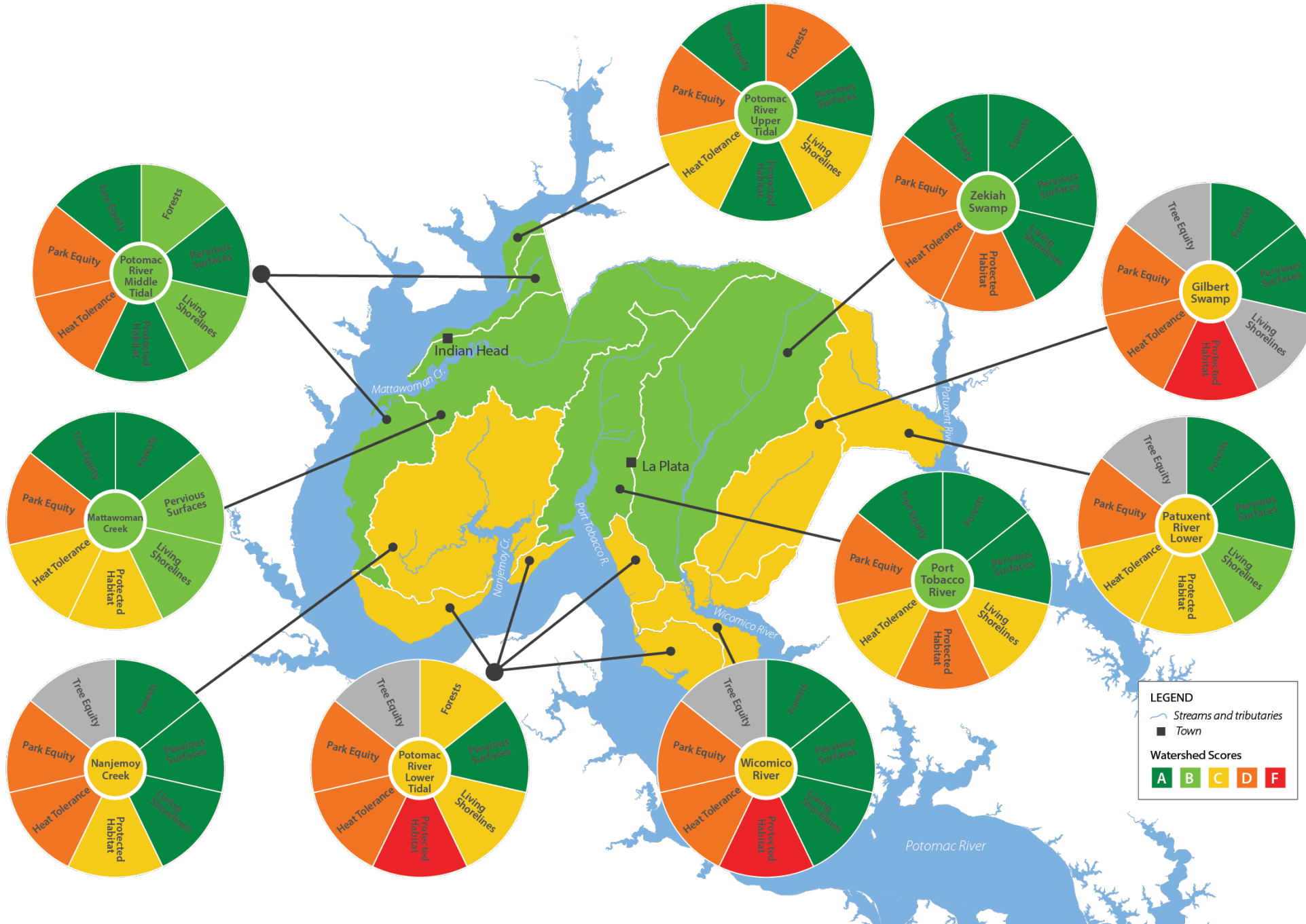

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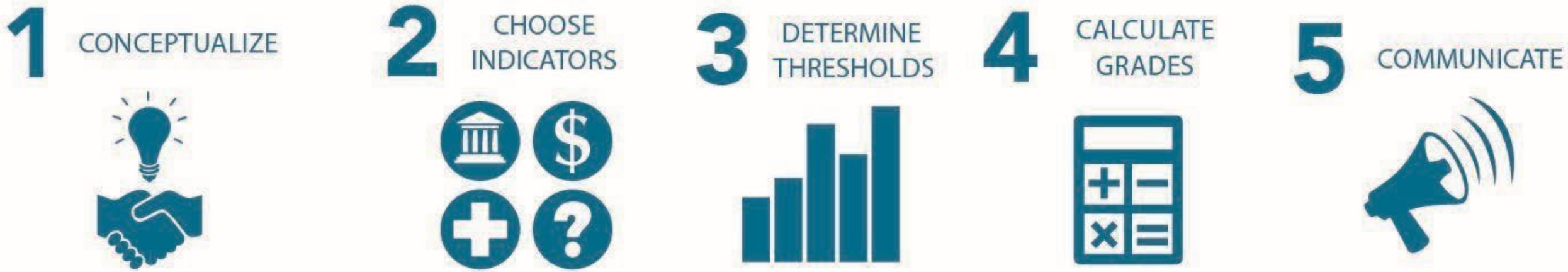
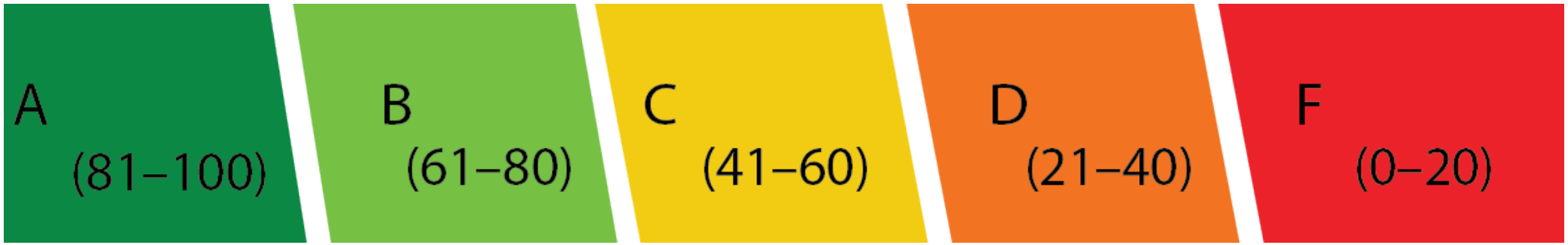
Process and Progress



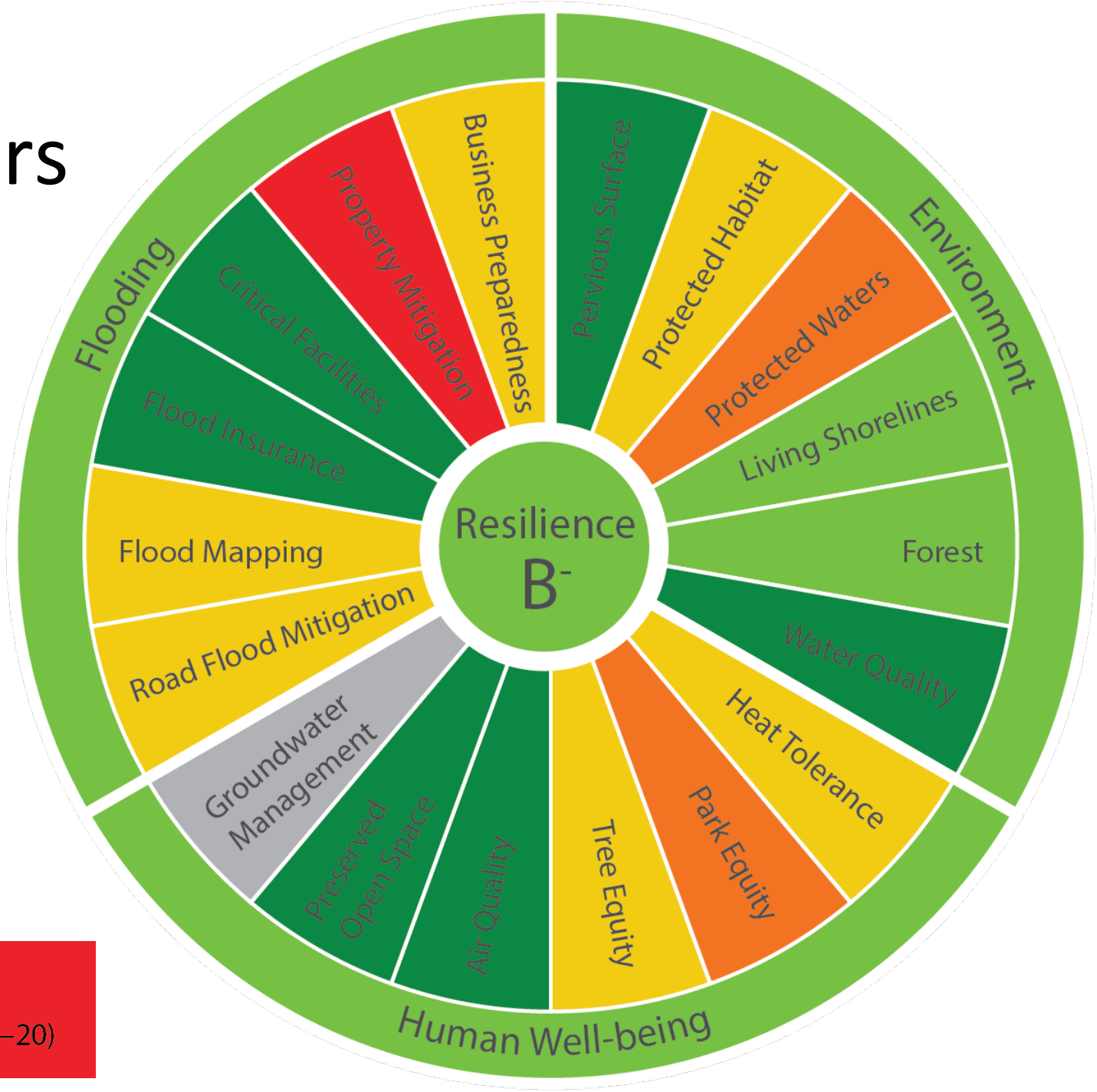
Indicator Scores

- Compare current condition against target/goal threshold
- Calculate a numeric score from 0-100%, where 100% meets the goal
- Translate to letter grade F-A, where F = 0% and A = 100%
- Display with stoplight colors



Resilience Indicators

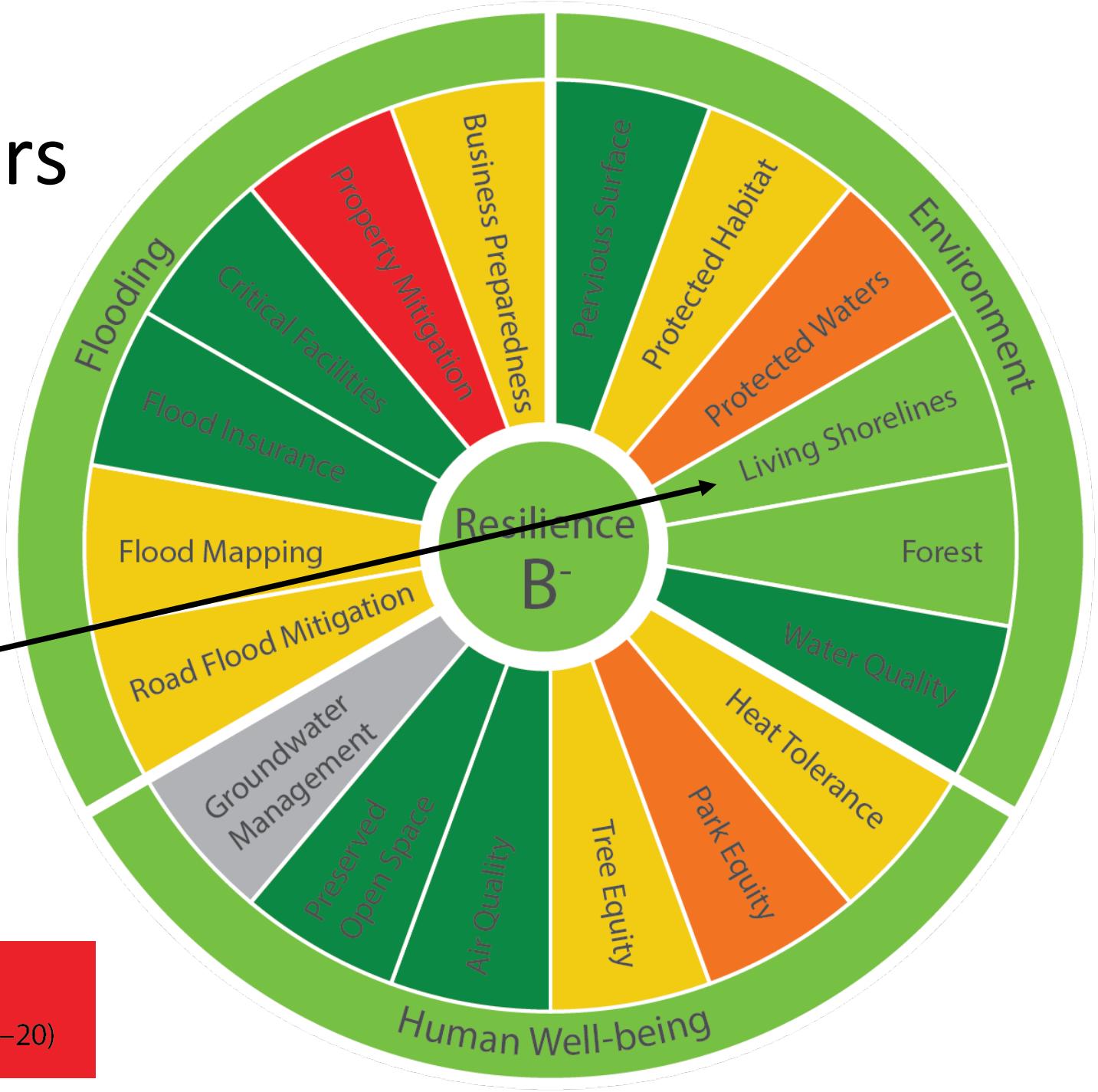
- 3 categories
  - Environment
  - Human Well-being
  - Flooding
- How well Charles County is positioned to withstand various threats of climate change

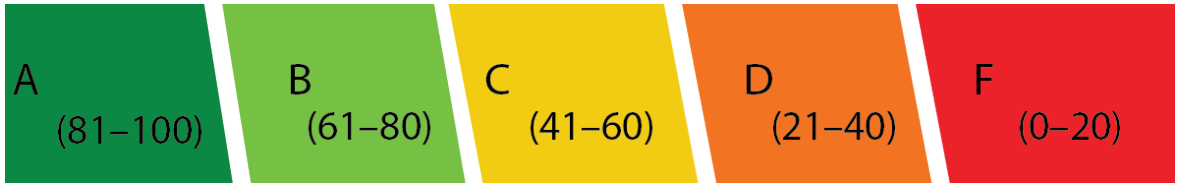


A	B	C	D	F
(81–100)	(61–80)	(41–60)	(21–40)	(0–20)

Resilience Indicators

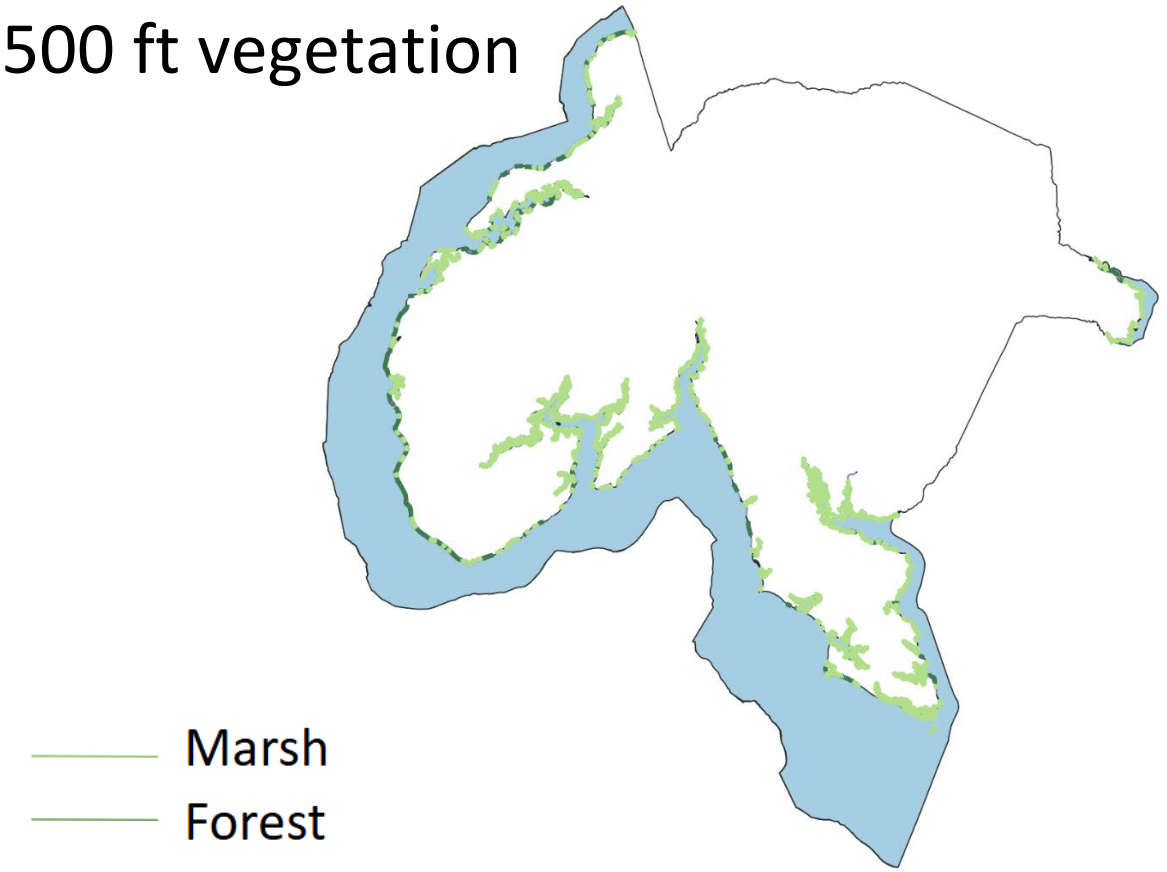
- 3 categories
  - Environment
  - Human Well-being
  - Flooding
- Focus
  - Living Shorelines
  - Park Equity
  - Road Flood Mitigation





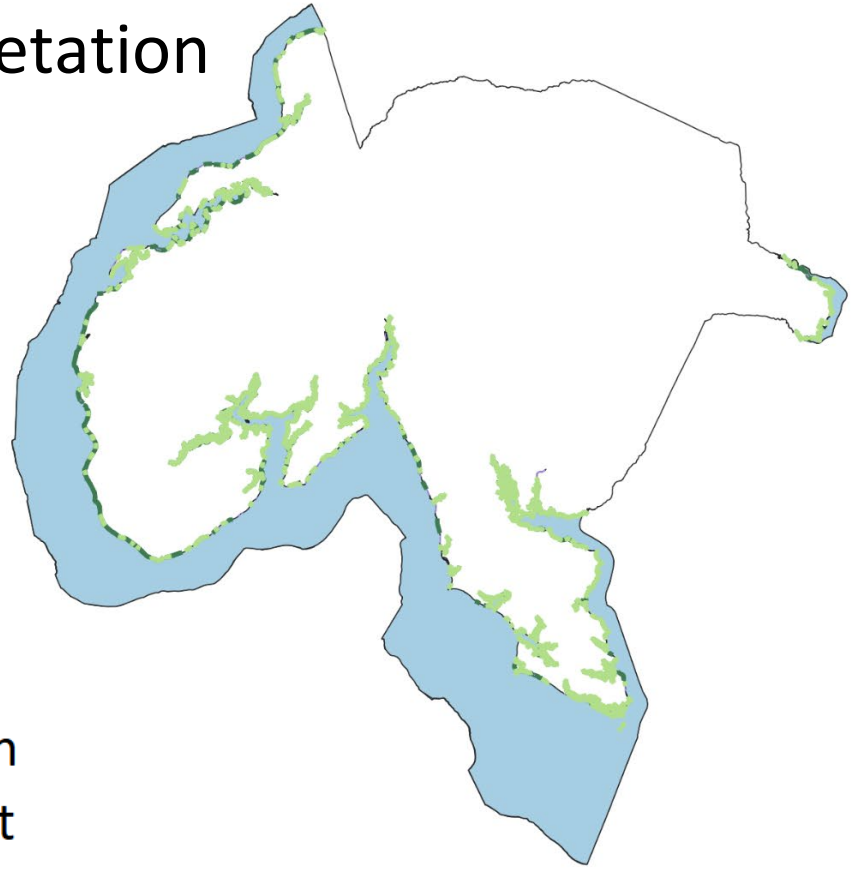
Living Shorelines

- Protection against erosion, storm surge, flooding
- Living shorelines have at least 500 ft vegetation
  - Marsh
  - Forest
  - Vegetation



Living Shorelines

- Protection against erosion, storm surge, flooding
- Living shorelines have at least 500 ft vegetation
  - Marsh
  - Forest
  - Vegetation
- Score: the percent of county shorelines that are “living”
- 72%, B



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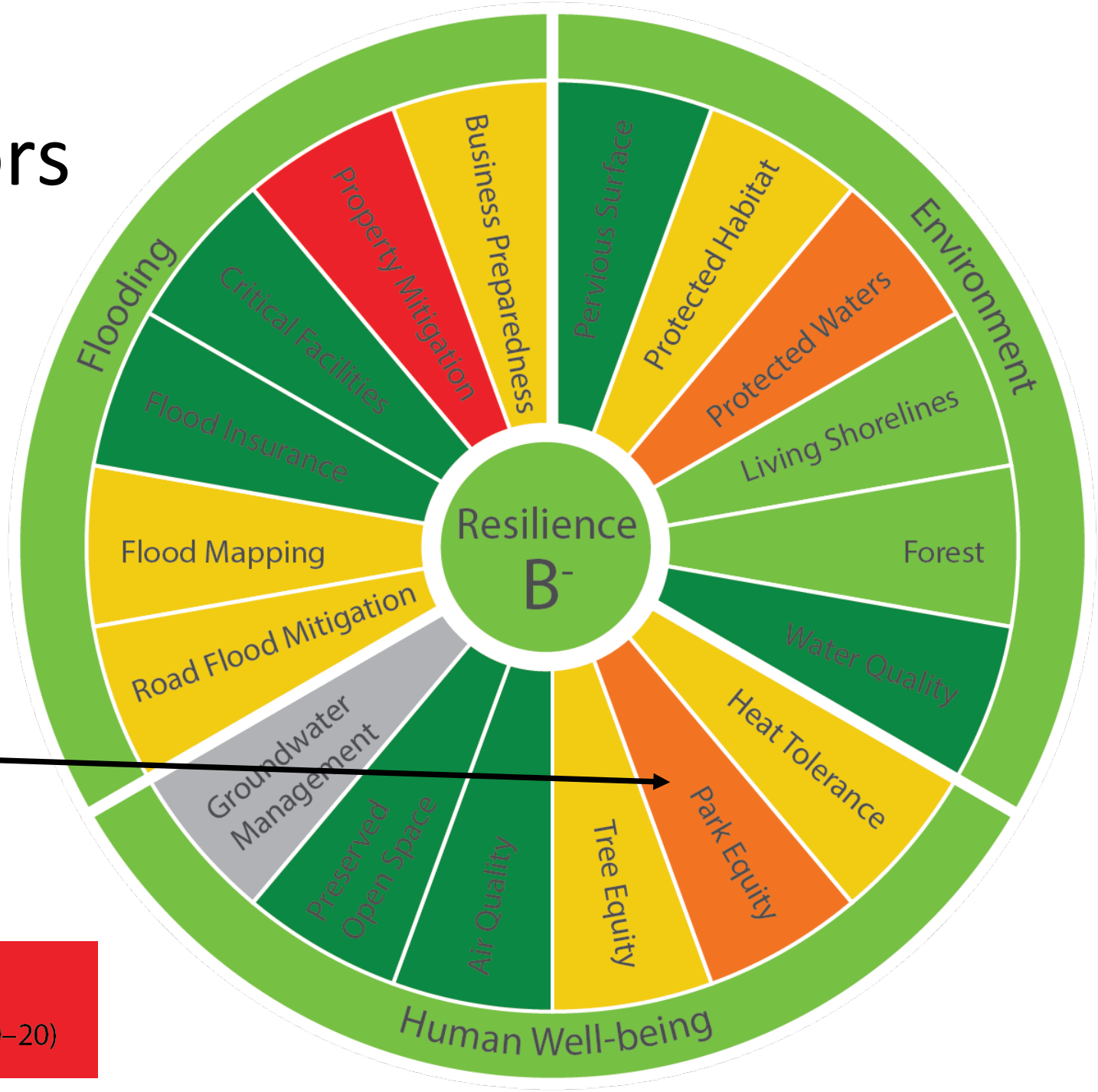
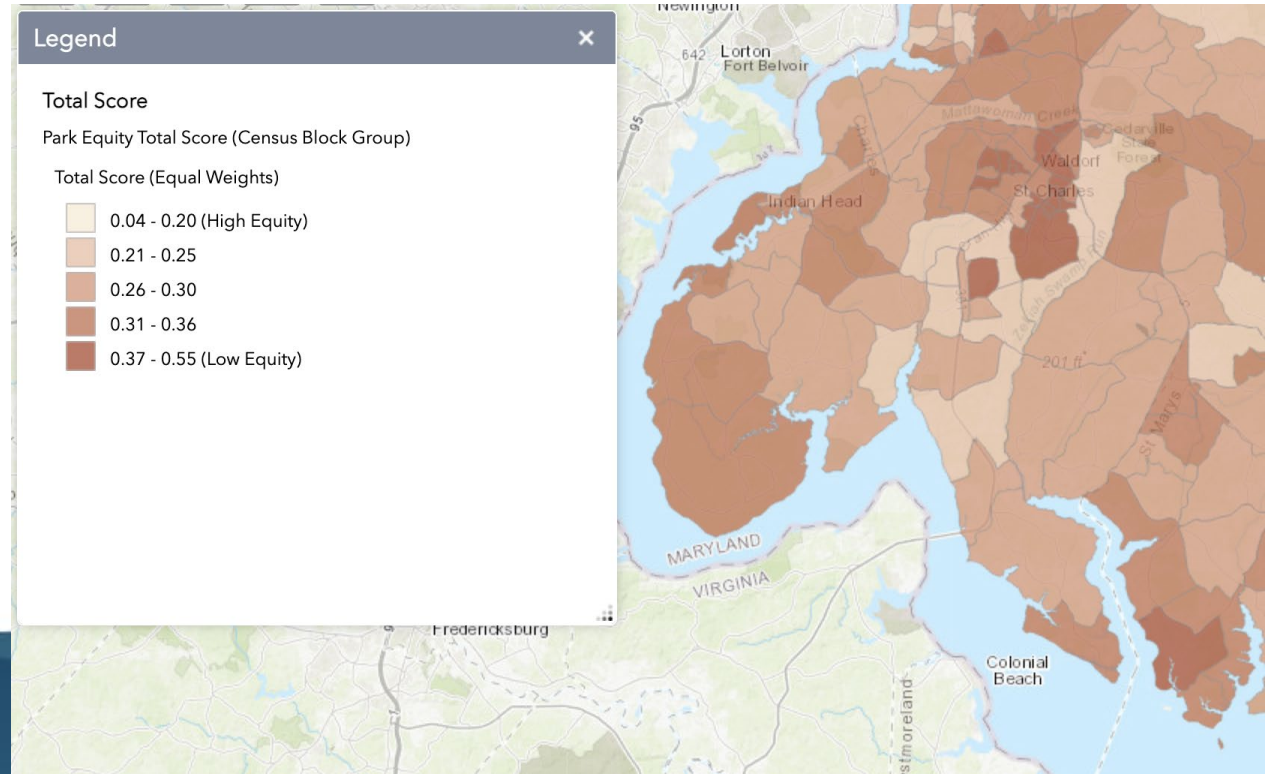


A	B	C	D	F
(81–100)	(61–80)	(41–60)	(21–40)	(0–20)

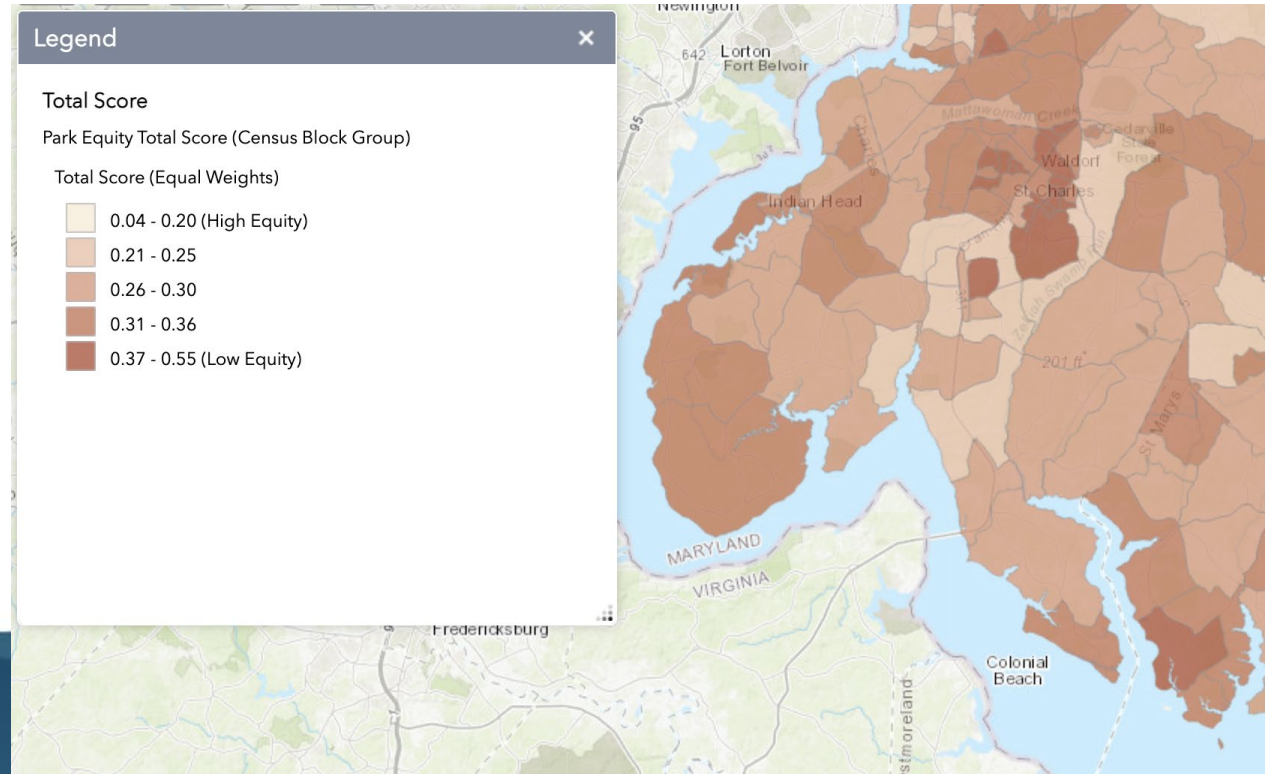
Park Equity

- Maryland DNR Park Equity Mapper
  - Scores equity in access to parks based on demographic data, such as race or age, in combination with park data including amenities, walkability, and public transit access
  - scores by census block group



Park Equity

- Maryland DNR Park Equity Mapper
  - Scores equity in access to parks based on demographic data, such as race or age, in combination with park data including amenities, walkability, and public transit access
  - scores by census block group
- Score: Rescaled DNR score to 0 – 100% scale
- Aggregated census block scores, weighted by area
- Score: 32%, D



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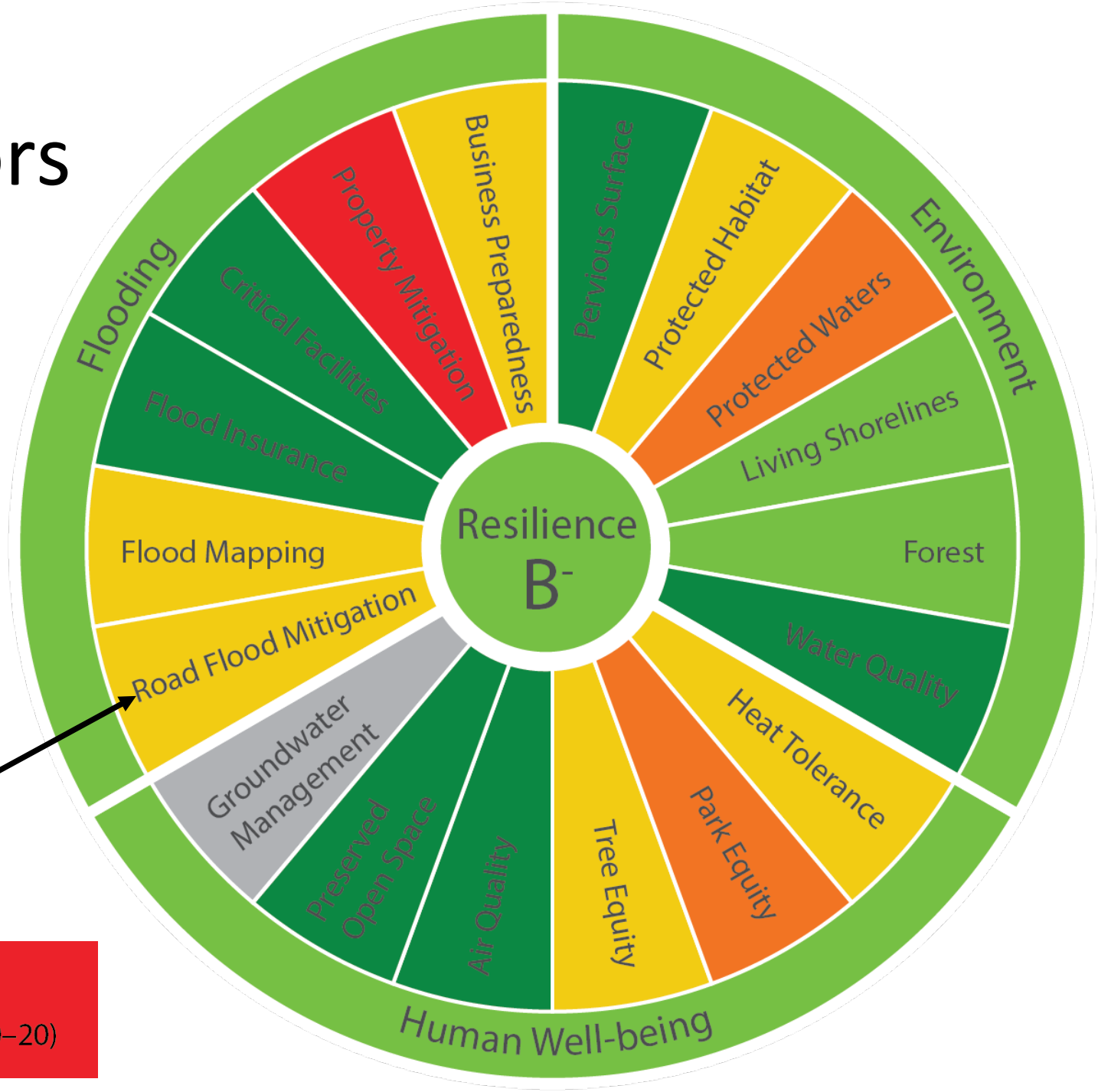
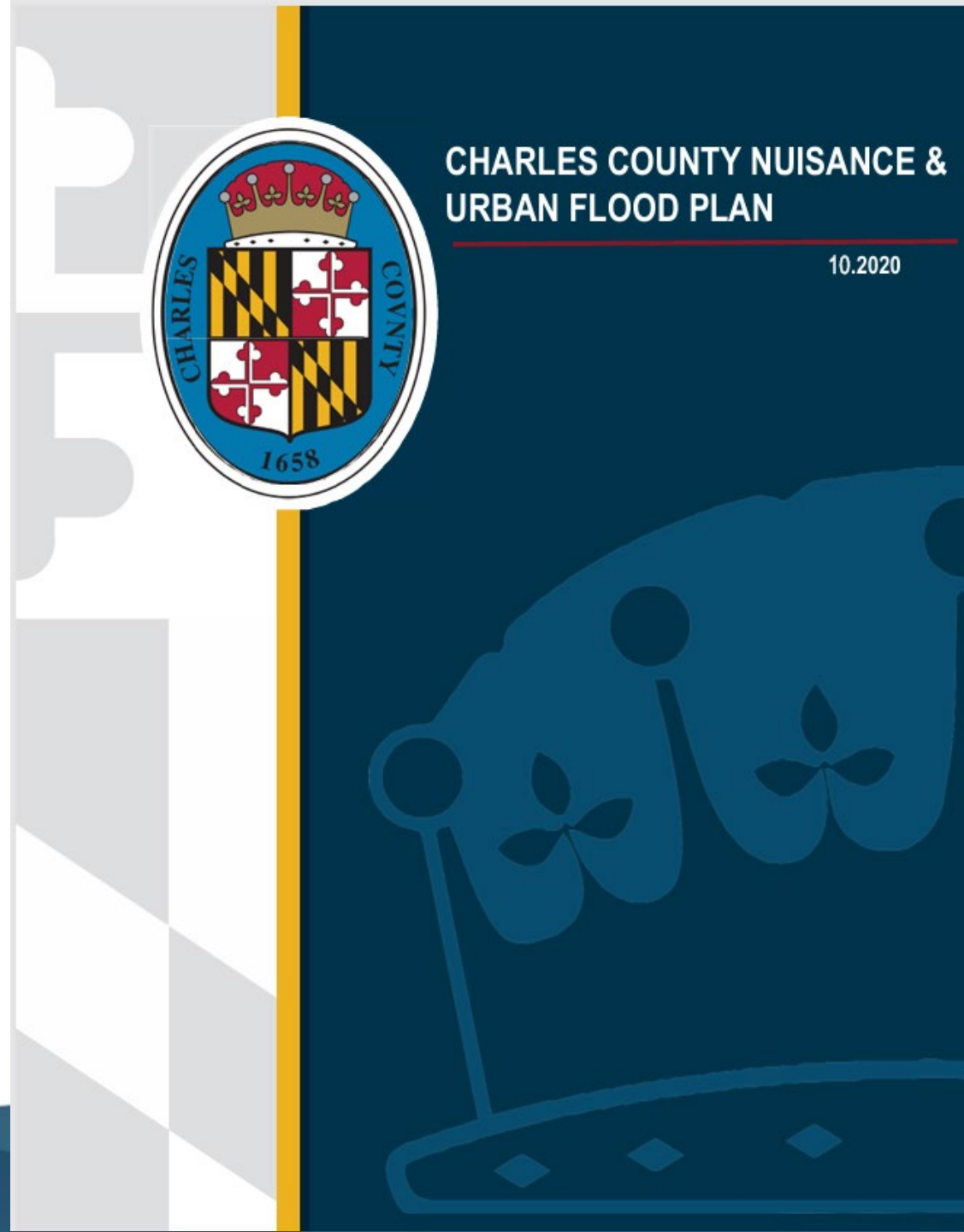


A	B	C	D	F
(81–100)	(61–80)	(41–60)	(21–40)	(0–20)

Road Flood Mitigation

- Charles County identified "Nuisance and Urban Flood Locations"
- 57 roads:
  - Ranked risk (Low, Medium, High)
  - Documented mitigation efforts



Road Flood Mitigation

- Charles County identified "Nuisance and Urban Flood Locations"
- 57 roads:
  - Ranked risk (Low, Medium, High)
  - Documented mitigation efforts
- Scored each road:
  - Initial score based on table to right
  - If mitigation is complete, add 20% to score
- Score: 56%, C

County Risk Rank	Initial Score	Score if mitigated
Low	80% (B)	100% (A)
Medium	40% (D)	60% (C)
High	0% (F)	20% (F+)

Overall Scores

- Indicator scores in each category averaged for category score
- Category scores averaged for overall score
- County scores a B-
- Moderately good ability to withstand climate threats

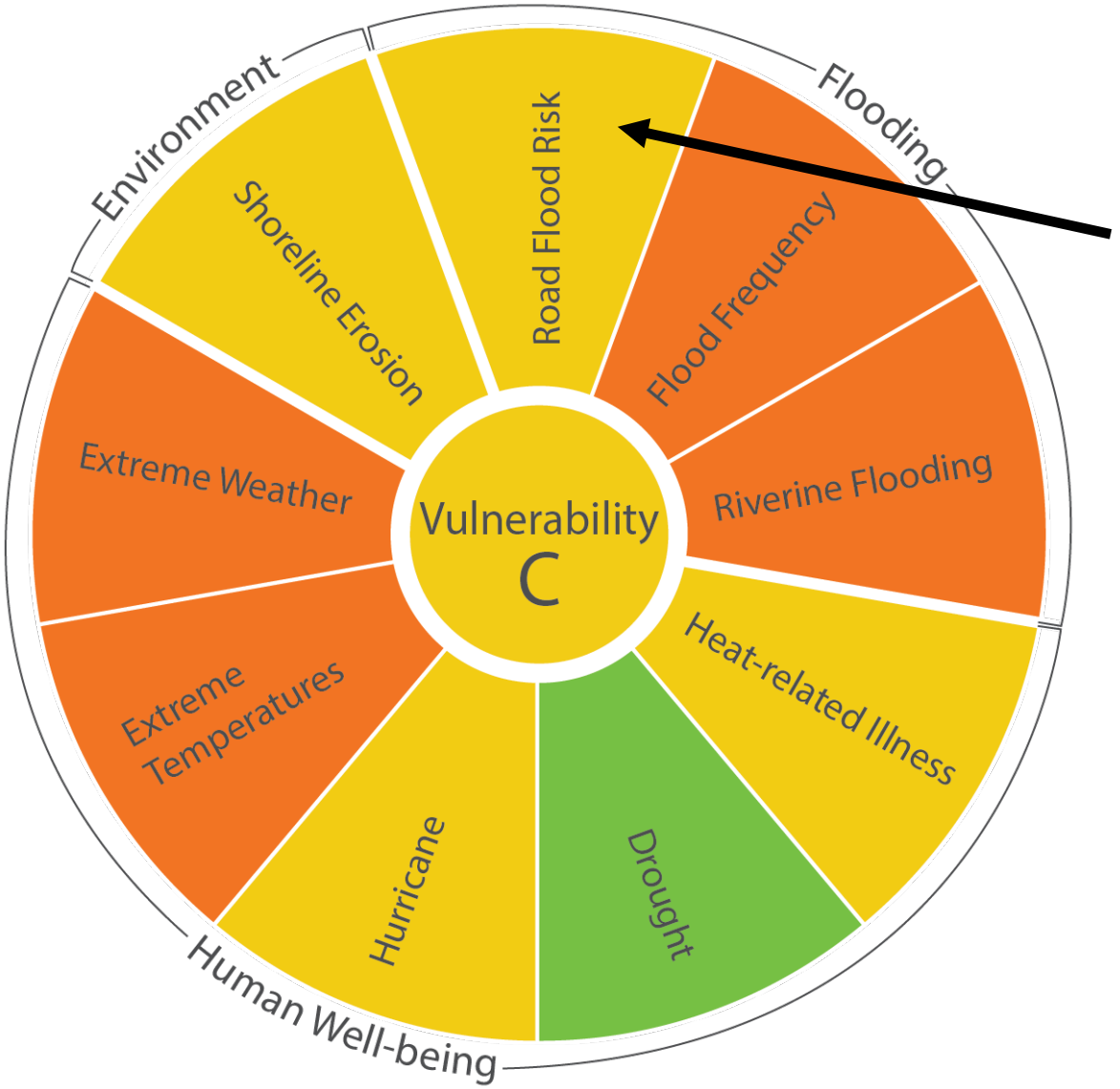
A	B	C	D	F
(81–100)	(61–80)	(41–60)	(21–40)	(0–20)

Resilience Indicators

Vulnerability Indicators

Resilience Indicators

Road Flood Risk



- Go back to Road Flood Mitigation Resilience Indicator
- Charles County identified "Nuisance and Urban Flood Locations"
- 57 roads:
  - Ranked risk (Low, Medium, High)
  - Documented mitigation efforts

Road Flood Risk

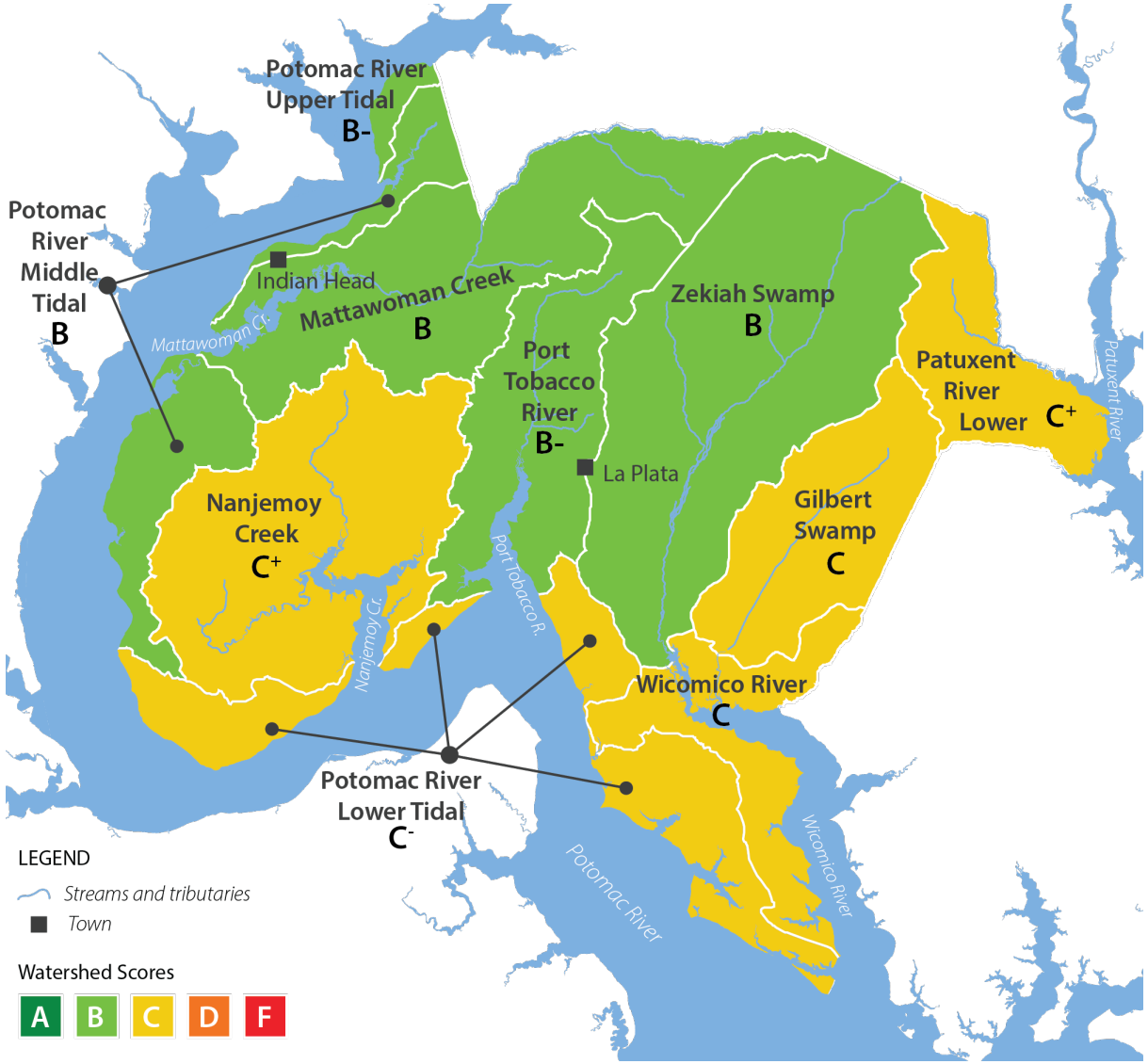
County Risk Rank	Initial Score
Low	80% (B)
Medium	40% (D)
High	0% (F)

- Go back to Road Flood Mitigation Resilience Indicator
- Charles County identified "Nuisance and Urban Flood Locations"
- 57 roads:
  - Ranked risk (Low, Medium, High)
  - Documented mitigation efforts
- Scored each road:
  - Initial score based on table to right
- Score: 50%, C

Vulnerability indicator	Resilience indicator

Vulnerability indicator	Resilience indicator
Extreme Temperatures	Heat Tolerance
Heat-related Illness	
Drought	Groundwater
Shoreline Erosion	Living Shorelines
Road Flood Risk	Road Flood Mitigation
Riverine Flooding	Flooding
Extreme Weather	
Flood Frequency	
Hurricane	

Also scored some indicators at sub-watershed level



- Environment Category
  - Forests
  - Pervious surface
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  - Protected habitat
- Human Well-being
  - Tree equity
  - Park equity
  - Heat tolerance

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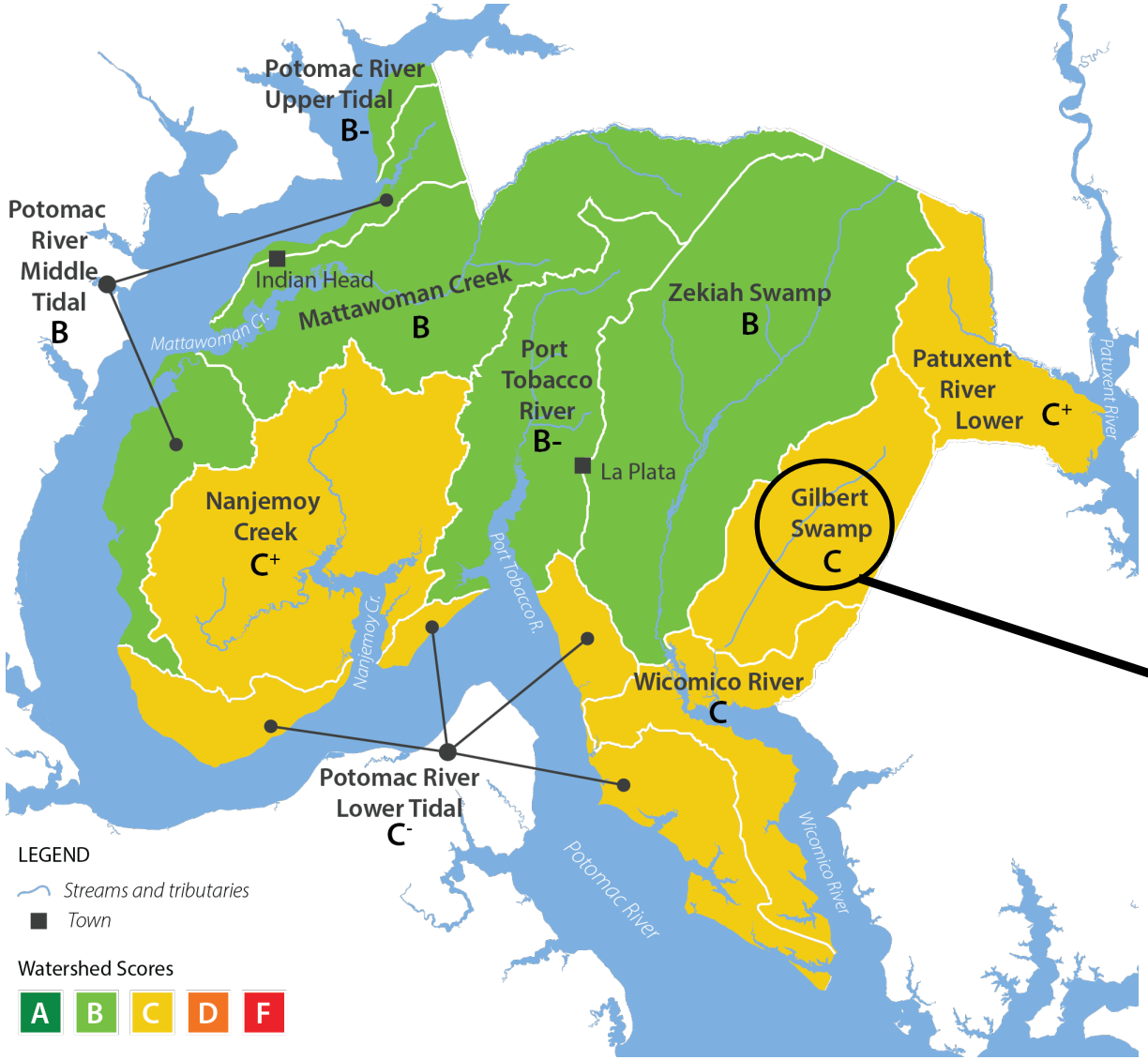

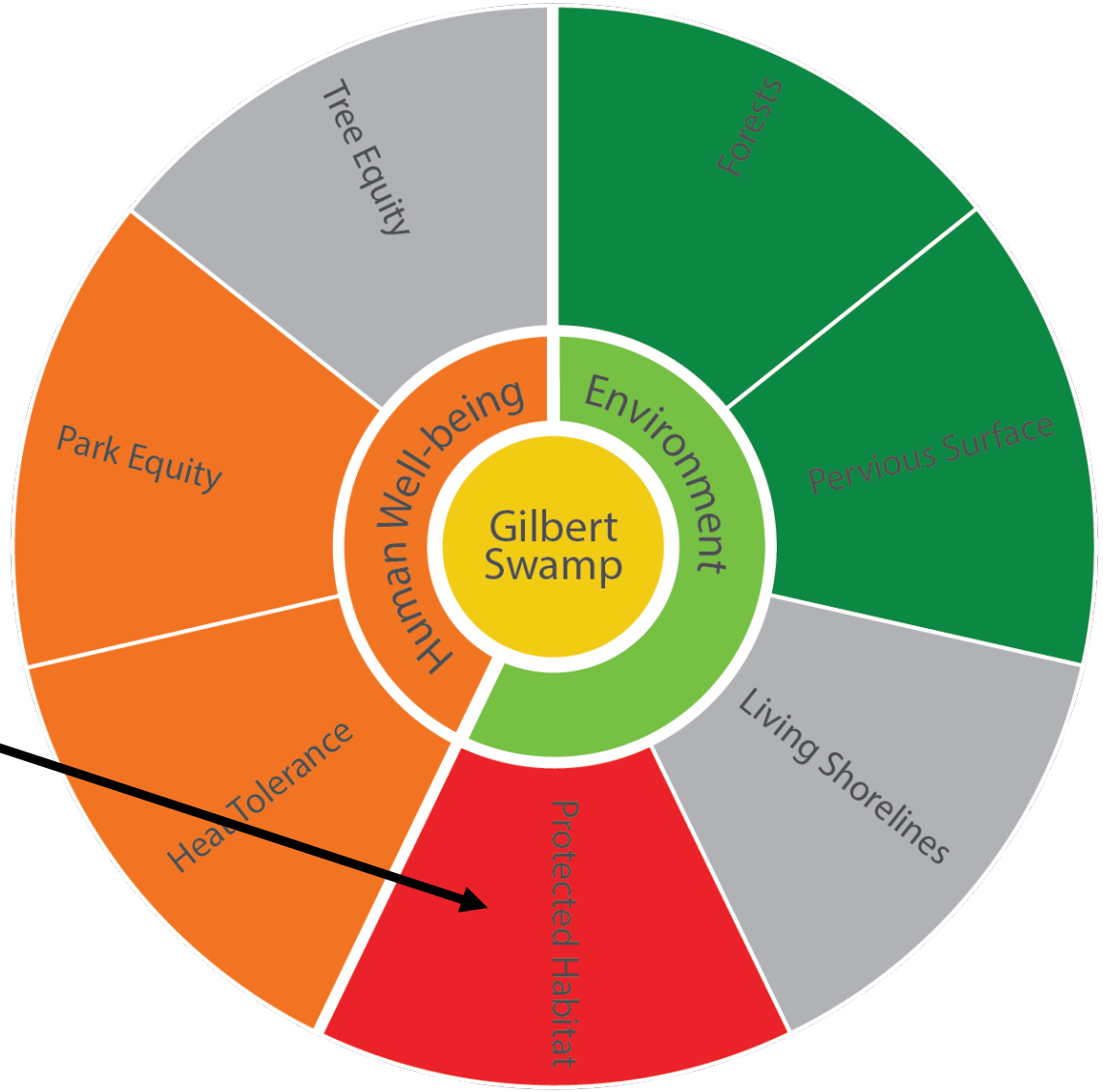

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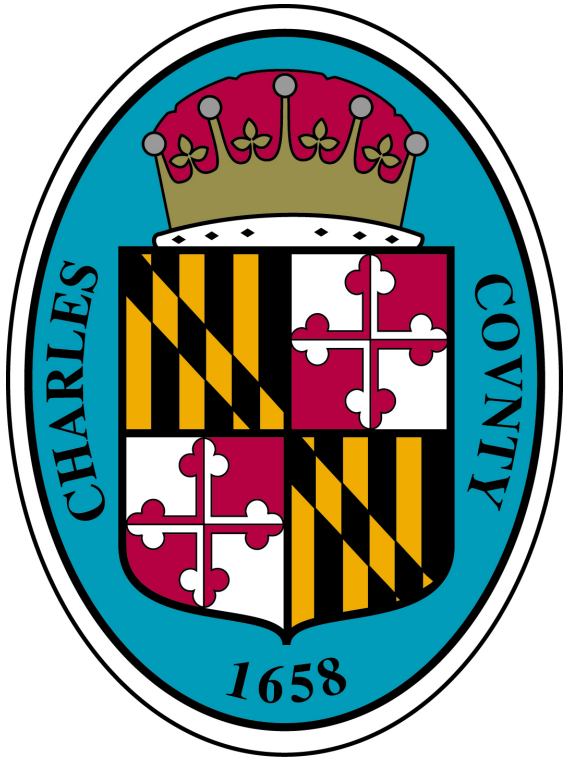

Questions? e-mail klaumann@umces.edu

Refined some indicators for Charles County

- Wetland extent
- Forest cover
- Shoreline erosion
- Beneficial use of dredge materials
- Critical facility locations
- Community rating system
- Floodplain population
- Freeboard height
- Flood mapping
- Nuisance flood planning
- Repetitive flood loss properties
- Flood loss coverage
- Green infrastructure
- Preserved farmland/open space
- Business disruption

State Level
- Forest cover data from the critical area
- Threshold: No loss
- Pass/fail for each county based on loss
- Weighted county scores by area for overall score

County Level
- County-wide forest cover data
- Threshold: 40% (target used in planning)
- Pass/fail for each subwatershed
- Weighted subwatershed scores by area for overall score

Both score a B

Refined some indicators for Charles County

- Wetland extent
- Forest cover
- Shoreline erosion
- Beneficial use of dredge materials
- Critical facility locations
- Community rating system
- Floodplain population
- Freeboard height
- Flood mapping
- Nuisance flood planning
- Repetitive flood loss properties
- Flood loss coverage
- Green infrastructure
- Preserved farmland/open space
- Business disruption

State Level

- Wanted living shoreline indicator but data were not available
- Used erosion rates as a proxy

County Level

- County-level data on shoreline composition available from VIMS
- Threshold: 100% of shoreline should be living
- Score=% of shoreline living

Both score a B

Refined some indicators for Charles County

- Wetland extent
- Forest cover
- Shoreline erosion
- Beneficial use of dredge materials
- Critical facility locations
- Community rating system
- Floodplain population
- Freeboard height
- Flood mapping
- Nuisance flood planning
- Repetitive flood loss properties
- Flood loss coverage
- Green infrastructure
- Preserved farmland/open space
- Business disruption

State Level: Preserved FARMLAND

- Considered climate resilience aspects of maintaining pervious/vegetated surfaces AND economic impact
- Scored % of the way state is to goal of preserving 1,030,000 acres of farmland
- Score: B

County Level: Preserved OPEN SPACE

- Considered climate resilience aspects of maintaining pervious/vegetated surfaces
- Scored % of way to meeting goal of preserving 50% of land as open space
- Score: A