Baltimore Area Climate Vulnerability Assessment

3/21/2024
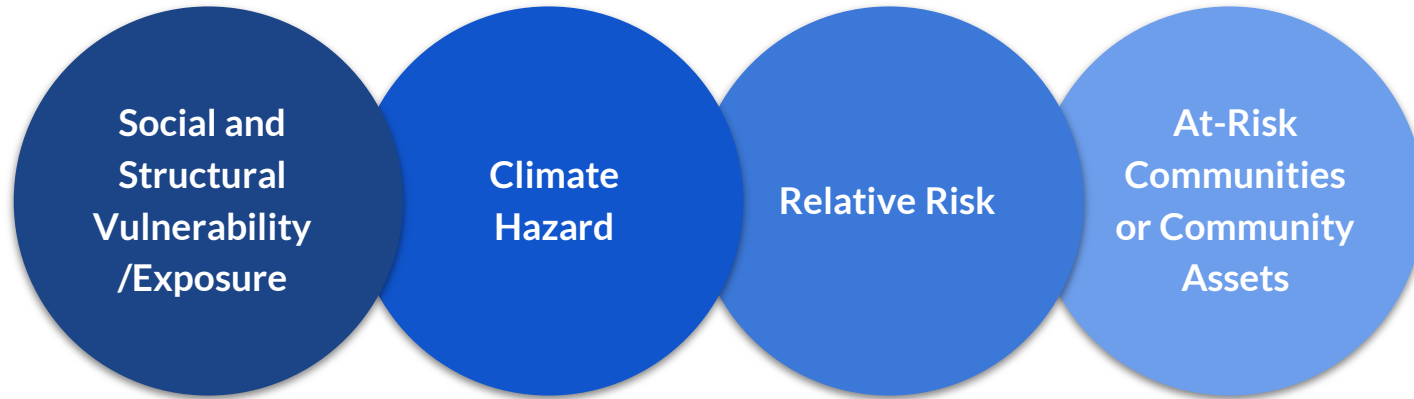
Amy Freitag, Seann Regan
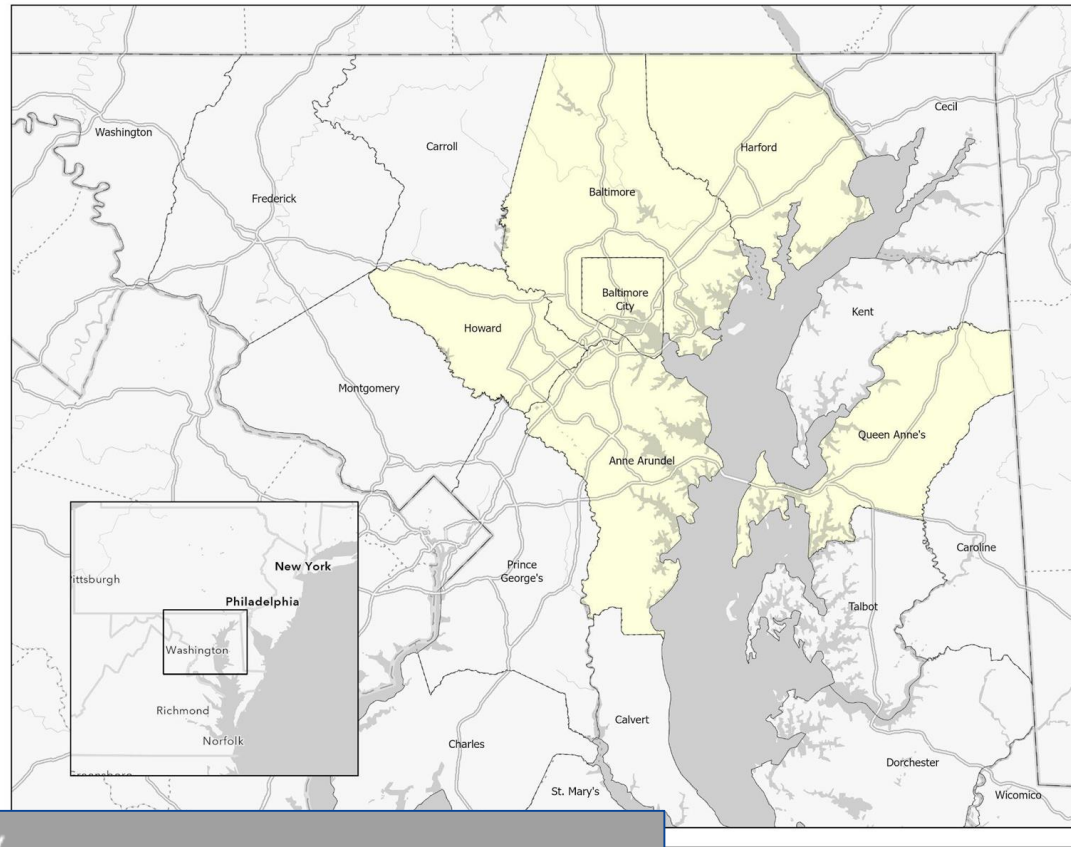
SCIENCE SERVING COASTAL COMMUNITIES

Where are we in our process?

NCCOS — NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Engagement	**Indicator development**	**Assess vulnerability and hazard**	**Assess risk**	**Conduct place-based research**	**Develop and release products**
Assign project advisory committee. Determine project goals and prioritize local needs.	Gather data to develop indicators.	Assess vulnerability (or exposure) and hazards.	Assess risk by intersecting vulnerability (or exposure) with hazard.	Use hazard, vulnerability, or risk maps to conduct further place-based research.	Develop products. Present findings and products. Revise and finalize.

The Community Climate Vulnerability Framework

Social and Structural Vulnerability /Exposure

Climate Hazard

Relative Risk

At-Risk Communities or Community Assets

Project Scope & Geography

Prioritization process

Category (in order)	Top research question	Secondary research question
Land use planning	Evaluate impacts of natural infrastructure and restoration efforts	Forecast when and where communities face climate-related thresholds
Better risk assessments	Map to advise communities if what they're considering is enough to meet the risks forecasted in the area	Where floodwaters are putting pressure on stormwater and wastewater systems
Retreat and migration	Are there identifiable tipping points or thresholds at which different decisions should be made, like retreat?	Spatially resolute shoreline mapping data and how they are expected to perform in future climate scenarios
Better human population data	Forecasting human patterns out to the same length of time as climate models	Are the information needs and/or tipping points different for water-dependent industries? —————————————————————— What are the impacts to the tax base if people choose retreat?

Wish List

1
2
3

Vulnerability: Social

- Social Vulnerability Index 2020
  - Based on Census data
- Dasymmetrically downscaled population data from EPA
- Forecasted population data to 2100 from Census & EPA

Vulnerability: Structural

- Schools: MD DOE
- Farms: MD Agricultural Areas & Easements
- Worship: IRS tax data
- Shoreline Inventory: iMAP
- Zoning: individual counties/city
- Stormwater: TBD, by jurisdiction or Chesapeake Conservancy (June)
- All part of modified structural resilience index (EPA methodology)

Vulnerability: Natural Resources

- Ecosystem Services - Elliot Campbell's model (DNR)
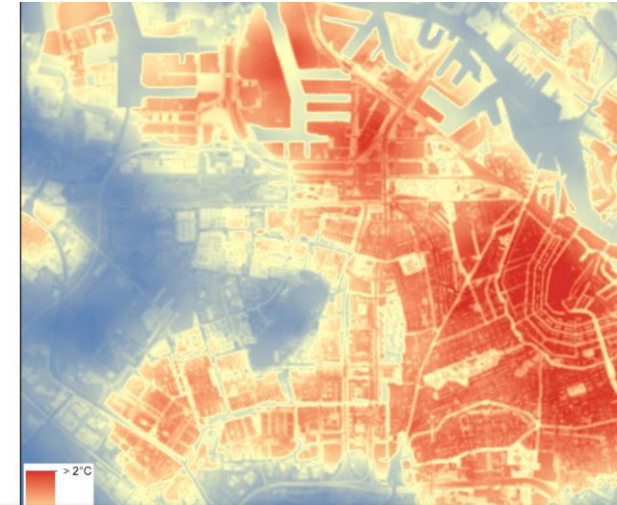- Marsh Protection Potential - Coastal Resiliency Assessment DNR
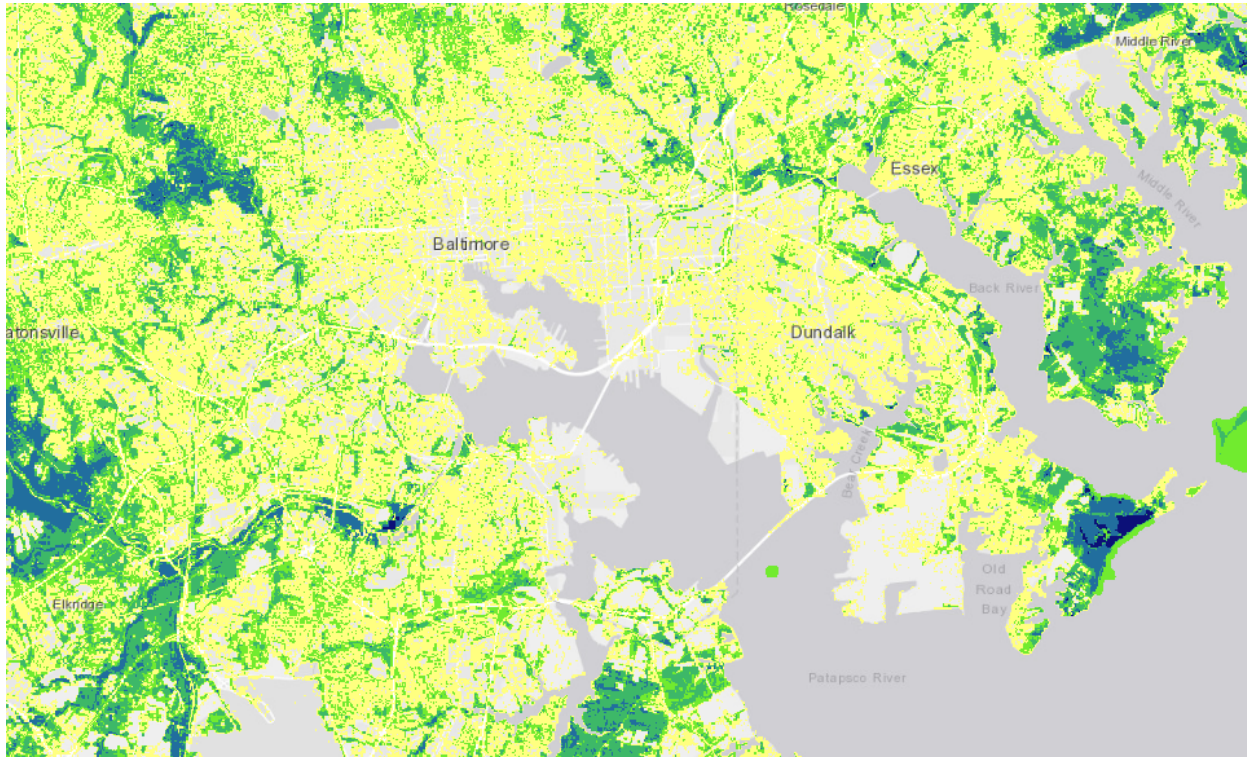
Risk: Combined Flooding

- Stormwater: Kazakis model based on remotely sensed landscape
- Sea level rise: DNR 2 ft Sea Level Rise vulnerability
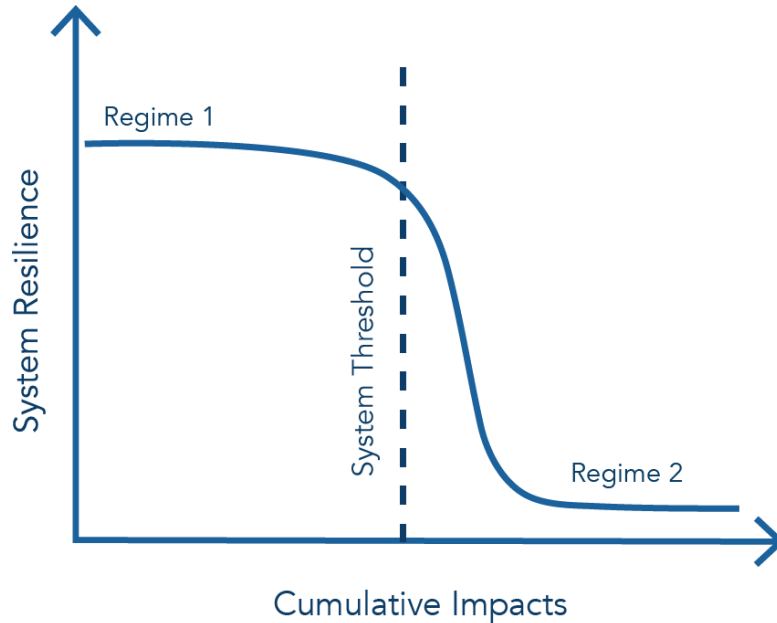- Cat 4 storm surge: DNR Coastal Resilience Assessment

Risk: Urban Heat

- Urban Heat analysis will draw on past efforts from NOAA's Climate Program Office
- Incorporation of local observed heat values during different times of day
  - Johns Hopkins effort, City of Baltimore
- Will incorporate remotely sensed and inventory data on tree canopy/trees
  - City of baltimore office of sustainability tree inventory, remotely sensed/satellite data
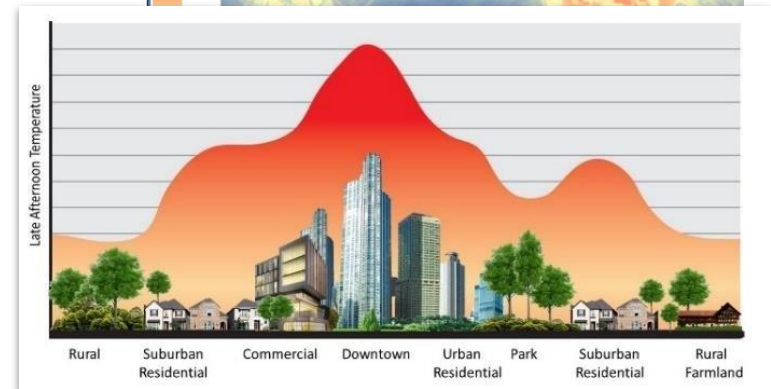
Combination Analysis: Stay Tuned

- Combination analysis:
  - Impact of natural infrastructure and restoration on culturally valuable sites
  - Policy and engineering thresholds of vulnerability and risk layers visualized

Questions?

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https://coastalscience.noaa.gov/project/assessing-community-vulnerability-to-flood-hazards-in-the-baltimore-maryland-metro-area/