

Future Conditions and Hazard Mitigation Planning

FEMA Region 3 Coffee Break Webinar Series | May 18, 2022

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Why is planning for
future conditions
important to you?

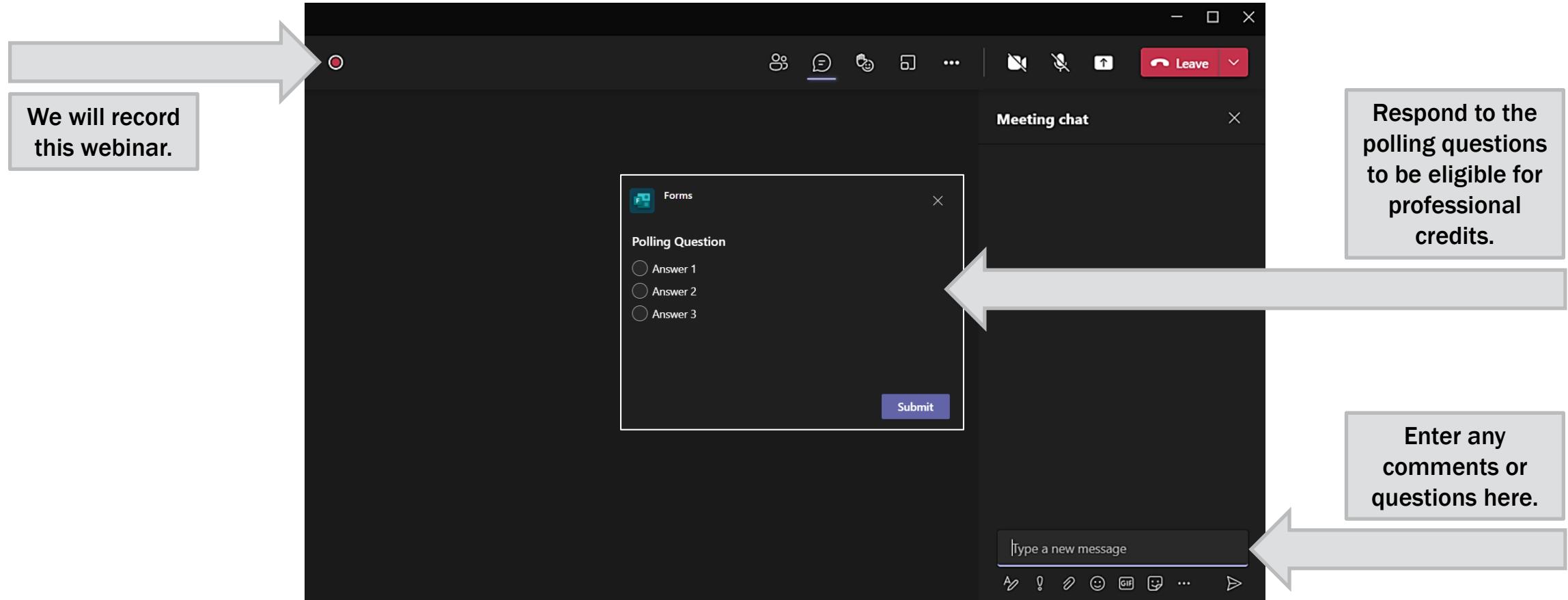
Let us know in the chat!



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Technology Tour



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Welcome and Overview

- Presentation Agenda
 - What Are Future Conditions?
 - Climate Science to Support Resilience
 - Climate Change Planning for Vulnerable Neighborhoods
 - Virginia Coastal Resilience Master Plan
- Wrap-up and Q&A
 - Future Coffee Break Webinars
 - Receiving Professional Credits



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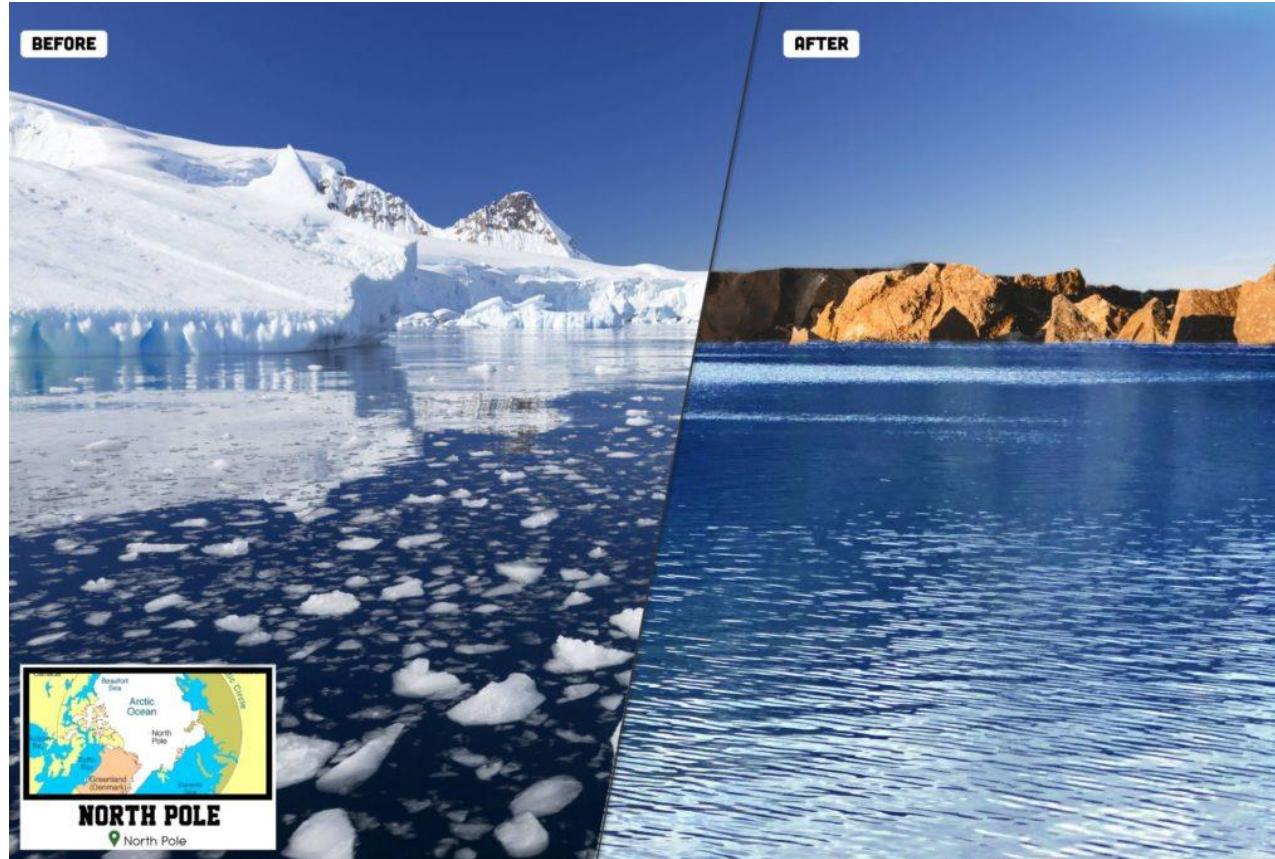




Mari Radford

Community Planning Lead, Mitigation Division, FEMA Region 3

“Change is the Only Constant” – Heraclitus 500 B.C.E.



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What Do We Mean By “Future Conditions”?

- A Changes in climate and weather patterns
- B Population and demographic shifts
- C Land use and development
- D Local and regional economic growth
- E All of the above



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Future Conditions: Climate

- Extreme weather
- Rising temperatures
- Wildfires
- Sea level rise
- Drought
- Changing precipitation patterns

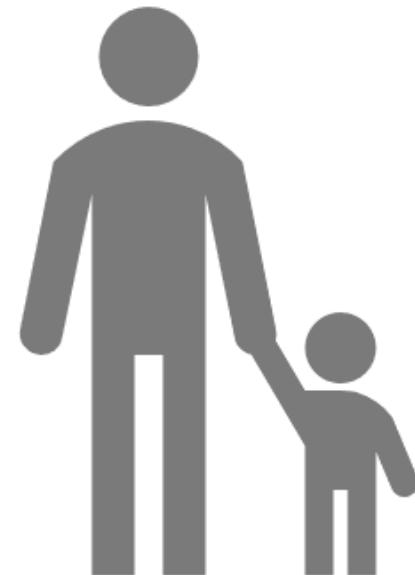


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Future Conditions: People

- Population growth/decrease:
 - Migration and relocation due to changes in climate.
 - Density patterns.
- Underserved populations:
 - Older adults.
 - Children.
 - Communities of color.
 - Those below the poverty line.
- Other identities:
 - Immigration status.
 - First language is not English.

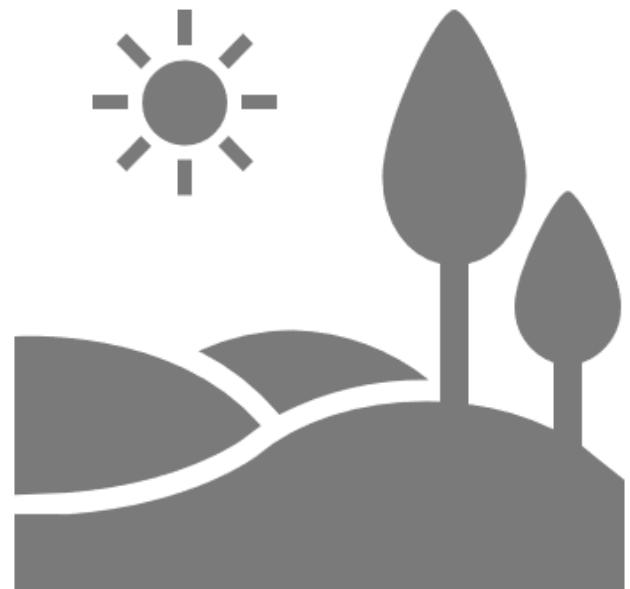


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Future Conditions: Land Use

- Planning documents.
- Regulatory requirements.
- Physical infrastructure/systems.
 - Transportation infrastructure.
 - Health systems infrastructure.
 - Previously implemented mitigation strategies for all hazards (flood mitigation infrastructure, wildfire mitigation infrastructure, etc.).
 - Lifelines.
 - Social support systems.
 - Housing.
 - Others?



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Credit Rating Impacts Due to Climate Change

- Moody's and Standard and Poor's believe climate change will:
 - Increase U.S. exposure and vulnerability to hazards.
 - Create negative economic effects that will vary by region.

The image shows two news snippets. The top snippet is from Moody's Investors Service, dated November 28, 2017, at 4:00 AM EST. It features a blue header with the Moody's logo and the title "Climate Change". Below the title, it says "Moody's Warns Cities to Address Climate Risks or Face Downgrades". The bottom snippet is from S&P Global Ratings, dated October 17, 2017. It has a red header with the S&P Global Ratings logo and the title "RatingsDirect®". Below the title, it says "Credit FAQ: Understanding Climate Change Risk And U.S. Municipal Ratings". Both snippets contain detailed text about the impact of climate change on the U.S. economy and municipal ratings.



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New Data is Available

- 2020 Census
- National Risk Index
- [National Centers for Environmental Information](#)
- [Climate.gov](#)
- [U.S. Climate Resilience Toolkit](#)
- [NOAA State of the Climate](#)
- [The U.S. National Climate Assessment](#)
- [NOAA Climate at a Glance](#)



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Sarah Abdelrahim

Deputy Director, U.S. Global Change Research Program, Office of Science and Technology Policy, Executive Office of the President

Emerging Federal Climate Resilience Landscape

- First-ever National Climate Task Force of 20 federal agencies.
- Federal agency adaptation plans (more than 25 plans released in October 2021).
- New funding/incentives and efforts to address financial risk.
- Interagency collaboration to address current and emerging climate-related hazards and screen future investments for climate-related risks.
- Advancing usable science to inform resilience decisions.
- Addressing disproportionate climate impacts and advancing equity.



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Climate Science in Action

- OSTP and USGCRP coordinate across the federal government to understand:
 - How the climate system works and is changing.
 - What impacts climate change is having.
 - How can we avoid the unmanageable? (mitigation)
 - How can we manage the unavoidable? (adaptation).
- OSTP and USGCRP share this knowledge to inform understanding, policy, and action



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The U.S. Global Change Research Program

- Began as a Presidential Initiative in 1989
- Codified in the GCRA (1990)
- Comprises the science arms of 13 agencies with responsibilities in global change
- FY2021 budget crosscut \$3.27 billion

[A] comprehensive and integrated United States research program which will assist the Nation and the world to understand, assess, predict and respond to human-induced and natural processes of global change”

(P.L. 101-606)

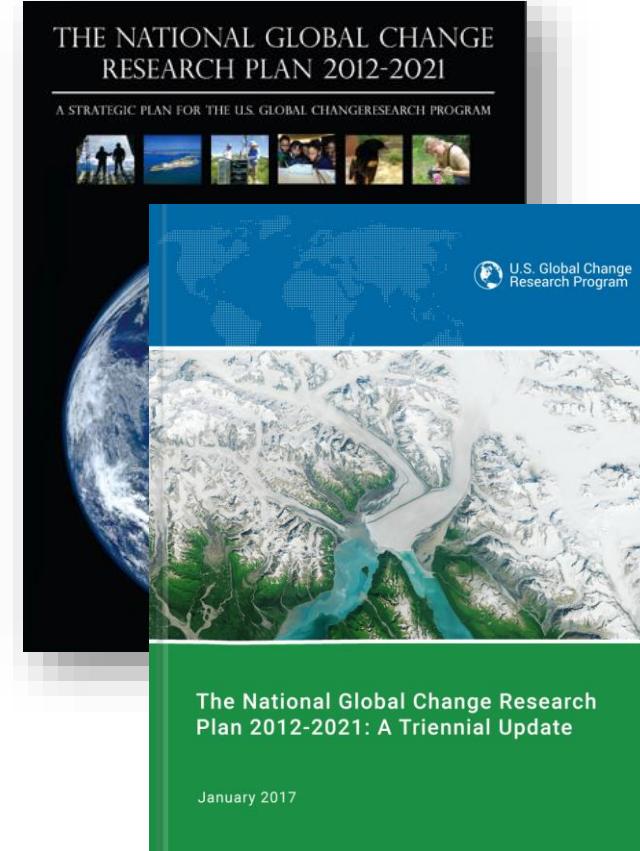


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National Global Change Research Plan

- “[The Program] shall develop a 10-year National Global Change Research Plan for implementation of the Program and revise it every 3 years” (GCRA)
- Transitioning to new plan, which will be released later this year. **Public Comment period expected soon!**
- Draft 2022-2031 Pillars
 - Advancing Science
 - Informing Decisions
 - Engaging the Nation
 - Collaborating Internationally



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Resources for Climate Resilience Planning

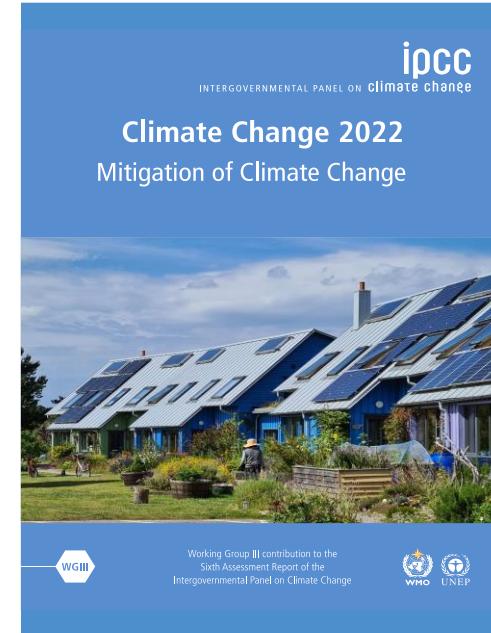
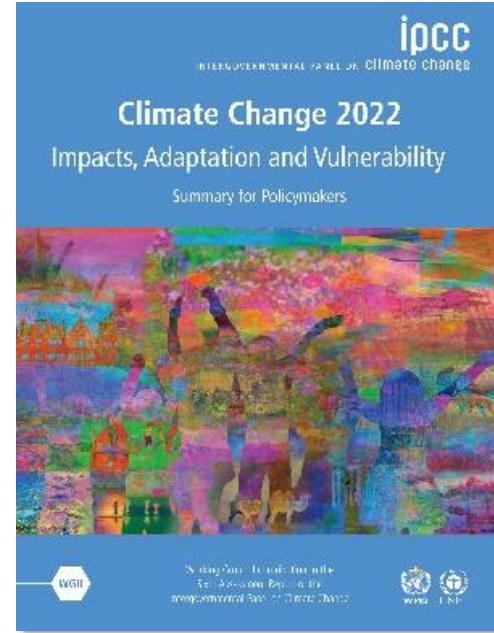
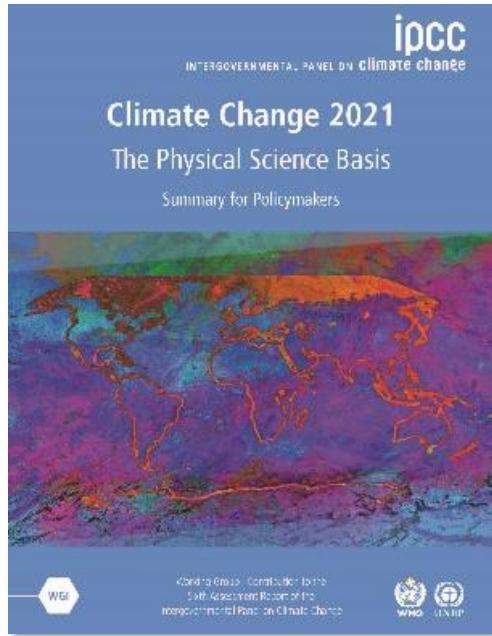
- [Intergovernmental Panel on Climate Change](#)
- [Fourth National Climate Assessment, Vol I](#)
- [Fourth National Climate Assessment, Vol II](#)
- [Climate Resilience Toolkit](#)
- [USGCRP Indicators Platform](#)



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Intergovernmental Panel on Climate Change (IPCC) Seventh Assessment Report

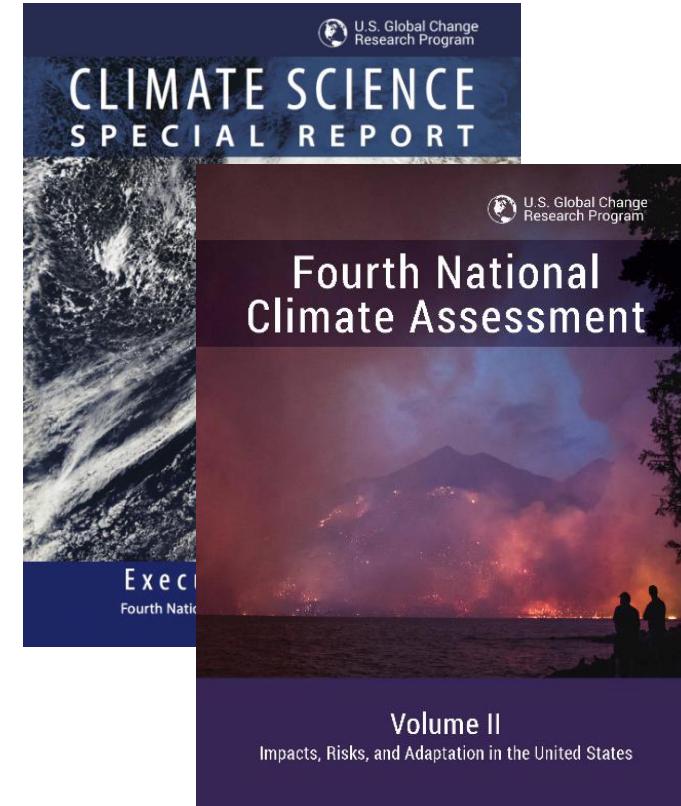


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The National Climate Assessment

- Congress mandates a National Climate Assessment on a quadrennial basis.
- To date, four NCAs have been released, most recent (NCA4) in Nov. 2018.
- NCA5 is under development and will be delivered in 2023.
- A new National Nature Assessment was just announced on Earth Day (to be delivered in 2026)!



NCA4, Vol. I & II



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Climate Resilience Toolkit: Making Climate Information More Accessible



- Summary of Climate Impacts
- Tools
- Case Studies
- Climate Explorer



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Conclusion and Moving Forward

- The federal government is prioritizing new efforts to inform and mobilize resilience action and to do so equitably.
- USGCRP will continue to:
 - Focus on coordinating research to answer societally relevant questions.
 - Prioritize the delivery of climate science and information in ways that are more accessible and useable by the public.
- USGCRP and the federal family offer a lot of resources for resilience planning and decision making.
- YOU can let us know what types of information would be useful. We encourage you to look out for public comment opportunities (e.g., USGCRP's Decadal strategic Plan).



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Polling Question 1

- How does your community currently plan for future conditions?
 - A. We don't
 - B. Climate Action/Adaptation Plan
 - C. Integrated into Comprehensive Plans
 - D. Integrated into HMPs
 - E. I'm not sure
 - F. Other (*please include more information in the chat*)



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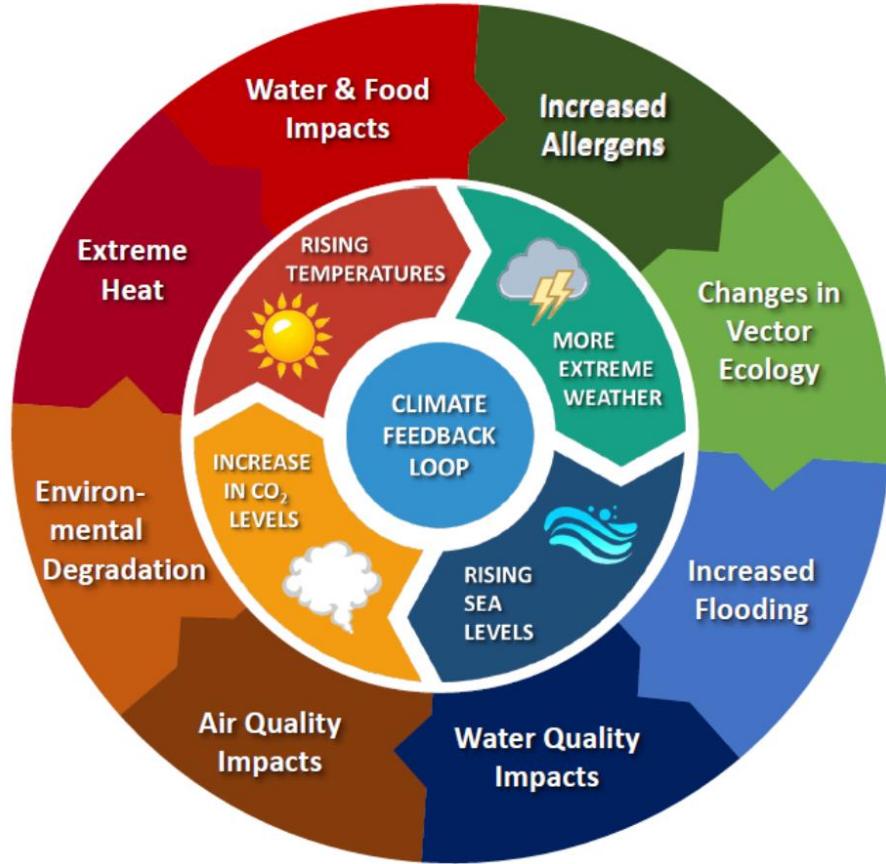




Jon Lesher

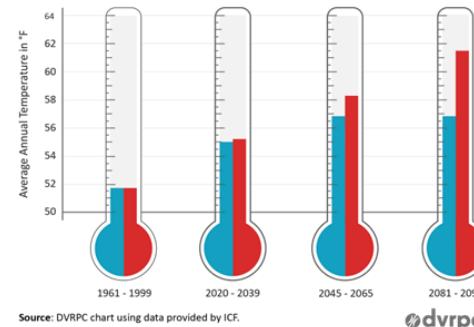
Environmental Planning Assistant Manager, Montgomery County Planning Commission

Climate Change in Pennsylvania

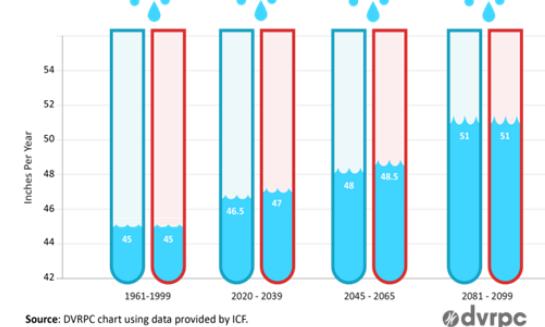


- What is changing? Pennsylvania is getting warmer and wetter.

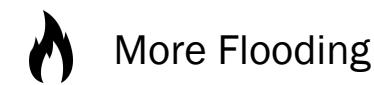
Average Annual Temperature in °F -- Historic and Projected
Montgomery County
Optimistic | Pessimistic



Average Annual Precipitation -- Historic and Projected
Montgomery County
Optimistic | Pessimistic



- Climate change is threatening to cause:



More Flooding



Increased Disease and Pests



More Heat and
Respiratory Deaths



Disruptions to Agricultural
Systems



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How Will Climate Change Affect Montgomery County?

- We aimed to map easy-to-understand climate change factors in a single-interface. We hope to bring attention to geographic areas where impacts are expected to be the greatest and therefore may require target interventions.



Heat Risk
Index



Flood Risk
Index



Indicators of Potential
Disadvantage Index

Exposure

Sensitivity

- What to do with it
 - Raise awareness about climate change issues and contribute to productive conversations.
 - Use the tool to determine the optimal locations for projects and groups to target with climate change resiliency projects.
 - Use the tool's scoring mechanism and the deeper dive to bolster grant applications. Another tool in the grant toolbox that other applicants may not have.
 - Incorporate the findings into Comprehensive Plans and other planning projects.

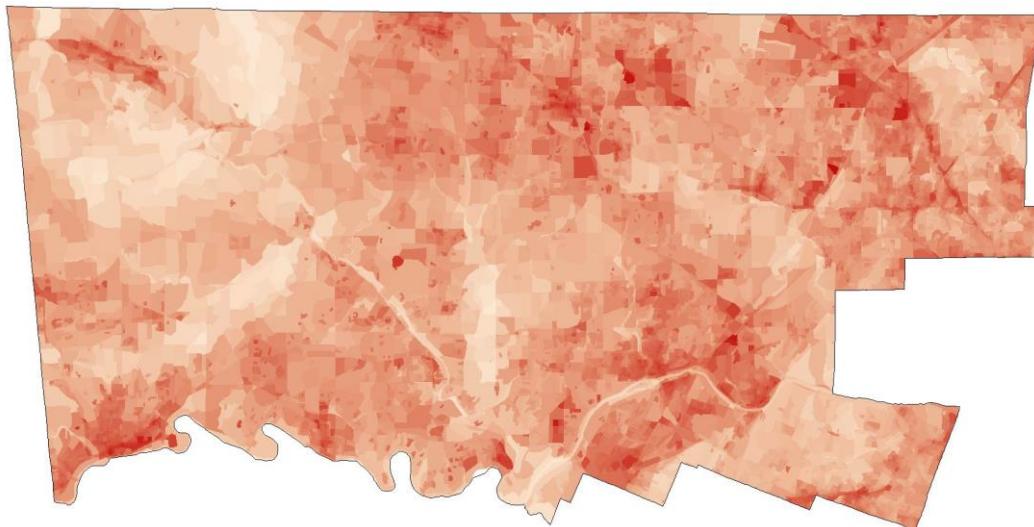


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Heat Risk Index and Highest Heat Risk Areas

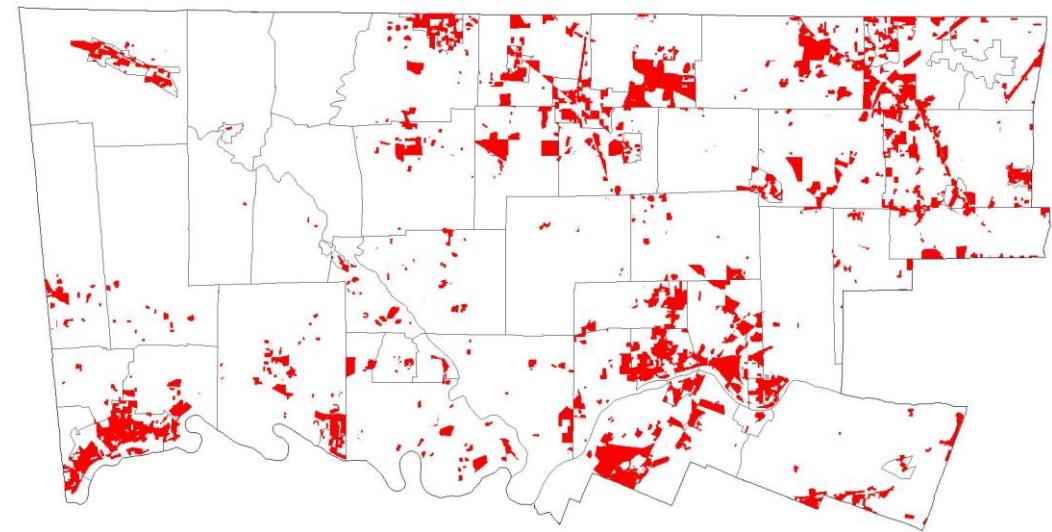
Heat Risk Index



Potential Risk



Highest Heat Risk Areas



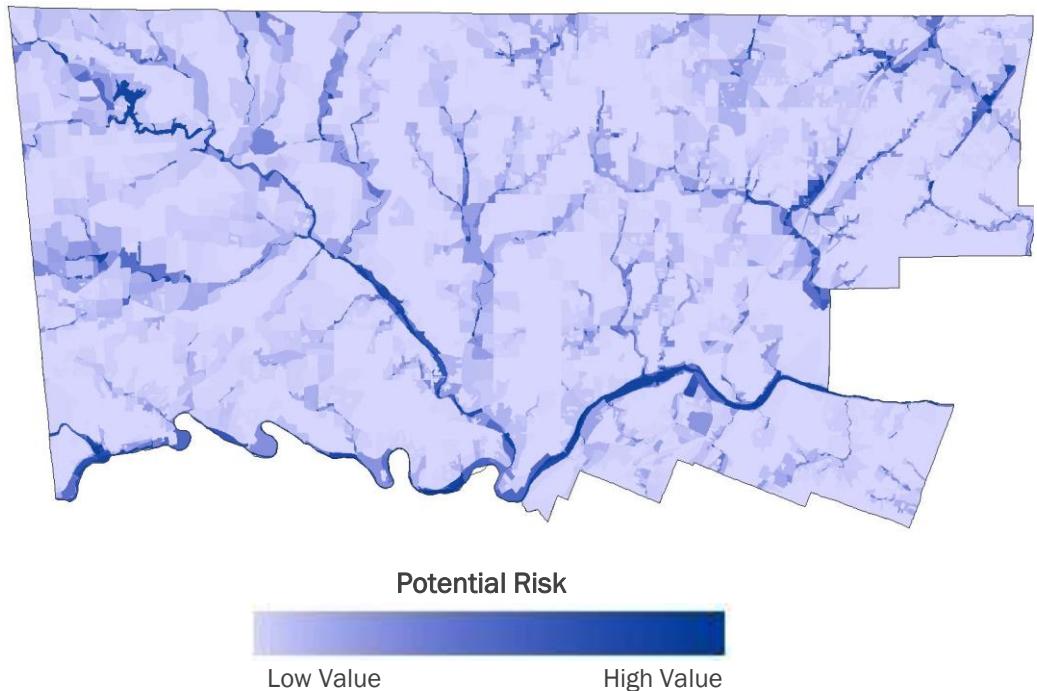
■ Potential Risk Well Above Average
(More Than 1.5 STDs Above The Mean)



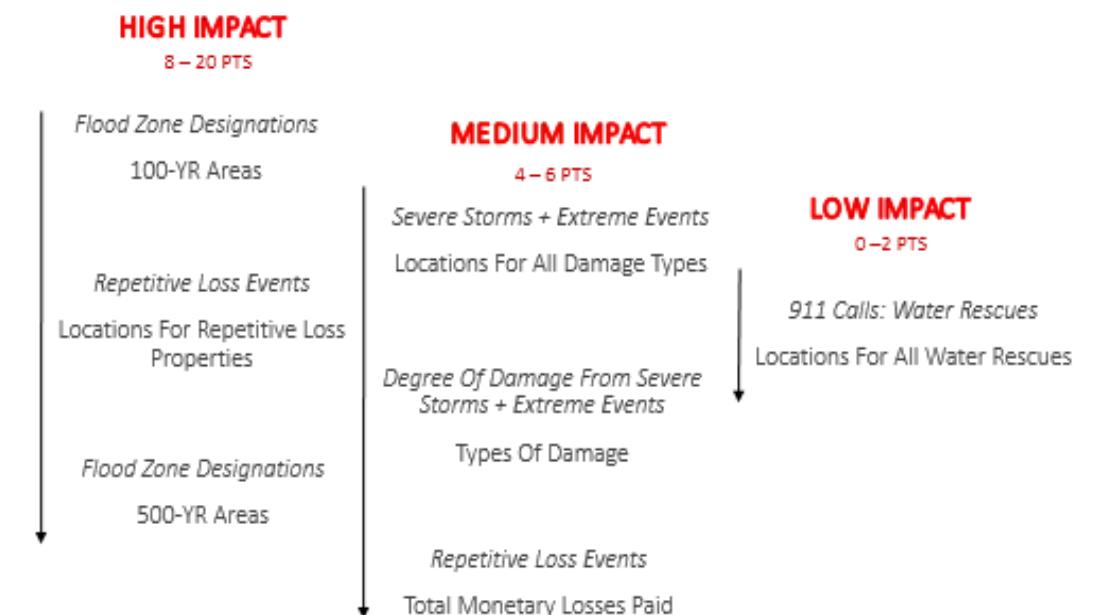
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Flood Risk Data Inputs



All indicators were **weighted subjectively** by the Montgomery County Planning Commission's Environmental Section.



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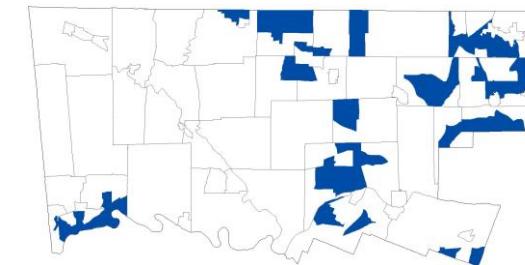
Socio-Economic Risk Index: Delaware Valley Regional Planning Commission's (DVRPC) Indicators of Potential Disadvantage (IPD)

- The IPD analysis identifies populations of interest under Title VI and EJ using U.S. Census American Community Survey (ACS) 2014-2018 five-year estimates data and maps these populations in each of the *Census tracts* in the region via Geographic Information Systems (GIS).
- Each population group is an “indicator” in the analysis and includes the following:
 - Female
 - Youth
 - Older adults
 - Disabled
 - Low-income
 - Ethnic minority
 - Racial minority
 - Foreign born
 - Limited English proficient

Potential Risk



Highest IPD Risk Areas



■ Potential Risk Well Above Average
(More Than 1.5 STDs Above The Mean)

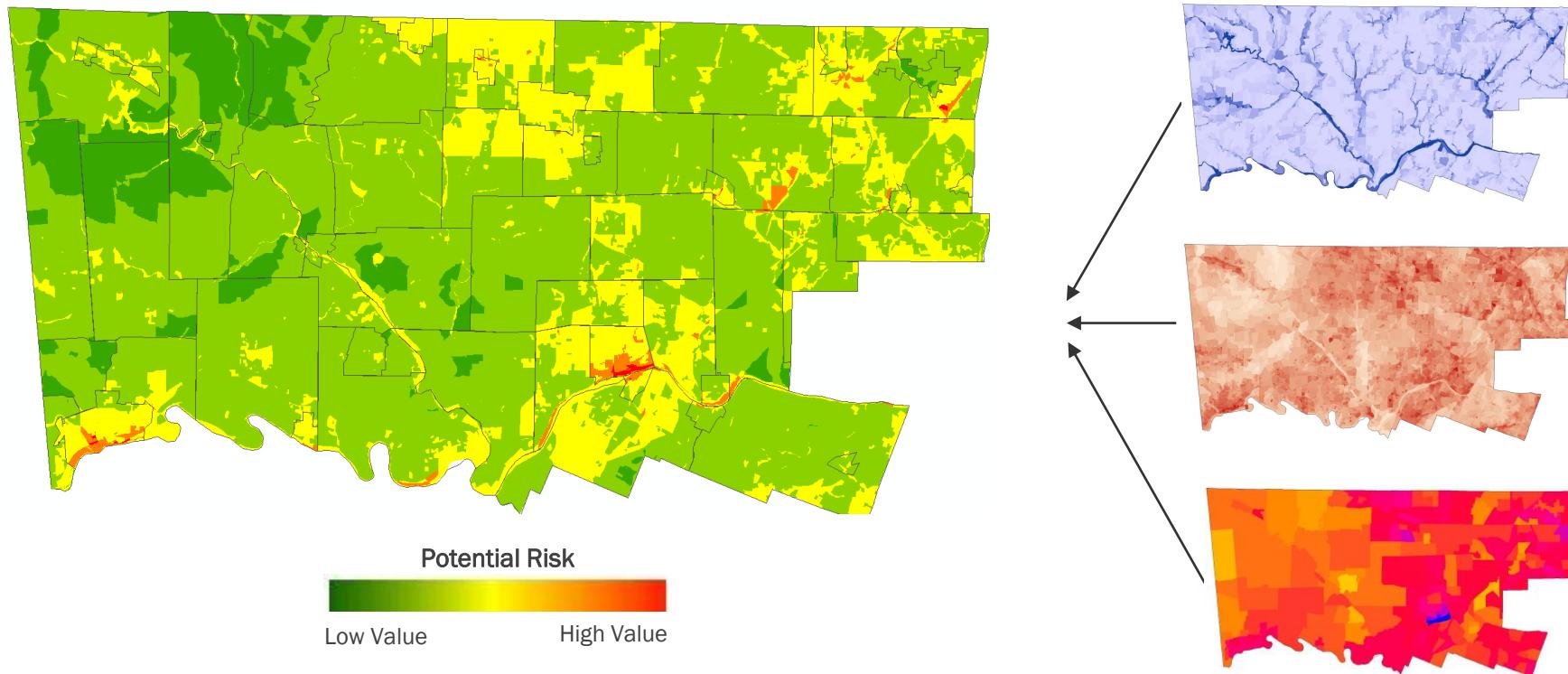


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Climate Change Potential Vulnerability Analysis

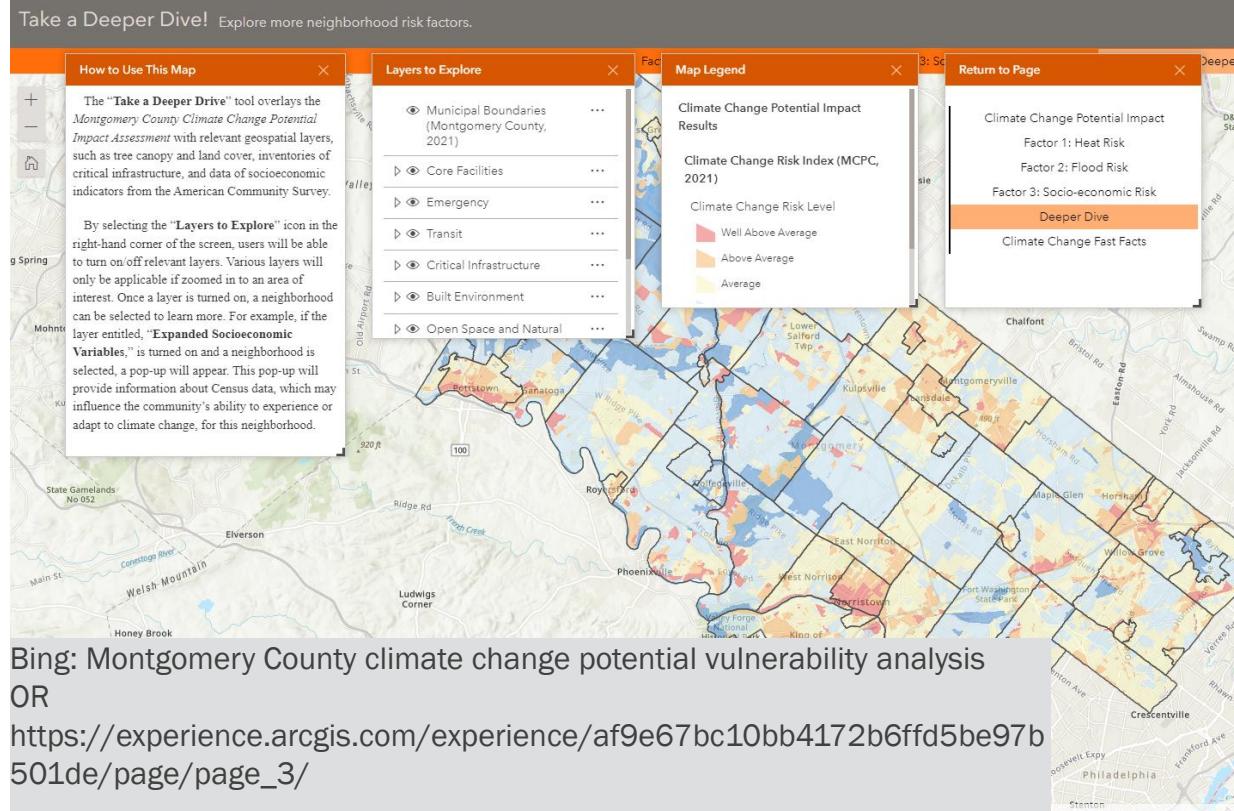
Each Index contributes equally to the final climate change potential impact value.



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Deeper Dive Tool



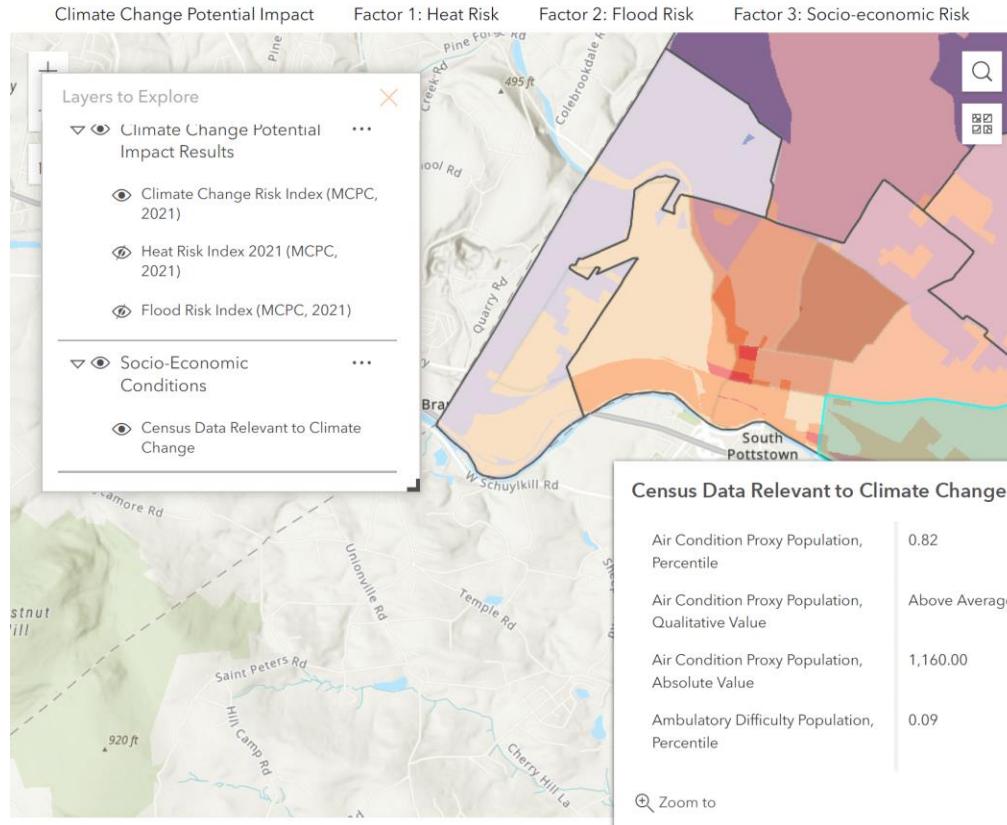
- We added key information to an online GIS Application to enable users to understand people, places and things that are vulnerable and will continue to be vulnerable to climate change.
- Additional information will be categorized under the characterized:
 - Core Facilities
 - Emergency Infrastructure
 - Critical Infrastructure + Transit
 - Built Environment
 - Open Space + Natural Features
 - Socio-Economic Conditions



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Deeper Dive Tool



a Deeper Dive! Explore more neighborhood risk factors.



Bing: Montgomery County climate change potential vulnerability analysis
OR
https://experience.arcgis.com/experience/af9e67bc10bb4172b6ffd5be97b501de/page/page_3/



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Matt Dalton, PE, CFM

Program Manager, Department of Conservation and Recreation

Virginia Coastal Resilience Master Plan

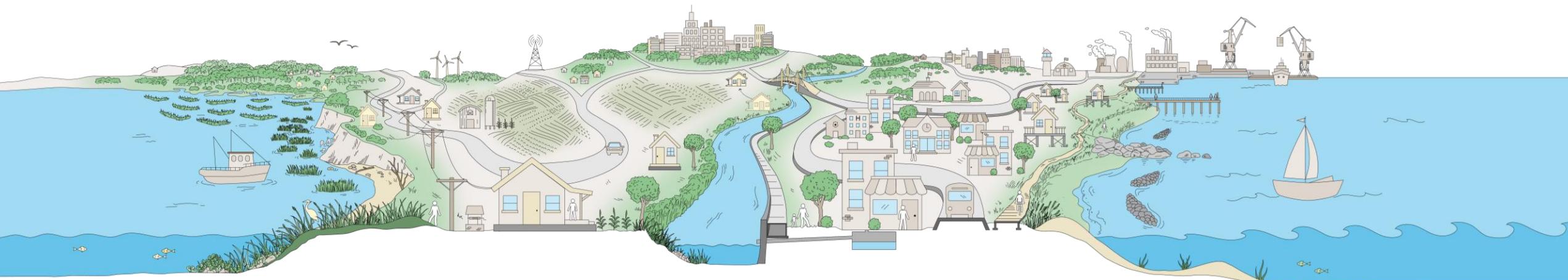
Phase 1

Coastal Flooding

Phase 2

Pluvial Flooding

Fluvial Flooding

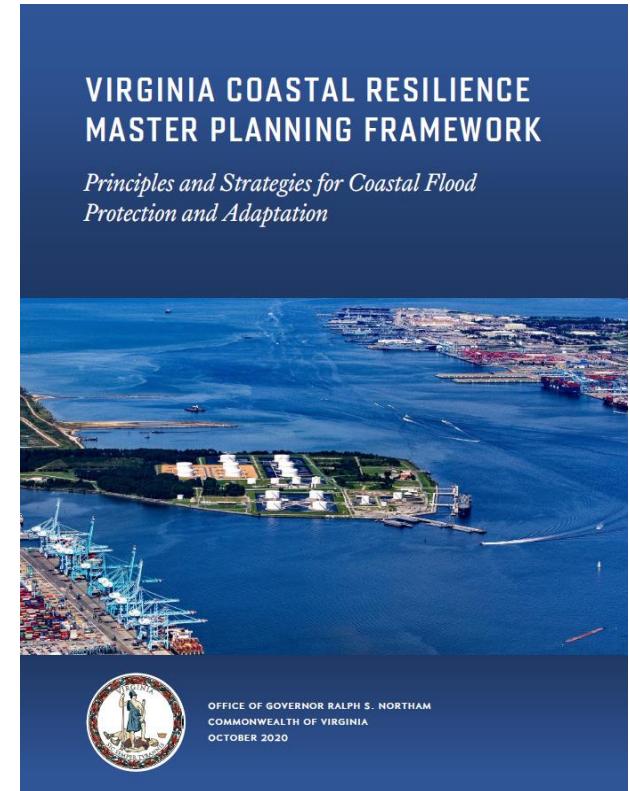


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Virginia Coastal Resilience Master Plan Goals

1. Identify and prioritize projects to increase the resilience of coastal communities, including both built and natural assets at risk due to flooding and sea level rise.
2. Establish a financing strategy, informed by regional differences and equity considerations.
3. Incorporate and promote climate change projections into Commonwealth's programs addressing coastal adaptation and protection.
4. Coordinate state, federal, regional, and local coastal region adaptation and protection efforts.



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Virginia Future Coastal Flood Hazard

- Floodplain Extent
- Water Surface Elevation
With and Without Waves
- Water Depth
With and Without Waves
- Relative Sea Level Rise at:
 - 2020
 - 2040
 - 2060
 - 2080
 - 2100*
- [NOAA 2017 Int-High]
- Water Level:
 - MLW
 - MHW
 - 1.5 x Mean Tide Range
 - 2-yr RI (50% AEP)
 - 5-yr RI (20% AEP)
 - 10-yr RI (10% AEP)
 - 25-yr RI (4% AEP)
 - 50-yr RI (2% AEP)
 - 100-yr RI (1% AEP)
 - 500-yr RI (0.2% AEP)



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Virginia Coastal Resilience Web Explorer

VIRGINIA COASTAL RESILIENCE WEB EXPLORER Ver 1.0

Introduction Hazards Impacts Community Context Projects and Initiatives Full >

Sea level rise increases coastal flood hazards in both extent and frequency. ⓘ

Select Area of Interest:

Commonwealth Virginia

Coastal Flood Time Horizon:

2020 2040 2060 2080

Acres of Land Area Inundated Across Flood Event Type

Year	Mean Low Water	Mean High Water	50% Annual Exceedance Probability (2-Year Storm)	20% Annual Exceedance Probability (5-Year Storm)	10% Annual Exceedance Probability (10-Year Storm)	4% Annual Exceedance Probability (25-Year Storm)	2% Annual Exceedance Probability (50-Year Storm)	Total
2020	150K	100K	50K	20K	10K	5K	2K	443.0K
2040	200K	150K	80K	30K	15K	10K	5K	521.7K
2060	250K	200K	120K	50K	25K	15K	10K	617.4K
2080	300K	250K	180K	80K	40K	25K	15K	723.7K

Map showing coastal flood hazard areas in Virginia, specifically Gloucester Point, York, and Poquoson. A callout box provides exposure details for each year:

- 2020 Exposure: 0.2% Annual Exceedance Probability (500-Year Flood)
- 2040 Exposure: 1% Annual Exceedance Probability (100-Year Flood)
- 2060 Exposure: 4% Annual Exceedance Probability (25-Year Flood)
- 2080 Exposure: 50% Annual Exceedance Probability (2-Year Flood)

Coastal Flood Event Type: INUNDATION_GRADUATION_2080

- Mean Low Water
- Mean High Water
- 50% Annual Exceedance Probability (2-Year Storm)
- 20% Annual Exceedance Probability (5-Year Storm)
- 10% Annual Exceedance Probability (10-Year Storm)
- 4% Annual Exceedance Probability (25-Year Storm)
- 2% Annual Exceedance Probability (50-Year Storm)

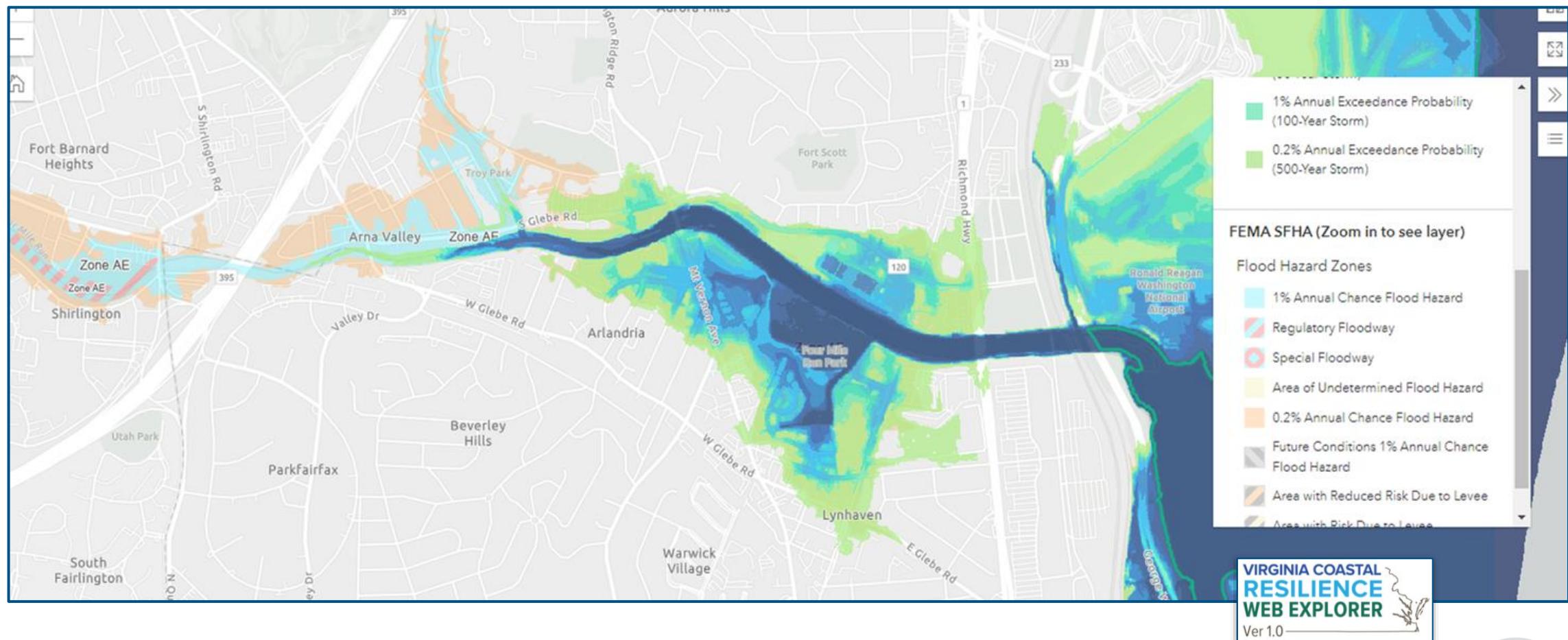
VIRGINIA COASTAL RESILIENCE WEB EXPLORER Ver 1.0



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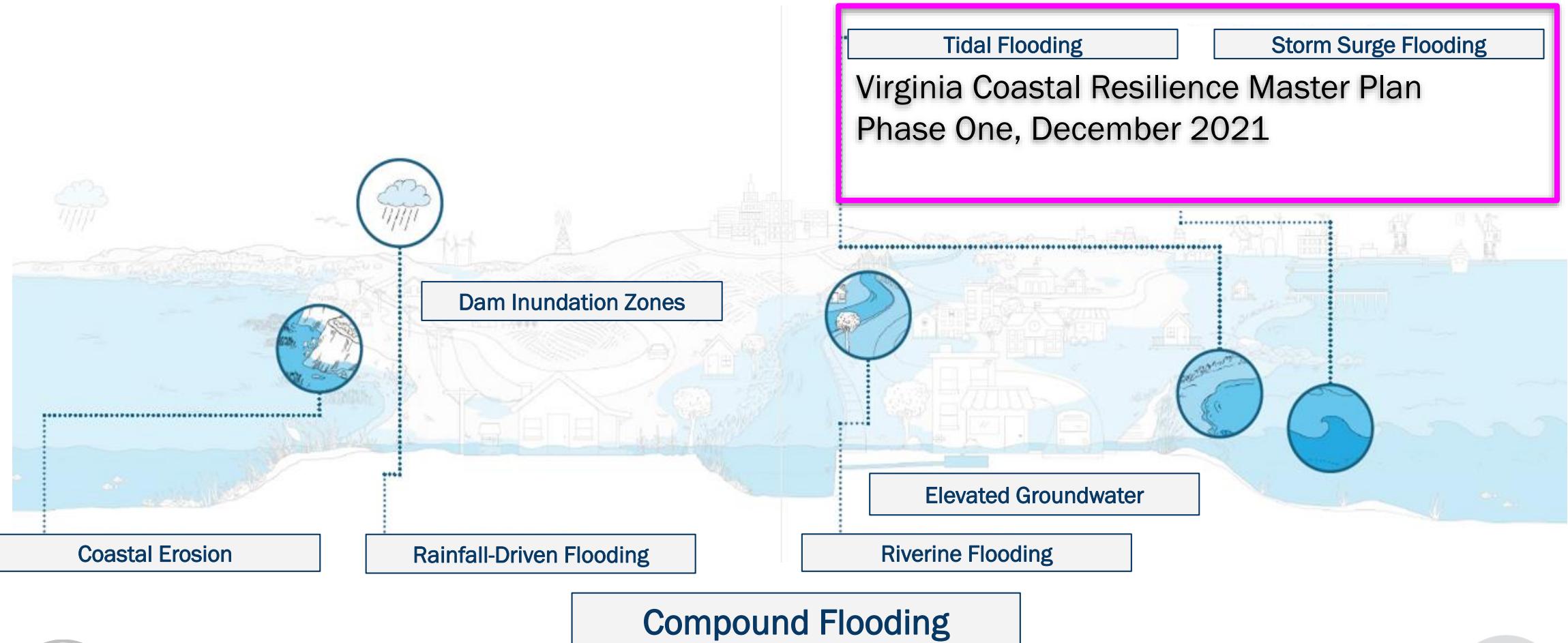
Coastal Flood Hazard ≠ Total Flood Hazard



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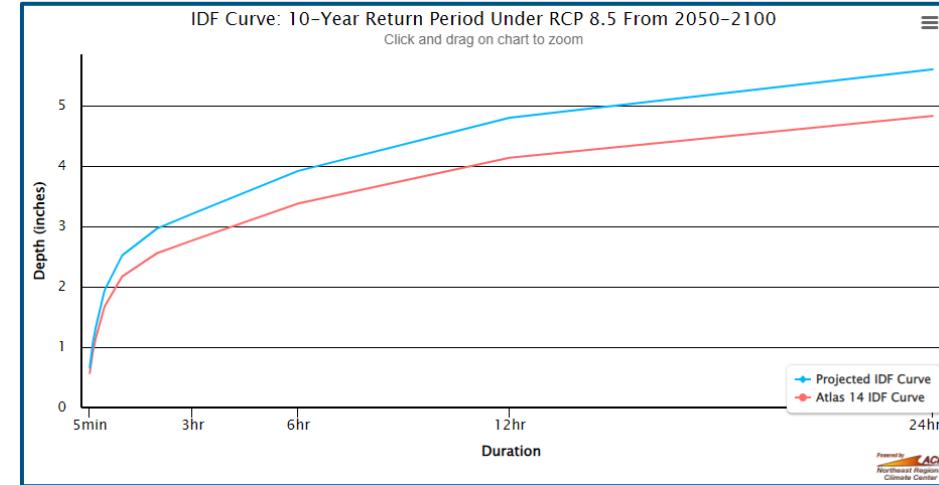
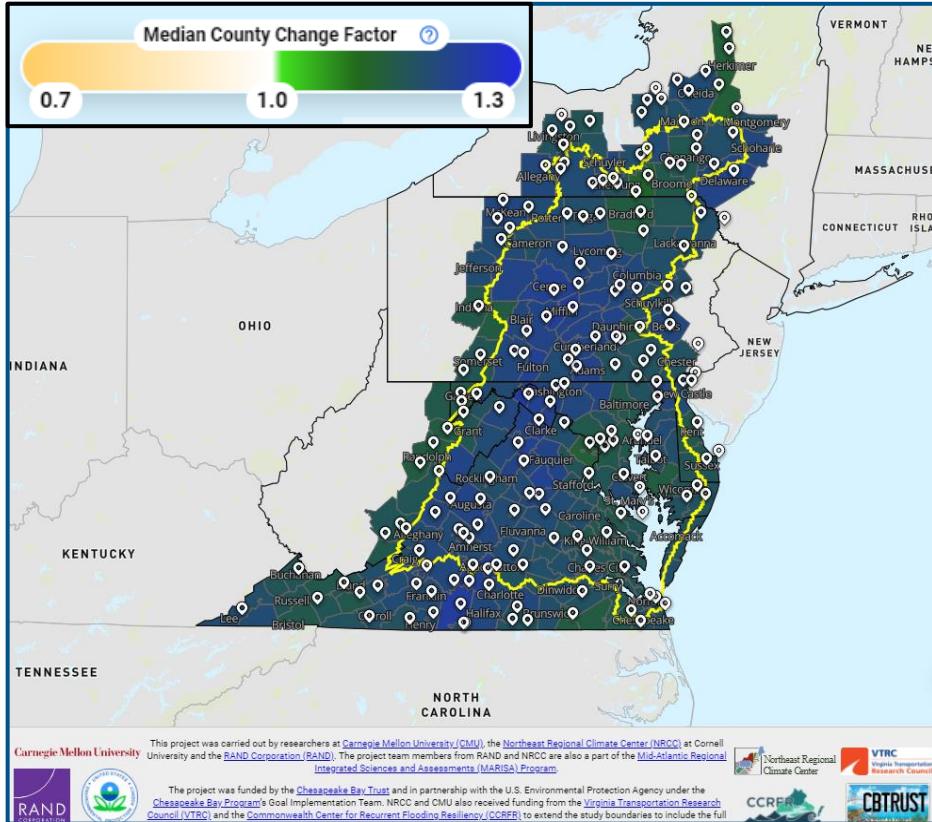
What is Next in Virginia



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Pluvial Flooding



Atlas 14 Change Factors for Prince William County:

10th Percentile:	1.03
25th Percentile:	1.09
Median:	1.16
75th Percentile:	1.23
90th Percentile:	1.30

Atlas 14 Change Factors for Roanoke County:

10th Percentile:	1.06
25th Percentile:	1.15
Median:	1.26
75th Percentile:	1.37
90th Percentile:	1.46



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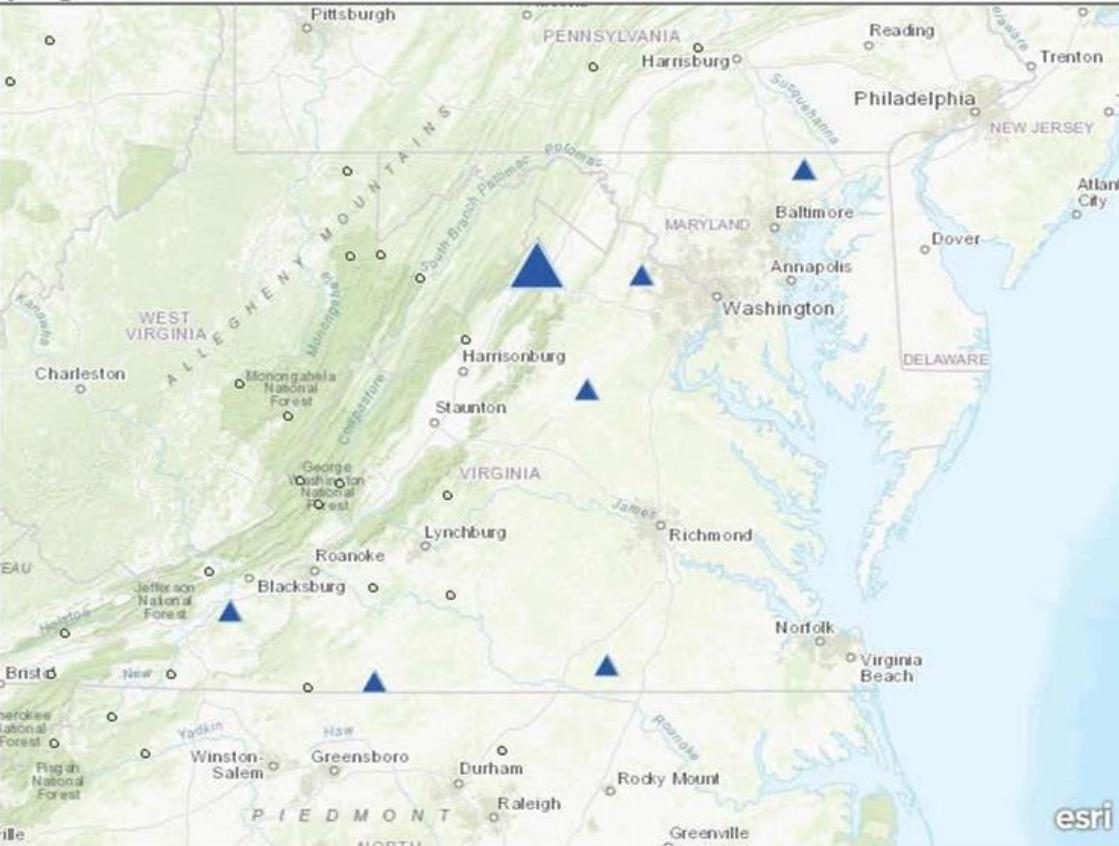
Fluvial Flooding

Streamflow - Three Day High Flow

Streamflow - Three-Day High Streamflows in the United States, 1940–2018

Percent

- ▲ More than 50% increase
- ▲ 20% to 50% increase
- 20% decrease to 20% increase
- ▼ 20% to 50% decrease
- ▼ More than 50% decrease



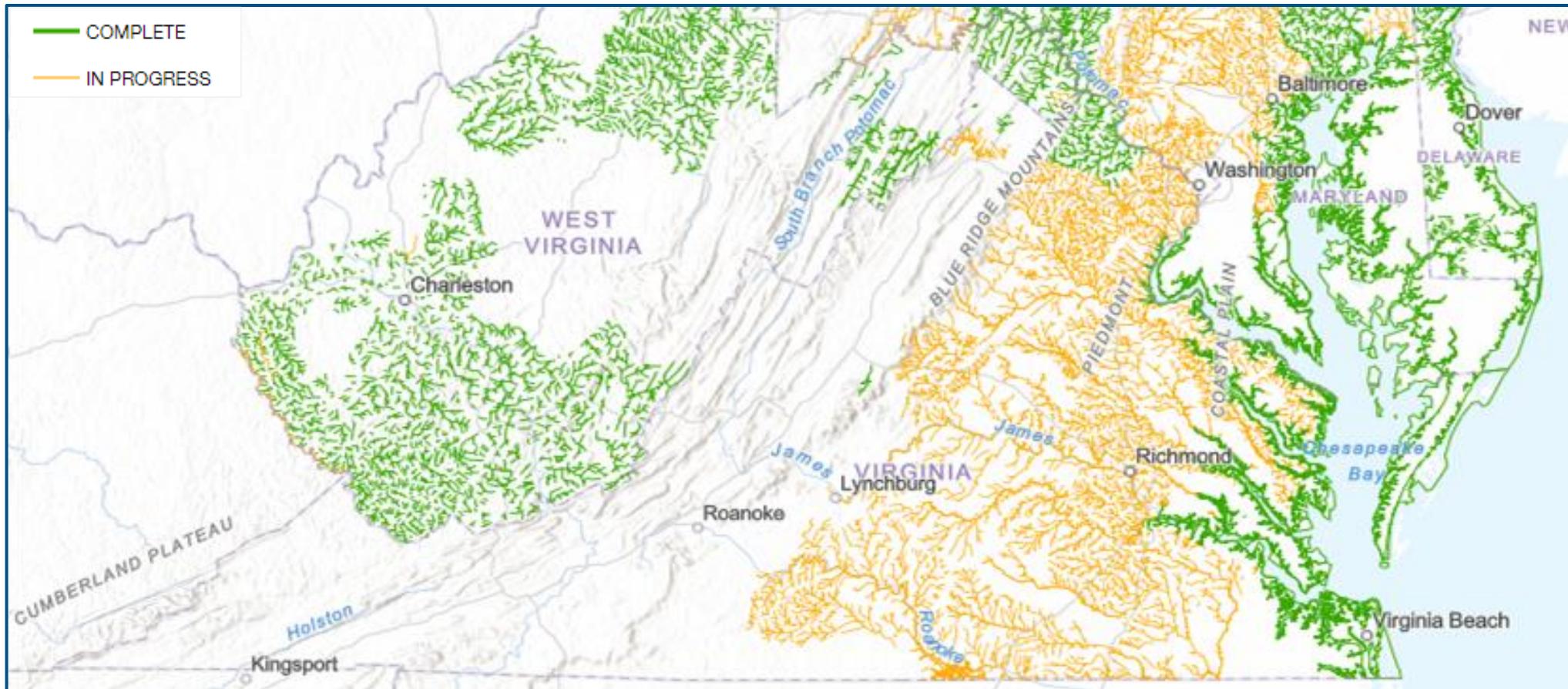
This map shows percentage changes in the maximum annual streamflow for rivers and streams across the country, based on the long-term rate of change from 1940 to 2018.



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Fluvial Flooding



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Polling Question 2

- Do you feel more prepared to make an informed decision about planning for future conditions?
 - A. Yes, I feel very informed
 - B. Yes, I feel more informed
 - C. About the same
 - D. No, I'm still confused
 - E. I don't know
 - F. Other (*please include more information in the chat*)



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Steps For Addressing Future Conditions in Your Risk Assessment

BUILD RESILIENCE WITH YOUR HAZARD MITIGATION PLAN

Hazard mitigation planning identifies long-term policies and actions to reduce damage and losses. Use your plan's risk assessment and mitigation strategy to build resilience. Address the impacts of future conditions through your planning process.

Steps for Addressing Future Conditions in Your Risk Assessment

- **Describe hazards:** How could future conditions affect each natural hazard profiled in your plan? Describe the location, intensity, and duration of those effects. The detail will depend on the data and resources available. If you have local information, you can make more precise projections. If not, make qualitative projections based on national or regional information.
- **Identify community resources:** Use the projected hazards to see which resources may be at risk in the future. Do this for each natural hazard. Resources can include neighborhoods, business corridors, historic districts, and natural systems.
- **Analyze risks:** Think about resources that may be at risk. Describe the possible impacts of each future hazard. How serious could your community's loss be, both right after the disaster and in the longer term? Also consider impacts on all sectors, including housing, infrastructure, emergency management, land use and development, health and social services, and natural and cultural resources.
- **Summarize vulnerability:** Use the risk analysis to list your main vulnerabilities. Share the list with elected officials and decision-makers. Create a mitigation strategy with this information.



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Planning Goals and Strategies

Tips for Addressing Future Conditions in your Mitigation Strategy

The four basic types of mitigation actions are described below. Understanding future disaster risk can strengthen each type of action.



Structure & Infrastructure Projects

These actions protect structures and infrastructure by changing them or removing them from danger. Use the projected hazards for your community to prioritize projects that keep structures safe as risks evolve.



Outreach & Education Programs

These actions inform and educate the community. They increase people's awareness of hazards and of ways to mitigate risk. By including future conditions, you can help your community invest in choices that protect lives and property for a longer time.



Local Plans and Regulations

These actions include policies or codes that influence the way land is developed and structures are built. With knowledge of future risks, you can change your plans, policies, and building and development codes. That will reduce the community's vulnerability.



Natural Systems Protection

These actions minimize damage and losses. They can also save or restore the benefits of natural systems. Identify the people and places that may be vulnerable to future disasters. Use those to set priorities. Conserve natural systems that will be at risk or that protect areas of future risk.



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Best Practices You Should Consider

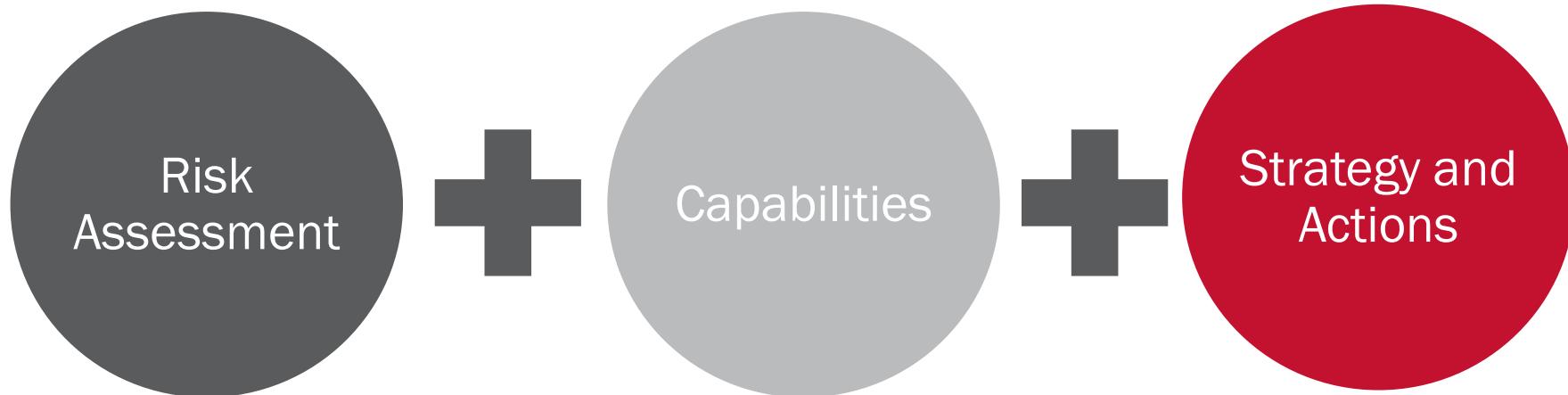
- Show AND Tell; use tables and maps, but also provide analysis.
- Plan integration is key: future conditions planning should also be a part of other plans.
- It's OK to admit what you don't know; plan to collect additional data.
- Bring in additional resources; universities/colleges, local NWS, state climatologist, extension services, conservation districts.
- Don't wait for your 5-year Hazard Mitigation Plan update; start collecting additional data now, expand your stakeholders/planning team, discuss at your annual plan review.



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Future Conditions Across the HMP



Future Conditions are relevant to all sections of the HMP!



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Communicating the Importance of Future Conditions to Others

- Our attention and understanding are greatly influenced by the way information is framed. Make the risk relevant by:
 - Using local examples, landmarks, images and stories.
 - Communicate the consequences in ways that match your audiences' values, needs and beliefs.
 - Give the audience "ownership" to reduce risks with concrete next steps.



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Resources

- Virginia Coastal Resilience Master Plan
 - Home Page: <https://www.dcr.virginia.gov/crmp/>
 - Coastal Resilience Web Explorer: <https://www.dcr.virginia.gov/crmp/ResilienceExplorer>
 - Open Data Portal: <https://crmp-vdcr.hub.arcgis.com/>
 - Web Map Server: <https://vacrmp.dewberryanalytics.com/arcgis/rest/services>
 - Flood Resilience Listserv Signup: <https://www.dcr.virginia.gov/signup>
- Additional Resources
 - Mid-Atlantic IDF Curve Tool: <https://midatlantic-idf.rcc-acis.org/>
 - EPA Climate Change Indicators: <https://www.epa.gov/climate-indicators/climate-change-indicators-streamflow>
 - FEMA Region 3 Mitigation Mapping (Mit Maps):
<https://fema.maps.arcgis.com/apps/MapSeries/index.html?appid=f3bb86e451d74093a0bd46e4501aa9f1>



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Additional Resources

- [Climate Change on FEMA.gov](#)
- [Planning for Future Conditions Job Aid](#)
- [National Climate Assessment](#)
- [National Centers for Environmental Information](#)
- [U.S. Climate Resilience Toolkit](#)
 - [Find Climate Experts in Your State](#)
- [Equitable Adaptation Legal & Policy Toolkit »](#)
[Introduction - Georgetown Climate Center](#)
- [Climate Change Potential Vulnerability Analysis](#)
- [Managing the Retreat from Rising Seas: Lessons and Tools from 17 Case Studies | Adaptation Clearinghouse](#)
- [Climate Change and Displacement in U.S. Communities.pdf \(cakex.org\)](#)
- [Climate Change and Displacement in the U.S.](#)
- [Climate Change in Coastal Communities | Climate Ready Estuaries | U.S. EPA](#)
- [Digital Coast Tools \(noaa.gov\)](#)
 - [Training \(noaa.gov\)](#)



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Looking Forward to Future Coffee Break Webinars

JAN. 19, 2022

Identifying and
Prioritizing At-Risk
Community Assets

**MARCH 30,
2022**

Funding Your
Hazard
Mitigation
Actions

MAY 18, 2022

Future
Conditions and
Hazard
Mitigation
Planning

JULY 20, 2022

Establishing
Meaningful
Outreach
Strategies

**SEPT. 21,
2022**

Addressing
Equity through
Hazard
Mitigation
Planning

NOV. 16, 2022

Utilizing
University
Partnerships in
Hazard
Mitigation
Planning

Please stay tuned for upcoming FEMA Region 3 Coffee Break webinars!

<https://femaregion3coffeebreaks.eventbrite.com>

Sign up for the Region 3 Resilience Report Newsletter and Coffee Break announcements!

<http://bit.ly/FEMA-Region-III>

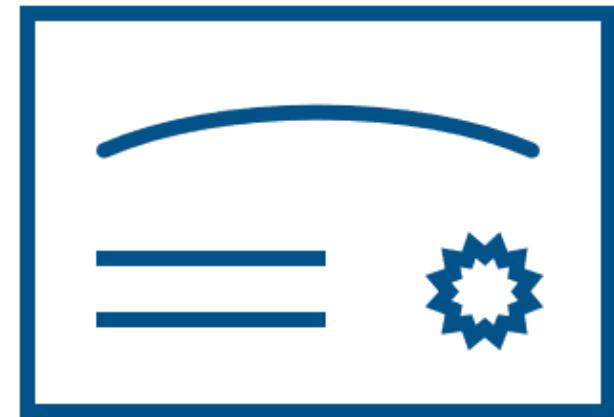


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You May be Eligible for Professional Credits

- Participation certificates will be sent to all participants who attended the whole session and responded to polling questions.
- One Association of State Floodplain Managers ([ASFPM](#)) Certified Floodplain Manager Continuing Education Credit.
- One American Institute of Certified Planners ([AICP](#)) Certification Maintenance.
 - Credit course number: [#9247964](#)



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Thank you for participating today!

**To request technical assistance, please add the following
in the chat:**

- Your name
- Community
- Email address



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