

You have arrived at:

Becoming Climate Resilient: ARC-X and Regional Success Stories

Welcome!

We will get started
soon.

Friendly Reminders Before We Get Started

Please **mute yourself** and **turn off your webcam** during presentations.

If you encounter technical difficulties during the meeting, you can:

- ✓ Put a request for help in the chat
- ✓ Call in to the meeting at +1 646 828 7666;
Meeting ID: 161 938 5372
- ✓ Email SWARNER@scgcorp.com

This session is being recorded and will be made available after the summit.




Becoming Climate Resilient: ARC-X and Regional Success Stories

EPA Mid-Atlantic Region 2022 Summit

“Working Together to Build a Better, More Equitable Region”

May 25, 2022



EPA's Climate Change Adaptation Resource Center (ARC-X): Responding to the Needs of Local Communities

**Presentation to
EPA Region 3 Stakeholder Summit**

**Joel D. Scheraga, Ph.D.
Senior Advisor for Climate Adaptation
Office of the Administrator / Office of Policy**

May 25, 2022

EPA's Goal in Support of Local Communities

Empower *all 40,000 communities* across the nation to anticipate, prepare for, and adapt to the impacts of climate change.

Central Element of EPA's Efforts: Building Adaptive Capacity

EPA is mainstreaming climate adaptation planning by:

- Building and strengthening the “adaptive capacity” of its staff and its partners in the states, tribes, territories, local communities and businesses, with a particular focus on advancing environmental justice.
- Supporting their efforts to integrate climate adaptation into the work they do by:
 - ✓ **Training**: increasing awareness of ways climate change may affect their ability to implement effective programs
 - ✓ **Tools and Technical Support**: providing data, information, tools and technical support
 - ✓ **Financial incentives**: supporting climate-resilient investments in communities across the country

Some Communities are Already Acting: Massachusetts Water Resources Authority

- Redesigned and upgraded the Deer Island Wastewater Treatment Plant in Boston Harbor (1989-1998)
- \$3.8 billion investment!
- Anticipated impacts of climate change and sea level rise over lifetime of the facility (2050)
- Raised key portions of the facility by 1.9 feet in anticipation of future increases in sea level



Many Communities Are Still Struggling to Adapt

- Particularly challenging for middle- to smaller-sized communities
- The challenges:
 - ✓ Often lack technical expertise and experience with adaptation
 - ✓ Also limited resources to devote to adaptation
 - ✓ Overwhelmed by huge volume of information about climate adaptation, much of which is irrelevant to their community
 - ✓ Challenging to integrate available information into a single package that will provide them with a complete recipe for how to evaluate and prepare for the risks posed by climate change

“We don’t need any more stinkin’ tools. What we need is the technical assistance to understand which tools are the right ones for us to use given the issues of concern to us, and the technical assistance to understand how to use the tools.”



**EPA's Climate Adaptation Resource Center (ARC-X)
Meets These Challenges.**

Unlike any other resource currently available to the public.

www.epa.gov/arc-x

Goal

The ARC-X is designed to help local government officials in *all 40,000 communities* across the nation anticipate, prepare for, and adapt to the impacts of climate change.

What makes the ARC-X unique?

The ARC-X is unique in its ability to deliver an integrated package of information tailored specifically to the user's needs.

EPA's Adaptation Resource Center (ARC-X): Responding to the needs of local communities

- Using the ARC-X, decision makers can obtain an integrated package of information *tailored specifically to their needs*.
- Once the user identifies the region of the country in which their community is located and their areas of interest, they will find information about:
 - ✓ the risks posed by climate change to the issues they care about;
 - ✓ adaptation strategies they might consider implementing (**non-prescriptive**);
 - ✓ case studies illustrating how other communities have successfully adapted to those risks;
 - ✓ tools to replicate the successes of other communities (**the relevant tools & technical support!**)
- **Already being used every year by over 40,000 users in all 50 states.**



A Quick Look Inside the ARC-X

Climate Change Adaptation
Resource Center (ARC-X)
Home

Tailor Your Climate
Adaptation Search

Implications of Climate
Change

Adaptation Planning

Adaptation Strategies

Case Studies

Tools

Training

Federal Funding &
Technical Assistance

Library

Underlying Science

EPA Contacts & State
Websites

Climate Adaptation and Sea Level Rise

EPA supports the development and maintenance of water utility infrastructure across the country.

Included in this effort is helping the nation's water utilities anticipate, plan for, and adapt to risks from flooding, sea level rise, and storm surge.



Climate change is causing sea levels to rise more rapidly across the country. The risk of sea level rise to coastal water utility infrastructure varies based upon the rate of sea level rise relative to land elevation in a particular location. Where relative sea level rise occurs, it amplifies near-term vulnerability to storm surge and increases long-term flood and inundation risk.

Rising sea levels amplify the threat and magnitude of storm surges in coastal areas. Water infrastructure, often located along the coast or tidally-influenced water bodies, can be vulnerable to greater changes in storm surge intensity. The threat of flooding and damage to water infrastructure will continue to increase over time as sea levels rise and the magnitude of storms increase.

Sea level rise is already worsening water levels during high tide; posing challenges to near term management of water infrastructure. Higher water levels during tides can reverse or reduce efficiency of stormwater drainage and wastewater outfall operations. Some coastal communities are already investing in one way stormwater valves to address more frequent and intense flooding during high tides.

Sea level-rise can also threaten the long term operation of drinking water, wastewater and stormwater utilities. Drinking water and wastewater utilities typically remain in operation for several decades. Some facilities can be at risk of increased inundation or reduced operational capacity over the intended operating life of the facility due to sea level rise.

Rising sea levels can also introduce new, or exacerbate existing, saltwater intrusion into freshwater resources. Both groundwater and surface water sources are at risk. This will pose challenges for drinking water treatment facilities and water resource managers.

Explore More About Adaptation and Sea Level Rise

- [Adaptation Strategies](#)
- [Case Studies](#)
- [Tools](#)
- [Library](#)
- [Underlying Science](#)

Related Information

- [Storms](#)
- [Saltwater Intrusion](#)

Tailor Your Climate Adaptation Search

Results of Your Search:

Climate Change in Your Region

The Northeast is projected to experience increased precipitation, more frequent and intense storms, and higher average temperatures. These projected changes pose challenges to communities as they protect water and waste infrastructure, maintain water quality, and protect air quality and public health. Many communities are building resilience to the risks they face under current climatic conditions.

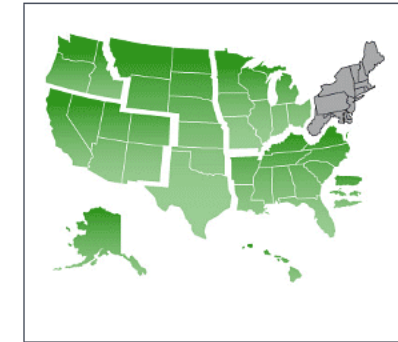
Use the links below for additional information about:

- [Climate Impacts on the Northeast](#)
- [What Climate Change Means for Your State](#)
- [How Communities in the Northeast are Adapting](#)

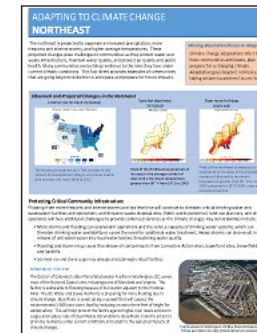
Results Tailored to Your Interests

Implications of Climate Change – See how climate change affects the areas of interest you identified	+
Adaptation Strategies – View strategies for adapting to climate change	+
Case Studies – Learn from communities that have dealt with similar challenges, and how to replicate their actions	+
Tools – Discover relevant EPA tools to help you adapt	+
Training – Available on-line training	+
Funding Opportunities – Find information on EPA and other federal funding opportunities	+
EPA Contacts & State Websites – Locate EPA Regional staff for additional support, and links to state adaptation websites	+

Search Again



How Communities in the Northeast are Adapting



Search Again

Tailor Your Climate Adaptation Search

Geographic Region

Pick one region:



Area of Interest

Pick one or more interests:

Air Quality

- Indoor Air
- Outdoor Air
- Ground Level Ozone
- Particulate Matter

Water Management

- Water Utility Facility Operations
- Drought
- Saltwater Intrusion
- Sea-level Rise
- Storms & Flooding
- Source Water Impacts
- Water Quality
- Stormwater Runoff
- Erosion & Sedimentation
- Algal Blooms
- Ecosystem Protection
- Wetland Protection
- Estuaries
- Change in Fish Species

Waste Management & Emergency Response

- Contaminated Site Management
- Disaster Debris Management

Public Health

- Air Quality
- Water Quality
- Extreme Heat

Adaptation Planning

- Getting Started
- Comprehensive
- Sector-Based

Select both a Region and an Area of Interest to search.

[Submit Search](#)

[Clear All](#)

Adaptation Actions for Water Utilities

The adaptation strategies provided below are intended to inform and assist communities in identifying potential alternatives. They are illustrative and are presented to help communities consider possible ways to address anticipated current and future climate threats to contaminated site management.

Related Information

[Climate Impacts on Water Utilities](#)

On this page:

- [Adaptation Actions](#)
- [Source Documents](#)
- [Disclaimer](#)



= Case Study available

Adaptation Actions

Construct New Infrastructure	Increase System Efficiency	Model Climate Risk	Modify Land Use	Modify Water Demand	Monitor Operational Capabilities	Plan for Climate Change	Repair and Retrofit Facilities
------------------------------	----------------------------	--------------------	-----------------	---------------------	----------------------------------	-------------------------	--------------------------------

Construct New Infrastructure

Build flood barriers to protect infrastructure	+
Build infrastructure needed for aquifer storage and recovery	+
Diversify options for water supply and expand current sources	+
Increase water storage capacity	+
Install low-head dam for saltwater wedge and freshwater pool separation	+
Plan and establish alternative or on-site power supply	+
Relocate facilities to higher elevations	+

[↑ Top of Page](#)



Source Documents

These strategies are adapted from existing EPA, CDC and other federal resources. Please view these strategies in the context provided by the primary source document:

- [Adaptation Strategies Guide for Water Utilities](#)

Climate Change Adaptation Resource Center (ARC-X) Home

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Boston Raises Wastewater Facility to Avoid Inundation

In the late 1980's, Boston's Deer Island Wastewater Treatment Plant needed an upgrade. The Massachusetts Water Resources Authority (MWRA) determined facility vulnerability to sea level rise and decided to raise key portions of the plant by 1.9 feet. The redesign and construction covered a ten year period (1989-1998) and was part of a \$3.8 billion upgrade to add secondary treatment and consolidate regional treatment capacity by increasing Deer Island capacity from 250 to 350 million gallons per day. MWRA's decision to raise portions of the plant avoided extensive costs associated with building a seawall and covered the projected vulnerability over the planned life of the facility (through 2050). MWRA considers the vulnerability of its facilities on an on-going basis using current information to assess the effectiveness of its climate adaptation actions. The Deer Island adaptation action has been re-evaluated for effectiveness within the city's Comprehensive Adaptation Plan ("Climate Ready Boston", 2013). This review used a community non-profit's sea level rise study and concluded that MWRA's decision to raise Deer Island is likely to be sufficient to avoid inundation of the facility over the next century.



A view of Boston's Deer Island Wastewater Treatment Plant's redesigned facility

- "[Climate Ready Boston \(PDF\)](#)", 2013 (29 pp, 7.17 MB, [About PDF](#)) [EXIT](#)

"Quick Start Guide" to Replicate this Success

Key Steps to Replicate

Relevant Tools

How Did They Do It?	Applicable EPA Tools
<p>MWRA identified facility vulnerability</p> <ul style="list-style-type: none"> MWRA assessed its Deer Island wastewater facility's vulnerability to sea-level rise in accordance with the best available science at the time. 	<p>The Climate Resilience Evaluation and Awareness Tool (CREAT) helps understand expected utility facility vulnerabilities from a changing climate.</p>
<p>MWRA adapted to future conditions</p> <ul style="list-style-type: none"> When confronted with needing to modernize the Deer Island facility, MWRA took the opportunity to redesign it keeping vulnerability over its projected operating life in mind (i.e., raising key portions by 1.9 feet). 	<p>EPA's Climate Ready Water Utilities Adaptation Strategies Guide, assists utilities identify potential facility adaptation strategies based upon expected climate vulnerabilities.</p>
<p>As science improves, MWRA re-evaluates risk and vulnerabilities to ensure effective adaptation</p> <ul style="list-style-type: none"> In recent years, MWRA analyzed its entire system's projected vulnerabilities to storm surge (using a proxy measurement equivalent to Superstorm Sandy), the 100 and 500 year storm events and low and high sea level rise scenarios. The analysis identified the facilities most at risk due to anticipated sea level rise. Deer Island, due to the adaptation measures already adopted, was among the least vulnerable facilities. MWRA also continues to monitor best available science to determine performance, including of the Boston Harbour Association's sea level rise analysis (used within Climate Ready Boston: Municipal Vulnerability Report). This report further supports previous analyses that suggest Deer Island is among the least vulnerable facilities. Climate Ready Boston: Municipal Vulnerability Report (PDF) (29 pp, 7.17 MB) EXIT 	<p>The EPA Coastal Inundation Toolkit can assist utilities in better understanding facility vulnerability by illustrating a range of potential sea level rise and storm surge scenarios.</p>

Climate Change Adaptation Resource Center (ARC-X)

Climate Change Adaptation Training

Learn how our climate is changing, and how to adapt.



- 1 2 3 4

Information Tailored to Your Needs



EPA's **Adaptation Resource Center (ARC-X)** is an interactive resource to help local governments effectively deliver services to their communities even as the climate changes. Decision makers can create an integrated package of information *tailored specifically to their needs*. Once users select areas of interest, they will find information about: the risks posed by climate change to the issues of concern; relevant adaptation strategies; case studies illustrating how other communities have successfully adapted to those risks and tools to replicate their successes; and EPA funding opportunities.

How to Use ARC-X



- [Navigation Tips](#)

Connect with Us

- [Sign up to receive news and updates by email](#)
- [Share your feedback about this site with us](#)

Tailor Your Search



[Tailor Your Search](#) – Select your region and area of interest (air, water, waste, public health, adaptation planning) to build your integrated package of information tailored specifically to your needs.

Explore the Center



- Learn about a specific topic:
- [Climate Change Implications](#)
 - [Adaptation Strategies](#)
 - [Case Studies](#)
 - [EPA Tools](#)
 - [Online Training](#)
 - [Federal Funding](#)
 - [Library](#)
 - [EPA Contacts and State Websites](#)



Related Topics: [Climate Ready Water Utilities \(CRWU\)](#)

[Contact Us](#) [Share](#)

Build Climate Resilience at Your Utility



The Climate Resilience Evaluation and Awareness Tool (CREAT) is a climate risk assessment and planning application for water, wastewater and stormwater utilities.

CREAT helps water utilities understand and adapt to climate change.

- Discover: Find out which extreme weather events pose significant challenges to your utility and build scenarios to identify potential impacts.
- Assess: Identify your critical assets and the actions you can take to protect them from the consequences of climate change on utility operations.
- Share: Generate reports describing the costs and benefits of your risk reduction strategies for decision-makers and stakeholders.

To access the methodology guide for CREAT, [click here](#).

Existing Users: Login

New Users: Register Here



Sign up for CRWU News

See Your Climate Projection

Check out EPA's Climate Scenario Project Map to explore potential climate impacts at your location.



Tools for Water Related Climate Change Adaptation

EPA staff have developed water tools to help communities anticipate, plan for, and adapt to the changing climate.

- The most relevant tools based on your search are provided below.
- To sort tool "Names" alphabetically, click on the arrow icon next to "Name". To sort by "Keyword" click on the arrow icon next to "Area of Interest/Keyword".
- Use the Search Box to explore the Tools section more generally.

Related Information

[More tools for Climate Change Adaptation](#)

You will need Adobe Reader to view some of the files on this page. See [EPA's About PDF page](#) to learn more.

- All Water
- Water Utility
- Water Quality Management
- Ecosystem Protection

Water Utility

All Water Utility	+
Drought	+
Saltwater Intrusion	+
Sea-Level Rise	-

Name	Brief Description	Available Training	Contact EPA	Example
RAINE, Resilience and Adaptation in New England	RAINE is a database that catalogs activities in more than 100 New England jurisdictions addressing climate change impacts. The database provides information at the state, local, or regional level. It includes information such as web links, reports, plans, tools, specific practices, funding sources, and partnerships.	<ul style="list-style-type: none"> • Learn about RAINE 	RL_Raine@epa.gov <small>(RL_Raine@epa.gov)</small>	
Scenario-Based Projected Changes Map	This mapping tool provides easy to access scenarios of projected changes from EPA's Climate Resilience Evaluation and Awareness Tool for annual total precipitation, annual average temperature, precipitation intensity for the 100-year storm, number of days per year with temperatures above 100 F, and sea-level rise for coastal locations.		CRWUhelp@epa.gov <small>(CRWUhelp@epa.gov)</small>	
Storm Surge Inundation and Hurricane Strike Frequency Map	This mapping tool illustrates current worst-case coastal storm surge or inundation scenarios and hurricane strike frequency derived from Sea, Lake, and Overland Surge from Hurricanes (SLOSH) models by the National Oceanic and Atmospheric Administration (NOAA), 100 and 500 year flood plains from the Federal Emergency Management Agency (FEMA), and hurricane strike dataset from the National Hurricane Center (NHC).	<ul style="list-style-type: none"> • For a guide on the projections underlying this tool please read about the Two Coastal Flood Inundation Maps (PDF) (5 pp, 611 K) 	CRWUhelp@epa.gov <small>(CRWUhelp@epa.gov)</small>	
CREAT, Climate Resilience Evaluation and Awareness Tool	A software tool to assist drinking water and wastewater utility owners and operators in understanding potential climate change threats and in assessing the related risks at their individual utilities.	<ul style="list-style-type: none"> • CREAT Video EXIT • Webinars (MP4) • Adaptation Strategies Guide 	CRWUhelp@epa.gov <small>(CRWUhelp@epa.gov)</small>	
ICLUS, Integrated Climate and Land Use Scenarios	The ICLUS project is developing scenarios broadly consistent with global-scale, peer-reviewed storylines of population growth and economic development, which are used by climate change modelers to develop projections of future climate.	User Manual and data sets	Britta.Bierwagen@epa.gov <small>(Bierwagen.Britta@epa.gov)</small> Phil.Morefield@epa.gov <small>(Morefield.Philip@epa.gov)</small>	Land-Use Scenarios: National-Scale Housing-Density Scenarios Consistent with Climate Change Storylines
Sustainable Communities Indicator Catalog	The Sustainable Community Indicator Catalog helps communities identify indicators that can measure progress toward their sustainability objectives. The indicators focus on the relationships among land use, housing, transportation, human health and the environment. (Interagency Partnership between EPA, HUD and DOT)		Smart.Growth@epa.gov <small>(smartgrowth@epa.gov)</small>	Bridgeport, CT: "Aiming to be New England's Greenest City" (PDF) (2 pp, 679 K)

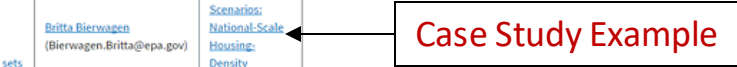
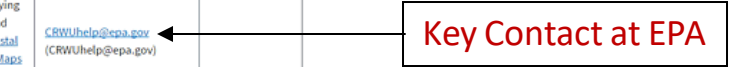
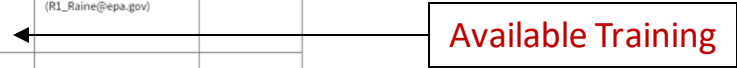
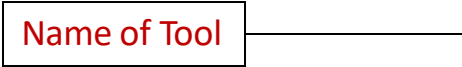
Name of Tool

Description of Tool

Available Training

Key Contact at EPA

Case Study Example



Local Government Climate Adaptation Training

About this Training

- This training was developed with the assistance of EPA's Local Government Advisory Committee.
- The video portions of the training have captioning for those who are hearing impaired.
- Completing the training will take about 30 minutes.
- Handout: [Community-Based Adaptation To A Changing Climate](#)
- Questions about this training? Email: [Climate Adaptation](mailto:climateadaptation@epa.gov) (climateadaptation@epa.gov)

Menu

Climate Change Adaptation Introductory Training For Local Governments

1. Introduction

- 1.1. Climate Change Adaptation Introductory Training for Local Governments
- 1.2. Training Welcome
- 1.3. Navigating This Module
- 1.4. Thinking About Climate
- 1.5. Training Sections

2. Climate Change Basics

- 2.1. Section 2. Climate Change Basics
- 2.2. Climate Change Language
- 2.3. Rising Temperatures
- 2.4. Changing Precipitation Patterns
- 2.5. Increased Drought and Wildfires
- 2.6. Sea Level Rise
- 2.7. Increased Intensity of Hurricanes
- 2.8. Reduced Permafrost

3. Vulnerabilities of Local Communities

- 3.1. Section 3. Vulnerabilities of Local Communities
- 3.2. Identifying Risks and Vulnerabilities

Search...

Climate Change Adaptation Introductory Training For Local Governments



Search...

Speaker icon, Play/Pause icon, Progress bar, Refresh icon

State-Level Versions

- ARC-X is a national system (to share information across all 40,000 communities in all 50 states)
- Unable to do “deep dive” into any one state
- Fostering development of state-level versions by “host universities”
 - ✓ **Provide code and content *free of charge***
 - ✓ **Provide technical support**
- Encouraging host universities to:
 - ✓ Form partnerships with, and leverage expertise of, other universities in the state
 - ✓ Ensure engagement of HBCUs and other minority-serving institutions (MSIs)
- Examples of systems being developed:
 - ✓ Indiana (**Launched in September 2018**)
 - ✓ New York & Puerto Rico
 - ✓ Virginia
 - ✓ Louisiana

Contact Information

Dr. Joel D. Scheraga
Phone: 202-564-3385
Email: Scheraga.Joel@epa.gov

METROPOLITAN WASHINGTON CLIMATE RESILIENCE

Maia Davis
Metropolitan Washington Council of Governments (COG)
Department of Environmental Programs

US Environmental Protection Agency
Mid-Atlantic Region Summit

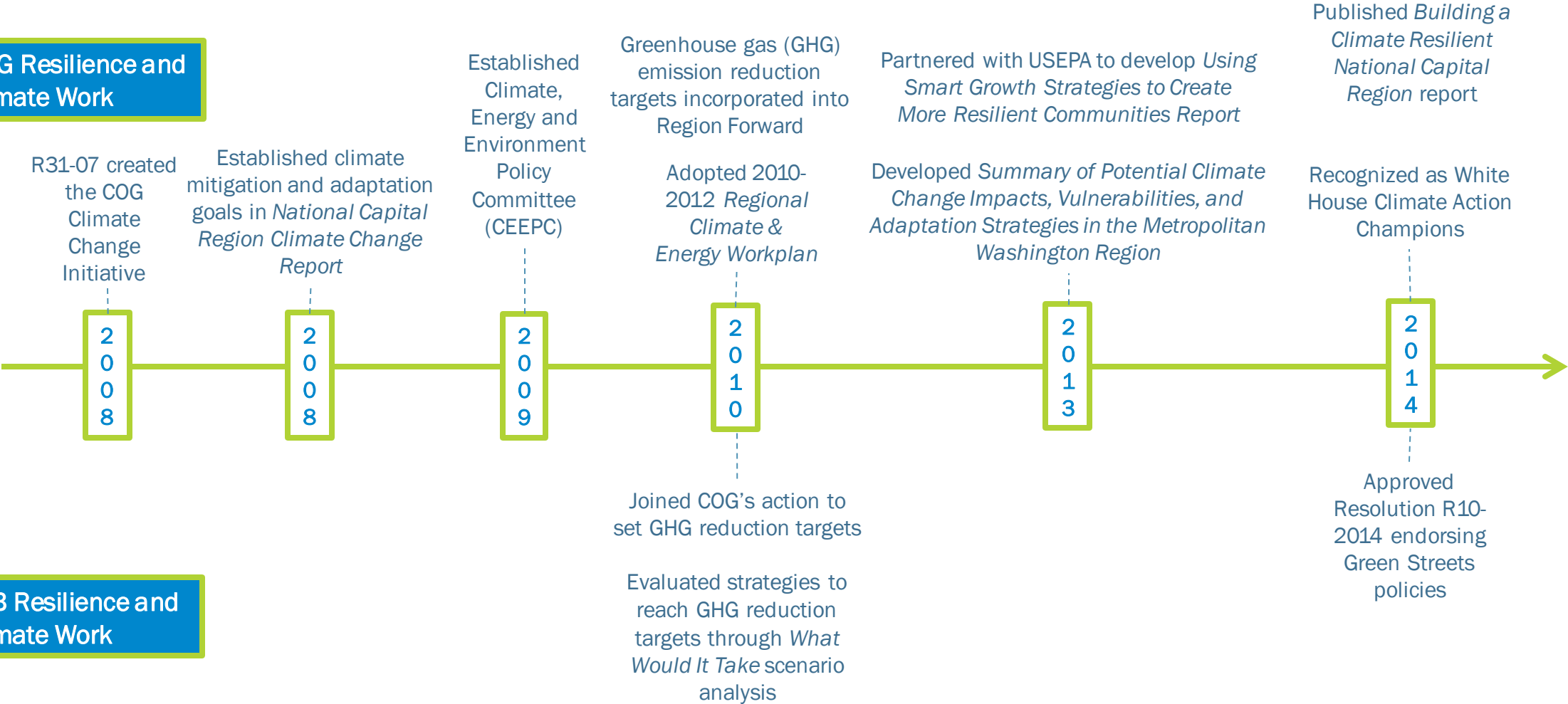
May 25, 2022

Climate Collaborative Guiding Principles

Principle	Description
1. Collective Action	We will continue to work together to leverage our impact and facilitate application at scale.
2. Effective Partnerships	We will continue to share best practices, learn together, and coordinate on implementation to advance regional transformation.
3. Lead by Example	We have a continued commitment to internal implementation of long-term solutions to reduce the climate impacts of our operations.
4. Integration	We understand climate action is inherently multidisciplinary and will promote cross-department coordination, including in areas such as equity, health, and economic development.
5. Flexibility	We understand the need for flexibility in how our public agencies and stakeholders across the DC, MD, and VA work to achieve regional GHG goals.
6. Transparency	We will continue to measure and report progress in a manner easily understandable by all.
7. Innovation	We support a just transition to a clean energy economy through the application of innovative technology, policies, and processes by public and private sectors.
8. Community Leadership	We will continue to educate, motivate, and empower action from our community's institutions, businesses, non-profits, and residents.
9. Inclusive Engagement	We commit to inclusive community engagement and equitable provision of climate and energy programs and services.
10. Advocacy	We will continue to support state and federal policies and programs that protect the human and environment health of our communities.

Regional Resilience in Metropolitan Washington

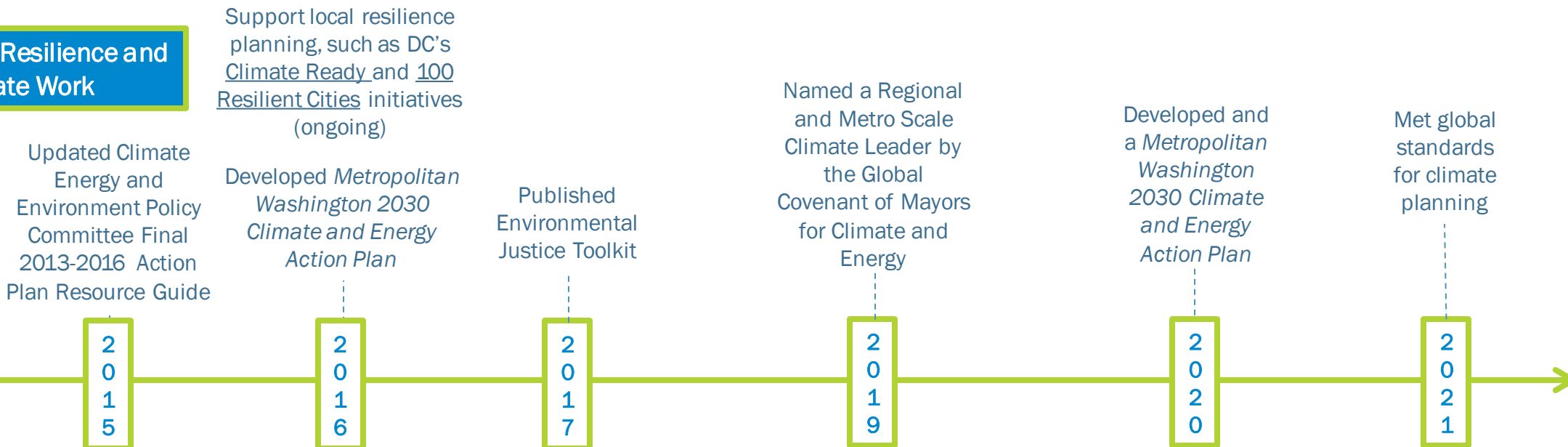
COG Resilience and Climate Work



TPB Resilience and Climate Work

Regional Resilience in Metropolitan Washington (continued)

COG Resilience and Climate Work



TPB Resilience and Climate Work



Climate Resilience Goals

In October 2020, per CEEPC's recommendation, the COG Board adopted (and TPB affirmed) the climate resilience goal of becoming a Climate Ready Region and making significant progress towards becoming a Climate Resilient Region by 2030.

Climate Ready Region:

To be Climate Ready by 2030, all local governments must assess current and future climate risks, and be actively integrating climate planning across government plans, operations, and communications.

Climate Resilient Region:

To fully be a Climate Resilient Region, the region must have the ability to adapt and absorb against disturbances caused by current and future, acute and chronic climate impacts and successfully maintain essential functions.

Local Climate Planning/Project Support Examples

- *Coordinated Policy Guidance*
- *Climate Risk and Vulnerability Assessment Tool*
- *Data and Tools to Support Equity*
- *Local and Sub-Regional Climate Planning Support*
- *Coastal Storm Risk Management Study*
- *Military Installation Resilience Review*
- *Energy Emergency Preparedness Exercises*
- *Clean Energy Feasibility Assessments*
- *Diesel Emission Reduction Act Program Repowers*
- *Technical Trainings and Capacity Building*
- *DMV Climate Partners*



Maryland Coastal Adaptation Report Card

Dr. Katie May Laumann

University of Maryland Center for
Environmental Science

Integration and Application Network



Why develop a coastal adaptation report card?



Why develop a coastal adaptation report card?



Report card process: assessing coastal adaptation



Indicators to measure adaptation progress



Socioeconomic

- Business disruption
- Loss coverage
- Preserved farmland
- Repetitive loss properties



Ecosystem

- Wetlands
- Forest
- Shoreline erosion
- Dredged materials use



Planning

- Nuisance flood plan
- Green infrastructure
- Flood mapping



Flooding

- Critical facilities
- Community rating system
- Floodplain population
- Freeboard height

Indicator Scoring



- Target or threshold condition identified
 - Science
 - Expert consultation
 - Legislative goals
- Current condition compared to threshold
- Scored on a scale of 0-100% and A-F grading scale





F 0–20%
misses adaptation goals

D 21–40%

C 41–60%

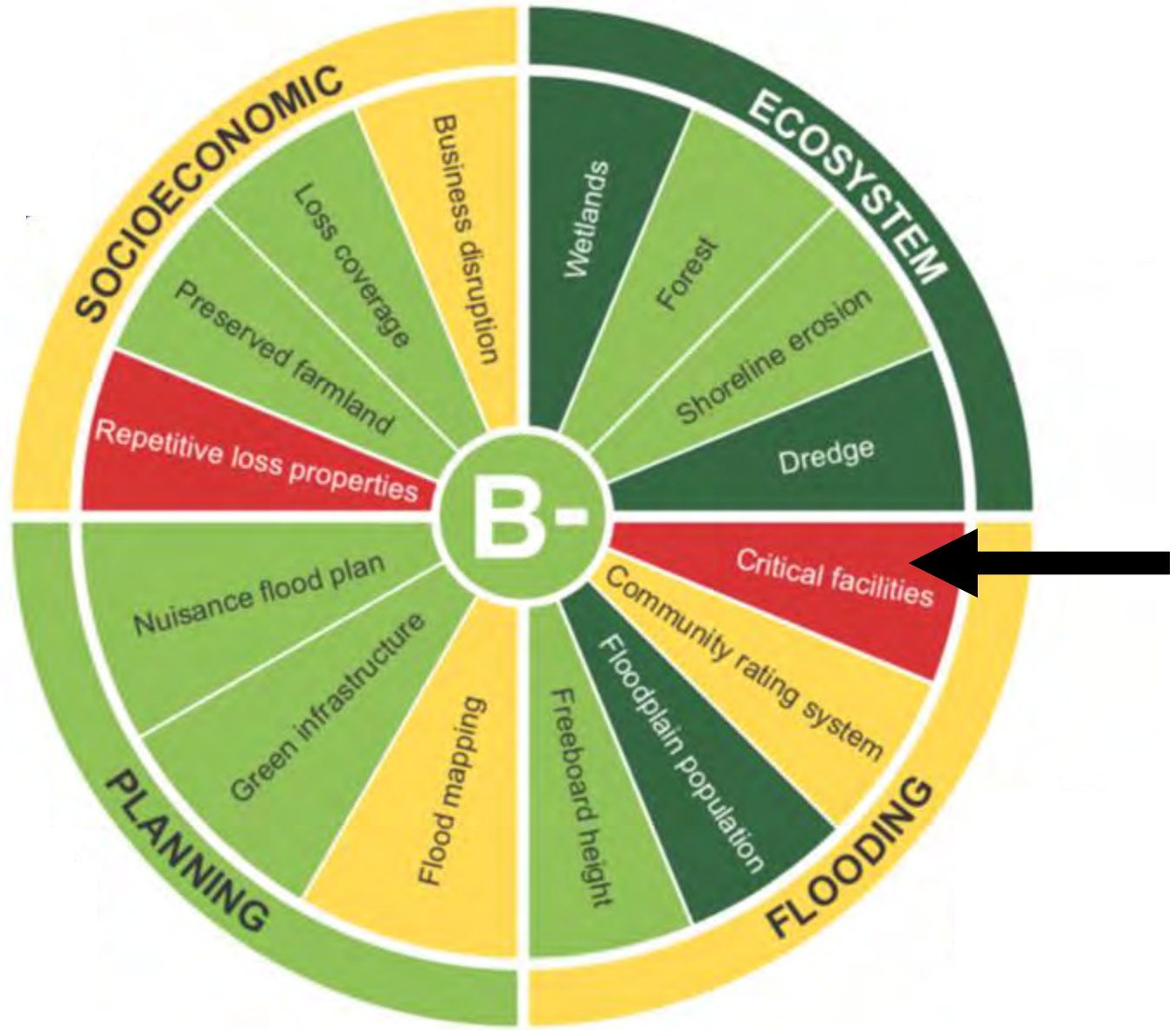
B 61–80%

A 81–100%
meets adaptation goals

Indicator Score: Wetlands



- Buffer against flooding
- Threatened by coastal change
- Threshold: no net loss
- Data: NOAA Office for Coastal Management CCAP Database
- Score: 100%, A



F 0–20%
misses adaptation goals

D 21–40%

C 41–60%

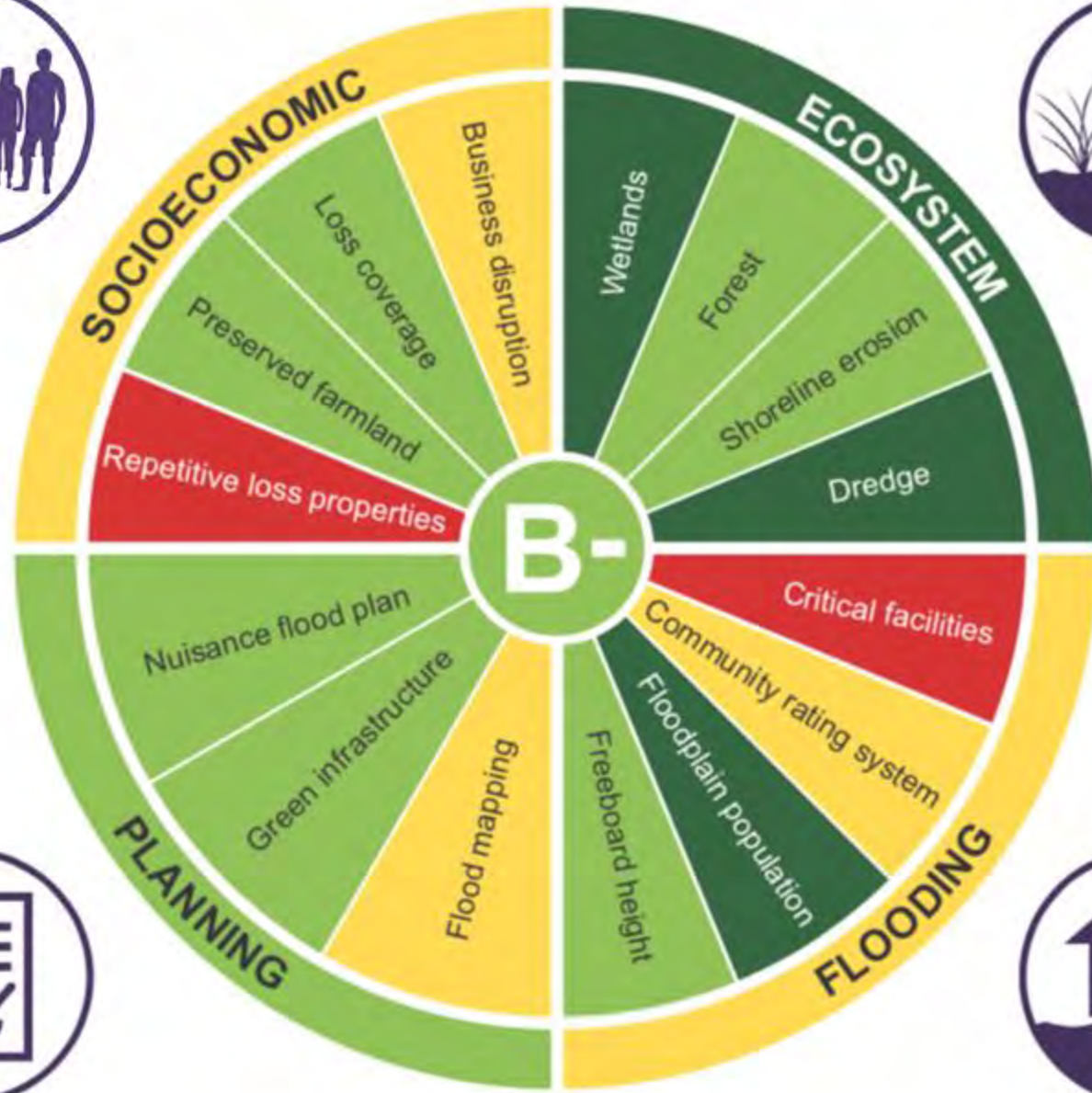
B 61–80%

A 81–100%
meets adaptation goals

Indicator Score: Critical Facilities



- Must continue to operate during emergencies
- FEMA: “even a slight chance of flooding is too great a threat.”
- Threshold: no critical facilities in flood hazard areas
- Data: Maryland Hazard Mitigation Plan
- Score: 10%, F



F 0–20%
misses adaptation goals

D 21–40%

C 41–60%

B 61–80%

A 81–100%
meets adaptation goals

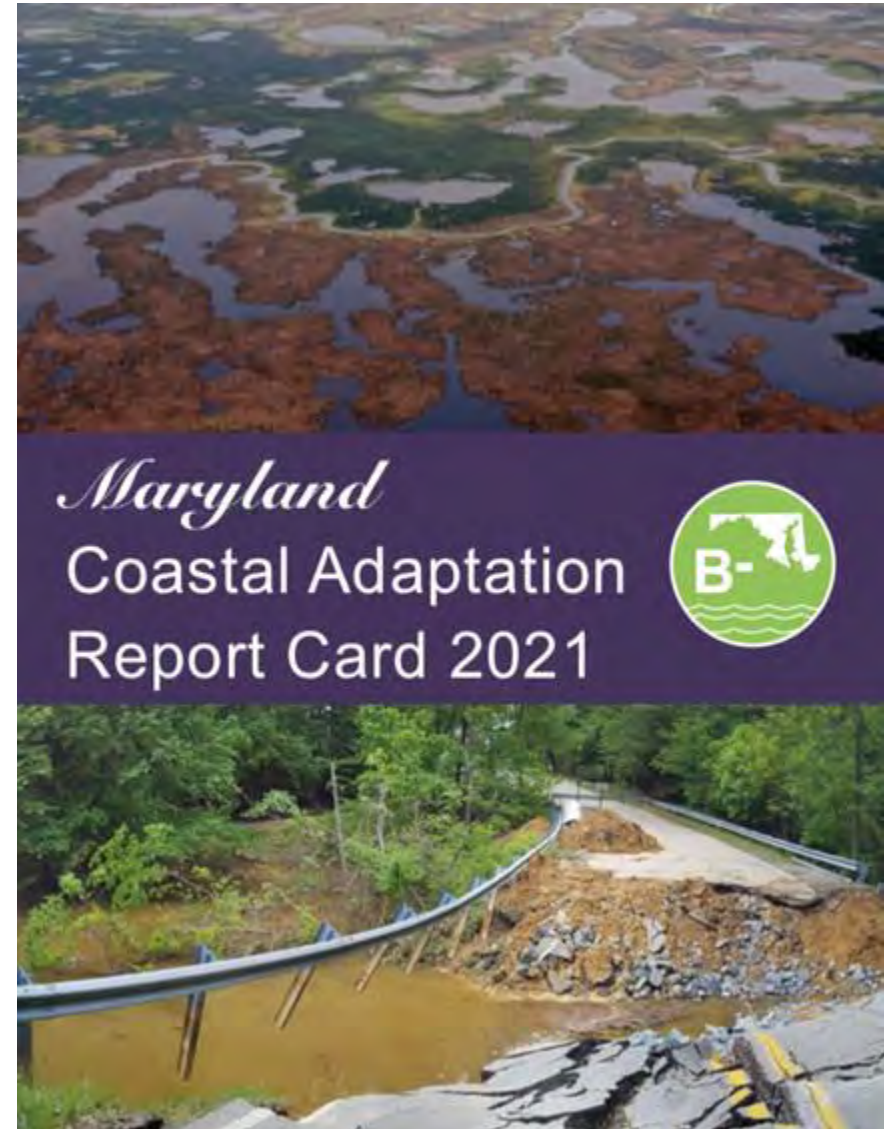
Challenges and Recommendations

- Data gaps
- Improved access to funding
- Assessing and ensuring equity

For more information:

<https://ian.umces.edu/projects/coastal-adaptation-report-card-2021/>

email: klaumann@umces.edu





Northern Neck Master Gardeners



Shoreline Evaluation Program



www.ext.vt.edu

Virginia Cooperative Extension is a partnership of Virginia Tech, Virginia State University, the U.S. Department of Agriculture, and local governments. Its programs and employment are open to all, regardless of age, color, disability, gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, military status, or any other basis protected by law.

Presentation Overview

Leveraging Horticultural Know-How

- * Orientation – Location and Players
- * Reedville Living Shoreline
- * Shoreline Evaluation Program

The Northern Neck of Virginia

- * Between the Potomac and the Rappahannock rivers – 4 counties
- * Population ~ 55,000
- * Area ~ 980 square miles
- * Shoreline ~ 1,100 miles

Chesapeake Bay

Potomac River

Rappahannock River

Many creeks and coves



NNMG/SEP

Sharing Knowledge/Empowering Communities

- * **NNMG** - Northern Neck Master Gardeners is an association of Extension Master Gardeners (**EMG**), under the auspices of Virginia Cooperative Extension (**VCE**).
 - Educators in sustainable horticulture and landscape management
- * **VIMS** - VIMS/CCRM – Virginia Institute of Marine Science/Center for Coastal Resources Management.
- * **WATER STEWARD** – Advanced EMG training focusing on water issues.
- * **SEP** - Shoreline Evaluation Program is an NNMG **Water Steward** program.

Reedville Fishermen's Museum Garden

The Beginning

- * **Early 2000s** - NNMG involved in non-structural living shoreline trials.
- * **2005** - Reedville structural living shoreline project to manage seawater and stormwater erosion.
- * A collaboration of NNMG, VIMS, Reedville Fishermen's Museum, Bethany United Church, and several others.
- * Maintained for last 16 years by NNMG with Reedville Fishermen's Museum.



Reedville Fishermen's Museum Garden

Function

* **DEMONSTRATES:**

- Seawater and stormwater protection
- A structural living shoreline
- Vegetative stormwater management
- Native plant ideas for homeowners
- A manageable/attractive living shoreline

* **INSPIRES:**

Landscape architects visited for inspiration in early design stage of new 0.25 mile shoreline installation at the Tides Inn in Irvington, VA.



The Shoreline Evaluation Program

A collaboration with VIMS

MOTIVATION

To contribute to the restoration of the Chesapeake Bay.

MISSION

Through interaction and education encourage homeowners to adopt **Integrated Shoreline Protection**.

INTEGRATED SHORELINE

The combined upland, buffer, shoreline and near shore water.

INTEGRATED SHORELINE PROTECTION

A combination of site appropriate protection measures to minimize:

- **Shoreline erosion/Failure**
- **Stormwater erosion**
- **Effects of climate change**
- **Pollution of nearshore water**

Preserving as much wildlife habitat as possible.

THANK YOU

SEP Today – Ten Years Later

- * 300+ shoreline evaluations to date.
- * Face to face interaction with +/- 600 people each year.
- * Currently transferring SEP know-how to James City County/Williamsburg EMG Water Stewards and Colonial SWCD.
- * Continue strong training/consulting relationship with VIMS.
- * Greatest challenge – Training new volunteers.



The Shoreline Evaluation Program Elements

* **EVALUATIONS**

- Threat/Risk/Vulnerability assessment
- Written report/Recommendations
- Shoreline Management Guide
- Follow-up

* **EDUCATION**

- Shoreline management seminars

* **OUTREACH**

- Farmers markets
- Community events
- Traditional/Social media

* **COLLABORATIONS**

- VIMS and others



SEP and Climate Change Resilience

Sea level rise , Groundwater rise, Heavier rainstorms

* HOMEOWNER ADVISEMENTS

- Potential **property flooding** and/or protection concerns to 2040 - Use NOAA/VIMS Chesapeake Bay sea level predictions/on-line mapping.
- Alert homeowner to any potential issues with **location of septic fields and wells.**
- Measure **property gradients**, assess protection, and communicate any **stormwater concerns.**

* TIDAL MAPPING

- Lead NN activity in collecting **VIMS tidal data.**



*Please email your questions to
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