

# Climate Resiliency

## Principles for Phase III Watershed Implementation Plans

### Protecting People and Infrastructure

The Chesapeake Bay watershed has experienced changes in climate over the last century.<sup>1</sup> On the whole, the watershed is experiencing stronger storms, an increase in heavy precipitation events, increasing air and water temperatures and a rise in sea level. These trends are altering the watershed, its ecosystems and the human communities of the Chesapeake Bay. Adapting to these impacts will require changes in programs and projects to successfully achieve restoration and protection goals.

Addressing these impacts in conjunction with ongoing restoration efforts will prepare communities for greater variability and can help achieve cost savings and reduce risks. Considering future impacts during the planning, siting, design and implementation of best management practices (BMPs) can help to reduce the vulnerability of a project to failure (structural or programmatically).

Assessing climate impacts at the initial stage of watershed implementation planning will increase effectiveness, decrease maintenance costs, and contribute to meeting the U.S. EPA's TMDL pollution reduction goals.

### Best Management Practices with Resiliency in Mind

In addition to water quality benefits, several suites of BMPs can aid with natural hazard risk reduction (riverine and coastal flood, heat and drought). See the table\* below for BMPs that have several co-benefits.

#### Success Stories



Living shoreline project at Ferry Point, MD  
(Source: MD DNR)



Forest buffer shading/cooling Brook Trout habitat (Source: CBP)

Best Management Practices	Climate Adaptation	Energy Efficiency	Flood Risk Mitigation
Urban Shoreline Management	4	0.5	1
Urban Forest Buffers	3.5	4	3.5
Forest Conservation	3.5	3	3.5
Urban Stream Restoration	2.5	2.5	3.5
Agriculture Forest Buffer	2.5	0.5	3.5
Urban Tree Planting	2	4.5	2
Bioretention, Raingardens, Bioswales	2	3	3.5
Wetland Restoration	2	1	3.5
Agriculture Shoreline Management	0	0	4

\*Values were taken from the [Quantification of BMP Impact on the Chesapeake Bay Program Management Strategies](#) study by Tetra Tech. [Appendix E](#) Final Impact Scores evaluates BMP effects on outcomes on a scale of +5 (very beneficial) to -5 (very harmful). This table shows BMPs that scored a 3.5 or higher for the Climate Adaptation Outcome.

-5 -4.5 -4 -3.5 -3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5

<sup>1</sup> Najjar et.al. (2010). Potential Climate-Change Impacts on the Chesapeake Bay. Estuarine, Coastal and Shelf Science. 86. 1-20. Last Updated: Feb. 2018

# Guiding Principles for Incorporating Climate Resiliency

## **WIP Development**

1. *Capitalize on “co-benefits”* – select BMPs to maximize climate resiliency, flood control, carbon sequestration or socio-economic benefits.
2. *Account for existing stressors* – consider existing stressors (e.g., land-use change) in combination with climate impacts when establishing reduction targets.
3. *Align with existing plans and strategies* – align WIPs with existing greenhouse gas and climate adaptation strategies, hazard mitigation plans or floodplain mgmt. programs.
4. *Manage for risk and plan for uncertainty* – employ iterative risk management to achieve and maintain water quality standards in changing conditions.
5. *Engage local agencies and leaders* – work cooperatively with agencies, elected officials and staff to facilitate the development of WIPs to account for localized impacts.

## **WIP Implementation**

1. *Reduce vulnerability* - site and design BMPs to reduce future impact of sea level rise, coastal storms, increased temperature, and extreme precipitation.
2. *Build in flexibility and adaptability* - allow for adjustments in BMP implementation in order to consider a wider range of potential uncertainties and a richer set of response options.
3. *Adaptively manage* - Allow for changes in BMP selection or WIP implementation as new climate and ecosystem science, research, or data becomes available and our understanding of the impact of climatic and weather conditions on the performance of watershed restoration practices improves.

## Tools and Resources

- [Resilient BMPs: Planning Tools and Resources](#) – Fact sheet with links to available tools and resources.
- [Chesapeake Bay Program, Climate Smart Framework and Decision Support Tool](#) – This report details “Climate Smart” decision-making processes for implementation of goals, strategies and actions.
- [Best Management Practices: Preserving Clean Water in a Changing Climate](#) – This fact sheet provides information on climate risks and solutions for implementation of water quality related BMPs.
- [Climate Data for the Mid Atlantic](#) – Portal with gridded climate datasets for the Chesapeake Bay watershed.
- [Managing Water Quality in the Face of Uncertainty](#) - A report describing how to manage future uncertainties such as climate change and evolving land use patterns.
- [National Climate Assessment](#) – A report on the impact of climate change on the U.S., with regional information.
- [Climate Resilience Toolkit](#) - A compilation of tools, resources, data and projections, and case studies.
- [BASINS Climate Assessment Tool](#) - Combines GIS, national watershed data, and watershed modeling tools to model potential climate change scenarios.
- [Tools for Water Related Climate Change Adaptation](#) - A database of climate adaptation tools for communities.

## Contacts for More Information on Climate Resiliency in your Jurisdiction

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Last Updated: Feb. 2018