From Headwater to Sea: Adapting to Climate Change in the Chesapeake Bay
Climate Change in the Maryland
A 2100 Snapshot

✓ Sea Level Rise: +3-4 feet (1 to 1.5 meters)
✓ Temperature: +2-4 degrees C
✓ Annual Precipitation: -10% to +20%
  ✓ Spring Runoff: Higher
  ✓ Summer Runoff: Lower

Global Climate Change = Real Consequences
Sea level has risen approximately one-foot (1/3 m) in the last century.

Chesapeake Bay has warmed by more than 2°F.

Shift in Plant Hardiness Zones

Source: http://www.umces.edu/applying-science/maryland-climate-change

National Arbor Day Foundation
Assessing State-wide Vulnerability

Maryland’s Risk from Sea Level Rise

Future Projections

Elevation above mean sea level
- Current water level
- 0–5 ft
- 5–10 ft

With accelerated melting
IPCC projections

Sea level rise (ft)

LOWER EMISSIONS
HIGHER EMISSIONS
LOW EMISSIONS
HIGHER EMISSIONS

2050
2100
Visualizing Impacts
Climate Resilience: Mitigation + Adaptation

**Mitigation**
Reducing greenhouse gas emissions in order to slow or stop global climate change.

**Adaptation**
Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

UKCIP (2008)
Maryland Climate Action Plan

CHAPTER TWO
Comprehensive Assessment of Climate Change Impacts in Maryland

CHAPTER FOUR
Comprehensive Greenhouse Gas and Carbon Footprint Reduction Strategy

CHAPTER FIVE
Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change; Phase I: Sea Level Rise and Coastal Storms
Sector-Based Adaptation Planning
Retain and expand forests, wetlands, and beaches to protect us from coastal flooding

Adaptation Strategy:
Facilitate landward movement of high priority coastal ecosystems subject to dislocation by sea level rise
Adaptation Strategy:
Develop siting & design criteria for coastal infrastructure

- Elevate new and/or replacement structures 2+ feet above the current 100-year base flood elevation
Adaptation Strategy: Incorporate Sea Level Rise into Hazard Mitigation Plans

Maryland Sea Level Rise
Maryland 2011 Hazard Mitigation Plan

Legend:
- 2 foot inundation
- 2-5 foot inundation
- 5-10 foot inundation
- County Boundary
- Data Not Available

Description:
Existing sea-level rise (SLR) impact data available for the State of Maryland and/or Anne Arundel County are limited to broad-brush inundation coverages for generalized scenarios (Anne Arundel County, 2010). These data, developed by the Maryland Department of Natural Resources, allow individuals to navigate to the desired geographic extent and visualize SLR-related inundation at scenarios of 0-2, 2-5, and 5-10 feet. Individual risk can be surmised by overlaying the SLR coverages and parcel data, but reporting is limited to “in or out” for each scenario. This conservative approach reflects the uncertainty in SLR projections themselves, but provides a minimal accounting of exposure and is difficult to digest by individuals.

Data Sources:
- MD Department of Natural Resources
- ESRI State Boundaries
- MSHA County Boundaries

Projection:
Maryland State Plane
North American Datum 1983

Disclaimer: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indications of areas that may be susceptible to hazards in order to identify potential risk in the State of Maryland. Data has been used beyond the original intent.
Adaptation Strategy:
Ensure long-term water supply

Reduce water use and reuse
Increase water capture and storage
Adaptation Strategy:
Reduce the impacts of flooding and stormwater

Projected change in 100 year floods in 2100

Protect headwater streams and expand floodplain protection
Embed resiliency in water infrastructure design
Adaptation Strategy:
Protect and restore at-risk species and habitat

Increase legal protection for temperature sensitive species
Implement projects to increase resilience and coordinate across boundaries
Adaptation Strategy: Reduce existing stressors

- Remove impervious surfaces and barriers to habitat connectivity
- Prepare for new or expanding ranges of invasive species
DNR Policy: Building Resilience to Climate Change

DNR policy to guide investments in and management of land, resources and assets so as to better understand, mitigate and adapt to climate change.

• New Land Investments
• Facility Infrastructure Siting & Design
• Habitat Restoration
• Research & Monitoring
• Resource Planning
• Government Operations
• Advocacy

**Intent:** Through implementation of this policy, DNR will guide its own actions, and will lead by example, encouraging our sister agencies and local government leaders to plan for and to mitigate the effects of climate change.
Adaptation Strategy: Develop technical planning guidance to advise adaptation planning at local level.

The Coastal Communities Initiative grant program provides financial and technical assistance to local governments to promote the incorporation of natural resource and/or coastal management issues into local planning and permitting activities.
Marcus Griswold
mgriswold@dnr.state.md.us
(410) 260-8987
http://www.dnr.state.md.us/climatechange