

# CLIMATE CHANGE IMPACT AREAS

# PLANNING FOR

# CLIMATE CHANGE

## TAKE ACTION NOW TO PROTECT YOUR COMMUNITY AND ITS FUTURE

In order to protect local citizens from public health and safety risks and to protect public and private investments, communities should begin to plan for the impacts of climate change that our state is experiencing now and will continue to experience in the future.

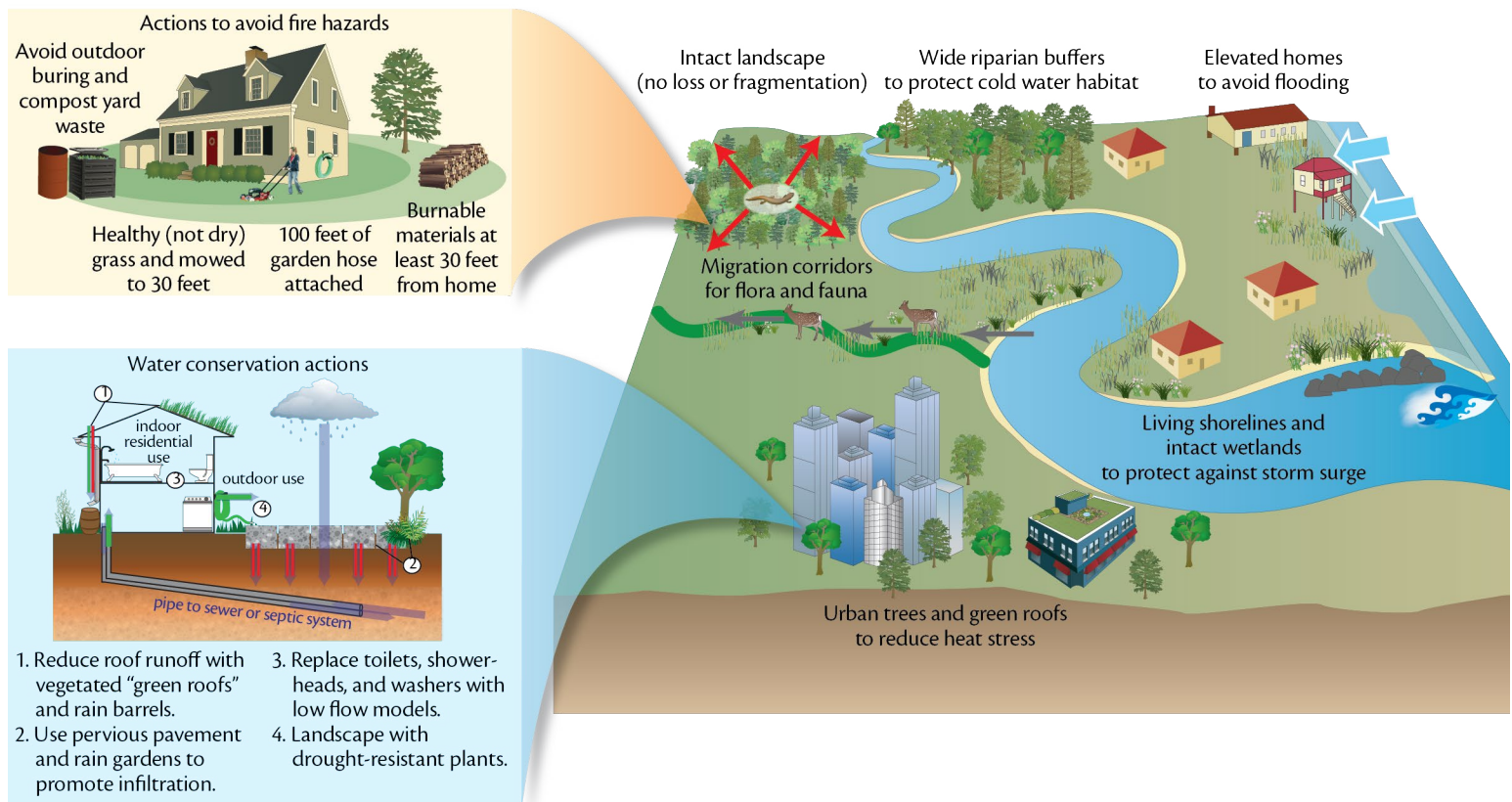
Climate change will affect communities and local government functions in a variety of ways. Likely impacts include an increased risk for extreme events such as drought, storms, flooding, and forest fires; more heat-related stress; the spread of existing or new vector-borne disease into a community; and increased erosion and inundation of low-lying areas along coastlines.

When assessing what the future climate holds, local governments may find that many of the projected climate change impacts are in fact more extreme versions of what communities are already experiencing today as a result of present-day climate variability and extreme events. Being proactive and strategic in planning for climate change impacts can create opportunities for modifying present-day policies and practices that can increase vulnerability to climate change.

Communities can reduce their risk to climate related impacts by:

- Protecting critical natural and built environments from the impacts of climate change and climate-induced natural hazards;
- Maintaining and enhancing services provided by ecosystems including but not limited to flood risk reduction, drinking water protection, and urban heat reduction;
- Providing additional protection for game and non-game species and habitats particularly sensitive to changes in climate;
- Avoiding infrastructure capacity improvements that increase human exposure to climate-induced risks and hazards;
- Decreasing financial risks associated with development or re-development in areas vulnerable to climate-induced natural hazards; and,
- Reducing climate-related public health risks and ensuring sufficient emergency response capacity.

### Local strategies to reduce climate risk



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## LOCATIONAL GUIDELINES

In the past 30 years, Maryland's climate has become wetter and hotter, resulting in more runoff and longer heat waves. August and September of 2011 were the wettest the state has seen in 117 years. Increasing temperatures associated with climate change will make these storm events more commonplace as warmer air traps more moisture. July of 2010, 2011, and 2012 were the hottest on record across much of the state. Historic tide-gauge records show that sea levels along Maryland's coast have risen approximately one foot over the last 100 years.

Changes in Maryland's climate system will likely have far-reaching impacts, most notably those associated with rising sea level, increasing temperatures, and changes in precipitation patterns. Acknowledging the increasing likelihood and magnitude of these impacts and their associated risks is necessary to protect both natural and man-made environments for years to come. The areas below represent land areas in Maryland that are projected to be the most sensitive to anticipated changes in climate.

### Storm surge risk

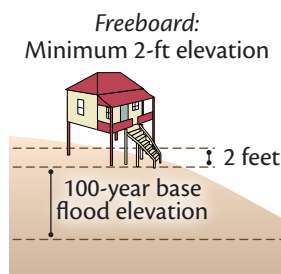
Storm surge is a rapid rise in sea levels associated with hurricanes. Increasing water temperatures and more intense precipitation will increase the risk of these events. As storms become more intense and sea level rises, areas not typically flooded are expected to do so. Creation of natural storm surge buffers and enhancing building and public infrastructure resilience are options for managing this impact.

### Wetland adaptation

Wetlands buffer communities from storm surge and sea level rise. Wetlands are also lost because of these impacts, as well as from increasing temperatures and drought. They require space to move inland. Wetland adaptation zones are important as migration or transition zones for wetlands, and communities should consider formalizing these zones in comprehensive planning.

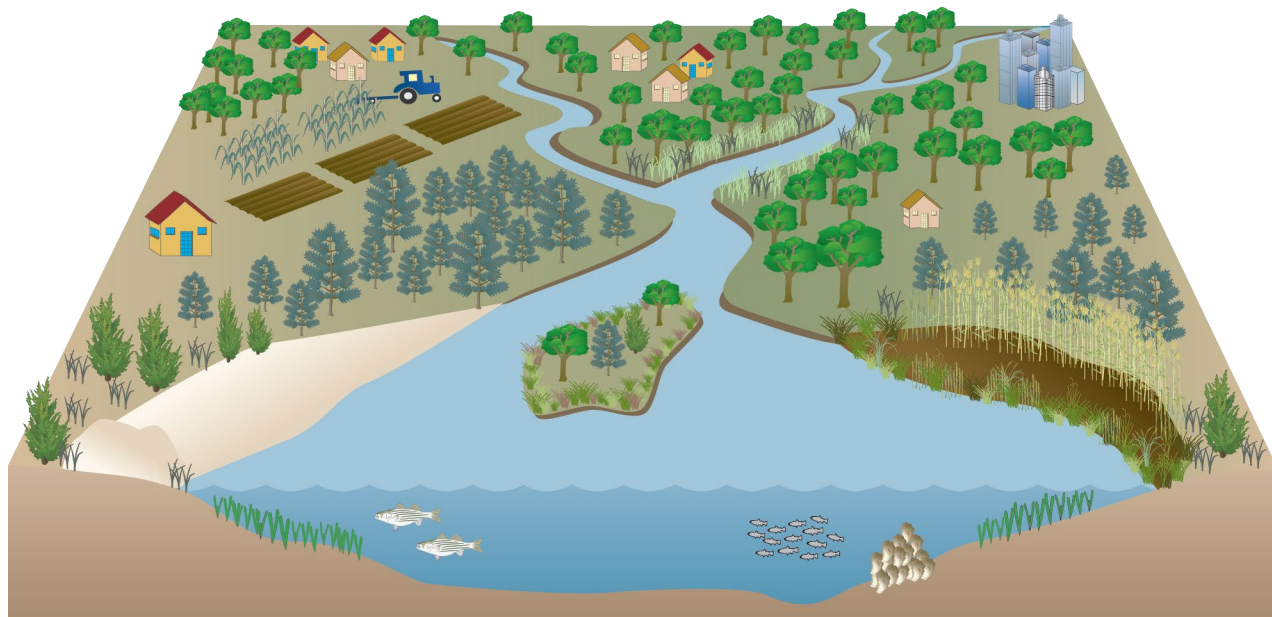
### Sea-level rise vulnerability










As our climate changes, sea levels are expected to continue to rise—potentially twice as fast as the one foot of rise during the 20<sup>th</sup> century. Current projections show that sea levels in Maryland may rise two feet by 2050 and as much as four feet by 2100. Sea level rise affects coastal areas by exacerbating coastal flooding, influencing shoreline erosion, and submerging tidal wetlands. Maryland's low-lying Eastern Shore and its barrier and bay islands are the most at risk areas. It is important for communities to begin planning now to reduce future impacts to their existing built environments, as well as to future growth and development.



Freeboard is an elevation above a designated high water level. As sea level rises, so will the height of flood levels. The Maryland Climate Action Plan recommends that the lowest horizontal part of a structure within a tidally influenced floodplain be built to allow for two or more feet of freeboard above the 100-year base flood elevation.

## Protect and restore natural buffers to reduce coastal risk



Natural barriers such as beaches , dune vegetation , wetlands , coastal forests , and vegetated stream buffers  protect residential areas  and urban areas  from flooding, erosion, and inundation. Natural barriers also protect crops  and agricultural areas .



## Erosion vulnerability

Erosion vulnerable areas are shorelines that have a moderate to high risk of erosion. Sea level rise and storm surge will increase erosion, accelerating property and wetland loss and sending sediment into the local streams and Chesapeake Bay. Protecting those areas most vulnerable should include natural solutions, such as living shorelines.



Living shorelines provide erosion control benefits while also enhancing the natural shoreline habitat.

## 100-year and 500-year floodplains

Floodplains along rivers absorb flooding during large storm events. Increasing precipitation and more intense storm events will saturate the ground and expand the floodplain. The 100-year flood now occurs on a 60-year cycle in our region but is expected to occur every 20-50 years by 2100. Investments in the floodplain should focus on expansion of riparian buffer zones and other natural areas as well as flexible and non-critical infrastructure.



Mattawoman Creek, a tributary of the Potomac River, has extensive wetlands and forests as part of its floodplain.

## Wildfire priority areas

Wildfires in Maryland peak in the spring and fall. Increasing temperatures and drought will extend the fire season and fire intensity and place more communities at risk from wildfires. A wildfire is an even greater challenge when it threatens homes and other structures. Communities should consider adopting firewise principles and aligning forest management with comprehensive planning efforts.

## Drought hazard risk

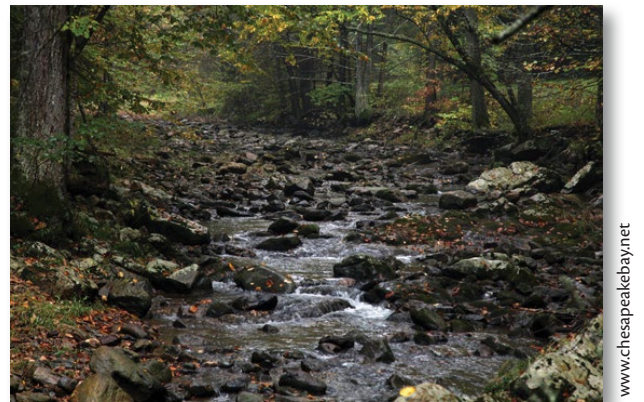
Rising temperatures and reduced summer rainfall will increase the likelihood of water shortages from drought in the summertime, lower streamflows, and decrease groundwater levels. This will affect agricultural production, drinking water supplies, and fish populations. Communities should consider planning for drought, implementing water conservation plans, and evaluating ecosystem impacts of drought.



Planting native and drought-tolerant native plants can help reduce water usage.

## High quality cold water resources

Cold water dependent species, such as brook trout, cannot survive when water temperatures exceed 68 degrees Fahrenheit. Alterations to Maryland's environment, such as forest clearing for development and agricultural production, have altered the extent of pristine, cold water habitats. Temperatures in streams and rivers are increasing and likely to worsen, causing heat stress and decreased water quality. Protecting watersheds that surround these areas is an important step to maintaining cold water systems.










































Streams with well-forested buffers help keep streams cool for temperature-sensitive organisms.

### Climate Change Impact area data and more information:

- Climate Change Impact Area ArcGIS Explorer Mapping Application
- DNR Climate Change Website: [www.dnr.maryland.gov/climatechange/](http://www.dnr.maryland.gov/climatechange/)
- Maryland Coastal Atlas: [www.dnr.maryland.gov/ccp/coastalatlus/shorelines.asp](http://www.dnr.maryland.gov/ccp/coastalatlus/shorelines.asp)
- Plan Maryland: [www.plan.maryland.gov](http://www.plan.maryland.gov)

## PLANNING GUIDELINES FOR LOCAL GOVERNMENTS

Communities are encouraged to designate Climate Change Impact Areas at the local level and to develop strategies to avoid or reduce impacts. Strategies can be incorporated into existing elements (i.e., land-use, transportation, water resources) of a local comprehensive plan or a community could develop a stand-alone climate change adaptation element. Policies can also be developed that address one or more specific climate-related impacts. Below is a list of some recommended planning and management practices to reduce risk.

Planning and management practices	Sea level rise Vulnerability	Storm surge	Wetlands adaptation	Erosion vulnerability	100 and 500-year floodplains	Wildfire priority areas	Drought hazard risk	High quality cold water resources
Restore and conserve land to protect natural climate buffers (drinking water supply, wetland/ habitat transition zones, storm surge buffers)								
Discourage new growth, development and redevelopment in sea level rise inundation zones or other high hazard areas								
Implement climate smart development and redevelopment for public and private infrastructure and engineering projects (e.g., septic restrictions, setbacks, enhanced building codes)								
Develop land-use or density restrictions to protect climate sensitive habitats (intermittent streams, vernal pools, temperature sensitive streams, and at-risk species)								
Plant urban tree canopies and riparian buffers to protect sensitive humans and wildlife								
Consider climate impacts in local hazard mitigation plans and local comprehensive plans								
Evaluate historic erosion rates and implement strategies to reduce erosion, specifically the use of living shorelines								
Develop water management plans that account for environmental flows								
Implement water conservation practices								

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