Climate Hazards and Risks

This section describes the types of climate change hazards and impacts that Rockville will continue to experience. This initial high-level overview provides 1) the foundation for a closer examination of what the city can do to be better prepared locally, and 2) evidence that reducing emissions in the short-term can significantly reduce long-term risks to human health, infrastructure, buildings, services, and the environment.

With 3,100 miles of shoreline, Maryland is one of the most vulnerable states in the nation to climate change. According to the National Oceanic and Atmospheric Administration's (NOAA) historic records of temperature and precipitation, climate change has already begun to impact Maryland residents, businesses and visitors through higher, prolonged summer temperatures and increased precipitation variability. Several Maryland communities are already experiencing more frequent flooding, severe storm damage, and health effects from increased temperatures, poor air quality, and shifts in vector-borne diseases that pose economic, health and environmental challenges.

While Rockville's location and elevation protect it from direct impacts of rising sea levels, the city is vulnerable to the following changes in weather patterns: (Figure 1):

- Rising temperatures and more frequent and intense heat waves;
- Concentrated heavy rainfall; and
- Increased frequency and severity of storms.

Changes in temperature, precipitation, and storms are climate drivers that impact built infrastructure, ecosystems and ultimately pose significant health risks to our community (Figure 4). Climate change affects everyone but tends to have outsized impacts on the same communities that have suffered disproportionate health and economic impacts from the COVID-19 pandemic – low income groups and communities of color. Heat and humidity contribute to poor outdoor air quality days and extended allergy seasons, which increases human health risks, especially for sensitive populations such as children, the elderly and low-income. The city must prepare to assist vulnerable populations, especially in emergencies.

Given the city's location on high ground, the city's infrastructure is not as prone to major flooding as it is to local drainage problems. Because a warmer atmosphere holds more water vapor, Rockville's stormwater and transportation infrastructure is vulnerable to an increase in heavy precipitation events, and the city must plan accordingly.

Rockville is dependent on local and regional infrastructure such as roads, bridges, transit, water and wastewater systems, communications, and electrical and natural gas networks that are vulnerable to climate impacts including Potomac River flooding, rising tides and storm surge. Continued coordination throughout the region will be needed to prepare for these and other national or global disruptions (i.e. to agriculture, to supply chains, to water supply, leading to conflict and migration) resulting from climate change.

Figure 1: Climate Projections for Washington D.C. and Vicinity

Temperature Increase[1]

- Average summer highs will be 6 or 7 degrees warmer by mid-century, and up to 97°F towards the end of the century (high emissions).
- The number of days with a heat index over 95°F is projected to double in coming decades and could triple by 2100.
- The current yearly number of heat waves (4) and length of average heat waves (5 days) could double by 2100.

Precipitation Intensity[2]

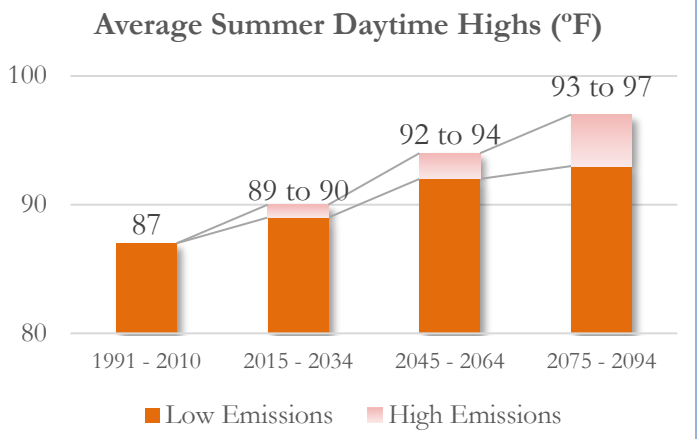
- Winters and springs are wetter.
- Precipitation is becoming more episodic with heavier rainfall concentrated into fewer events.
- Today's 100-year rain event may increase from 8 up to 14 inches.
- Drought and water supply are not major risks for the area but should be monitored.

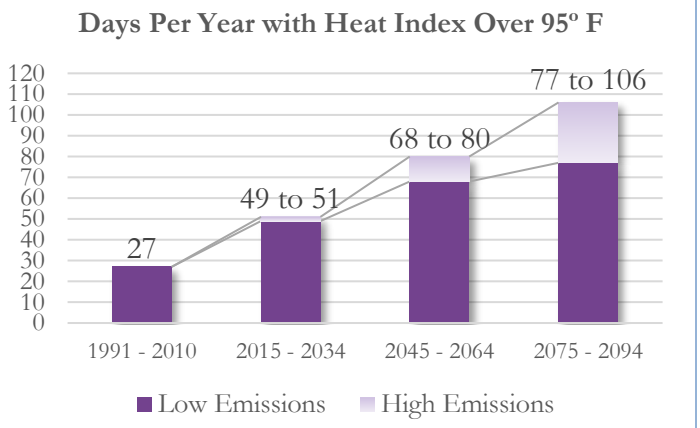
Severe Storms[2]

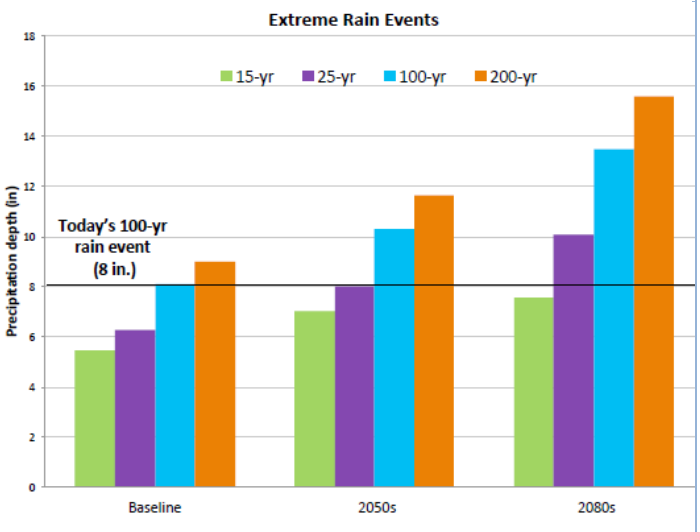
- The number and severity of extreme weather events is projected to increase (e.g., more concentrated rainfall events, high winds, hurricanes, nor'easters, hail, tornados, thunderstorms, ice storms, and other storm-related conditions).
- Intense snowstorms possible in near term but average snowfall is decreasing over time.

Sea Level Rise[3]

- Sea level rise combined with local land subsidence is 1.2 to 4.2 feet or more by 2100, depending on emissions and ice sheet dynamics, plus storm surge flooding, i.e., the tidal Potomac rose 10ft. with Hurricane Isabel.





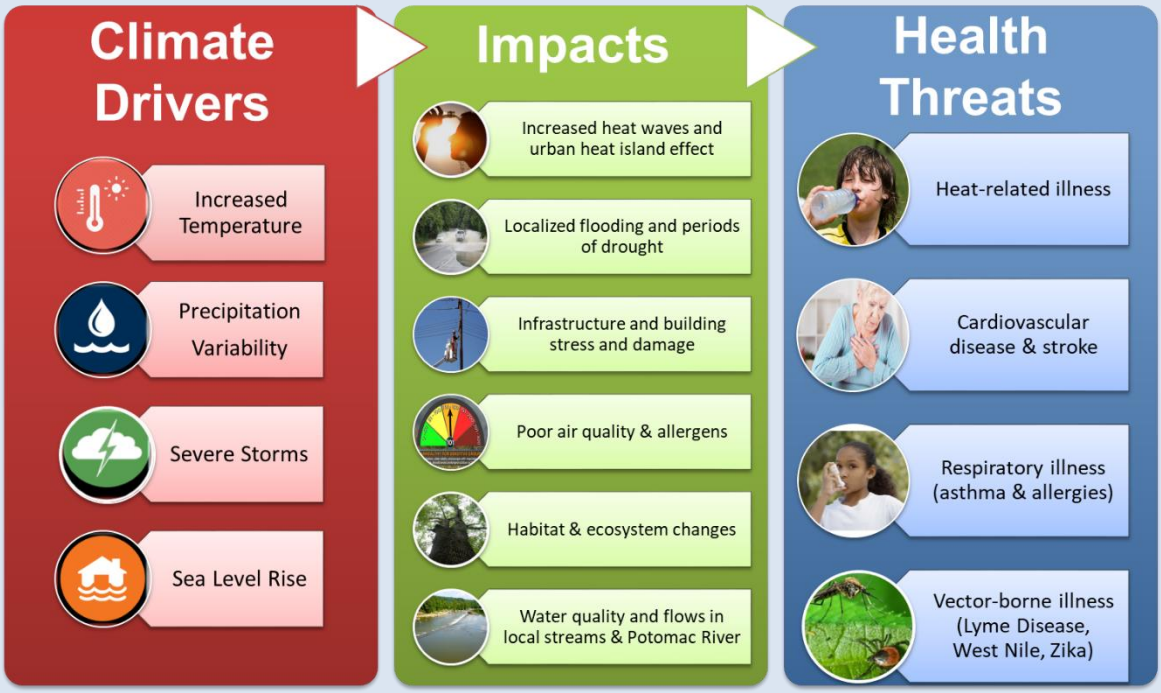


[1] *District of Columbia Climate Projections, 2015* https://doee.dc.gov/node/1110407

[2] Fourth National Climate Assessment, 2018 https://nca2018.globalchange.gov/

[3] Sea Level Rise Projections for Maryland, 2019 https://www.umces.edu/sites/default/files/Sea-Level%20Rise%20Projections%20for%20Maryland%202018_1.pdf

Figure 4: Expected Climate Impacts



Impacts to Infrastructure, Buildings and Services

- Risks to transportation, stormwater, wastewater, drinking water, and energy infrastructure and increased demand for emergency management services:
- Increased urban heat island effect, demands on building cooling systems, and summertime peak energy demand and energy costs.
- Risk of brown outs or black outs from strained energy infrastructure or severe weather.
- Increased intensity of precipitation events increases the likelihood of runoff volumes exceeding stormwater capacities, causing localized flooding and drainage problems.
- Extreme heat and storms impact the lifespan, performance, and maintenance needs of buildings (roofs, envelope, mechanical systems, etc.), infrastructure, parking lots, sidewalks, streets, bridges, etc.
- Impacts to transportation that cause more frequent travel disruptions and delays (downed trees, power outages, rail).
- Increased heat waves, precipitation variability (flooding and drought) and poor outdoor air quality impacts to community recreation and parks resources and services (facilities, parks, fields, cooling centers, outdoor activities).
- Extreme weather events, sedimentation, drought, and algal blooms pose risks to Potomac River that impact drinking water supply and treatment.

IMPACTS TO ECOSYSTEMS AND THE ENVIRONMENT

- Vegetation & wildlife ecosystem shifts; current species may be vulnerable to invasive species, pests, disease, and habitat changes.
- Risks to stream health from changes and variability in seasonal stream flow (flash flooding and drought) and changes in water quality (temperature, sediments, nutrients, dissolved oxygen).
- Increased stress on urban tree canopy and landscapes, increased watering demands, more frequent maintenance and replacement.

HEALTH THREATS

Extreme heat and precipitation events, poor outdoor air quality days and extended allergy seasons increase human health risks, especially for sensitive populations such as children, the elderly and low-income:

- Heat related illness (heat stroke, rashes)
- Respiratory illness (asthma, allergies, respiratory disease)
- Cardiovascular disease, heart attack and stroke
- Vector-borne and infectious diseases (West Nile, Lyme Disease and other tick, mosquito, and foodborne illness)

Maryland Department of Health and Mental Hygiene. Maryland Climate and Health Profile Report (2016).
Metropolitan Washington Council of Governments (COG). Summary of Potential Climate Change Impacts, Vulnerabilities, and Adaptation Strategies in the Metropolitan Washington Region (2013).

Next steps on climate resilience

Rockville can reduce future costs of climate change by preparing for more intense heat waves, intense precipitation patterns, and severe storms. Planning for climate resiliency focuses on protecting infrastructure, buildings, ecosystems, public health, and quality of life by identifying potential climate impacts, reducing community vulnerability, and increasing the capacity to recover from a disturbance and/or adapt to new conditions.