Community Climate Outlook
CAROLINE COUNTY, MD

Caroline County residents will face increasingly severe weather- and climate-related hazards, such as heat waves, flooding, and storm surge.

As the frequency and intensity of local hazards change, it is important for all of us to protect communities and local habitats.

Using the best available evidence, scientists can project how climate (long-term averages in daily weather) will change in the future, and the effects this will have on local communities.

Climate information can guide decision-making to help us plan and prepare for future weather and climate hazards. It is important that action includes areas with limited resources and people at higher risk. With justice-minded planning and preparation, Caroline County can build a resilient community for all residents and future generations.

SEA LEVEL RISE

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KEY MESSAGE: *As temperatures warm, land ice melts and seawater expands causing sea levels to rise around the world. Between 1980 and 2019, sea levels near Caroline County rose roughly 0.6 feet leading to more frequent and severe coastal flooding, and property damage. Sea levels will rise an additional 0.5 to 2.4 feet in the next 50 years (by 2070), submerging property and permanently reshaping Caroline County's coastline.*

FLOODING: Rising sea levels allow tides, waves, and severe flooding to push further inland. This causes more frequent high tide flooding and increases the impacts of storm surge, putting low-lying housing, commercial property, and infrastructure at risk.

Photo courtesy of M. Land, Chesapeake Bay Program

SALTWATER INTRUSION: As saltwater from sea level rise pushes further upstream and seeps into ground water, it threatens drinking water and agriculture. Saltwater intrusion can force farmers to abandon fields and municipalities to increase investments in desalination treatments.

Cambridge II
— Central Estimate
▨ Projected Very Likely Range
● Observed
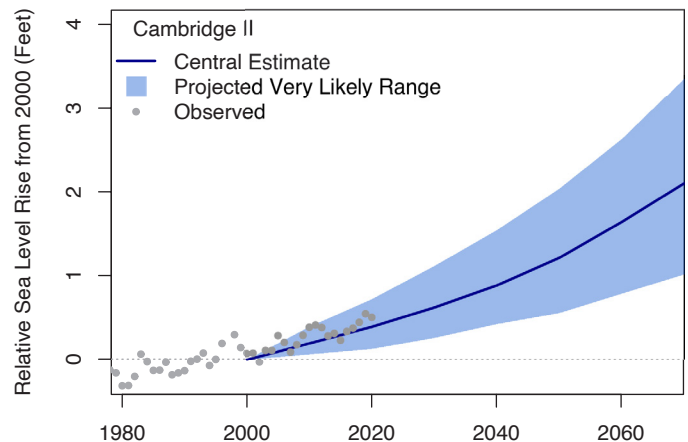
The graph shows the projected change of sea level in feet above mean sea level relative to 2000. The blue line shows the central estimate (50% probability) and the blue shading shows the very likely range (5 to 95% probability) of sea level rise used for official planning purposes in Maryland. Dots show the observed changes in sea level at Cambridge II tide station. Data for the future scenarios are based on a low-emissions scenario (RCP 4.5).

FUTURE SCENARIOS[1]: Future climate will depend, in part, on the efforts that we take today to reduce carbon dioxide emissions from the burning of fossil fuels like coal, oil, and methane gas. This fact sheet presents two scenarios[1] of future climate based on a combination of climate models scaled to Caroline County, MD. The first scenario, a higher-emissions scenario (RCP8.5), assumes continued increase of fossil fuel emissions, with no mitigation. The second, a lower-emissions scenario (RCP4.5), is a scenario where we tackle the issue of emissions head-on by responsibly using our natural resources and implementing strategies that begin to reduce global fossil fuel emissions by 2050, stabilizing carbon dioxide concentrations before 2100.

Access resources for adaptation, data references, and additional outlooks by visiting: *marisa.psu.edu/outlooks*

MARISA

# CHANGING TEMPERATURE PATTERNS

! **KEY MESSAGE:** *Human health, local fisheries, and infrastructure are all threatened by higher temperatures. At 95°F, it is hard to keep indoor areas and our bodies cool. Caroline County's summers are getting hotter. On average, Caroline County sees 6 days per year with temperatures above 95°F (1990-2019 average). Within the next 50 years (by 2070), Caroline County can expect a yearly average of 30 to 50 days above 95°F, with associated increases in cooling costs, reduced air quality, and heat-related illnesses.*

HEAT-RELATED ILLNESSES: Heatwaves can kill people and pets. In Maryland, more than 80 people have died from extreme heat between 2010 and 2019. Individuals at higher risk include children, pregnant women, older adults, outdoor workers, and lower-income residents.

DISRUPTED FISHERIES: Across the Mid-Atlantic, stream temperatures increased roughly 2.5 degrees F from 1960 to 2010. Warmer water stores less dissolved oxygen, which threatens the survival of rockfish, oysters, and soft-shelled crabs, and disrupts local fisheries and ecosystems.

Photo courtesy of W. Parson, Chesapeake Bay Program
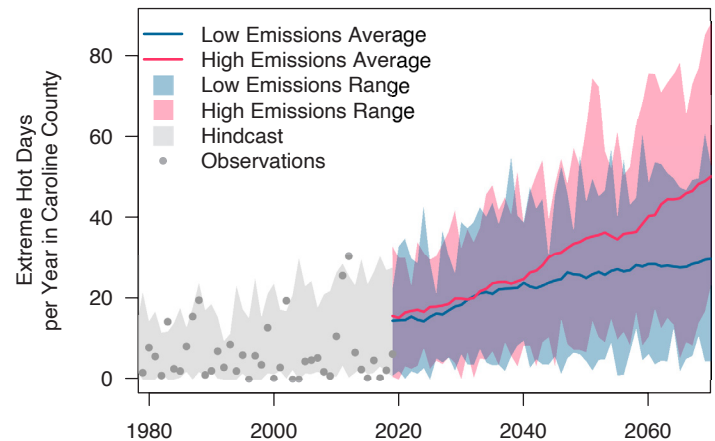
The graph shows the number of days in a year with temperatures above or equal to 95°F. Dots represent observed annual days of extreme temperatures and the gray shading shows the hindcast[2]. Two scenarios[1] of the future are shown as a high-emissions scenario (RCP 8.5) in red and a low-emissions scenario (RCP 4.5) in blue. Data for the future scenarios[1] are retrieved from Multivariate Adaptive Constructed Analogs (MACA), and observed data are from the Gridded Surface Meteorological Dataset (gridMET).

CHANGING RAINFALL PATTERNS

! **KEY MESSAGE:** *Heavy rainfall in Caroline County is increasing in frequency and intensity, causing property damage, septic backups, and impacts to water quality in wells, local streams, mold and indoor air quality issues, and the Chesapeake Bay. Annual rainfall in Caroline County will likely increase by an average of 2 inches (2050-2079 average compared to the 1990-2019 average).*

FLOODING: Heavy rain overwhelms infrastructure and drainage systems, causing property damage and covering roads.

Photo courtesy of C. Tombleson

REDUCED HUMAN HEALTH: Rising water tables cause septic backups and groundwater pollution, putting drinking water at risk of contamination. Changing moisture levels impact the spread of mold and illness, including tick- and mosquito-borne diseases as high humidity promote their activity.
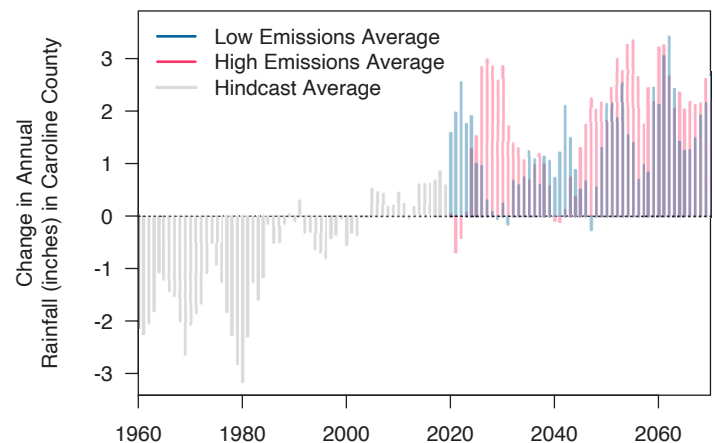
The graph shows the change in annual rainfall compared to the average between 1990 and 2019. The gray lines show the hindcast[2]. Two scenarios[1] of the future are shown as a high-emissions scenario (RCP 8.5) in red and a low-emissions scenario (RCP 4.5) in blue. Data for the future scenarios[1] are retrieved from MACA.

FOOTNOTES:
1 Scenarios are a plausible representation of future events. They are not predictions or forecasts, but they offer insight into the implications of developments and actions.
2 Hindcasts are model results for a historical period. Hindcasts are useful for comparing observations with model estimates.