



Drinking Water Guide Fact Sheet: Climate Change Impacts

Key Points

- The impacts of climate change (such as extreme weather, drought, wildfires, and rising temperatures) may impact drinking water sources and distribution.
- Some of the ways drinking water could be affected include contamination from flooding, water line breaks from drought, and saltwater intrusion into freshwater sources from rising sea levels.
- Since it is difficult to predict the effects of climate change, this fact sheet provides a list of the types of expected impacts, along with case studies to exemplify those categories.

What Are Some Impacts of Climate Change on Drinking Water?

Changing climate patterns will continue to have a disruptive and unpredictable impact on our drinking water resources and communities. These changes can disproportionately affect the most vulnerable members of society and those already facing significant health and economic burdens in our communities.

The impacts of climate change on water resources and drinking water services are highly variable across the country and very difficult to anticipate or predict. This uncertainty makes the already complex job of managing water quantity and quality, protecting infrastructure sustainability, managing affordability, and building consumer trust even more challenging. Responding to and mitigating these impacts requires:

- Careful long-term planning
- Smart financial investments
- Close communication between drinking water systems, municipal leaders, and consumers



Types of Climate Change Impacts

Extreme Weather

Extreme weather events, such as hurricanes and other storms, can cause unexpected, significant damage to drinking water infrastructure, interrupting service to the community and necessitating expensive and sometimes disruptive infrastructure repairs or replacement. Extreme events can also affect water quality, particularly for those communities that rely on surface water sources of drinking water and may require the temporary use of an alternative water source or bottled water. Extreme events can also lead to population changes over time, impacting the size and make-up of a system's customer base, which in turn can affect a system's revenue.



- Case Study of Extreme Weather
 - In July of 2022, Eastern Kentucky had an extreme rainfall event that triggered flooding in 13 mountain counties, affecting many low-income and rural households. This rain led to issues and disruption of local rural water systems. 18,000 service connections did not have water, and over 45,000 had boil water notices.

Rising Temperatures

Rising temperatures from climate change can have significant impacts on the hydrologic cycle. Higher temps are expected to lead to increased precipitation, changes in the intensity and frequency of precipitation, and changes in water runoff and evaporation. In regions where water supplies rely on winter snowmelt, the amount of snowmelt, and when and how fast the snow melts may also change.

Rising temperatures can also promote biological growth in drinking water sources, such as harmful cyanobacteria blooms, that may require expensive and rapid response changes to treatment operations, or temporary bans on the use of that water source. And for coastal water systems, sea level rise from melting glaciers due to rising temperatures is another significant concern. Rising seas can threaten infrastructure, cause saltwater intrusion into drinking water sources, and worsen the effects of extreme events, such as hurricanes on coastal communities and the water systems that serve them.



- Case Study of Rising Temperatures
 - Heavy precipitation and early runoff in California in 2017 led to severe damage to the Oroville Dam, prompting large-scale community evacuations. Early runoff can overwhelm infrastructure designed to handle the timing and capacity of snowmelt as it has occurred historically. One study estimated that the timing for snowmelt-driven runoff, which is a critical water supply source for many agricultural and metropolitan areas in America's west, could be significantly earlier due to rising temperatures.

Drought & Wildfires

Drought is characterized by insufficient precipitation over an extended period of time. The impacts of drought are often made worse by rising temperatures. Some regions of the country have been experiencing more frequent and longer droughts. Drinking water systems in drought-prone regions of the country have the added challenge of not knowing how long drought conditions will last, or how severe they will become. Drought can:

- Decrease the quantity of water available (e.g., wells running dry)
- Increase demand for an increasingly limited supply of water leading to other impacts, such as dropping groundwater levels and sinking land
- Impact water infrastructure (e.g., changing soil structure can lead to more frequent water main breaks)
- Affect surface water and groundwater quality (e.g., saltwater contamination of freshwater sources on coasts or higher concentrations of nutrients and other contaminants)

Wildfires can also have significant impacts on drinking water, in part because they often deposit ash and other debris in water sources. When heavy rains follow a wildfire, flash flooding can move large deposits of dirt, debris, sand, heavy metals, and other contaminants into drinking water sources. Such events can lead to very costly and time-intensive clean-up and treatment efforts.



- Case Studies of Drought & Wildfires
 - In 2021, the Dixie Fire of California burned over 963,000 acres in the northern portion of the state. It was named the second largest fire in California's history and was spurred on by the effects of climate change. Severe drought, high temperatures, and windy weather during the summer created prime conditions for the fire to spread after a faulty fuse initiated the spark. Erosion and runoff into the Sierra watershed, including chemicals from the burned down town of Greenville, were top concerns for state water officials that autumn, as crews began work to mitigate those effects.

Additional Resources

- [Climate Change Impacts \(National Oceanic and Atmospheric Administration\)](#)
- [Climate Change Impacts on Freshwater Resources \(Environmental Protection Agency\)](#)
- [Climate Impacts on Water Utilities \(Environmental Protection Agency\)](#)
- [Implications of Climate Change for Urban Water Utilities \(Association of Metropolitan Water Agencies\)](#)
- [What is 'climate justice'? \(Yale Climate Connections\)](#)
- [Moving Toward Equitable, Climate-Resilient Water Systems in Rural Communities in the United States \(Pacific Institute, Rural Community Assistance Partnership, and Livelihoods Knowledge Exchange Network\)](#)