Fifth National Climate Assessment

Water toplines

On November 14, 2023 the United States released the Fifth National Climate Assessment, a science-based synthesis of the effects of climate change on the United States.

The report summarizes the latest scientific consensus that safe, reliable water supplies in the United States are threatened by drought, flooding, and sea level rise. Climate change is degrading water quality for people and ecosystems, and threatening public health. While many communities across the country are already investing in climate-water solutions, adaptation efforts aren't moving fast enough to keep up with the speed of climate change impacts on water resources.

For more background, read the Climate Signals summary of the science.

This summary highlights the water-related subject-matter findings of the Fifth National Climate Assessment:

Climate change threatens safe, reliable drinking water supplies

- Aging infrastructure wasn't designed for the climate extremes we experience today. Disinvestment and deferred maintenance has left U.S. water systems ill-equipped to handle increased climate risks from heavy rain, flooding, and drought.
- Saltwater intrusion into rivers and aquifers threatens the drinking water supply for coastal communities.
- Sediment and debris from more frequent and intense wildfires is contaminating headwater forests and, ultimately, drinking water treatment facilities downstream.
- Climate impacts are interconnected with water insecurity and public health. Native Americans were more likely to get sick and die from COVID-19 than white Americans as Tribal households are more likely to lack reliable access to safe water and sanitation.
    - Current gaps in Tribal water infrastructure increases Tribes' vulnerability to flooding, drought, and disease.
    - This inequity is widespread. According to the Indian Health Service, more than 400,000 American Indian and Alaska Native (AI/AN) households need improved sanitation.

Redlining, discrimination, and loss of green space worsen flooding for communities of color

- Across the United States, stronger storms with more extreme precipitation have likely increased the economic damage from flooding by $46-$105 billion dollars.
- When cities lack green space, heavy rain falls on hard surfaces like concrete and asphalt, channeling fast-flowing water into overwhelmed storm drains rather than allowing it to soak into the ground.
- Black, Hispanic, Indigenous and low-income communities face greater risks to climate-driven extreme weather events because of close proximity to industrial and agricultural pollution, disinvestment in infrastructure, and inequitable access to funds for preparedness and prevention.
    - Black communities will experience a disproportionate impact from future flooding. Census tracts where Black residents make up at least 20% of the population will experience flood damage at twice the rate of neighborhoods where less than 1% of the population is Black.
- In 2017, climate change intensified the extreme rainfall (8-19% heavier due to human-caused warming) and increased flood damage (33-80% worse due to human-caused warming) from Hurricane Harvey, killing 100 people and causing $125 billion in damages in Houston, Texas.
    - Black, Hispanic, low-income, and disabled people affected by Hurricane Harvey are more likely to live in properties not covered by federal flood insurance.

Warming and unsustainable water use are driving drought in the United States

- Human-caused climate change is leading to “profound shifts in the water cycle,” and while some regions in the United States are facing more extreme rainfall, drought and increasing aridity threatens snowpack, streams, rivers, and aquifers in others.
- In the Southwestern United States, droughts are projected to increase in intensity, duration, and frequency. The extended periods of drought in the West, “appear to be due in part to long-term aridification rather than episodic drying.”
    - Warming temperatures will also lead to smaller snowpack that peaks and melts earlier, decreasing the overall seasonal water volume in the West by more than 24% by 2050.
- While extreme weather events like hurricanes and wildfires garner a lot of media attention for the cost of destruction, drought also takes a considerable economic toll on communities. “Between 1980 and 2022, drought and related heat waves caused $339.4 billion (in 2022 dollars) in damages; only tropical cyclones and severe storms were more costly (NOAA NCEI 2022).”

- 1 in 3 people in the U.S. depend on groundwater for their drinking water, and the water under our feet is impacted by hotter temperatures and overuse. Hotter temperatures are leading to decreased natural groundwater recharge, increased threat of saltwater intrusion, and reduced water quality. Coupled with increased demand and over pumping for irrigation, the safety and reliability of underground water reserves are at risk.
- The dire climate impacts and historic overuse on the Colorado River are resulting in competition, conflict, or the opportunity for collaboration, in water management decisions between states, Tribes, the federal government, and Mexico.
    - Watch out for nature's variability. The 22-year drought and dire reservoir levels created urgency for the most severe water restrictions to-date on the Colorado River. Yet, wetter years, which will become shorter and less frequent, could lead to climate complacency. In the long-run, human-caused climate change means less water in the Colorado River Basin, requiring sustainable water management.
    - The bulk of Western water law was established with little of the flexibility needed today to be responsive to a changing climate.
    - Water data and better tools to plan for climate change's impacts on water resources are crucial for water managers. This is particularly true for Tribal communities who need additional resources, capacity, and technical assistance to access federal funds and onerous interagency processes.

Climate change threatens cultural heritage; solutions can both protect ecology and preserve tradition

Chapter 16 on Indigenous Peoples examines the ways climate change threatens Indigenous cultural sites, burial grounds, and sacred places.

- Many programs to help people recover from climate disasters were not designed to support Indigenous peoples. For example, Indigenous peoples living in coastal areas pay into the National Flood Insurance Program and are burdened by high flood insurance premiums even though they were forcibly relocated by the U.S. government to low-value, flood-prone land.
- Warming waters increase harmful algal blooms and the prevalence of invasive species, threatening access to waters for recreation, native wildlife, and traditional Indigenous practices.
- Investing in nature-based solutions that center Indigenous peoples and knowledge are cost-effective ways to restore ecosystems and protect communities from flooding while preserving cultural heritage.
- Tribes and Indigenous organizations are leading climate planning adaptation efforts that are place-based and rooted in tradition and should be invested in. For example, traditional Hopi farming techniques conserve soil moisture so corn can be grown even in

drought conditions. The Karuk Tribe has worked with the State of California to practice cultural burning that reduces fire risk.

We must accelerate action to help vulnerable communities adapt

- While many communities across the country are investing in climate-water solutions, adaptation efforts aren't moving fast enough to keep up with the speed of climate change impacts on water resources.
- The accuracy and availability of climate and water data is improving each year, local water managers are often still relying on models based on past historical records that don't reflect the rapid rate of climate change impacts. Where global climate models exist, gaps in actionable local water date and high levels of uncertainty make planning difficult.
- Water resource decision-making has largely excluded Tribes and frontline communities from full representation in water resources negotiations and planning in the past.