

# Law and Policies that Address Equitable, Climate-Resilient Water and Sanitation

WATER, SANITATION, AND CLIMATE CHANGE IN THE UNITED  
STATES SERIES, PART 2

## Summary



OCTOBER 2024

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### SUGGESTED CITATION

Campbell-Ferrari, Alexandra, Shannon McNeeley, Morgan Shimabuku, Luke Wilson, 2024. Law and Policies that Address Water and Sanitation and Climate Change, Water, Sanitation, and Climate Change in the US Series, Part 2, Pacific Institute, Oakland, CA, <https://pacinst.org/water-sanitation-climate-change-US-part-2/>



## ABOUT CENTER FOR WATER SECURITY AND COOPERATION

The Center for Water Security and Cooperation (CWSC) is a 501(c)(3) nonprofit organization based in Washington, D.C. Founded in 2015, the mission of the CWSC is to advance water security and cultivate cooperation by building a unified body of laws, policies, practices, and standards that ensure the availability of water for current and future generations, and a peaceful, stable, and vibrant global society. Ultimately, the CWSC works to ensure that law and practice guarantee water security and universal access to water and sanitation because without good law those people who have access will lose it, and those who don't, won't ever get it. More information about the CWSC can be found at [www.thecwsc.org](http://www.thecwsc.org).

## ABOUT THE PACIFIC INSTITUTE

The Pacific Institute envisions a world in which society, the economy, and the environment have the water they need to thrive now and in the future. In pursuit of this vision, the Institute creates and advances solutions to the world's most pressing water challenges, such as unsustainable water management and use; climate change; environmental degradation; food, fiber, and energy production for a growing population; and basic lack of access to fresh water and sanitation. Since 1987, the Pacific Institute has cut across traditional areas of study and actively collaborated with a diverse set of stakeholders, including leading policymakers, scientists, corporate leaders, international organizations such as the United Nations, advocacy groups, and local communities. This interdisciplinary and independent approach helps bring diverse groups together to forge effective real-world solutions. More information about the Institute and our staff, directors, funders, and programs can be found at [www.pacinst.org](http://www.pacinst.org).

## ABOUT DIGDEEP

DigDeep is a human rights nonprofit working to ensure every person in the United States has access to clean running water and sanitation at home. The nonprofit has served thousands of families across the country through their award-winning and community-led field projects: the Navajo Water Project (Arizona, New Mexico, and Utah), the Appalachia Water Project (West Virginia), and the Colonias Water Project (Texas). DigDeep is a leading force in US water access research, workforce development, and policy advocacy, underscoring our commitment to addressing the sector's lack of comprehensive data. Notable national reports, including "Closing the Water Access Gap in the United States: A National Action Plan" and "Draining: The Economic Impact of America's Hidden Water Crisis," unveiled the harsh reality that over 2 million people in the US live without a toilet or tap at home, which costs the American economy a staggering \$8.6 billion annually. For more information, please visit [digdeep.org](http://digdeep.org).



## ABOUT THE AUTHORS

### Alexandra Campbell-Ferrari

Alexandra Campbell-Ferrari is the Executive Director and Cofounder of the Center for Water Security and Cooperation. As a water lawyer, Alexandra works to create frameworks for understanding whether our laws create the rights and protections we need to achieve water security and universal access to water and sanitation, to evaluate existing laws against those frameworks, and to work with governmental and nongovernmental stakeholders to write for the first time, rewrite, or enforce water laws. Alexandra also teaches water law at the University of Maryland Carey School of Law and American University Washington College of Law as an adjunct professor. Before starting the Center for Water Security and Cooperation, Alexandra was Fulbright Scholar in Spain researching the implementation of the European Union Water Framework directive in Spain. Alexandra holds a bachelor's degree in Political Science and Spanish from Bucknell University, and a juris doctor degree from the George Washington University Law School.

### Shannon McNeeley

Shannon McNeeley is a Senior Researcher at the Pacific Institute and the Water and Climate Equity Lead. Her work focuses on water and climate equity and justice for frontline communities. This engages an interdisciplinary and cross-cultural co-production approach, incorporating the social and natural sciences along with different ways of knowing to understand human-environment relationships and how people are impacted by and respond to environmental change. Her research has focused on climate change science and policy, water resources and drought preparedness, and climate planning and action, all with a strong focus on supporting those who are overburdened and under resourced through just and equitable solutions. Dr. McNeeley has worked closely for decades with a multitude of different partners, organizations, decision-makers, Tribes and Indigenous peoples, and frontline communities bridging technical research with applied decision support information and tools. Prior to joining the Pacific Institute, she was at the North Central Climate Adaptation Science Center at Colorado State University and before that at the National Center for Atmospheric Research. Dr. McNeeley holds a master's degree in International Environmental Policy from the Middlebury Institute of International Studies at Monterey and a doctoral degree in Environmental Change and Sustainability Science, which integrated anthropology, ecology, and climatology, from the University of Alaska Fairbanks.

### Morgan Shimabuku

Morgan Shimabuku is a Senior Researcher at the Pacific Institute where she researches a wide range of water management issues, including water equity and access challenges, benefits and trade-offs of water management strategies, water resilience, and more. Prior to joining the Pacific Institute, Morgan was a senior program manager at an environmental nonprofit in Colorado where she ran residential and commercial water conservation program operations in partnership with municipal water providers. Morgan received a bachelor's degree in Environmental Studies and Geology from Whitman College and a master's degree in Geography at the University of Colorado Boulder, where she studied climate change, hydrochemical cycling, and snow hydrology at the Institute of Arctic and Alpine Research.

## Luke Wilson

Luke Wilson is co-founder and Deputy Director of CWSC where he specializes in transboundary water issues and international law including human rights and international criminal law. Professor Wilson also teaches international law at the George Washington University Elliott School of International Affairs. Professor Wilson has worked with The World Bank, The American Bar Association and the U.S. Government in various capacities, with a focus on law systems, dispute resolution, and enforcement issues. Additionally, Professor Wilson was the co-chair of the American Bar Association's International Human Rights Committee, leading one of the Association's largest committees and advancing policy proposals on behalf of the membership, and also served as a law clerk to judges of the International Court of Justice in The Hague. Professor Wilson has been an invited speaker at the Council on Foreign Relations, the American Bar Association, and Bowdoin College, among others, and is a member of international task forces focused on global water affordability and on sanitation policy. Professor Wilson is also a tenor with The Washington Chorus and has performed with the National Symphony Orchestra and the Philip Glass Ensemble.

## ACKNOWLEDGEMENTS

Thank you, Kim Lemme, George McGraw, Heather Cooley, Alan Miller, Jessica Dery, Jackie Rigley, Rachel Will, Becky Anderson, and DigDeep staff. Each provided essential guidance, input, feedback, review, and/or support for this report. Also, thanks to California State Water Resources Control Board (SWRCB) staff Christopher Hyun, James Nachbaur, Nicole Williamson, Andrew Altevogt, and Karina Herrera, who reviewed the California sections. All conclusions expressed herein, and any errors or omissions are those of the authors and do not necessarily reflect the views of the SWRCB. We acknowledge the partnership of the Pacific Institute Communications and Outreach team to launch this work and ensure it reaches key decisionmakers, audiences, and other levers of change toward the goal of building a more resilient world. This work was generously supported by Liquid IV and the BHP Foundation.

## **DEDICATION**

**We dedicate this report to the communities who feel the impacts of climate change first and most strongly, especially those communities being failed by existing laws.**

**Water is life.**





# Summary

In the United States, federal, tribal, state, and local laws and policies exist to govern the provision of water and sanitation services to communities and homes. The laws are designed to ensure the protection of public health and the environment; deliver sufficient, safe water for drinking, bathing, cooking, and other household needs; and remove and treat domestic (i.e., household) waste. People without complete plumbing or safe water live within the “water access gap.” As explored in the [first report in this series](#), climate change—from extreme temperatures to droughts, floods, extreme storms, and wildfires—is making it hard to close this gap and keep it from growing. Water and sanitation systems in frontline communities already feel the disproportionate “first and worst” impacts of climate change to these systems and to their access to water and sanitation. Laws and policies should help anticipate and plan for the incremental and catastrophic impacts of climate change and protect those most harmed by the effects. Unfortunately, in most cases, the climate is changing faster than the law can respond, thereby leaving frontline communities’ water and sanitation systems vulnerable to damage or destruction.

## Key messages:

1. The law often **does not proactively manage water resources in the context of climate change**, especially groundwater use, or create a system where uses are weighed against each other or reviewed for their continued appropriateness for a given water source or basin. The basic rules governing water use and water rights are insufficient. As climate change alters precipitation patterns, which subsequently changes our use patterns and the broader availability of water, the laws will be insufficient to ensure there is sufficient water to meet our needs and sustain the environment.
2. Laws provide **insufficient guidance on the design and siting of climate-resilient water and wastewater systems**. Water and wastewater infrastructure is under threat from floods, droughts, saltwater intrusion, and wildfires. As the frequency and severity of natural disasters increases, our infrastructure may be unable to withstand storms and other extreme events, leaving communities without drinking water and/or wastewater services.
3. Access to water and sanitation infrastructure and services is inequitable, and the **laws in the United States do not ensure the human right to water or sanitation**, leaving some households without any safe or regular services and other households under constant threat of shutoffs. This is especially true for households in frontline communities who are affected first and worst by climate change, especially those who may not be able to afford to rebuild or repair their



onsite or decentralized systems. This may leave homes and communities that lose access to their water and/or sanitation without recourse for regaining it, causing backsliding, and widening the water access gap.

In this report, we examine the laws and policies in the US that govern the equitable delivery of water and sanitation in the face of growing climate change impacts. The objective is to identify and understand whether and how laws manage, anticipate, or enable effective responses to climate change impacts on water and sanitation service delivery and infrastructure. This is intended to provide a foundation for a future, more comprehensive evaluation of the gaps and shortcomings that exist in law and policy to ensure the necessary steps can be taken to construct and rehabilitate the legal infrastructure to limit or avoid the impacts of climate change on water and sanitation service delivery. We pay special attention to laws that give visibility to and empower frontline communities and vulnerable households, both those without consistent water and sanitation access and those facing the greatest threat to their access from climate change.

The report is based on two considerations: 1) legal considerations related to climate change impacts on water resources, service delivery, and infrastructure, and 2) the categories of systems that provide drinking water and sanitation services that determine the applicable legal and regulatory requirements. We structured the report based on centralized drinking water systems, centralized wastewater systems, and decentralized, onsite drinking water and sanitation systems. Within each of those, we examine the laws and policies that address three types of climate change impacts on these systems—water scarcity, overabundance of water and flooding, and poor water quality. We also include a section focused on issues of equity in achieving universal, climate-resilient water and sanitation access for all in the US.

*The law plays a critical role in anticipating and managing the impact of climate change on water resources, infrastructure, and water and sanitation service delivery.*

## Water Law and Climate Change

While some laws may not explicitly mention climate change, they can be foundational to adapting to climate change impacts, for example, by providing oversight of water supply availability or setting drinking water quality standards. Having in place the basic laws necessary to manage water resources and service provision can inadvertently, indirectly, and fortuitously protect against climate impacts. There is also an increasing need for water laws to *explicitly* incorporate and consider climate change considerations. Water laws, generally, were developed to provide predictability, yet climate change is making the natural water cycle highly unpredictable. Climate change is already exposing gaps in water law, water quality law, energy law, and environmental law. While better laws for water management and service provision inherently help to address the impacts of climate change on water and sanitation systems, laws increasingly need to intentionally consider the intersection of climate change to ensure that the impacts are properly anticipated and adequately addressed. Existing water laws are ill-equipped to adapt to climate change. Water laws will fall short

if the basic structure of water management and service provision reflected in those laws is not based on an intentional consideration of the actual and anticipated impacts of climate change.

Here we summarize key findings and conclusions from our review of federal, tribal, state, and local laws and policies from across the US on whether they help achieve equitable, climate-resilient water and sanitation for frontline communities.

## Centralized Drinking Water Systems

Climate change through extreme heat, flooding, drought, rising seas, more extreme storms, wildfires, and other impacts, is already threatening the reliability and safety of drinking water access to frontline communities in the US. In the US there are approximately 300 million people that receive drinking water from centralized drinking water systems, which are the systems that collect, treat, and distribute water to multiple residential, commercial, and/or industrial customers within specifically defined geographical areas called service areas. Most centralized drinking water systems are governed by the Safe Drinking Water Act (SDWA). Changes to water quality from flooding, drought, rising temperatures, saltwater intrusion, wildfires, reductions in snowpack, and other climate events are disrupting and damaging centralized drinking water systems and are making it more challenging to ensure the water they deliver is safe.

In some cases, the way water laws are designed or implemented may exacerbate the challenges created by climate change. For example, Tribes are often legally entitled to more water than they can use, which is inconsistent with the state prior appropriation doctrine approach by which water rights are maintained through actual use (“use it or lose it”). This can create tensions between state and tribal entities, especially where climate change and other factors decrease the volume of available water resources. Also, climate change can exacerbate unsustainable groundwater uses and practices, especially in places where the law either allows for unsustainable groundwater use or does not protect groundwater sustainability. As climate change creates greater dependence on groundwater in some places, laws like California’s Sustainable Groundwater Management Act have the potential to provide an important management mechanism for protecting vulnerable groundwater supplies and contributing to more inclusive governance processes, however, implementation of this law has not yet proved to be completely successful in these goals.

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Laws that prioritize available water resources for domestic purposes could become more imperative as climate change shifts precipitation patterns and reduces the availability of water in some geographies. There are examples of states with laws that both create automatic prioritization of domestic uses during droughts and authorize water managers to address emergency water shortages. Together, these provisions can help protect domestic needs when there is insufficient water to meet every demand. In some states, laws where prioritization between water uses is not

clear, such as between domestic and agricultural uses, there may be potential for conflict between water uses during times of scarcity.

Some states have laws that mandate water resource management planning, which is a process whereby water managers (including those operating centralized drinking water systems) plan for future investments, like infrastructure upgrades and water supply needs. This is done by analyzing water supply availability, water quality, and use in concert with projected changes in population, the economy, and other factors that impact water demand. Increasingly, water resource management planning processes incorporate climate change considerations, but many do not. Some states have passed laws to create programs that provide technical assistance to small drinking water systems that often lack the capacity for water management planning and planning for climate change. While not specific to climate change, though with implications, drought planning laws and policies are approaches that have been used for requiring or incentivizing consideration of how water systems will function and adapt to water scarcity and supply constraints. Less than half of all states have laws that require drought preparedness plans for water systems.

As climate change alters precipitation patterns, populations continue to grow in urban centers, and costs of delivering water increase, instituting laws and policies that help reduce water use, improve water use efficiency, or permit and regulate using alternative water supplies can help communities adapt to these pressures. Demand management, reducing and making water use more efficient, is often applied through voluntary measures. However, there are several ways that laws and policies have led to long-term water demand reductions and supported adaptation to increasing water scarcity and more intense, prolonged periods of drought. Some key demand management laws and approaches have included: the Energy Policy Act of 1992, state-level laws that set standards for fixture water efficiency in building codes, requirements to upgrade to high-efficiency devices upon change of ownership of a property, and regulations for urban water suppliers to manage water



demand. Laws that permit and regulate water reuse and recycling or rainwater and stormwater capture and use may contribute to improved water supply resilience by adding to the community's supply portfolio or by freeing up freshwater to be used for other purposes.

Flooding is among the costliest climate disasters in the US, and climate change is causing the impacts of flooding to grow. Laws that help prevent and reduce the impact of flooding through system design and construction requirements are supposed to help keep centralized drinking water infrastructure safe from these events. The National Flood Insurance Program (NFIP), created by the National Flood Insurance Act, has used historical flood event data for establishing insurance premiums and designating flood risk areas, which may not be applicable under future climate change as catastrophic flooding occurs more frequently. Existing drinking water systems and other infrastructure that were sited and designed based on NFIP's old, outdated maps may be at risk from flooding damage. Drinking water and wastewater systems in communities that are not eligible for the NFIP or are excluded by outdated flood maps that do not account for climate change may lack flood insurance. Even in communities that are participating in the NFIP, protection and disaster recovery have been inequitably distributed with costs disproportionately being placed on low-income neighborhoods. Some states have taken steps to go beyond the federal NFIP requirements, which may provide more protection against flooding events. But even these can fail to explicitly account for future climate change and more extensive flooding.

## Centralized Wastewater Systems

Like centralized drinking water systems, centralized wastewater systems are at risk from the impacts of climate change through extreme heat, drought, flooding, damage from extreme storms, sea level rise, and challenges with maintaining their mandated level of treatment in places where water is becoming more contaminated or scarce. In the US, centralized wastewater systems are made up of networks of pipes, pumps, holding tanks, and wastewater treatment plants (WWTPs) that collect, transport, treat, and dispose of waste from approximately 75% to 80% of the population. WWTPs are governed by the Clean Water Act, which regulates the discharges from wastewater treatment plants and requires that the discharges meet certain standards that will protect the quality of the water resources into which the effluent is discharged.

The siting, design, and proper construction of WWTPs can significantly impact the climate resiliency of these systems. Generally, state and local laws and regulations govern these engineering decisions. Once built, it is often many decades before updates or improvements are made to centralized wastewater systems. Due to drought and reductions in per capita water use, some wastewater systems have a mismatch between the volume of influent they were designed for compared to the volume that they now receive, yet there are few legal approaches for addressing this mismatch. While regulations can address the threat of floods and other climate impacts when building new wastewater treatment plants, changing existing plants may be harder.

There are few, if any, legal recourses for homeowners whose sewers back up into their homes during flooding events.



Centralized wastewater systems that were sited and designed based on historical flood event data also may be at risk from the increased extent and severity of flooding damage. Current federal law exists to ensure new systems are in areas with lower flood risks, but these laws are still based on historical flood maps and do not protect existing wastewater infrastructure. While wastewater treatment systems are taking steps to protect their infrastructure from sea level rise and erosion, many of these changes are made purely voluntarily.



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In many cities, even small rainstorms can pose problems for aging sewers that were built decades or centuries in the past and are too small or in such poor condition that they cannot effectively transport water. Aging and inadequate infrastructure can lead to homes and businesses experiencing backflows of water from the sewer. This is already occurring in many places like New York City, where sewer backups from rainstorms occur disproportionately in low-income communities and communities of color. But there are few, if any, legal recourses for homeowners whose sewers back up into their homes during flooding events. Climate change and the increase in extreme precipitation and storm events in many parts of the country will only worsen these types of inequities.

Untreated or insufficiently treated wastewater can threaten people's health and wellbeing if it comes into their home, but it can also degrade the quality of surface waters. If inadequately treated, wastewater effluent can degrade drinking water quality, public health, and the environment. The CWA provides a foundation for limiting the impact of wastewater effluent on water resource quality but is inadequate in explicitly requiring considerations of climate change in setting effluent limits. To meet the CWA standards and properly operate, consistently maintain, and periodically rehabilitate and update wastewater infrastructure requires ongoing financial resources and technical capacity. The impacts of climate change, such as degraded water quality and infrastructure damage, compound with these ongoing needs, especially for under resourced communities, exacerbating their efforts to meet regulatory requirements and provide safe, reliable services. Existing legal requirements and regulations were designed to improve pollution control from WWTPs, not to address the impact of extreme weather events and climate change.



## Decentralized, Onsite Drinking Water and Wastewater Systems

Climate change is also impacting water and sanitation access for US households that rely on decentralized, onsite drinking water and wastewater systems, such as wells and septic systems. Based on the most recent study available (using pre-2010 data), approximately 23 million people—or 17% of the US population at the time—relied on domestic wells for drinking water. More than one in five households in the US use onsite septic systems or small community cluster systems to treat wastewater, and many of those are concentrated in the Northeast and Southeast. The use of septic tanks has continued to grow as more homes are built for people looking to live outside urban centers.

One of the reasons why onsite water and sanitation access is at risk from climate change is because there is limited legal oversight of these systems. Onsite drinking water is largely governed and legislated at the state and local levels. There are often laws that govern the siting and construction of domestic wells, including, for example, a California law that requires domestic wells to be constructed so that flood waters cannot enter through the top and to ensure domestic wells are installed out of historical floodplains. But these types of laws do not always account for changes to flooding severity or frequency due to climate change. At the same time there are few, if any, laws that require ongoing maintenance and inspection of existing domestic wells used for domestic drinking water purposes, let alone preparing for or responding to climate change. Some states or local entities require reinspection of septic systems post-disaster or during resale of a home. Post-disaster inspections may become more critical to ensuring these systems remain functional as more extreme weather events damage and disrupt onsite systems.

In regions where sea level is causing the groundwater table to rise, laws may be needed to address potential groundwater contamination from septic systems.



From a water resources perspective, state laws that seek to ensure groundwater availability for domestic wells and other users have at times been inadequate for achieving these goals. As climate change adds more water stress, these laws may not be sufficient. Allowing and developing regulations for the installation and use of waterless or greywater systems for onsite sanitation collection, treatment, and disposal will help to encourage their use, and possibly their replacement of water-based household sanitation systems. In regions where sea level is causing the groundwater table to rise, laws may be needed to address potential groundwater contamination from septic systems.

Domestic well quality testing regulations are potentially helpful for improving awareness of water quality in domestic wells, but they do not directly address the increasing risk of water contamination from climate change. Broad groundwater quality protection seeks to provide protection from human activity like agriculture, oil and gas development, or other forms of land use, but it does not offer explicit protection of groundwater from climate change phenomena. Few of the water quality laws governing management of decentralized, onsite drinking water or wastewater systems incorporate climate change.

## Laws and Policies for Equitable, Climate-Resilient Systems

Laws can help to ensure that safe, climate-resilient water and sanitation service delivery and infrastructure is available to all by creating rights and protections that enable greater and more equitable access to water and sanitation services. For example, laws can establish that water and sanitation are human rights. While the human right to water and sanitation have yet to be legally recognized at the federal level, some states have amended their constitutions in ways that could serve as a foundation for taking action to protect water resources if climate change causes harm to water quality or reduces water availability, even if not explicitly for the purposes of drinking water access. Furthermore, none of the existing state or local human right to water and sanitation laws or resolutions in the US explicitly address climate change. But when crafted well, these laws create an obligation on state or local governments to take steps to ensure every person has access to safe water and sanitation services now and into the future.

Climate change contributes to rising costs for the drinking water and wastewater utilities, which in turn are passed on to ratepayers, with the greatest impact on low-income households. Laws can create rules that disallow disconnections of water service for households that are unable to pay their bills. As one example, Washington has a law that provides legal protection for households that are struggling to pay their utility bills during hotter weather, ensuring they have access to water when temperatures are extreme and pose a risk to human health.

Laws can create rules that disallow disconnections of water service for households that are unable to pay their bills.

Laws also create funding mechanisms to help ensure that funding is equitably distributed to communities, especially overburdened and under resourced communities. Achieving the standards set out in the CWA and SDWA and ensuring water and wastewater infrastructure is climate-resilient requires federal funding, which is commonly authorized by laws. Two more recent examples of laws that include funding for climate-resilient water and sanitation projects are the Bipartisan

Infrastructure Law and Inflation Reduction Act. Together, these provide historic levels of funding for federal, tribal, state, and local water projects, among other things.

In sum, climate change, by changing the availability of water and the frequency and severity of storms, will continue to make universal water and sanitation access difficult to achieve without legal protections in place. Without explicit consideration of how climate change will impact water availability, the operation of infrastructure, or the quality of surface waters, existing laws leave homes and communities, especially those on the frontlines, exposed and unprepared. Our current laws and policies are insufficient to provide water security, particularly with the significant impacts of climate change on the near horizon. Without changes to the law, more water and wastewater systems will fail and will do so more frequently, leaving entire communities without basic services they need to lead a healthy, dignified life.

Many communities struggling with water and sanitation access face other challenges as well. These include inadequate or unenforced laws, structural and systemic racism, fragmentation of decision making for water and climate change, institutional constraints, and lack of resources to begin and sustain adaptation efforts. A first step to overcoming these challenges and barriers is better understanding the key attributes of equitable, climate-resilient water and sanitation along with the barriers to and opportunities for achieving them. Our next report, Part 3 in [this series](#), will provide a framework for equitable, climate-resilient water and sanitation in the US, as well as an overview of strategies and approaches that frontline communities are taking to create equitable, climate-resilient water and sanitation.



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