

Building Resilience: How Recent Federal Policy Is Laying the Groundwork for Improved Climate Adaptation

Public health agencies should play a key role in climate response planning and programs.

Adapting to the changing climate is crucial to protecting the public's health. The purpose of this brief is to highlight the intersections between climate adaptation and public health. It will serve as a resource for public health departments as they bring their expertise in health surveillance, health communications, partnership development, and health equity to multisector climate adaptation efforts. TFAH has analyzed three federal actions: the Infrastructure Investment and Jobs Act, the Inflation Reduction Act, and the Justice40 Initiative. Each provides funding to jurisdictions or advises on spending to help communities become more climate resilient. This brief details how these programs are supporting climate adaptation efforts at the state, tribal, and local levels. It discusses the value of comprehensive and multisector climate adaptation approaches and the importance of public health agencies being at the table during climate adaptation program planning. Public health's experience in data analysis, program planning, and health equity, plus its grounding in community relationships, make it a critical partner in any climate adaptation programming.

Background

With its diverse landscapes and climates, the United States faces multifaceted challenges—in 2023 alone, the country experienced a record 28 weather and

Trust for America's Health (TFAH) is a non-profit, nonpartisan public health policy, research, and advocacy organization. TFAH's mission is to promote optimal health for every person and community and make the prevention of illness and injury a national priority. Among its many issue areas, TFAH is dedicated to advancing public health's role in promoting climate adaptation and resilience strategies that protect the health and well-being of all people and communities, especially those most vulnerable to the impacts of climate change. This paper is one of several pieces examining the intersection of public health, climate change, and equity.

climate disasters that each caused at least \$1 billion in damage¹—necessitating a spectrum of adaptation measures tailored to local needs. While historically fragmented, adaptation strategies began coalescing into a more unified approach in the latter part of the 20th century. Collaborations across sectors and levels of governance in support of adaptation efforts emerged, while federal funding from the Federal Emergency Management Agency (FEMA), the Environmental Protection Agency (EPA), and the National Oceanic and Atmospheric Administration (NOAA) provided early assistance.

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Despite these advances, however, the response to climate change remains insufficiently aligned with the escalating severity and complexity of its impacts, which now urgently demand a comprehensive public health strategy. The effects of climate change manifest not only through stark disasters such as hurricanes, wildfires, and floods but also through more insidious, long-term health consequences, including increased prevalence of respiratory diseases, heat-related illnesses, and vector-borne diseases. These evolving health threats, exacerbated by environmental degradation and air quality deterioration, highlight the critical need for an integrated public health response that prioritizes resilience, adaptation, and equity. This approach must encompass both emergency preparedness for acute climate events and a sustainable strategy to address the gradual but profound changes in public health threats. Enhancing health risk and disease surveillance, bolstering healthcare infrastructure to withstand climate stresses, and implementing community-based adaptation measures that consider social determinants of health are critical. Therefore, it is essential to develop policies that not only mitigate the immediate impacts of climate-related disasters but also address the long-term public health challenges posed by climate change, ensuring equitable health outcomes for all communities, especially the most disadvantaged.

A complex challenge for public health officials is that the health impacts of climate change are often addressed through adaptation measures that fall outside the traditional scope of public health departments. Many of the key determinants of health in the context of climate change, such as infrastructure development, urban planning, transportation, agriculture, environmental protection, and emergency management, are typically handled by other sectors and government agencies but have substantial direct and indirect implications for public health outcomes. Therefore, public health officials should proactively seek and engage in multisectoral collaborations, advocating for health considerations to be integrated into adaptation planning and resilience efforts across these various domains.² This requires building partnerships, sharing knowledge, and developing joint strategies with diverse stakeholders, including other government agencies, non-governmental organizations, academia, and the private sector. This may involve participating in interagency working groups, providing technical assistance, and leveraging public health data and research to inform decision-making. Additionally, public health departments can play a crucial role in disease detection and monitoring, research, and risk communication related to climate and health. They can use evidence to inform

and influence adaptation policies and practices in other sectors, ensuring that health co-benefits are maximized and potential unintended consequences are minimized.

Recent federal efforts to prioritize environmental justice and spur climate action have propelled a strategic realignment, marked by significant milestones such as the Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law or BIL), the Inflation Reduction Act (IRA), and the Justice40 Initiative. The nation's complex journey toward a more resilient and sustainable future involves integrating federal guidance and funding with local initiatives to foster equitable and informed climate adaptation. However, this journey is fraught with challenges, including inequitable resource distribution, the imperative for greater inclusivity in decision-making, and the sheer scale of effectively implementing necessary adaptation measures.

The Bipartisan Infrastructure Law's adaptation components encompass a diverse array of programs and initiatives aimed at fortifying the nation's resilience against climate change and extreme weather events. These include substantial investments in resilient infrastructure, clean drinking water, roads and bridges, public transit, power infrastructure, and environmental cleanup. Additionally, the law allocates significant funding to various resilience programs, such as wildfire management, electric grid reliability, flood mitigation, habitat restoration, dam safety, estuary protection, and tribal climate resilience. These initiatives not only address immediate vulnerabilities but also foster long-term sustainability and community resilience.

Likewise, the Inflation Reduction Act, while representing the most significant legislative effort in U.S. history to reduce greenhouse gas emissions and shrink the country's carbon footprint,³ also includes various adaptation components designed to bolster resilience to climate change impacts and enhance environmental justice. These efforts encompass agricultural conservation practices, drought mitigation measures, community-based pollution reduction, and climate resilience initiatives. There are programs to support coastal communities in preparing for climate-related challenges, improve energy efficiency in U.S. Department of Housing and Urban Development (HUD)-assisted properties, and sustain tribal ecosystems through climate resilience planning. Furthermore, the act allocates funding for climate and weather research, technical assistance for Native Hawaiian communities, and climate change planning in U.S. insular areas, demonstrating a comprehensive approach to addressing climate-related challenges.



Climate Adaptation and Mitigation: A Comprehensive Approach to Climate Resilience

Climate adaptation is the process of making adjustments in human and natural systems in response to actual or projected climate change effects. Its goal is to mitigate harm and seize new opportunities. Adaptation strategies can include constructing defenses against rising sea levels, developing drought-resistant agricultural practices, redesigning urban environments to handle extreme weather events, and enhancing public health infrastructure to prevent and respond to climate-related health risks. Adaptation addresses immediate to medium-term needs, helping communities and ecosystems cope with the changing climate's impacts.

Climate mitigation involves efforts to reduce or limit the severity of future climate change by reducing greenhouse gas emissions, enhancing the removal of these gases from the atmosphere, and protecting and enhancing natural carbon sinks like forests and oceans. Mitigation strategies extend beyond emission reduction, encompassing changes in consumption patterns and land use management to reduce our carbon footprint. The

effects of mitigation are, in most cases, more long-term, aiming to prevent the worst impacts of climate change from occurring.

Adaptation and mitigation are complementary strategies in the effort to safeguard against the health and property impacts of climate change. While adaptation addresses the climate change impacts we cannot avoid, mitigation efforts work to prevent future changes by targeting the root causes. Effective climate action intertwines both, ensuring a resilient present while safeguarding the future.

These approaches also share co-benefits, where certain measures can serve both adaptation and mitigation purposes. For instance, green infrastructure like urban forests not only provides cooling benefits, reducing heat island effects (adaptation) but also sequesters carbon (mitigation). Similarly, sustainable agricultural practices can enhance soil health, improving crop resilience to climate variability (adaptation) while storing more carbon in the soil (mitigation).

The actions have already made significant progress in advancing climate adaptation, equity, and resilience priorities. With over \$50 billion dedicated to an all-hazards approach,⁴ efforts include removing flammable materials to prevent wildfires, improving water infrastructure for drought resilience, and funding projects like the Gila River Indian Community's water conservation efforts. Equity is a key focus, with the Justice40 Initiative ensuring that at least 40 percent of benefits reach communities experiencing disadvantage, prioritizing clean water and lead pipe replacement, and directing investments to areas with environmental justice concerns.⁵ Rural and tribal communities are receiving attention and substantial investments to address their unique challenges, such as improving infrastructure and supporting tribal relocation programs. Federal agencies have designated Infrastructure Coordinators, who are providing technical assistance to help ensure all communities can benefit from the law, complementing other initiatives targeting economic distress and disinvestment in underserved areas.

To demonstrate how the policies are supporting adaptation efforts, this brief examines three separate initiatives, each showcasing the intricate strategies and collaborative efforts facilitated by the legislative framework.

The first initiative highlights a strategic approach to managing overgrown forests and mitigating wildfire risks. The strategy combines thinning and prescribed fires to restore historical forest density levels and enhance forest and community resilience. Recognizing the need to intensify efforts to manage vegetation and reduce combustible materials, especially in areas at high risk of wildfires, the plan targets 'firesheds'—specific geographic areas identified for wildfire risk reduction—focusing on restoration activities. Collaborative efforts across federal agencies, states, tribes, and communities aim to restore fire-adapted ecosystems and respond effectively to wildfires. Ten high-risk landscapes have been identified for initial investment, totaling \$131 million, with projects spanning several states and focusing on various goals, including forest resilience, community protection, and cross-boundary collaborations.⁶ These initiatives represent a proactive approach to mitigating wildfire risks and improving forest health.

The second initiative is intended to respond to the challenges faced by the Colorado River System due to climate change and overuse, which have led to decreased water availability and prolonged droughts. Funding from the Bipartisan Infrastructure Law and the Inflation Reduction Act aims to enhance the system's resilience. Efforts include investments in water conservation projects, infrastructure upgrades, and drought resilience measures. Importantly, the federal government is also addressing water rights disputes, particularly for tribal communities, through the establishment of the Indian Water Rights Settlement Completion Fund. Overall, these efforts represent a comprehensive approach to safeguarding water resources and promoting sustainable water management in the Colorado River Basin.

The third initiative focuses on the challenges faced by coastal communities in the United States due to climate change, including sea-level rise, intensified storms, habitat degradation, and health and economic impacts. Programs designed to enhance the resilience of coastal communities and ecosystems include NOAA's investments in habitat restoration, climate data and services, fisheries, and protected resources. The initiatives are meant to support climate-ready infrastructure, provide essential climate information and tools, and restore fisheries habitat while fostering community economic development.

The United States stands at a pivotal juncture in its approach to climate adaptation, underpinned by significant legislative efforts and a holistic strategy that encompasses environmental justice, public health, and resilience across diverse communities and ecosystems. The Infrastructure Investment and Jobs Act, the Inflation Reduction Act, and the Justice40 Initiative represent foundational steps toward a more resilient future, integrating federal guidance with local actions to address the complex challenges posed by climate change. However, the journey ahead demands continued innovation, collaboration, and a steadfast commitment to equity and inclusivity. As we move forward, it is imperative that these efforts not only mitigate the immediate impacts of climate change but also lay the groundwork for sustainable, long-term adaptation strategies. This requires a collective resolve to enhance our resilience, protect our most vulnerable communities, and steward our natural resources with foresight and responsibility.

The Evolution of Climate Adaptation in the United States

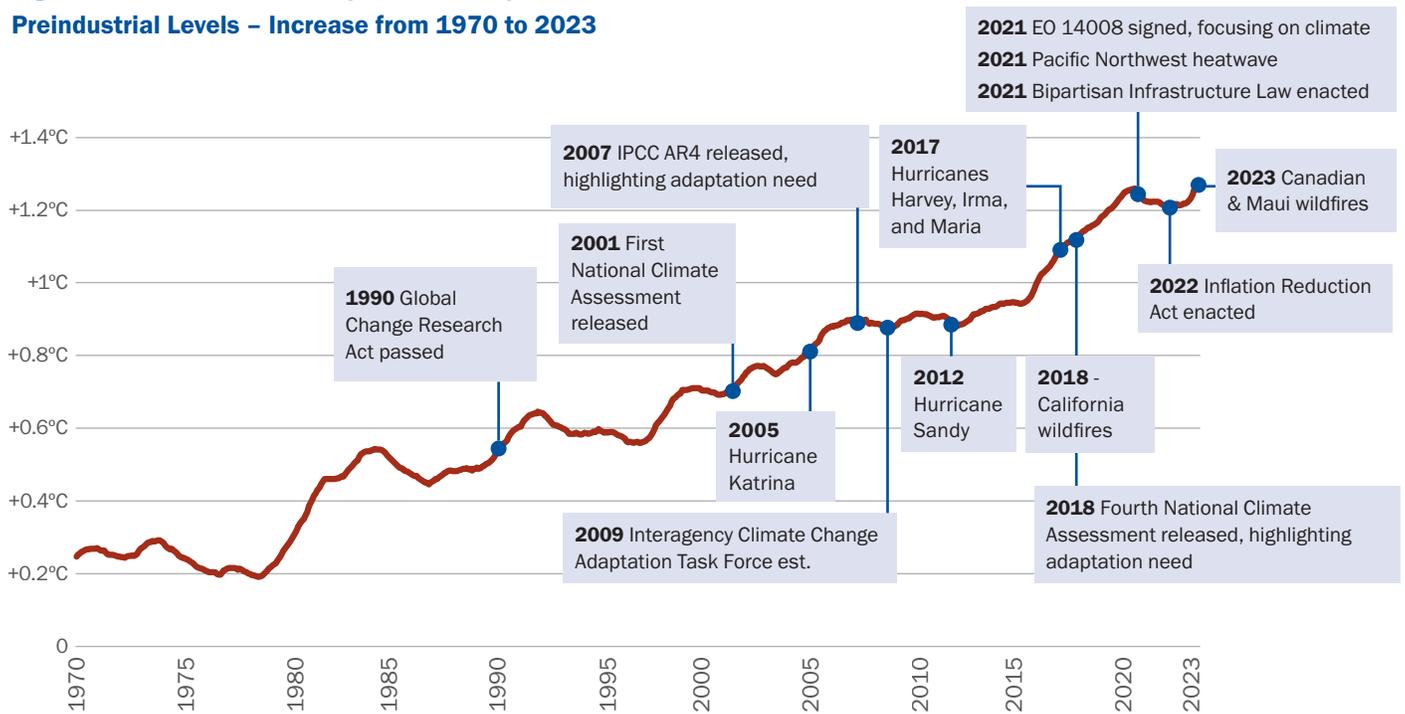
Climate adaptation involves strategic actions aimed at minimizing the negative impacts of climate change. Adaptation measures range widely, including constructing barriers against rising sea levels, modifying agricultural practices to suit changing weather patterns, implementing stricter building codes in regions increasingly susceptible to extreme weather, developing cooling centers or green spaces to protect populations from extreme heat, enhancing disease surveillance systems to monitor health threats, and investing in health infrastructure to ensure healthcare facilities are resilient to climate impacts.

The United States faces various climate challenges. Historically, U.S. adaptation strategies were fragmented, shaped by its federal structure which empowers state and local governments in health and environmental policymaking. This led to a range of solutions tailored to

local needs—for example, a town in Arizona focusing on water conservation to combat prolonged droughts, and a coastal city in Florida prioritizing sea walls or mangrove restoration to address flooding.

This patchwork approach began to coalesce into a more unified strategy in the latter part of the 20th century. A turning point came with the Global Change Research Act of 1990. This legislation required a regular, comprehensive overview of climate change impacts through the National Climate Assessment, published every four years.⁷ These comprehensive reports, rooted in extensive data and research, highlighted the urgency for a coordinated national adaptation strategy and illuminated vulnerabilities in various sectors and regions. This shift marked a significant step toward addressing climate change in a more integrated and informed manner across the nation.

Figure 1: Global Surface Temperature Compared with Preindustrial Levels – Increase from 1970 to 2023



Source: Copernicus/ECMWF

In 2014, the Obama Administration unveiled the Climate Resilience Toolkit,^{8,9} a vital resource equipping communities with tools, data, and guidance for implementing climate adaptation measures. That same year, the U.S. Department of Agriculture introduced Climate Hubs,^{10,11} providing crucial information to farmers and landowners to adapt to changing climate conditions, thereby enhancing the agricultural sector's resilience against climate-related risks.

Also in 2014, the U.S. Department of Health and Human Services released its "Climate Adaptation Plan," which detailed strategies for implementing sustainable operations, promoting climate-resilient health and human services, supporting scientific research on the effects of climate change on health and well-being, and undertaking risk reduction and adaptation measures.¹² It also created the Sustainable and Climate Resilient Health Care Facilities Initiative, which provides the healthcare sector with tools and information to prepare to operate during climate-related events and reduce its environmental impacts.¹³

All of these efforts reflected a growing recognition across various sectors of the need to respond proactively to climate challenges. Innovative adaptations in areas like infrastructure and water resources have become increasingly critical. For instance, coastal regions, facing threats like hurricanes and sea-level rise, are focusing on natural solutions such as restoring barrier islands and mangroves, which provide natural protection and ecological benefits.¹⁴ In urban areas, green infrastructure initiatives, like rain gardens and permeable pavements, help manage stormwater and reduce flooding risks.¹⁵ Meanwhile, water-stressed regions, particularly in the western U.S., are prioritizing water conservation and reuse strategies, employing technologies like efficient irrigation systems¹⁶ and water recycling¹⁷ to sustainably manage scarce water resources.

As awareness of climate threats increased nationally, states and localities began actively utilizing this knowledge. Many developed comprehensive climate action plans, integrating both mitigation strategies—aimed at reducing greenhouse gas emissions—and adaptation strategies to prepare for and manage the effects of climate change.^{18,19}

Collaboration has become a cornerstone of climate adaptation, with partnerships developing among Tribal Nations, the private sector, non-governmental

organizations (NGOs), international entities, and federal, state, and local governments. In California, for example, efforts to combat wildfire risks have seen a diverse range of participants join forces. NGOs like American Forests, through its Reforestation Pipeline Partnership, are focusing on revitalizing critical forest areas,²⁰ while the National Forest Foundation is addressing forest health in fire-affected regions with initiatives such as the Southern California Forest Fund.²¹ These collective efforts aim to restore and maintain resilient forest ecosystems and effectively reduce wildfire risks. In the Pacific Northwest, Tribal Nations are contributing their traditional knowledge to shape fishery management strategies in response to a warming climate.^{22,23,24,25} These collaborations not only bolster the adaptive capacity of these regions but also leverage pooled financial, technical, and knowledge resources for more effective climate adaptation strategies.

Additionally, state and territorial health agencies are implementing Health in All Policies (HiAP) strategies to address climate change through cross-sector collaboration, demonstrating how HiAP can be applied to build relationships, exchange information, share decision-making responsibilities, and effectively address climate adaptation and promote health equity.²⁶ For example, the Washington State Department of Health has integrated climate change into its Office of Emergency Preparedness and Response, working with partners such as other state agencies, Tribal Nations, educational institutions, and local health departments to build resilience against natural disasters, major emergencies, and extreme weather events. In Wisconsin, the Department of Health Services collaborated with multiple state agencies and community stakeholders to develop the Wisconsin Environmental Equity Tool, a comprehensive mapping tool that identifies communities most impacted by pollution, climate change, and other environmental and health hazards.

Parallel to state and local activities, the development of federal funding bolstered adaptation efforts. Grants to states and localities from the Federal Emergency Management Agency (FEMA) have not only supported disaster response and recovery but also contributed to resilience and adaptation projects in regions vulnerable to hurricanes.²⁷ Similarly, the Environmental Protection Agency (EPA) has allocated resources for broader environmental

protection efforts, which include enhancing water quality and managing the impacts of drought, underpinning the agency's commitment to sustainable water management as part of climate adaptation.²⁸ The National Oceanic and Atmospheric Administration (NOAA) extends this support to coastal areas, offering financial and technical assistance to mitigate the effects of sea level rise and coastal erosion, reflecting a comprehensive approach to safeguarding these vulnerable communities.²⁹

In addition to these concrete actions, the expansion of climate awareness and education has been equally significant. Universities, NGOs, and various government entities have been at the forefront of disseminating crucial information and fostering best practices regarding climate change. This collective effort has been instrumental in laying the foundation for a society that is not only more aware of the challenges posed by climate change but also better equipped to face them.

Recent federal initiatives have increasingly recognized the critical link between climate adaptation and

public health.^{30,31} The Centers for Disease Control and Prevention's (CDC) Climate and Health program stands as a pivotal example of this recognition, aiding state, tribal, local, and territorial public health agencies in safeguarding communities by developing strategies that address the wide-ranging health impacts of climate change.³² Programs addressing needs in communities that have been marginalized, particularly those disproportionately affected by climate change, exemplify this approach. These initiatives aim to address health-related impacts like heat-related illnesses, increased air pollution, and vector-borne diseases exacerbated by climate change. In tandem, efforts to fortify healthcare infrastructure against extreme weather events and to promote public health awareness in the context of climate risks are also part of this integrated strategy.^{33,34} These measures underscore the importance of a holistic approach to climate adaptation that includes the active participation of public health systems, acknowledging that environmental changes have profound implications for community health and well-being.

Heat.gov: A One-Stop Resource for Extreme Heat Information and Tools

Launched in July 2022, Heat.gov is a new website developed by the National Integrated Heat Health Information System (NIHHIS) to provide clear, timely, and science-based information to help communities understand and reduce the health risks of extreme heat. Heat.gov serves as a one-stop hub for heat and health information across the nation, offering a range of resources, including:

- Heat forecasts from NOAA's National Weather Service
- National Climate and Health Outlooks developed by the Office of Climate Change and Health Equity within the Department of Health and Human Services.
- The CDC's Heat & Health Tracker, an online tool that provides real-time data and forecasts on heat-related health risks
- Heat planning and preparedness guides
- Information on federal programs, events, and funding opportunities
- Resources to help communities at heightened risk

The website also features an interactive map that provides localized heat information and highlights the NOAA and NIHHIS urban heat island mapping campaigns. By providing easy access to a wide range of resources and data, Heat.gov empowers communities, particularly those most vulnerable, ensuring they have necessary tools to improve resilience against the escalating threat of extreme heat.

Heat.gov exemplifies a robust collaboration among multiple federal partners, including NOAA, the CDC, the EPA, and FEMA, and integrates contributions from state and local health departments, showcasing the collective effort to address extreme heat. By bringing together expertise and resources from numerous stakeholders, Heat.gov aims to improve federal, state, and local capacity to reduce the health, economic, and infrastructural impacts of extreme heat, ultimately supporting the development of a more climate-ready and heat-resilient nation.

Still, the trajectory of climate adaptation in the U.S. has encountered its share of roadblocks. Political shifts have led to fluctuations in support for climate policies and funding. This inconsistency has sometimes resulted in the reduction or reversal of critical environmental programs and regulations, hindering progress in climate resilience and adaptation. Moreover, regional disparities in resource allocation and political commitment further complicate national adaptation efforts, underscoring the complex interplay between localized perspectives and overarching national goals in the context of climate change.

Overall, climate adaptation efforts in the U.S. have not kept up with the increasing severity of environmental changes and risks. The response to threats such as extreme weather, rising sea levels, and other climate-driven challenges has been slow. In the realm of public health, the reaction to climate-related health threats like heatwaves, worsening air quality, and vector-borne diseases has faced several challenges.³⁵ Public health systems have had to grapple with limited resources, competing priorities, and the inherent difficulties in addressing the complex, multifaceted health impacts of climate change. These challenges have been compounded by a historical lack of prioritization and funding for climate-related health initiatives, as well as the need to adapt traditional public health approaches to the unique context of climate change. Despite these obstacles, public health professionals and organizations have been working diligently to develop and implement strategies to protect communities. However, the disparity between the current state of adaptation actions and the growing scale and urgency of climate impacts has underscored the need for more comprehensive, proactive, and well-resourced responses across all sectors.

Many of the key determinants of health in the context of climate change, such as infrastructure development, urban planning, transportation, agriculture, environmental protection, and emergency management, are typically handled by sectors and government agencies beyond health departments but have substantial direct and indirect implications for public health outcomes. For example, the design and maintenance of urban green spaces, which can help mitigate the urban heat island effect and improve air quality, are typically managed by parks and recreation departments or urban planning agencies. Similarly, the development and maintenance of resilient infrastructure, such as flood control systems and heat-resistant housing, are typically managed by agencies like the U.S. Army Corps

of Engineers or the Department of Housing and Urban Development. These infrastructure projects can help protect communities from the health impacts of extreme weather events, such as hurricanes, floods, and heatwaves, which are becoming more frequent and severe due to climate change.

Therefore, public health officials must be a part of proactive, multisectoral collaboration, advocating for health considerations to be integrated into adaptation planning and resilience efforts across these various domains. This requires building partnerships, sharing knowledge, and developing joint strategies with diverse stakeholders, including other government agencies, non-governmental organizations, academia, and the private sector. For instance, public health officials can work with urban planners to ensure that the health benefits of green infrastructure projects are maximized or can collaborate with environmental agencies to monitor and address the health impacts of air pollution, such as respiratory and cardiovascular diseases.

Effective multisectoral collaboration may involve participating in interagency working groups, providing technical assistance, and leveraging public health data and research to inform decision-making. Public health officials can contribute their expertise in health impact assessments, risk communication, and evidence-based interventions to help shape adaptation policies and projects that promote health and health equity. They can also use their knowledge of local health needs and vulnerabilities to advocate for adaptation measures that prioritize populations most at risk, such as low-income communities, older residents, and people with pre-existing health conditions.

Additionally, public health departments bring skills in disease detection and monitoring, risk communication, and collaborating with academic partners to climate and health programs. By tracking key health indicators, such as heat-related illnesses, vector-borne diseases, and air quality-related respiratory problems, public health officials can identify emerging health threats and target interventions accordingly. Through partnerships with academic institutions, public health departments can contribute to research efforts aimed at better understanding the complex pathways through which climate change affects health and evaluating the effectiveness of different adaptation strategies. Finally, public health departments can use their communication channels and community partnerships to raise awareness about climate-

related health risks and promote individual and community resilience. By providing evidence-based information and guidance, public health officials can empower individuals and communities to take action to protect their health in the face of a changing climate.

For years, the federal government's approach to climate adaptation was a fragmented landscape of efforts, highlighting the need for a cohesive federal response. The government has since focused its work, pursuing a new course through global partnerships, strategic policy shifts, an infrastructure focus, and the appointment of climate-focused leaders. A key tenet of this approach was recognizing that the impacts of climate change are not uniformly distributed, with marginalized and frontline communities often disproportionately affected.^{36,37} This includes Indigenous peoples in Alaska and the Southwest, residents of low-income neighborhoods in industrial cities, those living in coastal and agricultural areas, individuals in urban heat islands, those residing in regions prone to wildfires in the Western U.S., and Appalachian areas impacted by coal mining. This acknowledgment steered the federal government towards integrating equity into climate strategies.

In January 2021, the U.S. rejoined the Paris Agreement, illustrating a recommitment to global climate action.³⁸ Subsequently, executive orders have directed the reversal of previous environmental policy rollbacks and catalyzed a comprehensive shift in the U.S.'s climate strategy.^{39,40}

An early example of the new approach was the establishment of the Office of Climate Change and Health Equity (OCCHE) in response to Executive Order 14008, operating under the U.S. Department of Health and Human Services (HHS).⁴² This office is dedicated to addressing the intersection of climate change, health equity, and environmental justice. By leveraging the expertise across HHS, OCCHE aims to mitigate the health impacts of climate change on populations that experience disadvantage, ensuring that climate strategies incorporate health equity considerations. It works to identify communities most at risk from climate change, promote resilience in healthcare infrastructure, and integrate climate considerations into public health interventions. The establishment of OCCHE, notwithstanding the absence of dedicated funding appropriated by Congress, underscores

Heat & Health Tracker: Protecting Public Health in a Changing Climate

In April 2024, the Centers for Disease Control and Prevention (CDC), in partnership with the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS), launched a new Heat and Health Initiative to help protect all U.S. residents from the increasing health risks associated with extreme heat events.⁴¹ The initiative includes three key components:

- 1.** The HeatRisk Forecast Tool, developed by CDC and NOAA, provides a seven-day heat forecast nationwide, indicating when temperatures may reach levels that could harm health.
- 2.** CDC's HeatRisk Dashboard, a consumer-friendly product, integrates data from the HeatRisk Forecast Tool with other information, such as local air quality, to inform the public on how to protect themselves when outdoor temperatures are high.
- 3.** Newly developed CDC clinical guidance helps clinicians keep at-risk individuals safe when temperatures rise, providing condition-specific heat action plans tailored to patients' unique circumstances.

By providing accessible, actionable information and resources, the Heat and Health Initiative represents a significant step forward in equipping public health officials, healthcare providers, and individuals with the tools they need to stay safe and healthy in the face of increasingly frequent and severe extreme heat events driven by climate change.

the U.S. government's commitment to addressing climate change not just as an environmental issue, but as a critical health equity concern, following the broader directives of the executive order to comprehensively tackle the climate crisis and its implications for public health.

As climate adaptation efforts have matured, and as the establishment of OCCHE demonstrates, the focus has increasingly shifted toward not only addressing the physical impacts of climate change but also rectifying the social and health disparities it exacerbates.

Justice40: A Major Push for Environmental Equity

The Justice40 Initiative was announced as part of the executive order on ‘Tackling the Climate Crisis at Home and Abroad’ in early 2021.⁴³

The Justice40 Initiative’s overarching aim is to correct historic environmental inequities and ensure that as the U.S. transitions to a more sustainable and resilient economy, the benefits of this transition are felt equitably across all communities. In essence, it represents an effort to intertwine climate action with social justice, recognizing that the two are inextricably linked.

Embedded within the initiative is a recognition of the interconnected relationship between climate resilience, economic stability, and public health. Climate-resilient communities that can effectively respond to and recover from climate-related events tend to be economically resilient, which in turn supports the overall health and well-being of their residents. Economic stability facilitates access to essential services and resources, reducing vulnerability to health crises. Additionally, climate adaptation measures often promote healthier lifestyles and environments, further enhancing community health. This underscores the importance of integrating climate resilience into public health planning and economic development strategies to build stronger, healthier communities capable of withstanding the impacts of climate change.

Key aspects of the Justice40 Initiative include:^{44,45,46,47,48}

1. Targeted Benefits: The goal is to ensure that at least 40 percent of the benefits from federal investments in areas such as clean energy, sustainable housing, pollution cleanup, and workforce development are directed to disadvantaged communities. The term “benefits” is broadly defined and can include things like job opportunities, clean air and water improvements, and access to renewable energy.

2. Climate and Economic Justice Screening Tool:⁴⁹ Leveraging socioeconomic and environmental indicators, this tool aids federal agencies in identifying communities across all 50 states, the District of Columbia, and U.S. territories that are affected by pollution and underinvestment. It undergoes annual updates and refinements based on feedback and emerging data. Communities are classified as disadvantaged if they are in census tracts that meet thresholds for the tool’s environmental burden categories and an associated

socioeconomic metric, or are located on federally recognized tribal lands. Additionally, tracts surrounded by disadvantaged areas with at least 50 percent of residents qualifying as low-income are also considered disadvantaged. Categories include:⁵⁰

- a. Climate Change:** High risks related to agriculture, buildings, population, floods, or wildfires and ranking in at least the 65th percentile for the percentage of the population that is classified as “low income” (households earning 200 percent of the federal poverty level or less, excluding students in higher education).
- b. Energy:** High energy costs or air pollution (PM2.5) and in at least the 65th percentile for low income. PM2.5 refers to particulate matter that is 2.5 micrometers in diameter or smaller. Due to their small size, PM2.5 particles can be inhaled deeply into the lungs and even enter the bloodstream, posing significant health risks, including respiratory and cardiovascular diseases, and exacerbating conditions like asthma and heart disease.
- c. Health:** High rates of asthma, diabetes, heart disease, or low life expectancy, coupled with being in at least the 65th percentile for low income.
- d. Housing:** Historic underinvestment or high housing costs, lack of green spaces, indoor plumbing, or presence of lead paint, and being in at least the 65th percentile for low income.
- e. Legacy Pollution:** Presence of abandoned mines, defense sites, proximity to hazardous waste, Superfund sites, or Risk Management Plan facilities (a hazardous-substances site that must have plans to prevent and mitigate chemical accidents), in at least the 65th percentile for low income.
- f. Transportation:** High exposure to diesel particulate, transportation barriers, or traffic proximity, and at least 65th percentile for low income.
- g. Water and Wastewater:** Presence of underground storage tanks or wastewater discharge and at least 65th percentile for low income.
- h. Workforce Development:** High levels of linguistic isolation, poverty, or unemployment, or low median income and over 10 percent of individuals aged 25+ lacking a high school diploma.

3. Broad Scope of Investment: The investments encompassed by the Justice40 Initiative are wide-ranging. They include renewable energy deployment, energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, remediation of legacy pollution, and infrastructure development.

4. Interagency Council: An interagency council on environmental justice has been established to coordinate efforts across the federal government, ensuring that agencies collaborate effectively in achieving the initiative's goals.

5. Accountability and Transparency: The initiative emphasizes regular reporting and tracking of progress. Federal agencies are required to provide annual public reports detailing their efforts in directing benefits to disadvantaged communities.

By November 2023, the Justice40 Initiative encompassed 518 programs across 19 federal agencies. This expansive

network of programs spans diverse areas, including climate change, clean energy, affordable housing, workforce development, and environmental remediation.^{51,52} At around the same time, the White House Council on Environmental Quality (CEQ) announced its plan to update the Administration's Environmental Justice Scorecard, a tool launched in April 2023 that assesses progress federal agencies are making to advance environmental justice, including through the Justice40 Initiative. For example, according to the scorecard, the Department of Health and Human Services has implemented several initiatives under the Justice40 umbrella, focusing on areas such as environmental health, infrastructure improvements in tribal communities, and addressing the impacts of climate change on disadvantaged groups.⁵³

While challenges remain, such as ensuring meaningful community engagement and developing robust metrics to track progress, the Justice40 Initiative has already begun to direct much-needed resources to communities most impacted by environmental and economic disparities.

Infrastructure Investment and Jobs Act: Paving the Path to Climate Resilience

By the early 2020s, a growing consensus existed about the pressing need to bolster infrastructure and enhance community preparedness for more frequent extreme weather events. Yet, the nation's foundational systems, including extensive road networks and complex electrical grids, were showing their age and vulnerability, increasingly strained under climate-induced stresses.

This sense of urgency and purpose around climate adaptation was given further weight by international research. The Intergovernmental Panel on Climate Change (IPCC), a leading international body for assessing climate science, released its Sixth Assessment Report, which offered a global perspective on the need for well-planned, effective adaptation strategies.⁵⁴ It cautioned against short-sighted measures, which might offer immediate relief but exacerbate vulnerabilities in the long run. The report also highlighted the value of inclusive adaptation strategies. This means not only bridging the gap between federal directives and local actions but also integrating the insights and needs of communities that have been marginalized. In the U.S., this inclusivity recognizes the invaluable contributions of Indigenous peoples and

other communities of color, as well as community-based groups and residents of affected areas, all of whom bring a deep understanding of local ecosystems and often bear a disproportionate burden of climate impacts.

Within this context, the Infrastructure Investment and Jobs Act (also known as the Bipartisan Infrastructure Law or BIL) emerged as a significant legislative response to the growing consensus on infrastructure and climate adaptation needs. While not a complete solution, it signaled an important shift in the U.S. approach to addressing these challenges, building upon prior efforts and setting the stage for further progress in strengthening the nation's resilience to climate change. With its provisions ranging from modernizing transportation infrastructure and replacing lead-piped water systems to expanding broadband access, the act was comprehensive in its sweep. More crucially, it dedicated significant funds and resources to projects specifically aimed at making the nation's infrastructure resilient to climate change. This was more than just repairing and building; it was about reimagining and enhancing long-term sustainability.

This piece of legislation did not exist in isolation; rather, it fit into the larger narrative of climate adaptation in the U.S. Historically, America's journey towards a resilient future had been punctuated with sporadic efforts, often reactionary in nature and tethered to regional specifics. But with this act, there was broad recognition of the intertwined fates of infrastructure and climate change. While individual states like California, grappling with wildfires, or Florida, facing the brunt of hurricanes, had their own localized efforts, the Bipartisan Infrastructure Law (BIL) knitted these disparate threads into a cohesive national strategy. It represents one of the most significant federal commitments in history to adaptation and resilience.

The law placed a heavy emphasis on resilience, committing over \$50 billion to ensure the country's foundational systems can withstand the multifaceted threats of climate change and extreme weather.⁵⁵ Each year, millions of U.S. residents bear firsthand witness to the destructive powers of climate change, be it through inundated neighborhoods and schools, prolonged power outages, or smoky skies. Likewise, climate change's health impacts are felt by many, from the exacerbation of respiratory and cardiovascular conditions due to poor air quality to the spread of diseases following floods. It is often people of color who find themselves disproportionately exposed to and impacted by severe weather.

The BIL aims to fortify our nation against such adversities. It was meant to bolster our infrastructure's resistance against droughts, extreme heat, floods, rampant wildfires, and other threats. Key elements of the law include (among others):⁵⁶

- **Clean Drinking Water.** With an allocation of \$55 billion, the legislation seeks not just to expand access but also to eliminate the long-standing issue of lead service pipes. This move is particularly aimed at benefiting underprivileged communities, ensuring that every U.S. resident can trust the water flowing from their taps.
- **Roads and Bridges.** The very backbone of America's transportation has been earmarked for significant reinforcement. \$110 billion is channeled to not just repair, but to reconstruct these critical pathways with a keen eye on climate resilience and safety.
- **The National Highway Performance Program (NHPP)** is centered on enhancing the condition, performance, and resilience of the National Highway System (NHS). Beyond the Interstate System, the NHS encompasses the Strategic Highway Network, major connectors, and both urban and rural primary roads. Funding from the

NHPP is designated exclusively for projects aligned with the program's objectives, as updated by the BIL. These objectives aim, among other goals, to enhance the NHS's resilience against sea level rise, extreme weather events, and other natural disasters. The BIL notably introduced the latter goal, emphasizing the importance of resilience against natural catastrophes and cybersecurity threats.⁵⁷

- **The Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)** initiative introduces two programs managed by the Federal Highway Administration.⁵⁸ The **PROTECT - Formula Program**, with \$7.3 billion over four years, supports resilience improvements in transportation infrastructure, focusing on community resilience and evacuation routes. The **PROTECT - Discretionary Grants Program** offers \$1.4 billion over four years for similar resilience projects, available to a wider range of recipients, including local governments and tribes.⁵⁹ Both programs have an 80 percent federal and 20 percent non-federal cost-share, with exceptions for certain tribal projects.
- **Public Transit** is indispensable in urban centers. The BIL acknowledges this by investing \$89.9 billion to revitalize transit infrastructure, simultaneously paving the way for reduced greenhouse gas emissions.
- **Power Infrastructure.** Over \$65 billion is invested to secure a future powered by clean, reliable energy, a step that is vital for climate adaptation.
- **Environmental Clean-up.** As a testament to the importance of environmental justice, the law allocates \$21 billion to rejuvenate Superfund and brownfield sites, reclaim deserted mines, and cap orphaned oil and gas wells.

Editor's note: This is not a comprehensive summary of the law, which also includes provisions related to broadband internet, airports and ports, rail systems, and electric vehicle chargers.

The BIL, by allocating unprecedented funds towards modernizing and safeguarding the country's infrastructure against climate change, lays the groundwork for a more climate-resilient future. As detailed below, the law catalyzes a range of initiatives designed to protect U.S. communities, ecosystems, and public health. These programs are integral to transforming the law's strategic vision into tangible benefits, enhancing the adaptive capacity of the nation's infrastructure, and helping to ensure a sustainable environment for future generations.

Climate Adaptation Programs

This section delves into the specific programs that are instrumental in translating the BIL's ambitious climate adaptation-related goals into actionable strategies and projects. It explores a diverse portfolio of initiatives, each designed to address distinct aspects of climate adaptation—from enhancing the resilience of critical infrastructure and ecosystems to safeguarding communities against the increasing severity of climate-induced hazards. Through a combination of federal funding, strategic planning, and collaborative efforts across various levels of government and sectors, these programs represent a multifaceted approach to climate adaptation. They aim not only to mitigate the immediate impacts of climate events but also to build long-term sustainability and resilience into the fabric of our communities—all efforts that ultimately protect the public's health.

Wildfire Management

- The Bipartisan Infrastructure Law allocates substantial funding to the **U.S. Department of the Interior** for various wildfire management and mitigation programs. It includes **\$878 million** for fuels management to reduce hazardous fuels,⁶⁰ **\$325 million** for burned area rehabilitation post-wildfires,⁶¹ and **\$245 million** for preparedness programs to enhance federal response readiness and firefighter support.⁶² Additionally, **\$10 million** is designated for the Joint Fire Science Program, focusing on research in wildland fire management.⁶³
- The BIL's wildfire management provisions that are administered by the **Forest Service** within the **U.S. Department of Agriculture** encompass various programs that total about **\$3.8 billion**.⁶⁴ These include the Community Wildfire Defense Grant Program (\$1 billion), hazardous fuels management (\$514 million), federal wildland firefighter salaries and expenses (\$480 million), and additional hazardous fuels provisions (\$400 million). Significant funds are also allocated to burned area recovery (\$325 million), fuel breaks (\$250 million), prescribed fires (\$250 million), post-fire restoration (\$100 million), native vegetation restoration (\$100 million), and forest health management (\$100 million). Capital improvement and maintenance receive \$100 million, state fire assistance \$88 million, fire response workshops/training \$50 million, volunteer fire assistance \$20 million, the Joint Fire Science Program (with the **Department of the Interior**) \$10 million, and wildfire detection equipment \$5 million.

- The **Department of Commerce's National Oceanic and Atmospheric Administration (NOAA)** is allocating **\$50 million** from the Bipartisan Infrastructure Law to support wildfire prediction, detection, observation, modeling, and forecasting.⁶⁵ NOAA will work with partners to enhance weather, smoke, and fire behavior forecasts; provide information for improved risk management and resource planning; conduct research on the health and air quality impacts of fires; and advance fire weather science innovations. The funds will be distributed through various mechanisms to states, local governments, tribes, higher education institutions, and nonprofits, with no non-federal cost share required.

Technological Innovation and Grid Resilience

- The Bipartisan Infrastructure Law allocates **\$10 billion** across two **U.S. Department of Energy** programs to enhance the electric grid's reliability and resilience. The first—**Program Upgrading Our Electric Grid and Ensuring Reliability and Resiliency**, also known as the **Grid Innovation Program**—with \$5 billion in funding, is dedicated to innovative transmission, storage, and distribution infrastructure projects to boost grid resilience.⁶⁶ The second program—**Preventing Outages and Enhancing the Resilience of the Electric Grid / Hazard Hardening**—also has \$5 billion for states, tribes, and other entities to prevent outages and harden the grid against hazards, with a focus on mitigating wildfire risks and other disruptive events.⁶⁷ Both programs require cost-sharing, are designed to supplement existing efforts, and are available until the funds are expended.

Public Safety and Disaster Preparedness

- The **Flood Mitigation Assistance Grant Program (\$3.5 billion)** is a competitive initiative designed to support states, local communities, federally recognized tribes, and territories in mitigating the risk of recurrent flood damage to structures under the National Flood Insurance Program.^{68,69} **FEMA** selects beneficiaries based on the project's ranking, its eligibility, and its cost-effectiveness. Additionally, to qualify for specific non-emergency disaster aid, including mitigation assistance funding, **FEMA** mandates state, local, tribal, and territorial governments to formulate and implement hazard mitigation strategies. This approach ensures a proactive stance on climate adaptation, emphasizing preparedness and resilience.
- The **Safeguarding Tomorrow Revolving Loan Fund Program** is administered by **FEMA**.⁷⁰ With an allocation of **\$500 million** through fiscal year 2026, the program

provides capitalization grants, which are initial funding resources used to create revolving loan funds. These funds continually finance projects as loans are repaid, aiding local governments in mitigating risks from natural hazards and disasters. In FY 2024, FEMA earmarked \$150 million for the program to offer low-interest loans, particularly targeting resilience enhancements in low-income and underserved communities. Eligible entities include states, territories, the District of Columbia, and federally recognized tribes affected by major disasters. This program directly empowers these entities to make funding decisions and award loans. The program's focus on resilience and mitigation aligns with climate adaptation goals, addressing the growing frequency and intensity of climate-related hazards.

- The Bipartisan Infrastructure Law's allocation of **\$585 million to FEMA's Rehabilitation of High Hazard Potential Dams Grant Program** is a significant investment in enhancing dam safety and resilience.^{71,72} Administered by states, this program allows distribution of funds to non-federal governmental and nonprofit organizations. It prioritizes rehabilitation projects for dams that do not meet safety standards and pose serious risks to communities. These projects include a range of activities from repairs to structural modifications, with a focus on mitigating threats from deteriorating dams. The program's eligibility criteria, compliance requirements, and prioritization methods help ensure that the most critical projects receive attention. This initiative is vital for climate and health adaptation, as it directly addresses the need for secure and resilient water infrastructure in the face of increasing risks such as severe flooding, extreme weather events, and the deterioration of aging dam structures.

Infrastructure and Community Resilience

- The **Building Resilient Infrastructure and Communities** program, administered by FEMA and funded with **\$1 billion**, offers grants aimed at identifying and implementing mitigation actions to counteract risks from natural hazards.^{73,74} It emphasizes fostering partnerships for high-impact investments, bolstering the adoption of codes and standards for comprehensive risk reduction, and protecting life and property from future disasters. States and territories that have experienced a major disaster in the preceding seven years, or federally recognized tribes situated within such states, are eligible for funding. Public utilities, certain private non-profit, and private for-profit utilities can also apply, provided a local government champions their application.⁷⁵

Water Resources and Conservation

- The **Watershed Protection and Flood Prevention Operations (WFPO) Program (\$500 million)**, authorized by the Flood Control Act of 1944 and the Watershed Protection and Flood Prevention Act of 1954, facilitates cooperation between the federal government, states, and local subdivisions to address erosion, floodwater, and sediment issues.^{76,77} Aimed at optimizing land and water usage, the WFPO provides technical and financial support to various governmental entities to implement watershed plans targeting flood prevention, watershed protection, public recreation, and other objectives. Watersheds, land areas drained by specific streams, typically under 250,000 acres, are the program's focus. Local community involvement is essential, with projects co-designed and executed by local, state, and federal agencies and backed by landowners and residents. The **Natural Resources Conservation Service (NRCS)**, a U.S. federal agency within the **U.S. Department of Agriculture**, offers program support. Projects encompass a variety of conservation measures, from dams to terraces, and prioritize both agricultural and non-agricultural water management, enhancing supplies, improving quality, and catering to diverse needs like municipal use and recreation.
- The Bipartisan Infrastructure Law's **WaterSMART Water and Energy Efficiency Grants**, administered by the **Bureau of Reclamation, Department of the Interior**, allocate **\$400 million** for competitive grants to improve water management. These grants, under the authority of the SECURE Water Act, focus on enhancing water supply sustainability, increasing drought resilience, and providing environmental benefits. The funding is available until expended and requires varying cost shares from recipients, ranging from 25 percent up to 65 percent for some projects. Eligible uses include projects that contribute to water management improvements with sustainability and environmental advantages.⁷⁸

Climate Research and Data Management

- The Bipartisan Infrastructure Law's **\$492 million** investment in **flood and inundation mapping, forecasting, and water modeling** addresses the escalating water-related challenges in the United States, including floods, water availability, and water quality, all exacerbated by climate change.⁷⁹ Central to this initiative is **NOAA's** five-year plan to transform water prediction, delivering the first-ever, coupled, continental-scale operational services for coastal and inland flood forecasting and inundation mapping. This project focuses on providing equitable, actionable

decision support services to communities nationwide. It also includes updating the U.S. precipitation frequency atlases to account for climate change, developing modernized probable maximum precipitation studies, and enhancing coastal water prediction capabilities. This comprehensive approach aims to bolster national security and economic stability by, among other services, supporting the resilient design and operation of crucial infrastructure, from energy to transportation systems.

Coastal and Habitat Restoration

- The **Habitat Restoration Program**, managed by NOAA's **Office of Habitat Conservation**, is an initiative with **\$491 million** in funding over five years.⁸⁰ Its primary aim is to restore and protect diverse ecosystems such as marine, estuarine, coastal, and Great Lakes habitats. This is achieved through contracts, grants, and cooperative agreements that provide both funding and technical assistance. NOAA's Restoration Center leads the implementation through competitive grants and expert guidance. The program focuses on high-impact projects that not only restore natural habitats like wetlands, coral, and oyster reefs but also enhance the resilience of coastal

communities against environmental threats like flooding. In 2022, it announced two funding opportunities: one for transformational projects aiding fisheries and community resilience, and another for capacity building in underserved communities for habitat restoration. The overarching goal is to foster ecosystems and communities that are both resilient and sustainable, with a focus on productive fisheries, species conservation, and socioeconomic benefits.

- The **National Oceans and Coastal Security Fund**, enhanced by the Bipartisan Infrastructure Law with an allocation of **\$492 million** over five years, is administered by NOAA's **Office for Coastal Management**.⁸¹ The fund supports natural and nature-based infrastructure projects like restoring marshes, wetlands, and coral reefs to protect against coastal flooding and enhance ecological integrity. These initiatives are crucial for mitigating coastal flooding and erosion impacts on community health and infrastructure. The program places a strong emphasis on equity, targeting assistance to communities most vulnerable to climate impacts, particularly those historically disadvantaged. This approach involves not



only enhanced engagement and technical assistance but also partnerships with private sectors and equity-focused organizations, ensuring effective collaboration with state, local, tribal, and territorial governments.

- The **National Estuary Program (NEP) Watersheds Grants**, part of the Bipartisan Infrastructure Law and managed by the **Environmental Protection Agency**, were allocated **\$132 million** to protect and restore the water quality and resources of nationally significant estuaries. This program supports 28 local NEPs using ecosystem-based management for their protection and restoration goals. The funding is available until expended and covers a range of actions, including habitat restoration, water quality improvement, pollution reduction, climate change adaptation, and coastal resilience promotion. The program also emphasizes engaging communities in urban areas that are historically underserved, focusing on ecosystem restoration and educational initiatives. NEPs have long been key players in addressing climate change impacts in their watersheds through partnerships and green, nature-based solutions. Their climate efforts include assessing and planning for vulnerabilities and resilience, habitat restoration, and water infrastructure projects that integrate innovative adaptation and resilience strategies. Additionally, they focus on climate-related research, particularly in carbon sequestration and adaptation, and on outreach and education projects related to climate change.⁸²
- The **Coastal Zone Management Program** of the Bipartisan Infrastructure Law, overseen by **NOAA's Office for Coastal Management**, allocates **\$207 million**.⁸³ This funding is distributed over two years in tranches for competitive and noncompetitive grants. It aims to restore and protect coastal ecosystems through direct investment by coastal states and

territories in ecologically significant habitats. Key focuses include climate change, ocean planning, and energy facility development, with the goal of conserving lands crucial for community resilience against natural hazards. No non-federal cost share is required for this program.

Tribal Resilience

- The Bipartisan Infrastructure Law's provisions for **Tribal Climate Resilience** include two key programs managed by the **Bureau of Indian Affairs**.⁸⁴ The **Voluntary Community-Driven Relocation** program, with **\$130 million**, supports Tribal Nations' governments in strategies like community relocation or protect-in-place actions in response to coastal or riverine erosion, flooding, permafrost degradation, sea level rise, and other impacts. The program covers assessment, monitoring, planning, and implementation activities, aiming to safeguard infrastructure and resources at risk due to climate change impacts. In November 2022, the White House announced a \$135 million commitment to assist 11 severely impacted tribes with relocation and adaptation planning. The initiative, one of the first federal programs of its kind, focuses on collaborating with community leaders to relocate key infrastructure and enhance resilience against climate threats.⁸⁵ The **Tribal Climate Resilience Annual Awards Program**, funded at **\$86 million**, aids in climate-resilient planning to sustain tribal ecosystems and resources.⁸⁶ This program aids in various activities, including training, vulnerability assessments, adaptation planning, and coastal management. It focuses on sustaining the health and safety of tribal lands and peoples in the face of climate change. Both programs have no federal cost-share requirements and are designed to help tribes adapt to evolving environmental challenges.

Inflation Reduction Act: Amplifying Climate Resilience and Sustainability

Following the Bipartisan Infrastructure Law, the United States took another significant step forward in combating climate change with the enactment of the Inflation Reduction Act (IRA) in August 2022. This landmark legislation builds on the foundation laid by its predecessor, not only by continuing to address the pressing need for climate resilience but also by expanding the scope to include substantial investments in clean energy and greenhouse gas emissions reduction.

The Inflation Reduction Act reflects a comprehensive strategy aimed at transforming the country's energy landscape. It includes incentives for renewable energy production, energy efficiency improvements, and the adoption of electric vehicles, among other initiatives. These measures are designed to significantly reduce the United States' carbon footprint, addressing the root causes of climate change while also enhancing the nation's resilience to its impacts.

Central to the IRA's approach is the recognition of the urgent need for inclusive climate action. Much like the Bipartisan Infrastructure Law, the Inflation Reduction Act emphasizes the importance of supporting communities that have been marginalized, which are often most vulnerable to the adverse effects of climate change.

The enactment of the IRA, coming less than a year after the Infrastructure Investment and Jobs Act, signifies a period of rapid legislative action in response to the global climate crisis. Together, these laws form a robust framework for the United States' climate adaptation and mitigation efforts, addressing both the causes and consequences of climate change. As the nation moves towards implementing these ambitious policies, the synergy between infrastructure resilience, clean energy, and sustainable development will be critical in shaping a resilient and sustainable future for all residents.

Adaptation Provisions of the IRA

While the Inflation Reduction Act is primarily oriented toward climate mitigation, focusing on reducing greenhouse gas emissions and promoting clean energy, it also incorporates several provisions aimed at climate adaptation. These adaptation measures are essential for enhancing the resilience of communities and ecosystems to the ongoing impacts of climate change. The IRA's adaptation provisions span a broad array of programs,

demonstrating a multifaceted approach to building resilience across different sectors and communities.

The Environmental Quality Incentives Program (EQIP) and the Drought Mitigation Program exemplify this approach by offering assistance for soil, water, and air quality improvements, drought resilience, and adaptation to weather volatility. The law also prioritizes community resilience through the Environmental and Climate Justice Block Grants, funding initiatives for pollution reduction and resilience enhancement. Programs like Investing in Coastal Communities and Climate Resilience and the Green and Resilient Retrofit Program highlight adaptation efforts for coastal communities and HUD-assisted properties, emphasizing energy, water efficiency, and climate resilience. Moreover, the IRA makes significant investments in Tribal Climate Resilience, supporting ecosystem and community adaptation strategies, including habitat restoration and relocation.

Through these and other provisions, the Inflation Reduction Act integrates climate adaptation measures into its broader climate policy framework. By doing so, the IRA complements the Infrastructure Investment and Jobs Act, expanding the United States' approach to not only mitigate climate change but also adapt to its current and projected impacts, ensuring that communities and ecosystems are better prepared. This integrated approach is crucial for effectively addressing the multifaceted challenges posed by climate change.

Agricultural and Land Management Resilience

- The **Environmental Quality Incentives Program (EQIP)**, administered by the **Natural Resources Conservation Service of the Department of Agriculture**, received **\$8.45 billion**.⁸⁷ EQIP offers technical and financial assistance to agricultural producers for conservation practices that improve soil, water, and air quality, and enhance wildlife habitats. It also focuses on drought resilience, weather volatility adaptation, energy conservation, and greenhouse gas reduction in agricultural production. The program is open to agriculture producers, including nonindustrial private forest landowners and Tribal Nations.⁸⁸

Drought Resilience and Water Conservation

- The **Drought Mitigation** program, managed by the **Department of the Interior**, received **\$4 billion** for actions to protect basins like the Colorado River, Sacramento-San Joaquin, Klamath, and Rio Grande

from long-term drought. Available until 2026, it supports projects ensuring that conserved water benefits drought-affected basins and prevents its diversion for consumptive use. The program is open to public entities and Tribal Nations, with no mandatory cost-sharing but subject to determination by the Commissioner.^{89,90}

Environmental Justice and Community Resilience

- The **Environmental and Climate Justice Block Grants** program, administered by the EPA's Office of Environmental Justice and External Civil Rights, is allocated **\$3 billion** until September 30, 2026. It aims to support community-based organizations in reducing indoor and outdoor pollution, including greenhouse gases, and in enhancing community resilience to climate change impacts. This program includes grants and technical assistance for pollution monitoring, capacity building, and promoting engagement in decision-making processes. Eligible recipients include community-based nonprofits, partnerships with nonprofits, Tribal Nations, local governments, and educational institutions. The focus is on community-led pollution mitigation, climate resilience, reducing indoor pollution, and fostering community involvement in environmental processes.⁹¹

Coastal and Marine Resilience

- The **Investing in Coastal Communities and Climate Resilience** program, overseen by NOAA, dedicates **\$2.6 billion** to support coastal and marine habitat conservation, restoration, and protection, including fisheries.⁹² This funding, available until 2026, will aid coastal communities in preparing for climate-related challenges like extreme storms. It targets coastal states, tribal governments, non-profits, local governments, and educational institutions. The specific uses include projects that sustain natural resources crucial for coastal and marine-dependent communities, with cost share and formula funding details to be determined.⁹³

Urban Infrastructure and Housing Resilience

- The **Green and Resilient Retrofit Program** under the IRA, managed by the **Department of Housing and Urban Development (HUD)**, provides funds for enhancing HUD-assisted properties. It includes **\$837.5 million** for grants and loans to improve energy and water efficiency, air quality, and climate resilience, available until 2028. An additional **\$60 million** is allocated for contracts and cooperative agreements to implement the program until 2029. Furthermore, **\$42.5 million** is dedicated to energy and water benchmarking and related data analysis, available until 2028.⁹⁴

Indigenous and Territorial Resilience

- The **Department of the Interior** manages two significant **Tribal Climate Resilience** programs under the IRA. The first, with a **\$225 million** budget, supports broad climate resilience planning for tribal ecosystems, including habitat restoration and community relocation, until 2031. The second program, allocated \$10 million, focuses specifically on sustaining 88 tribal fish hatcheries, ensuring their operational longevity through maintenance and operational support, also available until 2031. Both programs offer financial assistance through grants, contracts, and direct federal spending, with no cost-sharing for tribes.⁹⁵
- The **Emergency Drought Relief for Tribes** program, managed by the Bureau of Reclamation within the **Department of the Interior**, provides **\$12.5 million** for drought relief for Tribal Nations impacted by Bureau of Reclamation water projects. This new program, available until September 2026, focuses on mitigating drought impacts, including water shortages and the loss of tribal resources, through grants or cooperative agreements.⁹⁶
- The **Native Hawaiian Climate Resilience Program**, introduced under the IRA by the **Department of the Interior's Office of Native Hawaiian Relations**, provides **\$25 million** for climate change adaptation and resilience for the Native Hawaiian community. This new program aims to support activities that preserve the community's identity while building capacity for adaptation and transformation in response to climate change. It covers a range of activities, including education, research, resource management, and technical assistance, and is available to various recipients, including Native Hawaiian organizations and NGOs, with no cost-sharing requirements.⁹⁷
- The **Climate Change Technical Assistance for Territories** program, under the **Department of the Interior's Office of Insular Affairs**, allocates **\$15.9 million** for climate change planning, mitigation, adaptation, and resilience in U.S. insular areas. These include American Samoa, Guam, the Northern Mariana Islands, the U.S. Virgin Islands, and Puerto Rico. Available until September 2026, this new program will utilize grants and direct federal spending without cost-sharing requirements.⁹⁸

Climate Research and Data Management

- Three programs administered by NOAA focus on climate and weather research and preparedness. The **\$200 million Climate Data and Services program** enhances climate research and forecasting capabilities. The **Computing Capacity and Research for Weather, Oceans, and Climate program**, with **\$190 million**, improves data processing for weather and ocean studies. **\$100 million** is allocated for new hurricane forecasting aircraft, boosting storm tracking efficiency. Additionally, the **Department of the Interior's 3D Elevation Program**, funded at **\$23.5 million**, aims to create detailed 3D elevation data, crucial for responding to natural disasters.⁹⁹

Two Years of Progress

The first two years of the **Bipartisan Infrastructure Law** have seen progress in advancing climate adaptation and equity priorities, with significant investments directed towards bolstering the nation's resilience.¹⁰⁰ Over \$50 billion have been dedicated to an all-hazards approach, safeguarding communities from physical, climate, and cybersecurity-related threats. This comprehensive strategy encompasses projects such as the removal of flammable materials from millions of acres of land to reduce the threat of wildfires. In addition, funding has been channeled into water infrastructure and conservation projects, aiming to advance drought resilience in vulnerable areas. One example is the Gila River Indian Community's project, funded with \$118 million, which will conserve crucial water resources, alleviating drought pressures in the Colorado River Basin.

Equity remains a fundamental pillar of the law, with a strong commitment to addressing environmental injustices that have disproportionately burdened disadvantaged communities. The Justice40 Initiative ensures that over 180 programs associated with the law deliver at least 40 percent of their benefits to these communities. In practice, this has translated into prioritized funding for, among other priorities, clean drinking water and lead pipe replacement, with at least 49 percent allocated to communities that have experienced disadvantage. Superfund site investments have directed 76 percent of their funding toward construction projects in areas with potential environmental justice concerns. Furthermore, the Army Corps of Engineers has invested \$1.3 billion in projects that will make communities that have experienced disadvantage more resilient to flooding and the impacts of climate change.

Rural regions and tribal communities have received particular attention, with significant investments aimed at addressing their unique challenges. Rural areas across the nation are benefiting from billions of dollars directed towards improving infrastructure, including affordable high-speed internet, safe transportation networks, and essential utility services. The law's \$13 billion commitment to tribal communities represents the largest-ever investment in tribal infrastructure. With initiatives like the voluntary community-driven relocation program, these funds are helping tribal communities affected by climate-related environmental threats.

Infrastructure Coordinators have been appointed to facilitate communication and collaboration between federal, state, local, tribal, and territorial governments. Technical assistance guides and resources are available to assist communities in unlocking the full potential of the law. This support complements the place-based technical assistance provided through initiatives like the Thriving Communities Network and Rural Partners Network, addressing economic distress and systemic disinvestment in underserved areas.

With respect to the **Inflation Reduction Act's** first year, the country has made significant strides in climate action and infrastructure development.¹⁰¹ Key achievements include the creation of over 170,000 clean energy jobs, spurred by over \$110 billion in clean energy manufacturing investments. The law has propelled a substantial reduction in greenhouse gas emissions, demonstrating a solid foundation towards meeting ambitious mitigation goals and improving air quality.

Crucial to climate adaptation, the law has allocated over a billion dollars to enhance community resilience against climate-induced challenges such as drought, heat, and extreme weather. This funding supports, among other priorities, nearly 150 projects across 30 coastal states and territories, emphasizing coastal resilience and protection against extreme climate events.

Moreover, the Inflation Reduction Act, together with the Bipartisan Infrastructure Law, has created a path towards achieving a clean energy economy, highlighting the synergy between climate mitigation and adaptation strategies. The combined impact of these laws is expected to be instrumental in driving the United States towards its goal of significantly reducing greenhouse gas emissions by 2030 and ultimately reaching net-zero emissions by 2050.¹⁰²

Announced Bipartisan Infrastructure Law Funding for States

Efforts through the Bipartisan Infrastructure Law to bolster the nation’s infrastructure and enhance resilience against climate change are being systematically documented.¹⁰³ Each state’s allocation of funds is recorded, and regularly updated details on the impact of the law, highlighting funding allocations and specific projects across various sectors, are published. The reporting includes investments in transportation (roads, bridges, public transit), internet access, water infrastructure, clean energy, and environmental resilience. The information showcases efforts to improve infrastructure, enhance public services, and address climate change and pollution, emphasizing benefits for local communities, including rural and underserved areas. Through the collection of data for states and territories, a comprehensive overview of the law’s reach and impact emerges. The data serve as a valuable tool for stakeholders at all levels to understand where and how the federal funds are being channeled.

Table 1 presents a subset of reported funding as of March 2024. This segmentation of data provides an in-depth look into the allocation of resources across crucial sectors. By examining these categories, stakeholders can gauge the scale and scope of federal efforts to mitigate the impacts of extreme weather events, safeguard water resources, reinforce power grid reliability, and remediate environmental hazards.

Note: The “Clean and Safe Water” category signifies investment in the U.S.’s water infrastructure, focusing on replacing lead service lines and addressing Per- and Polyfluoroalkyl Substances (PFAS) chemicals, with substantial allocations for statewide water safety and infrastructure improvements through the Environmental Protection Agency. “Power Outage Prevention & Grid Resilience” reflects investments aimed at enhancing the power grid’s resilience and preventing outages, part of the broader efforts under the Bipartisan Infrastructure Law to upgrade the U.S.’s power infrastructure. “Resilience” refers to allocations aimed at enhancing community resilience against the impacts of climate change, extreme weather events, and other hazards, including cyberattacks. “Flood Mitigation” is a subset of “Resilience.” “Superfund and Brownfield Site Cleanup” encompasses efforts to address legacy pollution by cleaning up hazardous sites, including Superfund and brownfield locations.

Source: *The White House*¹⁰⁴

TABLE 1: Bipartisan Infrastructure Law Funding Breakdown by State and Territory – Allocations for Key Categories, as of March 2024 (in millions)

	Overall Funding	Clean & Safe Water	Power Outage Prevention & Grid Resilience
Alabama	\$6,400	\$379	\$20.10
Alaska	\$7,600	\$849	\$345.10
American Samoa	\$188.30	\$97	\$2.10
Arizona	\$7,700	\$983	\$30.60
Arkansas	\$5,200	\$260	\$33.70
California	\$41,000	\$3,000	\$260.10
Colorado	\$6,400	\$653	\$26.40
Commonwealth of the Northern Mariana Islands	\$244.50	\$82	\$3.40
Connecticut	\$6,400	\$254	\$10.50
Delaware	\$1,500	\$196	\$12.20
District of Columbia	\$2,300	\$203	\$4
Florida	\$16,200	\$995	\$162.80
Georgia	\$10,200	\$486	\$275.10
Guam	\$362.40	\$92	\$2.50
Hawaii	\$2,200	\$218	\$121.90
Idaho	\$2,700	\$274	\$16
Illinois	\$15,700	\$1,000	\$75.70
Indiana	\$6,700	\$438	\$13.90
Iowa	\$4,300	\$321	\$17.60
Kansas	\$3,300	\$257	\$117.60
Kentucky	\$7,000	\$299	\$16.60
Louisiana	\$8,500	\$329	\$329.30
Maine	\$2,300	\$222	\$38.30
Maryland	\$12,500	\$437	\$46.50
Massachusetts	\$7,100	\$553	\$64.60
Michigan	\$10,400	\$699	\$148.70
Minnesota	\$6,200	\$421	\$485.50
Mississippi	\$5,000	\$244	\$18.90
Missouri	\$8,500	\$454	\$67.90
Montana	\$5,300	\$2,000	\$26.30
Nebraska	\$2,600	\$218	\$17.80
Nevada	\$3,500	\$248	\$23.40
New Hampshire	\$1,500	\$228	\$9.10
New Jersey	\$10,700	\$620	\$18.40
New Mexico	\$5,200	\$1,000	\$54.80
New York	\$22,700	\$1,000	\$55.30
North Carolina	\$9,300	\$603	\$35.30
North Dakota	\$3,200	\$376	\$13
Ohio	\$11,700	\$978	\$21
Oklahoma	\$6,000	\$317	\$96.30
Oregon	\$5,200	\$355	\$335.10
Pennsylvania	\$15,800	\$859	\$193.40
Puerto Rico	\$2,200	\$248	\$11
Rhode Island	\$2,000	\$206	\$55.10
South Carolina	\$4,700	\$267	\$20.80
South Dakota	\$2,500	\$402	\$17.80
Tennessee	\$6,600	\$407	\$54.50
Texas	\$30,600	\$2,000	\$118.90
Tribes	\$13,700	\$4,000	N/A
US Virgin Islands	\$277.70	\$102	\$3.10
Utah	\$3,500	\$623	\$20.20
Vermont	\$1,700	\$194	\$27.60
Virginia	\$10,000	\$389	\$58.30
Washington	\$8,700	\$492	\$81.10
West Virginia	\$4,700	\$267	\$11.40
Wisconsin	\$6,600	\$799	\$21.90
Wyoming	\$3,800	\$212	\$40.20

TABLE 1: Bipartisan Infrastructure Law Funding Breakdown by State and Territory – Allocations for Key Categories, as of March 2024 (in millions)

		Number of Extreme Weather Events, Past Decade	Cost of Extreme Weather Events, Past Decade	Resilience	Flood Mitigation	Superfund and Brownfield Site Cleanup
Alabama		41	\$9,000	\$119.90	\$19	\$2.70
Alaska		3	\$750	\$488.60	\$281.50	\$12
American Samoa		N/A	N/A	\$6.10	\$0.59	N/A
Arizona		N/A	N/A	\$296.10	\$83.60	\$8.50
Arkansas		35	\$6,000	\$398.20	\$39.90	\$1
California		20	\$102,000	\$1,100	\$336.40	\$31
Colorado		33	\$23,000	\$526	\$373.40	\$36.30
Commonwealth of the Northern Mariana Islands		N/A	N/A	\$22.80	N/A	N/A
Connecticut		14	\$2,300	\$104.60	\$3.10	\$65.10
Delaware		9	\$400	\$43.20	\$8.10	\$1.20
District of Columbia		N/A	N/A	\$139.90	\$6.30	\$2
Florida		10	\$227,000	\$1,500	\$51.10	\$123
Georgia		48	\$14,000	\$303.80	\$95.40	\$25.90
Guam		N/A	N/A	\$7.40	\$0.23	N/A
Hawaii		145	\$921	\$65.20	\$4	\$1
Idaho		12	\$2,000	\$112.10	\$10.30	N/A
Illinois		48	\$16,000	\$1,400	\$92.90	\$28.10
Indiana		34	\$5,000	\$118.80	\$5.40	\$26.40
Iowa		32	\$23,000	\$160.30	\$86.50	\$5.20
Kansas		38	\$13,000	\$88.60	\$38.30	\$32.10
Kentucky		27	\$7,000	\$575.50	\$23.80	\$7
Louisiana		37	\$77,500	\$572.50	\$21.40	\$45.70
Maine		N/A	N/A	\$44.80	\$1.10	\$57.20
Maryland		32	\$3,400	\$216.80	\$29.60	\$2.40
Massachusetts		14	\$1,300	\$118.70	\$10.10	\$87.50
Michigan		25	\$5,000	\$196.30	\$14.80	\$38.40
Minnesota		18	\$13,000	\$86.40	\$5.60	\$7
Mississippi		37	\$4,700	\$473.40	\$227.40	\$39.50
Missouri		48	\$14,000	\$161.70	\$24.50	\$69.20
Montana		12	\$6,600	\$232	\$0.45	\$16.80
Nebraska		25	\$13,000	\$118.10	\$77	\$26.90
Nevada		13	\$500	\$97.50	\$0.13	\$9
New Hampshire		4	\$250	\$30.50	\$3.20	\$8.40
New Jersey		24	\$18,000	\$473	\$13.30	\$394.50
New Mexico		14	\$3,200	\$378.20	\$23.40	\$21.20
New York		34	\$18,500	\$361.60	\$62.60	\$95.20
North Carolina		46	\$50,000	\$206.70	\$23.90	\$26.20
North Dakota		8	\$6,000	\$598.80	\$500	\$3
Ohio		33	\$6,000	\$182.70	\$26.40	\$5.70
Oklahoma		43	\$13,000	\$149.10	\$65.10	\$41.50
Oregon		16	\$7,000	\$206.40	\$29.70	\$39.20
Pennsylvania		37	\$9,000	\$1,200	\$106.10	\$80.30
Puerto Rico		4	\$154,000	\$257	\$61.70	\$14.10
Rhode Island		10	\$360	\$72.20	\$10.40	\$3
South Carolina		40	\$15,000	\$114.30	\$1.60	\$7
South Dakota		13	\$9,000	\$57	\$14.10	\$0.88
Tennessee		40	\$8,000	\$134	\$26.90	\$34.30
Texas		76	\$233,000	\$1,200	\$449.10	\$18
Tribes		N/A	N/A	\$111	N/A	N/A
US Virgin Islands		3	\$7.50	\$58.60	\$52.70	N/A
Utah		2	\$15,000	\$105.50	N/A	\$20.80
Vermont		11	\$610	\$38.10	\$10.30	\$47.30
Virginia		46	\$5,000	\$594.40	\$20.50	\$26.10
Washington		15	\$4,000	\$503.80	\$252	\$9.20
West Virginia		10	\$1,500	\$94.70	\$8.60	\$11.40
Wisconsin		24	\$8,000	\$126.90	\$13.20	\$15.90
Wyoming		15	\$1,700	\$54.10	\$5.90	\$2.50

An extensive analysis of these data is beyond the scope of this paper. However, in the policy landscape, the dissemination and utilization of data are critical for driving informed decisions and fostering transparency. The state- and territory-level data reported on the implementation of the Bipartisan Infrastructure Law illustrate the multifaceted applications of federal funding across various sectors.

The funding data equip federal government agencies and policymakers with critical information to develop, evaluate, and refine policies tailored to climate adaptation and infrastructure improvement. By analyzing the data, decision-makers can allocate resources strategically, ensuring that investments directly address the most urgent needs and opportunities for meaningful impact. The data can also be used to inform international discussions on climate change adaptation and infrastructure financing, allowing the United States to share best practices and learn from other countries' experiences.

For state governments, local partners, and community planners, the data provide a detailed account of federal investments within their jurisdictions. This insight facilitates more targeted community engagement and project development, ensuring that the initiatives resonate with local priorities and needs. Moreover, the data can

facilitate coordination and collaboration among different government agencies at the federal, state, and local levels, highlighting model programs worthy of emulation and ensuring a more integrated approach to infrastructure development and climate adaptation. And information on specific projects and sectors receiving funding can be used to identify skills gaps and inform workforce development initiatives, ensuring that there is a trained and ready workforce to implement the funded projects.

Researchers and experts can use the data to study the impact of federal funding on climate resilience and infrastructure at state and local levels. This analysis helps assess funding efficiency and guides policy improvements. It also provides a baseline for tracking project progress and outcomes, facilitating data-driven adjustments. These insights contribute to discussions on best practices and policy recommendations.

The granularity of the data empowers NGOs and advocacy groups, particularly those focused on climate change and environmental justice, to champion equitable resource distribution. These entities monitor project implementations with an equity lens, advocating for the prioritization of underserved communities and ensuring that the transition towards resilient infrastructure is inclusive.

Putting Climate Laws to Work: Strategies for Resilience and Adaptation

This section delves into key case studies that demonstrate the multifaceted approaches recent federal legislation takes to advance climate resilience. From forest restoration efforts aimed at mitigating wildfire risks in the Western United States to innovative strategies enhancing the Colorado River System's resilience against climate change, these initiatives reflect a comprehensive effort to safeguard

ecosystems, protect communities, and ensure a sustainable future. Through a blend of technological innovation, collaborative governance, and targeted investments, these projects offer valuable lessons and insights into building climate resilience and protecting public health across diverse landscapes and communities.

CASE STUDY 1: Forest Restoration Initiatives for Western Wildfires

In recent years, the United States has witnessed a dramatic escalation in wildfire activity, a trend that scientists attribute largely to the effects of climate change.¹⁰⁵ Rising temperatures, prolonged droughts, and changing precipitation patterns—hallmarks of a shifting climate—have intensified wildfire seasons, both in frequency and ferocity. Notable examples, such as the 2018 Camp Fire in California, which claimed 85 lives and razed the towns of Paradise and Concow,¹⁰⁶ the 2020 wildfire season, where over 10 million acres burned,¹⁰⁷ and the wildfires that swept through Hawaii in 2023, causing unprecedented damage and leading to significant loss of life and property, particularly on the island of Maui,¹⁰⁸ underscore the devastating impact of these disasters.

The connection between wildfires and climate change is multifaceted. Warmer temperatures increase evaporation, drying out vegetation and making it more combustible. Simultaneously, altered weather patterns can lead to dry lightning storms, igniting fires in already parched forests and grasslands. Furthermore, the expansion of the wildland-urban interface has placed more people and property in harm's way, complicating fire management efforts and elevating the risks to safety.

The health threats posed by wildfires are significant and varied. Direct exposure to flames and heat can result in injuries and deaths, but the broader health implications often stem from the smoke these fires produce. Wildfire smoke, laden with particulate matter and hazardous chemicals, can lead to respiratory issues, exacerbate chronic heart and lung conditions, and has been linked to increased rates of hospitalization.^{109,110} For example, between April 30 and August 4, 2023, on days when wildfire smoke from Canada was present, there was a 17 percent increase in asthma-associated emergency department visits across the U.S., particularly affecting regions with prolonged smoke exposure.¹¹¹ Moreover, wildfires pose a significant threat to the safety of drinking

water. The destruction of infrastructure and the contamination of water sources with toxic runoff can compromise water quality, posing additional health risks to affected communities. The mental health consequences are equally concerning, with communities affected by wildfires experiencing heightened levels of stress, anxiety, and depression, compounded by the loss of homes, livelihoods, and loved ones.

Beyond human health, wildfires have profound ecological consequences, altering landscapes, disrupting ecosystems, and threatening biodiversity. The economic toll is also staggering, encompassing not only the immediate costs of firefighting and reconstruction but also long-term impacts on property values, insurance markets, and local economies.

The Bipartisan Infrastructure Law represents a groundbreaking federal response to the escalating wildfire crisis in the U.S., providing over \$7 billion for comprehensive wildfire management and mitigation programs.¹¹² This allocation includes funds for a variety of initiatives aimed at developing and implementing wildfire preparedness and mitigation projects, focusing on reducing the volume of flammable materials in forests, and enhancing the capacity and safety of firefighting efforts. Additionally, the law provides substantial investments to restore and maintain healthy, resilient forest ecosystems capable of withstanding wildfire threats.

The U.S. Forest Service within the Department of Agriculture has historically treated up to 2 million acres annually in the West to mitigate wildfire risks through thinning and prescribed burns, with significant success in protecting homes and natural resources.¹¹³ However, the magnitude and destructiveness of recent wildfires have surpassed these efforts, necessitating a strategic increase in treatment levels by up to four times to address the escalating threat in the West, in addition to increasing treatments in eastern areas,

to sustain forest health and resilience against climate change impacts.¹¹⁴ In response, the agency has developed a strategy to target “firesheds” for treatment, focusing on areas where wildfires pose the greatest risk to communities. The plan aims to create healthier, more resilient forests and reduce wildfire impacts on communities and the environment.

The agency’s strategy emphasizes the combined use of thinning and prescribed fires to manage overgrown and unhealthy forests.¹¹⁵ It also acknowledges the need for a specialized workforce to implement these methods, especially in areas where thinning is restricted, utilizing prescribed and unplanned fires to manage fuels and maintain forest health responsibly.

The strategy outlines a collaborative approach to wildland fire management, building on decades of partnership across federal agencies, states, tribes, and communities. It emphasizes the importance of shared stewardship and cross-boundary treatments, aiming to restore fire-adapted ecosystems, build fire-resilient communities, and respond effectively to wildfires. By coordinating resources and efforts, including through the National Cohesive Wildland Fire Management Strategy and other collaborative frameworks, the approach seeks to significantly increase fuels and forest health treatments to address the wildfire crisis and enhance ecosystem resilience.

To implement its plan, the Forest Service identified initial high-risk landscapes for investment in hazardous fuels mitigation. This process involved collaboration with federal, state, and local agencies, as well as with tribes, communities, NGOs, and private landowners. The agency aimed to identify landscapes for large-scale, outcome-driven projects that are ready for implementation, benefit underserved communities, leverage existing partnerships, and utilize current authorities. From 29 candidate landscapes, 10 were selected for Bipartisan Infrastructure Law funding totaling \$131 million in eight states (Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, and Washington) during FY 2022.¹¹⁶ These investments focus on reducing wildfire risks to people, communities, and natural resources, and are part of a broader effort to strengthen resilience nationwide.

The 10 projects included:¹¹⁷

- The **Four Forest Restoration Initiative, or “4FRI,”** aims to restore forest resilience and reduce wildfire risk across four national forests in Arizona, covering 2.4 million acres. The project intends to strategically manage forests to reestablish historical conditions conducive to natural fire regimes. This includes thinning overgrown forests, conducting controlled

burns, and restoring wildlife habitats. The initiative also focuses on protecting communities, infrastructure, and important water sources. Expected outcomes include the treatment of 300,000 acres by 2024 and accelerating treatments in high-priority locations.

- The **Greater Prescott Area Wildfire Protection and Restoration** project focuses on reducing wildfire risks in Prescott National Forest across 401,000 acres in Arizona. It aims to enhance ecological health and watershed function while reducing wildfire hazards in key communities. The strategy involves cross-boundary collaboration to implement fuels and forest health treatments, such as prescribed and mechanical treatments. Expected outcomes include the treatment of 88,000 acres by 2024, with an emphasis on protecting high-risk firesheds and enhancing fire-adapted ecosystems.
- The **North Yuba Landscape** project in California’s Tahoe National Forest spans 313,000 acres and aims to reduce wildfire risk while enhancing forest resilience. It focuses on ecologically-based thinning and prescribed fire to protect communities and improve watershed health. The project, expected to complete initial treatments by 2032, leverages private investments and involves partners such as the National Forest Foundation and The Nature Conservancy. It planned to treat 4,500 acres in FY 2022 and 16,900 acres by 2024.
- The **Stanislaus National Forest** project in California spans 245,000 acres and is dedicated to enhancing forest resilience and mitigating wildfire risks. This initiative encompasses various treatments, such as forest thinning, controlled burns, and the maintenance of fuel breaks, all designed to safeguard communities and natural habitats. A key element of the project is the implementation of the Social and Ecological Resilience Across the Landscape (SERAL) project, which focuses on maintaining ecological integrity and safeguarding resources. Utilizing a combination of grants and collaborative partnerships, this project is set to extend its reach onto private lands and is working in conjunction with the Tuolumne Band of Me-Wuk to incorporate a component under the Tribal Forest Protection Act (TFPA). The TFPA facilitates collaboration between tribes and the federal government, allowing for joint efforts in forest management on federal lands adjacent to tribal lands to protect against threats like wildfires, disease, and insect infestations.
- The **Colorado Front Range** project, encompassing 3.5 million acres across multiple national forests, involves a broad coalition of partners, including cities,

state agencies, utilities, and NGOs, to restore forest health and reduce wildfire risks. It aims to minimize wildfire impacts and associated economic and health externalities, focusing on forests as critical water sources. The project seeks to mitigate sedimentation and improve water retention, with plans for strategic fuels treatments to reintroduce fire into ecosystems, enhancing their resilience and water retention capabilities.

- The **Southwest Idaho Fuels Reduction Project** aims to treat 250,000 acres in the Boise and Payette National Forests to mitigate wildfire risk, enhance watershed health, and improve forest resilience. Leveraging partnerships and shared stewardship, this initiative will extend treatments to federal, state, and private lands, significantly reducing catastrophic wildfire risks and bolstering the landscape's resilience against climate change.
- The **Kootenai Complex** project, spanning 800,000 acres in the Kootenai National Forest across Montana and Idaho, is dedicated to treating hazardous fuels on 150,000 acres. Its primary objective is to lessen the risk of severe wildfires in communities such as Libby, Troy, and Eureka. Integral to a broader cross-boundary initiative, the project's goals include enhancing wildlife habitats, bolstering forest health and resiliency, improving water quality, and generating local employment. It integrates with the Lincoln County Shared Stewardship Initiative in Montana, a collaborative effort aimed at reducing severe wildfire threats and improving forest health, while simultaneously upgrading wood product utilization infrastructure and fostering job creation in the region.
- The **Enchanted Circle** project in the Carson National Forest, New Mexico, aims to treat 1.5 million acres to reduce fire risk and increase watershed resilience. This project involves collaborative prescribed fire, mechanical fuels treatments, timber sales, and wetland/stream restoration across various land ownerships, including tribal and private lands. It integrates long-term collaborations with tribes, local water managers, and other groups, aligning with community wildfire protection plans. The project focuses on providing forest products and creating fire-adapted landscapes.
- The **Central Oregon** project encompasses 2.6 million acres, including the Deschutes National Forest and Crooked River National Grassland. It focuses on collaborative fire management and forest restoration to protect communities, infrastructure, and the local economy, which relies heavily on recreation and tourism.



The project aims to reduce wildfire risk in areas like Bend, Sisters, Sunriver, LaPine, and Crescent, and improve aquatic and terrestrial habitats for species like the Oregon spotted frog and Chinook salmon.

- The **Central Washington Initiative** in the Okanogan-Wenatchee National Forest, covering 2.45 million acres, is dedicated to mitigating wildfire risks in communities and enhancing watershed health. This project employs the “all hands all lands” approach, a collaborative wildfire management strategy engaging various partners to implement forest health and fuel treatments across multiple land jurisdictions effectively. It prioritizes six high-risk watersheds, aiming to improve both community health and economic stability in areas prone to wildfires.

These initiatives represent a strategic effort to mitigate wildfire risks across the West. The projects focus on a variety of goals, including restoring forest resilience, protecting communities and natural resources, and leveraging cross-boundary collaborations. Each initiative is tailored to address specific regional needs and challenges, with an emphasis on collaborative development, scalable impact, and readiness for implementation.

In January 2023, Agriculture Secretary Tom Vilsack announced expanded efforts to combat the wildfire crisis across the western United States.¹¹⁸ This \$490 million initiative, backed by significant funding from the Bipartisan Infrastructure Law and the Inflation Reduction Act, aims to protect communities and vital infrastructure in 11 additional landscapes, adding Nevada and Utah to the list of states receiving federal assistance.

CASE STUDY 2: Investing in Coastal Resilience and Infrastructure

Forty percent of the U.S. population, over 128 million people, live in counties directly on the shoreline of an ocean or the Great Lakes.¹¹⁹ Climate change presents a multitude of challenges to coastal communities in the United States, threatening both the environment and the well-being of residents. One of the most pressing issues is sea level rise, which poses a direct threat to coastal infrastructure, property, and livelihoods. As global temperatures increase, polar ice caps and glaciers melt, causing ocean levels to rise. This exacerbates coastal erosion, flooding, and saltwater intrusion into freshwater sources, endangering not only the people who live nearby but also vital ecosystems and habitats.

The intensification of storms is another acute challenge to public health and safety within coastal communities. Climate change leads to more frequent and severe hurricanes, tropical storms, and storm surges, which can cause devastating damage to coastal areas. These extreme weather events result in widespread flooding, erosion, property destruction, and loss of life. Coastal communities are particularly vulnerable due to their proximity to the ocean and the reliance on coastal infrastructure for economic activities such as tourism, fishing, and shipping.

The degradation of coastal habitats exacerbates the impacts of climate change on coastal communities. Wetlands, mangroves, and coral reefs provide critical ecosystem services, including shoreline protection, habitat for wildlife, and carbon sequestration. However, these habitats are increasingly threatened by climate change-induced factors such as sea level rise and ocean acidification. The loss of these natural defenses leaves coastal communities more susceptible to erosion, flooding, and storm damage.

Flooding and storm surges pose immediate risks of injury and drowning but also contribute to waterborne diseases, such as gastrointestinal infections, when water sources become contaminated. There can also be mental health impacts, including anxiety, depression, and post-traumatic stress disorder, in coastal communities amid nuisance flooding—minor, recurrent flooding that typically occurs during high tides and is exacerbated by sea level rise, often referred to as “sunny day” flooding—or following extreme weather events and displacement.

Climate change also poses significant economic and social challenges for coastal communities. Disruptions to coastal industries, such as fishing and tourism, can lead

to job losses, economic downturns, and displacement of residents. Infrastructure vulnerabilities, including roads, bridges, ports, and power plants, further compound these challenges, as they are susceptible to damage from rising sea levels, storm surges, and erosion.

Addressing these acute challenges requires comprehensive and coordinated efforts at the local, state, and federal levels. Strategies must prioritize climate adaptation and resilience measures, including coastal zone management, land-use planning, infrastructure upgrades, and ecosystem restoration. Additionally, reducing greenhouse gas emissions and mitigating the drivers of climate change are essential for long-term solutions to protect coastal communities and their valuable ecosystems.

Recently, the National Oceanic and Atmospheric Administration (NOAA), has invested nearly \$3 billion in Bipartisan Infrastructure Law funds in habitat restoration, coastal resilience, and climate data and services.¹²⁰ These funds are supporting transformational projects aimed at helping communities, especially underserved ones, enhance local climate resilience and climate-ready infrastructure. NOAA’s investments will be directed towards three major initiatives: Climate Ready Coasts, Climate Data and Services, and Fisheries and Protected Resources.

These investments are meant to be scalable, leveraging partnerships and responding to the need for better climate information. Furthermore, NOAA aims to ensure that the impact of this funding is equitable, coordinated, and beneficial for Tribal Nations, underserved, and underrepresented communities. Notices of funding opportunities have been announced, focusing on habitat restoration, coastal resilience, and marine debris removal. These initiatives are designed to support coastal communities in implementing green infrastructure and nature-based solutions, which enhance their resilience against the impacts of climate change and extreme weather events.

Climate Ready Coasts

The Climate Ready Coasts initiative, backed by \$1.5 billion over five years, represents a strategic effort to fortify the resilience of coastal communities. Through prioritizing natural infrastructure projects, this initiative aims to tackle multiple objectives simultaneously. Firstly, by restoring and enhancing coastal ecosystems like wetlands and mangroves, the initiative seeks to bolster coastal resilience, providing



crucial defenses against storm surges, erosion, and rising sea levels. Additionally, these projects are poised to generate employment opportunities, particularly benefiting local communities adjacent to coastal areas, thereby fostering economic growth and stability.

Moreover, the Climate Ready Coasts initiative recognizes the pivotal role of coastal ecosystems in carbon sequestration. By investing in the restoration and conservation of these habitats, the initiative not only enhances their capacity to store carbon but also contributes to broader climate change mitigation efforts. Furthermore, the initiative targets marine debris pollution, a pressing issue affecting coastal environments, through activities such as beach clean-ups and debris removal efforts. By reducing marine debris accumulation, the initiative safeguards coastal habitats and promotes environmental sustainability.

Lastly, the Climate Ready Coasts initiative emphasizes habitat restoration as a cornerstone of coastal resilience, recognizing the invaluable services provided by coastal ecosystems in supporting biodiversity and ecosystem functions. Through concerted efforts to revive and conserve habitats like salt marshes and coral reefs, the

initiative enhances ecosystem resilience and promotes species diversity. Overall, the initiative embodies a holistic approach to coastal management, harnessing the power of natural infrastructure to address climate change impacts while delivering tangible benefits for coastal communities, economies, and environments alike.

Since January 2023, NOAA has announced funding for many projects in dozens of states and territories.¹²¹ For example, in April 2023, the White House announced \$562 million in funding,¹²² encompassing nearly 150 projects across 30 coastal and Great Lakes states and territories.

The funding comprises \$477 million for projects focused on strengthening coastal communities' response to extreme weather events, restoring coastal habitats, storing carbon, and supporting underserved communities. An additional \$46 million was directed toward preparing communities for increasing coastal flooding and sea-level rise while improving coastal habitats. Furthermore, \$39 million in funding is designated for state and territorial coastal management programs and national estuarine research reserves, supporting essential planning, policy development, research, and education efforts.

In Florida, for instance, the Department of Commerce targeted \$78.7 million for 16 projects across the state.¹²³ These initiatives encompass diverse strategies such as habitat restoration, flood mitigation, and marine debris removal, aiming to create jobs and enhance environmental outcomes for coastal communities while combating the impacts of climate change. The Sarasota County Alligator Creek Stream Restoration, funded at \$14.5 million, targets sea-level rise and flooding impacts by restoring stream and shoreline habitat, benefiting local communities such as the City of Venice through increased flood protection and recreational opportunities. The Perdido Watershed Habitat and Community Resilience Initiative, funded at \$12.8 million, aims to enhance climate resilience by restoring habitat across Alabama and Florida, buffering communities from flooding and storm impacts while improving water quality. The Pensacola Bay System Oyster Restoration Initiative, funded at \$10.9 million, focuses on restoring oyster habitat, which is vital for supporting fisheries and mitigating shoreline erosion. These efforts align with broader goals of improving ecosystem health and community resilience along Florida's coastline.

Climate Data and Services

The allocation of \$904 million over five years to Climate Data and Services underscores a significant investment in providing essential information and tools to decision-makers grappling with a range of climate-related challenges.¹²⁴ These resources are poised to support efforts to address floods, wildfires, droughts, and ocean health, offering decision-makers critical insights into evolving climate patterns and their impacts on various ecosystems and communities. By leveraging advanced data analytics, modeling techniques, and innovative service delivery mechanisms, this initiative aims to enhance preparedness, response, and adaptation strategies across sectors, ultimately bolstering resilience and sustainability. Through comprehensive data-driven approaches, decision-makers will be better equipped to anticipate and mitigate the adverse effects of climate change, fostering more informed and effective policymaking and resource allocation efforts.

One component of Climate Data and Services focuses on flood and inundation mapping, aiming to address water-related challenges such as floods, water availability, navigation safety, and water quality.¹²⁵ NOAA plans to improve water prediction by providing the first-ever continental-scale operational forecasting and inundation mapping services for both coastal and inland areas. These services will offer user-friendly, actionable decision support tools, ensuring

equitable delivery of flood and inundation information to communities nationwide. Additionally, NOAA will update precipitation frequency atlases for the United States to account for climate change, indicating the expected levels of precipitation over various timescales and regions. It will also develop modernized probable maximum precipitation studies (i.e., assessments of the maximum possible precipitation in a given area) and enhance total water prediction capabilities at the coast on sub-seasonal to annual timescales (i.e., forecasting comprehensive coastal water conditions, including rain, rivers, ocean conditions, tides, storm surge, and wave heights).

Fisheries and Protected Resources

The allocation of \$592 million over five years to support fisheries and protected resources represents a significant investment in restoring fishery habitats and fostering community economic development. This funding will support various initiatives aimed at enhancing the health and sustainability of fisheries' ecosystems while also benefiting local communities reliant on these resources. By prioritizing the restoration and conservation of fishery habitats and promoting economic opportunities, this funding aims to bolster the resilience of marine ecosystems and the livelihoods of those who depend on them.

Initiatives related to this effort encompass three key components. First, funding totaling \$20 million over five years will be allocated for consultations and permitting related to the Endangered Species Act, the Marine Mammal Protection Act, and Essential Fish Habitat.¹²⁶ This funding will support NOAA's fisheries initiatives in addressing the increased demand for consultations and permits resulting from federal projects aimed at addressing the climate crisis, such as offshore wind energy initiatives. Second, \$400 million over five years will be dedicated to restoring fish passage by removing in-stream barriers, with up to 15 percent reserved for Tribal Nations.¹²⁷ NOAA's Restoration Center will administer grants to restore fish passage through dam removal and other barrier removal projects, aiming to reopen migratory pathways and enhance habitat access for fish nationwide. Lastly, \$172 million over five years will be allocated to the Pacific Coastal Salmon Recovery Fund, supporting competitive grant programs for states and tribes to protect, conserve, and restore salmon and steelhead populations and habitats in the Pacific coastal region.¹²⁸ These provisions aim to advance fishery habitat restoration efforts, promote community economic development, and address the impacts of climate change on marine ecosystems.

CASE STUDY 3: Enhancing Resilience in the Colorado River System

The Colorado River System, a cornerstone for water supply in the Western United States, is facing unprecedented challenges due to climate change. Critical issues include a reduction in snowpack levels in the Rocky Mountains due to warmer winters, which directly affects the river's flow and water availability. This problem is compounded by increased temperatures, leading to higher evaporation rates and altering traditional hydrological patterns. As a result, the region is experiencing prolonged periods of extreme drought, severely impacting water levels in major reservoirs such as Lake Powell and Lake Mead, and putting immense pressure on water security for over 40 million people—spanning Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, as well as people in 30 Tribal Nations and Northern Mexico—and agricultural lands and hydropower facilities reliant on this water source.^{129,130}

These environmental changes are occurring in a context of historical overuse and an optimistic estimation of the river's capacity, leading to a critical imbalance between water demand and supply. The legal and management frameworks governing the river's use, based on agreements made under different climatic and hydrological conditions, are now being challenged to adapt to the realities of climate change. This includes addressing overallocation, enhancing water-use efficiency, and rethinking water-sharing agreements to reflect the current and future scarcity of resources.¹³¹

To address these challenges, a comprehensive and coordinated approach is needed, focusing on reducing water consumption, improving management practices, and investing in technologies for better water-use efficiency. Additionally, updating policy frameworks to reflect the changing climate and hydrology is critical for sustainable water management. The Colorado River's plight underscores the urgent need for adaptive management strategies that can ensure water security in the face of climate change, emphasizing the importance of both local and regional efforts in addressing this multifaceted crisis.

Investments of at least \$15 billion from the Bipartisan Infrastructure Law and Inflation Reduction Act are enhancing the resilience of the Colorado River System against climate change and megadroughts.¹³² Efforts include drought resilience, new water-saving projects, infrastructure repairs, and expanded drought outreach. Initiatives aim to reduce water demand, improve water efficiency, and ensure sustainable management.

Investing in water conservation

The Bipartisan Infrastructure Law and the Inflation Reduction Act provide billions of dollars for water conservation projects in the Colorado River Basin. These projects will help to reduce water use and improve water efficiency, which will help to stretch the river's limited water supply. These include:

- **Lower Colorado River Basin System Conservation and Efficiency Program Funding:** Aiding with immediate water-use reduction through investments such as \$50 million from the Inflation Reduction Act, expected to save 125,000 acre-feet of water annually.¹³³ To put this into perspective, saving this amount of water annually is akin to supplying water for about 1.4 million U.S. residents to use in their homes for a year.¹³⁴ The program is a collaborative effort among federal and state agencies, local water districts, tribes, and conservation groups to promote water conservation and efficiency in the lower Colorado River Basin area. By implementing various measures such as incentivizing the adoption of water-saving technologies in agriculture, retrofitting urban infrastructure to minimize water loss, and providing education and outreach to the public, the program aims to reduce overall water consumption while maintaining sustainable water management practices. Data collection and monitoring play a crucial role in assessing the effectiveness of implemented measures, allowing for adaptive management strategies to be employed as conditions change over time.¹³⁵

Saving 100,000 acre-feet of water annually is akin to supplying water for about 1.1 million U.S. residents to use in their homes for a year.

- **Coachella Valley Water Conservation:** Allocating up to \$36 million, including a \$12 million agreement with the Coachella Valley Water District to conserve 30,000 acre-feet of water in Lake Mead, with similar investments planned for 2024 and 2025.¹³⁶ The program is a comprehensive initiative aimed at promoting efficient water use and conservation in California's Coachella Valley region. Through a combination of measures including offering incentives for water-saving devices, educational outreach efforts, water audits, and landscape

transformation programs, the program encourages residents, businesses, and agricultural users to reduce water consumption. Additionally, the program may implement policies and regulations to further promote conservation, such as watering restrictions.¹³⁷

- **Imperial Valley Water Conservation:** Working towards conserving up to 1 million acre-feet of water in the Imperial Valley through an agreement with the Imperial Irrigation District, aiming to save 250,000 acre-feet per year from 2023 to 2026.¹³⁸ The program is a multifaceted initiative designed to foster sustainable water management practices in California's Imperial Valley region. Through a combination of strategies including promoting efficient irrigation techniques, offering incentives for water-saving technologies, and implementing educational outreach efforts, the program aims to reduce water consumption across agricultural, residential, and commercial sectors. Additionally, regulatory measures and research initiatives support the program's goals, while monitoring and reporting mechanisms ensure accountability and inform decision-making.^{139,140}

- **Upper Basin System Conservation Pilot Program:** Relaunching with up to \$125 million available to support voluntary conservation in the Upper Colorado River Basin.¹⁴¹ The program is a voluntary initiative focused on promoting water conservation and efficiency measures across the upper Colorado River Basin region. Participants, including water users and irrigation districts, implement a range of tailored conservation measures with support from technical assistance, funding, and training provided by the program. Monitoring and reporting mechanisms track water savings and evaluate the effectiveness of implemented measures, informing adaptive management strategies. Additionally, the program fosters a collaborative learning environment, enabling participants to share experiences and best practices.^{142,143}

Upgrading Aging Infrastructure

Through the implementation of the Bipartisan Infrastructure Law and the Infrastructure Reduction Act, significant resources have been directed towards repairing and modernizing critical infrastructure systems to ensure the efficient delivery and management of water resources.

Investments in infrastructure upgrades are crucial for improving the efficiency and reliability of water delivery systems within the Colorado River Basin. Repairing aging infrastructure, such as dams, canals, and water treatment

facilities, helps minimize water losses and ensures the effective conveyance of water to meet the diverse needs of communities, agriculture, and ecosystems. By modernizing infrastructure, the region can better withstand the impacts of drought and maintain essential water supplies during times of scarcity.

One notable aspect of this effort includes investments totaling more than \$54 million, aimed at improving water conveyance, storage facilities, safety measures, and hydropower generation capabilities.¹⁴⁴ A substantial portion of the allocated funding, approximately \$8.3 million, has been specifically earmarked for addressing critical repairs and maintenance needs at the Imperial Dam, located on the Colorado River, near Yuma, Arizona. The dam plays a pivotal role as a key component of the water delivery infrastructure in the region. Its functionality is integral to the efficient conveyance and distribution of water resources to various stakeholders, including agricultural communities, municipalities, and ecological habitats.

The funding also supported 14 infrastructure projects in the Colorado River System in fiscal year 2023.¹⁴⁵ These projects are designed to address various infrastructure needs, including repairs to aging facilities, upgrades to water conveyance systems, and improvements to water treatment infrastructure.

Recent federal efforts surrounding infrastructure upgrades extend beyond immediate repairs to include investments in long-term resilience and sustainability. For instance, funds from the Bipartisan Infrastructure Law will support projects aimed at increasing water storage capacity, including \$20 million for small surface water storage and groundwater storage projects in California and Utah.¹⁴⁶ These initiatives are essential for mitigating the impacts of drought and ensuring the availability of water resources for future generations.

Drought Resilience

Drought resilience is essential for ensuring the reliability and sustainability of water resources in the Colorado River Basin. It involves implementing measures to reduce vulnerability to drought, mitigate its impacts, and maintain essential water supplies during periods of water scarcity.

A key piece of this within the Colorado River Basin area is the investment of \$281 million in 21 water recycling projects through the Bipartisan Infrastructure Law.¹⁴⁷ These projects aim to maximize the efficient use of existing water resources and alleviate pressure on traditional water supplies during periods of drought.



Water recycling, also known as water reuse, involves treating wastewater to a high standard and then repurposing it for beneficial uses such as irrigation, industrial processes, or even drinking water. Investments by the Interior Department in water recycling infrastructure are helping states diversify their water sources and reduce reliance on finite freshwater supplies, particularly in arid regions prone to drought.

These 21 water recycling projects are expected to increase annual capacity by about 172,000 acre-feet of water, underscoring the role such projects can play in augmenting water supplies. This additional water capacity represents a valuable buffer against the effects of drought, providing a reliable source of water even during periods of reduced precipitation and dwindling surface water supplies.

Moreover, beyond their immediate benefits for drought resilience, water recycling projects contribute to broader environmental and sustainability goals. By reducing the discharge of treated wastewater into water bodies and minimizing the need for withdrawals from natural water sources, these projects help protect water quality, preserve ecosystems, and conserve freshwater resources for future generations.

Water Rights

The establishment of the Indian Water Rights Settlement Completion Fund within the Bipartisan Infrastructure Law, comprising a substantial \$2.5 billion allocation, represents a significant commitment to addressing longstanding water rights disputes and fulfilling promises made to tribal communities across the United States.¹⁴⁸ This fund is a critical component of the broader effort to rectify historical injustices, recognize tribal sovereignty, and promote economic development in Indigenous communities reliant on shared water resources.

Many Tribal Nations have faced challenges in accessing and asserting their water rights, often resulting in protracted legal battles and unresolved disputes over water allocations. The Indian Water Rights Settlement Completion Fund aims to redress these injustices by providing financial resources to facilitate the implementation of water rights settlements negotiated among tribes, states, and the federal government. These settlements represent mutually agreed-upon resolutions to water rights claims, delineating the rights and obligations of all parties involved and establishing frameworks for managing and allocating water resources in a manner that respects tribal sovereignty and promotes equitable access.

By allocating \$2.5 billion to support tribal water rights settlement projects, the Bipartisan Infrastructure Law seeks to address the historical underinvestment in tribal water infrastructure and provide tribes with the necessary resources to develop and maintain water systems that meet their needs. Access to reliable and clean water is essential for supporting community health, sustaining traditional practices, and fostering economic development in tribal communities.

Providing dedicated funding for tribal water rights settlement projects creates a pathway for tribes to secure access to water resources essential for supporting agricultural, industrial, and municipal activities. Moreover, facilitating the development of water infrastructure projects, such as dams, pipelines, and treatment facilities, can contribute to economic growth and self-sufficiency in tribal communities. However, it is crucial to ensure that these projects are planned and implemented in an environmentally and socially responsible manner, taking into account the broader context of water management and the need for sustainable and equitable solutions. This may involve incorporating traditional ecological knowledge and promoting regenerative farming practices, among other measures. The active participation of tribal communities in decision-making processes is essential for developing culturally appropriate and sustainable water management strategies.

The Indian Water Rights Settlement Completion Fund provides financial resources to implement water rights settlements and support the development of sustainable water infrastructure. The fund helps fulfill long-standing promises to tribes, remedy historical injustices, and promote water management practices that benefit Indigenous communities and the broader society. Achieving these goals will require a holistic approach that balances the need for infrastructure development with the imperative to promote sustainable and equitable water management practices.

Conclusion

In addressing the pressing issue of climate change, recent developments in federal legislation provide a structured approach to climate adaptation. The Infrastructure Investment and Jobs Act, alongside the Inflation Reduction Act and the innovative Justice40 Initiative, collectively forge a strategic response to the complex challenges posed by global warming, including threats to public health.

These legislative actions signify a transformative shift in the United States' climate strategy, transitioning from a patchwork of reactive measures to a comprehensive and unified effort towards climate resilience. Central to this federal policy shift is not just the emphasis on robust infrastructure and reduced emissions, but the importance of ensuring an equitable transition that benefits all communities, with particular attention to those historically underserved.

However, these initiatives represent just the initial steps. The true impact of these laws and policies will depend on their effective implementation backed by adequate funding—transforming theoretical frameworks into tangible outcomes. It is crucial that the benefits derived from these measures are equitably distributed, reflecting the diverse needs and vulnerabilities across American society.

The journey ahead will undoubtedly present challenges. Within the realm of public health, a complex challenge is that addressing key impacts of climate change often necessitates adaptation measures beyond the traditional remit of public health departments. Crucial health determinants under climate change—ranging from infrastructure and urban planning to transportation, agriculture, and emergency response—are often managed by sectors outside of direct public health control. This necessitates that public health officials actively engage in and are integral to multisectoral collaborations. They must advocate for the incorporation of health and health equity considerations in adaptation and resilience planning across these areas. Such collaboration involves forging partnerships, exchanging knowledge, and crafting unified strategies with a broad array of stakeholders, including government bodies, NGOs, academia, and the private sector. Engaging in interagency efforts, offering expertise, and applying public health insights to guide policy and planning are key roles for these officials. Furthermore, public health departments are essential in monitoring health trends, contributing to research, and communicating about the health risks associated with climate change. By applying data and research, public health officials can influence broader adaptation efforts, ensuring health and safety are prioritized and negative outcomes are avoided.

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