American Rivers
RIVERS CONNECT US®

RIVERS AS ECONOMIC ENGINES

INVESTING IN CLEAN WATER, COMMUNITIES AND OUR FUTURE

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To view the report online, visit www.AmericanRivers.org/InvestInRivers

About American Rivers
American Rivers believes every community in our country should have clean water and a healthy river. Since 1973, we have been protecting wild rivers, restoring damaged rivers and conserving clean water for people and nature. With headquarters in Washington, D.C., and offices across the country, we are the most effective river conservation organization in the United States, delivering solutions that will last for generations to come.

Disclaimer
This report and its recommendations are solely attributable to American Rivers and do not necessarily represent the views of the above mentioned individuals.

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PHOTO: MISSISSIPPI RIVER, ST. LOUIS, MO, BRYAN WERNER

EXECUTIVE SUMMARY

We are at a pivotal moment in time. In the wake of COVID-19, Congress has made — and is considering additional — investments to jump-start the economy and bring the millions of unemployed Americans back to work. At the same time, Congress has a historic opportunity to make significant investments in our crumbling infrastructure, which has been underinvested in for decades. Investment in water infrastructure and healthy rivers will not only create jobs, it will also strengthen our communities, improve public health and safety, address longstanding injustices and improve our environment.

While COVID-19 is shining a grim light on injustices surrounding the availability of clean water for all, our rivers and water infrastructure have been neglected and abused for decades. Too many people in our country lack access to safe, clean affordable water — two thirds of which comes from rivers and streams.[1] Centuries of poor river management has degraded ecosystems and disconnected communities from their rivers. And, the impacts of climate change — increased drought, severe storms and increased flooding — are exacerbating existing vulnerabilities in communities across the country.[2] Many of these inequities fall disproportionately on Black, Indigenous, Latinx and other marginalized people. Our nation is in a defining moment, as we grapple with the coronavirus pandemic, a historic economic downturn and the reality of climate change. Equitable investment in clean water and healthy rivers can be a powerful part of the solutions needed to rebuild our communities and economy.

Clean water and healthy rivers are smart investments that can contribute significantly to economic growth and job creation. The Value of Water Campaign[3] estimated that every $1 million spent on water infrastructure in the United States generates more than 15 jobs throughout the economy. Similarly, the University of Oregon[4] found that every $1 million invested in watershed restoration creates 16 new or sustained jobs on average. Healthy rivers also spur tourism and recreation, which many communities rely on for their livelihoods. The Outdoor Industry Association's National Recreation Economy Report[5] found that Americans participating in watersports and fishing spend over $174 billion on gear and trip related expenses. And, the outdoor watersports and fishing economy supports over 1.5 million jobs nationwide.

To put our economy back on track, while addressing some of our nation's most pressing challenges, Congress must increase funding for healthy rivers and clean water. Any infrastructure, economic stimulus or jobs bill crafted to address the COVID-19 economic crisis must include major investments in water infrastructure, flood management and watershed restoration. American Rivers recommends Congress invest $500 billion for rivers and clean water over the next 10 years. We recommend an initial investment of at least $50 billion to address the urgent water infrastructure needs associated with COVID-19 and shovel-ready projects to improve flood management and restore rivers across the country.

PHOTO: CREATIVE COMMONS, CENTER FOR NEIGHBORHOOD TECHNOLOGY

Installing permeable pavement.

We recommend the funds be prioritized in the following ways:

Improve Water Infrastrucutre. At a minimum, we recommend $200 billion over 10 years to improve water infrastructure and prioritize funding where it is needed most. This includes:

- Increasing financial support from state and federal governments to ensure safe and affordable clean water and sanitation through water infrastructure improvements and maintenance. Because of disparities in local abilities to pay for water infrastructure, only the federal and state governments have the resources to ensure equitable access to clean water;
- Developing water assistance programs that ensure basic levels of water and sewer services are available and affordable for all communities;
- Supporting democratic decision-making in local and regional water management. Decision-making around water infrastructure does not always include full community engagement and participation, or take into consideration the impacts, particularly with low-income and communities of color. The federal government must encourage local jurisdictions to ensure a more democratic and inclusive approach to water infrastructure decision-making; and
- Prioritizing investments toward solutions that maximize economic, social and environmental benefits and improve community resiliency, such as green stormwater infrastructure.

Modernize Flood Management. At a minimum, we recommend $200 billion over 10 years that will provide investments to incentivize a shift from outdated flood control to an integrated flood management approach that prioritizes equitable, multiple benefit solutions that ensure all communities are resilient to flooding. This includes:

- Incentivizing and building capacity for natural infrastructure solutions for flood management and community resiliency in federal agencies, including Federal Emergency Management Agency (FEMA) and the U.S. Army Corps of Engineers (USACE);
- Ensuring flood hazard mitigation plans consider climate change, include climate resiliency planning and integrate natural infrastructure or nature-based solutions;
- Directing and funding the Federal Interagency Floodplain Management Task Force to update the Unified National Program for Floodplain Management to better integrate floodplain management at the federal level; and
- Creating a new grant program, housed within the National Fish and Wildlife Foundation, that will assist tribes, state and local governments, and regional watersheds in implementing and building capacity for multi-benefit floodplain projects and initiatives.

Restore Watersheds in our Communities. At a minimum, we recommend $100 billion over 10 years to restore rivers, make agriculture more sustainable and improve recreation opportunities. This includes:

- Prioritizing integrated water management plans that identify actions to protect existing and future water uses and support healthy rivers in the face of population growth, changing land uses and climate change;
- Incentivizing agricultural improvements, including updating irrigation infrastructure, improving and mitigating the adverse water quality impacts of drainage systems, expanding the use of cover crops, and restoring marginal farmland to native floodplain and wetland habitat;
- Developing a new Civilian Conservation Corps (CCC) that will restore rivers and riparian habitat and improve recreational access; and
- Investing in dam removal, culvert replacement and other infrastructure improvements that benefit the environment and public safety.

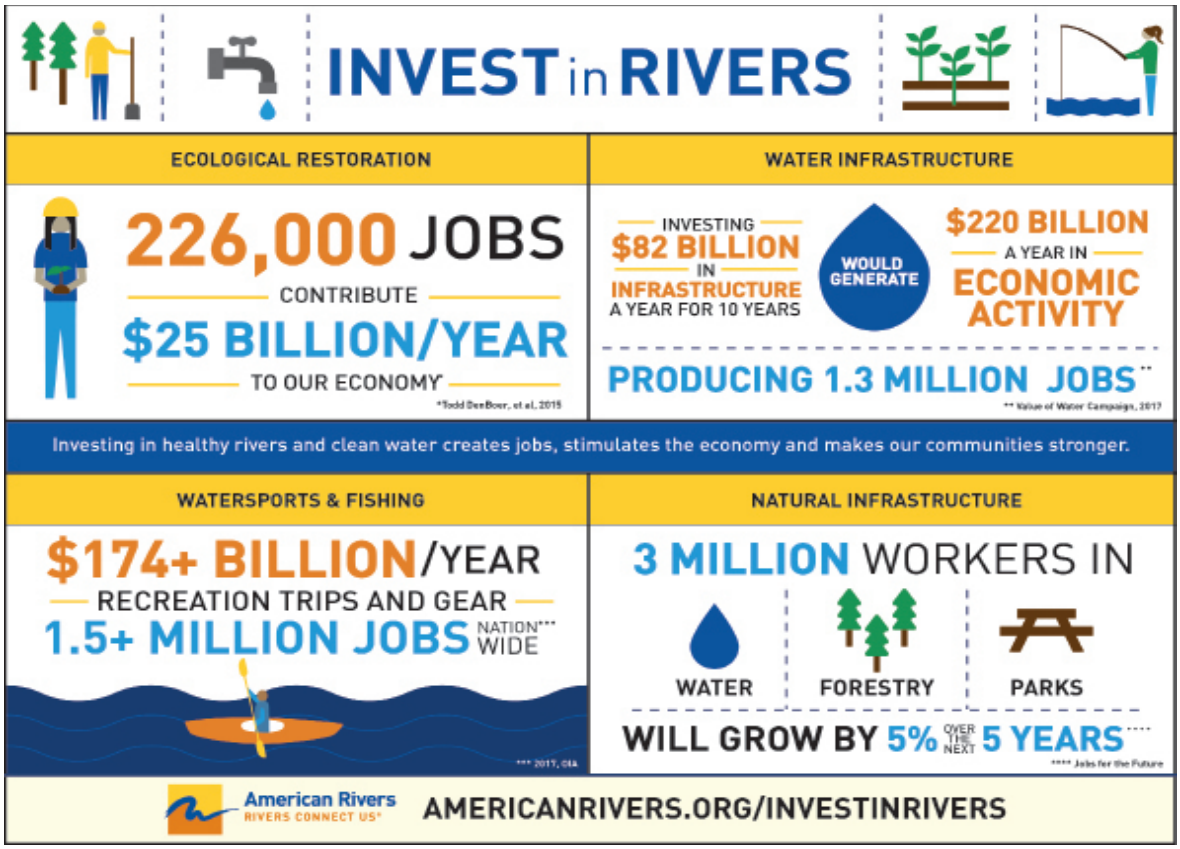
When investing in these solutions, it's critical we invest equitably. Any future federal infrastructure investment program should include criteria to ensure the funding results in a more sustainable and equitable future for Americans from coast to coast. Federal investment must prioritize projects and programs that:

- Equitably distribute funds to communities — prioritizing those that routinely experience underinvestment. This includes low-income neighborhoods and Black, Indigenous and Latinx communities;
- Develop an employment track that targets those that are underemployed, particularly in communities that have experienced underinvestment; and
- Prioritize projects that will create high-quality jobs and bolster local economies while improving the health of rivers and their surrounding lands.

As we seek to reinvigorate our economies and communities in the wake of COVID-19, we must seize the opportunity to build smarter. We need to integrate our systems across bureaucratic silos to maintain clean water, resilient communities and healthy rivers in a time of change and growth. We must confront our legacy of privileged white and wealthy communities at the expense of communities of color and low-income communities.

This white-paper provides a framework for how Congress can invest equitably in healthy rivers and clean water. It includes case studies of successful investments and describes where federal investments should be directed in order to support healthy rivers, clean water, economic recovery and strong communities.

"The nearly three million miles of rivers running across our country are a source of great strength and opportunity. By prioritizing investments for water infrastructure and healthy rivers, Congress can create jobs, boost the economy and strengthen our communities for generations to come."
– Bob Irvin, President and CEO, American Rivers



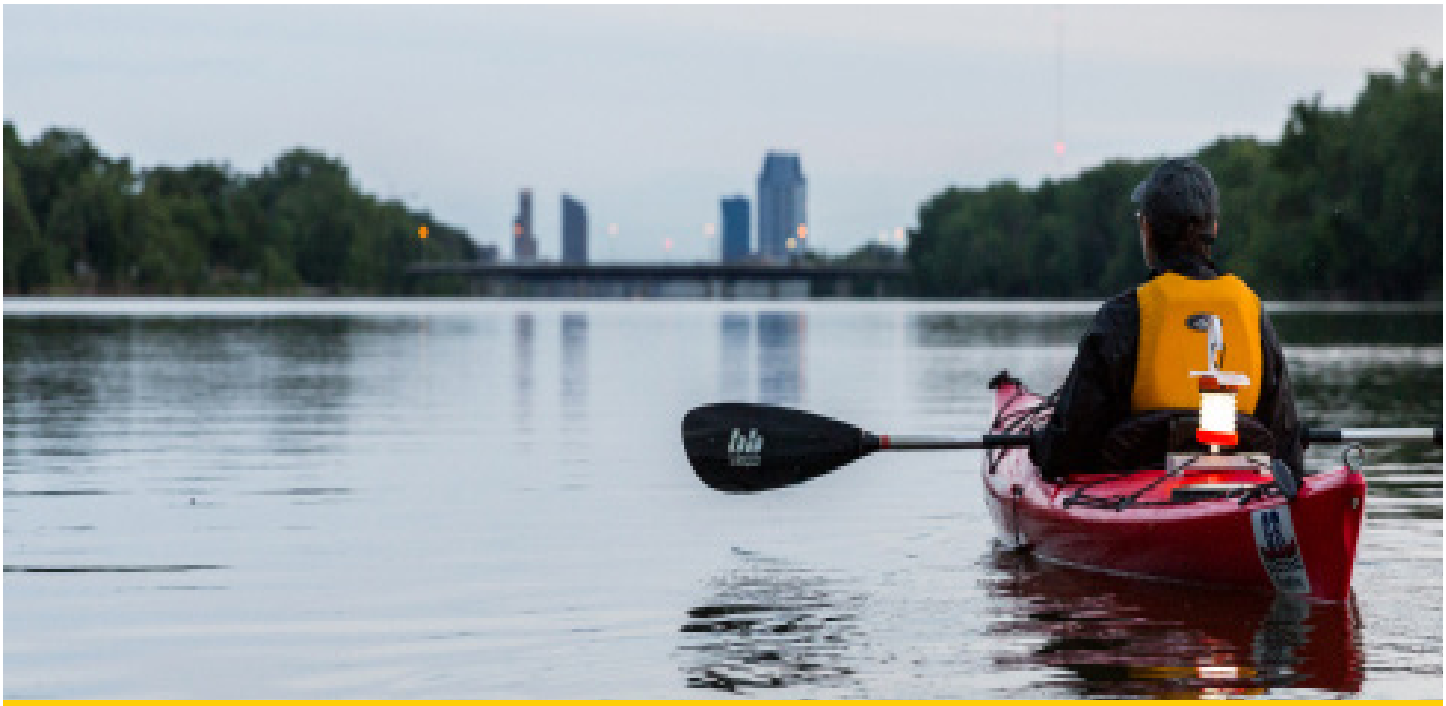


PHOTO: GRAND RIVER, GRAND RAPIDS, MI

"Rivers have always represented opportunity. Today, as our nation grapples with a devastating pandemic, longstanding environmental injustices and a severe economic downturn, equitable investment in clean water and healthy rivers can offer a positive path forward for all." – Bob Irvin, President and CEO, American Rivers

PART ONE: INTRODUCTION

Our nation is in a state of disruption and uncertainty. The COVID-19 pandemic has devastated families and communities and upset many aspects of society. In addition to the staggering number of lives lost since the pandemic began, over 40 million people[6] have lost their jobs and tens of thousands of businesses have shut their doors to prevent the spread of the disease. These impacts are disproportionately affecting low-income communities and Black, Latinx and Indigenous communities.

In the wake of the severe economic downturn, Congress is considering massive investments to jump-start the economy and bring the millions of unemployed Americans back to work. This creates a historic opportunity to make significant investments in our crumbling infrastructure, which has been underinvested in for decades. Investments in water infrastructure and healthy rivers will not only create jobs, it will also strengthen our communities, improve public health and safety, address longstanding injustices and improve our environment.

While COVID-19 is shining a grim light on injustices in our water infrastructure, our rivers and water infrastructure have been neglected and abused for decades. Too many people in this country lack basic access to clean water — two thirds of which comes from local rivers and streams[7]. Centuries of poor river management have fouled water supplies, degraded ecosystems, disconnected cities and towns from their rivers, and increased flood risk and flood damage in many communities.

Climate change is expected to exacerbate these existing challenges. As the most consequential environmental challenge facing our planet, climate change is impacting communities across the country as they are struggling to do more with less water, forest fires are growing more destructive and storms are triggering more life-threatening floods. The National Climate Assessment states, "Water quality and water supply reliability are jeopardized by climate change in a variety of ways that affect ecosystems and livelihoods...Very heavy precipitation events have increased nationally and are projected to increase in all regions. The length of dry spells is projected to increase in most areas, especially the southern and northwestern portions of the contiguous United States."[8] Climate change and its rising temperatures, droughts, floods and impacts to water quality it brings with it threaten to undermine the ecological health of rivers across the country, and therefore the clean water we all rely on.

We need smart investments in solutions that benefit our economy and jobs, as well as our communities and environment. Restoring rivers and improving access to clean water meet these needs.

Climate change is impacting everyone, however, many of these inequities fall disproportionally on Black, Indigenous, Latinx and other marginalized people. In this moment, we have an opportunity to strengthen our communities, drastically improve our public health and put our economy back on track by investing in the health of our rivers and repairing our water systems. But we must do so while avoiding the mistakes of the past. Instead of exploiting people and our environment, we can restore river health, help communities prepare for disruptions caused by climate change, and begin to heal this country's legacy of injustice.

Clean water and healthy rivers are smart investments that can contribute significantly to economic growth and job creation. The Value of Water Campaign[9] estimated that every $1 million spent on water infrastructure in the United States generates more than 15 jobs throughout the economy. Similarly, the University of Oregon[10] found that every $1 million invested in watershed restoration creates 16 new or sustained jobs on average. Healthy rivers also spur tourism and recreation, which many communities rely on for livelihoods. The Outdoor Industry Association's National Recreation Economy Report[11] found that Americans participating in watersports and fishing spend over $174 billion on gear and trip related expenses. And, the outdoor watersports and fishing economy supports over 1.5 million jobs nationwide.

To achieve our bold vision of healthy rivers and clean water for everyone, we need a significant investment of federal funds. American Rivers recommends Congress invest $500 billion for rivers and water infrastructure over the next 10 years. We recommend an initial investment of at least $50 billion to address the urgent water infrastructure needs associated with COVID-19 and shovel-ready projects to improve flood management and restore rivers across the country. Investments in healthy rivers and water infrastructure will not only create jobs across the country, it will also strengthen our communities, improve public health and safety, address longstanding injustices and improve our environment.

This white-paper provides a framework for how Congress can best invest in rivers and water infrastructure to support human needs, enhance public safety, correct ongoing injustices and augment our economy.

Why Rivers?

Imagine all that rivers do for us. Most of our towns and cities have a river running through them or flowing nearby. Rivers provide clean drinking water, irrigate crops that provide our food, power our homes and businesses, provide wildlife habitat, and are the lifeblood of the places where we fish, boat, explore, play and nourish our spirits. Healthy watersheds help mitigate climate change, absorbing and reducing the amount of carbon in the atmosphere. Healthy rivers and floodplains help communities adapt and build resilience in the face of climate change by improving flood protection and providing water supply and quality benefits. Rivers are the cornerstones of healthy, strong communities.

Investing in rivers and natural infrastructure provide multiple benefits for communities. Natural infrastructure protects, restores or mimics natural water systems. When working with traditional gray infrastructure, it can reduce the strain on those systems, particularly during times of flooding. Natural infrastructure adds flexibility to our water infrastructure while increasing green spaces, improving air quality and healthier lifestyles, and lowering medical bills. Using water more efficiently on the farm and at home leaves more water in the river and has energy savings. Healthy rivers and natural infrastructure provide space for recreation and boost property values while also encouraging development outside of the floodplain. These strategies save money, create jobs, revitalize local economies, increase tax revenues, and improve water quality and quantity while delivering a host of other social benefits.

The Challenge

Too many people lack access to clean water. Too many people have sick, polluted rivers in their communities. Too many people are threatened by droughts and floods. Climate change — and the resulting droughts, floods and rising temperatures — threatens to undermine the health of rivers and communities across the country.

All of us have felt the effects of the COVID-19 crisis. However, low-income communities and Black, Latinx and Indigenous communities have been disproportionally impacted by COVID-19.[12] While public health officials urge hand washing to stop the spread of the coronavirus, polluted drinking water from wells and surface waters pose dangers to some communities. Other people are without access to running water altogether. The US Water Alliance and Dig Deep found that at least 2 million people in our country do not have running water or a working toilet at home.[13]

Rural economies are often more directly reliant on natural resources. Rivers support livestock, crops, untreated drinking water, waste disposal and recreation. In agricultural communities that have already faced losses due to climate-disrupted weather patterns and ground conditions, COVID-19 has forced down commodity pricing and triggered supply-chain issues. For communities dependent on recreation and tourism, COVID-19 has significantly reduced the outdoor recreation-based economy and caused serious budget challenges for governments of all sizes.

Furthermore, many communities across our country were built and shaped by implicit or overt racial biases that still result in higher incidences of flooding, sewer overflows or a lack of clean drinking water and sanitation in communities of color. This places a larger burden on communities that already face a lack of investment, opportunity and power. Low-income communities and communities of color are disproportionately affected by climate change impacts, and there are obstacles embedded in the programs that assist them in the recovery from natural disasters.

The American Water Works Association conservatively estimates a cost of $1 trillion over the next quarter century to upgrade our drinking water systems alone.[14] Additionally, the American Society of Civil Engineers determined that over $271 billion in investment is needed for current and future demands for wastewater infrastructure.[15] On top of that, public lands that support local tourism economies carry a maintenance backlog of almost $20 billion.[16] The systems — including traditional and natural infrastructure — that supply clean water and benefit communities need help in the form of renewed and equitable investment.

To solve these problems, we need not only more investment in rivers and water infrastructure, but also a new kind of investment that prioritizes democratic processes, equitable funding, climate resiliency and job creation.

Looking Back at Water Infrastructure Investment During Crises

Over the course of our country's history, large-scale federal investments in rivers and water infrastructure have helped put Americans back to work and get the economy back on track. President Franklin D. Roosevelt and Congress adopted the the New Deal to generate jobs and restore hope in the American economy during the Great Depression. A number of programs were established, including the Public Works Administration, which built large-scale public works projects like dams, bridges and other hard infrastructure; and the Civilian Conservation Corps (CCC), which hired unemployed men — not women — to develop and conserve natural resources on public lands. By 1942, the CCC had hired over 3 million young men,[17] who developed projects like parks and trails. The Public Works Administration completed massive dam and flood-control projects, among others. While these created jobs, they also destroyed habitat, drowned valuable riverside land and cultural sites and displaced Indigenous people from the Tennessee Valley to the Missouri, Colorado and Columbia rivers.

After the 2008 financial crisis, Congress again invested in infrastructure to put Americans back to work. The American Recovery and Reinvestment Act (ARRA) allocated $6 billion for clean water and drinking water infrastructure through the State Revolving Fund (SRF) program. Twenty percent of this went to the Green Project Reserve, which funded projects that addressed water and energy efficiency or other environmentally innovative approaches.[18] Infrastructure funding programs, like the SRF and Green Project Reserve, decreased unemployment and boosted the economy. According to the Congressional Budget Office,[19] by the first quarter of 2011, ARRA funding created between 1.6 million and 4.6 million jobs and reduced unemployment by between 0.6 and 1.8 percent. More specifically, an analysis of ARRA[20] showed conservation investments generated 15 to 33 jobs per $1 million and an economic return of $2.40 for every $1 invested.

Today, when considering how to put millions of Americans back to work, Congress should review the previous stimulus investments, build on their successes and learn from their drawbacks. We don't have to trade the health of rivers and already marginalized communities for economic prosperity.

Economic success, future job growth, and environmental health and protection go hand-in-hand and must be reflected in future stimulus efforts.

PHOTO: BRAD FOR THE CITY

PHOTO: US ARMY CORPS OF ENGINEERS

IMPORTANT TERMINOLOGY IN THIS WHITEPAPER

- **Natural infrastructure**: Relies on strategies like restoration, conservation and management to provide services like improved water quality and supply, aquifer recharge and flood control,[21] which can supplement or even replace traditional built infrastructure. Natural infrastructure protects, restores or mimics natural water systems and includes solutions that restore wetlands, reconnects rivers with their floodplains, sets back levees and expands floodways.
- **Green stormwater infrastructure:** Mimics nature and captures rainwater where it falls. Green stormwater infrastructure reduces and treats stormwater at its source and includes solutions like rain gardens, bioswales, green roofs and other permeable surfaces.
- **Gray stormwater infrastructure**: Moves urban stormwater away from the built environment and includes curbs, gutters, drains, piping and collection systems.
  Floodplain: Relatively flat area on either side of a river that becomes inundated during flooding. Floodplains are a vital part of river ecosystems and provide important aquatic and terrestrial habitat, particularly during changes in the water level.
- **Watershed**: A discrete area or region drained by a river or river system, including upland areas, headwaters, tributaries, mainstem, distributaries, floodplains and estuary.
- **Floodplain restoration**: Involves returning connectivity between the river channel and the floodplain so that water can access the floodplain at the right time, volume and frequency to support ecological processes.
- **Integrated water management plan**: A collaborative plan that produces "triple bottom line" benefits (social, economic and environmental) in an equitable and sustainable manner and creates flexible, resilient water infrastructure that can respond to a range of scenarios.
- **Upland areas**: Lands that are at a higher elevation than the floodplain and river system.
- **Multi-benefit projects**: Defined as projects that provide more than one benefit or serve more than one purpose. For example, a wetland restoration project considers and benefits river health, agriculture and flood protections.
- **Direct jobs**: Defined as jobs created by the actual project or activity.
- **Indirect jobs**: Defined as jobs created by the suppliers who make and provide the materials used in the actual project or activity.
- **Induced jobs**: Defined as jobs created elsewhere in the economy as increases in income from the direct jobs leads to additional spending.

PHOTO: SAN JOAQUIN RIVER, DANIEL NYLEN

PART TWO: RIVERS ARE JOB CREATORS

Rivers can be drivers of a strong, resilient economy, and are an ideal place for rapid job creation in urban, suburban and rural communities. Plus, focusing these investments in communities that need it most can address longstanding inequities in the availability of water-related jobs in their communities. Rivers and clean water are job creators.

Inquantifying the natural infrastructure field more broadly — including water, forestry and parks — Jobs for the Future estimated almost 3 million people were employed in this sector and that this workforce will grow by 5 percent by 2023.[22] Additionally, the Brookings Institute found that natural infrastructure job growth outpaced traditional job growth at a rate of nearly 2-to-1 in the nation's 100 largest metropolitan centers between 2008 and 2010, providing diverse, career-starting opportunities.[23] Healthy rivers and public lands are also significant drivers of employment. The Outdoor Industry Association found that river-based recreation supports over 1.5 million direct and indirect jobs nationwide.[24]

Not only do healthy rivers and clean water generate jobs, they also put a lot of people with many different skill levels to work. The Pacific Institute identified 136 distinct occupations engaged in projects related to rivers and water infrastructure.[25] Jobs include scientists and maintenance professionals, communications specialists, a wide variety of construction workers, outfitters, groundskeepers, precision agricultural technicians, engineers and plumbers that assist in the services related to sustainable water and river-related projects.[29]

Many jobs in the river and water sectors are local and have the potential to catalyze the local economy. Eighty percent of restoration project investments stay in the county where the projects are located.[30] This makes it possible to develop workforce tracks and target public works jobs to underemployed workers in local communities. To further advance the development of local water-related jobs, we need to link federal water funds to programs that provide training, employment, contracting and other economic opportunities to people with low and very low incomes in the water management field. This should be modeled after the Section 3 Program of Housing and Urban Development Department.[31]

The highest-value investments in healthy rivers and clean water will prioritize equity, diversifying our labor force, public health and safety, and strengthening our river and water management systems. In the following pages, we recommend three key areas where investing in healthy rivers and clean water will pay off for the economy, improve community resiliency and strengthen our environment.

In its 2013 report, Sustainable Water Jobs, the Pacific Institute found that sustainable water projects, such as green stormwater infrastructure, floodplain restoration or agricultural efficiency projects, generate as many or more jobs than traditional water infrastructure.[26]

- When $1 million is invested in stormwater management, between 5 and 20 jobs are created.
- When $1 million is invested in agricultural efficiency, 15 jobs are created.
- When $1 million is invested in restoration/remediation, between 10 and 72 jobs are created.

In comparison, traditional water infrastructure generates between 10 and 26 jobs total per $1 million invested. While the data available for the Pacific Institute study was limited, these job numbers illustrate how beneficial sustainable river-related and water projects can be to our economy. The number of jobs a project creates depends on whether the project is more labor-intensive or equipment-intensive. Jobs that are more labor-intensive like riparian restoration projects hire more people, whereas equipment-intensive jobs use funds to cover equipment costs and hire workers to run the machines.[27]

CASE STUDY: CLEAN WATER PARTNERSHIP - Prince George's County, Maryland

In 2016, Prince George's County in Maryland turned a regulatory stormwater compliance mandate into an opportunity by partnering with the company Corvias to create the Clean Water Partnership (CWP), a community-based public-private partnership. The CWP implemented a stormwater management program that reduces polluted runoff at the source using a portfolio of projects that include green stormwater infrastructure. The CWP meets regulatory requirements while engaging the local community in decision-making and prioritizing contracts and opportunities for residents and local businesses owned by people of color. As of June 2018, CWP had restored 2,000 acres through green infrastructure and had contracted with local businesses, 85 percent of which were owned by people of color.[28]

PHOTO: MILWAUKEE METROPOLITAN SEWAGE DISTRICT

Milwaukee Metropolitan Sewerage District's green roof.

IMPROVE WATER INFRASTRUCTURE

RECOMMENDATIONS

Future investments must improve water infrastructure, ensure water and sanitation is available and affordable for all, and prioritize funding where it is needed most. This includes:

- Increasing financial support from state and federal governments to ensure safe and affordable clean water and sanitation through water infrastructure improvements and maintenance. Because of disparities in local abilities to pay for water infrastructure only the federal and state governments have the resources to ensure equitable access to clean water;
- Developing water assistance programs that ensure basic levels of water and sewer services are available and affordable for all communities;
- Supporting democratic decision-making in local and regional water management. Decision-making around water infrastructure does not always include full community engagement and participation, or take into consideration the impacts, particularly with low-income communities and communities of color. The federal government must encourage local jurisdictions to ensure a more democratic and inclusive approach to water infrastructure decision-making; and
- Prioritizing investments toward solutions that maximize economic, social and environmental benefits and improve community resiliency such as green stormwater infrastructure.

Today, across the United States, many people lack access to one of the most basic necessities of life — clean water. Over 2 million Americans are living without running water,[32] indoor plumbing or wastewater treatment. Many without access to clean water have had their water shut off because of unaffordable water bills. Other communities have contaminated water sources. Some studies estimate that by 2022, one third of Americans will not be able to afford their monthly water bill,[33] due to rate increases needed to repair aging water infrastructure. Those repairs are badly needed. The Society of Civil Engineers gave the United States' drinking water infrastructure a D grade and our wastewater infrastructure a D+.[34]

The iimpacts of climate change amplify these hazards and create new problems through increased drought and flood. Communities are facing increasing health and safety risks due to urban flooding, sewer overflows or a lack of clean water as a result of these climate-induced problems. Unfortunately, many communities do not have adequate funding to address these water infrastructure and water affordability needs, even without the threats posed by climate change.

Water affordability is often left up to local communities and utilities, where subsidizing rates at the local level can be a significant financial burden for many small municipalities. To address the challenges facing our water infrastructure, federal funding must prioritize the restoration and maintenance of water infrastructure. Additional federal and state funding is the only way to ensure that all local communities have access to clean, affordable water and protection from sewage overflows and flooding.

PHOTO: MICHELLE ADAMS

CASE STUDY: GREEN CITY, CLEAN WATERS, Philadelphia, Pennsylvania

Philadelphia is a leader in green stormwater infrastructure. The city launched its Green City, Clean Waters program in 2011, injecting at least $1.2 billion in public funds to reduce stormwater pollution by 85 percent. In 2019, the Sustainable Business Network[37] of Greater Philadelphia found that the program produces $4 billion in total economic impact for Philadelphia and about 1,160 jobs annually. Other benefits include a reduction in crime by nearly 9 percent and savings of $50 million annually in avoided health-related costs thanks to people's improved access to open space.[38]

In addition to more federal and state funding, affordability programs must include other measures to ensure ease of access. Programs should automatically enroll households in the program if a person/family meets affordability thresholds. The program should allow local utilities to utilize rate payer funds to support this type of program. Finally, the program should have federal debt forgiveness (for SRF loans) and funding to eliminate private debt for past infrastructure improvements tied to a shift to an equitable rate structure.

One of the primary challenges to such water affordability programs is the costs associated with repairing our aging water infrastructure. There are an estimated 240,000 water main breaks per year in the United States, wasting over two trillion gallons of treated drinking water.[35] To address these issues, we need to invest an additional $82 billion per year in water infrastructure — which includes both green stormwater infrastructure and traditional gray infrastructure.[36] If this investment gap is closed, over $220 billion in total annual economic activity will be added to the economy every year and sustain about 1.3 million jobs over the next 10 years. Additionally, the US Water Alliance[39] found that every $1 spent on infrastructure improvements in the US generates $6 in returns. By investing in repairs and upgrades to our water infrastructure, we can make our communities stronger and more resilient while amplifying local economies.

There are many different occupations associated with water infrastructure. In the case of green stormwater infrastructure — which includes solutions like rain gardens and other natural landscaping — careers are focused on planning, design, operations and maintenance. On average, a $1 million investment in stormwater management creates between 5 and 20 jobs.[40] Additionally, green stormwater infrastructure practices provide multiple community benefits, support local business and are cost-effective solutions to water challenges.

A NEW APPROACH TO WATER INFRASTRUCTRE

We need a new approach to water infrastructure that breaks down silos between drinking water, wastewater and stormwater management to create holistic, coordinated water systems. Referred to as One Water, this approach maximizes economic, social and environmental benefits in an equitable and sustainable manner. One Water conversations bring together city agencies, nonprofits and other stakeholders for collective problem-solving and decision-making that benefits all members of the community. Engaging community stakeholders in water decision-making — particularly those who have been excluded in the past — ensures agreed-upon solutions meet everyone's needs and benefit all equitably.

PHOTO: AARON VOLKENING, CREATIVE COMMONS

CASE STUDY: GREEN STORMWATER INFRASTRUCTURE, Milwaukee, Wisconsin

In Milwaukee, Wisconsin, the Milwaukee Metropolitan Sewerage District (MMSD) uses a combination of gray and green infrastructure for stormwater management. By choosing a green infrastructure option like rain gardens or bioswales, MMSD projects saving $44 million and adding 500 green maintenance jobs and 160 construction jobs per year.[41]

While not an exhaustive list, occupations associated with modernizing water infrastructure, implementing green stormwater infrastructure and protecting drinking source waters include:

- Green/natural infrastructure maintenance technicians
- Engineers (including civil and environmental)
- Water utility workers (drinking, stormwater and wastewater)
- Attorneys
- Plumbers and pipelayers
- Land managers
- Construction laborers and managers

Each of these careers is essential in ensuring access to clean drinking water and sanitation, requires different skillsets and provides opportunities to hire within the community.

In addition to boosting economic growth, investments in protecting drinking water sources provide future savings. It is vastly cheaper to protect clean water than to clean up dirty water. The U.S. Environmental Protection Agency (EPA) defines source water protection as actions focused on safeguarding the quality and/or quantity of sources of drinking water and their contributing areas — including rivers, lakes, reservoirs, springs and groundwater. One EPA study analyzed water expenditures in six communities and found that on average, every $1 spent on source water protection saved $27[43] in future contamination cleanup costs. The American Water Works Association[44] reported in a 2014 article that New York City's source water protection initiative has huge cost savings to the city. Instead of spending upwards of $10 billion on treatment plants, the city has spent less than $2 billion on land protection and improving management.

To address our aging water infrastructure, Congress must prioritize federal funding to replace and maintain water infrastructure, and encourage green stormwater infrastructure while also providing additional funding to assist local communities in ensuring clean water is affordable and accessible for all.

CASE STUDY: GREEN STORMWATER INFRASTRUCTURE LOS ANGELES, CALIFORNIA

Green stormwater infrastructure has multiple benefits and addresses water challenges, saves money and creates local jobs. A 2011 study by the Economic Roundtable found that four Los Angeles stormwater projects generated 13.8 jobs per $1 million invested, with average wages of $52,800 (in 2011 dollars). Additionally, 73 percent of workers lived within Los Angeles County.[42]

PHOTO:AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS

MODERNIZE FLOOD MANAGEMENT

RECOMMENDATIONS

Future investments should incentivize a shift from outdated flood control to an integrated flood management approach that prioritizes equitable, multiple benefit solutions that ensure all communities are resilient to flooding. This includes:

- Incentivizing and building capacity for natural infrastructure solutions for flood management and community resiliency in federal agencies, including Federal Emergency Management Agency (FEMA) and the U.S. Army Corps of Engineers (USACE);
- Ensuring that flood hazard mitigation plans consider climate change, include climate resiliency planning and integrate natural infrastructure or nature-based solutions;
- Directing and funding the Federal Interagency Floodplain Management Task Force to update the Unified National Program for Floodplain Management to better integrate floodplain management at the federal level; and
- Creating a new grant program, housed within the National Fish and Wildlife Foundation, that will assist tribes, state and local governments, and regional watersheds in implementing and building capacity for multi-benefit floodplain projects and initiatives.

Over 40 million people across the United States are estimated to live in floodplains.[45] Traditional flood control measures such as dams, levees and concrete flood control channels often give people an unwarranted sense of security as these measures do not prevent all flood damages. In fact, this type of gray infrastructure often makes flooding worse, passing the problems downstream, disrupting natural river processes, and perpetuating a flood-damage-repair cycle that has devastating costs to life, property, taxpayers and the environment. When levees and dams fail, floods can cause catastrophic damage to people, property and communities.

Nonstructural flood mitigation techniques like acquisition, relocation, elevation or floodproofing flood-prone properties are more effective than gray infrastructure at helping people avoid or minimize flood risk and are more cost-effective as well. Nonstructural projects to alleviate river flooding have been shown to provide $7 in benefits for every $1 invested.[46] However, these projects are often designed with flood reduction as the only goal and by not restoring natural infrastructure like floodplains and wetlands, communities miss opportunities to solve multiple challenges in their communities.

It ilt is time to adopt a new approach to flood management, placing natural infrastructure at the core of our strategy. Natural infrastructure protects, restores and mimics the natural ability of ecosystems to absorb, convey and store floodwaters. Natural infrastructure, such as ecologically functional wetlands and floodplains, provides additional benefits to communities beyond flood damage reduction. It helps recharge streams and aquifers, filters pollutants and excess nutrients, captures carbon, maintains water temperature, and provides habitat and recreation opportunities. These natural infrastructure solutions can be used on their own or can be coupled with nonstructural approaches like moving buildings to higher ground, or with gray infrastructure to augment and enhance traditional approaches. In many cases, natural infrastructure solutions involve adapting existing infrastructure that is no longer providing the protection it once did. There is no one-size-fits-all solution to flooding, and natural infrastructure won't prevent all flood damage, but it is a promising approach with the potential to reduce costs, provide multiple benefits and improve the overall effectiveness of the country's flood management system.

No single program or agency in the federal government has the sole responsibility for floodplain management and reducing flood damage in the United States. Rather, the responsibility is split across dozens of programs within a dozen agencies, which can result in silos and conflicts between programs that do not align. As a result, it is extremely difficult to implement multiple benefit floodplain projects that reduce flood damage, and provide additional benefits like clean water, restored habitat and carbon sequestration. In order to integrate these programs and align their efforts, the Federal Interagency Floodplain Management Task Force was established in 1975 to implement a "Unified National Program for Floodplain Management" with "dual goals of reducing the loss of life and property caused by floods and protecting and restoring the natural resources of floodplains."

FLOODING CHALLENGES IN 2019

The United States experienced 14 unique, billion-dollar, climate-related weather events in 2019 — three river floods, eight severe storms and two cyclones — causing $45 billion in damages.[48] According to the Center for Disaster Philanthropy, around 14 million people were impacted by flooding. The Midwest was hit especially hard in 2019, when homes, farms, roads and businesses were underwater for nearly 100 days on the Upper Mississippi River, and close to a full year on parts of the Missouri River. Despite these staggering figures, current river management decisions across the country are making the problem worse, allowing higher levees and risky floodplain development. Such development fails to adequately plan for the impacts of climate change.

Unfortunately, this integrated effort has proceeded in fits and starts, and investment and effectiveness shift based on the priorities of the different presidential administrations. The last update to the Unified National Program occurred in 1994. A new update is needed that reflects the significant progress made over the last quarter century in our understanding of the problems of current flood management systems, the impacts of climate change, the multiple benefits of natural floodplains to society, the effectiveness of natural infrastructure solutions to reduce flood damage and increase community resilience, and social justice disparities in current floodplain management.

The Federal Interagency Floodplain Management Task Force should be directed to update the Unified National Program in an equitable manner that reflects the needs of tribes, states and local governments, and to establish a framework for a new federal program that will fund multi-benefit floodplain projects and support initiatives by tribes, state and local governments, and watersheds to build capacity for local and regionally driven multi-benefit floodplain management programs. (Examples include Washington's Floodplains by Design, Vermont's River Corridor Program, and the Central Valley Flood Protection Program.) Funding for the Task Force is necessary to support agencies that take on and prioritize this effort.

In order to facilitate more state, regional and tribal multiple benefits flood management projects, and to promote public-private partnerships, this new federal funding program should be managed by the National Fish and Wildlife Foundation (NFWF). Agencies that have important roles in flood management, including USACE, FEMA, EPA and NOAA, among others, would provide technical assistance and guidance for the dispersal of the funds. Program funds would support capacity building, enhance technical capabilities, encourage inclusive planning and the implementation of multi-benefit projects, and provide significant portions of design and construction costs of multiple benefits flood management projects. This new grant program must support community-driven processes and projects that prioritize natural infrastructure and ensure inclusive planning processes with all stakeholders. The program should prioritize flood-prone regions of the country where it can help address flood management at scale as well as create jobs and spur economic activity.

CASE STUDY: FLOODPLAIN RESTORATION, Seattle, Washington

Located in one of the most developed watersheds in the Puget Sound region, the Duwamish estuary is critical habitat for salmon and is sacred to many Native American tribes. However, over the last century, the estuary and surrounding floodplains have been heavily developed, resulting in a declining ecosystem. To restore critical habitat for federally protected salmon, in 2009 the Army Corps of Engineers and King County worked together to restore North Wind's Weir. Located at a critical place in the estuary where the freshwater of the Green-Duwamish River meets the saltwater of Puget Sound, the project restored 2.5 acres of land and habitat, and generated approximately 24 full-time jobs — including 14 direct jobs — and $3.5 million in total economic output.[47]

CASE STUDY: FLOODPLAIN RECONNECTION, Napa, California

In 1998, Napa County residents approved the Napa River Flood Protection Program to reduce flooding in the community and reconnect the river to its floodplain. The program restored over 1,000 acres of wetlands and riparian habitat, including a new park in downtown Napa. As of 2015, the program had protected 3,000 properties from a 100-year flood event, protecting against $25 million per year of potential property damage. Over the last 20 years, nine developments have been constructed outside of the 100-year floodplain, in compliance with the New Downtown Riverfront Development and Design Guidelines. Today, the Riverfront supports 30,000 square feet of office space, 44,000 square feet of retail, and hotel structures that together support 1,248 permanent retail and administrative jobs.[50] Based on their construction value, these projects created an estimated 1,373 temporary construction jobs.[51]

States, local governments and tribes are required to create and maintain hazard mitigation plans in order to receive federal funding to mitigation flood risks. These plans include myriad strategies for reducing risk, but only a few incorporate natural infrastructure solutions. Not including natural infrastructure in hazard mitigation plans is missing significant opportunities to implement these multiple benefit, natural solutions that can improve public safety across the country.

We can make communities more resilient, restore critical habitat, prepare for the onslaught of climate change and employ millions of Americans from coast to coast by adopting a new approach to flood management that places natural infrastructure — wetlands, rivers, floodplains and upland areas — at its core.

Not only will modernizing flood management promote public safety and environmental health, it will create jobs. In 2015, Todd BenDor and his co-authors found that ecological restoration — which includes floodplain restoration — directly employs over 125,000 workers nationally, supports an additional 95,000 workers indirectly and contributes $25 billion to the economy annually, through direct and indirect spending.[49] Projects that implement natural infrastructure solutions and reconnect streams to their floodplains provide multiple social, environmental, economic and public safety benefits.

PHOTO: NAPA RIVER, CA, CALIFORNIA STATE ASSOCIATION OF COUNTIES

PHOTO: SOUTH PLATTE RIVER GREENWAY, DENVER CO, BRANDON PARSON

Flood management projects that rely on natural infrastructure create jobs locally while also providing communities with a reliable, cost-effective and flexible way to adapt to a changing climate. While not an exhaustive list, the types of jobs associated with restoring and reconnecting floodplains, improving community safety and saving taxpayer dollars include:

- Floodplain managers
- Attorneys
- Engineers (including civil and environmental)
- Green/natural infrastructure practitioners
- Project managers with conservation and forest training and expertise
- Pipelayers and pipefitters
- Architects and landscape architects
- Hydrologists and soil scientists
- Construction laborers and managers

Each of these jobs is critical to the restoration and maintenance of floodplains. Floodplain restoration jobs require diverse skillsets that can employ a broad base of people across a community, often where the project is taking place. The Pacific Institute found careers associated with restoring rivers — including reconnecting floodplains — require numerous skillsets from technical assessment, planning and design to construction and follow-up maintenance.[52]

Because of the different skillsets associated with restoration, the number of jobs created can vary. Job creation depends on whether the project is more labor-intensive (more lower-wage jobs) or equipment-intensive (fewer higher-wage jobs). On average, a $1 million investment in river restoration and remediation generates between 10 and 72 jobs.[53] For example, in Southern Illinois, the $10.6 million restoration of the Cache River and associated wetlands generated approximately 36 jobs for each $1 million invested.[54] Of the total jobs created, 22 were directly employed on the project, and about half of those employees lived in the counties where the restoration project occurred.

Giving rivers room to move and taking advantage of floodplains' natural ability to disperse and absorb floodwaters can provide better protection than traditional flood-fighting approaches. These solutions help protect communities, safeguard the environment, save tax dollars, improve property values and create jobs. By transforming our current flood management policy into a multi-benefit approach that includes climate resiliency planning, restoring critical wetlands and reconnecting rivers to their floodplains, we can make communities more resilient while employing millions of Americans from coast to coast.

CASE STUDY: RESTORING RIVERSIDE LAND, Denver, Colorado

In Denver, Colorado, city officials and local partners have worked to restore the South Platte River and Cherry Creek through the heart of downtown Denver. This included riparian restoration, stream channel repair, floodplain reconnection and the development of multiple greenways along the streams. In 2017, Summit Economics[55] evaluated the economic benefits of many years of restoration and found that, on average, properties within a half mile of local rivers or greenways hold 36 percent higher value than other properties in the city. Because of improved river conditions, Denver has collected an additional $64 million in property taxes.[56]

PHOTO: AMERICAN RIVER, CA, BOB WEIR

RESTORE WATERSHEDS IN OUR COMMUNITIES

RECOMMENDATIONS

Future investments should increase funding to communities to restore rivers, make agriculture more sustainable and improve recreation opportunities. This includes:

- Prioritizing integrated water management plans that identify actions to protect existing and future water uses and support healthy rivers in the face of population growth, changing land uses and climate change;
- Incentivizing agricultural improvements including updating irrigation infrastructure, improving and mitigating the adverse water quality impacts of drainage systems, expanding the use of cover crops, and restoring marginal farmland to native floodplain and wetland habitat;
- Developing a new Civilian Conservation Corps that will restore rivers and riparian habitat and improve recreational access; and
- Investing in dam removal, culvert replacement and other infrastructure improvements that benefit the environment and public safety.

Rivers are the lifeblood of local economies. In the aftermath of COVID-19, revitalizing communities by restoring lands and waters, improving agricultural practices and building recreational amenities makes good sense. Communities, particularly those in rural areas, have long depended on natural resources, and with the boom in outdoor recreation, are seeing these resources in a new light.[57] Communities are improving the health of their public lands and waters as they connect the dots between a healthy environment, recreation, agriculture and economic development.

Restoring rivers and improving agricultural practices both have significant benefits for local communities and their economies. By restoring local watersheds, rivers become healthier, cleaner and more resilient. Restoration brings rivers and their communities back to life by removing outdated dams, replacing culverts, and restoring wetlands and riparian areas. Removing outdated dams significantly improves public safety, reduces costs to dam owners and benefits river habitat. Restored riverside lands can soak up floodwaters, reducing downstream damages. Additionally, agriculture benefits from a healthy river with improved stream flows, greater soil health, aquifer recharge and reduced impacts from repetitive flooding. By improving agricultural practices and infrastructure, we can keep more water in the river, slow down agricultural runoff, and improve soil health and its water holding capacity. For farmland that has significant erosion or is otherwise marginalized, this land can be restored to native floodplain and wetland habitat.

CASE STUDY: MULTIPLE BENEFITS OF IRRIGATION IMPROVEMENTS, Kremmling, Colorado

A restoration project on the Upper Colorado River in Grand County, is restoring 12 river miles adjacent to land held by 11 landowners near Kremmling, Colorado. This project, known as The Irrigators of the Lands in the Vicinity of Kremmling (ILVK), will restore the river by creating structures to improve both irrigation and riparian/aquatic habitat. These solutions work with the river system, are sustainable and cost-effective, and reduce long-term operations and maintenance. This project cost approximately $3.4 million dollars and has stimulated approximately 18 local jobs while improving agricultural irrigation, soil and water quality, and aquatic habitat downstream. This solution is a win-win-win for the river, recreation and the local ranching community.[58]

Improving efficiency and innovative drainage solutions for agriculture is key. Agriculture is one of the largest water users in the United States. Many farms and ranches in the Western United States rely on outdated infrastructure to irrigate their land, resulting in wasted water. Over the last century, farmers in the Midwest have converted floodplains and wetlands to farmland because of their nutrient-rich soils. However, these practices have resulted in agricultural drainage systems that move water off fields and into rivers, and in turn have increased nutrient runoff and flooding for downstream communities. Investment is needed in the West to update irrigation infrastructure, improve irrigation practices and implement crop switching. This will help save water, make infrastructure more productive and increase yields. In the Midwest, investment is needed to modify drainage systems to slow water, expand the use of cover crops for soil health and water holding capacity, restore marginal farmland to native floodplain and wetland habitat, and reduce nutrient pollution.

PHOTO: UPPER COLORADO RIVER, CO JOSH DUPLECHIAN

To help communities identify and prioritize sustainable water solutions that benefit communities, agriculture and the environment, the federal government must prioritize the development and implementation of integrated water management plans. Integrated water management plans create flexible, resilient water management solutions that can respond to a range of climate scenarios facing communities across the country. These plans encourage stakeholder engagement and community outreach and have multiple benefits (social, economic and environmental benefits) for all water users. Integrated water management plans are essential in helping communities and stakeholders respond to a changing climate, ensure water security for all water users, and ensure protected and productive land for agriculture and the environment.

Integrated water management plans allow stakeholders to leverage funding, build a greater impact and provide multiple benefits for different users. These plans develop a portfolio of projects that work in concert to meet larger objectives than a single project typically can.

Many landscapes and watersheds that could benefit from restoration and agricultural improvements also need funding to improve and build new recreational access. Outdoor recreation is supported by vital infrastructure — including roads, bridges, trails, campsites, boat ramps and other facilities.[59] However, in order to protect the lands and water resources that facilitate outdoor recreation, a significant maintenance backlog of almost $20 billion for critical infrastructure must be addressed.[60]

CASE STUDY: YAKIMA RIVER BASIN INTEGRATED PLAN, WASHINGTON

The Yakima River Basin Integrated Plan is a 30-year water resiliency and ecosystem restoration plan for the Yakima River system in Washington, providing multiple benefits for the environment, agriculture and the economy. This plan specifically identifies projects to "protect and enhance fish and natural resources, improve water availability and reliability, establish more efficient water markets, manage the variability of water supplies, and prepare for the uncertainties of climate change through operational and structural changes."[61] Partners and beneficiaries of projects include the Yakama Nation, communities in Kittitas and Yakima counties, and the state of Washington. Projects identified in the plan will make these communities and the environment more resilient by funding habitat and floodplain restoration, fish passage and agricultural water reliability improvements. The overall plan is a 30-year, $4 billion effort funded primarily by Washington state, the federal government and agricultural water districts. The plan has many multi-benefit projects ready for implementation in 2021 and 2022 that need a federal investment of $199.8 million, and when implemented will provide 1,100 direct and 3,281 indirect and induced jobs.[62]

PHOTO: YAKIMA RIVER, TOM RING

CASE STUDY: RIVER RECREATION, Colorado

Business for Water Stewardship[63] found that Colorado's rivers are a major economic driver for the state, supporting over 131,000 recreation and tourism jobs in Colorado alone. River recreation contributes $18.8 billion in economic output for the state, contributes $6.3 billion to household income and provides $2.7 billion in tax revenue to the state.

PHOTO: WASHINGTON DEPARTMENT OF NATURAL RESOURCES

PHOTO: YAMPA RIVER, SINJIN EBERLE

To restore our local watersheds and improve recreational access, additional funding and a greater workforce is needed. In recent months, there have been calls for an establishment of a 21st Century Civilian Conservation Corps (CCC). This new CCC could train and hire people to restore watersheds and public lands, while revitalizing rivers, their surrounding lands and recreational opportunities. A new Civilian Conservation Corps program should be more inclusive than the original CCC by employing communities of color and women and must establish important partnerships with all levels of government, tribes and nongovernmental organizations. Such a program would get people back to work and make our communities and watersheds more resilient in the face of climate change.

River restoration, recreation and agricultural improvements also create jobs. The University of Oregon found that for every $1 million spent on watershed restoration, an average of 16 new or sustained jobs are generated, and that leads to $2.2 million to $2.5 million in total economic activity.[64] Moreover, investments benefit local economies. Eighty percent of restoration project funds invested stays in the county where the projects are located, often centered in rural counties. Additionally, on average, a $1 million investment in agricultural efficiency creates approximately 15 jobs.[65]

When a river is healthier, communities can benefit economically because of increased recreation and the indirect benefits associated with a tourism economy. The Outdoor Industry Association's National Recreation Economy Report[66] found watersports and fishing create over 1.5 million jobs nationwide.

Investing in watershed restoration benefits rivers, agriculture, local communities and the economy. While not an exhaustive list, restoring watersheds depends on and creates the following types of jobs:

- Engineers (including civil and environmental)
- Green/natural infrastructure practitioners
- Project managers with conservation and forest training and expertise
- Hydrologists and soil scientists
- Construction laborers and managers
- Recreation outfitters (inclusive of river/river adjacent activities)
- Construction workers
- Farmers and ranchers
- Precision agriculture technicians
- Indirect hospitality jobs (including jobs associated with hotels, restaurants, etc.)
- Attorneys

Each of these careers is unique, requiring different skillsets. Some of these jobs are directly related to restoring and preserving rivers, farmland and riverside lands, while others indirectly benefit from people experiencing and appreciating healthy rivers and their communities. All of these jobs are critical to the health and well-being of local communities and watersheds across the country.

CASE STUDY: WETLAND RESTORATION, Yuma, Arizona

In 2000, a grassroots initiative brought together the Quechan Tribe, the City of Yuma and private landowners to restore seriously degraded habitat along the lower Colorado River. Since the project started, over 350 acres of wetlands and riparian areas have been restored, and the area was designated as the Yuma Crossing Natural Heritage Area. The community leveraged over $8 million in federal, state, city and tribal funding, and the project employed over 150 people in full- and part-time jobs. In addition to economic growth for the community, the project restored habitat for 330 species of wildlife and provides recreational opportunities through improved trails, access points and overlooks. An estimated 200 people a day visit Yuma Crossings in the summer and over 130 visitors a day throughout the rest of the year.[67]

PHOTO: YUMA WETLANDS RESTORATION, COLORADO RIVER, AZ., FRED PHILLIPS

CASE STUDY: WATERSHED RESTORATION, Southern Oregon

Watershed restoration investments have been important for Oregon's southern coast in many ways. Not only did the restoration projects, which included maintenance projects, instream restoration and upland restoration, improve local infrastructure, increase land productivity, and revitalize the local rivers and forests, but these investments were significant job creators. In the first decade of the 2000s, restoration jobs supported an average of 73 local jobs per year, and 43 of these jobs were directly related to employment in restoration. These investments have resulted in more than $32 million in economic output on the southern coast as well. [68]

River restoration revitalizes the local economy. The city of Bellingham, Washington estimates that the removal of a dam on the Middle Fork Nooksack River in the summer of 2020 will create 224 jobs and provide over $40 million in avoided repair costs. This dam removal will not only improve river habitat and create jobs, it will also maintain the water supply for Bellingham residents.

On Washington's Elwha River, removal of Elwha Dam and Glines Canyon Dam created 760 new jobs and generated $33 million in personal income. With the dams gone, the area is expected to benefit from 500,000 new visitors spending $43.8 million each year. Not only was the dam removal good for the economy, it also has provided significant cultural and public safety benefits to the Lower Elwha Klallam Tribe downstream from the dams. Additionally, the dam removal opened up 40 miles of habitat for trout and salmon, including two listed endangered species.[69]

Many communities, particularly those in rural areas, have begun to change their outlook on rivers. Local communities are the stewards of local lands and waters and understand the benefits of a healthy ecosystem. Communities continue to discover how recreation in river corridors can improve and sustain local economies. By restoring their local watersheds and public lands, communities can further benefit from recreation, social and environmental benefits. This approach, coupled with infrastructure improvements in the agricultural economy, can stimulate a strong, multifaceted economy for rural communities.

CASE STUDY: DAM REMOVAL, Taunton and Norwell, Massachusetts

In 2019, the state of Massachusetts investigated the economic benefits of removing two outdated and unsafe dams — Barstowe's Pond Dam in Taunton, Massachusetts and Tack Factory Dam in Hanover and Norwell, Massachusetts. The analysis found that the two restoration projects created 17 jobs and generated $2.8 million in economic activity. The total cost to remove both dams was just over $1 million. Additionally, the removals eliminated the owners' liability and saved them money on dam repairs, inspection and ongoing maintenance. Most important, removing both dams opened up important habitat and improved public safety along the Cotley River and Third Herring Brook, a tributary to the North River estuary.[70]

PHOTO: ELWHA RIVER, WA, JOHN MCMILLIAN (NOAA)

A VISION FOR ABUNDANT SALMON, CLEAN ENERGY AND A STRONG ECONOMY IN THE PACIFIC NORTHWEST

A dialogue is growing in the Pacific Northwest about how to save Columbia and Snake River salmon from extinction, ensure clean and affordable energy, fulfill federal treaty and trust responsibilities with Native American tribes, and bolster the farming, fishing and recreation sectors of the regional economy. A comprehensive solution would include the removal of four dams on the lower Snake River and investments to improve energy, transportation and irrigation infrastructure.

The need for action is urgent. Wild salmon and steelhead returns are at or near record lows. In the fall of 2019, Idaho closed the Clearwater River and parts of the Snake River to salmon and steelhead fishing. A study conducted by Clearwater County estimated that the closure resulted in a loss of $8 million a month.[71]

Removing the dams would also create regional jobs, income and economic output. A 2019 report by ECONorthwest found that removing four federal dams on the lower Snake River in Eastern Washington could result in a net increase of $505 million in output, $492 million in value added, $408 million in labor income, and 317 average annual job-years (the number of persistent jobs created over a specific period of time).[72]

Removing these four dams and restoring a free-flowing lower Snake River is an essential part of any Snake River salmon recovery plan, and multiple studies have shown that the benefits the dams currently provide can be replaced. For example, a replacement energy portfolio featuring a combination of clean power resources could be created for $300 million, according to a 2018 study by Energy Strategies.[73]

Restoring a free-flowing lower Snake River would bring substantial recreation benefits, reduce the risk of flooding in Lewiston, Idaho, and reduce pressure on eastern Idaho farmers to forgo irrigation for the benefit of downstream salmon. Eastern Washington farmers who irrigate with Snake River water would be able to still irrigate with upgrades to irrigation systems and crops would still be able to get to market with investments in the railroad and freight transportation system. This is a win-win solution that restores abundant, harvestable wild salmon, fosters investment in new renewable energy, ensures sufficient water supplies and transportation infrastructure for farms and communities, and reduces risk of flood damage.

New voices from across the region are calling for solutions that solve multiple, interconnected challenges. For the Pacific Northwest, this moment represents a once-in-a-lifetime opportunity to restore the river, honor treaties, create new economic opportunity and modernize energy infrastructure in the face of climate change.

PHOTO: SNAKE RIVER, ALISON MEYER

PHOTO: CREATIVE COMMONS, CENTER FOR NEIGHBORHOOD TECHNOLOGY

Green roof maintenance.

PART THREE: A VISION FOR THE FUTURE – INVESTING IN RIVERS IS AN INVESTMENT IN OUR COMMUNITIES

As our nation struggles to recover from the massive economic fallout created by the pandemic, and Congress considers correspondingly massive economic stimulus legislation, we must ensure that the legislation addresses the economic, environmental, public safety and health needs of urban and rural communities across the country. Few options for doing so will be as effective on all fronts as smart and equitable investments in healthy rivers and water infrastructure. For too long, rivers and water infrastructure have been neglected and lacking investment, with communities being left to deal with the challenges of inefficient, crumbling infrastructure and degrading watersheds. Future investment must prioritize solutions that rebuild our economy, improve sustainable water infrastructure and support resilient solutions like natural infrastructure and river restoration.

To achieve our bold vision of healthy rivers and clean water for everyone, we need a significant investment of federal funds. American Rivers recommends Congress invest $500 billion for rivers and water infrastructure over the next 10 years. We recommend an initial investment of at least $50 billion to address the urgent water infrastructure needs associated with COVID-19 and shovel-ready projects to improve flood management and restore rivers across the country.

Investments in healthy rivers and water infrastructure will not only create jobs across the country, it will also strengthen our communities, improve public health and safety, address longstanding injustices and improve our environment.

American Rivers recommends Congress invest $500 billion for rivers and water infrastructure over the next 10 years. We recommend an initial investment of at least $50 billion to address the urgent water infrastructure needs associated with COVID-19 and shovel-ready projects to improve flood management and restore rivers across the country.

American Rivers recommends funding be prioritized in the following ways:

Improve water infrastructure: At a minimum, we need to invest $200 billion over 10 years.
This will increase funding for programs like the Environmental Protection Agency's Clean Water and Drinking Water State Revolving Funds and the Water Infrastructure Finance and Innovation Act (WIFIA), while providing funds to ensure water is affordable for everyone and to strengthen requirements to build natural infrastructure and prioritize funds to communities in need.

Modernize flood management: At a minimum, we need to invest $200 billion over 10 years.
This will increase funding for critical Federal Emergency Management Agency (FEMA) programs that acquire flood-prone properties like Hazard Mitigation Assistance, Flood Mitigation Assistance and the Building Resilient Infrastructure and Communities Program (BRIC), as well as its flood mapping program. Funding should be allocated to the new National Fish and Wildlife Foundation grant program to provide technical assistance, planning funding and multi-benefit project implementation. Additionally, significant investment is needed in nature-based upgrades like the U.S. Army Corps of Engineers Continuing Authorities Programs, National Flood Risk Management Program, support for the Emergency Watershed Protection Program — Floodplain Easement within NRCS and to include nature-based solutions in ongoing and new larger flood damage reduction projects.

Restore watersheds in our communities: At a minimum, we need to invest $100 billion over 10 years.
This will increase funding for agricultural improvements, including farm bill programs like the Environmental Quality Incentives Program, the Regional Conservation Partnership Program and the Agricultural Conservation Easement Program. Funding is needed to support critical fish habitat restoration funding from sources like the Fish and Wildlife Service's National Fish Passage Program and National Oceanic and Atmospheric Association's (NOAA) Restoration Center. Finally, funding should be prioritized to establish a 21st Century Civilian Conservation Corps to help communities restore watersheds and improve recreation infrastructure.

PHOTO: YUMA WETLANDS RESTORATION, COLORADO RIVER, AZ., FRED PHILLIPS

Rivers and water infrastructure projects rely on programs and funding from many different agencies within the federal government. The programs outlined above are just a snapshot of the many programs that need additional funding to support communities and create jobs while improving the natural environment. These programs provide critical funding that supports job creation and retention for on-the-ground projects to improve community resiliency and equity while restoring and preserving rivers and their surrounding lands. Programs and projects are ready to receive funding today and begin to bring Americans back to work.

An initial investment of $50 billion will ensure we can address some of the most pressing challenging facing communities right now — access to clean water, as well as projects that improve flood management and restore rivers across the country, while providing high quality jobs for a diverse array of workers. Continued investment in years 2 through 10 will provide communities time to continue planning, developing, contracting and implementing on-the-ground projects that modernize flood management, improve water infrastructure and restore watersheds. A breakdown of funding recommendations for year one can be viewed in the Appendix on page 26.

We can't simply invest in the ways we have in the past. Any future federal infrastructure investment should require criteria to ensure the investments result in a more resilient, sustainable and equitable future for all Americans. Federal investment must prioritize projects and programs that:

- Equitably distribute funds to communities — prioritizing those that routinely experience underinvestment. This includes low-income neighborhoods and Black, Indigenous and Latinx communities;
- Develop an employment track that targets those that are underemployed, particularly in communities that have experienced underinvestment; and
- Prioritize projects that will create high-quality jobs and bolster local economies while improving the health of rivers and their surrounding lands.

Federal funding is essential to ensure water infrastructure updates and improvements proceed in a timely manner. However, there are many opportunities for innovative solutions and partnerships that can amplify federal investments. Across the country public-private partnerships have allowed communities to have greater investment in water infrastructure, river restoration and agricultural improvements. For example, in the North Yuba Watershed,[74] the US Forest Service, Blue Forest Conservation, World Resource Institute and Yuba Water Agency developed a Forest Resilience Bond[75] to help restore the forest surrounding the Yuba Watershed. The Forest Resilience Bond leverages limited public financing by cost sharing with other stakeholders, engaging private capital and accelerating restoration efforts to avoid future costs to stakeholders. This public-private partnership is an innovative way to enhance community and watershed resiliency. Initial capital from federal and local agencies was key to creating this opportunity.

As we seek to reinvigorate our economies and communities in the wake of COVID-19, we must seize the opportunity to build smarter. We need to integrate our systems across bureaucratic silos to maintain clean water, resilient communities and healthy rivers in a time of change and growth. We must confront our legacy of privileging wealthy communities at the expense of communities of color and low income neighborhoods.

We have an opportunity to impact the future of our country, if we are wise enough to tap the potential of clean, healthy, free-flowing rivers to stimulate our economy and provide vibrant, sustainable jobs for communities across the country.

PHOTO: POTOMAC RIVER, GETTY IMAGES

APPENDIX

To stimulate the economy and generate new jobs, we need significant new funding and programs to ensure healthy rivers and sustainable water infrastructure for all. American Rivers recommends Congress invest $500 billion for rivers and clean water over the next 10 years, with an initial investment of $50 billion in the first year. To bolster and improve these types of solutions, funding should be prioritized to the following programs, many of which are ready to receive additional funding and begin implementing projects on the ground.

Environmental Protection Agency

- $65 billion for Clean Water and Drinking Water State Revolving Funds, with at least 20 percent of the new funding distributed to disadvantaged communities as additional subsidization (grants) rather than loans and eligibility for the new funding for all water systems, regardless of their organizational structure. We recommend 25 percent of these funds should go to the Green Project Reserve.
- $50 million for the Water Infrastructure Finance and Innovation Fund, with at least 20 percent of the new funding distributed to disadvantaged communities as additional subsidization (grants) rather than loans and eligibility for the new funding for all water systems, regardless of their organizational structure.
- $4 billion in immediate funding to the EPA for grants to the states for a Low-Income Households Drinking Water and Wastewater Assistance/Affordability Program.
- $1.5 billion for EPA Environmental Justice Small Grants (EJSG) Program with increased grant size of $500,000, which funds communities to address environmental risks from concentrated pollution, to prepare for climate change effects and improve public health.
- $4 billion for the Reducing Lead in Drinking Water Program to provide grants and technical assistance for completely replacing lead lines in households, daycare centers and schools, thus protecting our children and communities from the damaging impacts of toxic lead pollution.
- $60 million for the Small & Disadvantaged Communities Program, which assists public water systems in underserved, small and disadvantaged communities meet Safe Drinking Water Act requirements.
- $120 million for Alaska Native Villages and Rural Communities Water Grant Program.
- $100 million for the U.S.-Mexico Border Water Infrastructure Program to provide drinking water and wastewater services to communities living on the border.
- $225 million for the Sewer Overflow Control Grants Development Program, which will provide job training opportunities for careers in the water utility sector and specifically target opportunities at low-income communities and communities of color.
- $1 billion for Clean Water Act Section 319 Nonpoint Source Management Program, which assists states in watershed preservation and restoration and has successfully helped improve water quality across the country. This new funding should be prioritized toward disadvantaged and underinvested in communities.
- $20 million for EPA's Wetlands Program Development Grants, targeted specifically for wetlands restoration and rebuilding to protect communities against flooding and other natural disasters and filter drinking water while also creating jobs.
- Ensure that that all infrastructure funding prioritizes resilient and nature-based solutions such as restoring wetlands and streams, building bioretention and green roofs, and installing permeable roads and sidewalks, and that new projects and repairs do not increase stormwater runoff to surrounding waterways or wetlands.

National Institutes of Health

- $100 million for the National Institute of Environmental Health Science (NIEHS) Environmental Career Worker Training, which provides job and safety training for disadvantaged and underrepresented members of communities of color and low-income communities to secure jobs in environmental restoration, construction, handling hazardous materials and waste, and emergency response.

National Oceanic and Atmospheric Administration

- $1 billion for the Habitat Conservation Program — Reopening Rivers to protect and restore habitat.
- $4 billion for the National Coastal Resilience Fund and Resiliency and Habitat Grant Program to create jobs restoring wetlands, dunes, reefs, marshes, kelp forests, and mangroves to reduce flood risks, create habitat and restart tourism.

Department of Agriculture

- $1.75 billion, including $750 million in grants, for the USDA's Water & Waste Disposal Loan & Grant Program. This program funds construction and improvements for drinking water, wastewater and storm water systems for rural households and businesses and tribes, and will both provide the clean water these communities need while also spurring economic activity and creating jobs.
- $1 billion to the NRCS Emergency Watershed Protection Program — Floodplain Easement (EWPP-FPE) as authorized by the Federal Agriculture Improvement and Reform Act of 1996 (7 CFR 624), with an annual appropriation of $500 million.
- $900 million for the Agricultural Conservation Easement Program.
- $7 billion for the Environmental Quality Incentives Program, including $200 million in year one for Conservation Innovation Grants.
- $20 million for Cooperative Watershed Management Act projects.
- $7 billion for USDA's Conservation Stewardship Program.
- $1 billion for the Regional Conservation Partnership Program.
- $2.5 billion for Forest Service Capital Improvement and Maintenance, including Legacy Roads and Trails, to expand recreation, reduce flooding and improve water quality.
- Ensure that all infrastructure funding prioritizes resilient and nature-based solutions such as restoring wetlands, floodplain restoration and reconnection, on field best management practices, and that new projects and repairs do not increase stormwater runoff to surrounding waterways or wetlands.

Department of Homeland Security - Federal Emergency Management Agency

- At least $10 billion over five years for Federal Emergency Management Agency's (FEMA) Building Resilient Infrastructure and Communities (BRIC) program, which will fund non-structural flood mitigation projects and resilient infrastructure. While the BRIC program is funded through a set-aside of disaster-related funding, an additional amount of supplemental funding should be infused into the BRIC program. FEMA should also ensure natural infrastructure investments qualify and are competitive for BRIC funds. Congress should establish a Green Project Reserve with a minimum mandatory 20 percent set aside for natural infrastructure projects in Building Resilient Infrastructure and Communities Program (BRIC).
- $5 million annually for the Federal Interagency Floodplain Management Task Force to update and implement the Unified National Program for Floodplain Management to better integrate floodplain management programs at the federal level.
- $5 billion for flood mapping. According to an Association for State Floodplain Managers study, it is estimated that fully flood mapping the country will require $3.2-$11 billion. This information is critical to ensure the nation has informed community planning that reduces flood risk, lowers property and infrastructure damage, and helps protect lives.
- $1 billion for the Hazard Mitigation Grant Program, and require that Hazard Mitigation Grant Program includes natural infrastructure.
- $20 million for FEMA's High Hazard Dam Program.
- $700 million annually for Emergency Management Performance Grants.
- Provide adequate investment to increase FEMA staffing levels to ensure FEMA's ability to respond to multiple Category 1 events simultaneously.
- Ensure that all infrastructure funding prioritizes resilient and nature-based solutions such as restoring wetlands, floodplain restoration and reconnection, building rain gardens, and installing permeable roads and sidewalks, and that new projects and repairs do not increase stormwater runoff to surrounding waterways or wetlands.

Department of the Interior

- $50 million for Drought Contingency Plan projects in the Lower Colorado River Basin.
- $25 million for WaterSMART for the water energy and efficiency grant program specifically for multi-benefit projects designed to improve river flows or habitat for fish and wildlife.
- $50 million for the Title XVI water reuse and recycling projects that are part of the WaterSMART program.
- $50 million to drought response specifically for grants to improve watersheds and benefit ecosystems by building drought resiliency.
- $160 million for water conservation investments (canal lining, water control structures and on-farm irrigation infrastructure) and habitat development and maintenance in the Colorado River Delta, pursuant to Minute 323.
- $50 million for the Bureau of Reclamation to fund natural infrastructure projects that support water supply and habitat improvements.
- $1.9 billion for deferred maintenance priorities for the National Park Service, National Wildlife Refuge System, Bureau of Land Management, U.S. Forest Service and Bureau of Indian Education, among others.
- $900 million in permanent annual funding for the Land and Water Conservation Fund.
- $9 billion to create a CCC work program for restoration of the nation's public lands (National Park Service, Bureau of Land Management, Fish and Wildlife Service and U.S. Forest Service, among others).
- $25 million for the National Coastal Wetlands Conservation Grant Program.

Department of Interior continued

- $4 billion to build and repair state, local and tribal outdoor recreational infrastructure and improving accessibility through block grants for states, cities and tribes.
- $1.5 billion for implementing management and recreation plans for National Park units.
- $1 billion for expanding recreational infrastructure.
- $3 billion for implementing the National Fish Habitat Action Plan, reconnecting aquatic habitat through the National Fish Passage Program, addressing invasive species, and eliminating the maintenance backlog of the National Fish Hatchery System and state and tribal hatcheries.
- $1 billion for the Partners for Fish and Wildlife Partners Program.
- Ensure that all infrastructure funding prioritizes resilient and nature-based solutions such as restoring wetlands, rivers, streams and watersheds, floodplain restoration and reconnection, and that new projects and repairs restore natural functions and features wherever practicable.

U.S. Army Corps of Engineers

- $45 million annually for Planning Assistance to states to undertake comprehensive watershed plans in cooperation with States and governmental entities. ($30M federal and state cooperation, $15M Technical Assistance. 42 U.S. Code § 1962d–16).
- $50 million annually for Flood Plain Management Services to provide technical assistance and planning support for floodplain management activities. (33 U.S. Code § 709a).
- $50 million annually for Project Modifications for the Improvement of the Environment (Section 1135) to restore ecosystems and reduce harm caused by USACE projects.
- $62.5 million annually for Aquatic Ecosystem Restoration Projects (Section 206) to plan, design, and build projects to restore aquatic ecosystems for fish and wildlife including dam removal, and river, wetland, and floodplain restoration.
- $1 million annually to develop and maintain a Natural Infrastructure Committee, similar to the USACE's National Nonstructural Flood Proofing Committee. This new committee will help promote the development and use of natural infrastructure, dissemination of information about natural infrastructure and provide leadership in this space.
- Ensure that all infrastructure funding prioritizes resilient and nature-based solutions such as restoring wetlands and rivers, floodplain restoration and reconnection, and that new projects and repairs restore natural functions and features wherever practicable.

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