EPA's 2035 Green Infrastructure Strategic Agenda

Restoring nature and greening urban spaces

United States Environmental Protection Agency

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Introduction

EPA's 2035 Green Infrastructure Strategic Agenda provides a roadmap to equitably scale up green infrastructure and nature-based solutions across the nation. In renewing EPA's green infrastructure strategic agenda, the Agency recognizes nature as a necessary component of infrastructure planning to provide stormwater management, localized flood mitigation, aquifer recharge, heat reduction in urban centers, air quality management, increased biodiversity, and habitat restoration. One significant difference in this update is the emphasis on building green infrastructure to achieve equitable outcomes. EPA's first priority area is developing resources for equitable outcomes and supporting authentic engagement. This is an overarching theme that informs all other goals of this Strategic Agenda. The other three priority areas are using green infrastructure to support clean water regulatory programs; demonstrating the benefits of green infrastructure that enhance healthy watersheds and communities; and connecting communities to federal funding, technical assistance, and financing options.

These priority areas were developed from recent conversations with a diverse set of partner organizations, community groups, planners, regulators, and experienced leaders in the field. They also align with the *FY 2022–2026 EPA Strategic Plan* and input from across EPA's program offices, including air, water, research, and land management. They reflect the continued need to raise awareness of nature's broad range of ecosystem services that increase a community's resiliency and adaptability by trapping carbon in healthy soils, plants, and trees.

As nature is seen as an integral part of resilient communities—providing fundamental services to protect human health and restore our ecosystems—the use of nature-based solutions across federal programs is integral to agency missions that aim to meet climate resilience objectives. Although EPA primarily uses the term "green infrastructure" as defined under the Clean Water Act, other government and nongovernmental organizations use other terms to describe the nexus of nature and human-made systems, such as "nature-based solutions," "natural infrastructure," "green stormwater infrastructure," and "low impact development."

Since the previous Strategic Agenda, the term "**nature-based solutions**" has become more common. EPA defines nature-based solutions as actions that protect, conserve, restore, and sustainably manage natural or modified ecosystems. These solutions use natural features or processes to address public health and environmental challenges while providing multiple benefits to people and nature.

As defined by the Clean Water Act, the term "**green infrastructure**" means "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters."

EPA welcomes continued collaboration with partners to ensure that EPA's priorities and activities are supporting equitable outcomes in communities and healthy watersheds. We will continue to strengthen existing and form new partnerships with federal agencies, Tribes, states, nonprofits, communities, permittees, engineers, landscape architects, national organizations, and others interested in collaborating for meaningful action.

What Has Happened Since the Last Strategic Agenda?

Since the publication of the last Green Infrastructure Strategic Agenda in 2013, momentum for green infrastructure continues to build within EPA and across the federal agencies, states, municipalities, academia, private, and nonprofit sectors.

EPA's Clean Water State Revolving Fund (CWSRF) has funded at least $2.66 billion dollars of green infrastructure projects since 2009,[1] one year after EPA publicly supported green infrastructure as a viable option to achieve clean water and sustainability goals. In addition to the CWSRF funding, since 2013, almost a quarter of the EPA's Clean Water Act Section 319 Nonpoint Source Management Program grant funds have supported addressing urban stormwater pollution and funded implementation of 522 projects that used green infrastructure.

EPA's stormwater models, such as the National Stormwater Calculator, are used by tens of thousands of people every year. EPA funded the development of new models that include precipitation projections and green infrastructure performance metrics, including the Community-enabled Lifecycle Analysis of Stormwater Infrastructure Costs (CLASIC) tool. EPA staff have partnered with over 90 communities in providing design, analysis, and charrette facilitation through our Greening America's Communities and Building Blocks for Sustainable Communities programs and our Technical Assistance with Green Infrastructure efforts. EPA has developed or compiled over 40 case studies that highlight how green infrastructure has been successfully incorporated into permits and consent decrees.

The Water Infrastructure Improvement Act of 2019 requires EPA to promote the use of green infrastructure in, and coordinate the integration of green infrastructure into, permitting and enforcement under the Clean Water Act, planning efforts, codes, ordinance development, research, and technical assistance. The promotion of green infrastructure includes outreach, training, and information sharing for using green infrastructure to reduce water pollution, protect water resources, comply with regulations, and achieve environmental, public health, and community goals.

Coordinated federal action on green infrastructure has also picked up speed. In 2019, the Water Infrastructure Improvement Act sparked the formation of the Green Infrastructure Federal Collaborative (GIFC) by directing EPA to coordinate with federal, state, Tribal, and local governments to increase the use of green infrastructure, providing an impetus for collaborative efforts to continue to evolve.

The EPA-led GIFC created a community of practice of more than 20 federal agencies to align knowledge and coordinate strategies that foster climate resilience and encourage the equitable implementation of green infrastructure. In 2022, the GIFC members developed a Nature-Based Solutions Roadmap that provides five recommendations for accelerating the implementation of nature-based solutions to confront major challenges across the nation:

- Update federal policies, guidance, and permitting processes
- Unlock funding for nature-based solutions
- Lead with implementing green infrastructure at federal facilities and assets
- Train an equitable workforce
- Prioritize research, innovation, and knowledge sharing

1. U.S. EPA's Clean Water State Revolving Fund National Information Management System. Green Project Reserve State Data, Cumulative reporting from FY 2009 to FY 2023. Accessed on October 1, 2024. https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-national-information-management-system-reports.

Visit EPA's Green Infrastructure website to learn more about our past efforts, existing resources, and future learning opportunities.

Green Infrastructure Federal Collaborative Partner Agencies

- Executive Office of the President
  - Council on Environmental Quality (CEQ)
  - Office of Science and Technology Policy (OSTP)
- U.S. Department of Defense (DOD)
  - U.S. Department of the Army (DA)
  - U.S. Department of the Navy (DON)
  - U.S. Army Corps of Engineers (USACE)
- U.S. Department of Energy (DOE)
- U.S. Department of the Interior (DOI)
  - U.S. Fish and Wildlife Service (FWS)
  - U.S. Geological Survey (USGS)
- U.S. Department of State (DOS)
- U.S. Department of Transportation (DOT)
  - Federal Highway Administration (FHWA)
- U.S. Environmental Protection Agency (EPA)
- U.S. Department of Homeland Security (DHS)
  - Federal Emergency Management Agency (FEMA)
- U.S. General Services Administration (GSA)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Millennium Challenge Corporation (MCC)
- National Oceanic and Atmospheric Administration (NOAA)
- Peace Corps
- U.S. Small Business Administration (SBA)
- U.S. Agency for International Development (USAID)
- U.S. Department of Agriculture (USDA)
  - U.S. Forest Service
- U.S. Global Change Research Program (USGCRP)

Past Highlights

180+ projects funded including **50+ grants** funding green infrastructure projects and community engagement in underserved communities

840 teams from **280+** academic institutions participated in the Campus RainWorks Challenge over **11 years**

18 federal consent decrees included green infrastructure to help reduce sewer overflows

EPA's green infrastructure webinars have reached **22,500+ attendees**

Over $2.66 billion of green infrastructure projects funded by the Clean Water State Revolving Fund program

The Superfund Redevelopment Program has:

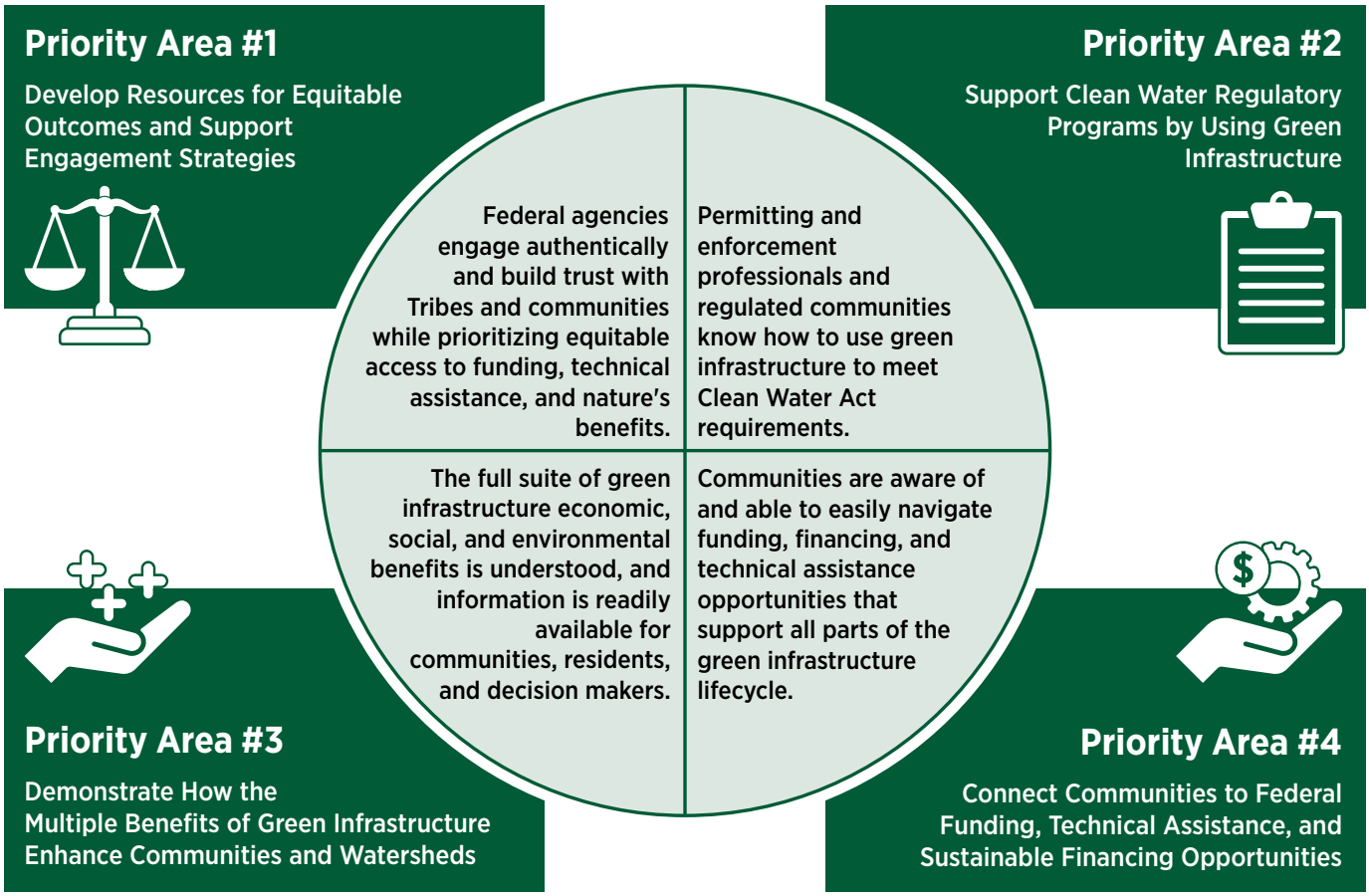
- Incorporated green infrastructure into **33 superfund sites** to manage stormwater
- Protected **over 1,900 ecosystems,** ranging from grasslands to wetlands to forests
- Conserved **15,000 acres**
- Developed **over 300 trails** and **700 parks** and picnic areas for recreational use

The Urban Waters Federal Partnership has:

- Protected or restored **32,000+ acres** of habitat
- Planted **27,000+** native trees and plants
- Collected **27,000+** pounds of trash

183 job training opportunities created in the environmental restoration sector

EPA's Green Infrastructure Priority Areas



Over the next 10 years, EPA plans to focus time and energy on the priorities in this section of the Strategic Agenda to equitably scale up green infrastructure and nature-based solutions in all communities. Extensive feedback from a wide range of partners informed the development of EPA's priority areas. We brought in a diverse set of opinions, heard success stories from community leaders, and listened to local advocates who expressed the most important challenges that need to be addressed.

Overcoming these barriers to green infrastructure implementation will help the nation unlock nature's full potential to solve the most important challenges our society faces today. Investing in these priorities will allow communities to focus on achieving a healthier and more sustainable future.

In 2022, EPA and the American Association for the Advancement of Science (AAAS) held listening sessions with federal and state agencies, universities, nongovernmental organizations, and communities about equitable green infrastructure. EPA incorporated takeaways from these sessions into this Strategic Agenda.

PRIORITY 1:

Develop Resources for Equitable Outcomes and Support Engagement Strategies

Historic underinvestment in infrastructure often overburdens communities with environmental hazards and has led to a lack of capacity to obtain and manage funding for green infrastructure. Green infrastructure can offer many benefits for these communities beyond stormwater management, including access to green space, heat mitigation, and local jobs.[2] Authentic engagement can support the equitable distribution of benefits to communities while mitigating the risk of displacement.

GOAL *for* **2035**

Federal agencies engage authentically and build trust with Tribes and communities while prioritizing equitable access to funding, technical assistance, and nature's benefits to overcome environmental hazards.

Although identified as a discreet goal, **equity** is an overarching priority that informs all other goals identified in this Strategic Agenda.

Objective 1: Increase accessibility to technical assistance and funding for Tribes and historically underinvested communities.

Promote funding for planning, technical assistance, and implementation to Tribes and historically underinvested communities. Encourage green infrastructure in the requirements laid out for eligible projects.

Objective 2: Develop equity-focused guidance and resources that promote green infrastructure as a viable stormwater management solution while addressing additional community goals.

Review and revise existing green infrastructure resources to ensure resources integrate equitable outcomes from inception.

Objective 3: Provide forums for authentic engagement and information exchange on green infrastructure planning and implementation approaches that achieve equitable outcomes.

Host workshops and charrettes that support engagement by listening to the needs of Tribes and communities. Leverage public webinar series such as "Soak Up the Rain" and shared knowledge forums with the GIFC to explore how to mitigate displacement in areas where green infrastructure investments are made.

Objective 4: Advance equitable access to green infrastructure workforce opportunities with partners.

Coordinate with the GIFC and other partners to support green infrastructure job training and professional certification programs for Tribes and underinvested communities.

2. See https://www.epa.gov/green-infrastructure/economic-benefits-green-infrastructure for more information on the economic benefits of green infrastructure.

PRIORITY 2:

Support Clean Water Regulatory Programs by Using Green Infrastructure

Many permitting and enforcement professionals and members of regulated communities may be unfamiliar with green infrastructure's potential to protect and improve the quality of surface waters and groundwater. Because of this, green infrastructure may be overlooked as a viable solution to meet permit requirements or address enforcement actions.

GOAL *for* **2035**

Permitting and enforcement professionals and regulated communities know how to use green infrastructure to protect surface waters when planning for and complying with National Pollutant Discharge Elimination System (NPDES) permits and enforcement actions.

Objective 1: Review and update existing guidance to promote the incorporation of green infrastructure into plans, permits, and enforcement actions.

Clarify how green infrastructure can support Clean Water Act regulatory compliance. Facilitate peer exchanges and trainings for permitting and enforcement professionals to build capacity on asset management and designing and effectively maintaining green infrastructure.

Objective 2: Showcase successful examples of how communities and permitting authorities have incorporated green infrastructure into plans, permits, and enforcement actions.

Share case studies and permitting examples that demonstrate how regulated communities have used green infrastructure to comply with Clean Water Act requirements. Highlight geographically diverse case studies through trainings and webinar series to reach a broad audience.

Objective 3: Continue to ensure all water enforcement actions consider the use of green infrastructure.

Identify green infrastructure approaches in the development of orders and settlements related to sanitary sewer overflows (SSOs), combined sewer overflows (CSOs), and municipal separate storm sewer systems (MS4s). Incorporate green infrastructure into injunctive relief where appropriate.

Photo Credit: Image reproduced with permission from Montgomery County, MD Department of Environmental Protection.

PRIORITY #3:

Demonstrate How the Multiple Benefits of Green Infrastructure Enhance Communities and Watersheds

Evidence shows that green infrastructure provides environmental, social, and economic benefits to communities. However, more effective storytelling and compelling case studies are still needed to demonstrate how and why green infrastructure is a smart investment for building vibrant, resilient, and healthy communities. As emerging issues arise, such as intensified precipitation events, extreme heat, and contaminants of concern (e.g., 6PPD-quinone, microplastics), additional research can pinpoint the effectiveness of green infrastructure in mitigating hazards and solving real-world challenges.

GOAL *for* 2035

Current and potential benefits of green infrastructure—including stormwater management, localized flood mitigation, aquifer recharge, heat reduction in urban centers, air quality management, increased biodiversity, and habitat restoration—are well understood. Communities can use the readily available current information to gain buy-in from residents and decision-makers as experts actively pursue future research gaps.

Objective 1: Distribute information on the benefits of green infrastructure more broadly and make the information more accessible.

Provide opportunities to share compelling stories about the multiple benefits of green infrastructure. Translate research into resources, media, and case studies in multiple languages that showcase the benefits of green infrastructure. Host webinars and conduct workshops that share how different types of communities have benefited from adopting green infrastructure in their planning (e.g., climate planning, master plans, strategic plans, sustainability plans) and capital improvement investments.

Objective 2: Identify data gaps for targeted research on the benefits and limiting factors of green infrastructure, including for intensified precipitation events, extreme heat, public health, and emerging contaminants.

Inventory current benefits research to identify where additional information is needed to showcase how green infrastructure can address emerging containments, environmental performance, and equity. Acknowledge limiting factors to avoid unintended consequences.

Objective 3: Conduct research to fill the wide range of green infrastructure data gaps.

Convene experts to conduct targeted peer-reviewed research and literature reviews to fill existing qualitative and quantitative data gaps on the multiple benefits of green infrastructure.

Objective 4: Continue to provide user-friendly tools and methods to assess and quantify the benefits of green infrastructure that promote sustainability planning and interdisciplinary coordination.

Enhance the costs and benefits quantification modules within EPA's Green Infrastructure Modeling Toolkit. Develop resources that build on the Land Use and Green Infrastructure Scorecard to help communities include green infrastructure in strategic planning between departments within municipalities.

PRIORITY #4:

Connect Communities to Federal Funding, Technical Assistance, and Sustainable Financing Opportunities

Numerous federal funding or technical assistance opportunities are available for projects that incorporate green infrastructure and nature-based solutions. The volume and variety of opportunities can be overwhelming for communities to navigate. More support is needed to help communities identify funding, financing, and technical assistance options that are best suited for their specific project(s), and to help them understand how to maintain funding/financing for long-term success.

GOAL *for* **2035**

Communities are aware of and able to easily navigate funding, financing, and technical assistance opportunities that support all parts of the green infrastructure life cycle (e.g., assessment, planning, design, implementation, operations and maintenance, and monitoring).

Objective 1: Continue to track and compile federal funding and technical assistance opportunities for green infrastructure and nature-based solutions.

Maintain an inventory of funding and technical assistance opportunities that support green infrastructure and nature-based solutions projects and life cycle costs.

Objective 2: Provide outreach to help communities learn how to identify and apply for federal funding and technical assistance opportunities for green infrastructure.

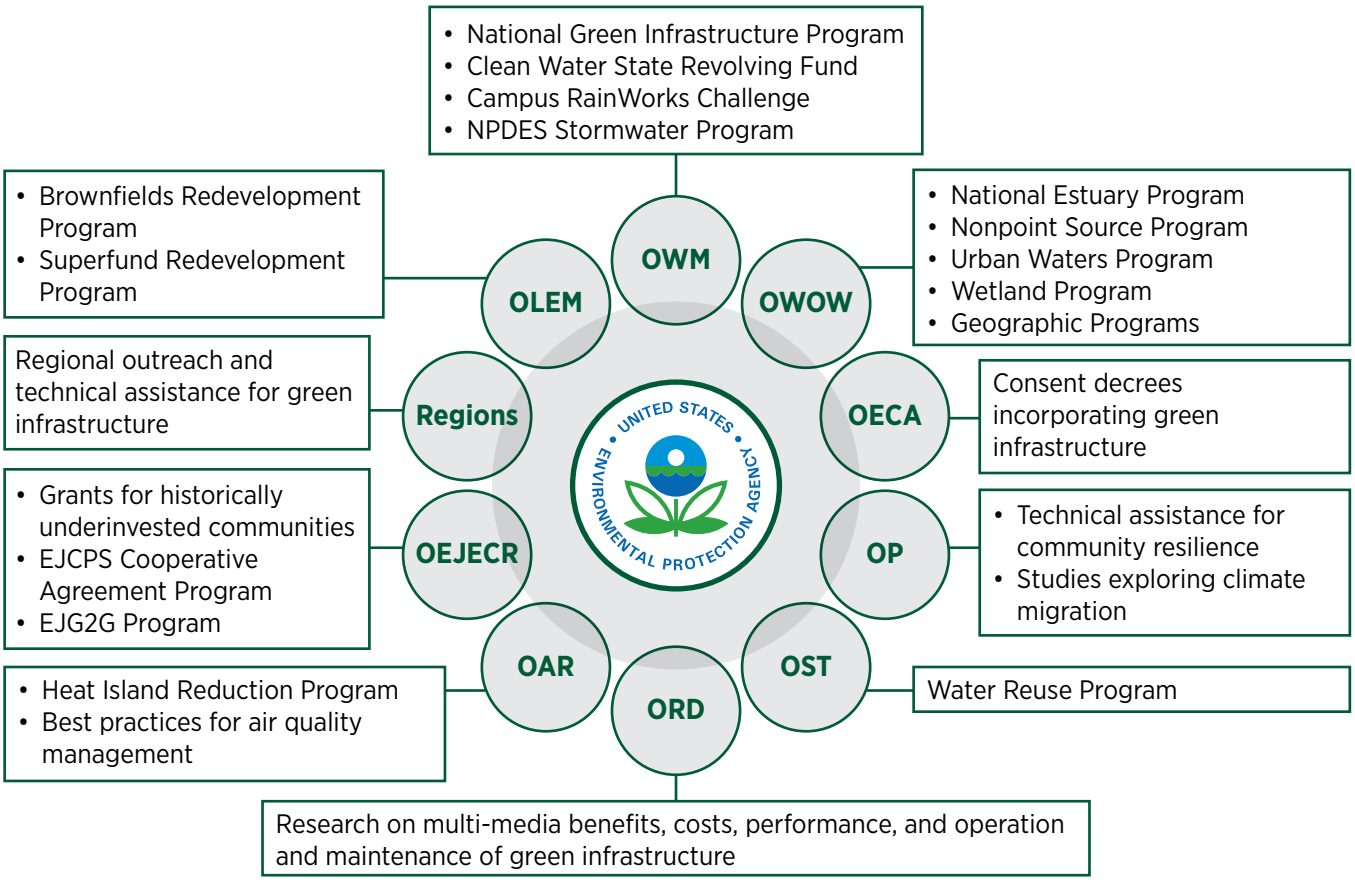
Build trust with communities when providing outreach and conducting webinars, consistently announce new opportunities, and speak at conferences to share how all communities can successfully obtain federal funding and technical assistance. Explore how automation and machine learning can help communities navigate and apply for opportunities.

Objective 3: Educate partners and communities on financing models to move from grants-only funding to sustainable models for communities to support the full range of green infrastructure life cycle costs, including monitoring and maintenance over the long term.

Host workshops that help communities understand the life cycle costs, return on investment, and importance of public–private partnerships associated with green infrastructure and the correlated funding and financing opportunities.

Programmatic Highlights

The ability of green infrastructure and nature-based solutions to deliver multiple environmental, social, and economic benefits beyond stormwater management is reflected in the breadth of EPA programs that promote green infrastructure to achieve EPA's mission and the four priorities summarized above. EPA regional offices have provided one part-time green infrastructure coordinator to promote green infrastructure within each region. EPA programs across water, air, and land management recognize the strong evidence that green infrastructure restores healthy watersheds, reduces heat and local flooding, and can encourage equitable development when communities become involved at the outset of a project. EPA researchers continue to study the performance of green infrastructure under changing conditions and evaluate its costs, benefits, limitations, and operation and maintenance challenges. The image below shows the various EPA offices that are involved in advancing green infrastructure across the Agency.



The table below lists activities EPA supports to advance green infrastructure.

Activity	Priority Area #1	Priority Area #2	Priority Area #3	Priority Area #4
The Office of Wastewater Management (OWM) releases guidance documents promoting green infrastructure to meet Clean Water Act requirements, including integrated planning resources that promote long-term stormwater planning and green infrastructure as key solutions for managing stormwater.		X		
EPA is incorporating green infrastructure into federal consent decrees as an option to meet Clean Water Act requirements.		X		
The 2024 Soak up the Rain webinar series focuses on the intersection of equity and green infrastructure.	X		X	
The Campus RainWorks Challenge showcases innovative green infrastructure projects and encourages students to join the green infrastructure workforce.			X	
The Nonpoint Source Program develops resources such as the Bioretention Design Handbook, the Green Streets Handbook, and the Environmental Benefits Compendium to highlight the multiple benefits of green infrastructure.			X	
In 2024, OWM established the Centers of Excellence for Stormwater Control Infrastructure Technologies Grant Program. The Stormwater Centers of Excellence will conduct research and provide technical assistance to support stormwater infrastructure improvements that protect public health, safeguard the environment, and increase resilience.	X		X	
An innovative Artist-in-Residence pilot initiative through the National Estuary Program (NEP) and the Urban Waters Federal Partnership aims to boost awareness, engagement, and participation in water challenges in six watersheds across the country.	X		X	
The Brownfields Redevelopment and Superfund Redevelopment programs provide job training, including green remediation practices and green infrastructure, for unemployed/underemployed residents of communities affected by solid and hazardous waste.	X	X	X	

Activity	Priority Area #1	Priority Area #2	Priority Area #3	Priority Area #4
The Environmental Justice Government-to-Government (EJG2G) program provides funding at the state, Tribal, and local levels to support government activities with measurable environmental or public health impacts in communities disproportionately burdened by environmental harms.	X			X
The Environmental Justice Collaborative Problem-Solving (EJCPS) Cooperative Agreement Program supports community organizations in building collaborative partnerships to develop solutions to environmental or public health issues.	X		X	X
The Office of Community Revitalization (OCR) will conduct future studies exploring the emerging issue of "climate migration" and how green infrastructure can be used to restore ecosystems while maintaining access to places of cultural value.	X		X	
Existing resources such as the Land Use and Green Infrastructure Scorecard are being revised to incorporate equity concerns.	X			
The Office of Science and Technology (OST) is developing resources under the National Water Reuse Action Plan promoting and explaining opportunities to use green infrastructure and nature-based solutions.			X	
The Heat Island Reduction Program helps educate the public on how green infrastructure can help mitigate the heat island effect.	X		X	
The Office of Research and Development (ORD) researches how to leverage benefits from green space and green infrastructure and how specific nature-based solutions can alleviate climate-induced health and well-being challenges that vulnerable communities in urban areas experience.	X		X	
ORD and the Office of Air and Radiation (OAR) have conducted research and provided best practices for implementing urban green infrastructure to reduce local air pollution and avoid unintended consequences related to air quality in near-roadway communities.	X		X	

Activity	Priority Area #1	Priority Area #2	Priority Area #3	Priority Area #4
The Office of Wetlands, Oceans, and Watersheds (OWOW) provides grant funds from the Section 319 Nonpoint Source Grant Program that can be used to address stormwater pollution in urban areas and continues to support the implementation of green infrastructure.	X		X	X
ORD publishes peer-reviewed journal articles evaluating green infrastructure performance, costs and benefits, and operation and maintenance issues.			X	
EPA's Green Infrastructure Modeling Toolkit helps communities assess the costs and benefits of green infrastructure projects.		X	X	
The Urban Waters Federal Partnership collaborates with community-led revitalization efforts in overburdened or economically distressed communities.	X		X	X
EPA administers 12 Geographic Programs (Geos). These programs are long-standing, geographically specific programs that help protect local ecosystems and communities from habitat loss and pollution.		X	X	X
The Clean Water State Revolving Fund (CWSRF) provides funding for green infrastructure projects. The program promotes and highlights opportunities to use CWSRF funds for green infrastructure and nature-based solutions, as well as educates communities on the benefits of green infrastructure and nature-based solutions through outreach materials, public presentations, and webinars.			X	X
Water Technical Assistance (WaterTA) provides support and education for communities applying for federal funding, developing sustainable financing mechanisms, and meeting NPDES permit requirements.		X		X
The Water Finance Clearinghouse is a database that helps communities understand the multiple benefits of investing in green infrastructure and provides information and resources on funding sources and sustainable financing strategies.			X	X
The EPA Region 3 Office annually provides grants through the Green Streets, Green Jobs, Green Towns (G3) Program to fund green infrastructure planning, design, and implementation.		X	X	X

Conclusion

EPA's Green Infrastructure Strategic Agenda recognizes that green infrastructure and nature-based solutions are critical water infrastructure components to support resilient and sustainable communities. Prioritizing green infrastructure in urban planning, capital improvement plans, sustainability initiatives, future investments, and decisions will help address many challenges our society faces today. Green infrastructure provides communities with strong stormwater management, localized flood mitigation, aquifer recharge, heat reduction in urban centers, air quality management, increased biodiversity, and habitat restoration. Programs across EPA will continue to prioritize green infrastructure and nature-based solutions to achieve equitable outcomes and to develop healthy watersheds and vibrant communities. EPA highlights its priorities through this strategy to encourage continued collaboration with partners. EPA will continue to strengthen existing and form new partnerships with federal agencies, Tribes, states, nonprofits, communities, permittees, engineers, landscape architects, national organizations, and others interested in collaborating for meaningful action.

For specific programmatic information, contact EPA Headquarters and Regional Office staff for green infrastructure through the EPA Green Infrastructure website.

To connect with the EPA Green Infrastructure program, join the Greenstream listserv to receive updates on green infrastructure publications, training, and funding opportunities by sending an email to join-greenstream@lists.epa.gov.