

GREEN INFRASTRUCTURE

October 2015

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Communities are Facing Many Challenges



Trash and other stormwater pollutants degrade our waters



Excess volume and velocity of stormwater cause flooding & erosion



Drought conditions lead to water scarcity and high runoff rates when it



Development often increases impervious cover and stormwater volumes leading to impacts for

Changing Stormwater Management

Traditional approach

- Convey stormwater quickly from site to waterbody or detention ponds
- Manage peak flows for flood control, drainage and large scale downstream erosion.



New approach - Integrate green infrastructure in the design of the project

- View stormwater as a resource
- Slow down the flow, allow to infiltrate
- Manage stormwater on site
- Reduces pollutant loads to waterbodies



Green Infrastructure for Climate Resiliency

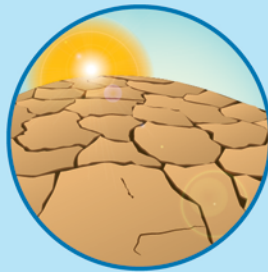
Climate change is impacting urban areas in many ways, from exacerbating the urban heat island effect to elevating flood risk. Build green infrastructure to help improve community resilience.

FLOODING



By the end of the century, annual damages from flooding in the U.S. are projected to **increase by 30%**¹

DROUGHT



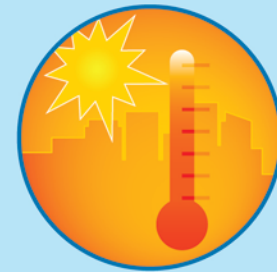
1 out of 3 U.S. counties in the lower 48 states face higher risks of water shortages by mid-century.²

COASTAL DAMAGE



50% of Americans live in coastal counties, where water and energy infrastructure are increasingly vulnerable to higher sea levels.³

URBAN HEAT



Climate change will likely lead to **more frequent and severe** heat waves during summer months.⁴

Integrating Green Infrastructure



Seattle bioswale.
*Photo courtesy of
Seattle Public
Utilities.*



Bioretention Cell
in El Monte, CA.
*Photo courtesy of
Bill DePoto.*



Permeable pavement
and bioretention in
Albuquerque, NM.
*Photo courtesy of
AridLID.org.*

Green Roofs



Chicago City Hall



Green Roof in Austin, TX. Photo courtesy of Greenroofs.com.

Rainwater Harvesting



Rainwater cisterns used to capture rainwater at the Texas Medical Center School of Nursing. Photo courtesy of Suzanna Perea.

Bioretention



Photo courtesy of Bill DePoto.



Bioretention used to treat roadway runoff in Downey, CA. Photo courtesy of Bill DePoto.

Downspout Disconnection Programs



Disconnected downspout and bioretention cell, Capital Hill, Washington, DC. *Photo courtesy of LID Center.*



Vegetated Planter and disconnected downspouts at Portland State University. *Photo courtesy of Martina Frey.*

Benefits to Growing Communities Inver Grove Heights, MN

In 2014, nearly 10" of rain fell over a 4-day period causing flooding in other parts of the Twin Cities-metro area. Minimal runoff reached the regional infiltration basins and no stormwater left the City.



The 134 acre retail & residential development used a train-treatment approach, that included:

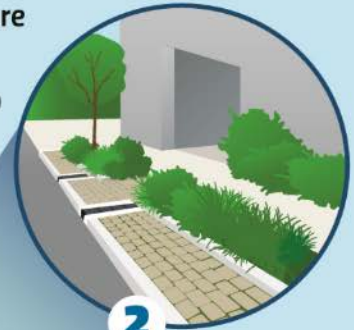
- 35 raingardens,
- 274 permeable asphalt parking stalls,
- 2 permeable paver intersections,
- 2 infiltration basins
- and a biofiltration swale



Green Infrastructure Builds Resiliency

1 Vegetation-based green infrastructure practices can mitigate carbon pollution.

2 Build green infrastructure like rain gardens and permeable pavement to manage flooding.



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3 Reduce dependence on imported water and save money.
Let water soak into the ground to recharge local groundwater supplies.

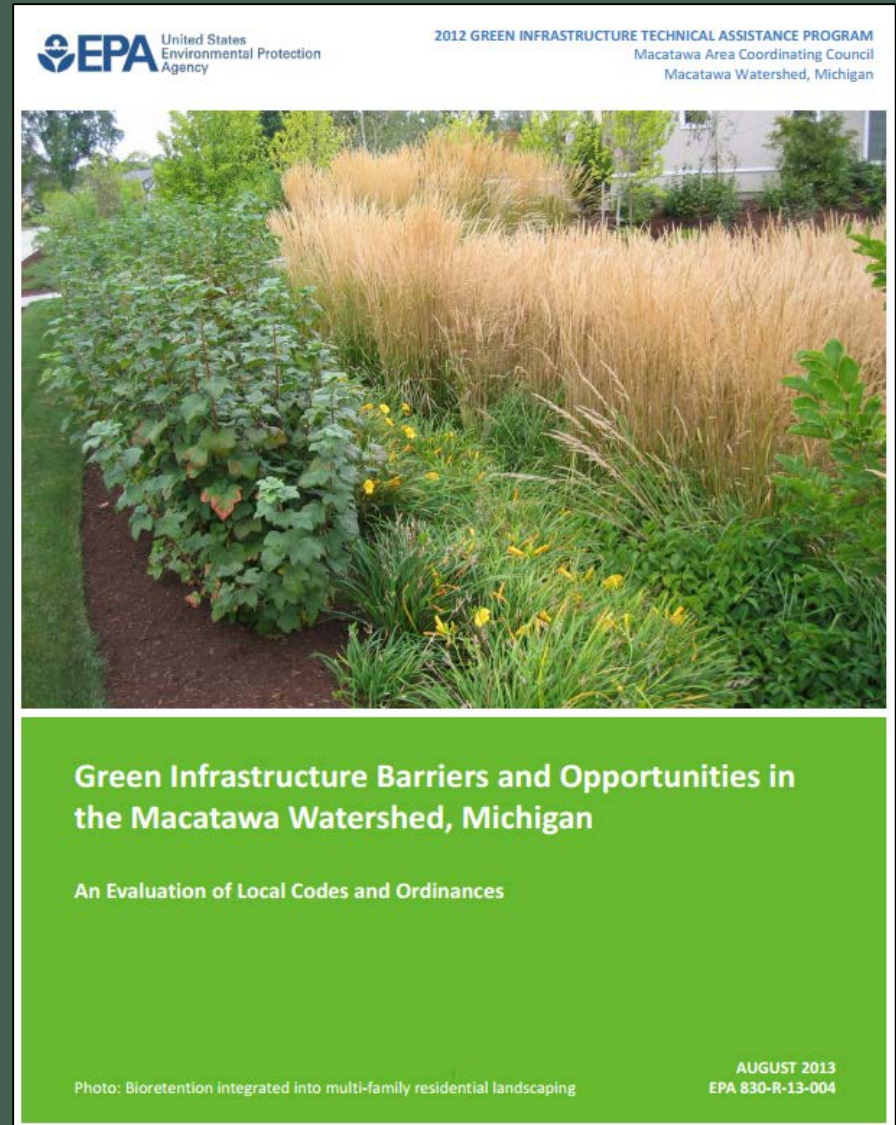
4 Keep water local. Capture runoff in cisterns and rain barrels to reduce municipal water use.

5 Plant trees and green roofs to mitigate the urban heat island effect.

6 Use living shorelines, buffers, dunes and marsh restoration to reduce the impact of storm surges.

Green Infrastructure Technical Assistance

- More than \$2 million provided to 39 communities
- 14 communities in 2014
- 3 resiliency projects:
 - Norfolk, VA – coastal flooding and sea level rise
 - Iowa City, IA – riverfront park options to manage flooding
 - Santa Monica, CA – rainwater harvesting for public park irrigation



Green Infrastructure Collaborative

- Intended to leverage efforts, build knowledge, and facilitate more rapid adoption.
- 30 organizations have signed on to work with federal family to advance green infrastructure.



The screenshot shows the EPA website's 'Green Infrastructure Collaborative' page. The header includes the EPA logo and navigation tabs for 'LEARN THE ISSUES', 'SCIENCE & TECHNOLOGY', 'LAWS & REGULATIONS', and 'ABOUT EPA'. A sidebar on the left lists various water-related topics, with 'Green Infrastructure' highlighted under the 'Water Infrastructure' section. The main content area features the collaborative's logo, a breadcrumb trail, and a list of resources. The text describes the collaborative's formation on October 8th, 2014, and lists three key goals: leveraging joint efforts, building knowledge, and facilitating shared inquiry. It also mentions the signing of a Federal Letter of Support by seven federal agencies.

EPA United States Environmental Protection Agency

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Green Infrastructure Collaborative

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- Green Infrastructure Collaborative
- Collaborative Members
- Green Infrastructure Collaborative Resources

On October 8th, 2014 EPA joined with federal agencies, non-governmental organizations, and private-sector entities to form the Green Infrastructure Collaborative, a network to help communities more easily implement green infrastructure. The Collaborative released a [Statement of Support](#) (15 pp, 281K, [About PDF](#)) outlining commitments from members to advance coordination around green infrastructure initiatives. The Collaborative will build capacity for green infrastructure implementation by providing a platform for national stakeholders to:

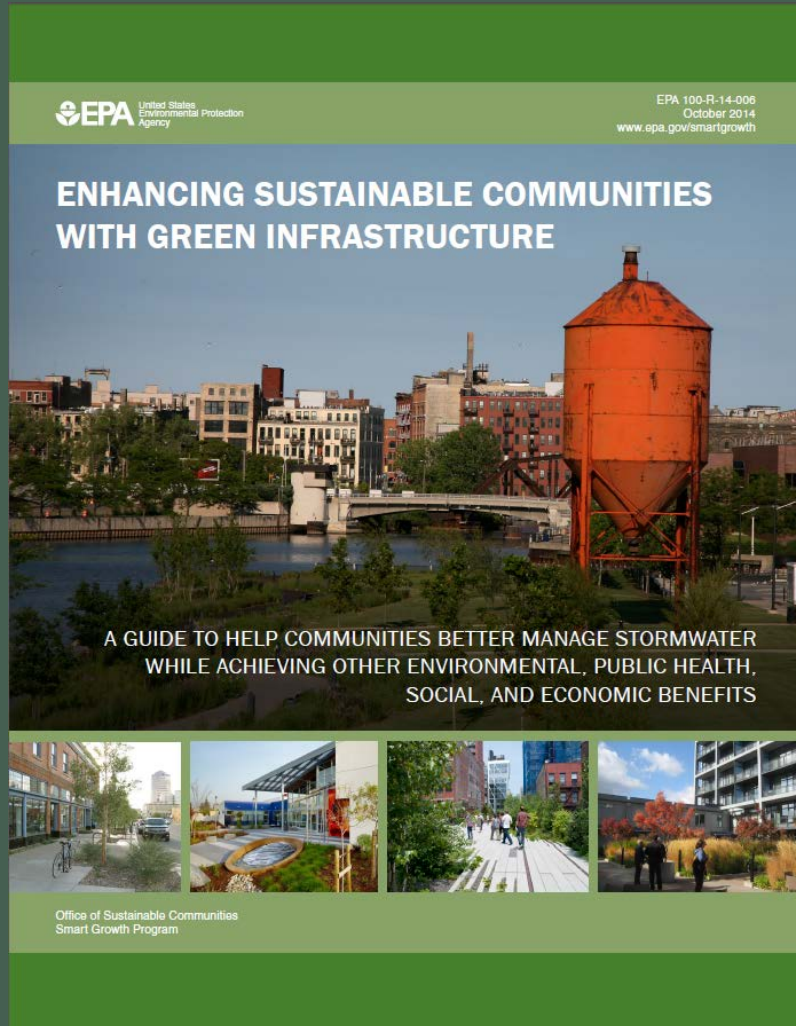
1. Leverage joint efforts to promote the multiple community benefits of green infrastructure;
2. Build and share knowledge around emerging green infrastructure technologies and policy issues; and
3. Facilitate shared inquiry into the best ways to encourage adoption of green infrastructure technologies at the local level.

Seven federal agencies have come together to support the Green Infrastructure Collaborative. These agencies signed a [Federal Letter of Support \(PDF\)](#) (5 pp, 248K, [About PDF](#)) committing to specific actions to promote green infrastructure. The cooperating agencies are EPA, the Department of Housing and Urban Development, the Department of Transportation, the Department of Agriculture, the Department of the Interior, the Department of Defense, and the Department of Energy.

Over the coming year, Collaborative members will work closely together to align public and private knowledge and resources to promote green infrastructure.

http://water.epa.gov/infrastructure/greeninfrastructure/gi_partners.cfm

EPA Resource



A guide to help communities better manage stormwater while achieving other environmental, public health, social, and economic benefits

<http://www2.epa.gov/sites/production/files/2014-10/documents/green-infrastructure.pdf>

Thank You!

www.epa.gov/greeninfrastructure



- Tools
- Operations and Maintenance (O&M)
- Design
- Funding
- Climate Resiliency



- Basics
- Cost Benefit Resources
- Performance
- Research
- Campus RainWorks
- Policy
- Permitting
- Training



- Green Infrastructure Collaborative
- Technical Assistance
- Collaborative Resources