

The Rain Garden Ripple Effect

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SEAS

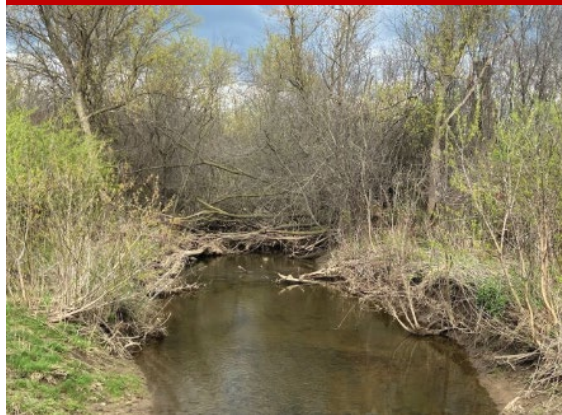
Friends
of the **ROUGE**

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INSTITUTE

Outline

1. Water Quality Challenge in the Rouge



2. Rain Garden— How does it work?



3. How can you help— Current residents' effort

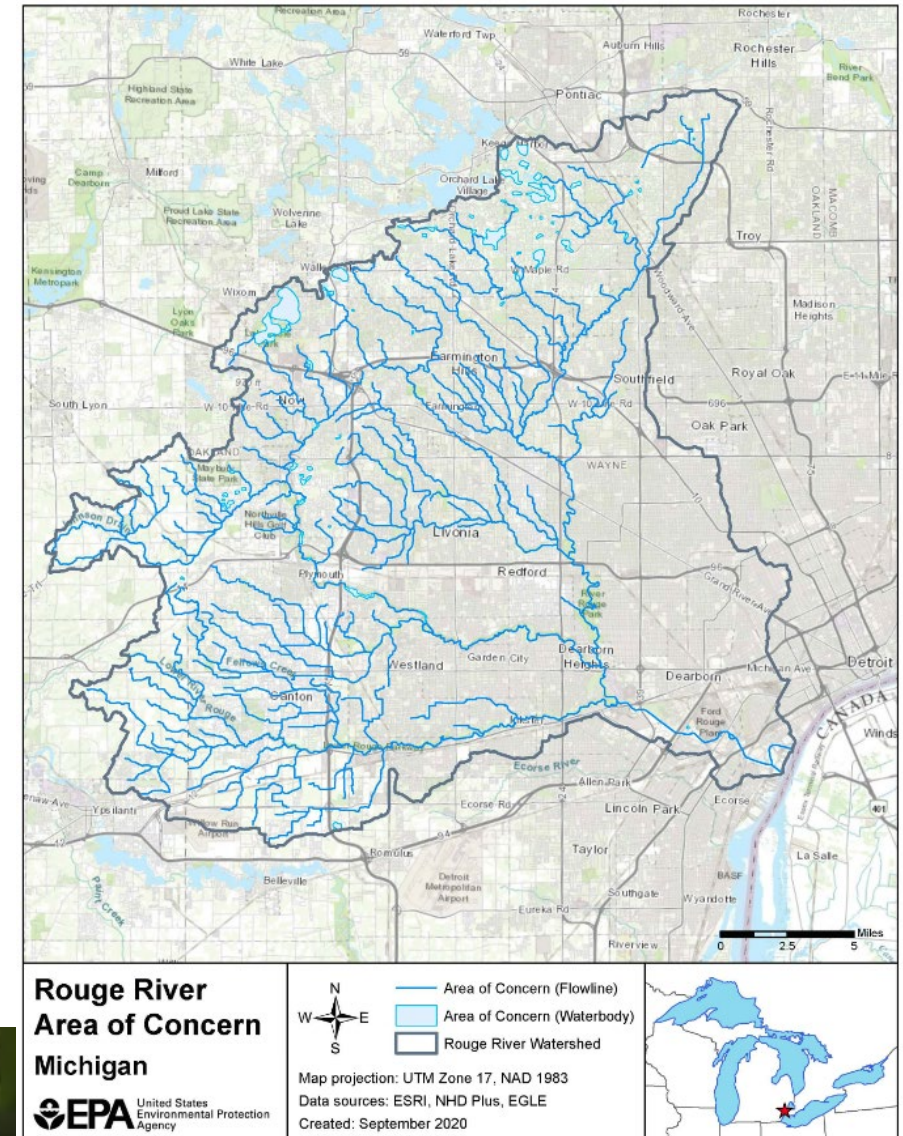




1. Water Quality Challenges in the Rouge

The Rouge River Watershed

- The Rouge River watershed, in Southeast Michigan
 - Drains **467** square miles into the **Detroit River**
 - Has **4** major branches (Main, Upper, Middle, and Lower), **127** river miles, and numerous tributaries
 - Is home to more than **400** lakes, impoundments, and ponds
 - Spans **3** counties (Oakland, Washtenaw, and Wayne) and **47** municipalities



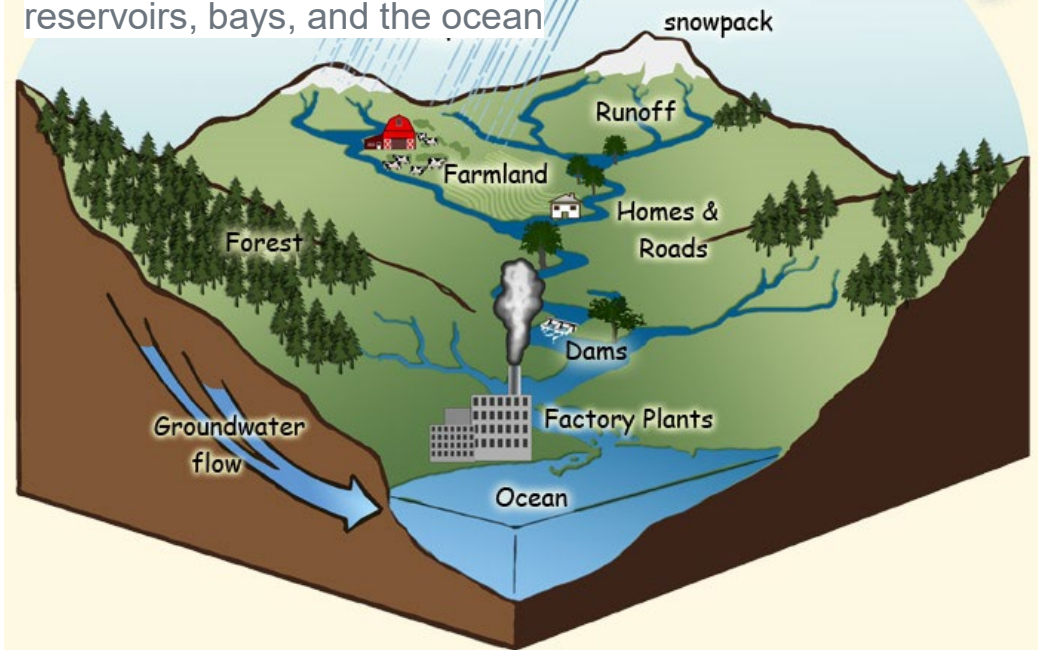
What is a watershed?



We all have waterfront properties: **Any actions** taken on our land impacts the health of our local and regional waterways!

WHAT IS A WATERSHED?

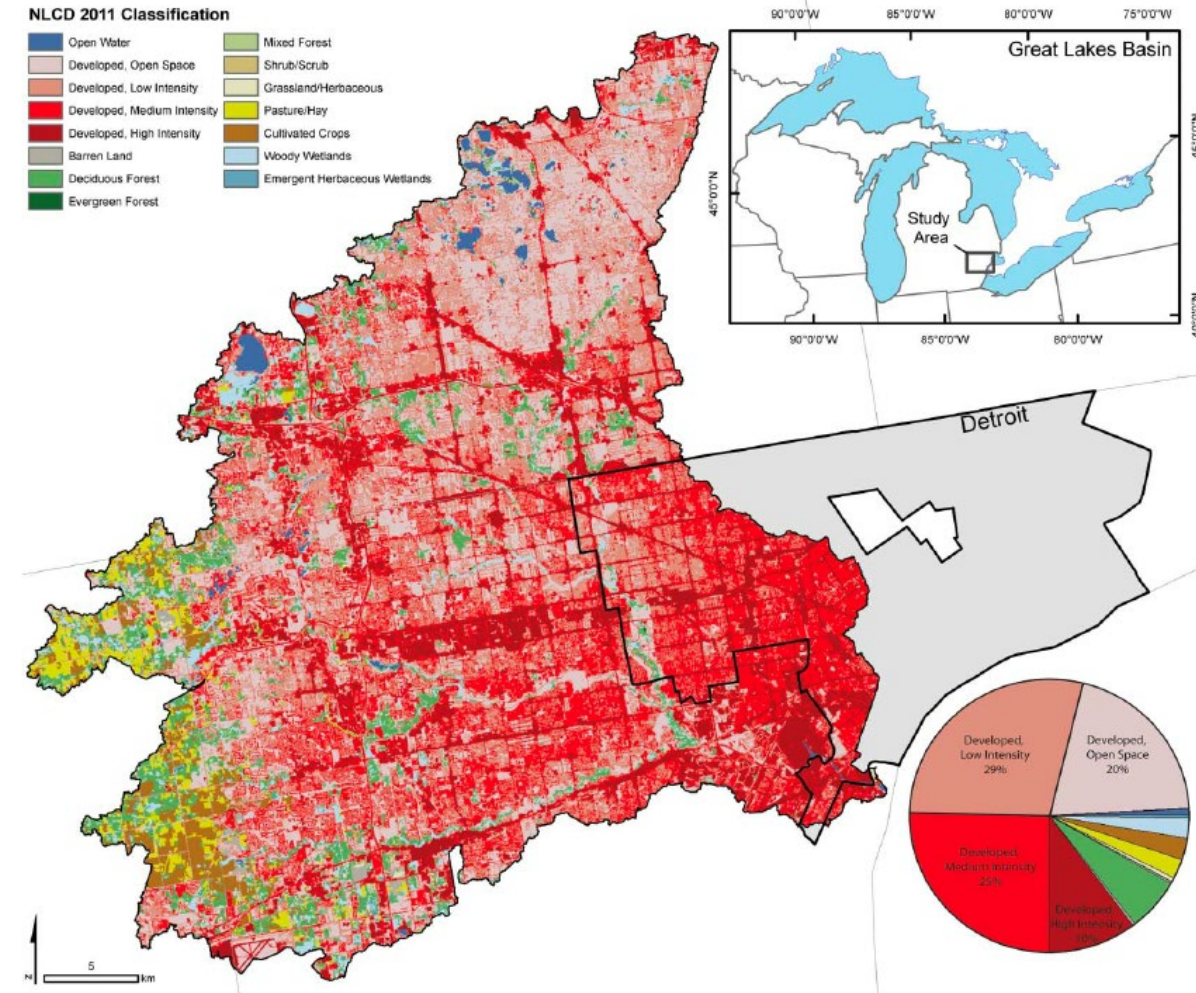
It's a land area that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean



The Rouge condition

Degradation of the Rouge River is **representative** of many urbanized and industrialized areas within the Great Lakes Basin.

- Over **50%** of the land use is residential, commercial, or industrial, with increasing development pressures in the headwaters.
- **Land uses** include rural, suburban, urbanized and industrial.



The challenges in the Rouge

- **URBANIZATION**: Humans are reshaping the land to make their homes
- **SEWAGE IN THE RIVER**: Aging infrastructure + big rain events allow raw sewage to enter the river
- **POLLUTANTS**: What people do on land directly impacts the health of our waterways
- **CLIMATE CHANGE**: Our changing climate is already impacting the Rouge River with more frequent high rain falls (six of the highest rainfall years have happened since 2006).



<https://www.wxyz.com/news/millions-of-gallons-of-sewage-flowing-into-rouge-river>

Michigan Under Water

- On August 11, 2014, heavy rains moved into Southeast Michigan and the metropolitan Detroit area, including the city of Flint and the Saginaw Valley.
- **4-6** inches of rain fell in a four-hour period, and over **75,000** homes and businesses suffered damage.



MICHIGAN UNDERWATER

Urban flooding and sewage problems



“We get all that grease and oil running off the parking lots and we also get the wastewater treatment facilities needing to release all that water without being fully treated”

Mary Bohling

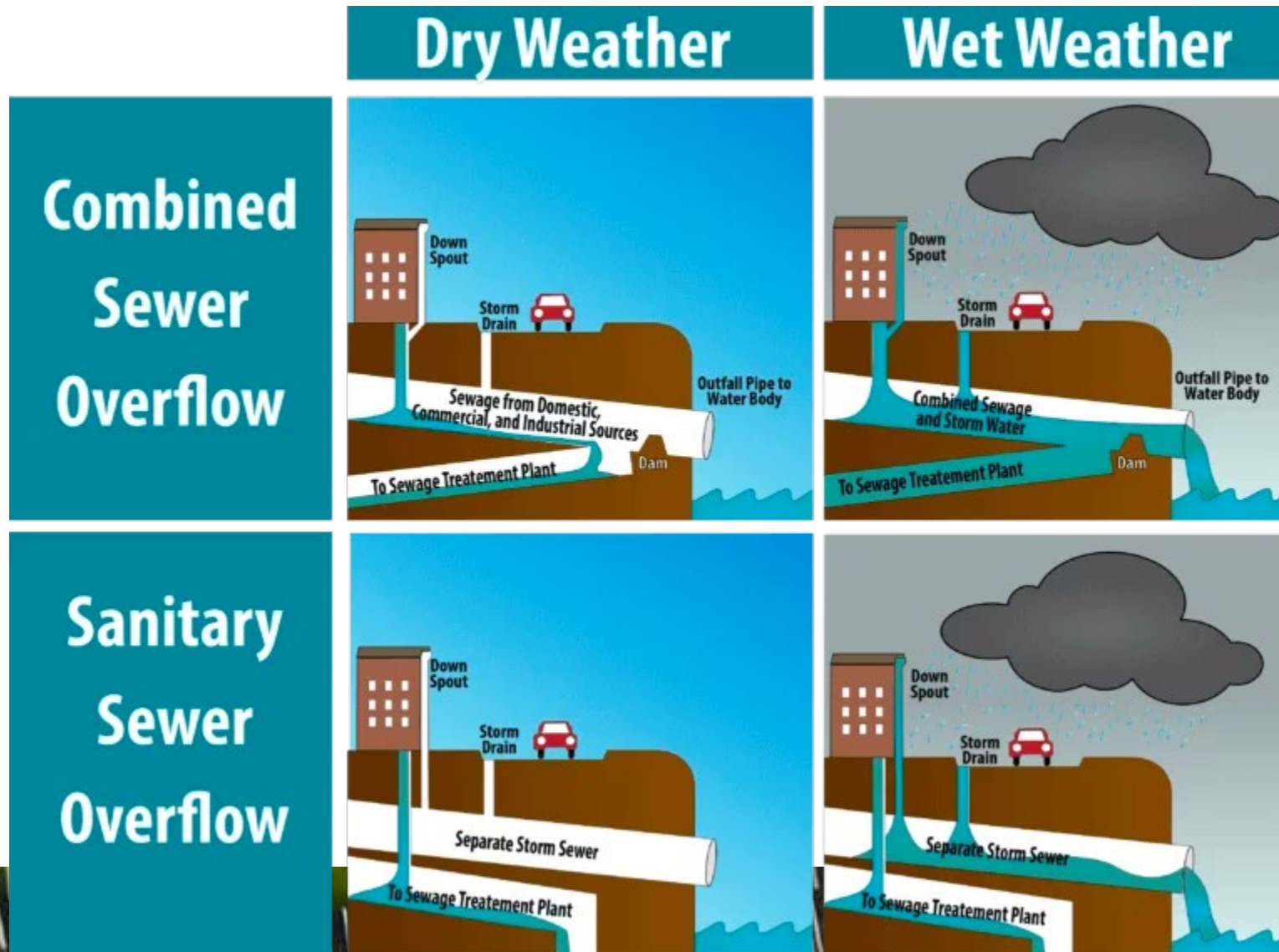
Educator, MSU Extension/Michigan Sea Grant

7abc

The quote is centered on a background image of a busy street with cars and traffic lights. The text is overlaid in white on a dark, semi-transparent rectangular area.

<https://www.wxyz.com/news/region/wayne-county/flooding-impact-how-diluted-raw-sewage-gets-into-metro-detroit-waterways>

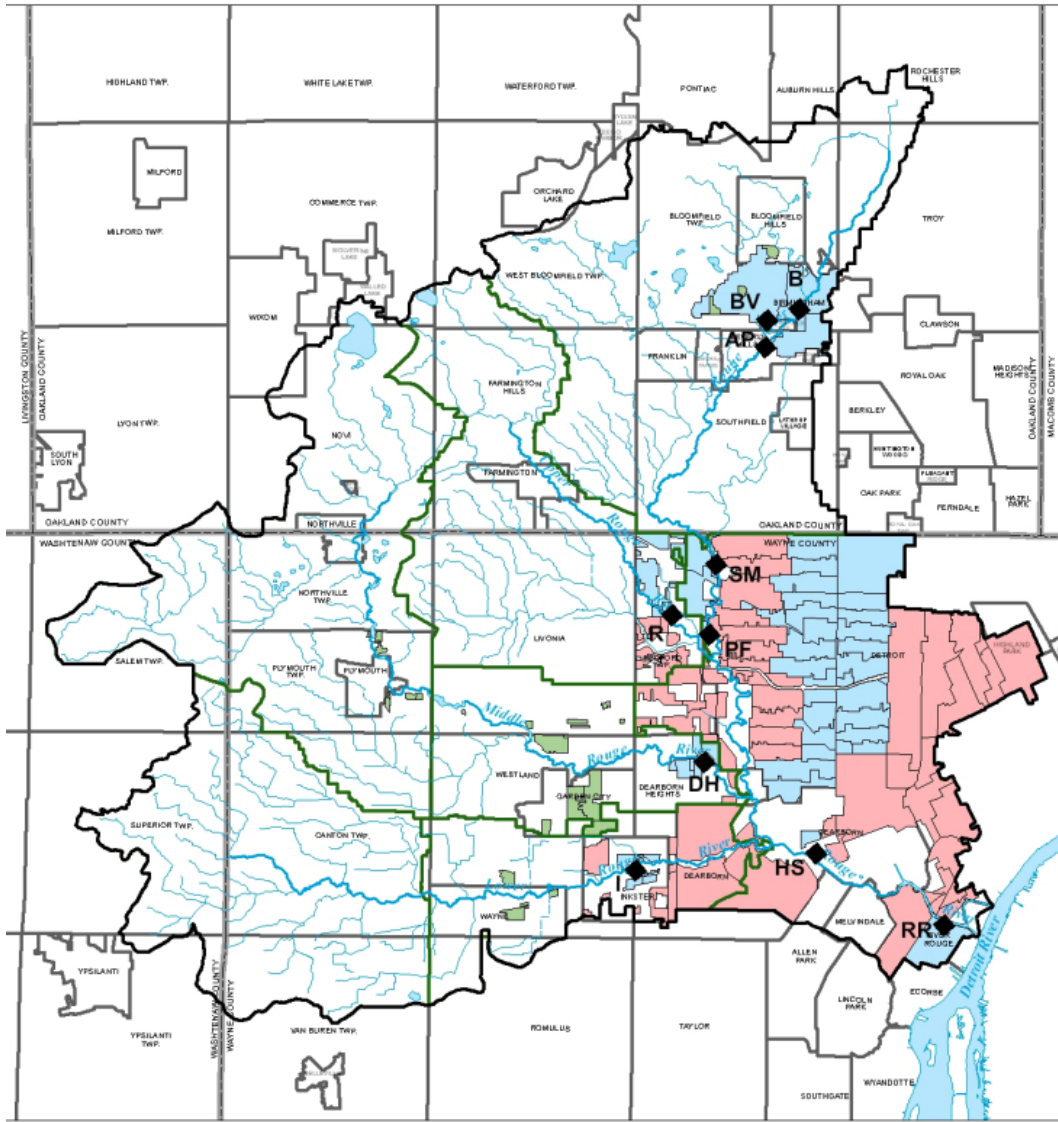
Combined vs Separate Sewer Systems



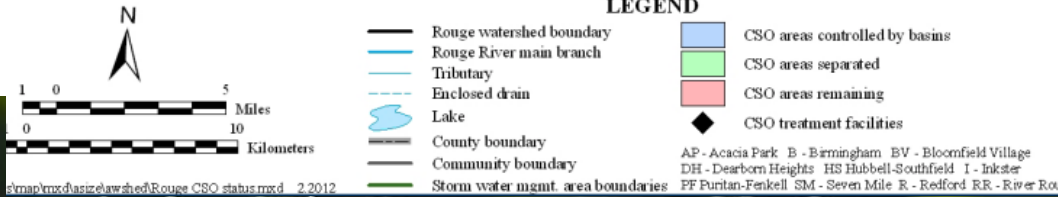
- **Combined sewer systems** often discharge sewage and various wastewater along with excess water from rainfall.
- **Separate sanitary sewer systems** only discharge stormwater.

CSO Area Status - December 2006

There were 36 combined sewer overflow discharges into the Detroit River in 2011.¹



Control facilities are still needed to **reduce sewer overflows** from areas of Dearborn, Dearborn Heights, Detroit, Highland Park, Inkster, and Redford Township



Why more water flowing to the river?

Five times more runoff !!

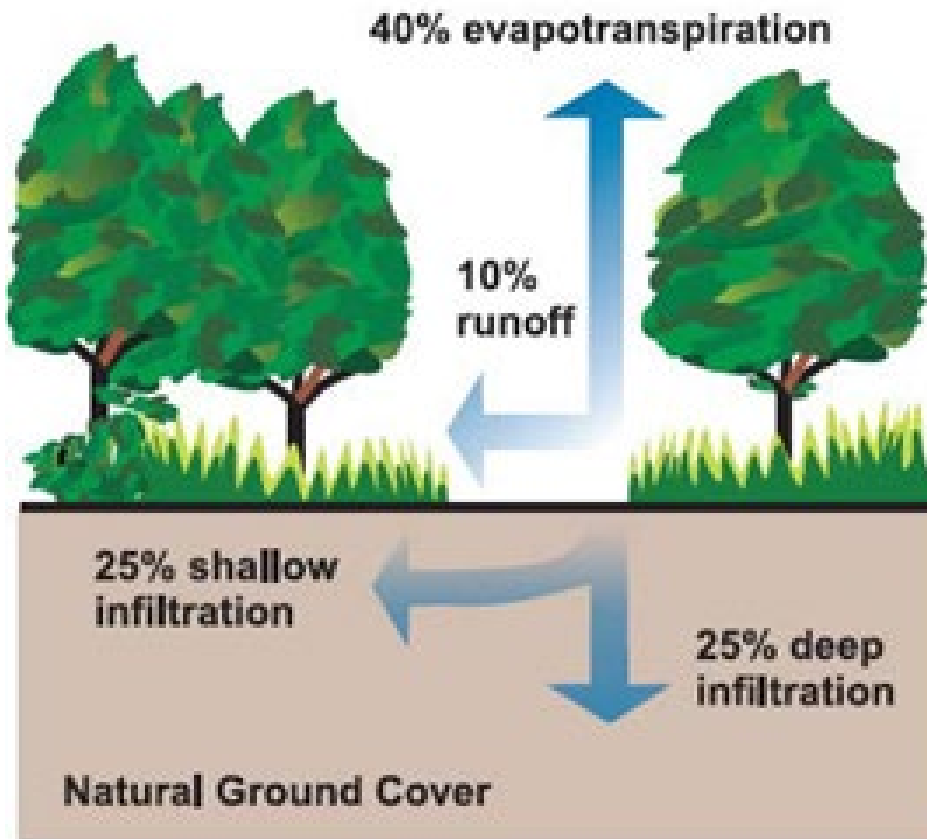
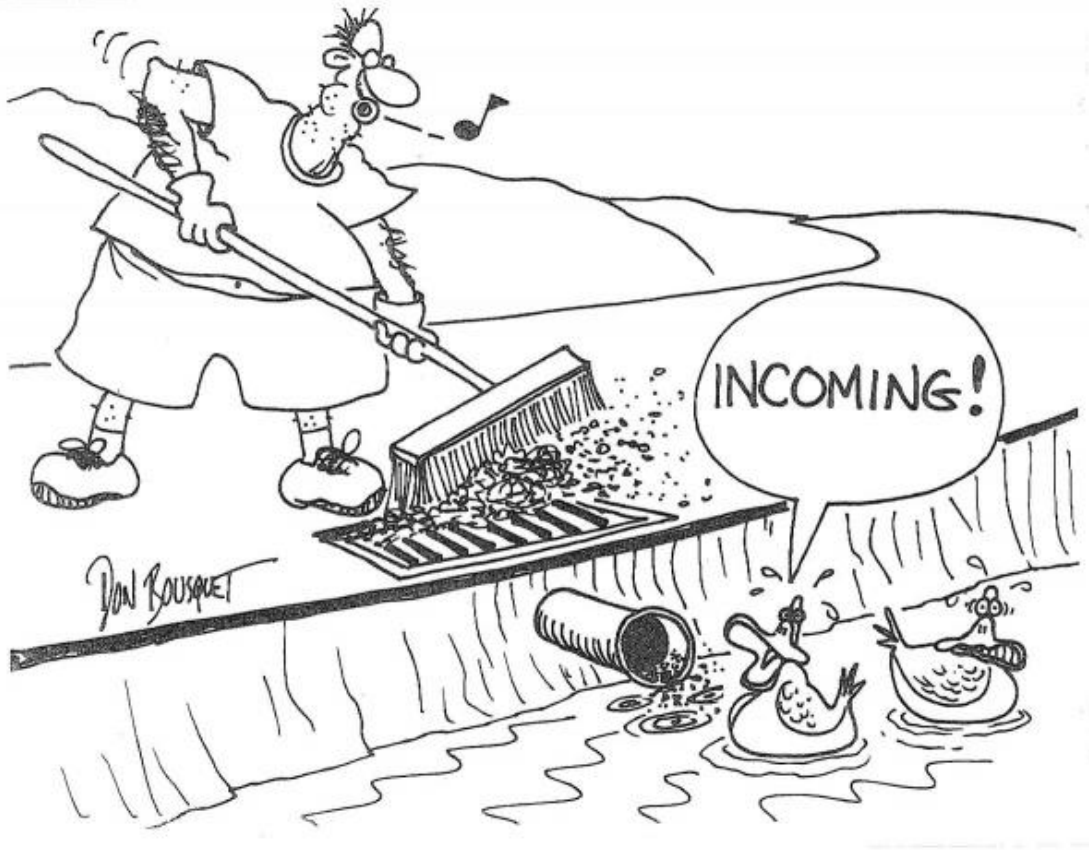


Image Source: U.S.E.P.A. 2007

Water quality problems



- Stormwater can pick up:
 - **Pesticides and fertilizer** when it runs over treated grass,
 - **Pollutants and chemicals** when it runs over solid surfaces called impervious areas such as roof tops, driveways, parking lots, roads, and more,
 - **Household hazardous waste** such as cleaners and paint solvents, motor oil and other auto fluids and chemicals when dumped on the ground or in storm drains.
 - **Sediment** when it runs over dirt also referred to as disturbed or unstabilized areas,
 - **Trash and debris** when heavy rains occur.



Urban Stream Syndrome:

The term "urban stream syndrome" describes the consistently observed ecological degradation of streams draining urban land.



Receiving water characteristics of urban streams

- **Degraded habitat** from increased stream power, channelization, loss of riparian zone, siltation-embeddedness
- **Elevated water temperature** and pulses of hot water during summer flow events
- Contaminated depositional **sediments**
- **Nutrient enrichment** and algal blooms
- Elevated **pathogens**, particularly during high flow
- Pollution tolerant organisms
- Litter, odor and other **aesthetic problems**



Harmful algal blooms

Maumee Bay, OH

Harmful algal blooms are overgrowths of algae in water.

Microcystis (hepatotoxin)

Lyngbya (benthic mats)

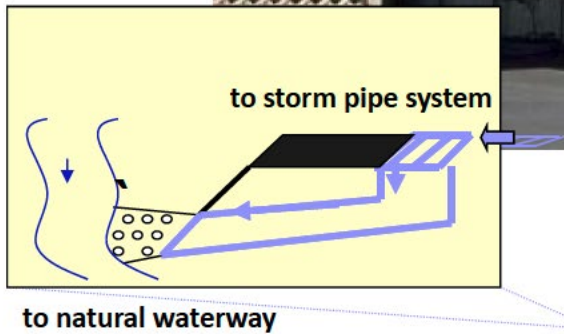


The Detroit River provides approximately **80% of the flow** and **25% of the phosphorus** entering Lake Erie.

**Green
infrastructure
and rain
garden— How
does it work**

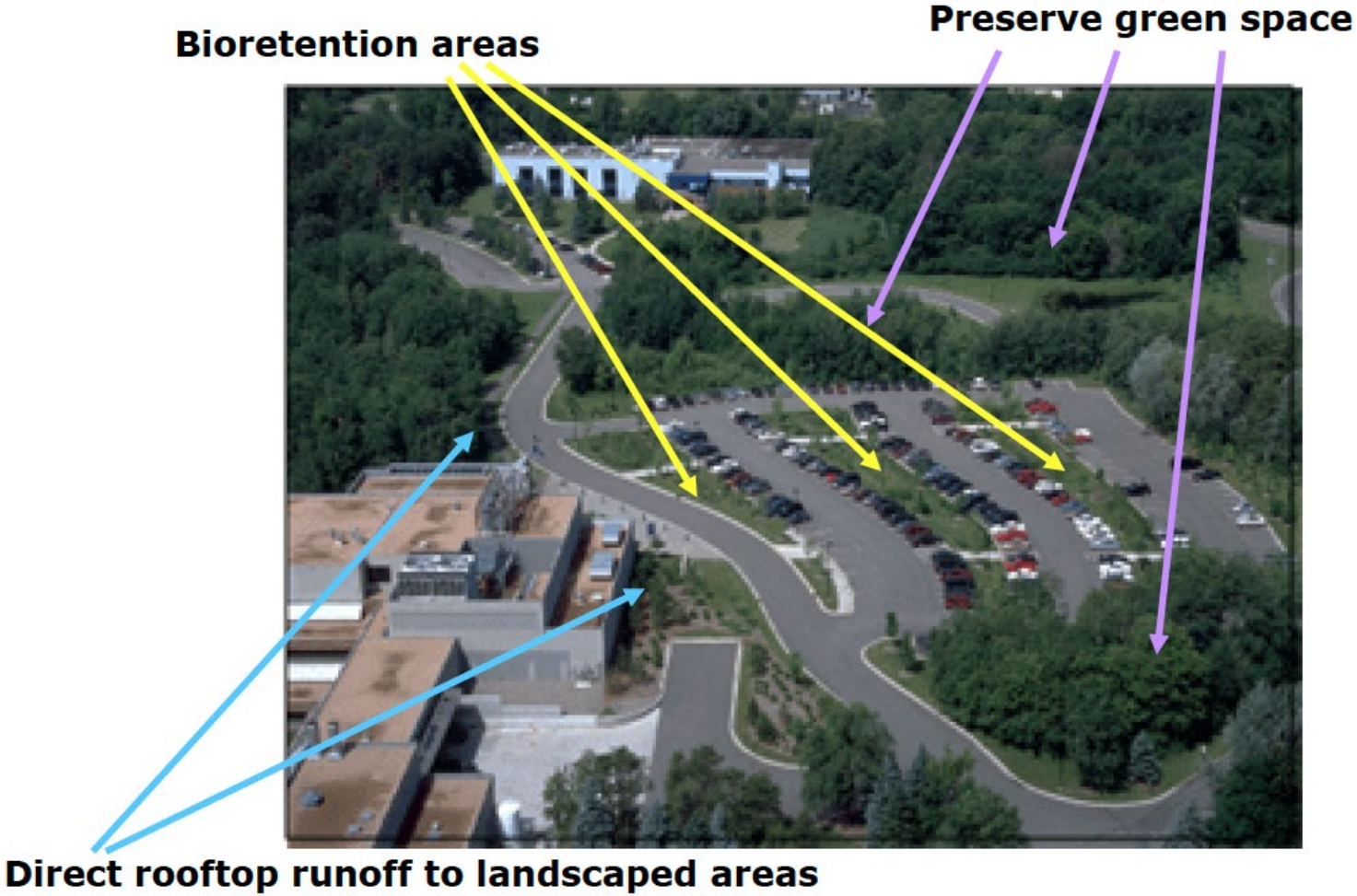


Conventional approach



- Design to collect, concentrate, convey to a natural waterway

Alternative approach



- Design so that rainfall stays where it fell

Paradigm Shift

- Eliminate curb and gutter drainage
- Shift from closed pipe drainage to open catchment infiltration
- Shift towards managing stormwater on site
- **Reduce stormwater runoff to the drainage system**



Mimic natural hydrology

Urbanization



Green infrastructure solution

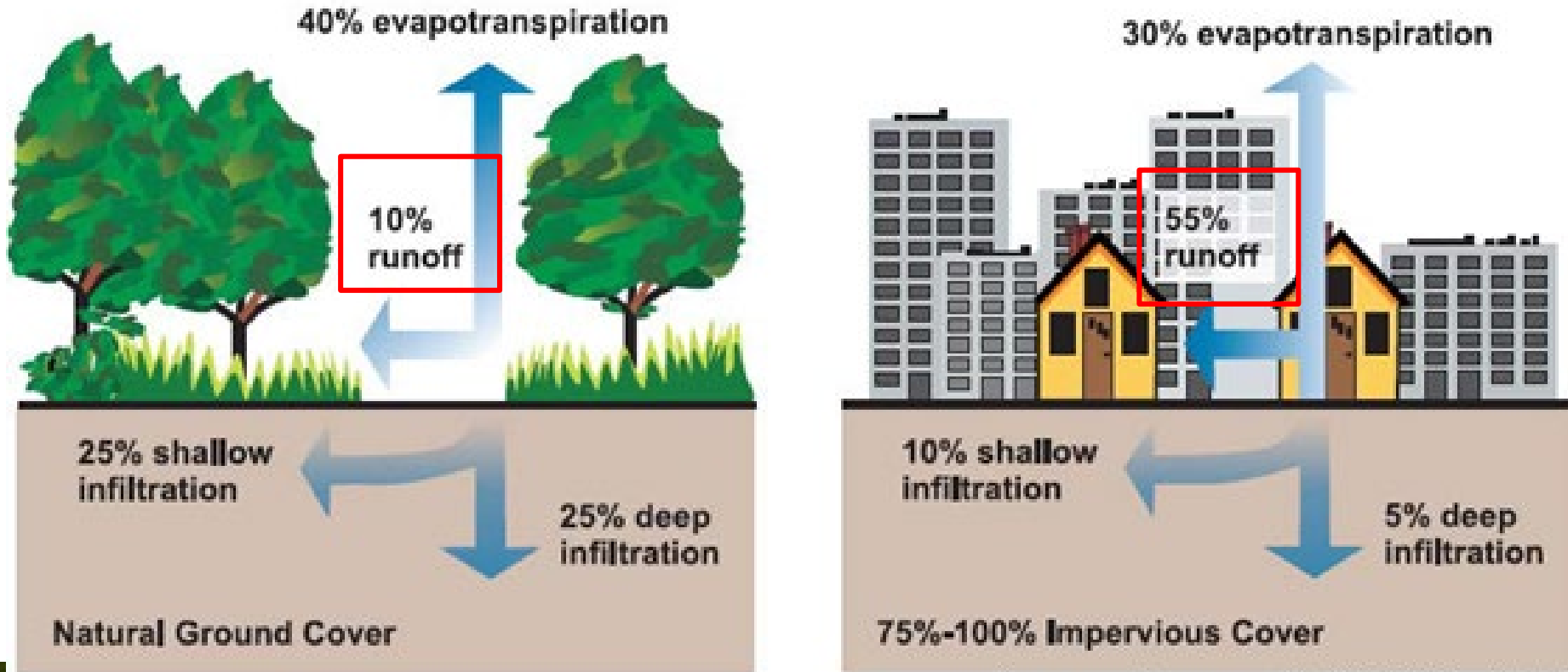


Image Source: U.S.E.P.A., 2007

Bioretention/Rain Garden

- Shallow, vegetated basins that collect and absorb runoff from rooftops, sidewalks, and streets.



Planter boxes



Bioswales



Rain Garden

<https://www.epa.gov/green-infrastructure/what-green-infrastructure#raingardens>

Rain Garden in the Rouge

- 19321 W Chicago, Detroit,
MI 48228



Rain Garden in the Rouge

- Rain garden construction in progress



Rain Gardens in the Rouge

- 5503 Newport St, Detroit, MI 48213,
- 11475 Outer Dr E, Detroit, MI 48224

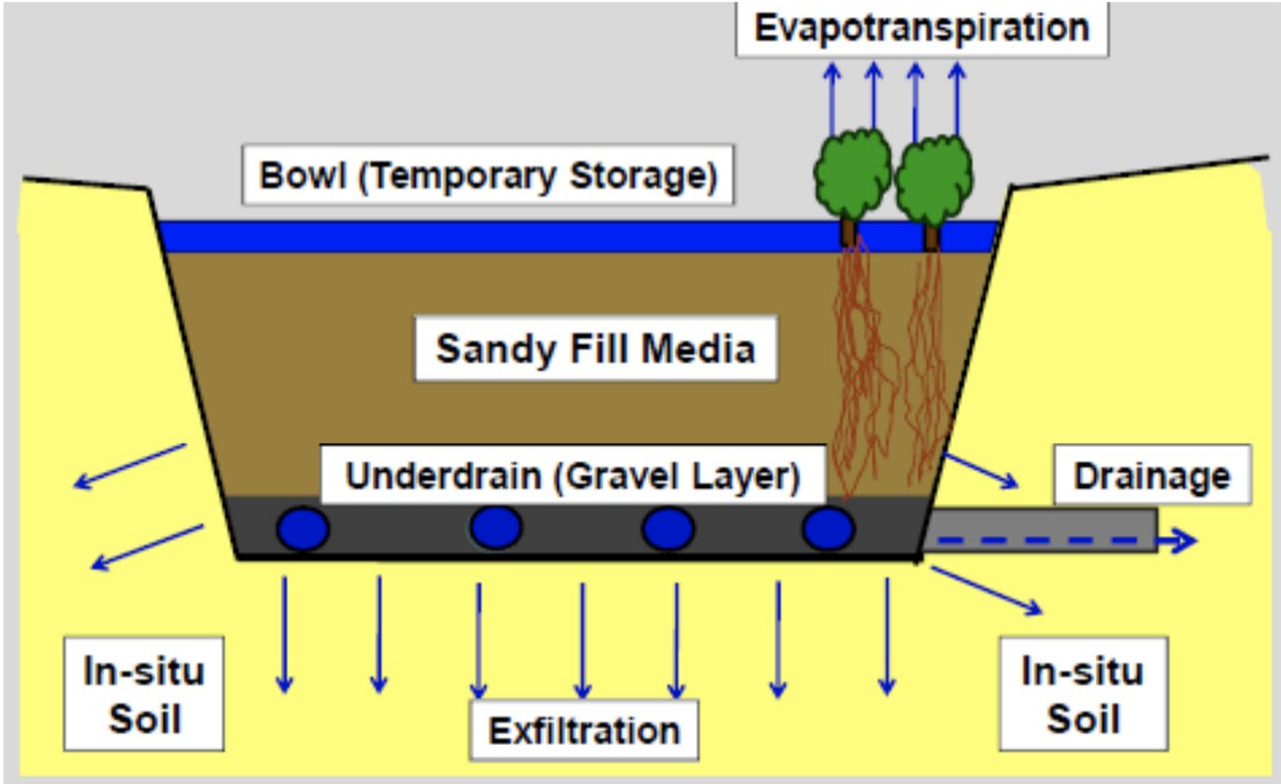


Rain Garden in the Rouge

- Viola Liuzzo
Park, Detroit,
MI



How Rain Gardens Work ?

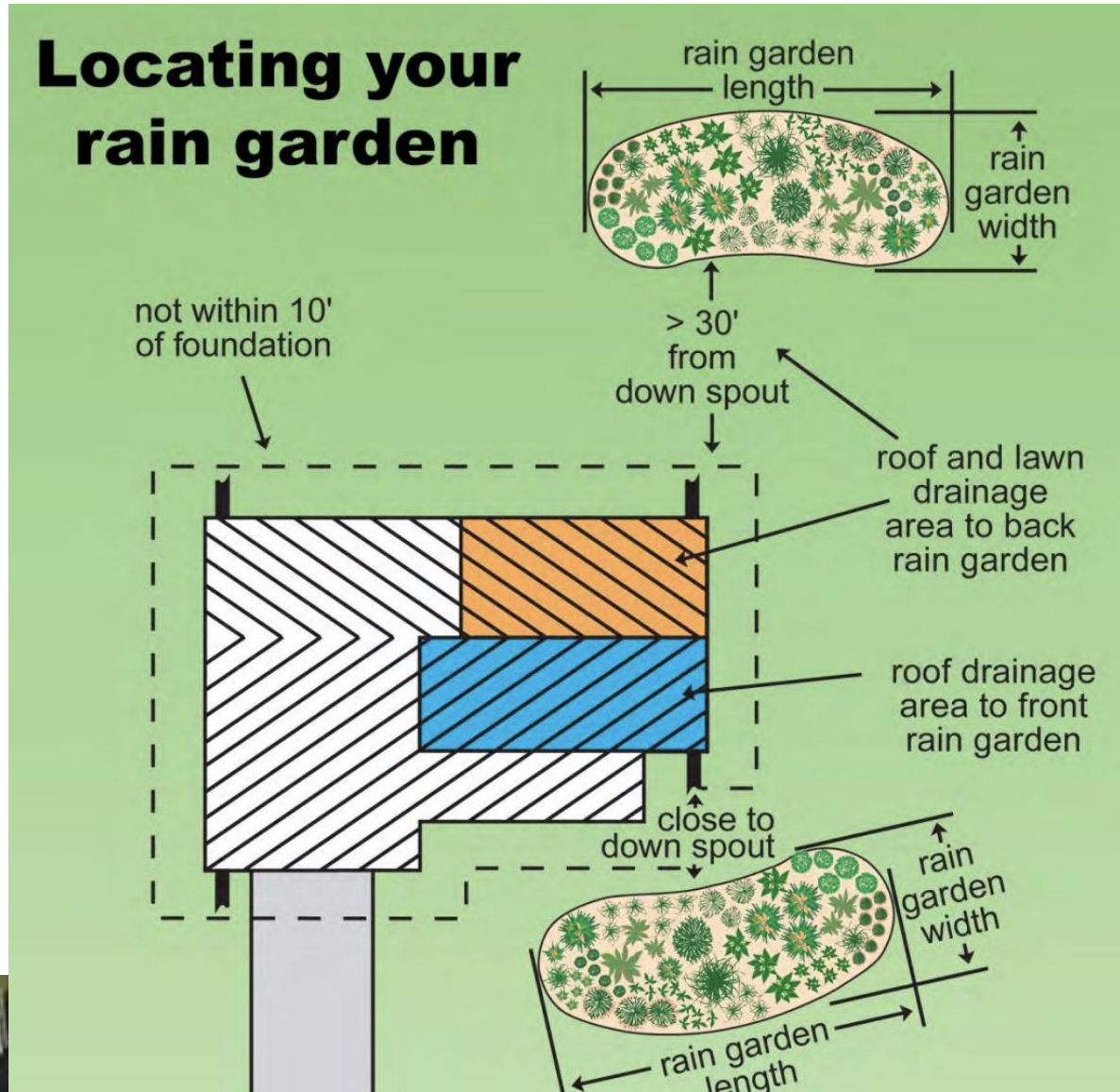


. Bioretention Processes (Photo credit: NCSU Stormwater Engineering)

How Rain Gardens Work ?

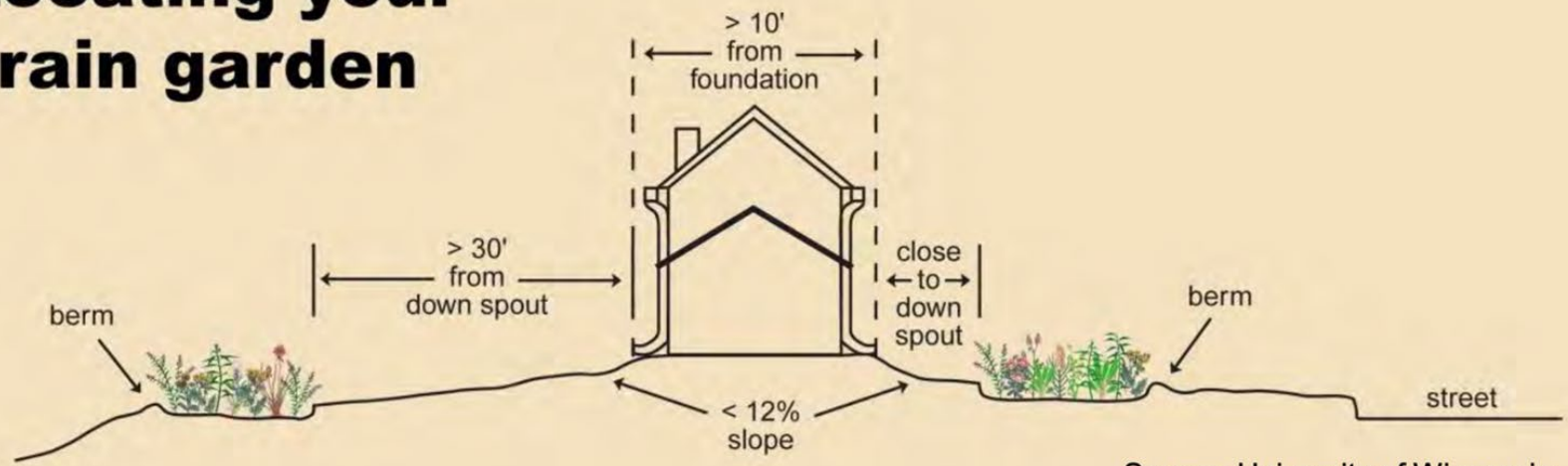


Layout of a Typical Rain Garden



- Size can range from **40 - 300** square feet for a residential area.
- Not within **10 feet** of foundations, but as close as possible to the impervious areas.

Locating your rain garden



Source: University of Wisconsin

Locating and sizing a rain garden

The objective of a rain garden is to capture the first **1/2** inches of runoff from a rooftop or driveway. Design the garden to be **4-6"** deep and **15-30%** the area of the impervious surfaces



Slope and soil considerations

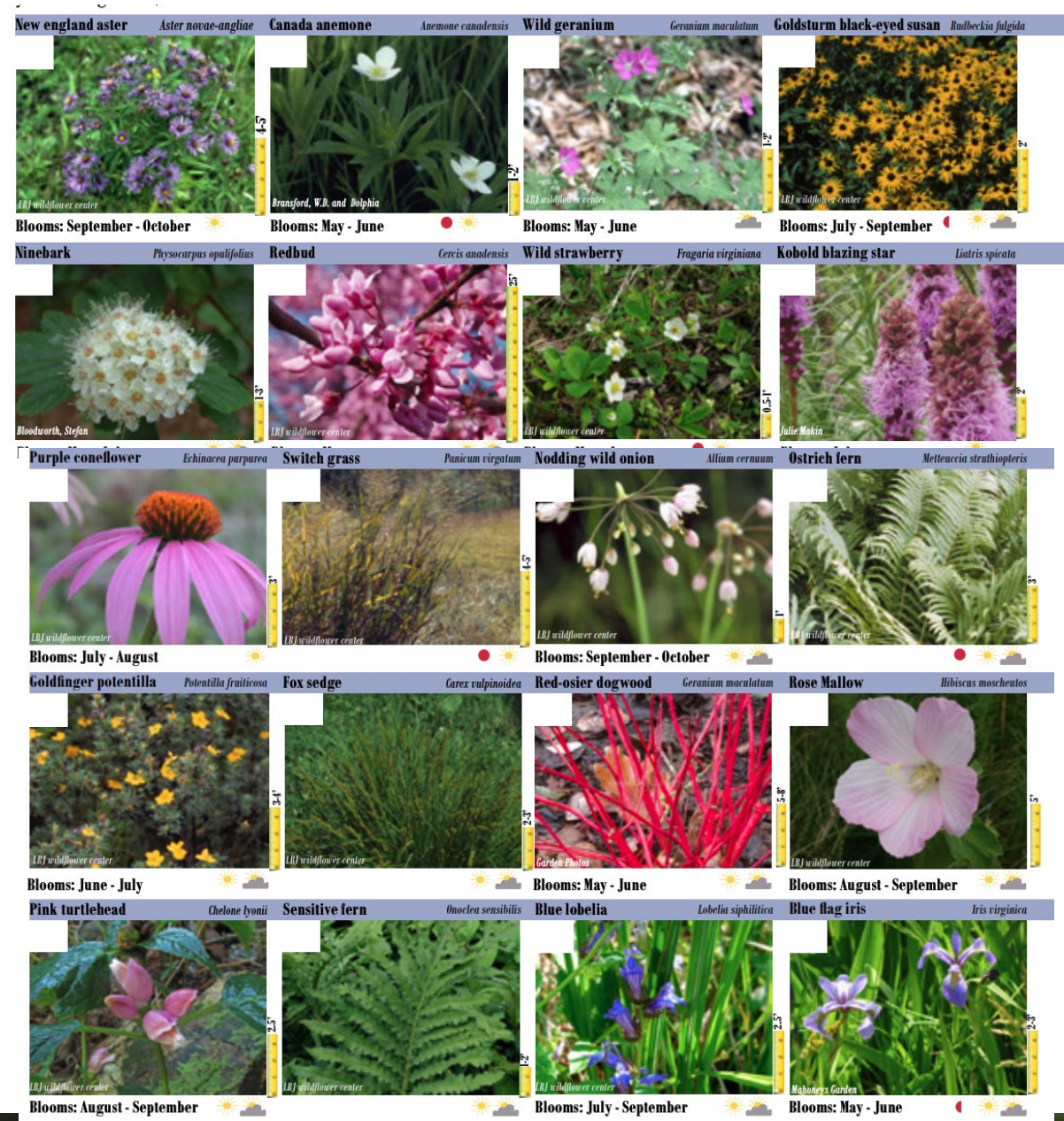
- **Avoid steep slopes**
 - Require relatively flat slopes to be able to accommodate runoff filtering through the system.
- **Avoid compacted and clay sub-soils**
 - The recommended soil replacement mix is 50-60% sand, 20-30% topsoil, and 20-30% compost.



Plant selection

- Choose plants **tolerant** of both occasional flooding as well as dry periods.
- Choose **local plants** that are adapted to the local environment.
- Choose **a mixture of species**.
- A good rule of thumb is one plant species for every 10 to 20 square feet.
- **More info in the design workshop!**

<https://therouge.org/wp-content/uploads/2018/07/Top-20-Plants-2014-PDF.pdf>



Benefits of Rain Garden

- **Reduce runoff** and **remove pollutant**
 - The runoff reduction associated with a bioretention practice ranges anywhere from **40-80%** (CWP and CSN, 2008).
 - Pollutant removal efficiencies:

Pollutant	% Removal
Total Nitrogen	56-69%
Total Phosphorus	66-80%
Total Suspended Solids	71-86%

Other Benefits

- **Groundwater** recharge augmentation
- Micro-scale **habitat**
- Aesthetic improvement
- Remove standing water in your yard
- Reduce mosquito breeding
- Increase **beneficial insects** that eliminate pests
- Reduce potential of home flooding
- Survive drought seasons
- Reduce garden maintenance
- Enhance property value



Rain garden maintenance

- **Water** daily the first few weeks after planting, then regularly until plants are established.
- **Weed** on a regular basis, especially the first year.
- **Mulch** reduces weeding and watering and helps establish the plants
- Once spring arrives and new growth is 4-6 inches tall, **cut all tattered plants back.**

Years 1&2	Annually	Annually Spring
<ul style="list-style-type: none"> •Weed •Water •Remove dead material •Seed head removal, if desired but provides winter food source •Maintain adequate mulch 	<ul style="list-style-type: none"> •Minimal weeding •Removal of dead material •Seed head removal after flowering (optional) •Maintain adequate mulch •Replace plants •Fix any soil erosion 	<ul style="list-style-type: none"> •Mow with a deck set 6 inches high, otherwise use a string trimmer, pruning shears, or weed-eater to cut stems to 6 inches high.

Does it work?

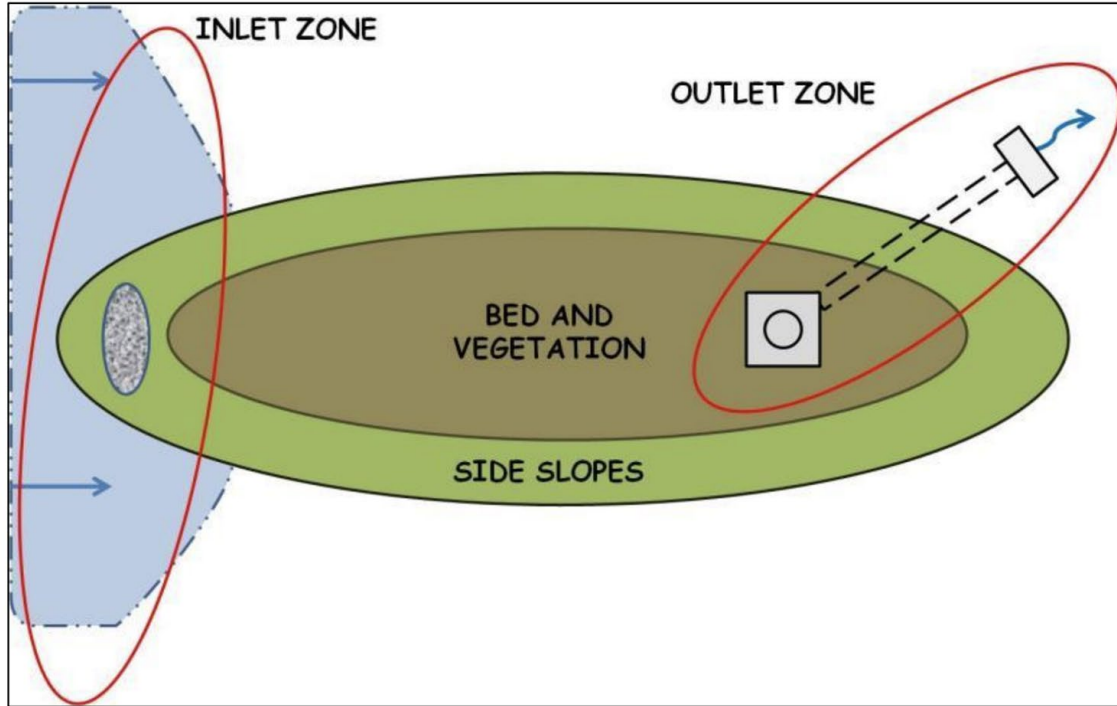


Table 9. Visual Indicators for a Bioretention Practice

No.	INDICATOR	Construct	Accept	Maintain	Verify
1	Inlet Obstruction		X	X	X
2	Erosion at Inlet		X	X	
3	Pretreatment	X	X	X	
4	Structural Integrity, Safety Features		X	X	
5	Surface Area	X	X	X	
6	Side slope Erosion		X	X	
7	Ponding Volume	X	X	X	X
8	Bed Sinking		X	X	X
9	Sediment Caking		X	X	X
10	Standing Water		X	X	X
11	Ponding Depth	X	X	X	X
12	Mulch Depth/Condition	X	X	X	X
13	Trash			X	
14	Bed Erosion		X	X	
15	Vegetative Cover	X	X	X	X
16	Vegetative Condition		X	X	
17	Vegetative Maintenance		X	X	
18	Outlets, Underdrains, Overflows	X	X	X	X



What
YOU
can do

River Friendly Practices at HOME

- Conserve water during times of heavy rain
- Use environmentally friendly cleaners
- Properly dispose of medications and household waste



River Friendly Practices in the YARD

- Plant/install: rain gardens, trees, native plantings and rain barrels
- Disconnect downspouts if connected to the sewer system
- Limit fertilizer and other chemical use
- Don't broadcast spray for mosquitos or other pests/weeds
- Pick up pet waste before it rains
- Minimize salt use in winter



River Friendly Practices - **Vehicle Maintenance**



- Wash vehicles at a commercial car wash or on the lawn, never on the driveway/paved surface
- Perform regular maintenance to prevent fluid leaks

In Your Community

- Participate in community visioning & master planning opportunities
- Attend planning and zoning commission meetings
- Encourage your municipality to install rain gardens
 - in public parks
 - around city offices, municipal yards, libraries & schools
 - along roadways & parking lots





At Your **PLACE OF WORSHIP**

- Encourage use of green stormwater practices to reduce mowing costs and drainage fees (where applicable)
- Creates peaceful green space for reflection, prayer & meditation
- Improves sense of place, health and wellbeing

At Your Place of **WORK**

- Encourage your employer to use green stormwater practices
- Benefits to the employer
 - Reduced mowing costs and drainage fees (where applicable)
 - Improved sense of place, health & wellbeing for workforce
 - Improved productivity by creating visual &/or real access to trees and native landscapes
 - Retail businesses with greenspace benefit from shoppers staying longer and spending more money



What **Friends of the Rouge** is doing

- Education:
 - Master Rain Garden/Rain Gardens to the Rescue: 5-part training courses
 - Storm Water Specialist Training: 6 week training course on rain garden maintenance
 - Sacred Grounds
 - Rain Garden Map
- Rain Garden Installations: 200+, soaking up ~half million gallons of rain with each rainfall
- Tree Plantings: 14,000 trees planted over the past 2 years



How YOU can HELP

Add your project to the map!

The screenshot shows the website header with a cloud icon and the title "RainScaping in Southeast Michigan". Below the title are navigation links: "Home", "Share a Project", "View Everybody's Projects", and "About Us". On the left is a logo for "MASTER RAIN GARDENER" featuring a sunflower and raindrops, and a graphic for "RAIN GARDENS TO THE RESCUE" with a house icon. The main content area features two large photos: one of four women in blue shirts celebrating in a garden, and another of a larger group of people posing in front of a newly installed rain garden. Below the photos is a teal banner with the text: "Clean water in southeast Michigan takes people just like you! Together we bring lawns to life with rain gardens, trees, habitat gardens, rain barrels, and more." At the bottom, there are two call-to-action buttons: "Share a Project" and "View Everybody's Projects". Below the "Share a Project" button is a small photo of a group of people and the text: "Did you finish a clean water project? A rain garden, habitat". Below the "View Everybody's Projects" button is the text: "See a map and photos of all".

RainScaping in Southeast Michigan

Home Share a Project View Everybody's Projects About Us

MASTER RAIN GARDENER

RAIN GARDENS TO THE RESCUE

Clean water in southeast Michigan takes people just like you!
Together we bring lawns to life with rain gardens, trees, habitat gardens, rain barrels, and more.

Share a Project

View Everybody's Projects

Did you finish a clean water project? A rain garden, habitat

See a map and photos of all

How YOU can HELP

- Volunteer
- Become a Member
- Connect us with potential partners
- Hire us
 - we offer residential consultation and design services
 - we also provide contract education, design and installation services for municipalities and corporate partners



RESOURCES

therouge.org/rainsmart/

QuickBooks Time... Blooming... Draft OSI MOU doc... Home - Asena Log In Wildtype | Native Pl... FOTR Programmat... Mow Town Model My Watershed https://www.surfid... Rainwater Har

RainSmart: 1,000 Rain Gardens for the Rouge

Restoring your river, one yard at a time.

Flooded basements, flooded streets, and dirty creeks share a common cause, and that's too much dirty water runoff during big storms. Time do your part—**time to get RainSmart!**

6,000 Rain Barrels for the Rouge!

1,000 Rain Gardens for the Rouge!

With over 1.35 million people living in the lands that drain to the Rouge, 1,000 rain gardens and 5,000 rain barrels are big but doable short-term goals for Rouge River restoration. Safeguard your home against flooding, and join the effort to restore your Rouge River by planting a rain garden! Explore below to get started.

RainSmart Resources

- Become a Master Rain Gardener
- Rain Barrel 101
- Rain Gardens for Tongueh and Johnson Creek
- Get Your Lawn a Lift
- Build a Rain Garden
- Rain Gardens to the Rescue
- Plants for Rain Gardens
- Find Rain Garden Pro & Suppliers

RainSmart Video Library

Earth Day Rain Gardens 101

Digging
What do I do with all this dirt?

TAKE ACTION: RAINSMART ACTION!

Get Smart... RainSmart!

Build a Rain Garden!

Learn about rain barrels!

BECOME A MEMBER

DONATE NOW