Using Rain Gardens to Reduce Runoff—Slow it down, spread it out, soak it in!

Webcast Sponsored by EPA's Watershed Academy

Wednesday, December 3, 2008 1–3 pm Eastern

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Lynn Hinkle, ASTRA Communications, Inc., and Goin' Green

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Topics for Today's Webcast

- Introduction to rain gardens as natural solutions to water pollution
- Guide to Rain garden construction
- Overview Montgomery County, MD RainScapes Program
- Kansas City 10,000 Rain Garden initiative and other citizen action initiatives

Introduction to Raingardens

Jennifer Biddle
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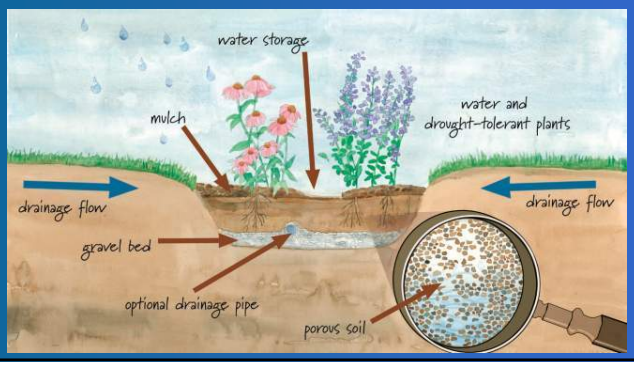
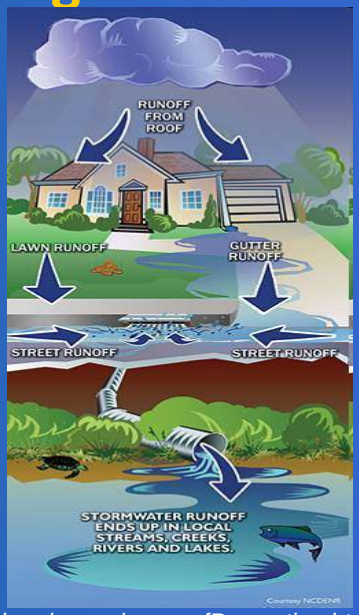
What is a rain garden?

- Bowl-shaped garden
- Captures and absorbs stormwater
- Functional garden



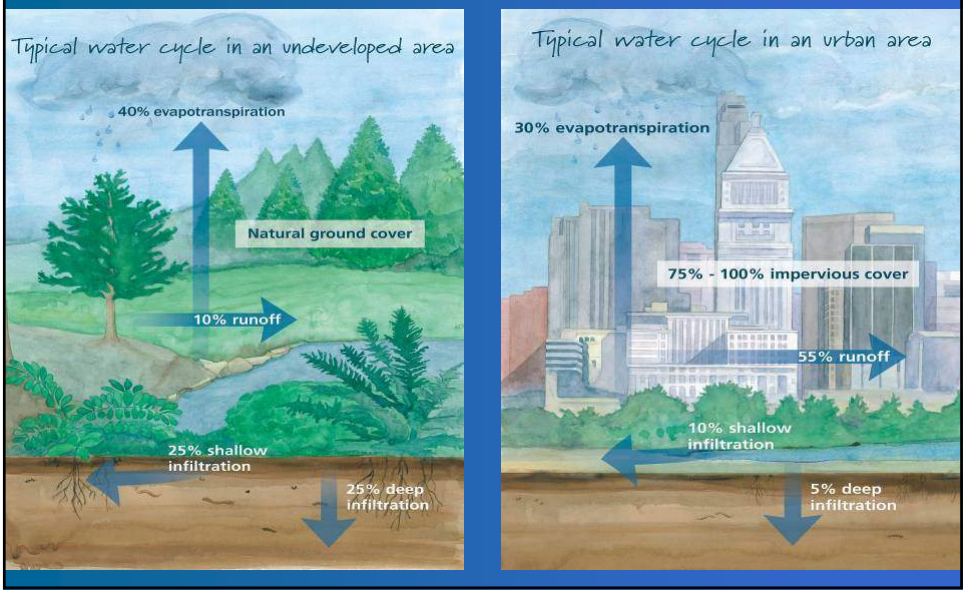
Why do we need rain gardens?

- Stormwater runoff is one of biggest problem facing waterways
- Impervious surfaces increase runoff = increase flow in our streams



www.enr.state.nc.us/upclose/pages/ounceofPrevention.html

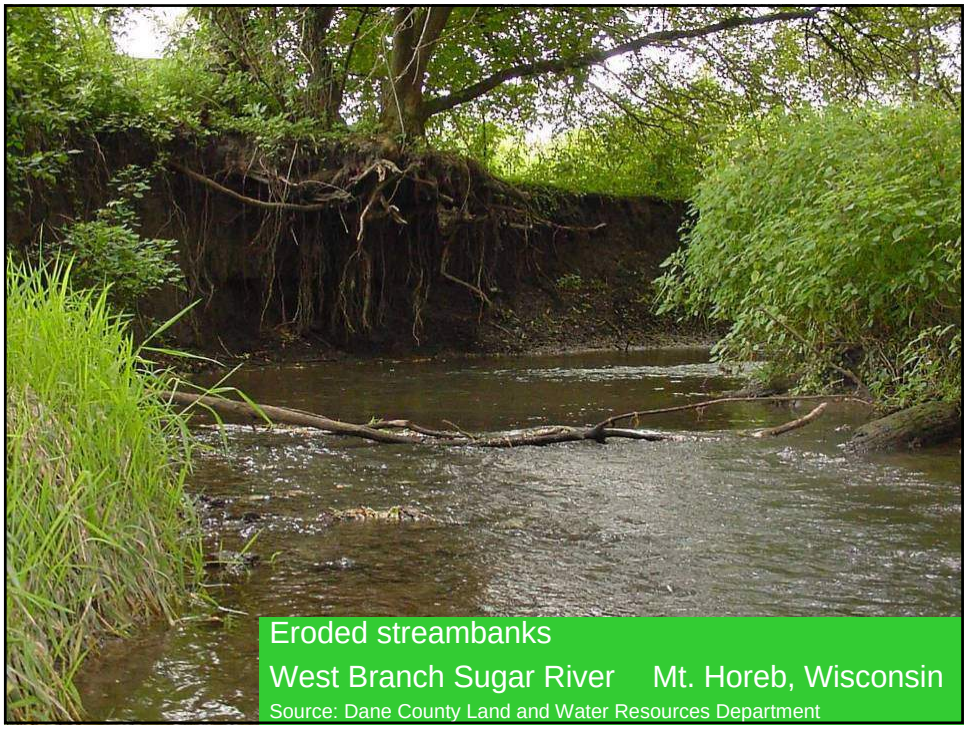
Pervious vs Impervious



Increased Stormwater Runoff

- Leads to:
  - Degraded water quality
  - Loss of habitat and aquatic life
  - Increased flooding
  - Stream erosion
  - Increased CSO problems

www.lakesuperiorstreams.org

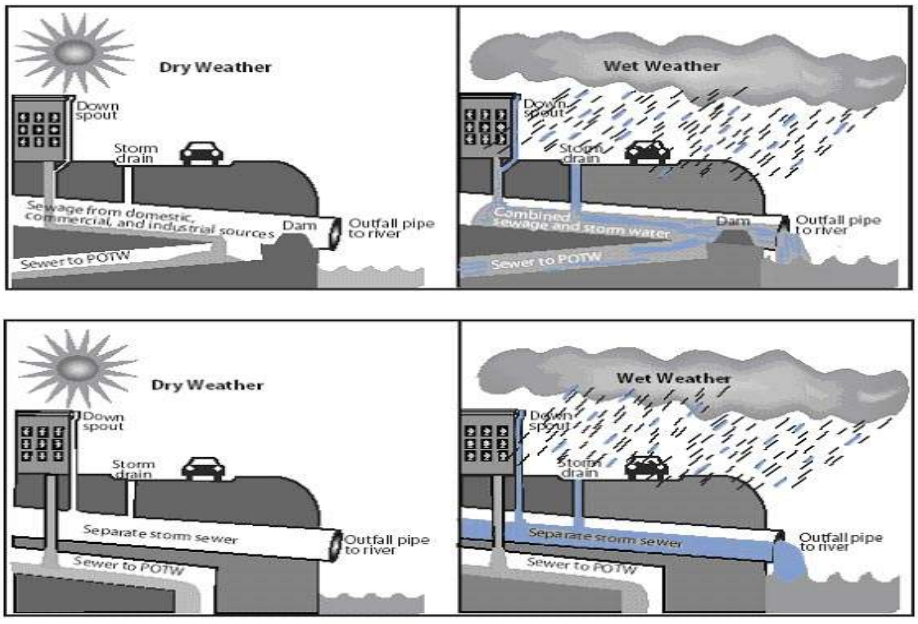


Eroded streambanks

West Branch Sugar River Mt. Horeb, Wisconsin

Source: Dane County Land and Water Resources Department

Combined Sewer Overflow



Source: www.water.ky.gov/.../cso_questions-1.htm

What is Low Impact Development (LID)?

- Practices that mimic natural processes to:
  - Infiltrate
  - Evapotranspirate
  - Reuse
- Retain water on-site
  - Rather than convey to storm sewers
- Control stormwater runoff
  - Slow it down, spread it out, soak it in!

Examples of LID Practices

Rain gardens …

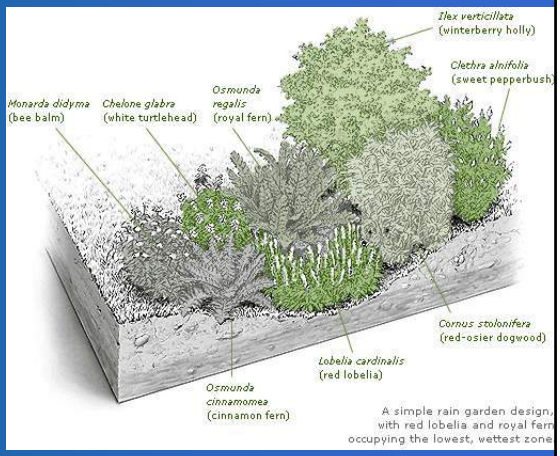
- Slow it down, spread it out, soak it in!
- Reduce runoff
- Remove pollutants
- Recharge ground water
- And are beautiful

Source: ohiowatersheds.osu.edu/trythis/

Beautiful and Functional

Rain gardens 101

- Bioretention
- Affect of soil type
- Water ponding



Source: www.bbg.org/gar2/topics/design/2004sp_raingardens1.html

Rain gardens come in many shapes & sizes…

Photos courtesy of Abby Hall, USEPA

Rain garden Ready

- Locate a good place
- Test your soils
- Determine size
- Build
- Plant

Source: encorecincinnati.wordpress.com/2008/08/

Location, Location, Location

- At least 10 ft. from house
- Not on top of septic system
- A sunny spot is best

www.leonardoacademy.org/Projects/raingardens.htm

Soil Particle Size Matters

- Sandy, Silty or Clayey soils?
- Sand= fastest infiltration
- Clay = slowest infiltration
- Clay soils = bigger garden

Soil Amendment

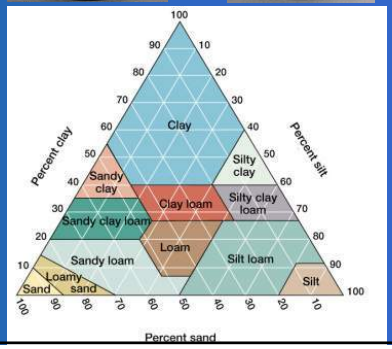
- Based on two factors:
  - Type of plants
  - Existing soil
- Add peat moss/compost/sand

Water enters the rain garden, then dissipates slowly into the ground

Source: www.cuyahogaswcd.org/grantfunded-raingardens.htm

Simple Soil Test

- Soil Texture Analysis
  - weather.nmsu.edu/teaching_Material/soil456/soiltexture/soiltext.htm
- Determines percent
  - Clay
  - Silt
  - sand



Infiltration Test

- Dig hole: 8”wide X 8” deep
- Fill hole with water
- Mark water level with stick
- Check watch and record time
- Measure water drop-
  - 1 hour, every 15 min.

Ponding Perfection

- Size matters
  - Based on drainage area
- No more than 24 hours
- Include overflow
  - Away from house

Building Basics

- Keep garden level
- Pound uphill/downhill stakes
  - 10-15’ apart
- Use carpenter’s level to tie horizontal string to both stakes

Choosing Plants

- Native
- Plants that tolerate some ponding and drought
  - Zones
- Wildlife value

Source: www.parkseedjournal.com/2008/05/rain-gardens-re.html

Choosing Plants

- Local Horticultural Society
- Master Gardener Group
- Local agency rain garden manuals
  - Fish and Wildlife Bayscaping Guide for Chesapeake Bay Watershed

Costs

- Varies
- Range $2-12/square foot
- Depends on:
  - Size
  - Materials
  - Labor
  - Design

Performance

- Reduces runoff
  - Retains 90% of storm events
- Removes pollutants
  - 65-90%
    - Sediment, nutrients, heavy metals

Maintenance

- 1st Year
  - Plant establishment
  - Plant removal and replacement
- Annually
  - Weeding
  - Removal (if needed) and replacement of mulch

Source: www.bae.ncsu.edu/topic/raingarden/maintenance.htm

Questions

Montgomery County RainScapes Program

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www.montgomerycountymd.gov/dep/rainscapes
www.rainscapes.org

Department of Environmental Protection
Montgomery County Maryland

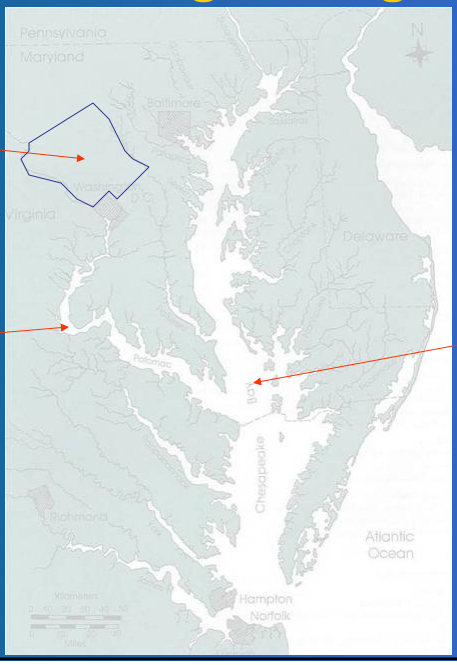
The RainScapes Program
Getting to the Source

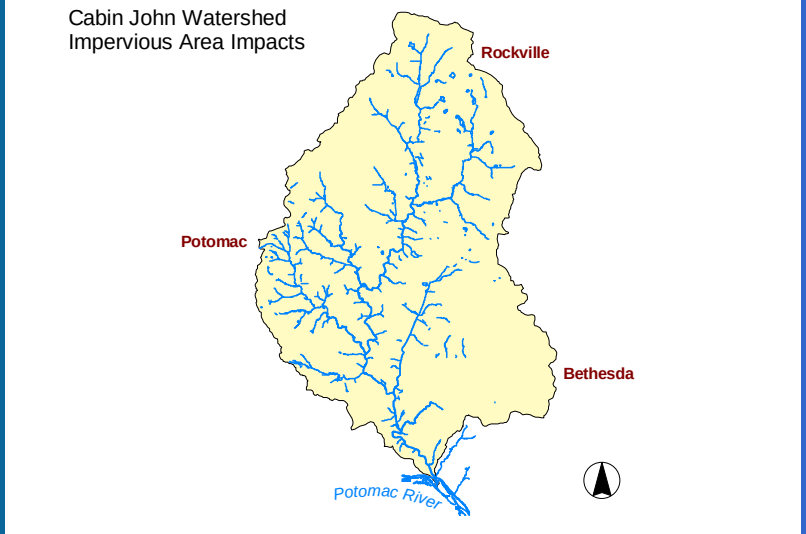
- Residential Urban Stormwater Management
  - Reduce Runoff Volume
  - Reduce Pollutants from Neighborhoods
  - Recharge Groundwater and Stream Baseflow

- Water Conservation and Habitat Diversity
  - Native Landscapes
  - Harvesting and Reuse

- Empowering Individual Actions

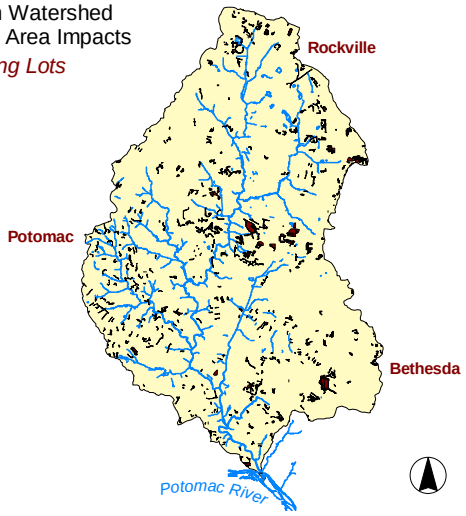
Local and Regional Significance





Cabin John Watershed
Impervious Area Impacts

Parking Lots



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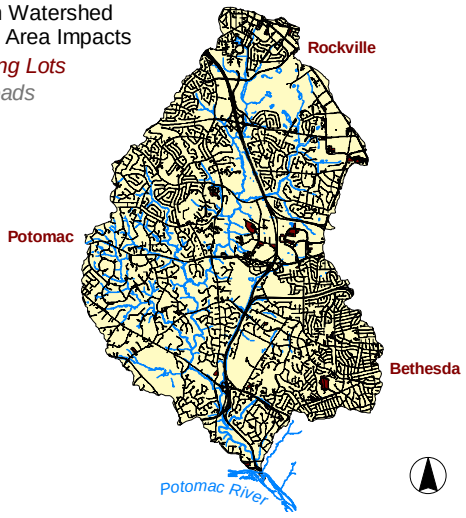
Roads



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Impervious Area Impacts

Parking Lots

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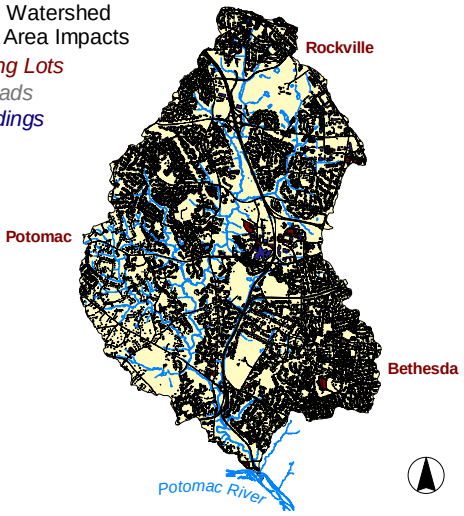
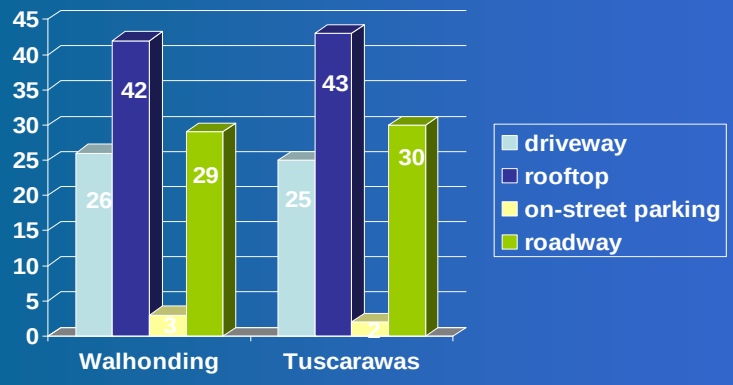
Buildings



Rooftops

In typical urban residential areas, rooftops account for 30-40% of the total impervious area – capturing runoff from residential rooftops CAN MAKE A DIFFERENCE

Neighborhood Impervious Cover



How much is directly connected??

Costly Repairs and Habitat Restoration Efforts

Stormwater Management – end of pipe practices: can provide very effective runoff control, but physical space for this is very limited in most developed neighborhoods!

RainScapes Initiative

- **County Incentive Funding** of **$500,000 per year Used in Three Ways:**
  - Rebate Program
  - RainScapes Neighborhood Approach
  - Partnerships with Watershed Organizations
- Funding comes from water quality protection charge that is paid by all County property owners

RainScapes Rewards Rebate Program
appr. $75,000 per year

- **$1,200** per residential lot; with project caps, up to:
  - $1200 for rain gardens, permeable paver retrofits, green roofs
  - $500 for turf removal conservation landscaping (min. 500 sq.ft.)
  - $200 for tree canopy
  - $50 for rain barrel (max 4)
- Commercial/Institutional: $.46 cents per sq.ft. of imp. area treated, up to $5000 per property

RainScapes Rewards Status

- **Residential only so far**
  - No Commercial, Institutional Properties
- **Currently in Program:**
  - Total 85 applications since March
  - Approximately 2.5 acres of impervious area treated
  - Total rebates requested: $35,673 (6 months)

RainScapes in Targeted Neigborhoods

- Neighborhood-scale RainScaping provides the best opportunity to achieve volume reductions
  - Can we reduce residential runoff in a measurable way?
- Know the particular needs of the Neighborhood
- Build on existing efforts and where there is some level of support
- Promote community participation
  - Widespread implementation! Can everyone do at least one thing differently? Concept of stormwater footprint
- Research and collaboration
  - Promote partnership and project innovation
  - Unique neighborhood conditions – wooded and steep
  - Can we improve infill and redevelopment practices?
- **Now working in six small neighborhoods**
  - **Refining metrics for future neighborhood selection**

Need to work closely with upstream residents and build relationships with other agencies

"Those without water problems indicated being unaware of how water leaving their property affected others. In short, a neighborly spirit - even if present - is of little effect unless residents understand how their decisions have consequences for their neighbor…"

(City of Maplewood, Focus Review Group of Rainwater Gardens, 2004).

Neighborhood RainScaping Elements

- Neighborhood Assessment and Surveys
  - opportunities and constraints – build upon prior work and address local concerns (drainage issues, traffic calming, etc)
  - CWP USSR
  - potential project sites, on-lot and ROW
- Resident Workshops
- Monitoring versus Modeling – volume reduction
- Project Templates and Installation Plans
- Implementation Plan and Installation Options
- *Timeframe: 12 to 18 months, demo sites earlier*
- ***What we have learned so far and Next Steps***

Watershed Group Partnerships

- Provides resources for these groups to expand their outreach efforts and membership
- Vastly extends reach of program
- DEP provides materials for community rain garden projects

Leap-frog effect among neighbors – good exposure for the watershed groups and opportunity to expand RainScapes Neighborhoods

RainScapes Techniques
A wide range of natural drainage options

- Downspout Diversion
- Rain Barrels, Cisterns (water re-use)
- Rain Gardens
- Permeable Pavers
- Green Roofs
- Soil Reconditioning and Amendment
- Native/Naturalized Landscaping
- Urban Tree Canopy

Techniques:
Downspout Diversion

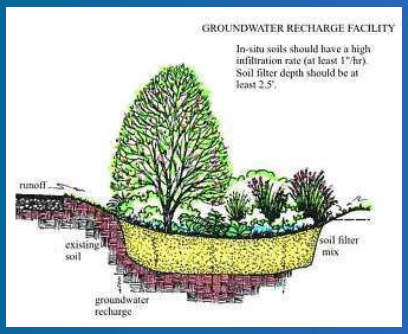
Downspout Diversion Basics

- Simple approach may work – redirect downspout flow with flexible tubing
- Carefully inspect grading to avoid basement seepage and lot to lot drainage problems
- More engineered (and costlier) solutions:
  - Dry wells
  - French drains
- Divert into a rain garden!

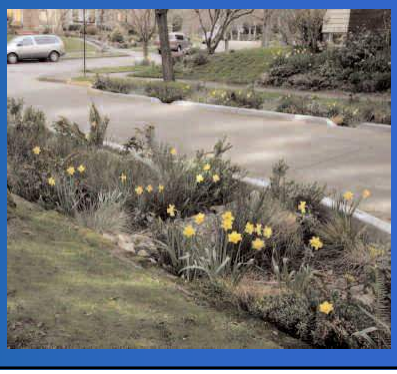
Rain Barrels!?!?!?

Techniques:
Rain Gardens

- **All Designs:**
  - Water source
  - Temporary ponding
  - Amended soils
  - Appropriate plants
  - Mulch



Shady spots



Rain Garden Considerations

- How big? How much off-site drainage?
- 20% - 30% of contributing impervious area
- 2.5’ depth (for larger storm control)
  - Looking at varying depths based on test pit results
- Dig a “test pit” to confirm soil drainage
- Shredded mulch not chips
- Avoid plugs
- Make sure you plan adequately for overflow drainage
- Choose plants to suit your light conditions, gardening objectives and maintenance ability
- Oh Deer, there goes my garden

More Considerations

- Miss Utility
  - Does not mark private lines or all house connections
  - 10' +/- error
  - Cable lines very shallow
- At least 10' from house and down-gradient from foundations
- Generally 15' from adjacent property lines
  - If additional flow is being directed to the rain garden, must ensure that the overflow path is adequate and clear, and does not create a lot-to-lot drainage issue
- Aim for no more than ½ acre drainage area to the garden (on-lot gardens)
- Check for settling, in the middle and around the edges – don't want to end up too deep
- Edging with stone or brick creates neater appearance and can reduce grass intrusion, make mowing easier

Associated Techniques: Soil Reconditioning and Amendments

Healthy soils and infiltration

- Mass grading during construction leaves little or no top-soil and highly compacted yards
- Intensive turf-grass culture can lead to highly compacted soils
- Test: Soil nutrients, organic content and compaction levels
- Add: Organic material and aeration for healthy lawns
- **Add: Native plants to create habitat gardens**

Goal: Streams in Good Condition

Sculpin

Stonefly

Questions

Rain Gardens:

an effective measure for citizens' use in improving water quality

Lynn Hinkle, ASTRA
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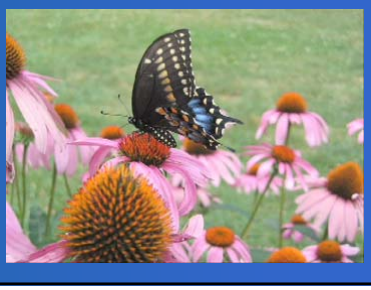
Screenshots

10,000 Rain Gardens



Screenshots

Stormwater Retention

Screenshots

Register Your Rain Garden

Go to RainKC.com
to register your rain garden
and a chance to win a trip for 4 to DC !

Rain Gardens are for Everyone

Native plants in north Kansas City

Photo: David Dods, URS

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Rain Gardens:

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Questions

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Climate Ready Estuaries

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