When It Rains, It Drains

Master Gardener University
2013

Janet Chapman
Mississippi Department of Environmental Quality
September 30, 2013

Watersheds—The Grounds for Water Quality!


Red Creek

A new way of looking at water resource protection

Janet Chapman

Mississippi Department of Environmental Quality

Presentation based on Center for Watershed Protection's *Why Watersheds*?
Some slides provided by NEMO, some pictures by Janet Chapman, MDEQ. 9/2013

In This Presentation…

1. Why Do Watersheds Matter?
2. What Is a Watershed?
3. What are the Impacts of Impervious Cover on a Watershed?
4. What Can Your Community Do?
5. What Can YOU Do?

Why Watersheds Matter!


Okay, but what exactly IS a watershed?

Watershed Definition

A watershed is all the land area that drains to a common point along a stream.

The borders of a watershed are the ridges and hilltops that separate it from the neighboring watersheds.

What makes up a watershed?

- water bodies—streams, lakes, rivers, etc.
- plants and animals
- soils
- topography

- rainfall runoff (clean/polluted)
- point source outfalls
- cultural and historical land use
- people—Everyone lives in a watershed!


How many ‘watersheds’ do you see?

OK, so I live in a watershed… what types of things can affect the health of my watershed?

Urban construction usually produces soil erosion. The sediment that is released can be devastating.


SEDIMENT is the number one pollutant in Mississippi streams!
Erosion on urban construction sites supplies sediment that pollutes many of the State's waters.
Note the black silt fence, a construction Best Management Practice (BMP) designed to reduce pollution. Is it working??

Hmm! Construction sites do release a lot of sediment, but most are eventually landscaped. Is there anything that will continue to be detrimental to my watershed?

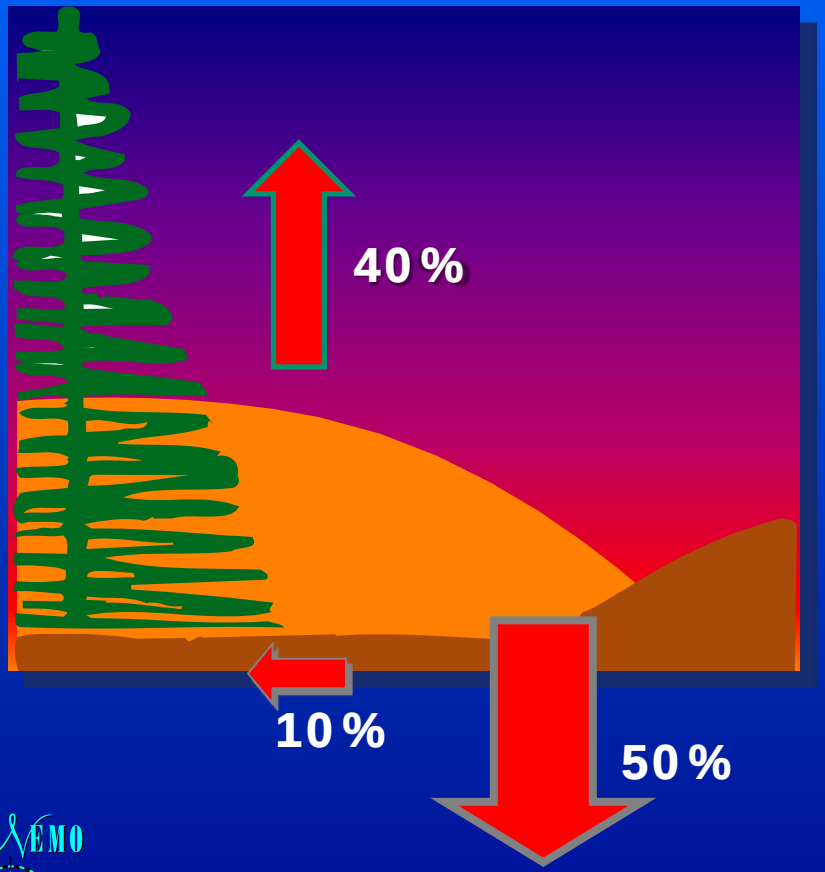
Large amounts of paved surfaces, or impervious cover, can have lasting impacts on a watershed.

Impervious Cover

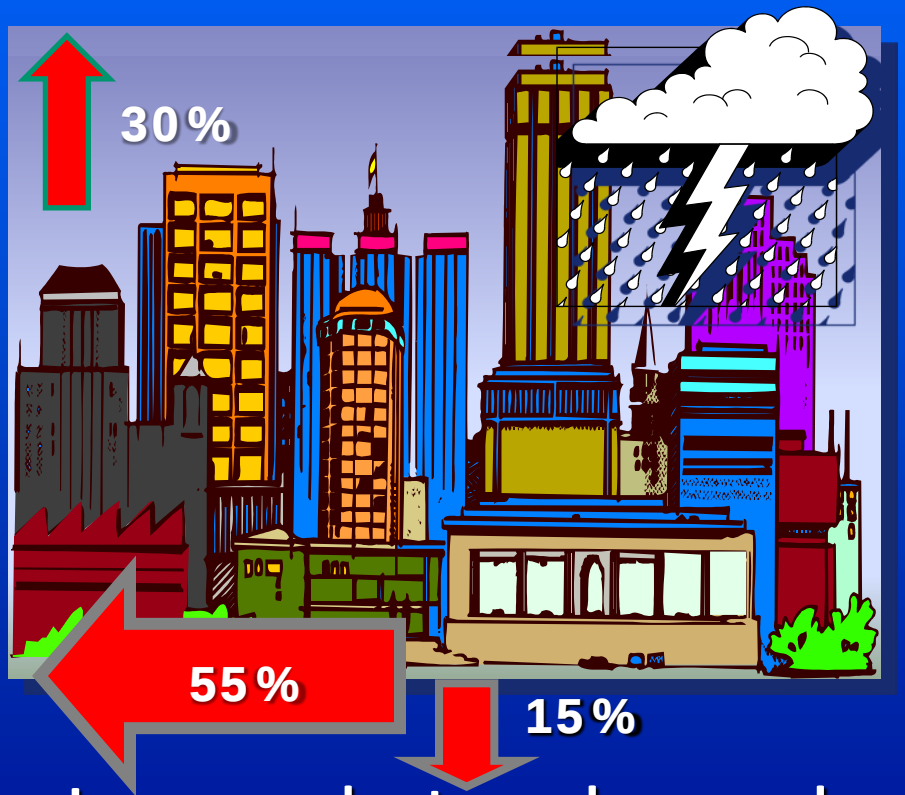
- Impacts the water cycle
- Prevents natural processing of pollutants by soils and plants
- Routes pollutants directly to waterways
- Diminishes water quality– how clean it is
- Influences stream flow, water quantity, channel shape and size
- Affects plant and animal habitat

Increased Impervious Cover from Development Impacts the Water Cycle

FOREST



CITY with 75-100 % IMPERVIOUS COVER



Less groundwater recharge and evapotranspiration

Less cleansing by soil and plants

NEMO adapted

Impervious Cover Reduces The Cleanliness of Water Runoff

Pollutants build up on impervious surfaces and wash into the stream system when it rains.

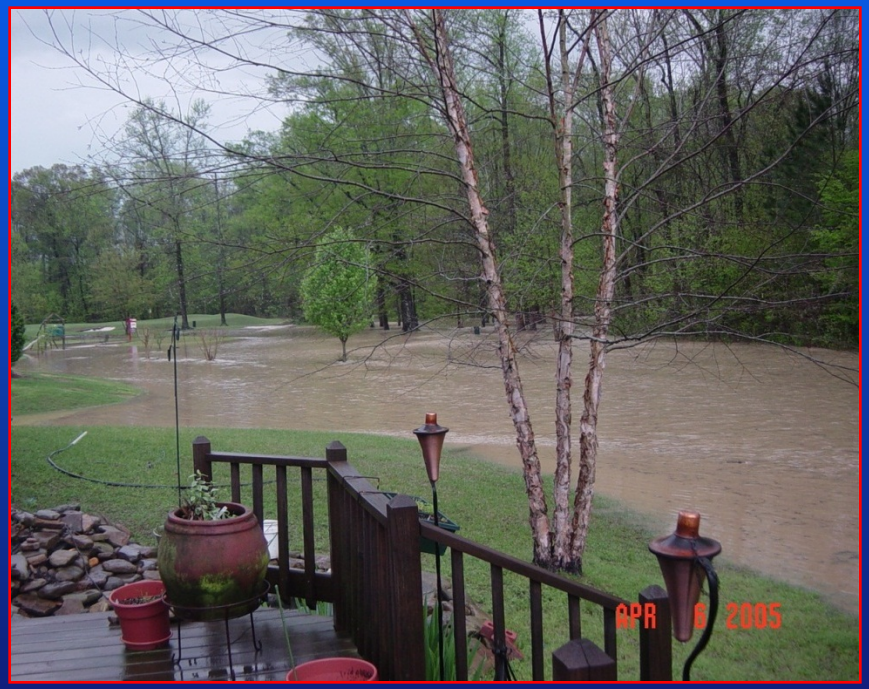
Water entering storm drains is NOT treated on its way to the stream.

Center for Watershed Protection

The Amount of Impervious Cover Influences Flooding

The increased flow of stormwater runoff in the streams can cause…

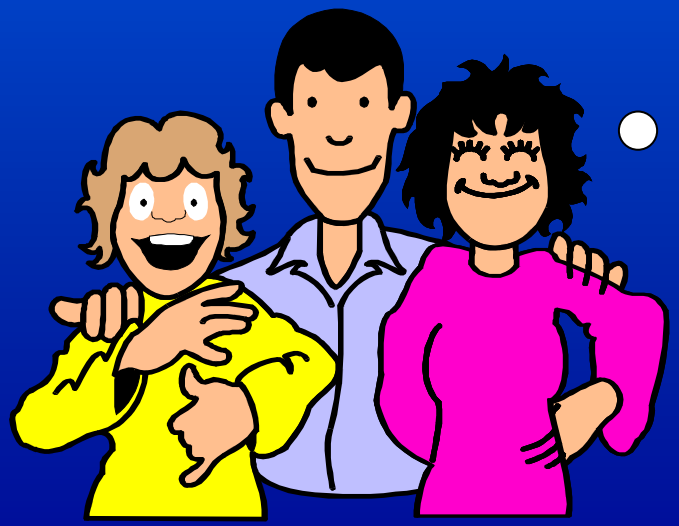
More Frequent Flooding



Higher Flood Levels

So impervious cover can impact watersheds in many ways …

…but is there a way our community can protect its streams?



Yes! No matter where you live, your community can use many tools to lessen the impacts of impervious cover.

Use The 8 Tools of Watershed Protection

8. Watershed Stewardship

1. Watershed Planning

2. Land Conservation

7. Non-Stormwater Discharges

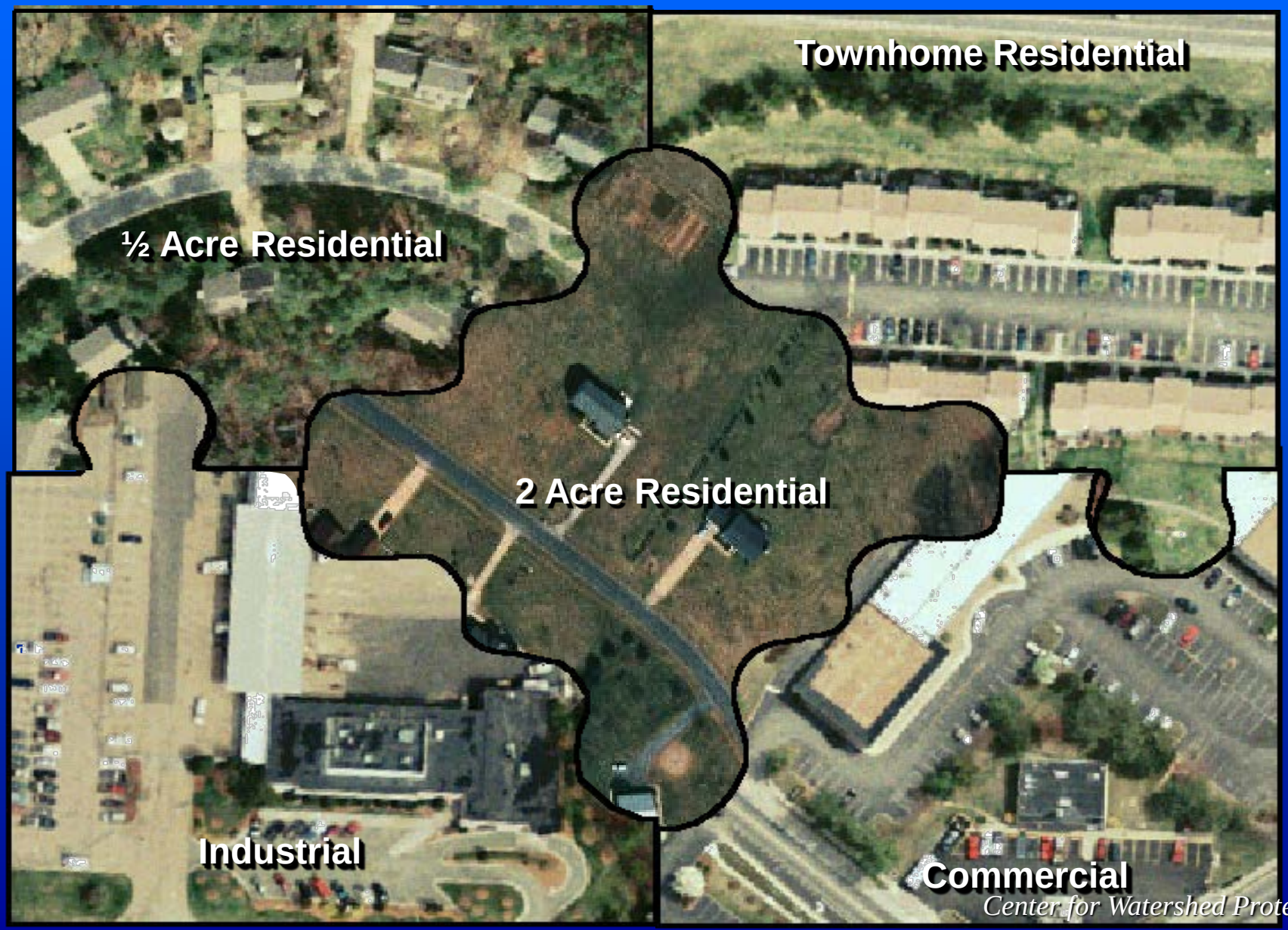
3. Aquatic Buffers

6. Stormwater Management

5. Erosion & Sediment Control

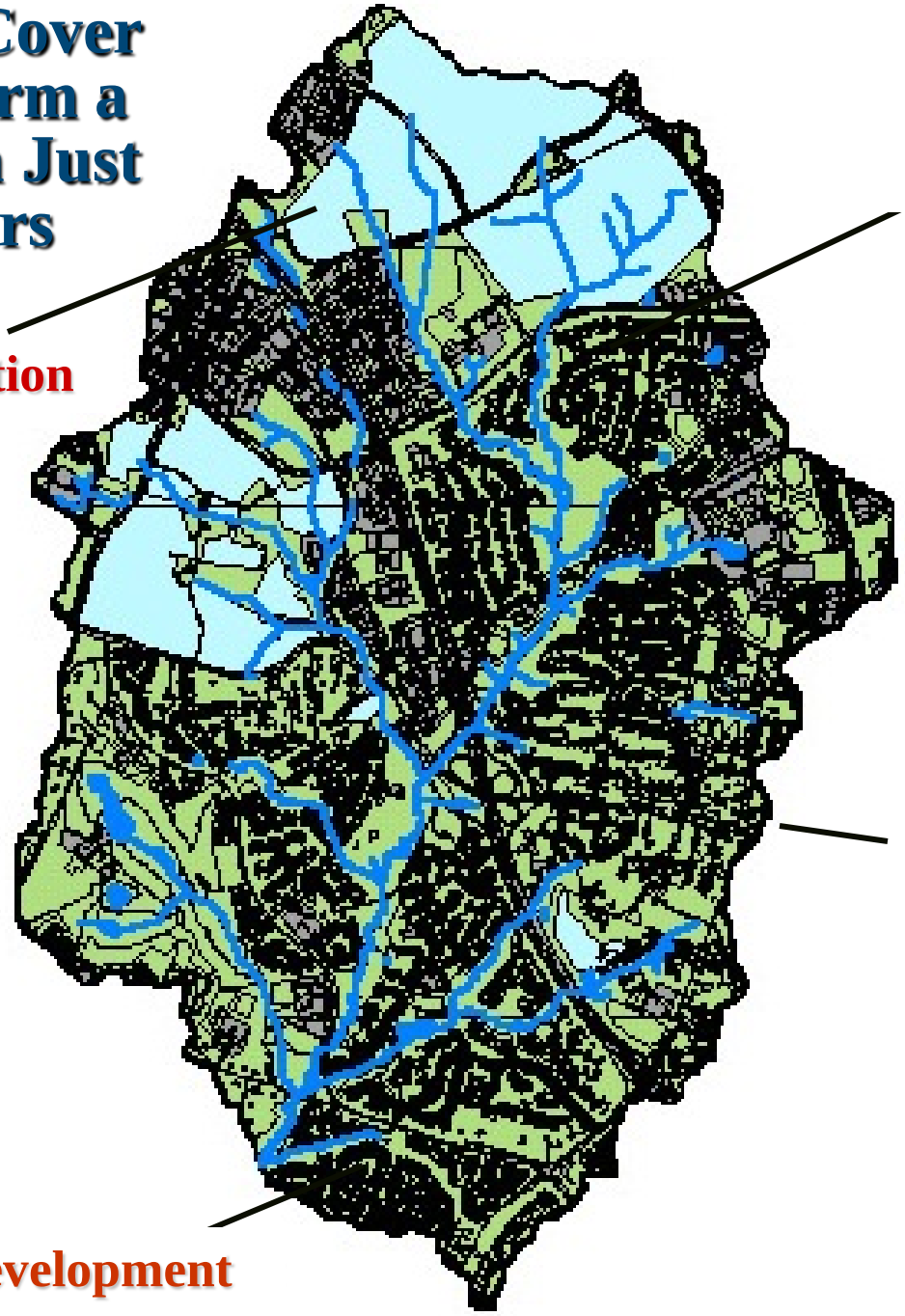
4. Better Site Design

1. Watershed Planning Involves Choices



Center for Watershed Protection

Impervious Cover Can Transform a Watershed in Just a Few Years

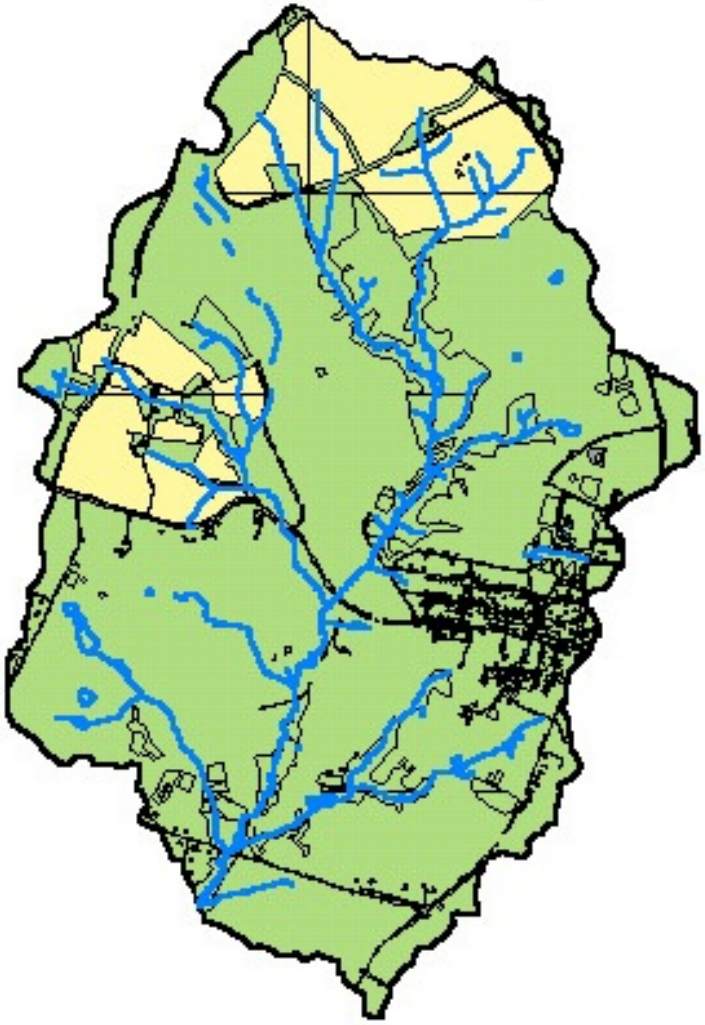


Development Without Watershed Planning

1990s

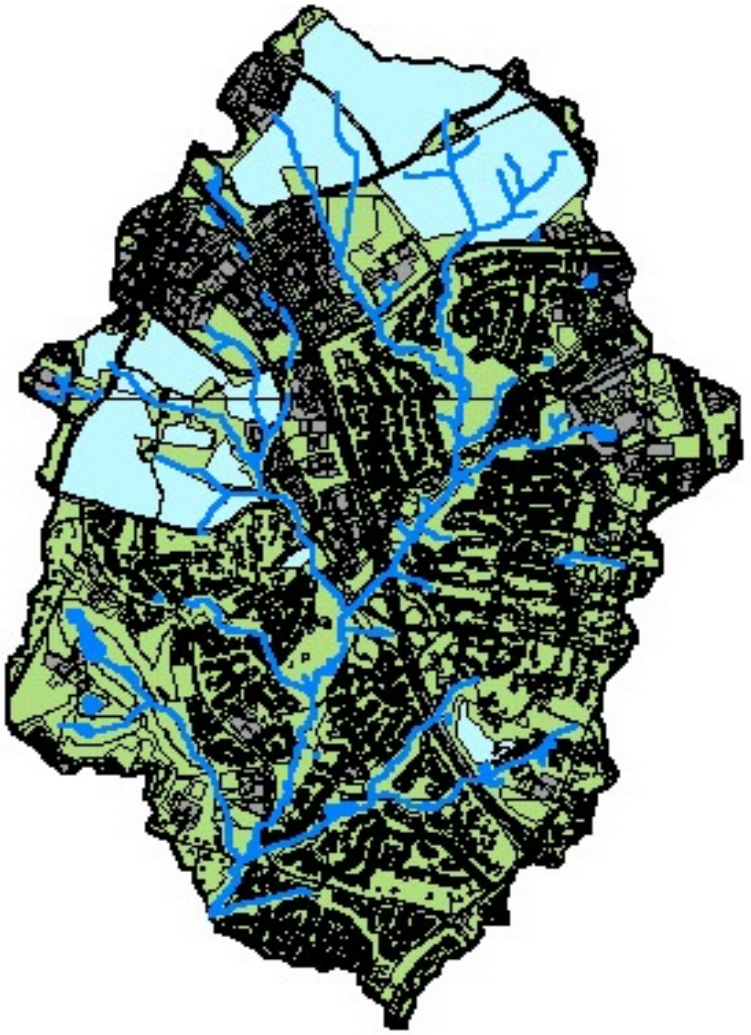
Center for Watershed Protection adapted

Undeveloped



1940s

Developed



1990s

6. Stormwater Management

Stormwater is managed by practices that temporarily store runoff and remove pollutants.

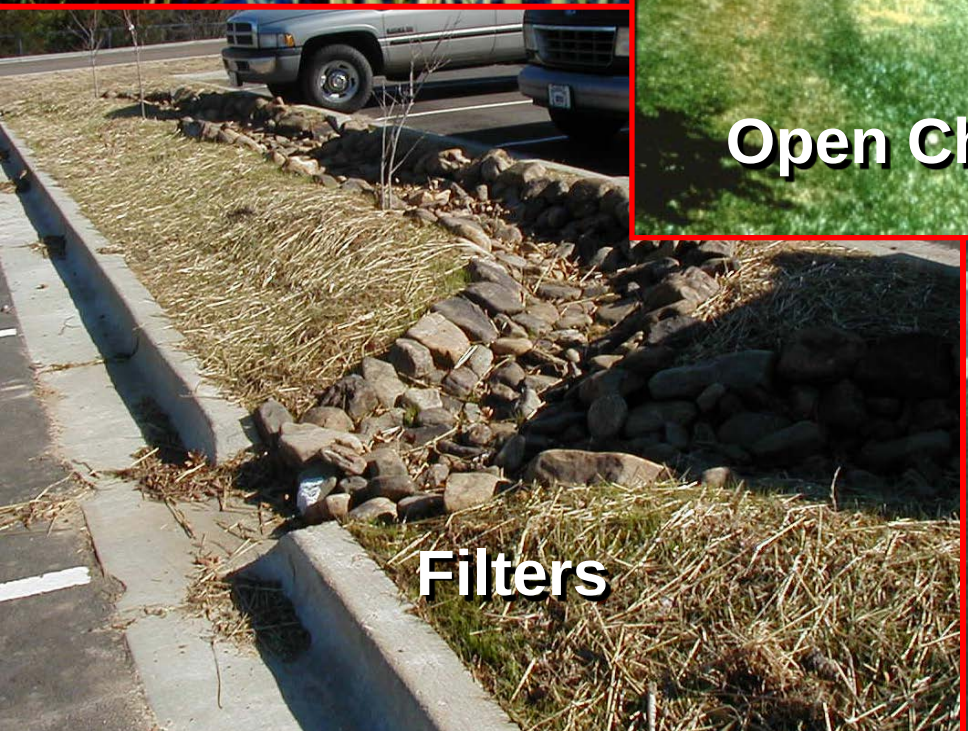
Types:

- **Ponds**
- **Wetlands**
- **Infiltration**
- **Filtration**
- **Open Channels**
- **Water Harvesting**
- **'Green' Processing**


Ponds


Wetlands


Open Channels

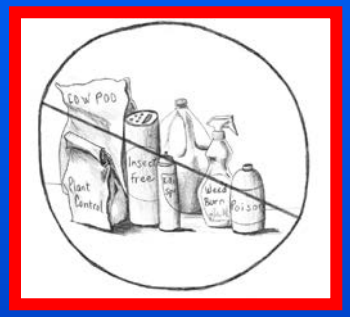

Filters


Infiltration


I don't control development…
I don't litter…
I'm only one person…
So what can I do to make a difference??!

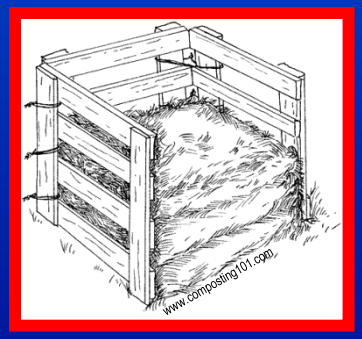
Top Ten Things *You* Can Do to Protect Your Watershed

1. Water Only When It's Necessary



2. Limit Use of Pesticides & Fertilizers

3. Plant Hardy Vegetation



4. Compost or Mulch Yard Waste. Don't Leave it in the Street or Sweep it into a Storm Drain!

Center for Watershed Proection

Top 10 Things *You* Can Do to Protect Your Watershed

5. Put Litter in its Place

6. Wash Your Car on the Lawn or at a Commercial Car Wash

7. Pick up After Your Pet!

Top 10 Things *You* Can Do to Protect Your Watershed

8. Recycle and Dispose of Household Chemicals Properly

9. Dispose of Deer Carcasses Properly

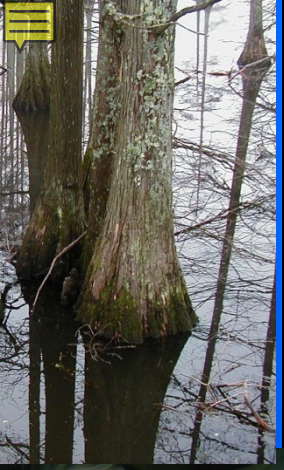
10. Inspect and Service Septic System Every Two Years

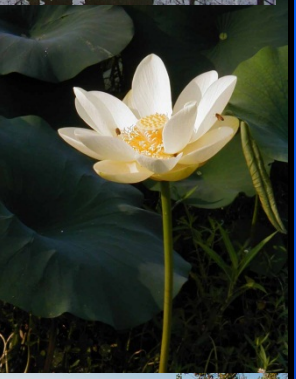
In Summary--

- Watersheds matter to us all and are a "natural" for addressing issues hindering clean water.
- Impervious cover is a serious threat to water quality & quantity.

- Watershed health is everyone's responsibility. You can make a difference— Begin in your own backyard!

Don't let roadblocks stop water resource protection!





For More Information Contact

Basin Management Branch

Mississippi Department of Environmental Quality

601-961-5171 or visit www.deq.state.ms.us

Websites for Further Study

U. S. Environmental Protection Agency

Watersheds water.epa.gov/type/watersheds/index.cfm

What is a Watershed? water.epa.gov/type/watersheds/whatis.cfm

Center for Watershed Protection cwp.org

U. S. Geological Survey water.usgs.gov/wsc

Reigning Over Runoff reigningoverrunoff.org

Questions? Comments?

Importance of Trees for Watershed Health

Tales of the Green and Blue

(or, An Intro to Urban Watershed Forestry)

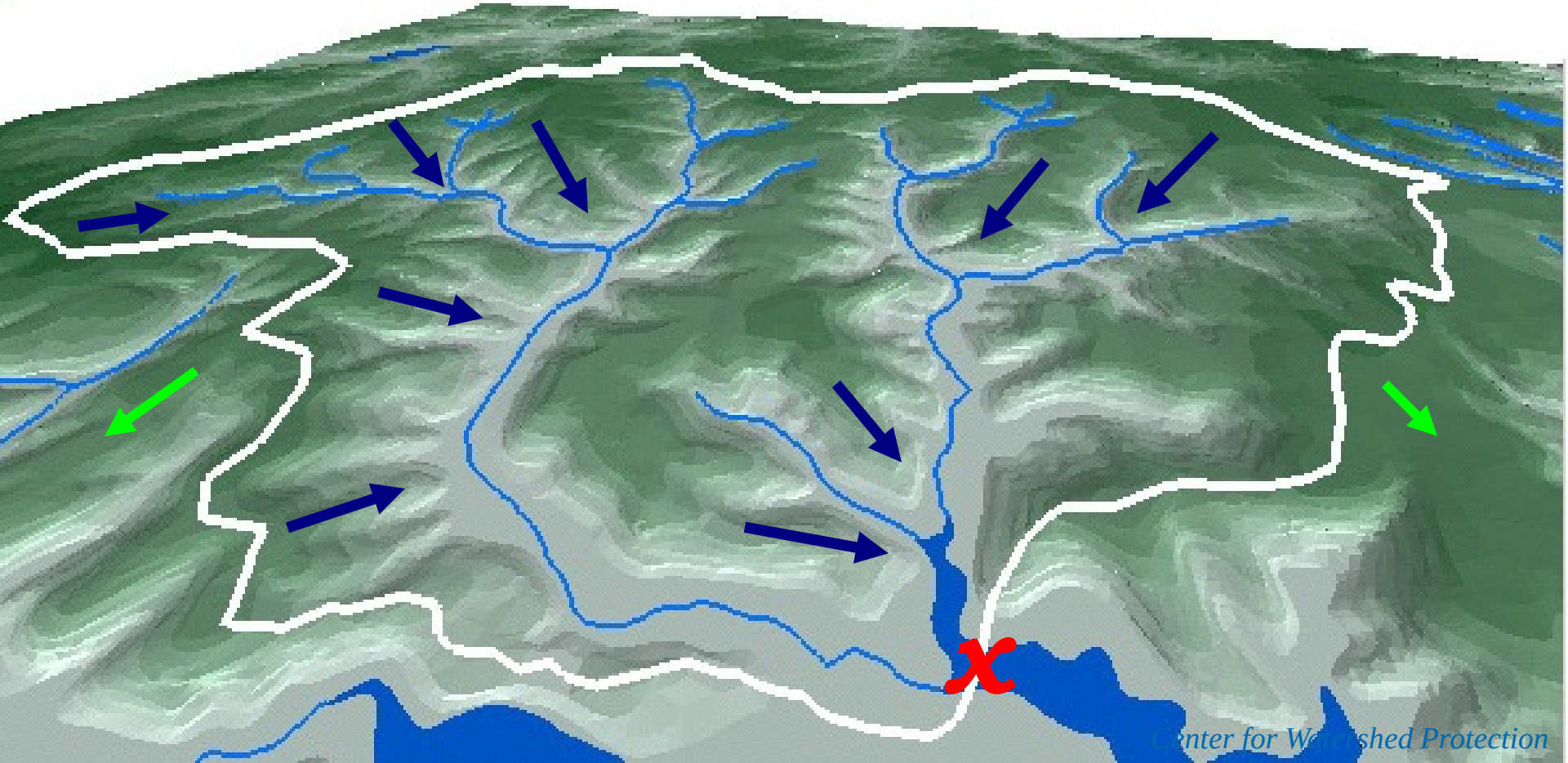
Janet Chapman
MS Dept of Environmental Quality

MISSISSIPPI
Department of Environmental Quality

What is a Watershed?

A watershed is all the land area that drains to a common point along a stream, or other waterbody.

The borders of a watershed are the ridges and hilltops that separate it from the neighboring watersheds.



Urban Watershed Forestry— What is it ??

Urban *refers to developed and developing areas—human communities– and adds the need for stormwater management.*

"Watershed forestry *is the use of forests and the practice of forestry to protect, restore, and sustain water quality, water flows, and the health and function of watersheds."* *(WFAP federal register)*

Urban watershed forestry *tracks and manages forest cover at the watershed scale and acknowledges the importance of trees and forests in protecting water resources and managing stormwater. (CWP)*

adapted from *urban watershed forestry concepts*, Center for Watershed Protection & USFS Northeastern Area, State & Private Forestry

Watershed Health: How is it Measured?

A healthy watershed has the ability to…

- intercept and store rainfall and runoff
- moderate stream flow
- hold on to and recycle nutrients
- protect soils from erosion
- support healthy aquatic systems
- accomplish self-repair

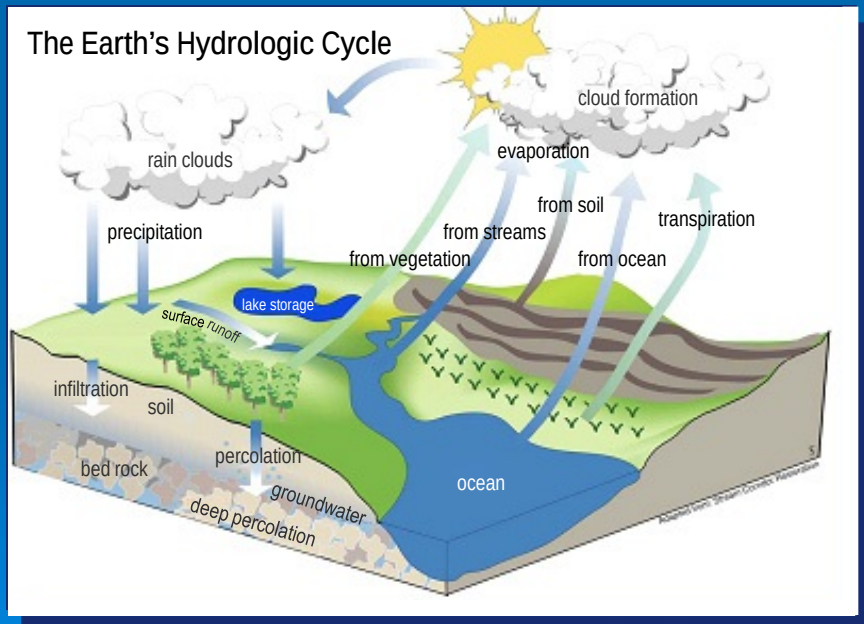
Watershed Health is Tied, in Part, to Forests…

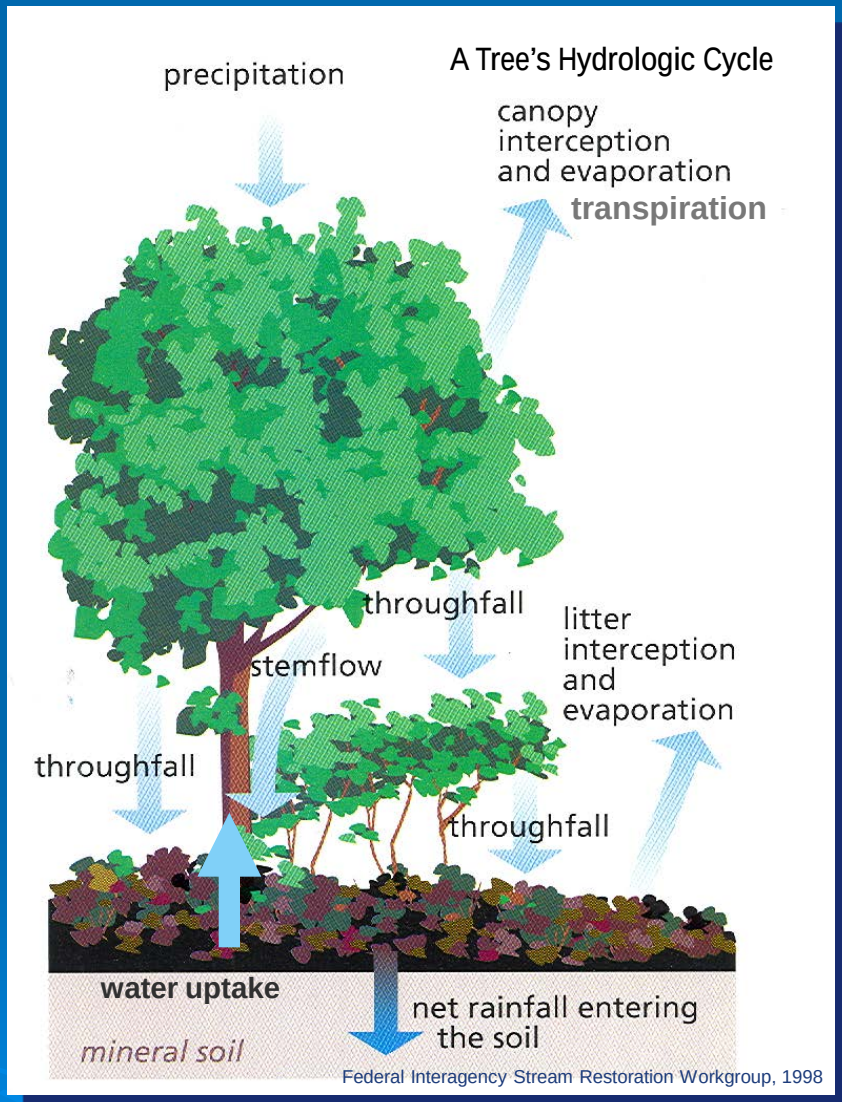
- **Percent forest cover is a leading indicator of watershed health**
- **Other considerations**
  - total amount of forest & tree canopy
  - condition of forest (health/age/growth)
  - quality of forest management and maintenance
  - retention of “critical” forest & tree canopy
    - riparian forests & wetlands
    - steep slopes/erodible soils/headwaters, etc.
    - disconnect impervious features
    - cover impervious features with tree canopy

Documentation from Research…

- **Rainfall Interception by Trees**
  - 10 - 40% of annual rainfall (Zinke, 1967)
  - Canopy interception avg. 35-40% (Calder 1990, 2003)
  - Even in winter? Yes!
    - 15% for a deciduous tree (Xiao et al 2000).
    - 27% for an evergreen species (Xiao et al 2000).
- **Comparison of Infiltration of Water by Trees**
  - 12.4 in/hr for forest, 4.4 in/hr for lawn
  - 1.9 in/hr for suburban development (Kays, 1982)

How does a tree affect the water cycle?





Our Forefathers Knew…

The first models for predicting runoff in a watershed appeared in the 1800s and used runoff coefficients to account for different land use and land covers.

The Rational Method (Mulvaney 1851)

Peak Discharge = Runoff Coefficient x Rainfall x Basin Area

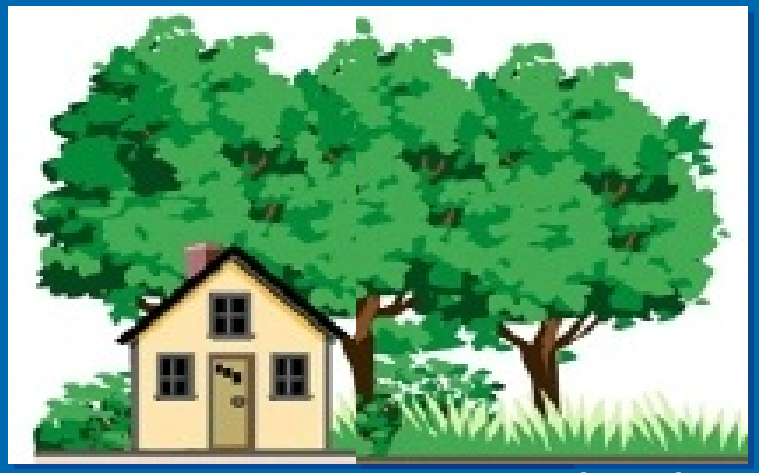
Runoff Coefficient Value Assignments:

- Forested ground is typically assigned a value of **near 0.**
- Pavement is given values **approaching 100 percent.**

"To protect your rivers, protect your mountains."

-ancient Chinese proverb

Value of Trees for Water and Air Quality



1973 51% Tree Cover in City

1997 Only 37% Coverage

51
-37
14

Concomitant Changes

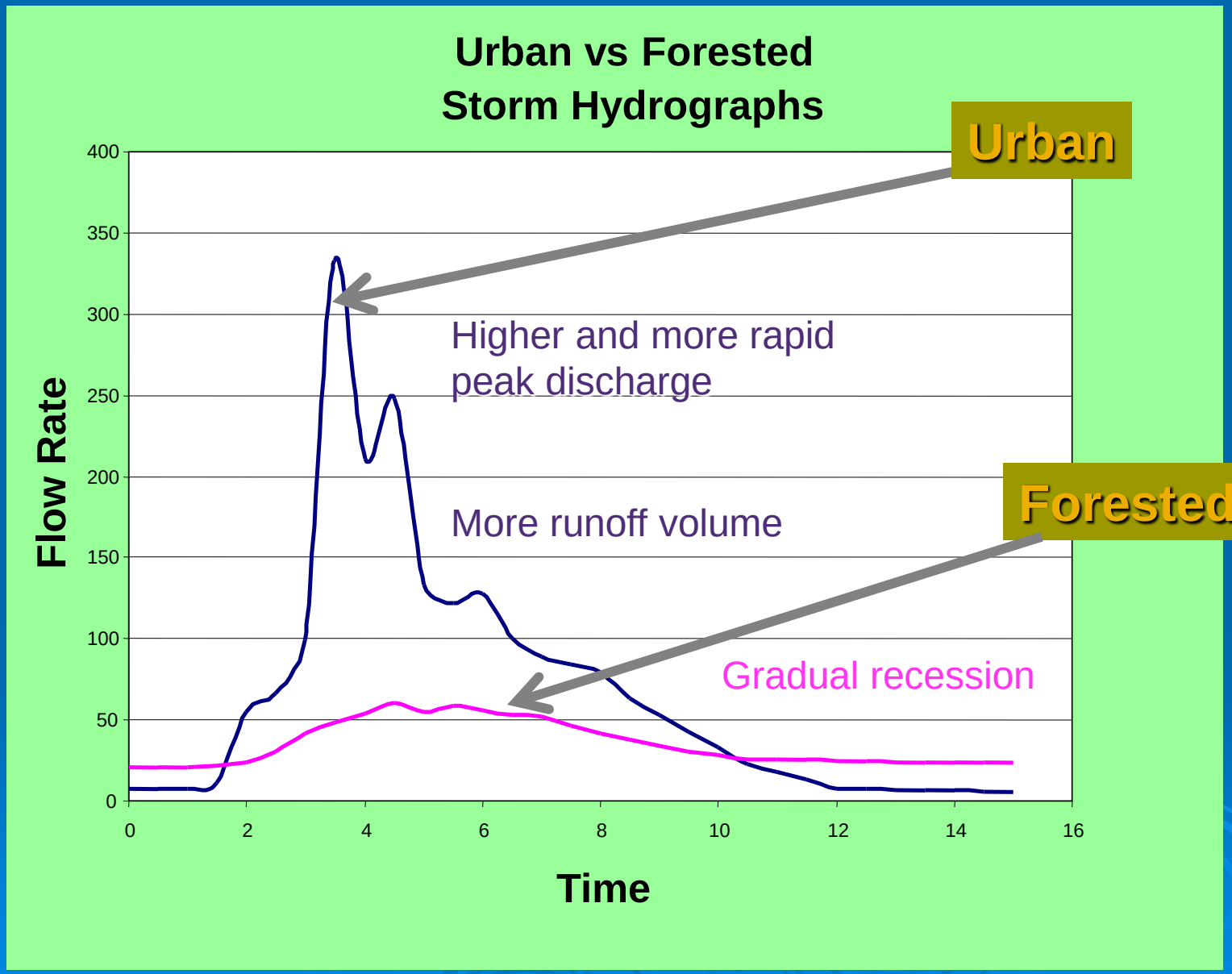
Increase in storm water runoff 19%
(from each 2-yr peak storm event)

Cost to construct treatment practices to intercept this runoff $1.08 B

Pollutants remaining in the atmosphere 9.3 M lbs/yr

Value of pollutant removal $24 M/yr

Baltimore-Washington Area
American Forests, 1999 quoted in Urban Watershed Forestry Manual 2005


Urban vs Forested
Storm Hydrographs
Urban
Forested
Higher and more rapid
peak discharge
More runoff volume
Gradual recession
Flow Rate
Time
0
50
100
150
200
250
300
350
400
0
2
4
6
8
10
12
14
16

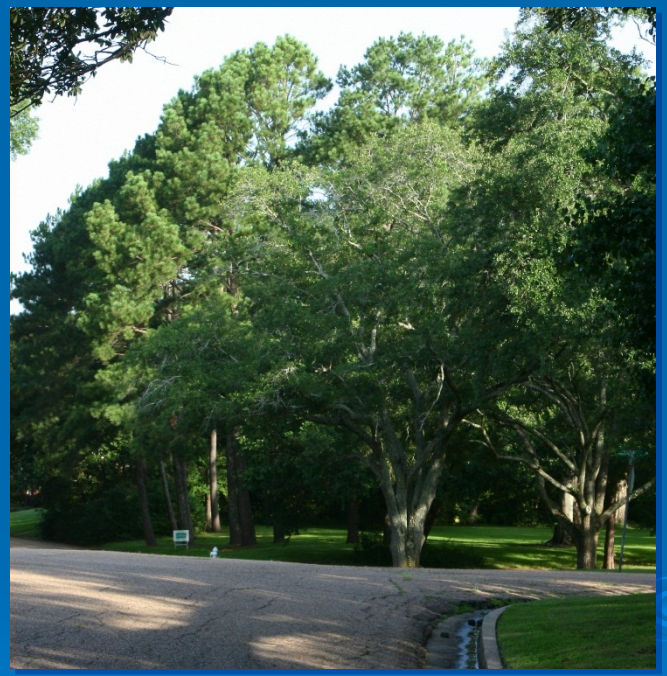
Key Question :

How do we

make this . . . function . . . like this??

Urban Forestry Management Plans

Comprehensive plans for protecting and restoring a forest in its urban setting



- Watershed-based goals
  - Increase forest canopy cover
  - Reduce stormwater runoff
  - Make an effective land use plan
  - Implement best practices
  - Develop supporting codes and ordinances
- Forest assessment and planning
- Strategies for protection, enhancement and restoration

Techniques for Maintaining and Increasing Forest Cover in a Watershed

Summary of Protection, Enhancement, and Reforestation Techniques		
Goals	**Objectives**	**Techniques**
Protect	A. Protect Priority Forests	1. Conservation easements 2. Land acquisition 3. Transfer of development rights
	B. Prevent Forest Loss During Development and Redevelopment	4. Bonus and incentive zoning 5. Clearing and grading requirements 6. Forest conservation regulations 7. Open space design 8. Overlay zoning 9. Performance-based zoning 10. Storm water credits 11. Stream buffer ordinances
	C. Maintain Existing Forest Canopy	12. Protection of significant trees 13. Tree removal restrictions for developed areas

Urban Watershed Forestry Manual Part 1 2005

Summary of Protection, Enhancement, and Reforestation Techniques		
Goals	**Objectives**	**Techniques**
Enhance	D. Enhance Forest Fragments	14. Increase forest area where possible 15. Increase habitat diversity 16. Manage deer 17. Protect soils from erosion and compaction 18. Provide food, cover, and nesting sites for wildlife 19. Reduce or eliminate invasive species 20. Remove trash and prevent dumping
Reforest	E. Plant Trees During Development and Redevelopment	21. Landscaping requirements 22. Planting trees in storm water treatment practices 23. Planting trees in other open areas 24. Shading and canopy requirements
	F. Reforest Public Land	25. Allow natural regeneration 26. Actively reforest public lands
	G. Reforest Private Land	27. Education 28. Incentives for tree planting 29. Stewardship and neighborhood action

Benefits of Urban/Community Forests

Environmental Benefits

- Reduce storm water runoff
- Enhance stormwater treatment practices
- Provide habitat for terrestrial and aquatic wildlife
- Reduce summer air and water temperatures
- Increase plant diversity
- Improve regional air quality
- Improve soil and water quality
- Reduce urban heat island effect
- Reduce stream channel erosion
- Create buffer zones for streams

Economic Benefits

- Decrease heating and cooling costs
- Positively influence consumer behavior
- Increase property values
- Reduce crime
- Reduce construction and maintenance costs (by decreasing costs related to clearing, grading, paving, mowing, and stormwater management)

Community Benefits

- Increase livability
- Block UV radiation
- Buffer wind and noise
- Provide aesthetic value
- Strengthen social cohesion in a community
- Assist with pedestrian and traffic flow
- Provide seasonal color, flowers, or fruit
- Add verticality to children's play opportunities
- Improve health and well-being
- Provide shade / reduce glare
- Increase recreational opportunities
- Increase community pride
- Leverage community revitalization
- Provide screening and privacy
- Enhance architectural design

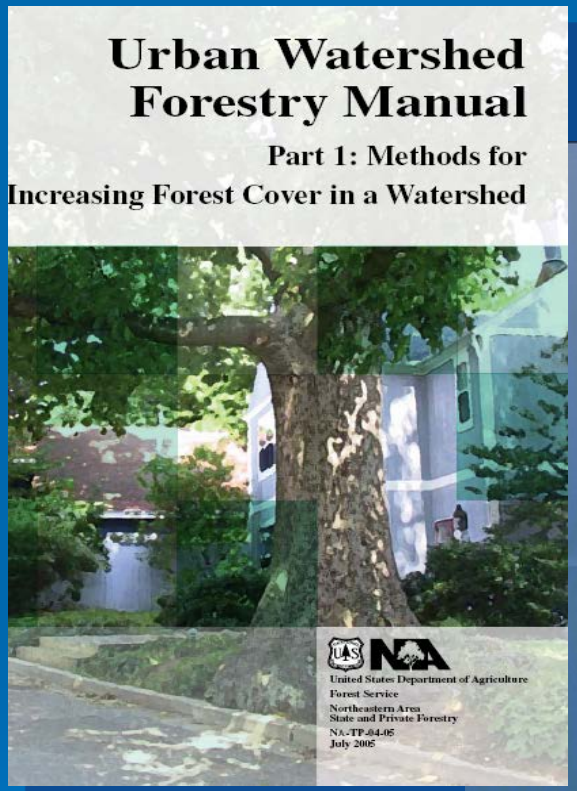
So…
Urban Watershed Forestry

- Integrates urban/community forestry and watershed planning and management.
- Sets watershed goals for the urban forest.
- Creates more hydrologically functional urban landscapes.
- Builds tools to assess, protect, and enhance urban green space as a part of stormwater management.
- Promotes urban forests as having environmental, economic, and community benefits.

adapted from *urban watershed forestry concepts*, Center for Watershed Protection & USFS Northeastern Area, State & Private Forestry

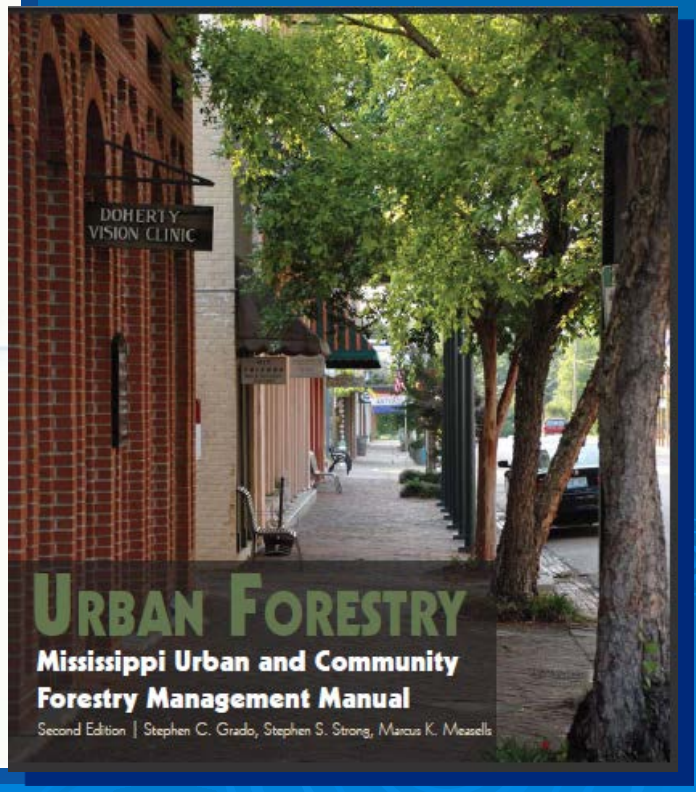
Excellent Resources for Further Study

forestsforwatersheds.org
urbanforestrysouth.org
ufmptoolkit.com



USDA Forest Service, NE Area State and Private Forestry

USDA National Agroforestry Center



MSU Forest & Wildlife Research Center

fwrc.msstate.edu/pubs/urbanmanual_second.pdf

WWW.URBANFORESTRSOUTH.ORG

Questions? Comments? Reflections?

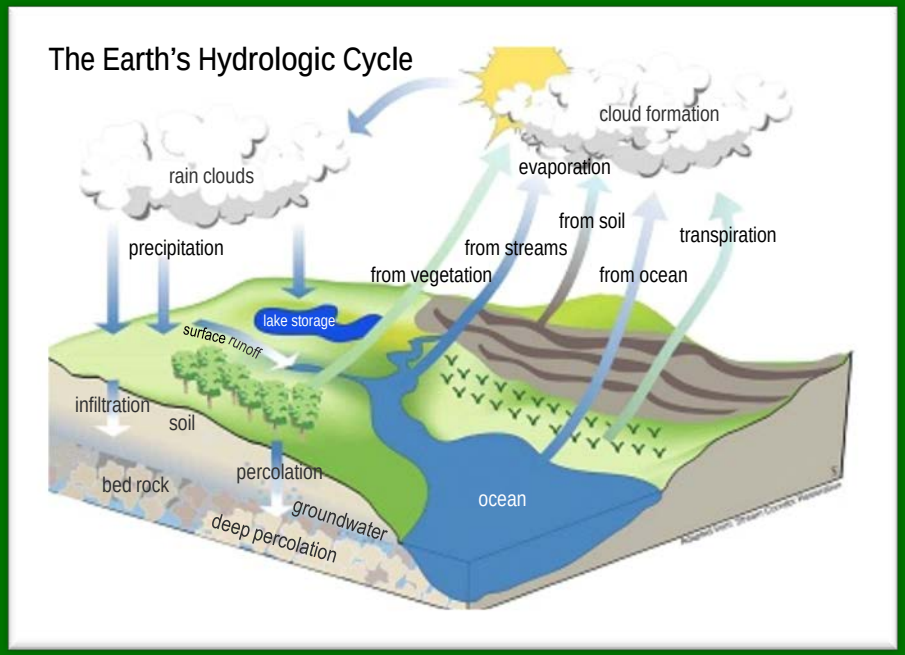
The Green Scene

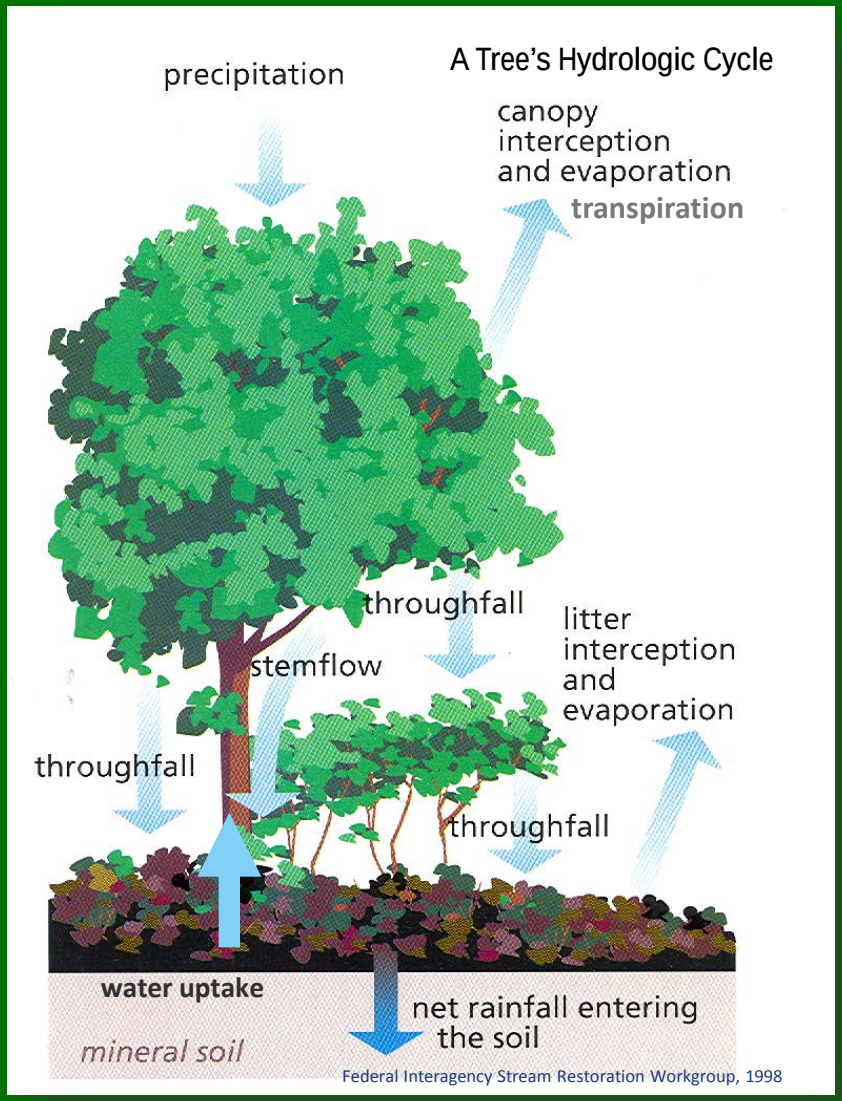
What's ↑ in Keeping Stormwater ↓!

Janet Chapman

Mississippi Department of Environmental Quality

What's All The Buzz About Stormwater?

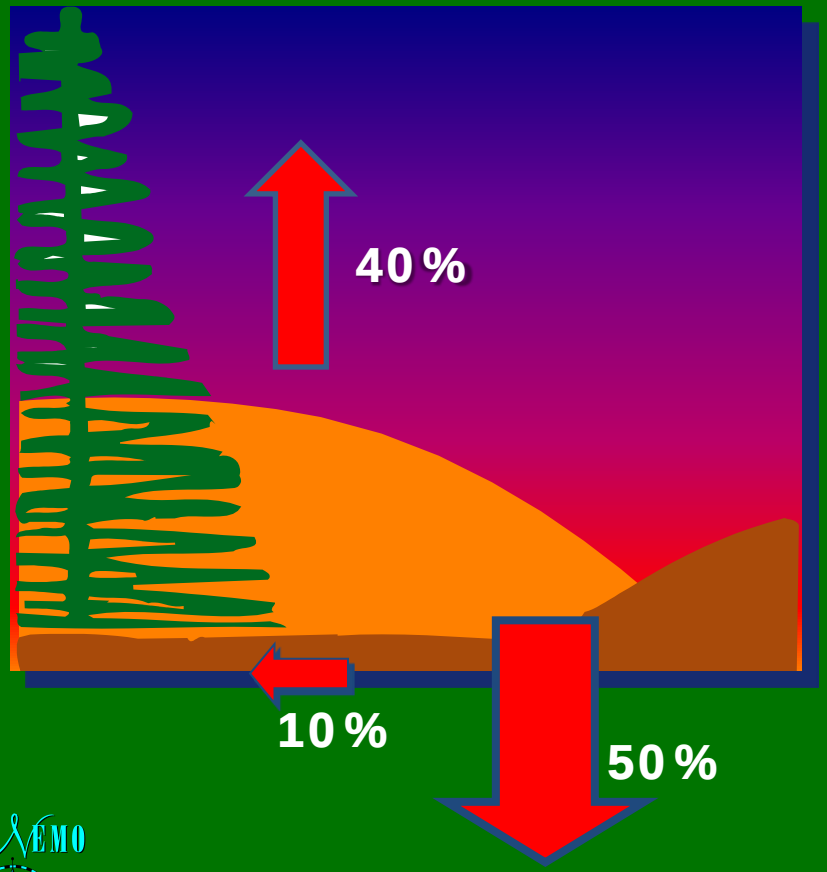




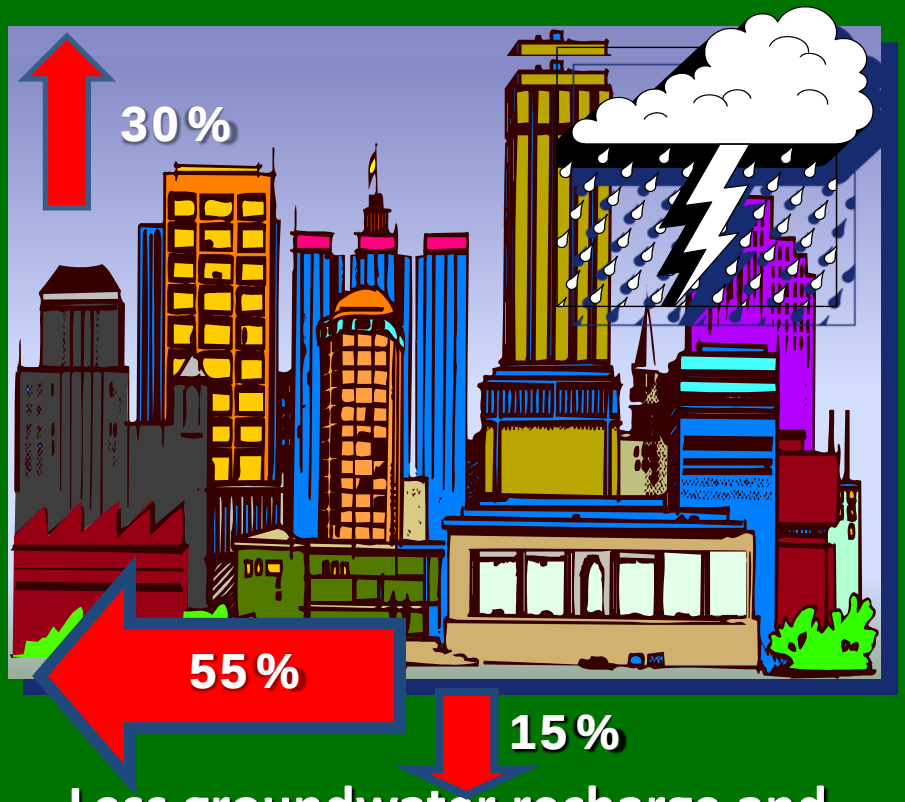
Typically, stormwater = rainfall + pollutants

Replacement of Forests by Urban Hardscapes Increases Stormwater Runoff

FOREST



CITY with 75-100 % IMPERVIOUS COVER

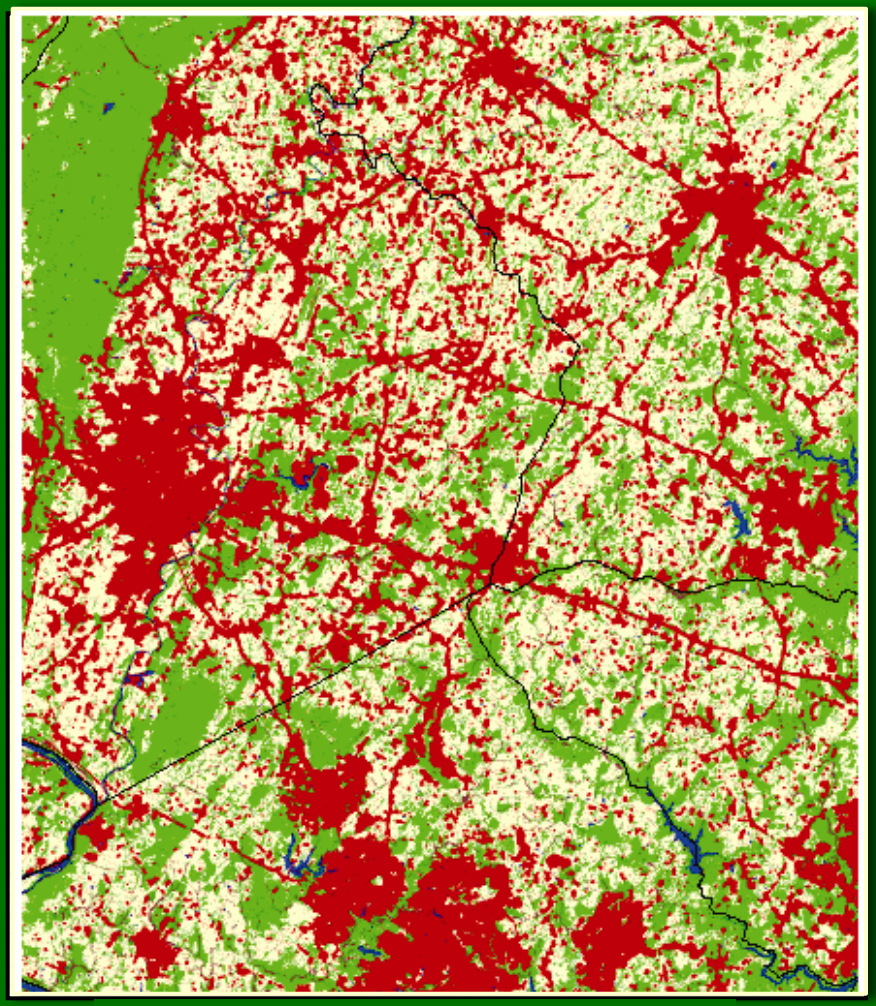


Less groundwater recharge and evapotranspiration

Less cleansing by soil and plants

NEMO adapted

What will our watersheds and streams look like if we continue present trends?



Watershed in 2030 (projected)

By 2030, if we continue along current trends we will see this:

- Loss of 21% of remaining forests
- Increase of 30% in stormwater runoff in our cities

adapted from *urban watershed forestry concepts*, Center for Watershed Protection & USFS Northeastern Area, State & Private Forestry

Key Watershed Question For Cities :

How do we

make this . . . function . . . like this??

adapted from USEPA R4

Local Governments Need Your Help!

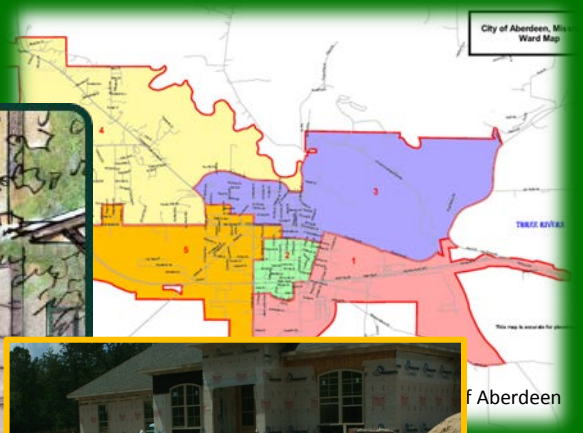
Local Government Responsibilities

- Zoning, quality & density of built structures (as well as so many other municipal concerns!)
- Sustainability of city resources and life style
- Handling stormwater in the city

Local Government Needs

- Thorough understanding of stormwater by newly elected officials
- Requirement of focused training
- Knowledgeable local citizens (you and your fellow MG's) to help fill the stormwater problems/solutions knowledge gap.

City of Hernando


f Aberdeen


Janet Chapman

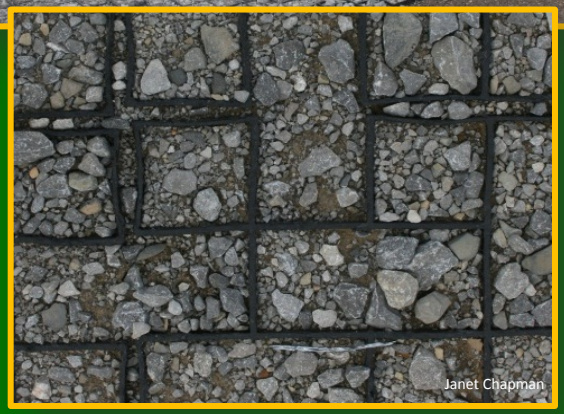
Cleaner Stormwater in Your City—

Find Answers in

http://www.deq.state.ms.us/mdeq.nsf/page/NPS_PlanningandDesignManual2ndEd_Vol1?OpenDocument

Green Planning Concepts for Stormwater Management

- Responsible Growth (aka Smart Growth)
  - promotes infill, compact, and mixed-use development
- Better Site Design Principles
  - addresses new development
- Low Impact Development
  - manage rainfall at the source



Low Impact Development

Low Impact Development (LID) is “an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls” (LID, 2007).

LID development minimizes changes to the flow of water runoff relative to pre-development conditions and maximizes infiltration after a storm.

Low Impact Development Controls

- Relies on advanced technologies and improved designs to manage stormwater on site or in neighborhoods
- Can be done on individual lots—is closely akin to 'green infrastructure'

bioswale

dry swale

Traditional Infrastructure

A curb drain on a city street with stormwater runoff flowing into it.

Green Infrastructure

Curb drain has been replaced with a street planter surrounded by pervious pavers. The stormwater runoff flows into planter through the pervious pavers.

adapted from EPA

What IS Green Infrastructure?

- Management approaches and technologies that infiltrate, evapotranspire, and reuse stormwater to maintain or restore natural hydrology (EPA via WEF)
- Soil-plant-water systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate some into the air, and release a portion slowly down stream (adapted from Philly Water Dept)
- Practices that maintain healthy waters, provide multiple environmental benefits and support sustainable communities (EPA)

Typical Green Infrastructure Practices

- Infiltration—Bioswales, Constructed Wetlands, Rain Gardens, Natural Areas, Porous Paving, Street Planters, Infiltration Trenches
- Water Harvesting –Rain Barrels, Cisterns
- Interception—Trees, Other Surfaces, Green Roofs, NFL Defensive Backs
- Transpiration—Trees, Other Vegetation
- Evaporation—Trees, Other Vegetation, Other Surfaces

EPA's National Stormwater Calculator

- A desktop computer application that assess how green infrastructure can be used to reduce rainwater runoff from development sites
- User selects different scenarios to see how specific GI changes (e.g., rain barrels or rain gardens) can prevent runoff on a given site.
- The tool estimates the annual amount of stormwater runoff from a specific site anywhere in the United States based on
  - local soil conditions
  - land cover
  - slope
  - historic rainfall records
- Useful to calculate property runoff reduction for
  - site developers
  - landscape architects
  - urban planners
  - homeowners

Seven GI Practices Considered

- Disconnection
- Rain Harvesting
- Rain Gardens
- Green Roofs
- Street Planters
- Infiltration Basins
- Porous Pavement

(Bioswales & Infiltration Trenches not included)

Trees, shrubs, perennials and grasses help manage rainwater, or stormwater, by diverting water and preventing it from becoming runoff via infiltration, evaporation, transpiration, and filtration. First, plant leaves, branches, and flowers catch the rain drops before the water hits the ground and becomes runoff. The stormwater collected on these surfaces can easily evaporate into the air and never have to be managed in traditional sewer and stormwater collection systems. Furthermore, plants help manage stormwater runoff by allowing water to infiltrate into the soil and by transpiration, the process in which water vapor is released to the atmosphere through its leaves. Last, plants and soil also help by filtering stormwater runoff.

A vision of what green stormwater infrastructure tools would look like when implemented in Philadelphia's neighborhoods.

adapted from EPA

Green Stormwater Infrastructure Tools Used By Cities

A stormwater tree trench is a system of trees that is connected by an underground infiltration structure. On the surface, a stormwater tree trench looks just like a series of street tree pits. However, under the sidewalk, there is an engineered system to manage the incoming runoff. This system is composed of a trench dug along the sidewalk, lined with a permeable geotextile fabric, filled with stone or gravel, and topped off with soil and trees. Stormwater runoff flows through a special inlet (storm drain), leading to the stormwater tree trench. The runoff is stored in the empty spaces between the stones, watering the trees and slowly infiltrating through the bottom. If the capacity of this system is exceeded, stormwater runoff can bypass it entirely and flow into an existing street inlet.

Stormwater Tree Trench

Mill Creek Tree Trench
Philadelphia, PA

A stormwater bump-out is a vegetated curb extension that protrudes into the street either mid-block or at an intersection, creating a new curb some distance from the existing curb. A bump-out is composed of a layer of stone that is topped with soil and plants. An inlet or curb-cut directs runoff into the bump-out structure where it can be stored, infiltrated, and taken up by the plants (evapotranspiration). Excess runoff is permitted to leave the system and flow to an existing inlet. The vegetation of the bump-out will be short enough to allow for open site lines of traffic. Aside from managing stormwater, bump-outs also help with traffic-calming, and when located at crosswalks, they provide a pedestrian safety benefit by reducing the street crossing distance.

Stormwater Bump-out

Portland, OR

A stormwater planter is a specialized planter installed into the sidewalk area that is designed to manage street and sidewalk runoff. It is normally rectangular, with four concrete sides providing structure and curbs for the planter. The planter is lined with a permeable fabric, filled with gravel or stone, and topped off with soil, plants, and, sometimes, trees. The top of the soil in the planter is lower in elevation than the sidewalk, allowing for runoff to flow into the planter through an inlet at street level. These planters manage stormwater by providing storage, infiltration, and evapotranspiration of runoff. Excess runoff is directed into an overflow pipe connected to the existing combined sewer pipe.

Stormwater Planter

Portland, OR

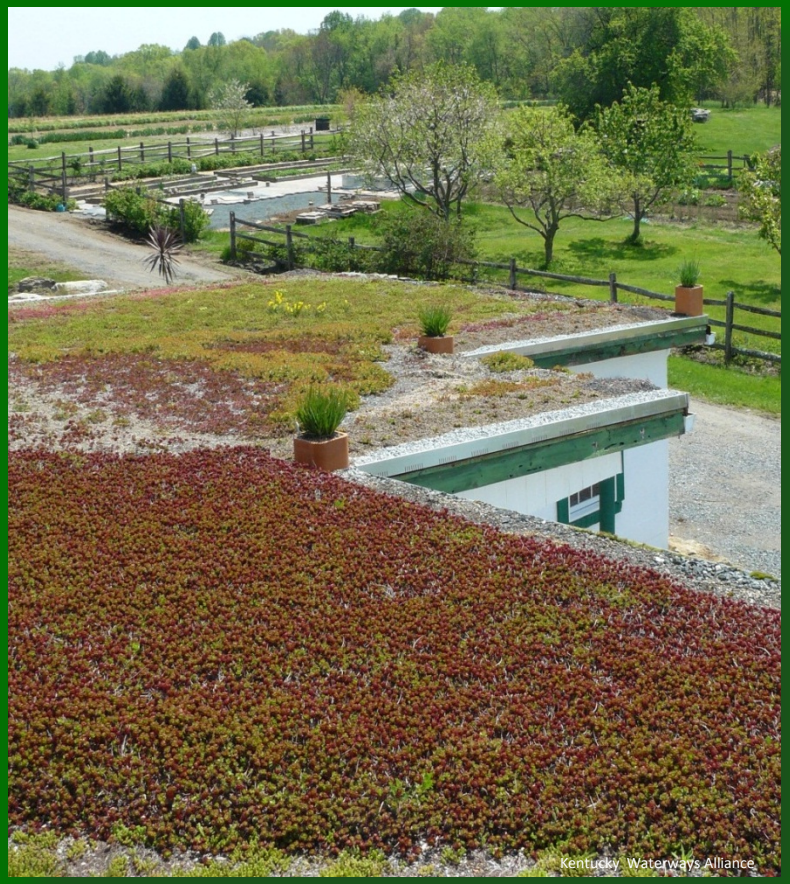
Pervious pavement is a specially designed pavement system that allows water to infiltrate through the pavement and prevents it from becoming runoff. This system provides the structural support of conventional pavement, but is made up of a porous surface and an underground stone reservoir. The stone reservoir provides temporary storage before the water infiltrates into the soil. There are many different types of porous surfaces including pervious asphalt, pervious concrete, and interlocking pavers. Interlocking pavers function in a slightly different way than pervious concrete and asphalt. Rather than allowing the water to penetrate through the paving, pavers are spaced apart with gravel or grass in between the pavers that allows for infiltration.

Pervious Pavement

Mill Creek Basketball Court
Philadelphia, PA

Green Roofs Anyone?

A green roof is a roof that is vegetated. They can be installed on many types of roofs from small slanting roofs to big commercial flat roofs. A green roof is effective in reducing the volume and velocity of stormwater runoff by temporarily storing stormwater, slowing excess stormwater release, and providing for evaporation and transpiration.



Sedum repestre 'Angelina'

Green Roof Structure

Diagram: JJR,LLC

Sedums and other such plants are excellent choices since they do well in dry, sunny areas.

Homeowners Unite!

Homeowners collectively can achieve a significant reduction in stormwater runoff in their neighborhoods.

Homeowners Can

- Plant More Trees
- Reduce Impervious Area
- Build a Rain Garden
- Install Flow Through Planters
- Harvest Rooftop Runoff
- Highlight Water As Art
- Reduce Nutrient Footprint

What can you do in your yard and garden??

Plant More Trees!

Plant the right tree in the right place!

Not this…

But this!

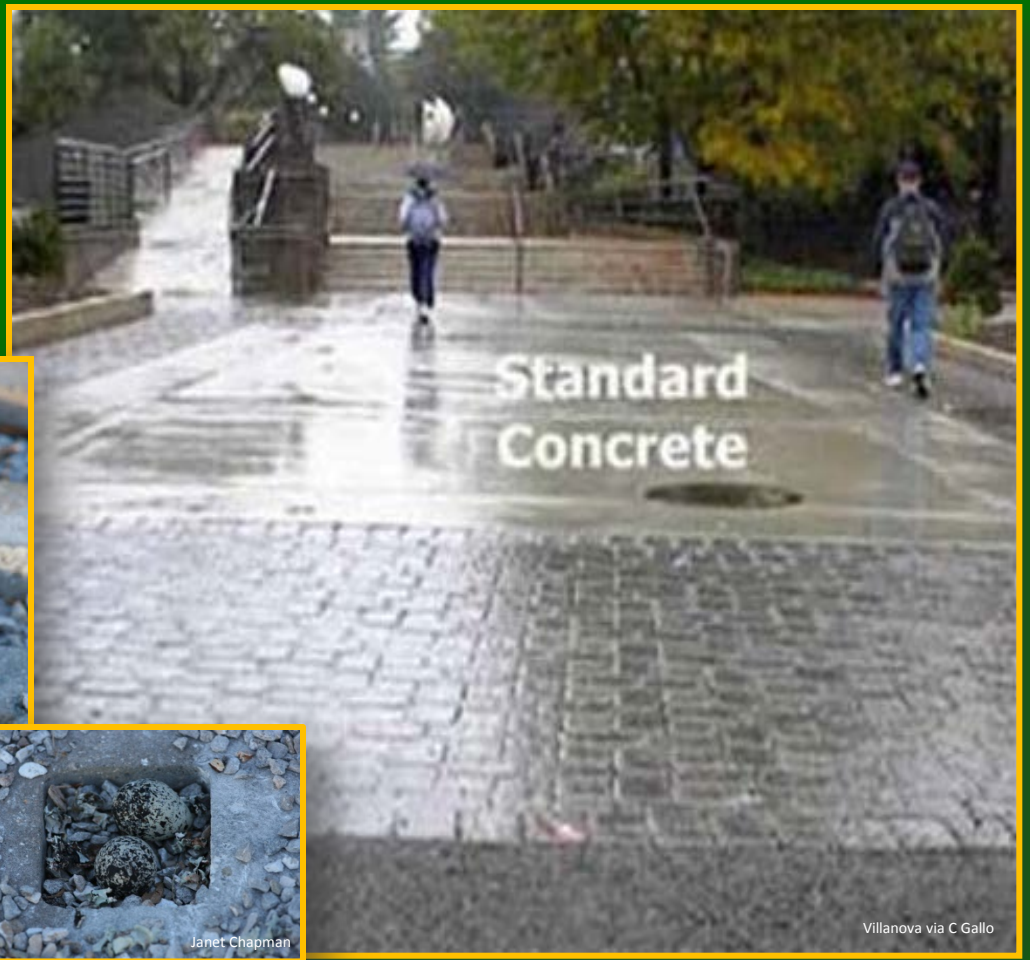
Which intercepts more rain—this tree or the rooftop??

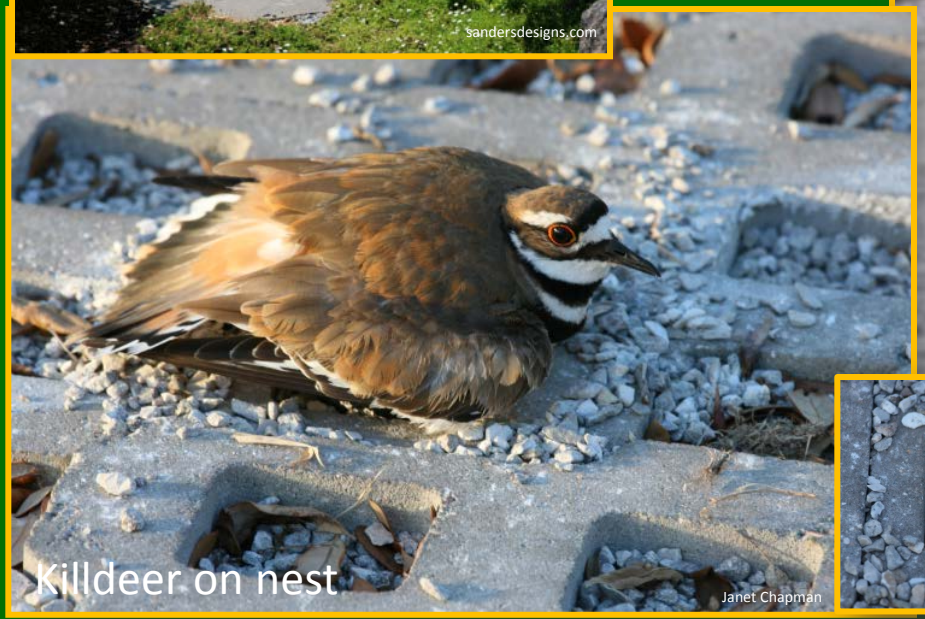
A large oak tree transpires approximately 40,000 gallons of water/year (that's ~110 gallons/day)!

Source: USGS

Reduce Impervious Areas

Use Porous Practices





Build a Rain Garden

A rain garden is a depression usually containing some stone so roof runoff, etc. can collect and pond within it for a short time. Plants use some of the water, but much will also infiltrate. Rain gardens are effective at removing pollutants and reducing stormwater runoff volume.

Install a Flow-through Planter

Flow-through planters are structures that are filled with a bottom layer of gravel, then soil and vegetation. The connection to the roof downspout directs the stormwater in. Once the soil is saturated, excess water is collected in an underdrain and can be discharged to the conveyance system or to other low impact controls such as an underground cistern or grassy swale.

Harvest Rooftop Runoff

Cisterns and rain barrels intercept runoff as it leaves the roof. To be truly effective, barrels must be emptied between storms. Barrels can be purchased or constructed by homeowners.

Highlight Water as Art!

Reduce Your Nutrient (N & P) Footprint!

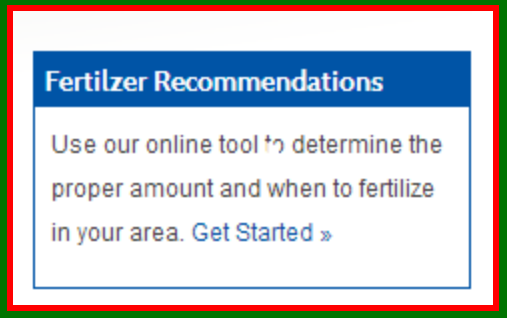
- Lawn Fertilizer Concerns
  - Choose wisely
  - Apply appropriately
  - Best Management Practices
    - Do not spill fertilizer
    - Do not spread onto water bodies or driveways
    - Use a drop spreader
    - Calibrate equipment properly
    - Avoid ‘weed & feed’ products
    - Do not fertilizer before heavy rains
    - Apply an iron source in summer (rather than a nitrogen rich fertilizer to green up the lawn)
    - DO NOT OVER FERTILIZE!

Help reduce hypoxia!

Reduce Your Nutrient (N & P) Footprint!

- Pickup pet poo
- Sweep up grass clippings and fertilizer from driveways
- Plant native plants that don't need extra fertilizer
- Do not wash your car in the driveway with phosphate rich detergents
- Maintain septic systems
- Install green infrastructure in your yard to reduce or eliminate runoff thereby preventing excess nutrients from going downstream from your property

Smart Yard, Healthy Gulf is a campaign designed to reduce the amount of fertilizers entering local waters by helping people make responsible lawn fertilizer decisions. smartyardhealthygulf.com



Reduce Your Nutrient (N & P) Footprint!

Visit the Nutrient Reduction Decision Support Toolbox

gulfofmexicoalliance.org./toolbox/toolbox.html

Decision Elements

Nonpoint Source Best Management Practices for Nutrient Reduction

Stakeholder Awareness, Outreach and Education

Watershed Characterization

Status and Trends in Water Quality and Nutrient Loading

Regulations, Policies, and Management Programs

Quantitative Reduction Targets

Analytical Tools

GOMA States

MS Dept of Marine Resources Stormwater Management Toolbox

Louisiana's Management Measures: Agriculture

BMPs for Coastal Louisiana NPS Pollution; Urban Storm Water Runoff: Roads, Highways, Bridges, Louisiana Department of Natural Resources

BMPs for Coastal Louisiana NPS Pollution; Urban Storm Water Runoff, Louisiana Department of Natural Resources

EPA National Menu of Stormwater BMPs

EPA Best Nonpoint Source Documents

NRCS National Conservation Practice Standards

Center for Watershed Protection BMP Publication

NRCS Conservation Practice Standard FIELD BORDER (Ft.) CODE 386

Center for Watershed Protection Coastal Plain Watershed Information Center

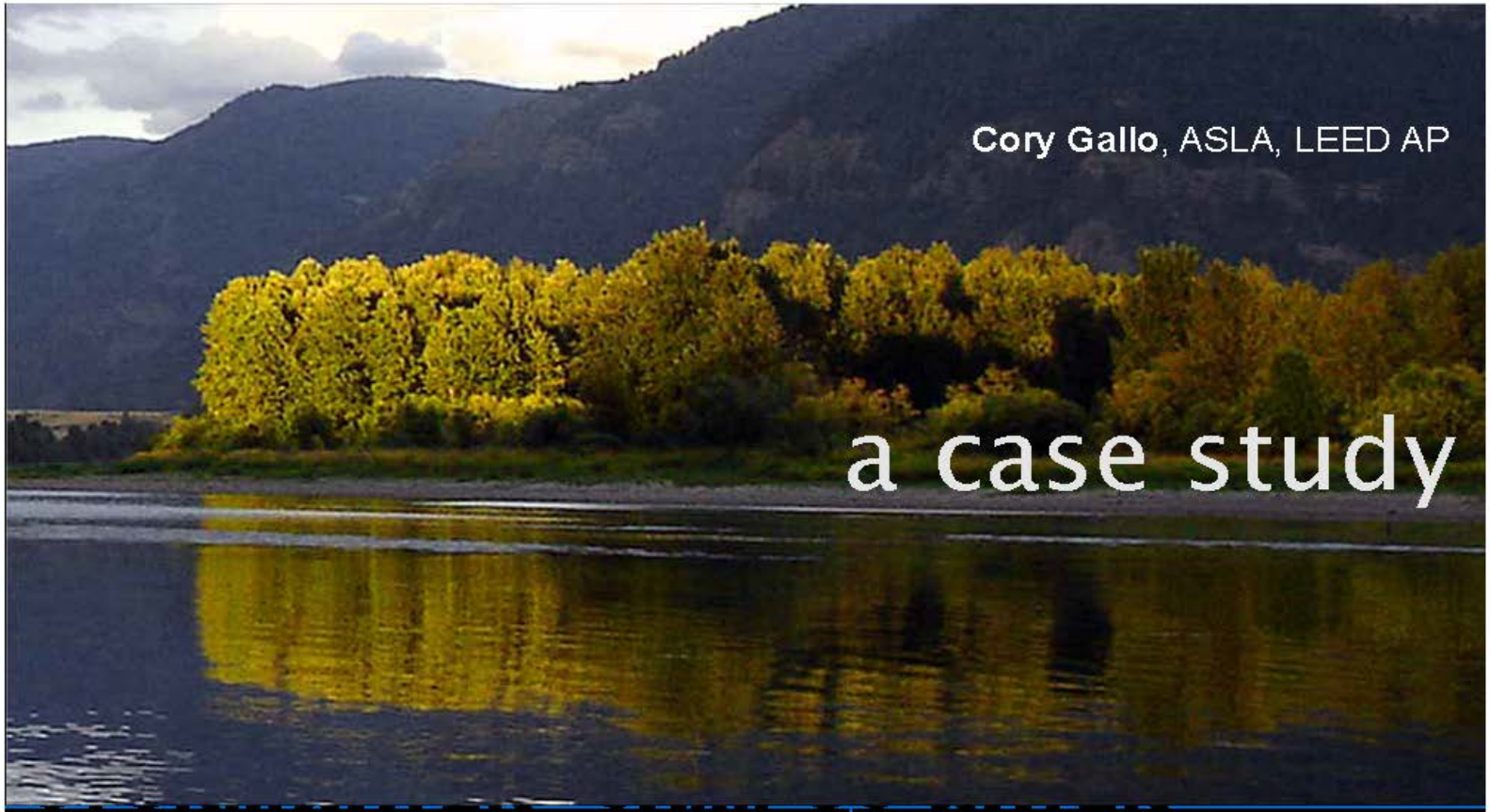


Photo: JJR, LLC

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

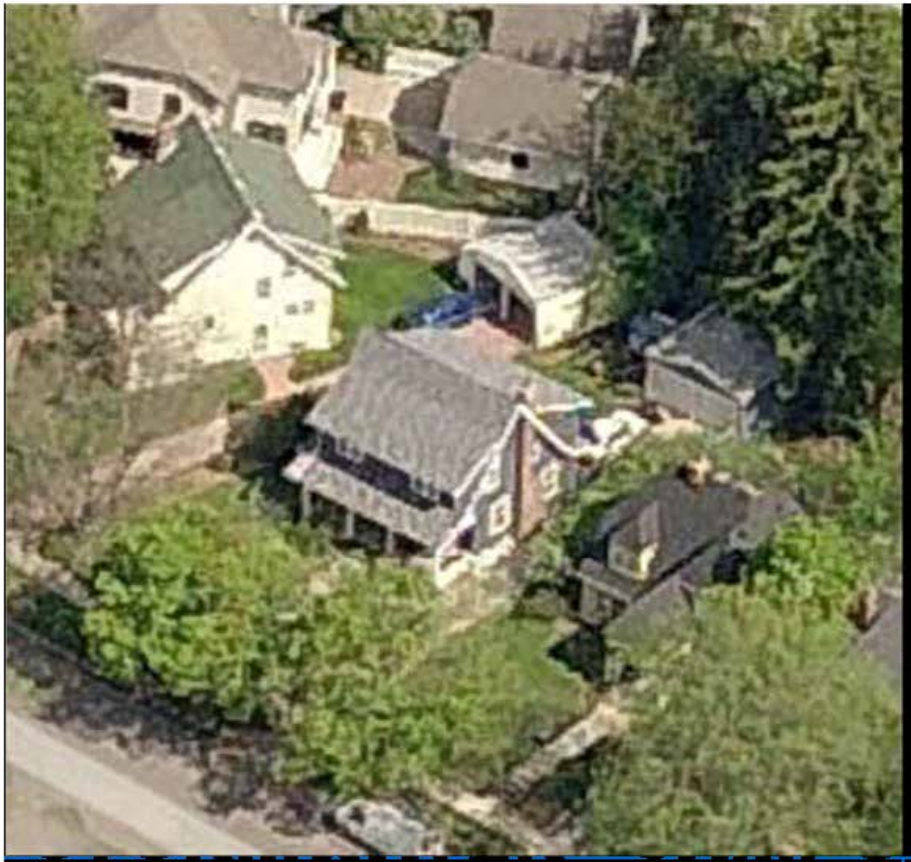


Photo: Live Earth

Norm and Anne Cox's House

3 Beds
1,400 sq.ft.

Norm & Anne's

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

Rain Barrel

Water used for watering garden and rinsing out things.

Photo: Norm Cox

Norm & Anne's

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

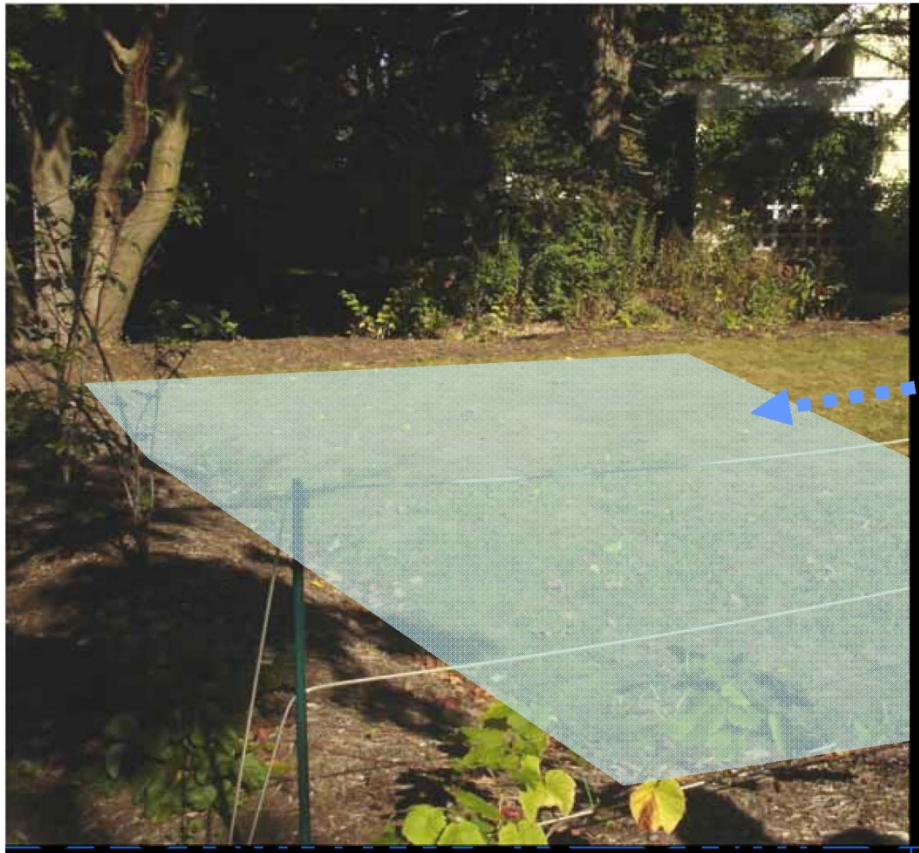
Rain Garden

Manages water from the driveway and some from the walk.

Photo: Norm Cox

Norm & Anne's

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University



Rain Lawn

Bermed lawn manages water from the front of the house.

Photo: Cory Gallo

Norm & Anne's

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

Norm's Block:
3.75 acres
24 homes
1.3 acres of impervious
35% impervious

Diagram: Cory Gallo

Norm & Anne's Block

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

Norm's Block:
3.75 acres
home to lots of plants and animals
0 acres of impervious
0% impervious

Diagram: Cory Gallo

Pre-Settlement

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

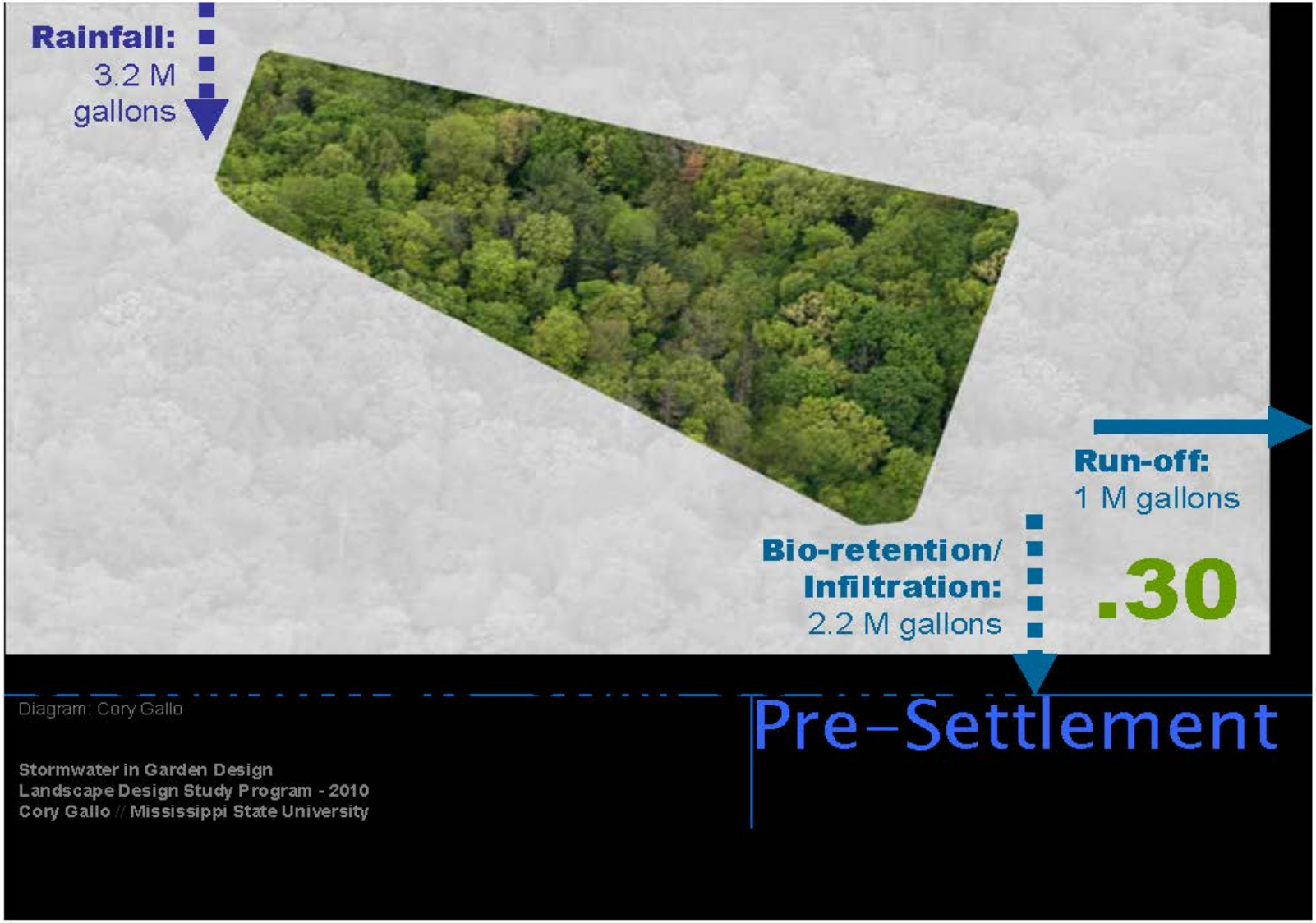


Diagram: Cory Gallo

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

Diagram: Cory Gallo

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University


Rainfall:
3.2 M
gallons
Run-off:
1.2 M gallons
Bio-retention/
Infiltration:
2 M gallons
.37
Diagram: Cory Gallo
Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University
Mitigated
Rain Gardens Managing ½ of
Pavement and Roof Area

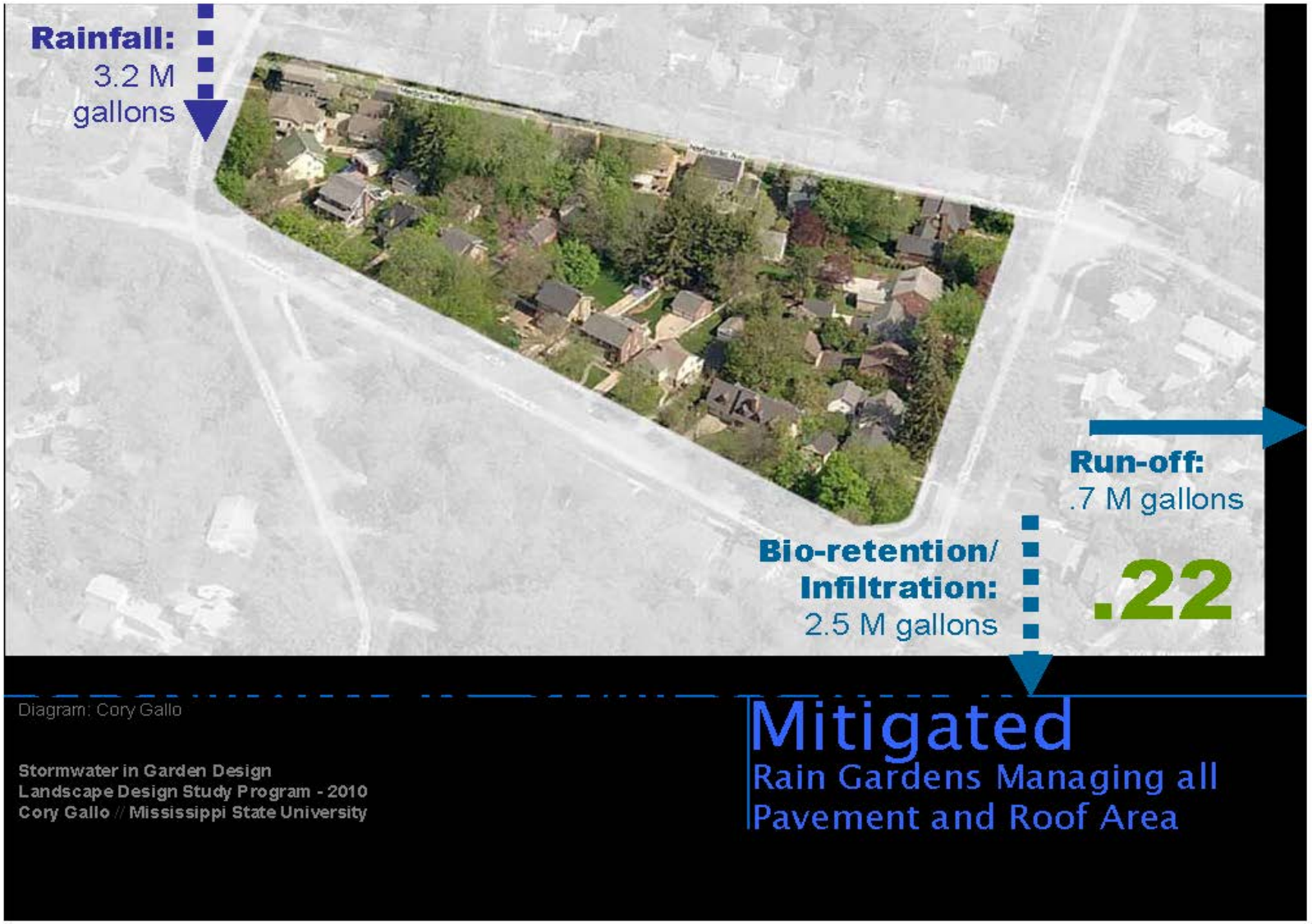


Diagram: Cory Gallo

Stormwater in Garden Design
Landscape Design Study Program - 2010
Cory Gallo // Mississippi State University

Mitigated

Rain Gardens Managing all Pavement and Roof Area

Questions? Comments?

Janet Chapman
Basin Management Branch
MS Department of Environmental Quality

janet_chapman@deq.state.ms.us
601-961-5266
www.deq.state.ms.us
reigningoverrunoff.org

MSU Extension Landscape Architect
Brian Templeton
662-325-3190
btempleton@lalc.msstate.edu

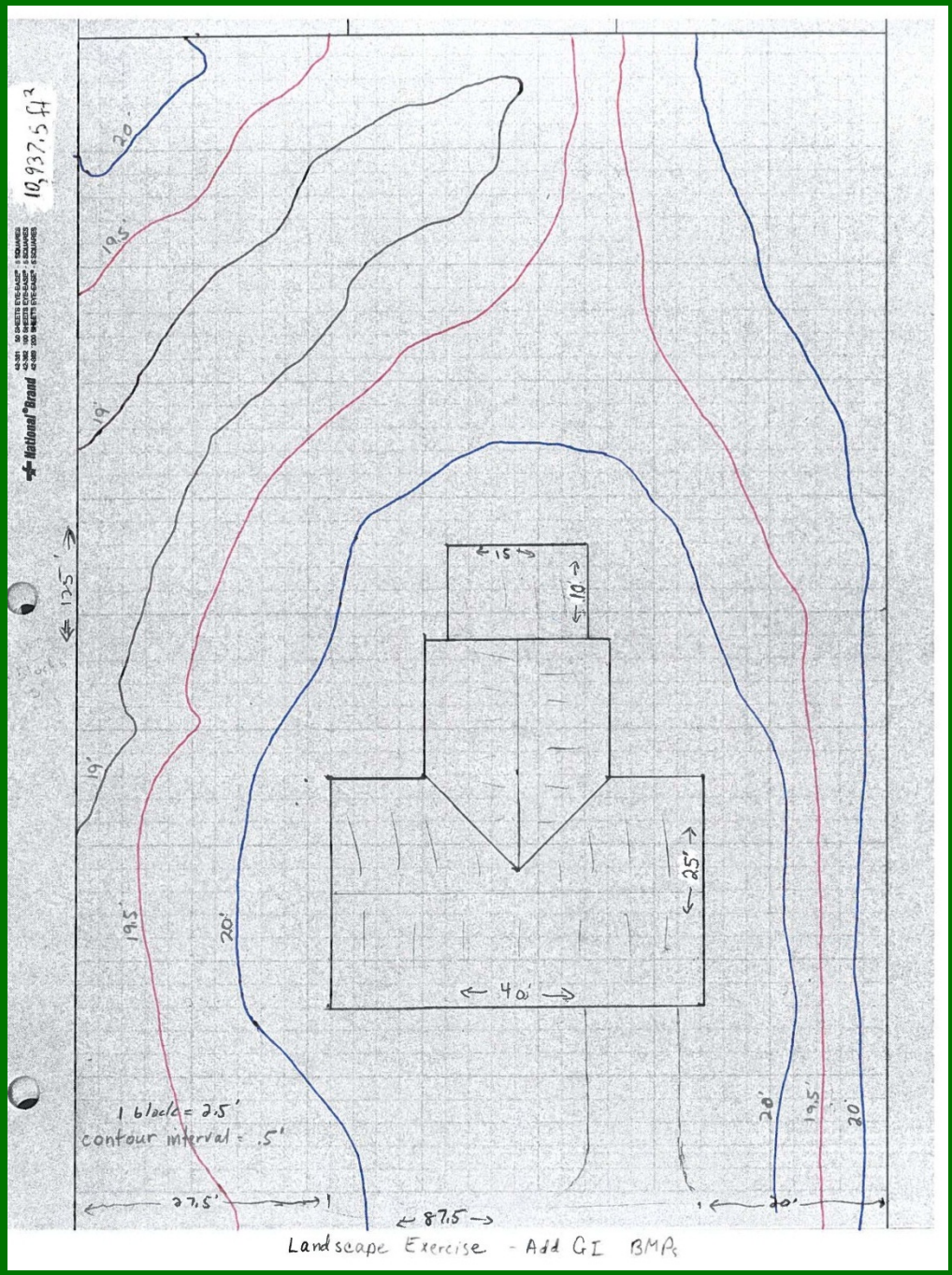
Donna Yowell
MS Urban Forest Council
601-672-0755
dyowell@aol.com

Hardy Natives!

Assignment!

Draw in green infrastructure practices to control the stormwater runoff from this property.

(See instructions!)



Instructions

Instructions for Exercise in Reducing Stormwater Runoff from Your Yard

How can stormwater features be woven into a yardscape design? **Draw a landscape plan that includes green infrastructure (GI) Best Management Practices (BMPs) to reduce the amount of stormwater runoff and improve the cleanliness of the stormwater that does leave your site.** The best case scenario is to treat all the stormwater on site or at least treat to the pre-development level. You must have

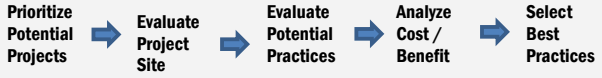
1) at least one BMP from each column of the table below,

2) at least one garden (of any kind), and

3) one water feature as art idea.

(That adds up to at least 4 items.)

Use the design principles you already know to make your lot attractive and functional. You may write your own scenario to customize your 'property' and situation. A commonly used process to help with selection is shown below.



Process for implementing stormwater source control projects

Draw on the handout a top down view of your plan (squiggly circles for trees, outline for rain garden or other specific areas, etc.). Use labels as necessary. Be creative and have fun planning for stormwater management on your new property!

Here are some sample scenarios:

1. "The roof over the porch of my house was built super strong and only has a 10% slope. My great uncle died and left me $30,000 with the stipulation that I could only use it for home and yard improvements."

2." I am on a tight budget, but my husband and I have been looking for summer construction projects for our two teenage boys. I have time to do web research to figure out what we want to do (size, shape, placement, materials, etc.) and we have a truck to haul freebies and other materials home. The boys can do the work."

3." My brother has a mid-sized tractor with a disc and box scraper he would probably let me use if I asked him—or he might come over himself and help me! Our house is new and the landscaping has not yet been completed. In fact, the developer 'gave' us an allowance at closing to do the landscaping ourselves. My MG friends have been after me for months to put in a butterfly garden and plant some yard trees—now would be just the time!"

4. "The ultimate: My husband is a landscape contractor. He has all the equipment we would ever need to fix our property up and can get materials at wholesale. Not only that, but my Momma finally quit driving (she was 90 years old!) and gave me her 2012 Cadillac Seville. I can sell it to fund my yard work!"

5. Your scenario? Make some assumptions and go to it! Note the scale and contour interval on the property plat.

Infiltration	Water Harvesting	Interception & Transpiration
Rain Gardens	Rain Barrels	Tree Planting
Natural Areas	Cisterns	Green Roof
Constructed Wetlands		Planters
Street Planters		(also all other vegetative treatments)
Bioswales		
Infiltration Trench		
Dry Swale		
Porous Pavers		
Pervious Asphalt & Concrete		

Green Infrastructure BMP Choices