Rainwater is Good: Showcasing Low Impact Development in Our County

A presentation prepared by the

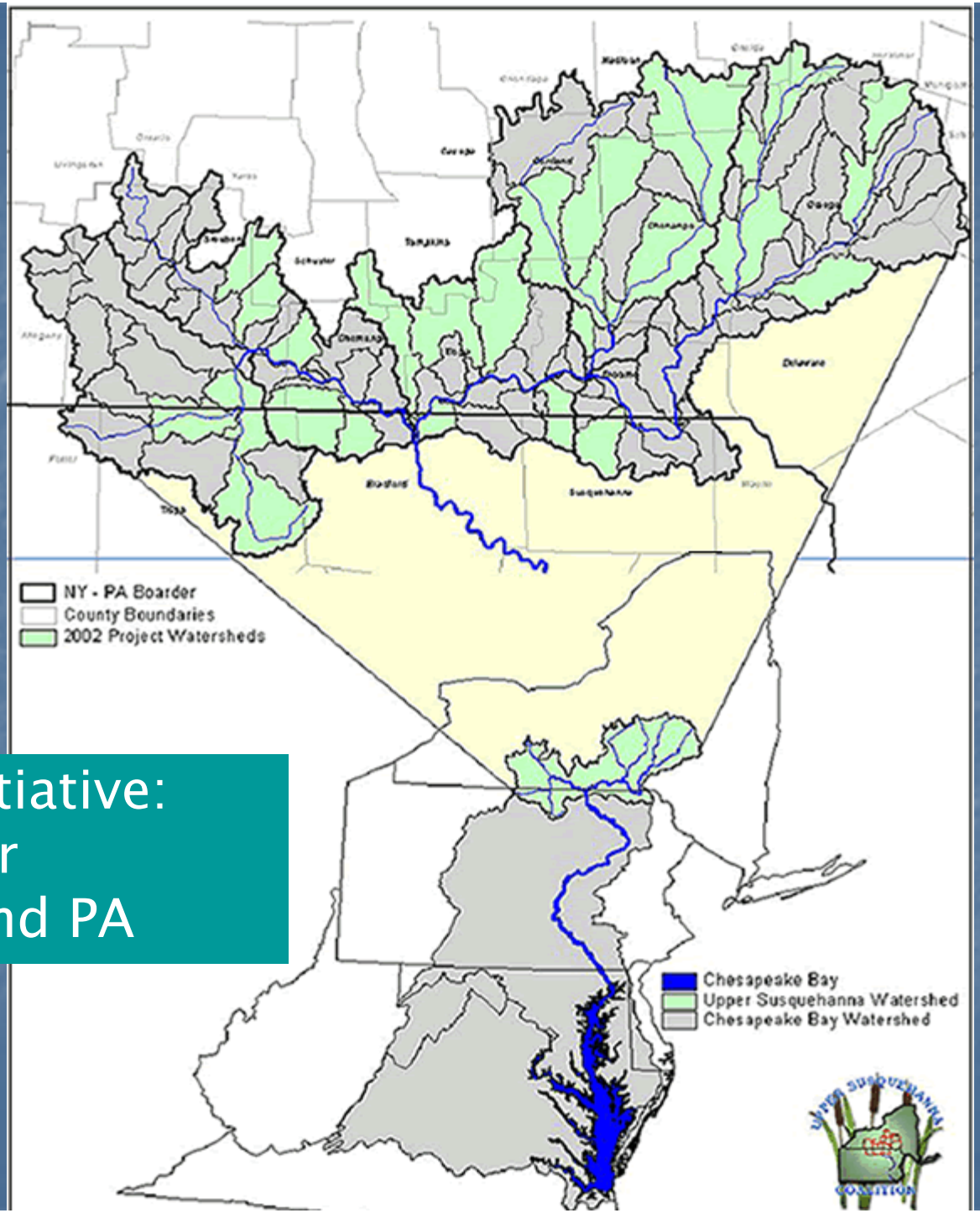
Upper Susquehanna Coalition

presented by

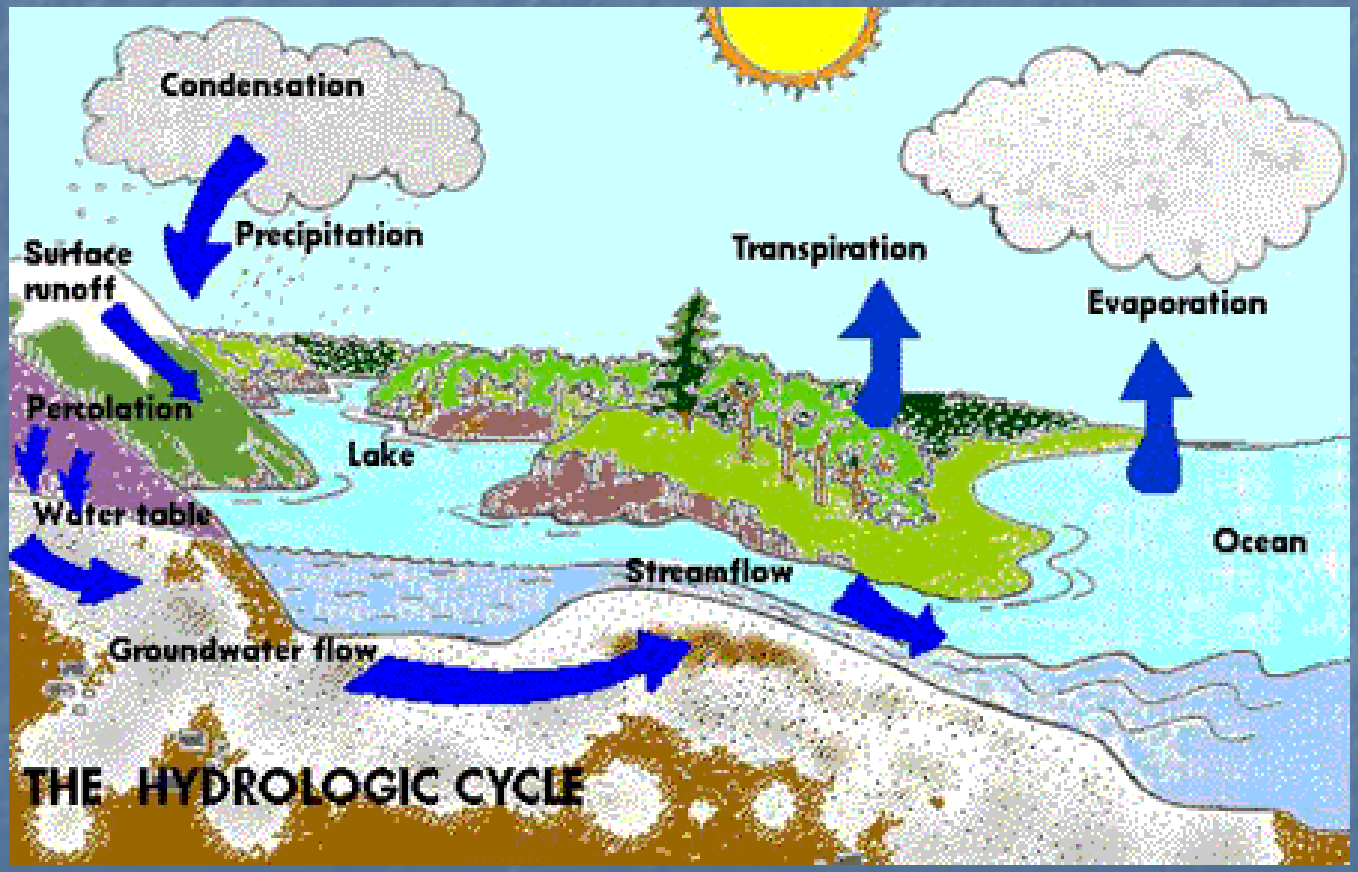
The BC EMC and BCSWCD

June 2, 2005

EPA Watershed Initiative: Susquehanna River Headwaters, NY and PA



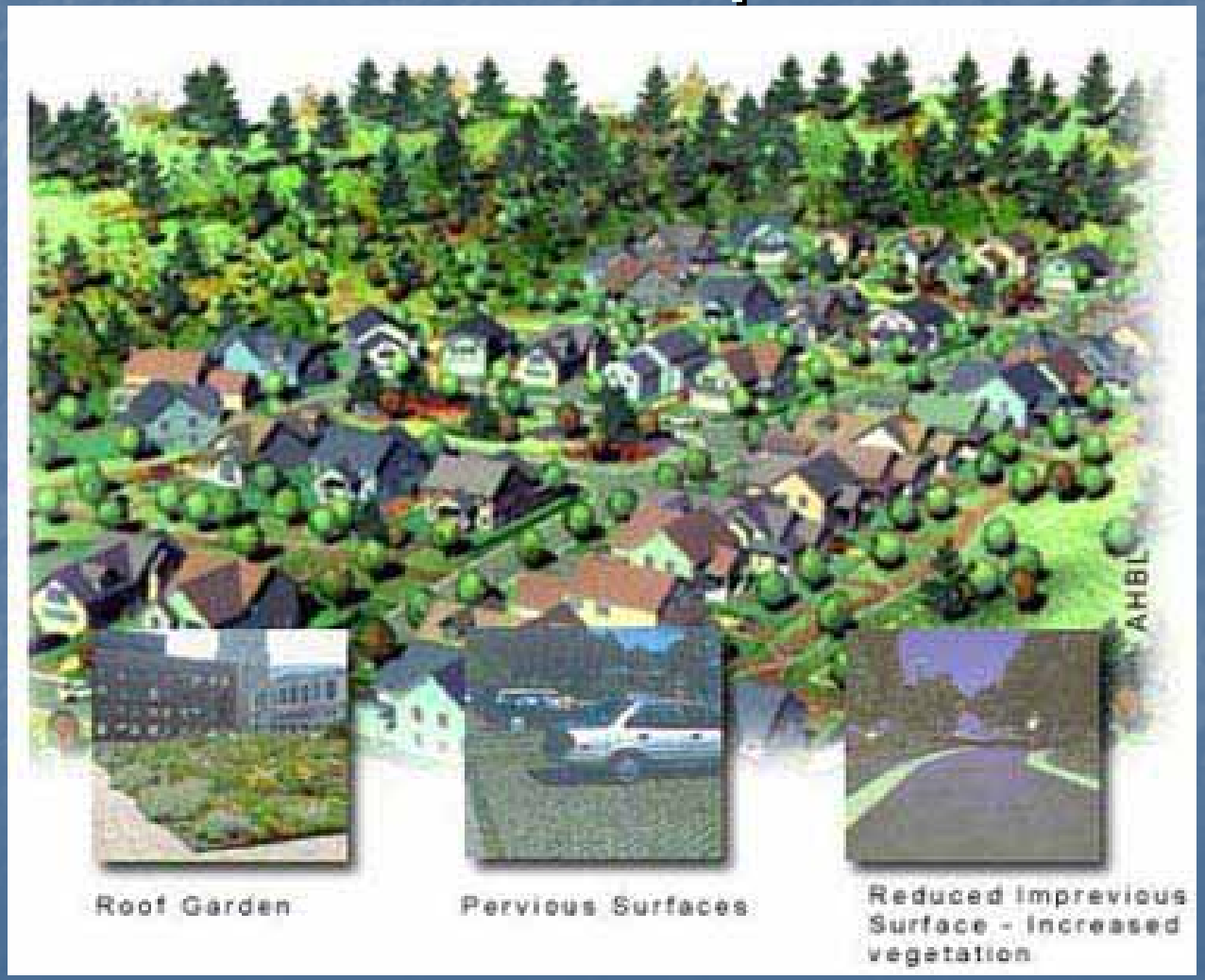
Basic Premise: Rainwater is Good!



More Basic Premises

- Creative, thoughtful people design our communities….cities don't just grow there!
- We rebuild our communities.
- Water can be designed into a place as a positive feature.
- Re-routed/intercepted water can reduce urban runoff.

Low Impact Development Can Help!



Integrate stormwater management early in site planning activities

Use natural hydrologic functions as the integrating framework

Focus on prevention rather than mitigation

Emphasize simple, nonstructural, low-tech, and low cost methods

Manage as close to the source as possible

distribute small-scale practices throughout the landscape

rely on natural features and processes

create a multifunctional landscape

Common LID Practices

Site related:

- Rain Gardens and Bioretention
- Vegetated Swales, Buffers, and Strips
- Tree Preservation
- Permeable Pavers
- Soil Amendments
- Impervious Surface Reduction
- Pollution Prevention and Good Housekeeping

Building related:

- Rooftop Gardens
- Roof Leader Disconnection
- Rain Barrels and Cisterns

Rain Gardens

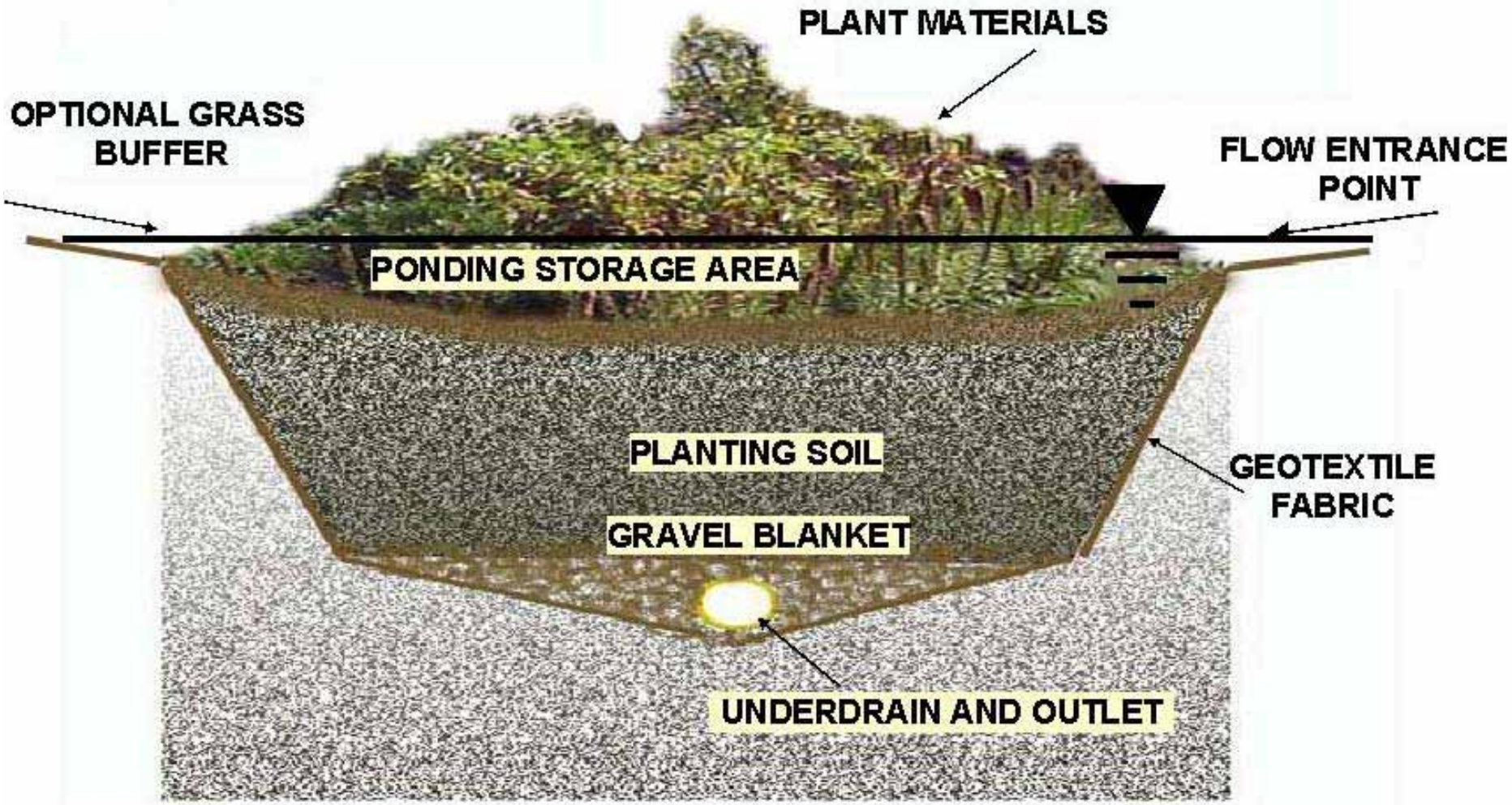
("Rain Garden History" 2)

- Dish-shaped depression
- Gathers runoff
- Plants filter out pollutants
- Advantages:
  - Good for small lots
  - Can be low-cost, easy
  - Beautifies land
  - Significantly reduces runoff

Bioretention

(Davis)

- Widely used concept
- Shallow basin filled with soil/sand
- Soil provides infiltration
- Native plants filter pollutants
- Reduces impervious surface area
- Aesthetically pleasing


PLANT MATERIALS
OPTIONAL GRASS BUFFER
FLOW ENTRANCE POINT
PONDING STORAGE AREA
PLANTING SOIL
GEOTEXTILE FABRIC
GRAVEL BLANKET
UNDERDRAIN AND OUTLET

Bioretention cont'd

Two types of bioretention:

- End-of-pipe
- On-site

Ideal uses for bioretention:

- Parking lot island (curb cuts)
- Highway median
- Rain garden
- Small lots

Vegetated Swales

- Long dip, usually along road, acts as a channel for stormwater
- Prevents water from flowing down impervious surfaces
- Vegetation slows water down and filters out toxins

(Rhodes 1-3)

Swales cont'd

- Wet swales encourage wildlife
- Slope and design important – too steep a slope can cause erosion
- Wide, shallow swales are easier to maintain
- Dry swales can be mowed
- Inexpensive and easy to build

(Rhodes 4)

Vegetated Buffers & Strips

("Designing," Buffer Handbook)

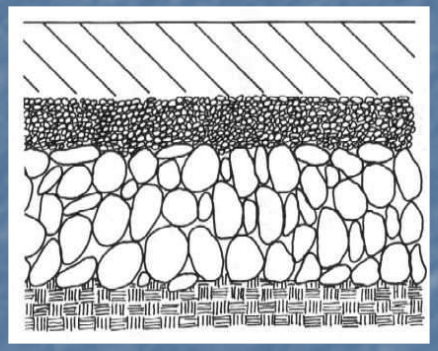
- Natural vegetation lining streams or roads
- Catch and filter runoff and pollutants
- Cut down on floods
- Prevent stream bank erosion
- Habitat for aquatic life
- Provide shade; cool water temperatures
- Restore natural conditions

Permeable Pavers

(James 2)

- Granular and porous or made of interlocking blocks
- Traps rainwater instead of acting as conduit
- Reduces runoff

Permeable Pavers cont'd



- Porous Asphalt
- Pervious Concrete
- Grid/Grass Pavers (plastic)
- Block Pavers
- PermaPave™

("Reducing Runoff," NEMO; PermaPave)

Soil Amendments

- Mix into soil
- Improve soil quality
- Increase soil's aeration, infiltration, and capacity to hold water and nutrients

("What is Soil?" NRCS Soils)

Soil type	Permeability	Water retention
sand	high	low
loam	medium	medium
silt	low	high
clay	low	high

- Use a soil amendment to change physical properties of soil.

Amendment	Permeability	Water retention
Fibrous		
Peat	low-medium	very high
Wood chips	high	low-medium
Hardwood bark	high	low-medium
Humus		
Compost	low-medium	medium-high
Aged manure	low-medium	medium
Inorganic		
Vermiculite	high	high
Perlite	high	low

(Davis & Wilson 4)

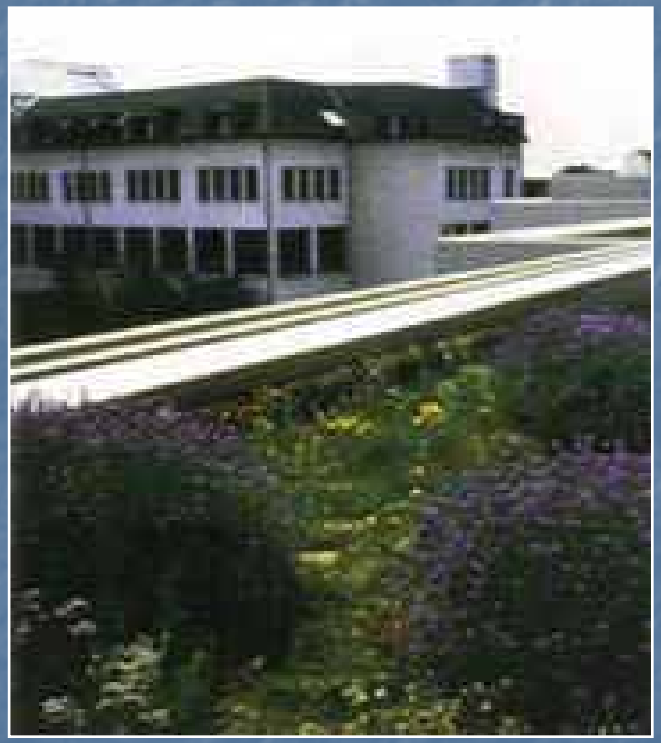
Pollution Prevention & Good Housekeeping

Construction sites:

- Stabilize drainage ways
- Protect waterways
- Minimize clearing and grading
- Separate construction into phases to decrease amount of exposed soil
- Protect steep slopes
- Perimeter controls filter sediment
- Advanced sediment settling controls
- Certify contractors on ESC plan implementation
- Citizen watch
- Assess ESC practices after storms

(Brown & Caraco 1997; EPA Construction 1-2)

Rooftop Gardens

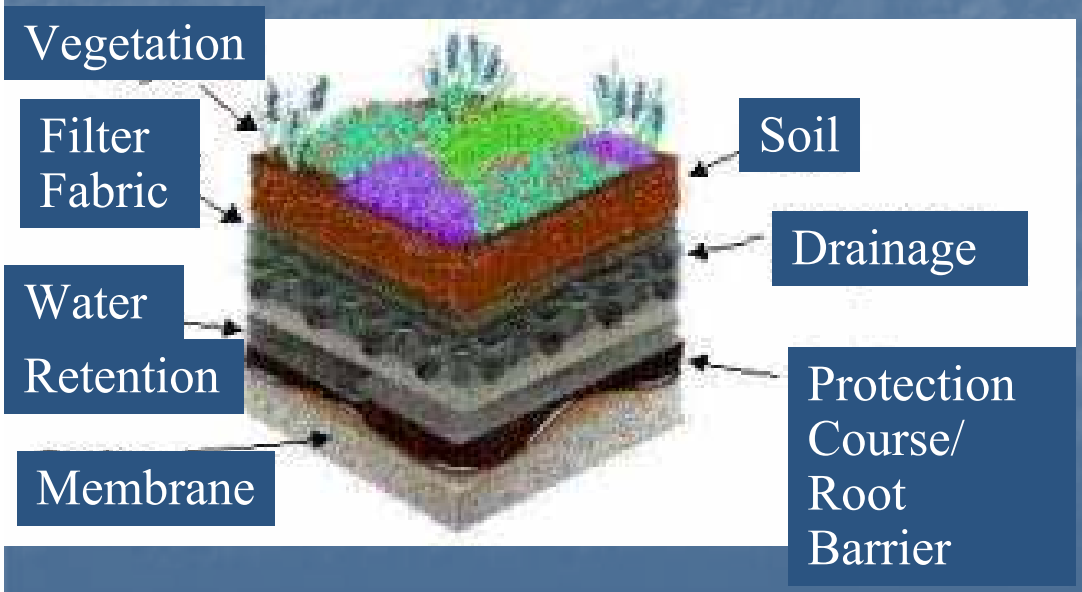


("Green Roofs," NEMO)

- Reduce impervious area
- Eliminate most/all of roof's runoff
- Shield and protect roof
- Lower energy costs
- Reduce "heat island" effect, improve air quality

Rooftop Gardens cont'd

- Three major design factors:
  - weight, drainage, slope



- Layers:
  - waterproof membrane
  - protection board
  - insulation
  - rainwater retention
  - substrate drain
  - filter fabric
  - soil
  - vegetation

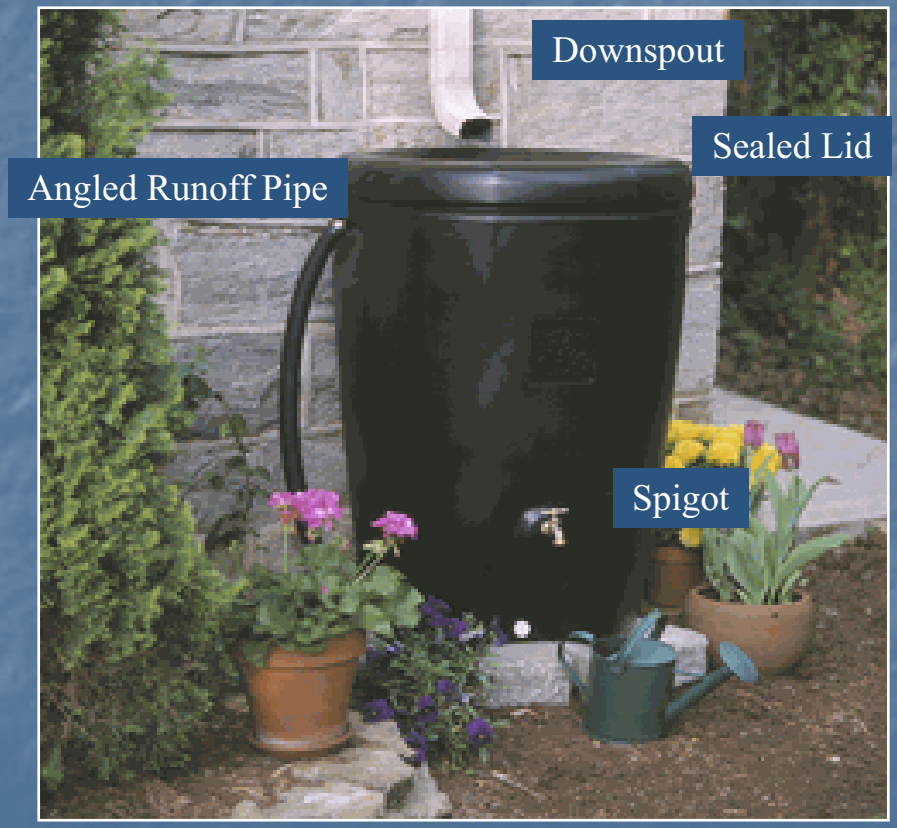
(D'Annunzio; "Green Roofs" 1; Greenroofs 101)

Roof Leader Disconnection

- Roof leaders connected to storm sewer
- Cut off end of downspout, cap sewer standpipe, attach elbow and extension to downspout; splashblock

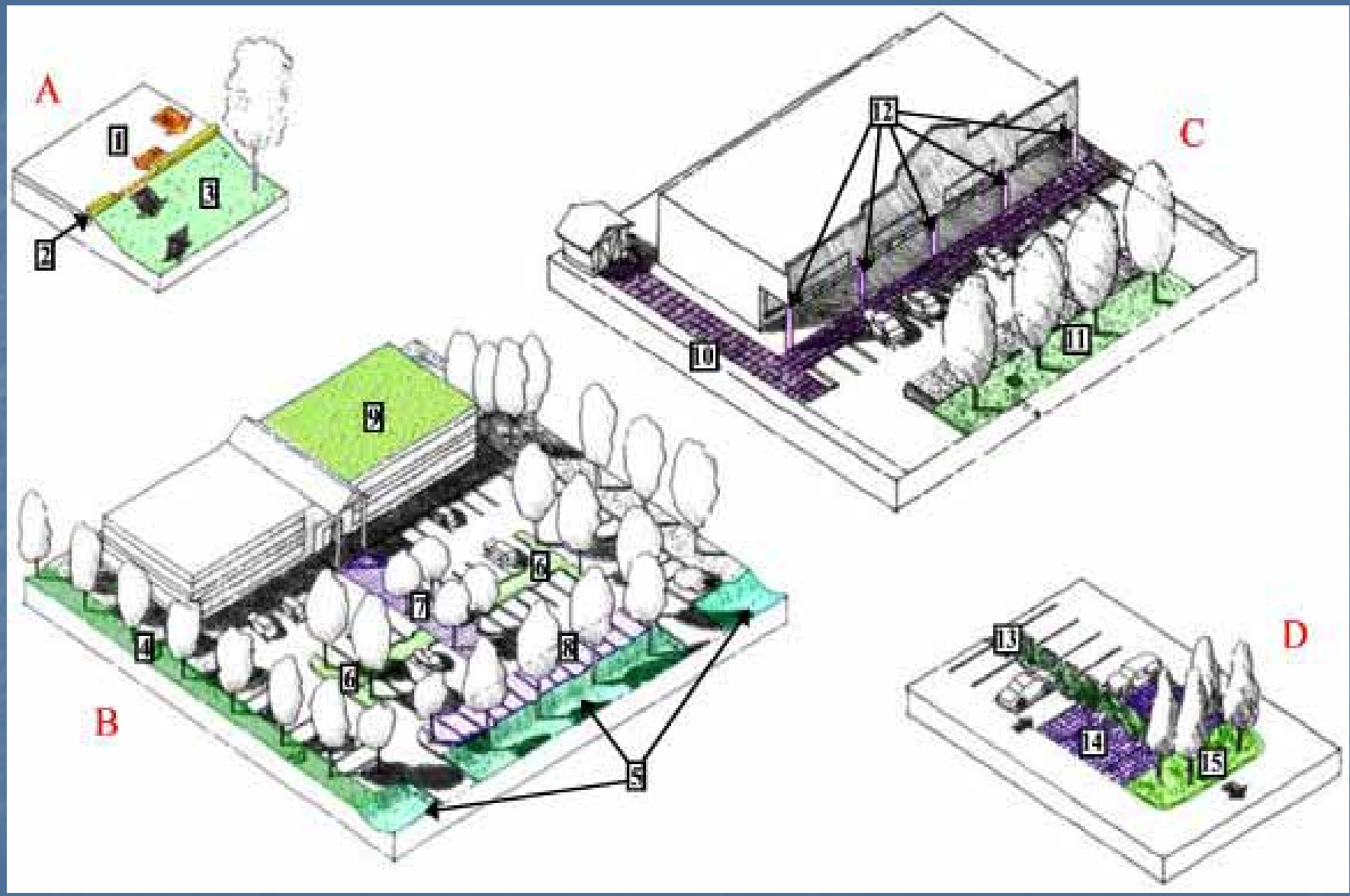
("Downspout Disconnection Program")

Rain Barrels & Cisterns



(Rain Barrel Guide)

- Collect rainwater
- Use to water garden
- Install filter (more $) for household use
- Cut down on water bills
- Connect to downspout
- Mosquito-proof lid
- Angled runoff pipe
- Spigot
- 1” rain on 1,000 ft^2 roof = 600 gal water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THE LOW IMPACT DEVELOPMENT CENTER, INC.
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LID COMMERCIAL STRIP PARKING LOT

EX. 7.0
NOV 2002

N.T.S.

Local Initiatives to Tackle Stormwater
August 31, 2003 – August 31. 2006

The Upper Susquehanna Coalition:
organized an oversight committee of leading water resource staff from county agencies, area colleges, engineering/architecture firms and others to work with communities and institutions to identify good post-construction BMP's and encourage their use in new construction projects.

compiled a concise reference bibliography of post construction BMP designs from readily available sources applicable to the Susquehanna River Basin with assistance from the oversight committee.

Prepared this PowerPoint presentation of post construction BMP's to each USC member.

Provided a copy of the annotated LID bibliography

Each Water Quality Coordinating Committee will: hold an informational meeting and identify existing practices.

Create two page summaries of each of the county examples of innovative BMP's provided by each USC county.

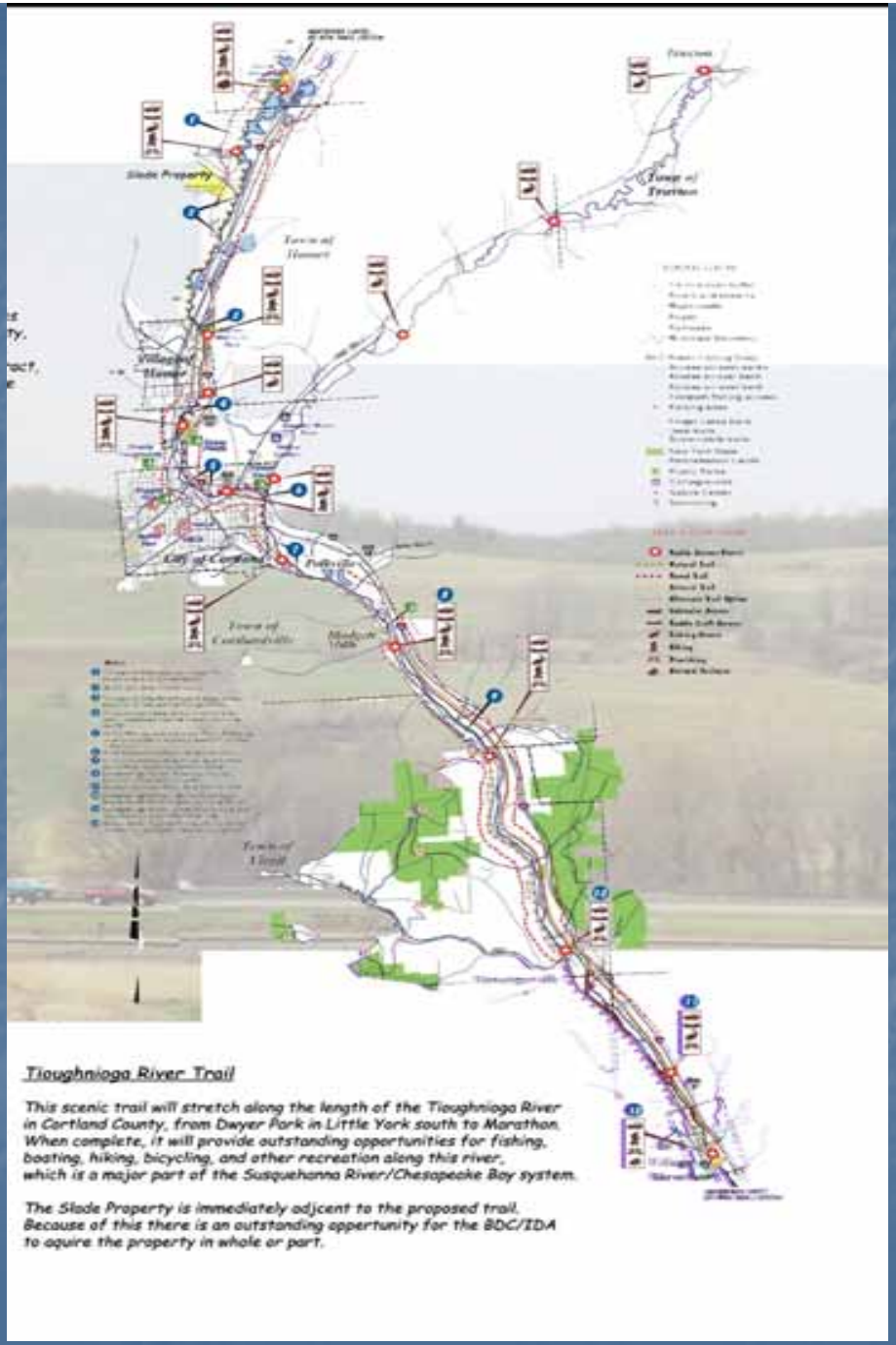
Solicit each USC county for a development project which could incorporate an innovative post-construction BMP.

The oversight committee will select four (4) projects for Demonstration Funding to design the BMP as part of the development project (about $4000 each).

Create summaries of the four Demonstration Site designs.

Provide each county with a copy of the summaries of the county BMP's for incorporation into watershed and county strategies to address urban runoff post construction issues.

The first Demonstration Project: The Tioughnioga River Trail – using pervious surfaces along the route to test them and to educate the public.



Views along the four mile Homer to Cortland trail route

For more information .....

- Ask for a copy of the Annotated LID Bibliography
- Contact your County Water Quality Coordinating Committee

Sources of LID info used in this presentation….

- EPA's Low Impact Development Center
- Tri-County/City SWCD – Fredericksburg, King George, Spotsylvania and Stafford
- University of Washington, College of Engineering
- South Carolina Dept. of Health and Environmental Control
- Water Environment Research Foundation