Stormwater Basics

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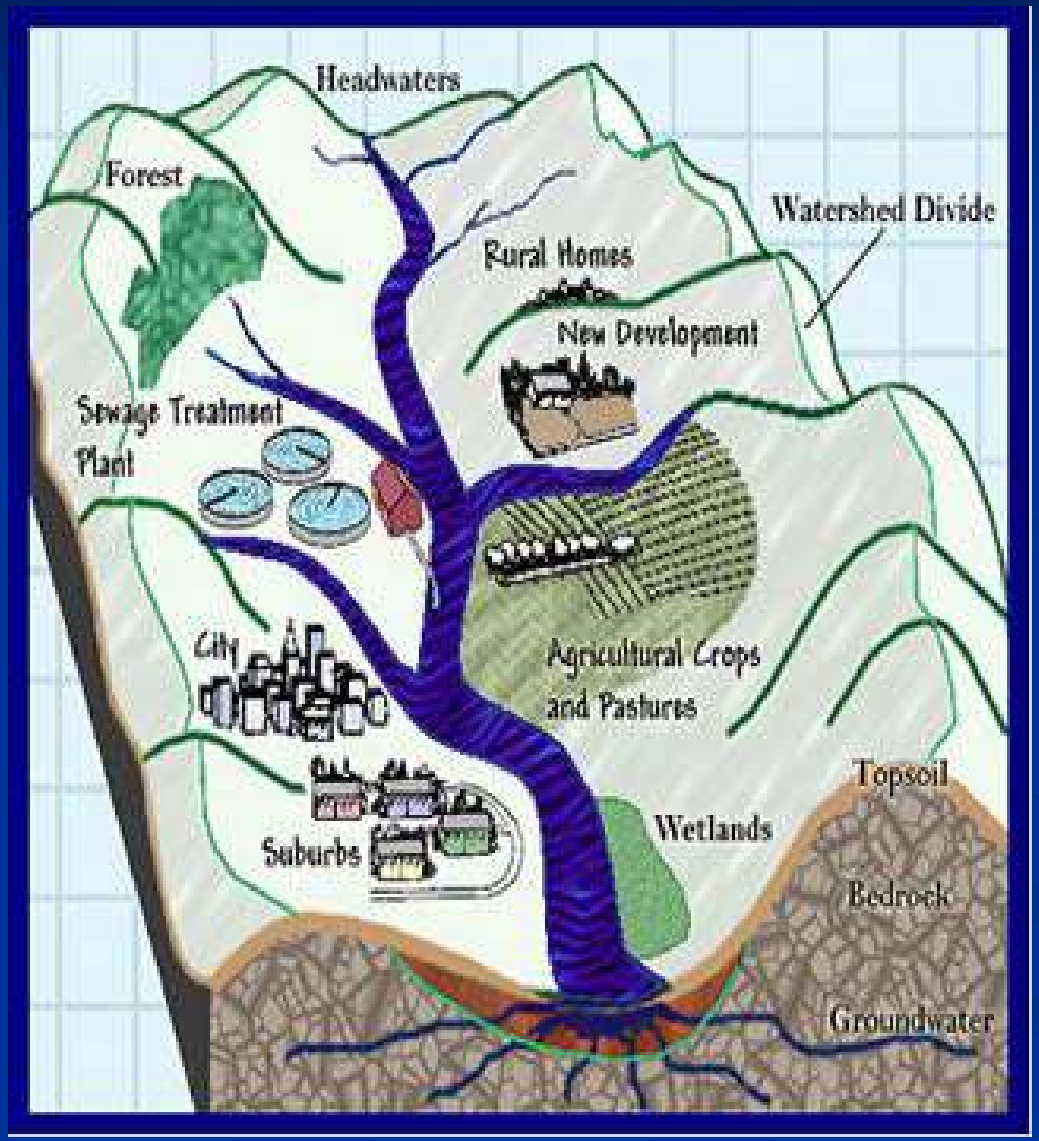
Outline

- What is a watershed?
- What is storm water?
- How do we manage storm water?
- What can you do?

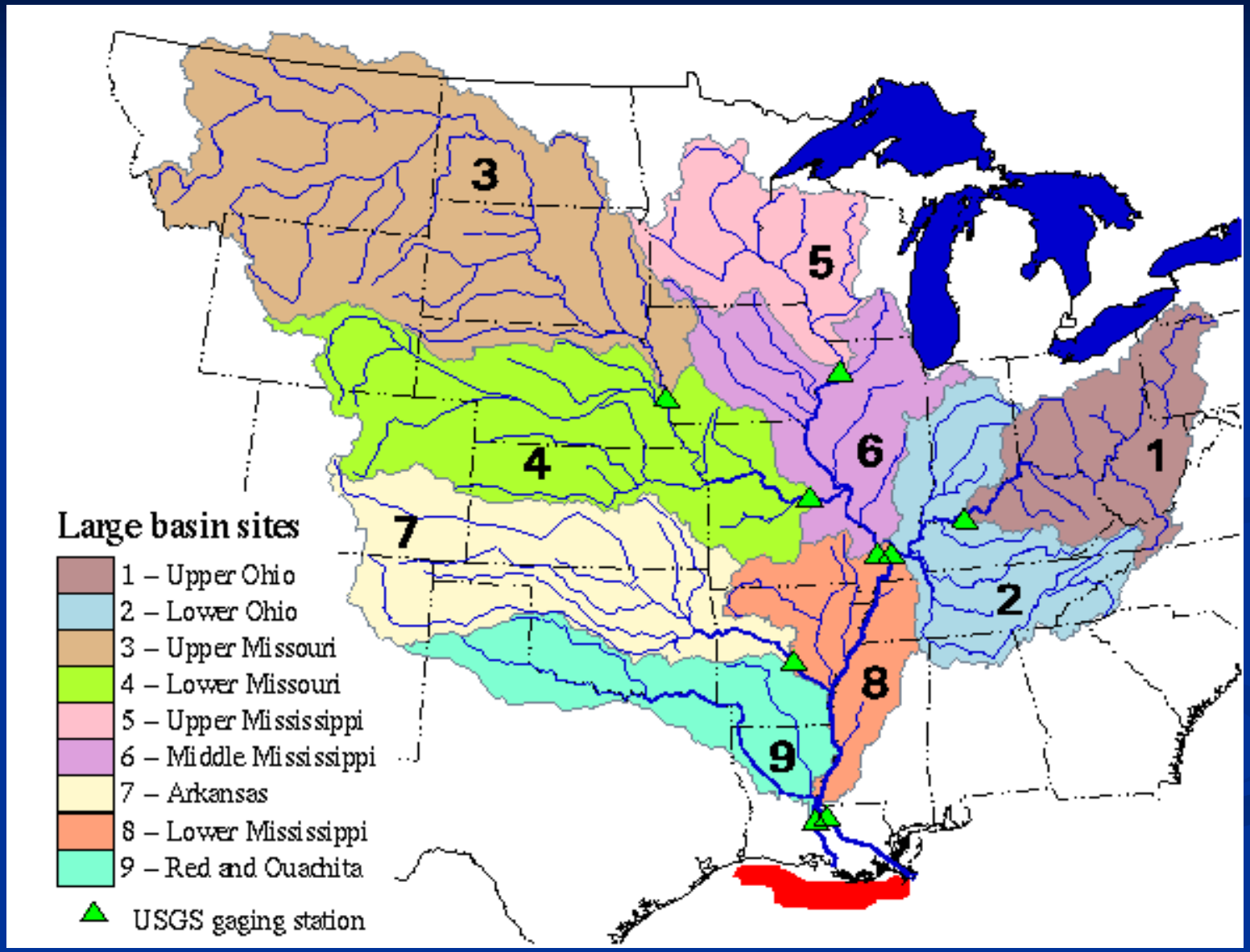
What Is a Watershed?

- A watershed is a natural area defined by high points and ridgelines that form the boundaries of a "basin".
- Precipitation falling in a watershed flows usually down to a river or lake at the lowest points in the watershed.
- Smaller watersheds are nested in larger watersheds. (Red Cedar River → Chippewa River → Mississippi River)

What Is a Watershed?



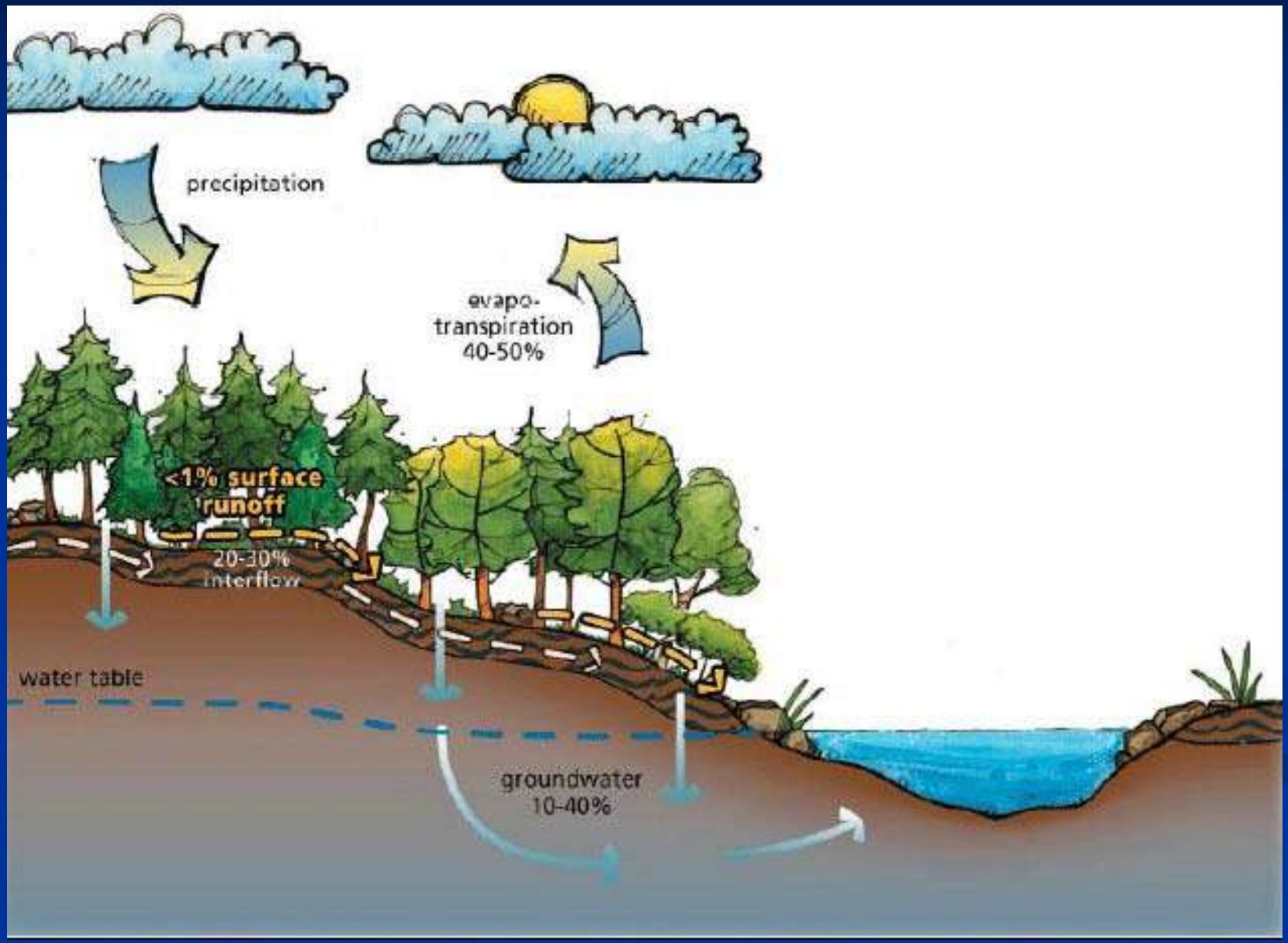
Mississippi River Watershed



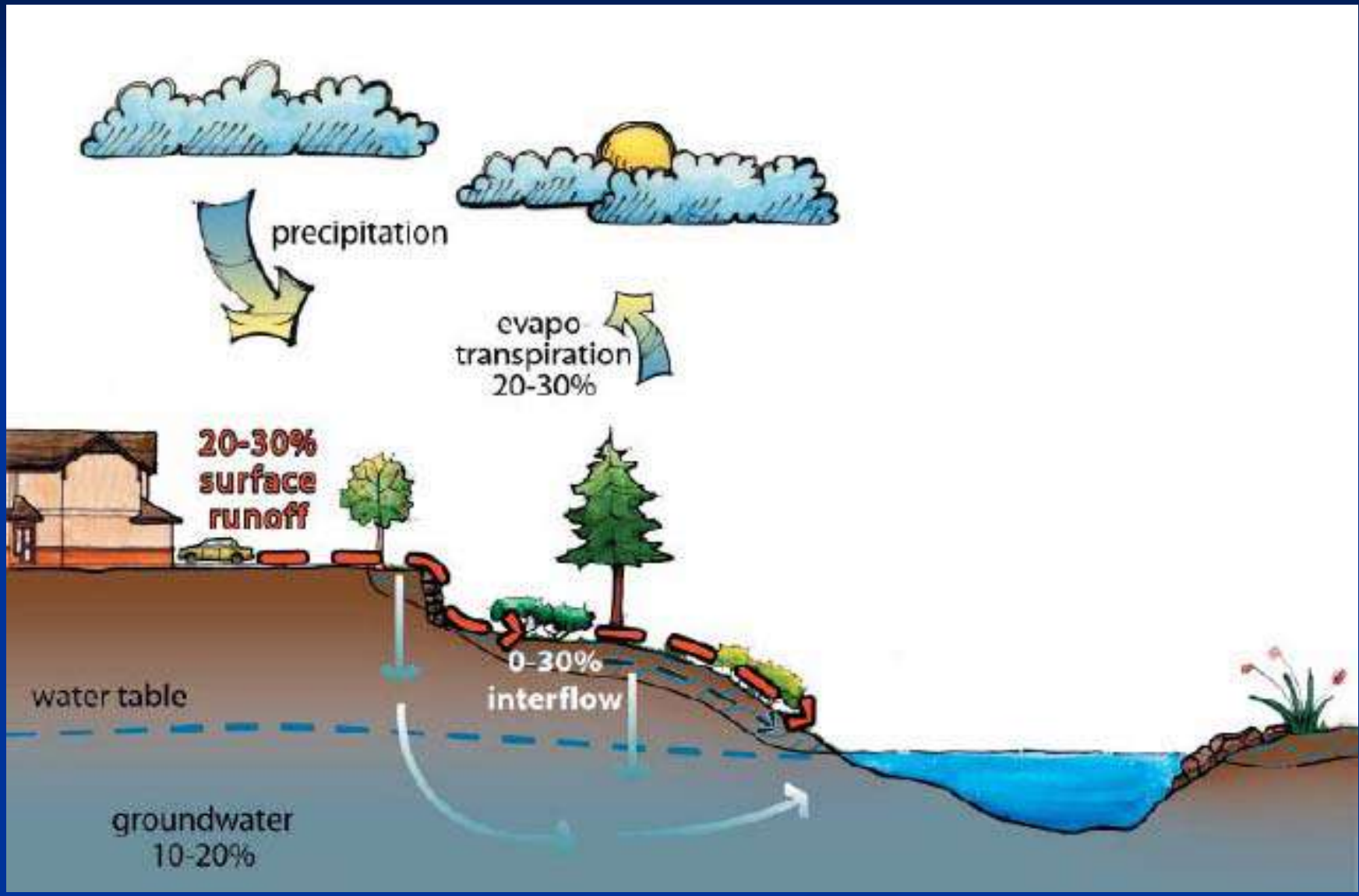
What Is Storm Water?

- When it rains, some water is caught by vegetation and evaporates to the atmosphere, some soaks into the ground, and the rest runs off the land.
- Concrete, compacted turf, and rooftops do not allow infiltration of water, and this "runoff" flows directly to water bodies or is conveyed to these water bodies by ditches or storm sewer networks.

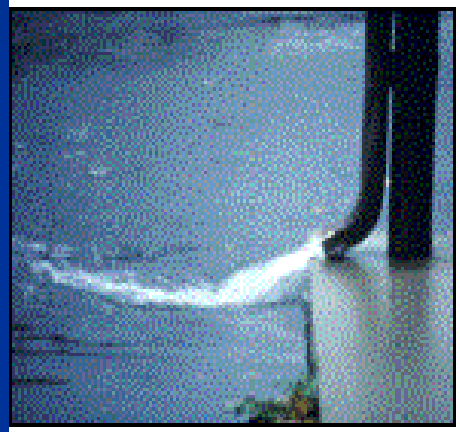
Pre-Development Hydrology



Post-Development Hydrology

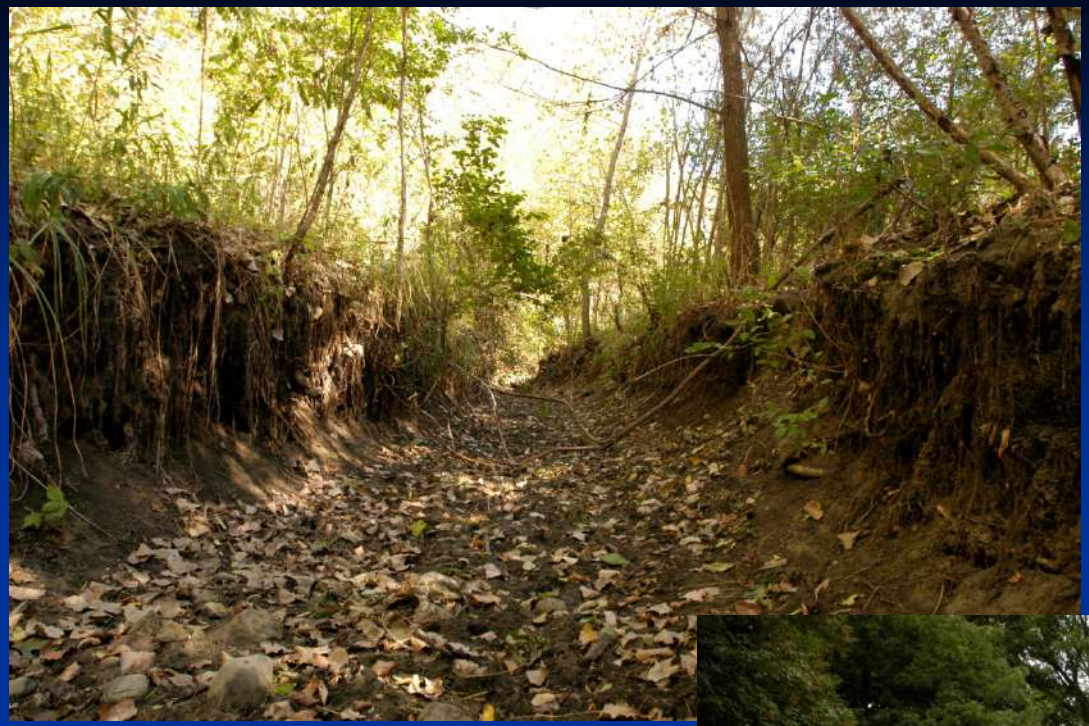


Storm water runoff is *not* treated.



Runs off impervious surface → Enters storm drain system → Discharged to river

After storms, water runs off ….



..following natural and designed conveyances or underground storm sewers…

…flowing directly
to streams & lakes

Mark Bennett

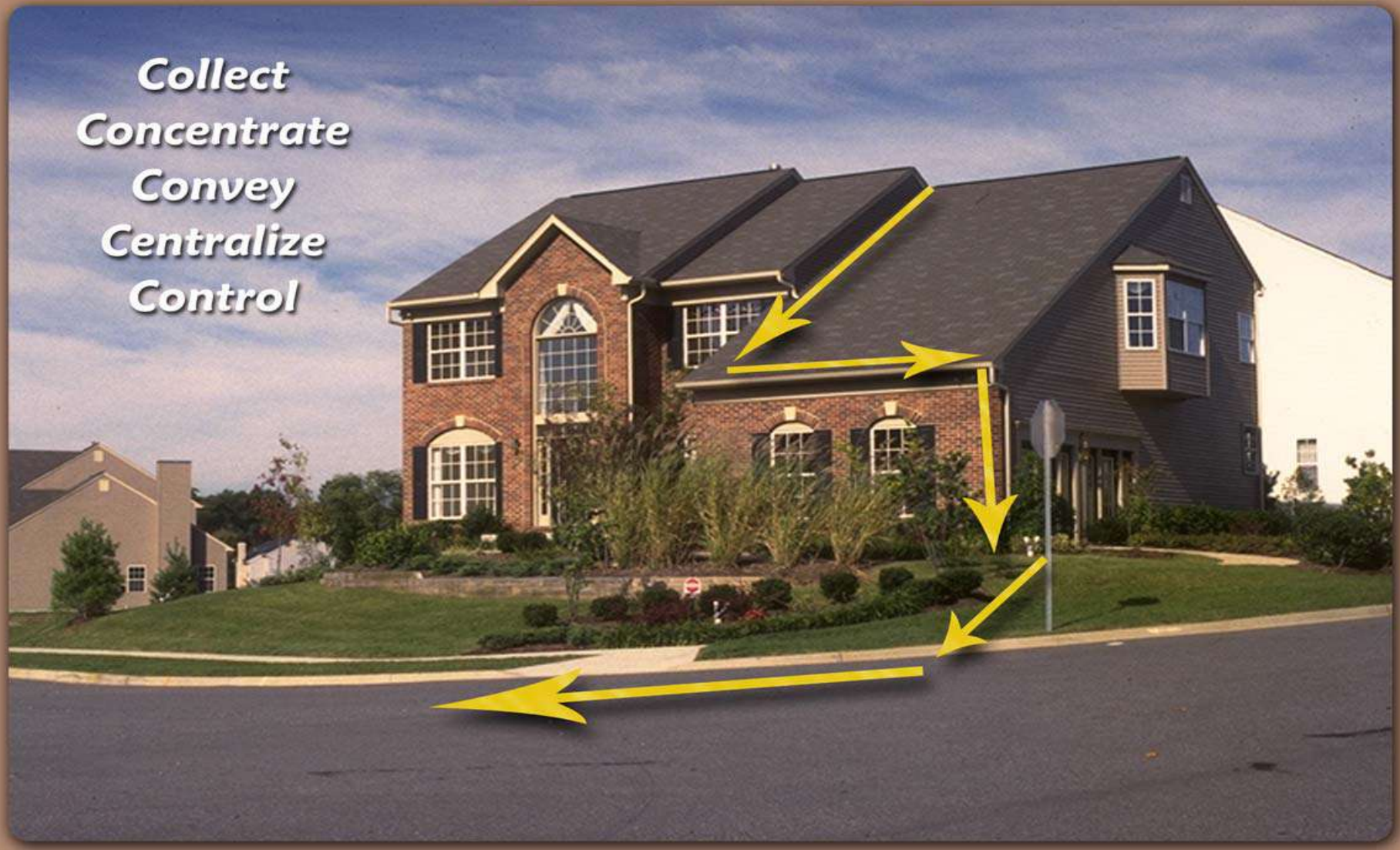
Storm Water Issues

- Quantity: The greater the area of impervious surface, the greater the volume of runoff.
- This leads to greater incidence of flooding and erosion.

Storm Water Issues

- Quality: Runoff carries litter, leaves, motor oil, sediment and other pollutants.
- Runoff can also carry nutrients such as nitrogen and phosphorus, which lead to algae blooms and fish kills in rivers and lakes.
- Runoff from impervious surfaces is often warmer than the receiving water body.

The Problem: Typical site design



Traditional Drainage

Managing Storm Water

- Newer approaches to storm water management focus on infiltration; keeping water onsite and allowing it to percolate down through the soil to the groundwater.
- This requires a more hydrologically-based approach, preserving where possible the natural way water moves on the landscape pre-development.
- This is often referred to as Low Impact Development (LID).

Low Impact Development (LID)

- Starts with a proper site design, and includes:

 - minimizing impervious surfaces

 - bioretention cells

 - rain gardens

 - open conveyance (vegetated or grassed swales)

 - rain barrels

 - many others

LID

Proper Site Design

LID

LID

Every home has a big impact on stormwater runoff

¼ Acre Residential Property

\+ “Green Concrete” Compacted Lawn

8,390 s.f. “impervious” x 1” rain (if infiltrates first ¼” of rain)

= 3,880 gallons of runoff

(if 75% infiltrates = 970 gal/runoff)

In a 1” rainfall

Potential Runoff:

2,512 gallons

1,500 s.f. house (& patio) x 1” rain

= 925 gallons of runoff

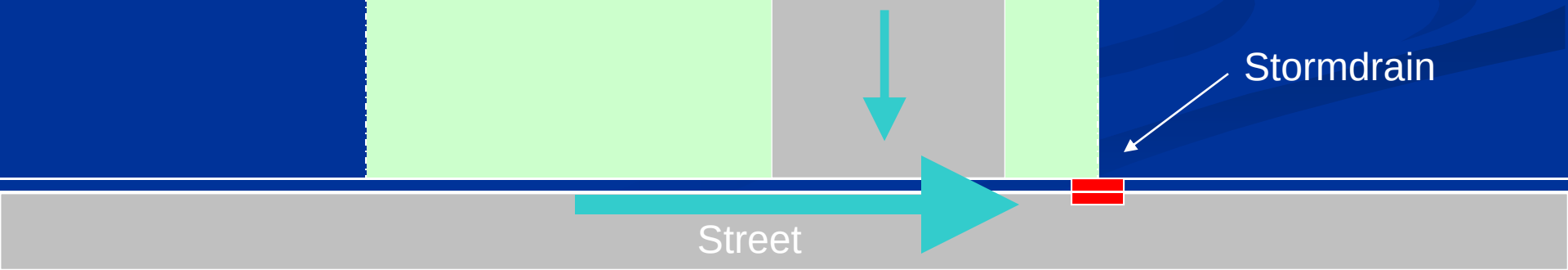
with 30” yearly precipitation

Potential Runoff:

72,360 gallons/yr

1,000 s.f. driveway x 1” rain

= 617 gallons of runoff



What Can You Do?

- Conserve Water: "Keep" your rain
- Infiltration – rain gardens, permeable surfaces
- Capture – rain barrels, cisterns, green roofs

What Can You Do?

- Keep leaves and grass clippings out of the gutter and storm drains: Compost grass clippings and leaves if you can.
- Don't overfeed your lawn: Do a soil test to determine what your lawn needs.

What Can You Do?

- Keep soil in your yard and out of waterways: Cover soil piles in your yard, and if doing construction, make sure to follow proper erosion control procedures.

What Can You Do?

- Pick up after your pets: Pet waste contains phosphorus.

- Practice careful car care: Get any leaks from your car fixed, and wash your car on the lawn or at a carwash.

Photos: Bragavision

More Things You Can Do

- Properly dispose of trash and recyclables
- Minimize use of yard and household chemicals
- Be a watershed watchdog: Report clogged storm drains, or chemicals flowing into rivers and streams.
- Make friends with your watershed: Join a watershed or conservation group.
- Conserve water: Use less water in the house and in the yard.

Summary

- We all live in a watershed.
- Storm water must be properly managed to minimize flooding and improve water quality.
- There are many new techniques available to developers and municipalities.
- There are many things we can all do.

Questions/Comments

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