

Land Use & Water Quality:

Watershed Connections

A partnership of the Interstate Commission on the Potomac River Basin and the Patuxent River Park, Maryland-National Capital Park and Planning Commission



Part One

Introduction to Maryland Waterways and Watersheds



Maryland's Treasures



1



2



3



4



Maryland's "Other" Waterways

Oil, toxins and road salt



5

Acid Mine Drainage



6

Channelization



7

Erosion and Sedimentation



8



Troubled waters...



9

- ▶ **46%** of Maryland's Streams are in "Poor" Condition.
 - ▶ Only **12%** are in "Good" Condition



Good Health, Poor Health — what does it mean?



Healthy streams have...



- Plants & trees growing along bank
- Diverse habitats
- Chemical and physical properties acceptable for aquatic life



water for
recreation



What makes an “unhealthy” stream?

Good Streams

- Plants along bank
- Diverse habitats
- Chemical properties acceptable for aquatic life
- Safe for human recreation

Versus

Poor Streams

- Lack habitats
- Are polluted
- Lack trees, plants, and shade
- Unsafe for public use
- Filled with trash and sewage





Why it matters...

- Main source for drinking water





Why it matters...

- Lowers the beauty of a stream
- Deters swimming, wading, boating...





Why it matters...

- Pollution affects our food supply





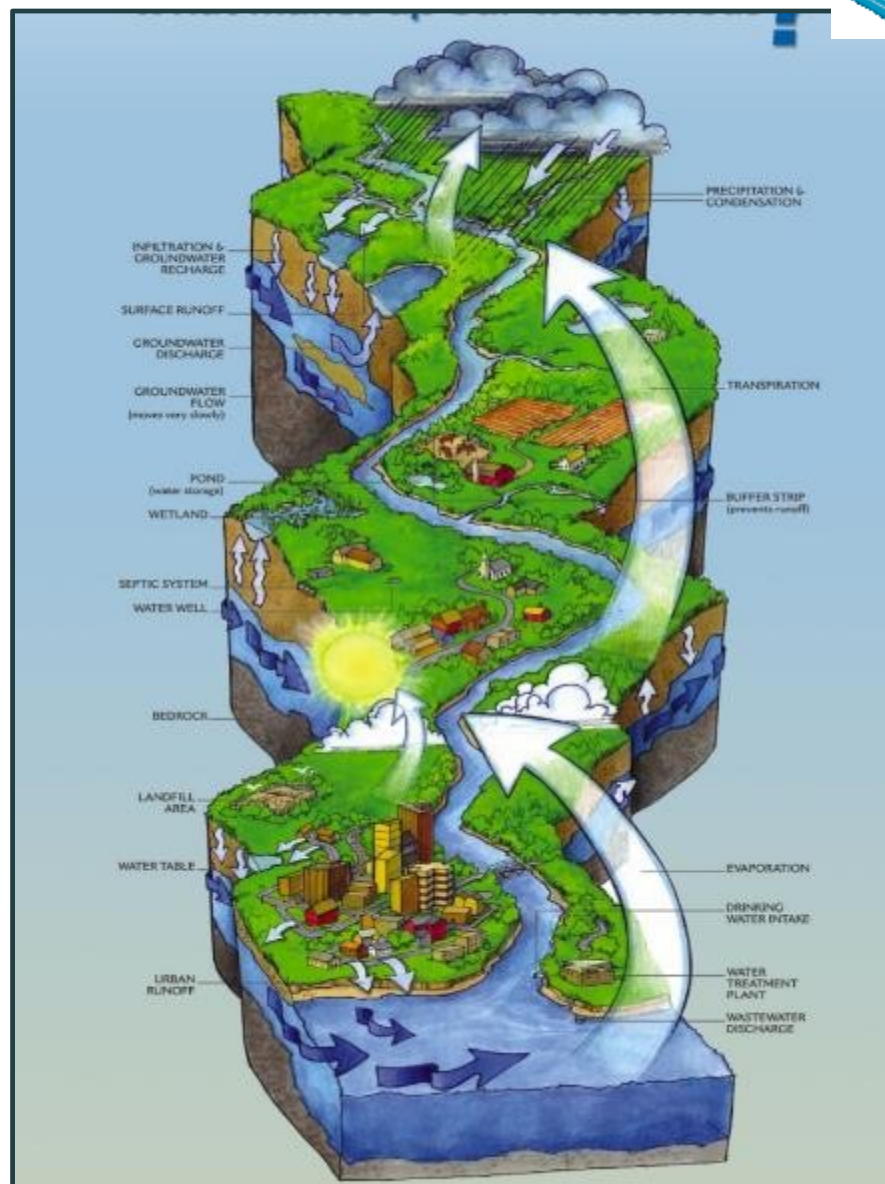
Why it matters...





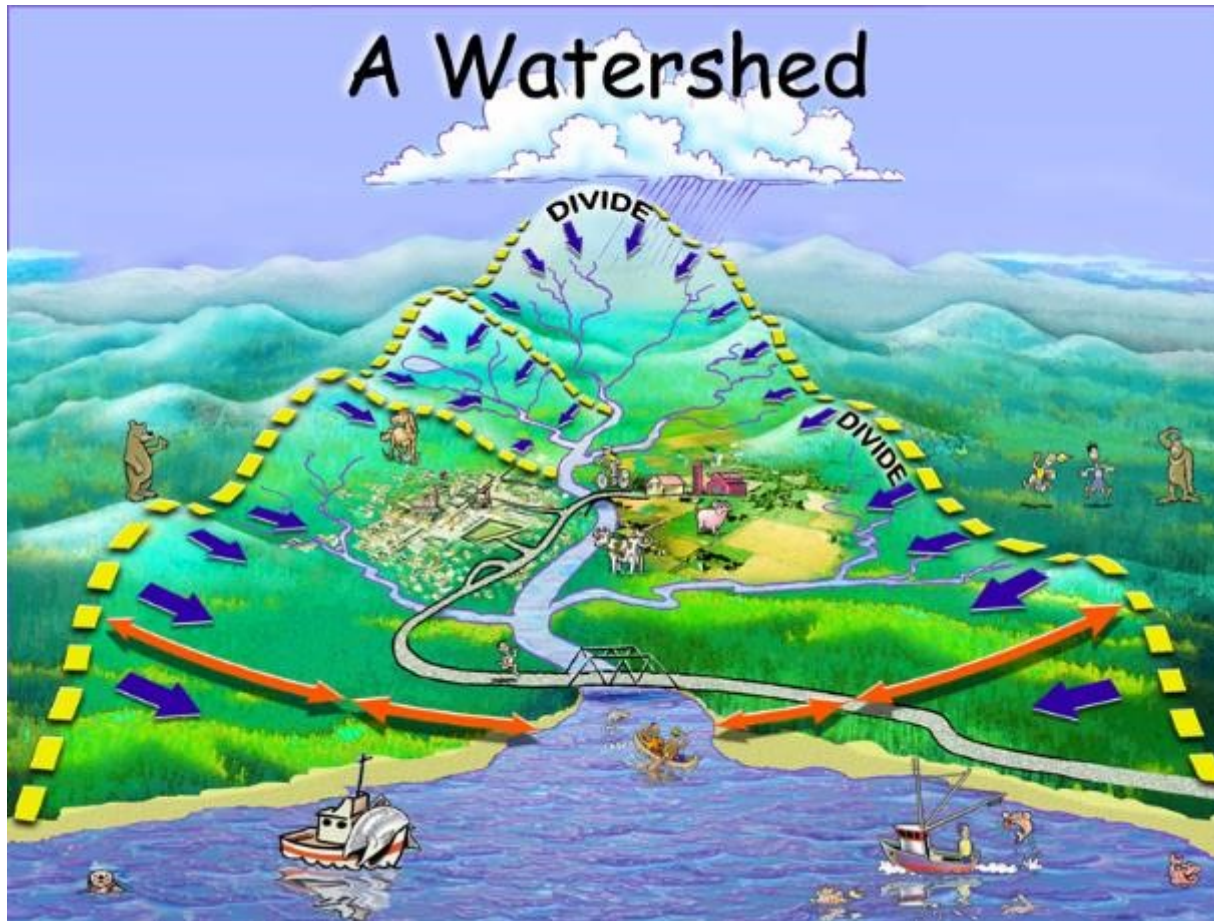
Protecting Our Water Resources

To protect and restore water quality, we need a *watershed perspective.*





So what is a watershed?



Watershed: An area of land where the water drains into a common source, such as a stream, pond, or bay

A **watershed perspective** looks at how our land use affects our waterways.



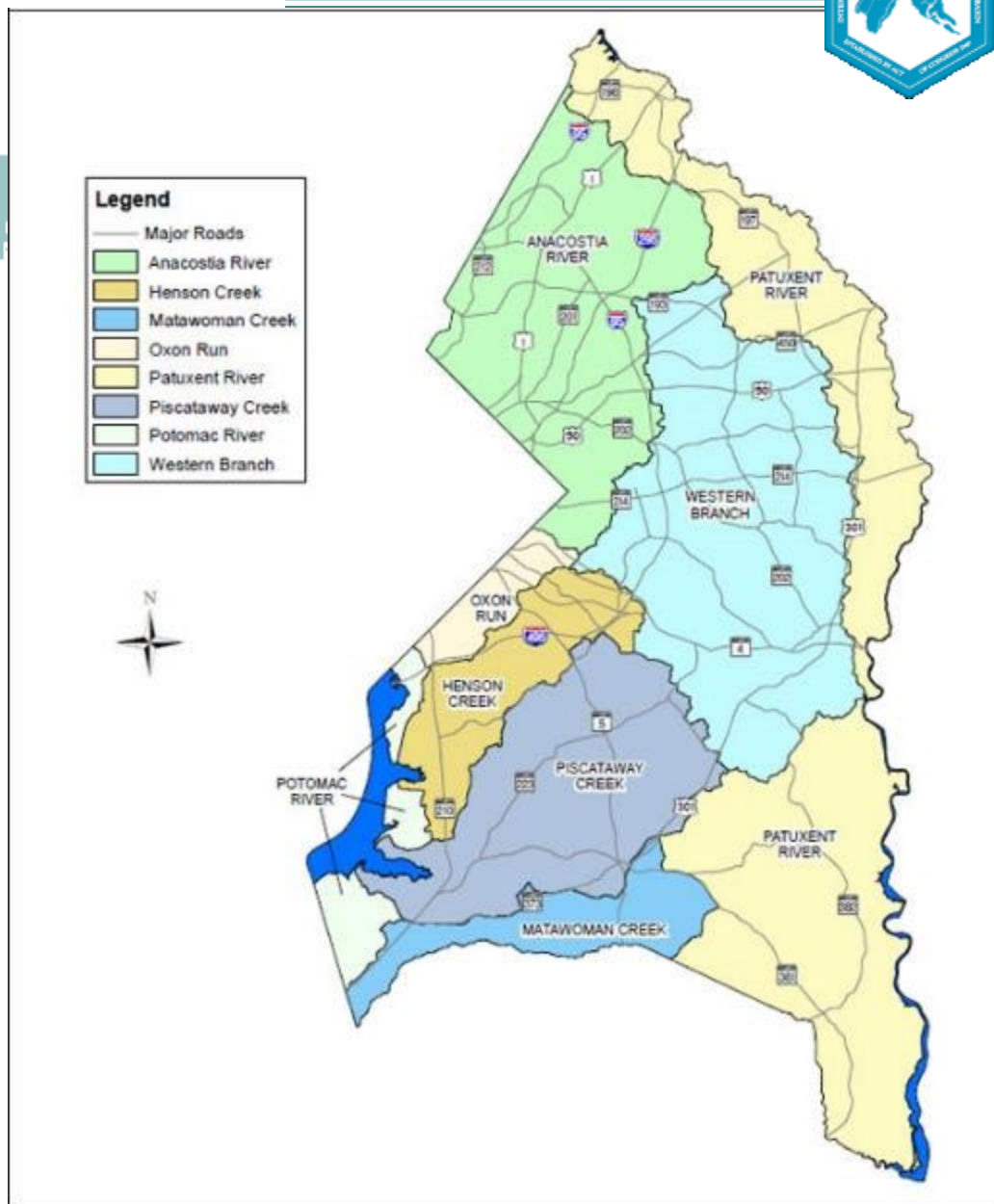
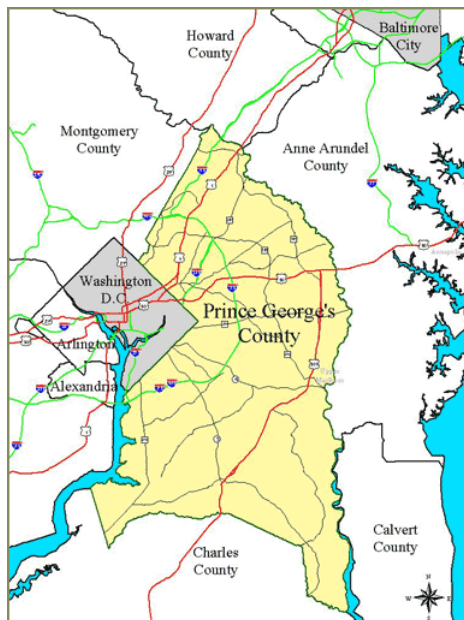
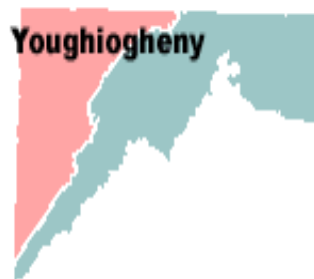
Our Chesapeake Bay Watershed



- Maryland is nested in one of largest watersheds on the East Coast, the Chesapeake Bay drainage basin.
- What other states are part of the Chesapeake Bay Watershed?



Watersheds within watersheds

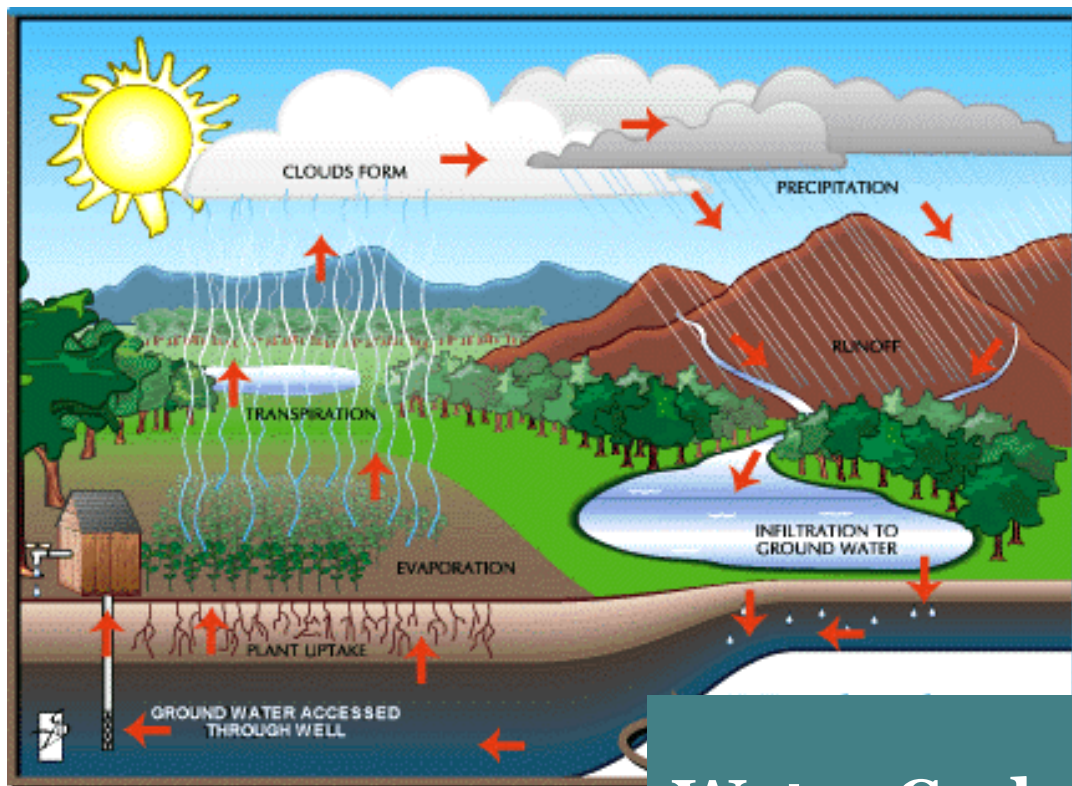
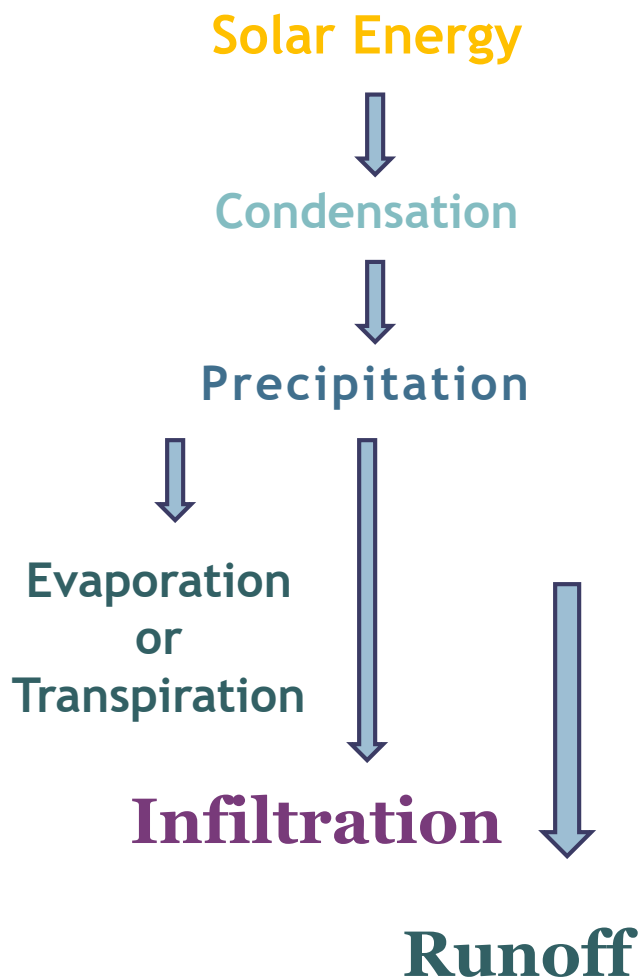


<http://www.anacostiaws.org/explore/maps>



True or False?

- A watershed only includes the land surface.
 - **FALSE**
- A watershed is a building for holding run-off water after a rainstorm.
 - **FALSE**
- The way land is used in a watershed affects water quality.
 - **TRUE**
- Everyone lives in a watershed.
 - **TRUE**
- Watersheds are drawn on maps according to political jurisdictions.
 - **FALSE**
- Some watersheds are hilly; others are relatively flat.
 - **TRUE**



Water Cycle



Part Two

Land Use:

How infiltration, runoff,
and water quality
differ in different landscapes...



Land Use:

Wetlands

Wetlands include :

Forested swamps in the low-lying flood-plains of rivers.

Marshes bordering the Chesapeake Bay and our large tributaries.



Wetlands now only cover 10% of Maryland;
73% have been destroyed since pre-colonial times.



Land Use:

Wetlands

Act as natural water filters

- Plants absorb pollutants
- Roots & leaves slow water flow and catch sediment in the water

And sponges

- Organic-rich soil hold water
- Water-loving plants draw up and transpire water.





Land Use:

Forests



Let's discover some connections between forests and water quality.

Where does the rain go in this scene?



Land Use:

Agriculture

- Where does the rain water go?
- What does the runoff carry?





Effects of Land Use: Farm Land

INPUTS

- Fertilizer --excessive nitrogen and phosphorous downstream
- Pesticides
- Animal waste runoff

RESULTS

- **Algae blooms**
 - **Reduced oxygen**
 - **Reduced aquatic life**

INPUT

- Excessive sediment in rivers

RESULTS

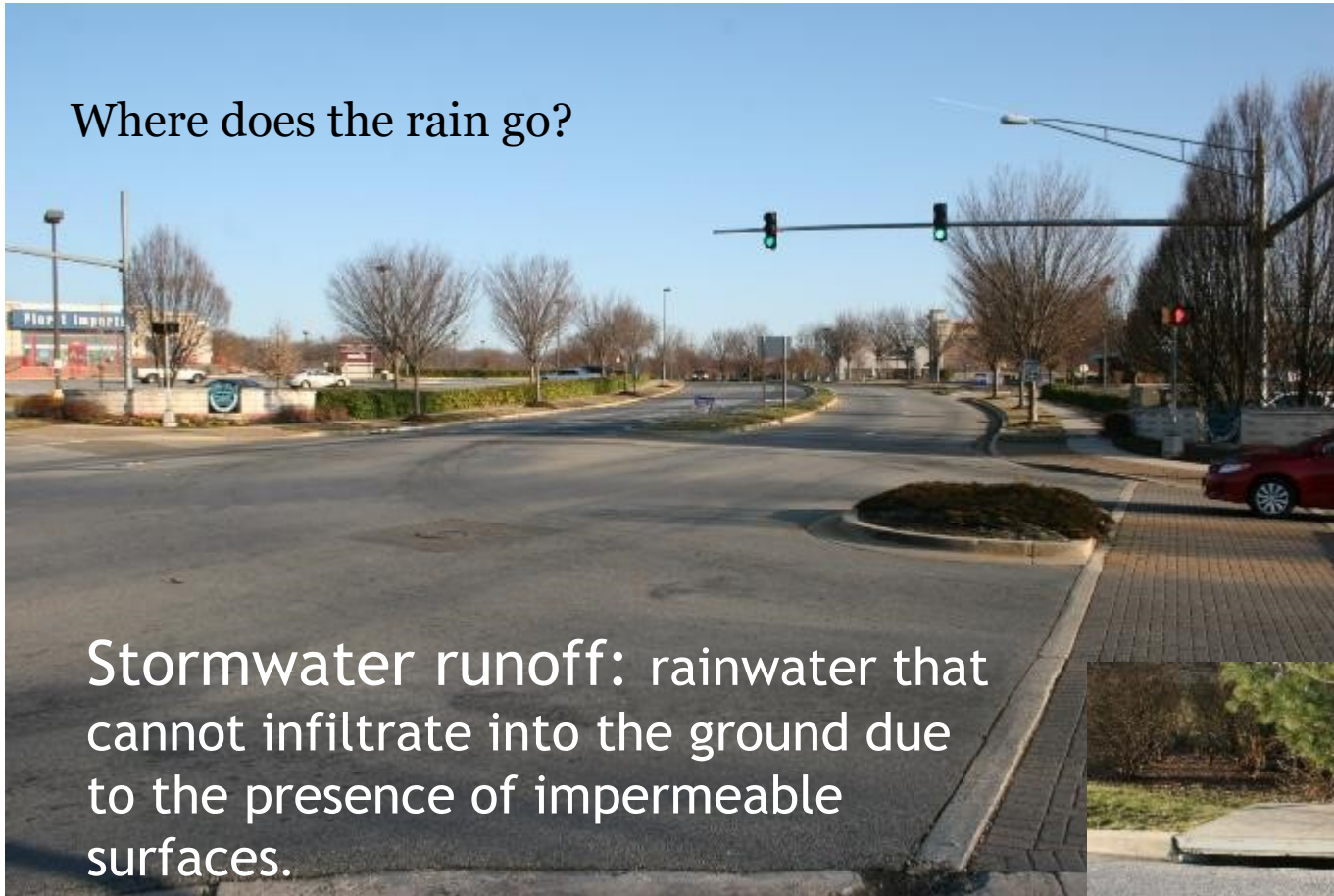
- **Murky waters: less sunlight reaches plants**
- **Fewer underwater plants = reduced dissolved oxygen**
- **Buried bottom habitat**
- **Clogged gills for fish and smaller invertebrates**



Land Use:

Cities and Suburbs

Where does the rain go?



Stormwater runoff: rainwater that cannot infiltrate into the ground due to the presence of impermeable surfaces.



Urban





Our Main Focus: Stormwater Runoff



Stormwater runoff is the only growing source of water pollution.

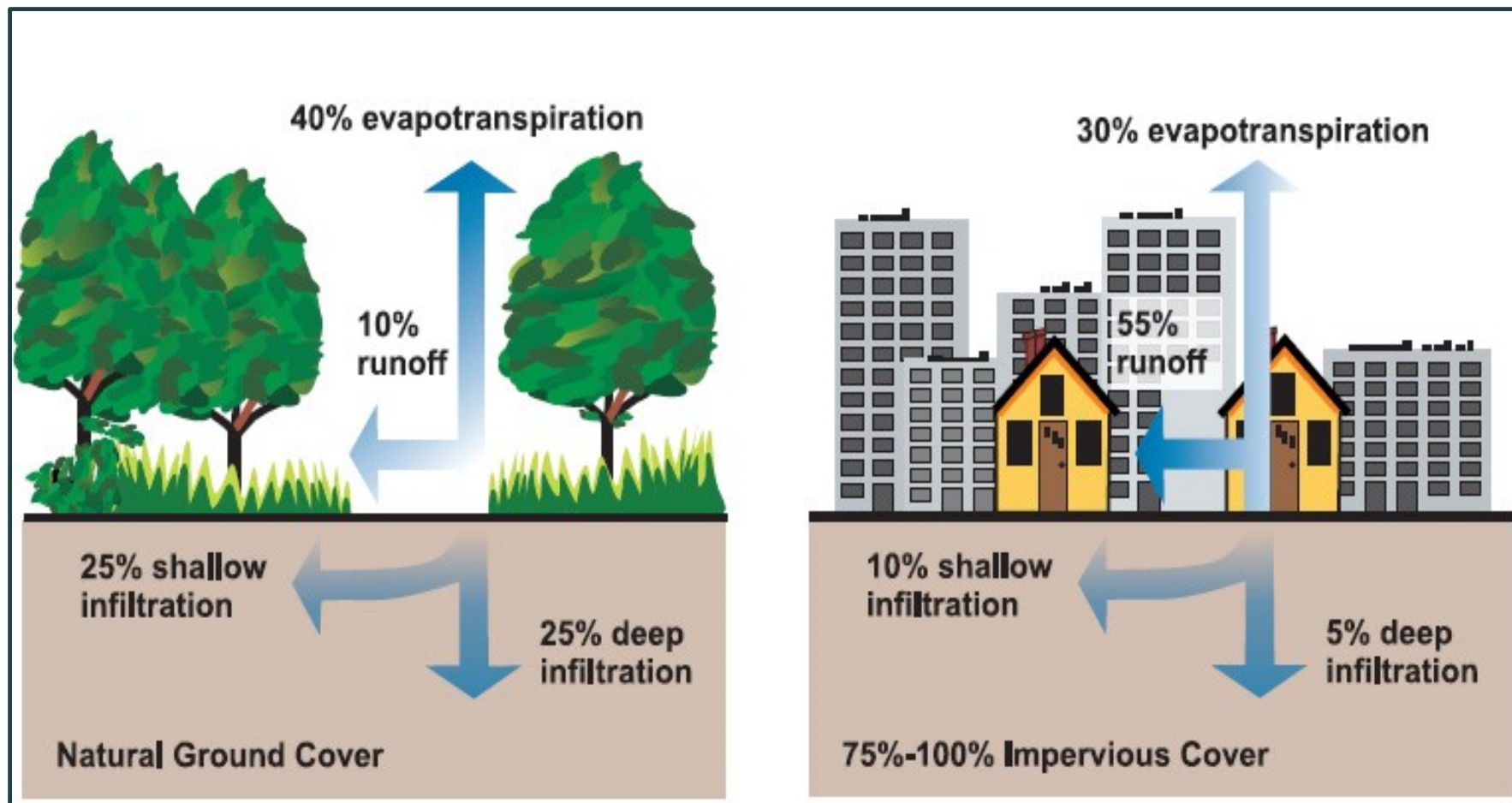




- Why is increased impervious surface linked to stream erosion?
- What are some effects of stream erosion?

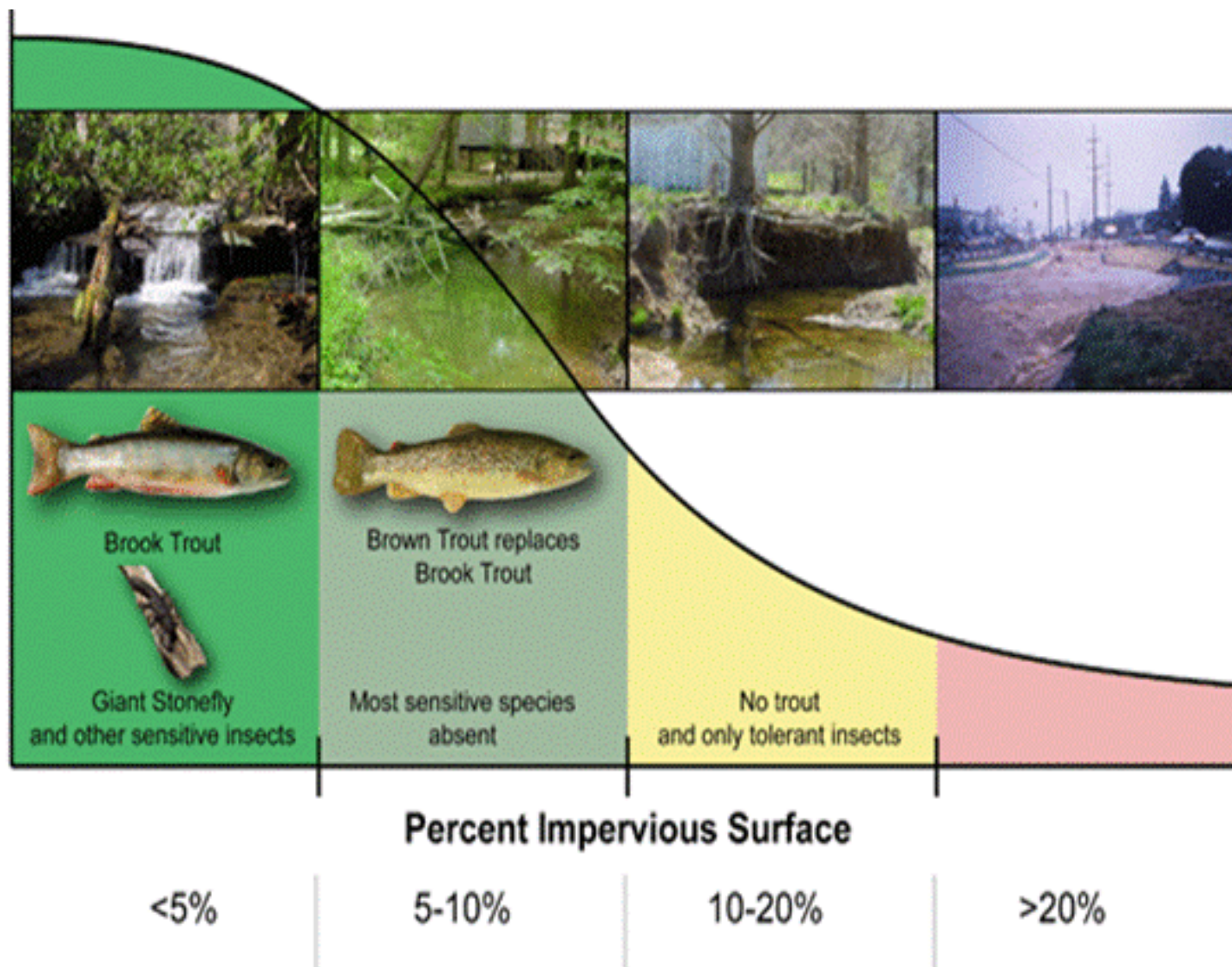


Forests versus Cities





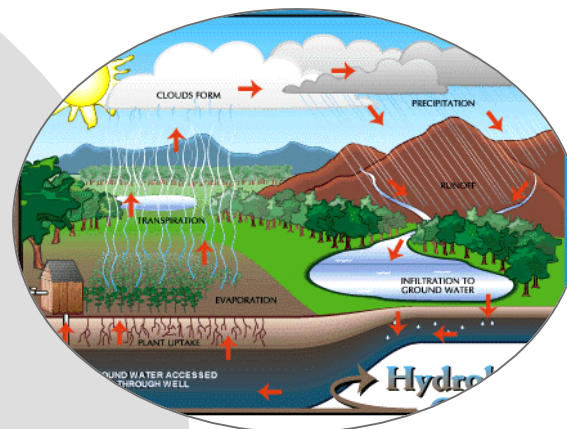
Land Use and Water Quality





It's All Connected

**The Water Cycle –
*Infiltration, Runoff,
Evaporation***



**Land Use &
Land Cover**



Healthy Water Resources



Part Three

Best Management Practices and
Stormwater Solutions:

Enough of the Bad Stuff!

What can we do to
protect our streams?



Protecting Our Watershed

- *Best Management Practices for farms:*
 - Tree buffers by streams
 - Fences around animals
 - Less fertilizer
 - Crop rows parallel to slope
 - No-till farming





Protecting our Watershed:

Stormwater Pollution Solutions

Conservation Gardens

- Slow down the runoff.
- Spread it out.
- Let it soak in.





Better yet...

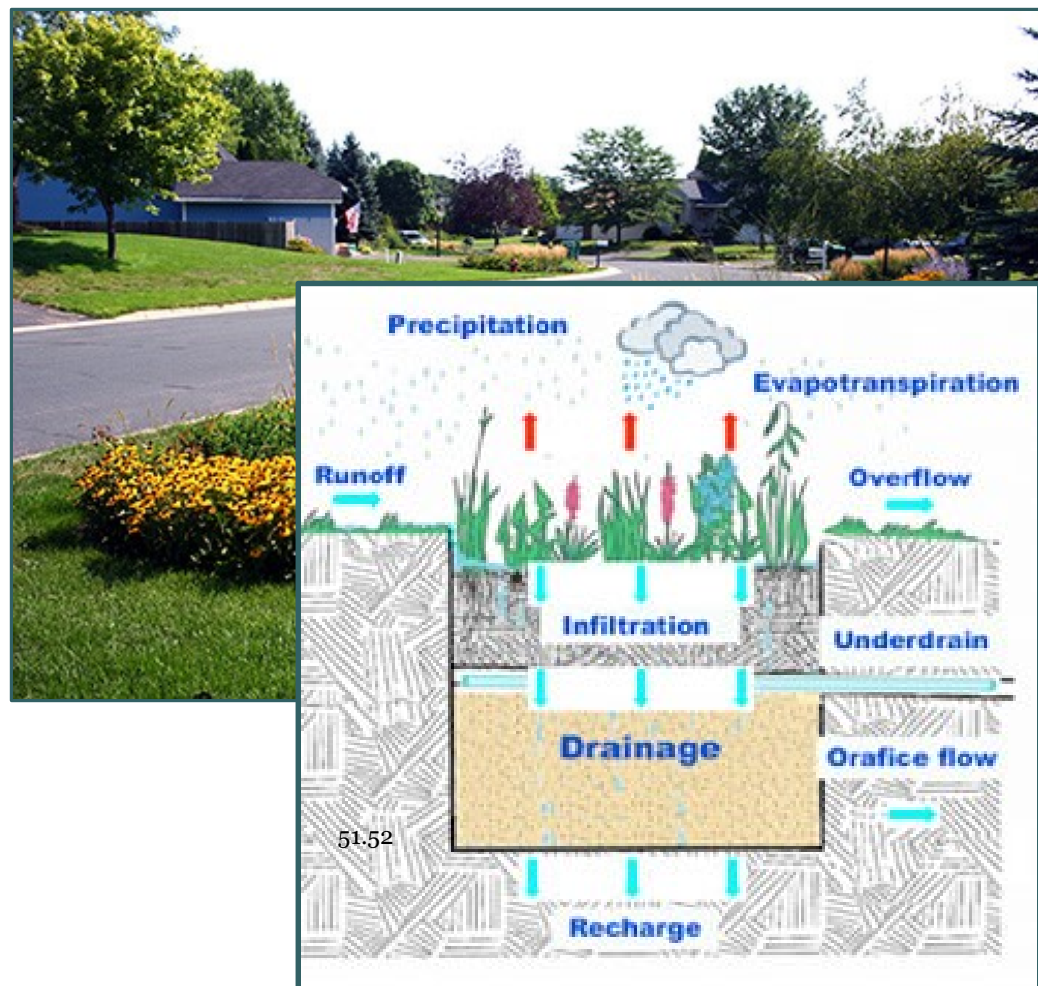
- Plant and protect forests





Rain Gardens: multiple benefits

- The basin catches runoff and allows it to infiltrate.
- The plants and soil bacteria clean the stormwater.
- Provides food for butterflies, birds, insects, rabbits, squirrels, mice....





Catch it: Rain Barrels

- Catch storm water from gutters.
- Direct it over garden and lawn.
- Reduce water use during droughts.
- Use for water education.





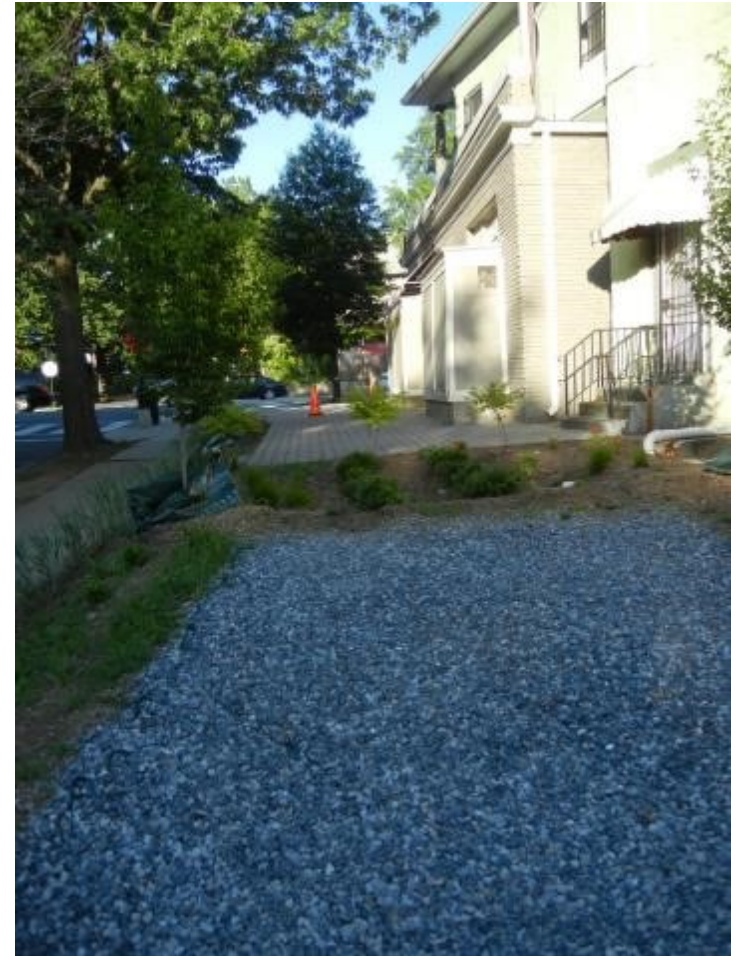
Change impervious surfaces to natural ones.

From Green Roofs to Grass Swales...





...to Pervious Pavement





What YOU can do everyday...

- Scoop the poop.
- Recycle and dispose trash properly.
- Use less fertilizer and pesticides.
- Keep waste out of storm drains.
- Raise Awareness.





It's your
world.
Envision it.





Resources for Student Research

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