

**Nonpoint Source
Pollution – A
Challenge to Control**

**Connecticut Envirothon
Aquatics Workshop**

January 14, 2017

**Presented by Denise Savageau
Conservation Director,
Town of Greenwich**



Point Source Pollution is generally defined as pollution that comes from a known source and usually comes out of a pipe. Examples: discharges from sewerage treatment plants or industrial plants.

Since the **Clean Water Act** was passed in **1972**, most of these sources are now controlled through a permitting process. This resulted in a huge reduction of pollutants and improvements in water quality.

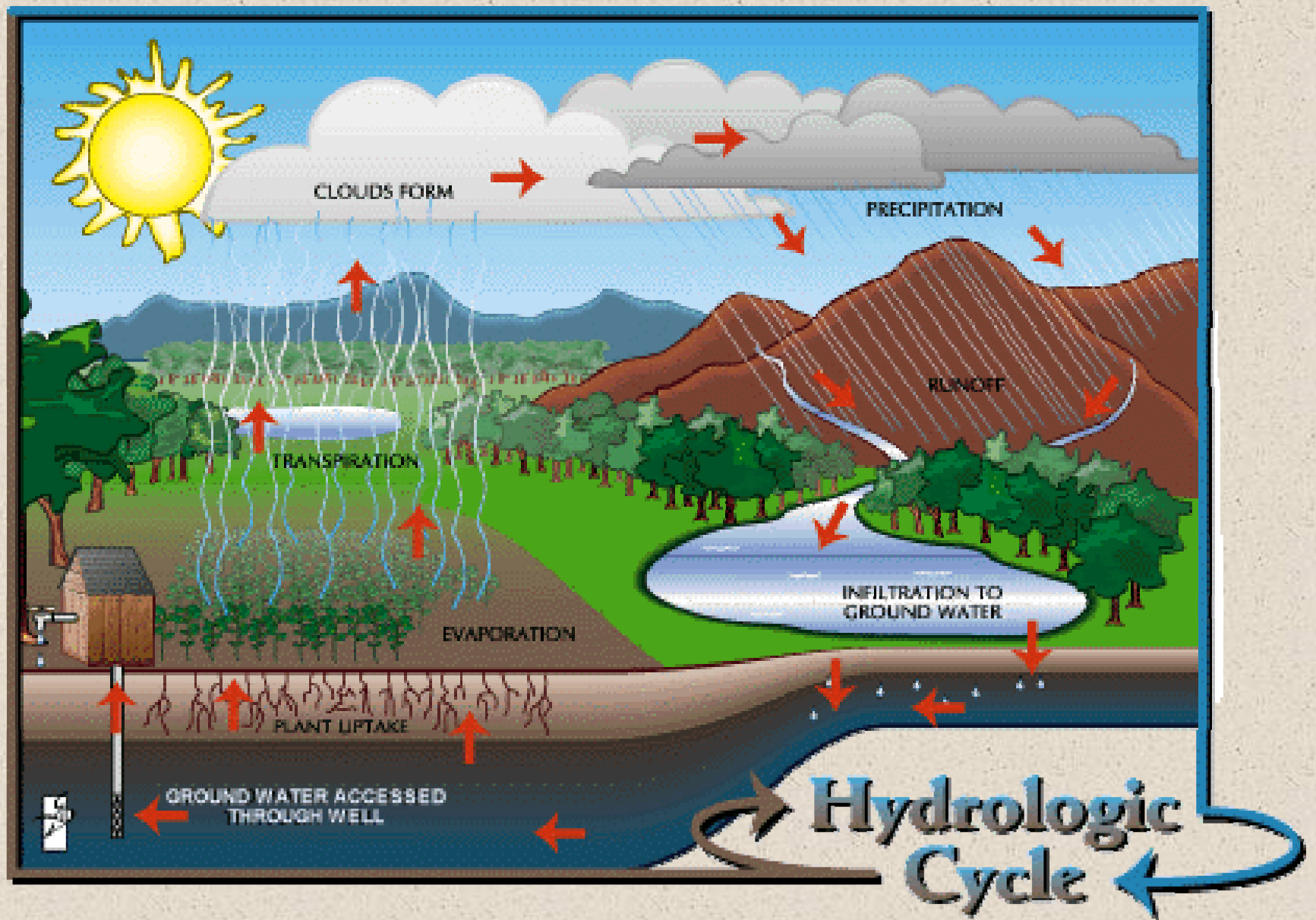
However, in the early 1980's we realized that we still had water quality concerns. **Nonpoint source pollution** is the challenge we now face both in surface and ground water.



Nonpoint source pollution is pollution that does not come directly from a known source via a pipe (or other type of conveyance). **Instead it is associate with storm water picking up pollutants as it flows across the landscape.**

This could be runoff from a parking lot, construction site or agricultural operation. In Connecticut, our primary source of nonpoint source pollution is **urban storm water runoff.**





Major types of nonpoint source pollution:

- Sediments
- Nutrients
- Pathogens
- Toxins
- Floatable debris
- Thermal

Major sources of nonpoint source pollution:

- Urban storm water – residential and commercial
- Construction sites
- Failing septic systems
- Agriculture
- Mismanagement of solid waste
- Clear cutting/veg removal

Type of NPS: Sediments

Problems:

- covers benthic layers
- fills in ponds, channels etc.
- increases scouring in stream channels
- clogs fish gills
- increases turbidity
- carries other pollutants

Sedimentation is the #1 nonpoint source pollutant in the USA by volume.



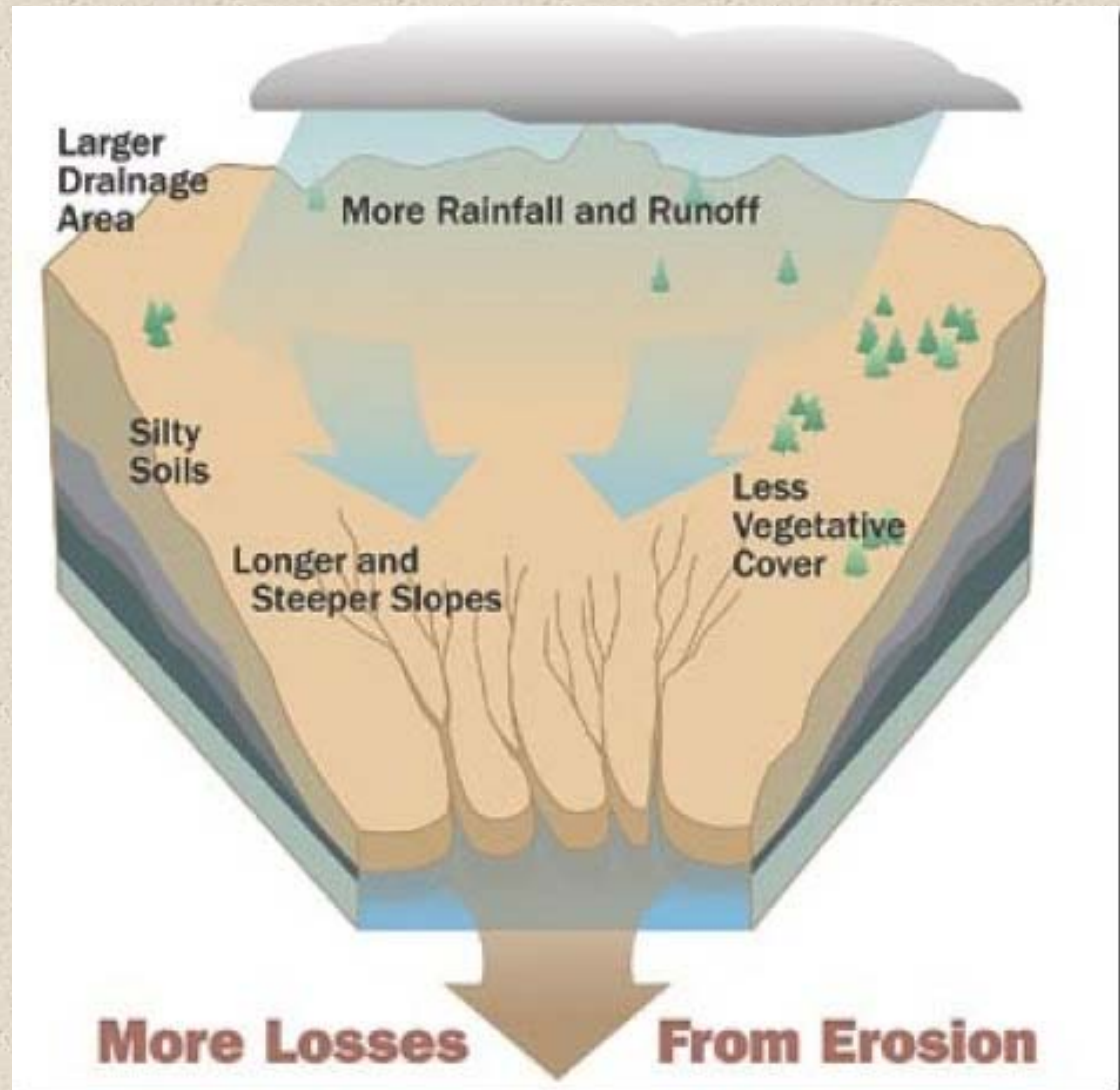
Soil erosion is the process of detachment and transportation of soil materials by water, wind, ice and gravity. It can be natural or caused by anthropogenic activities.

Sedimentation is the process of depositing sediments moved as part of the erosion process.



Factors that influence erosion:

- rainfall/runoff – amount and intensity
- types of soil
- length and /or steepness of slopes
- amount of vegetation
- size of drainage area



Erosion is a natural process. We are concerned with **accelerated erosion and sedimentation** caused by anthropogenic activities such as **construction, clear cutting, and agriculture.**

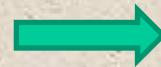
It is estimated that man creates 10x the amount of erosion as would occur naturally.





← Erosion resulting from unstable bank that was part of a road cut. Entire bank slumped onto road.

Erosion from construction site contained by silt fence but almost ready to fail



Type of NPS:

Nutrients – nitrogen and phosphorus

Problems:

- Habitat degradation
 - Hypoxia (low oxygen)
- Public Health
 - Harmful Algal Blooms (HAB) in drinking water

Sources:

- Lawns/golf courses
- Failing septic systems
- Other animal waste – geese, dogs etc.
- Agriculture



Type of NPS: Pathogens

Problems:

- Public Health
 - Unsafe drinking water
 - Beach closings
 - Contaminated shellfish
- Habitat degradation

Sources

- Failing septic systems
- Other animal waste – geese, dogs etc.
- Hospital waste
- Agriculture



Type of NPS: Toxins

Problems:

- Public Health
 - Unsafe drinking water
 - Bio-accumulation in food chain
- Habitat degradation

Sources

- Urban storm water
- Pesticides used in lawn care, highway maintenance etc.
- Maintenance facilities/garages
- Household hazardous waste including medicines
- Agriculture
- Acid Mine Runoff



Type of NPS: Floatable debris

Problems:

- Habitat degradation
- Source of other contaminants

Sources

- Urban storm water
- Mismanagement of solid waste
- Littering





For more info on Marine debris
<http://marinedebris.noaa.gov/info/pdf/patch.pdf>

Marine debris is a huge issue. This is a photo of a section of the “garbage patches” found in the eastern Pacific Ocean.

Taken in August 2009, scientists from National Geographic documented a “floating dump” 2x the size of Texas.

And although you can see some larger items, most are thumbnail size pieces of plastic.

Type of NPS: Thermal

Problems:

- Habitat degradation
- Algal blooms
- Hypoxia

Sources

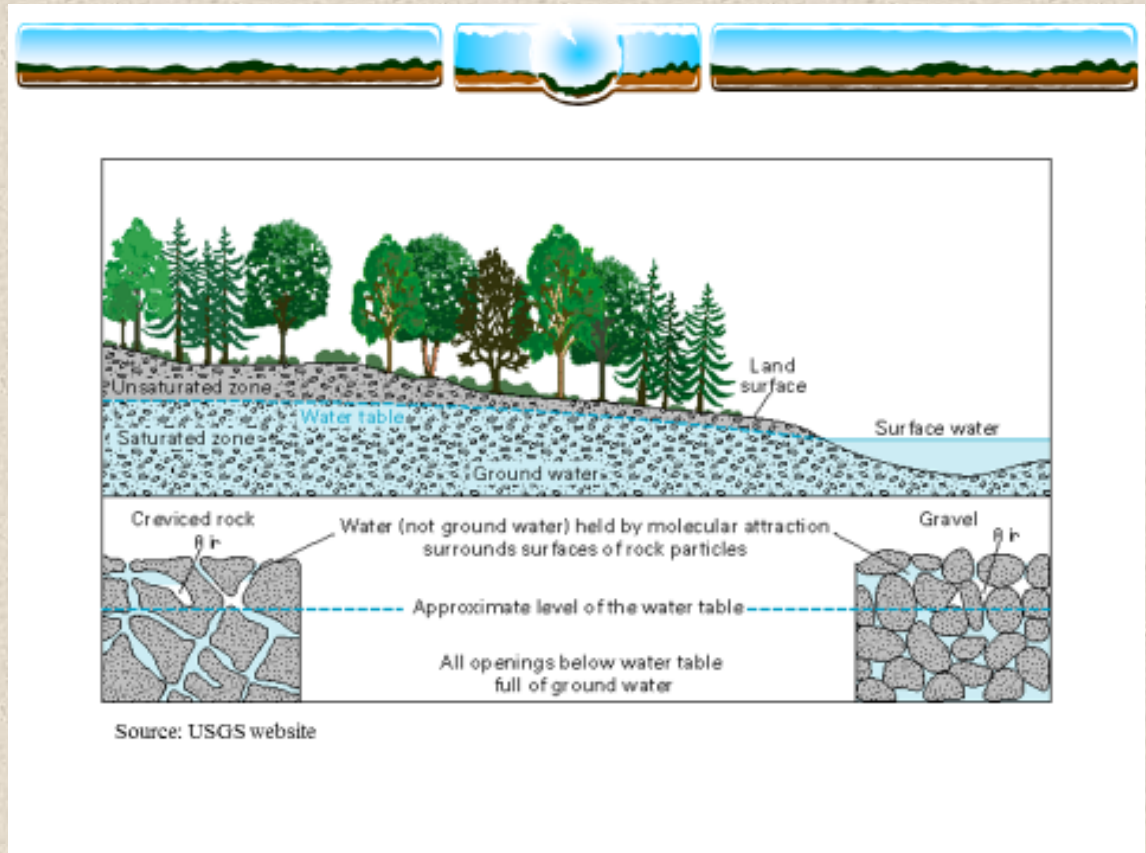
- Urban storm water
- Channelized streams
- Clear cut riparian areas



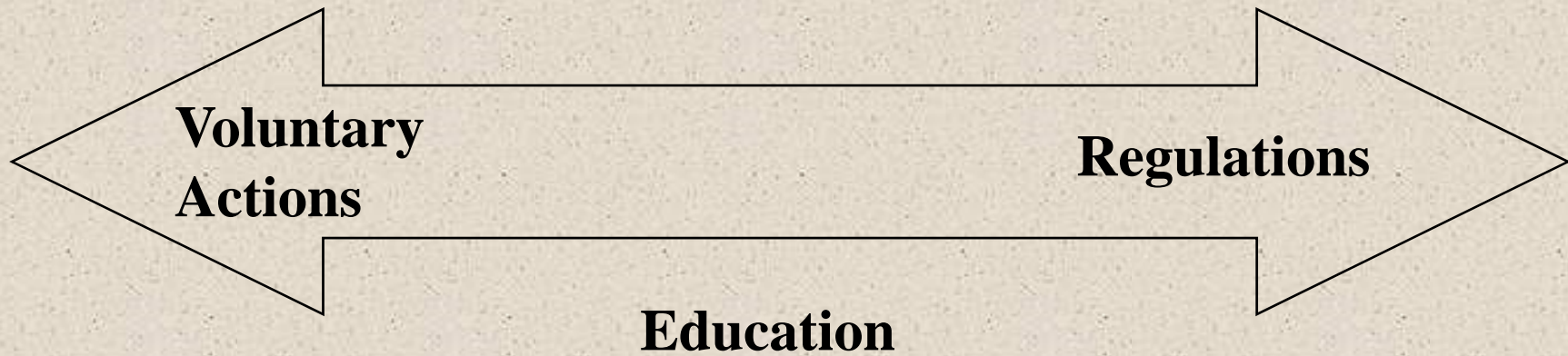
Storm water runoff does not just result in nonpoint source pollution and impacts to water quality. It also significantly impacts water quantity

Accelerated runoff changes how water moves through the water cycle. Development that increases impervious cover, removes vegetation, or changes topography all has an impact.

- Increases flooding
- Reduces infiltration and groundwater recharge
- Results in “flashy” stream conditions



Management Strategies



Nonpoint Source pollution is regulated under **Section 319 of the Clean Water Act**. Watershed Management is one of the main ways of dealing with nonpoint source pollution.

Storm water – nonpoint or point source pollution?

In the 1990's EPA also implemented storm water management regulations. Storm water regulations apply to:

- Municipal Separate Storm Sewer Systems (MS4s)
- Construction Activities
- Industrial Activities

If a site is regulated by one of these programs, storm water is considered point source instead of non-point source and may be treated differently in terms of funding etc.

One of the ways that EPA is deals with water pollution is to establish a **total maximum daily load or TMDL** for various substances. For nonpoint source pollutants, a TMDL is often established for a watershed.

In 2000, a TMDL was established for nitrogen in Long Island Sound to address low oxygen in the Sound.

90% reduction was assigned to point source pollution – primarily sewerage treatment plans and combined sewer (sanitary and storm water) systems.

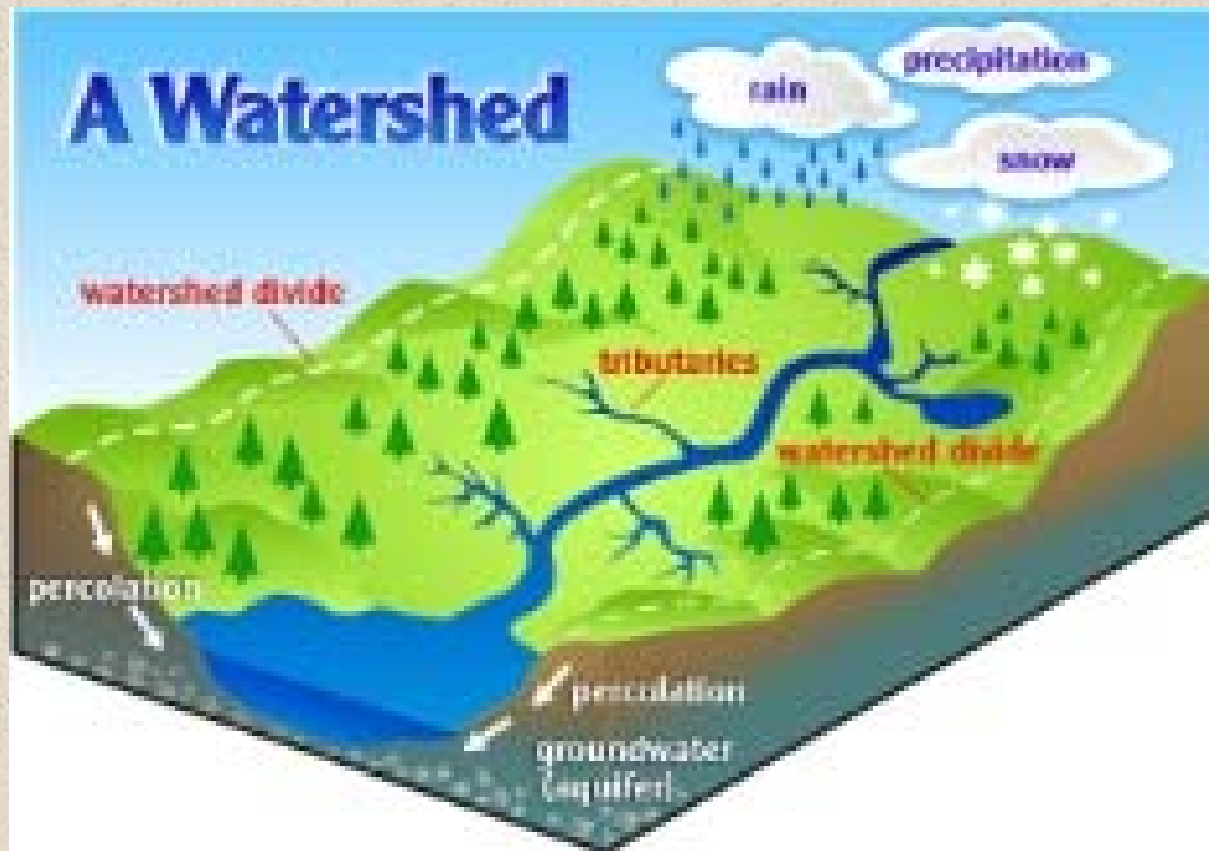
10% was assigned to nonpoint source pollution from both urban and agricultural sources.

Source water protection:

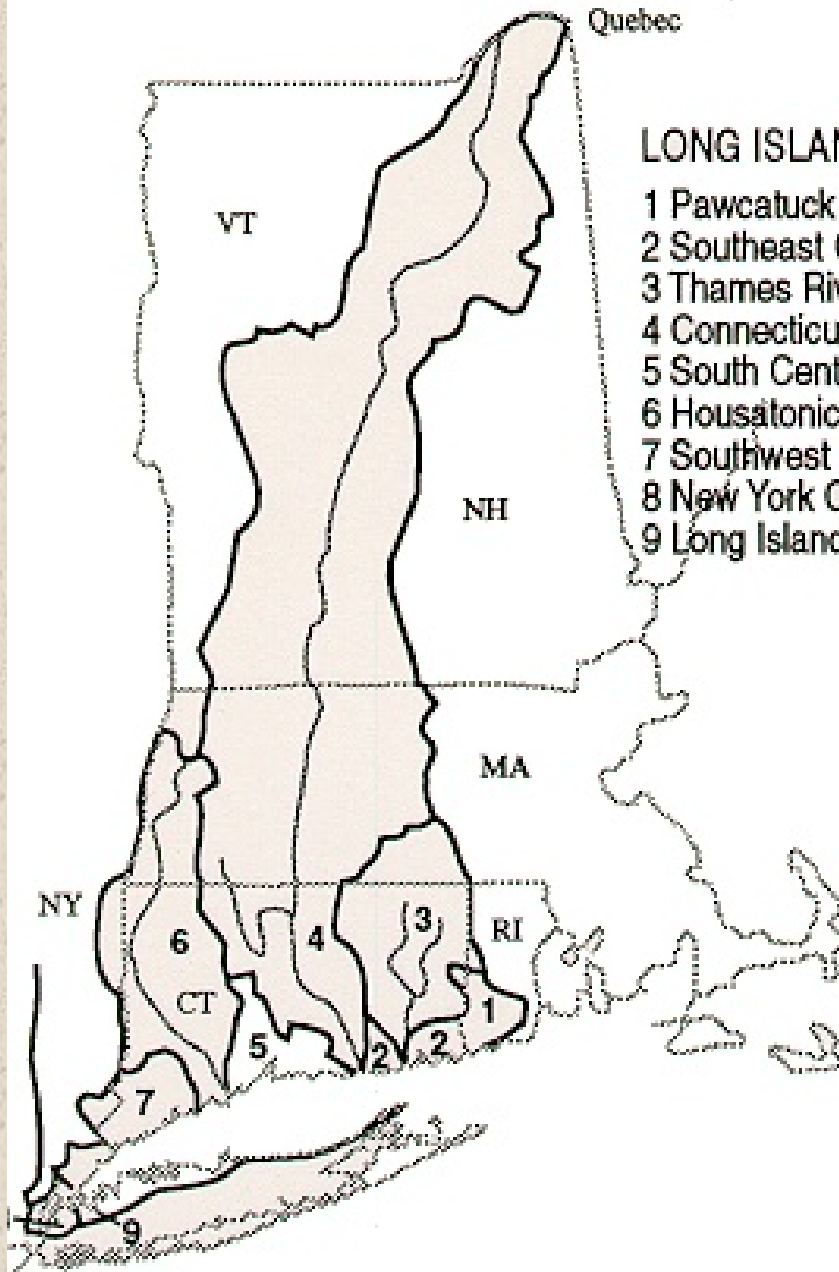
- Focuses on drinking water supply protection
- Looks at both quality and quantify issues
- In CT, lead on drinking water is Dept. of Public Health.



A watershed is:
an area of land
that drains to an
common area.
This is usually a
body of water
such as a river,
lake or ocean.



Watersheds are
also referred to as
drainage basins.



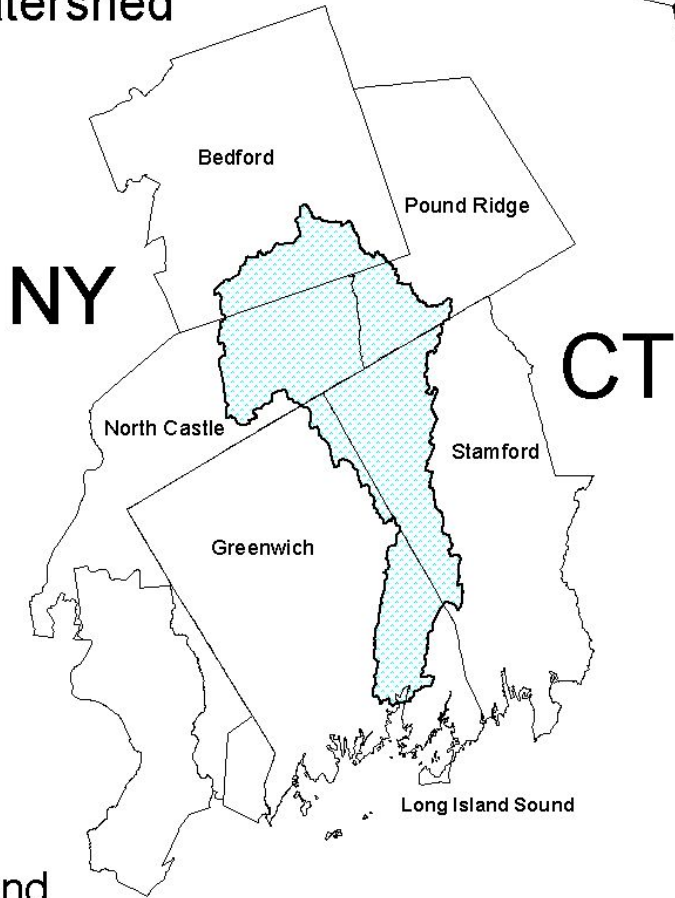
LONG ISLAND SOUND DRAINAGE BASINS

- 1 Pawcatuck River - 297 sq. mi.
- 2 Southeast Coast - 149 sq. mi.
- 3 Thames River - 1478 sq. mi.
- 4 Connecticut River - 11,263 sq. mi.
- 5 South Central Coast - 482 sq. mi.
- 6 Housatonic River - 1946 sq. mi.
- 7 Southwest Coast - 355 sq. mi. (includes Westchester County)
- 8 New York City - 66 sq. mi.
- 9 Long Island - 210 sq. mi.

Watersheds can be very large such as the Long Island Sound Watershed that starts in Canada

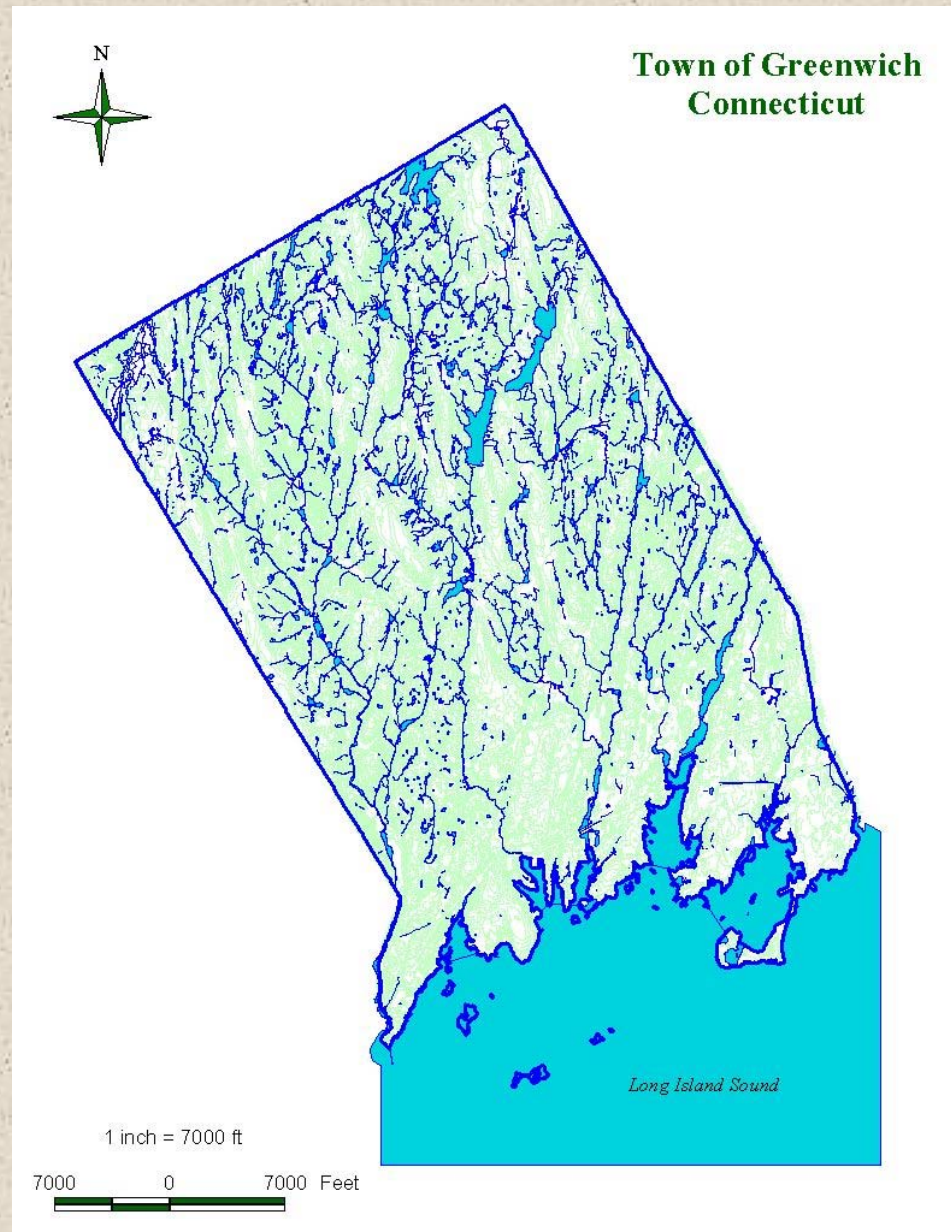
...

Mianus River Watershed



**... or small
such as the
Mianus River
Watershed.**

Watersheds are the lifeblood of Long Island Sound. The health of the Sound is determined by the health of the watershed.



Watershed management:

- ◆ uses drainage areas rather than political boundaries for planning and management
- ◆ balances conservation and development needs of the community
- ◆ coordinates land use planning and management between local governments in the watershed
- ◆ uses long range planning to protect resources for future generations

Watershed management:

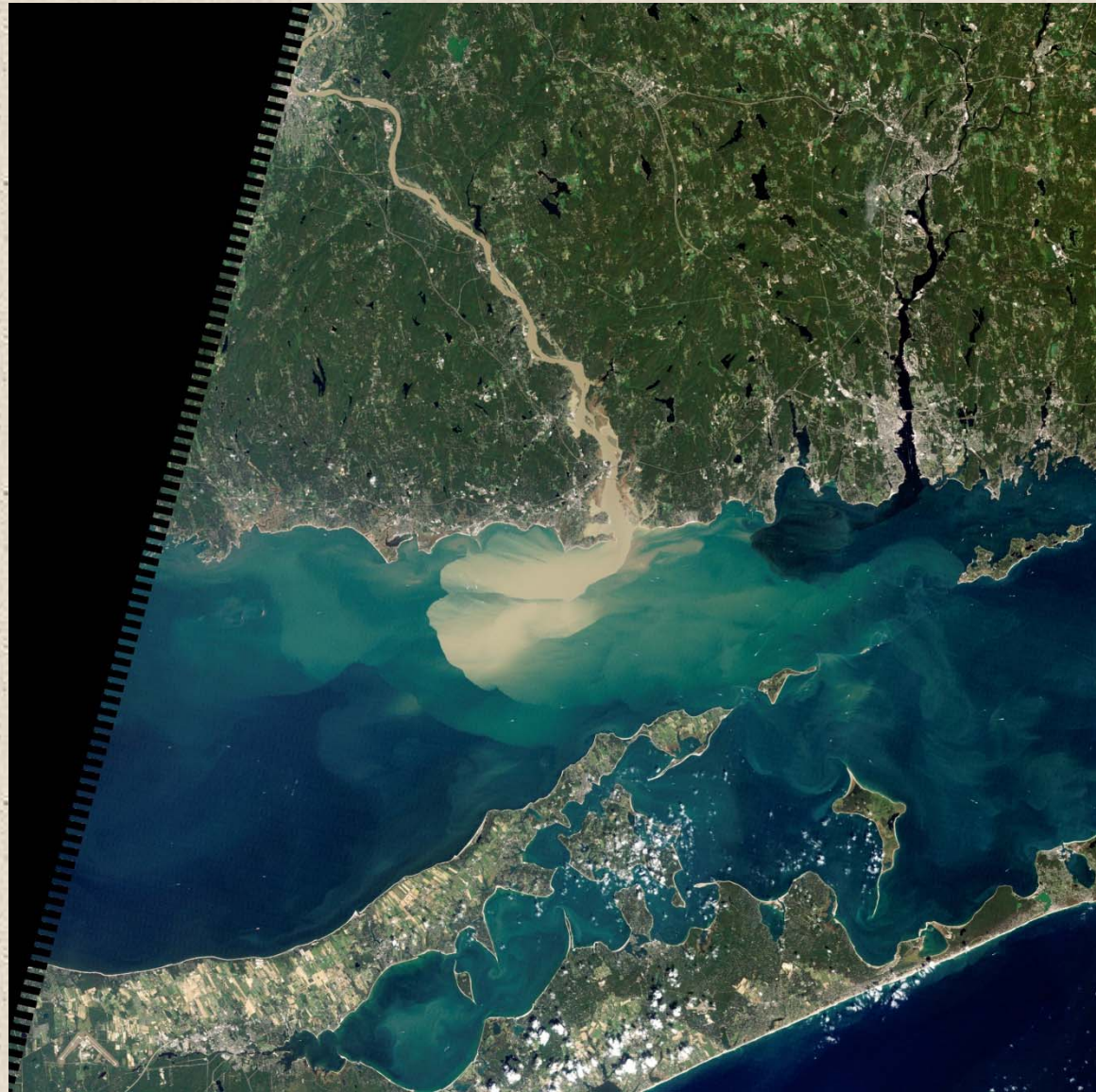
- ◆ deals with land use including:
 - loss of wetlands and riparian vegetation
 - conversion of forest and field to urban
 - channelization of streams
 - storm water runoff; quantity and quality
 - increases in impervious areas
 - septic system failures
 - construction sites

Challenges of Watershed Management/NPS Control

- **Historically only dealt with flooding – now focus on quantity and quality issues including NPS**
- **Limited public understanding of watersheds**
- **Lack of funding**
- **Water resources flow across political boundaries**
- **Involves lifestyle changes and personal choices**
- **How large/small watershed should we plan for?**
- **Voluntary versus regulatory approaches for NPS**
- **Because of new storm water regs now forgetting about E&S during construction**

Is there something we could have done to prevent this type of erosion from occurring?

What types of solutions are we working on long term?



CT River 9/09/2011 – after Hurricane Irene – NOAA photo

Best Management Practices for urban storm water:

- **Low Impact Development – starting with avoidance and limiting land disturbance = protecting open space**
- **reduce impervious surfaces**
- **more trees, meadows, gardens – less lawn**
- **vegetated riparian areas and protected wetlands including vernal pools**
- **less curbing – more infiltration**
- **“Good Housekeeping”**
 - e.g. E&S controls during construction, septic system maintenance, car maintenance, proper use, handling and storage of chemicals, etc.**





Pervious pavement helps to move water into subsurface flow instead of into centralized drainage system

Water Science on the WEB

Watershed mapping

http://cteco.uconn.edu/map_catalog.asp?town=149

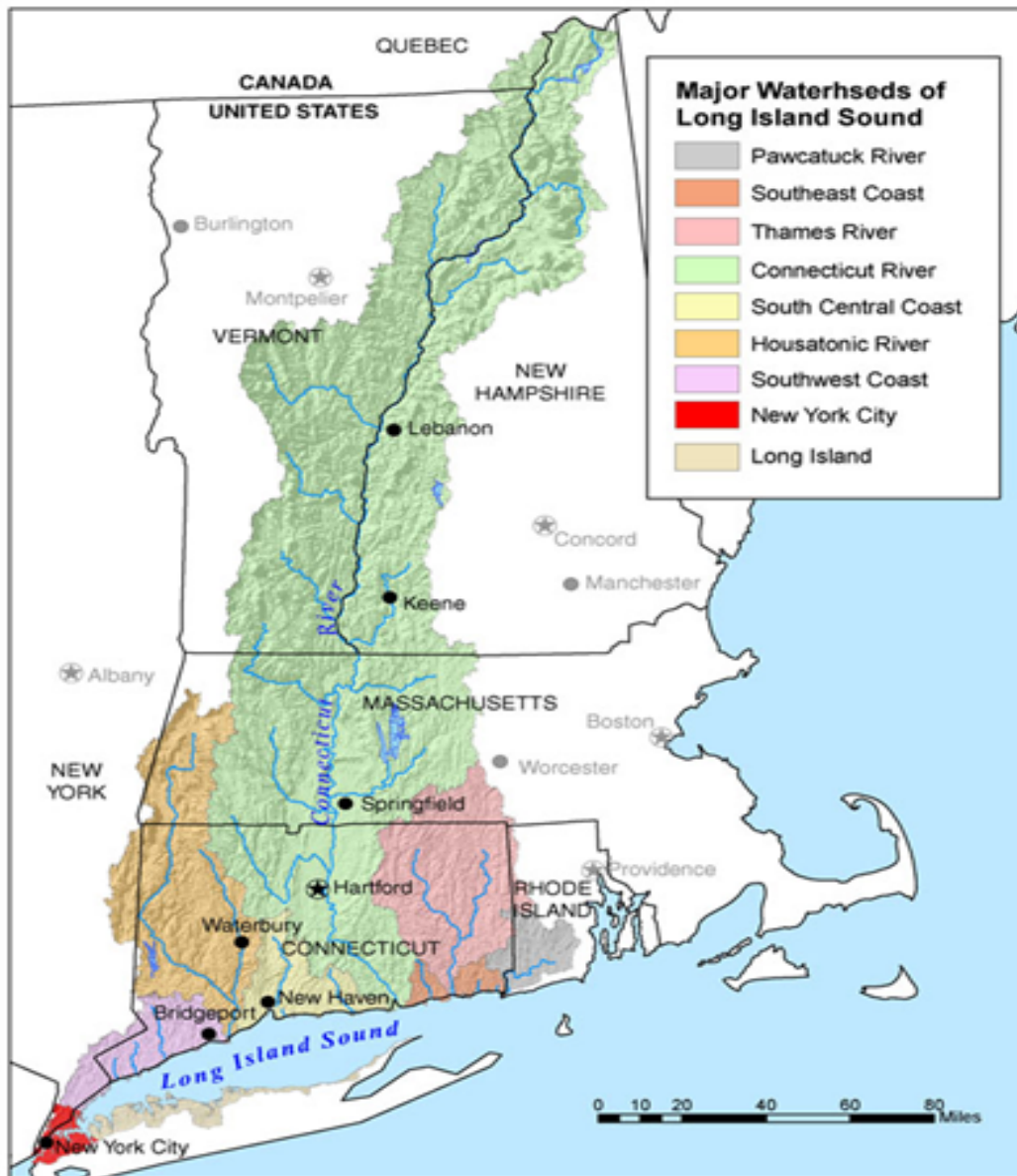
Water Quantity

<http://ct.water.usgs.gov/>

<http://droughtmonitor.unl.edu/>

Tidal gages

<http://tidesandcurrents.noaa.gov/stationhome.html?id=8516945>



Questions?

Contact:

Denise Savageau,
 Conservation Director
 Town of Greenwich

Denise.savageau@greenwichct.org
 203-622-6461