

Stormwater
Management and
Watershed-Scale
Planning
Onondaga County
Planning Federation
Planning Symposium
March 9, 2023

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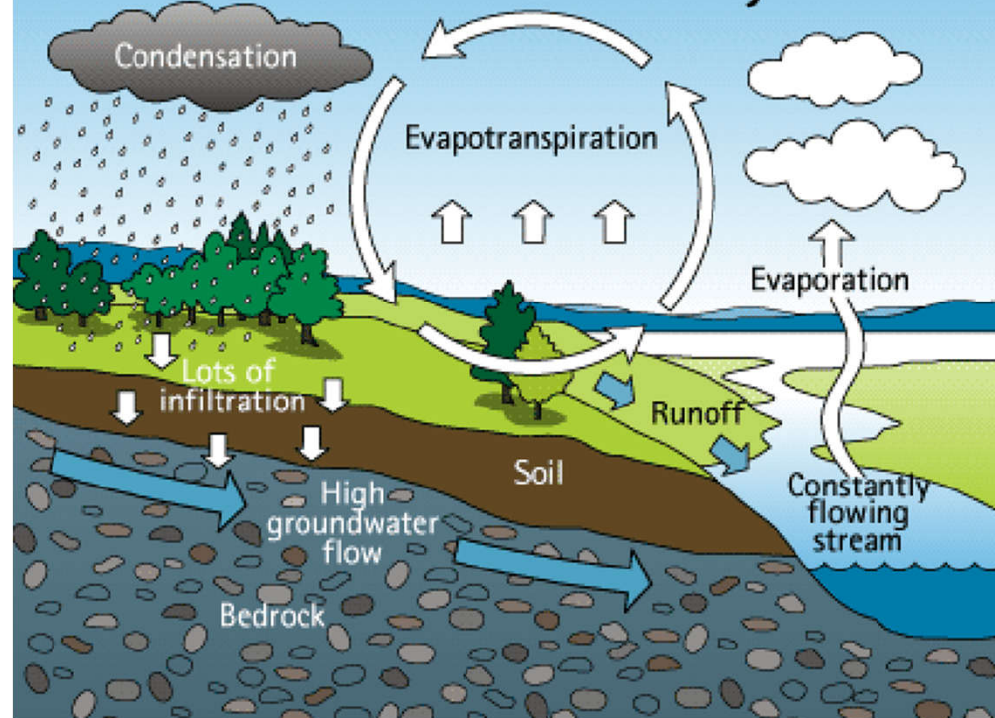
Stormwater Management for MS4s

Lauren Darcy

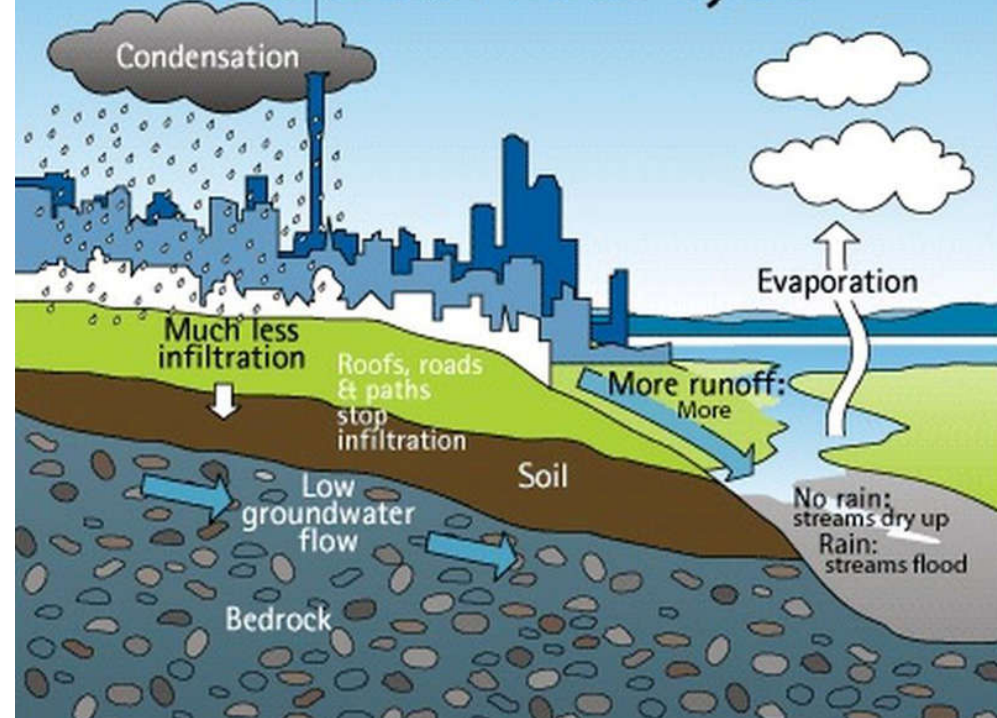
Senior Environmental Planner



The natural water cycle



The urban water cycle



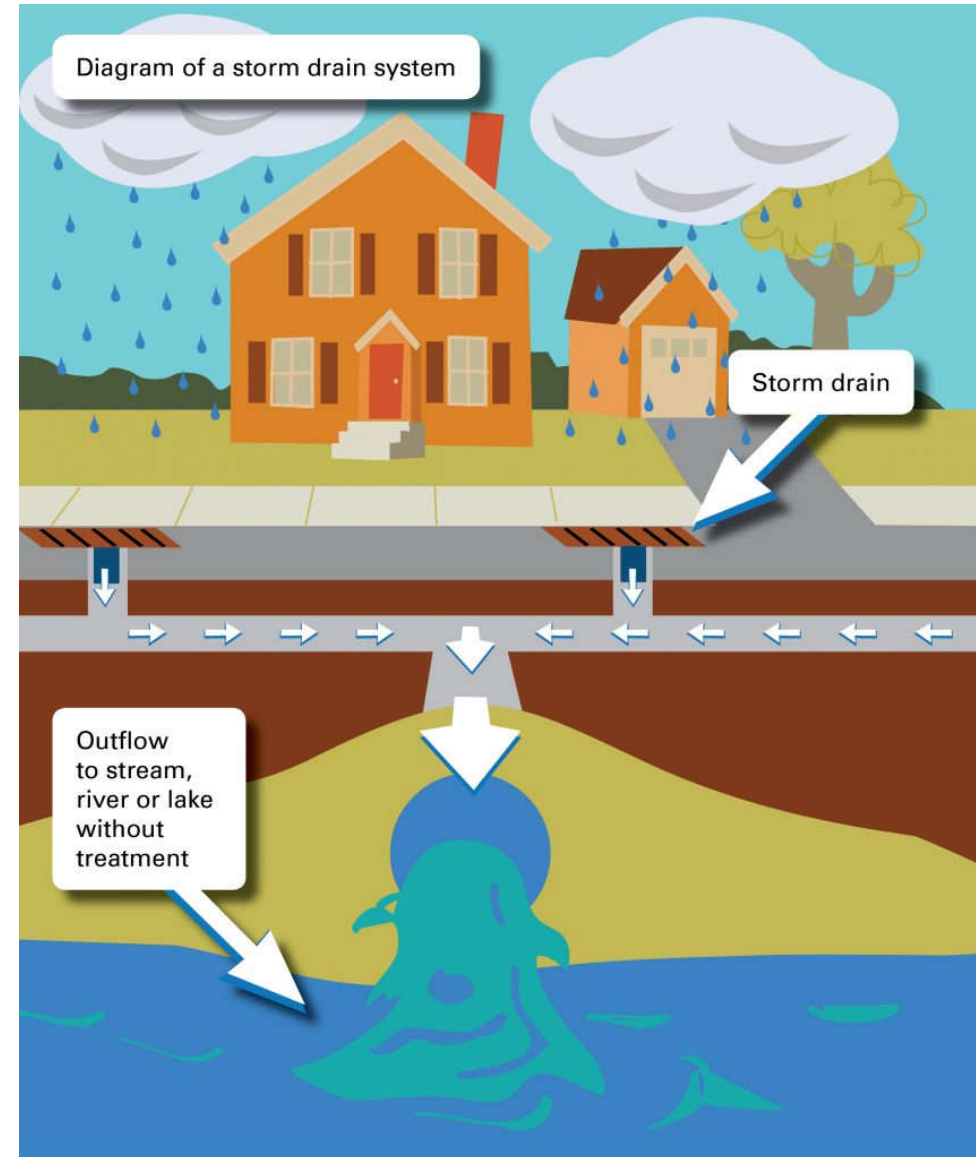
Municipal Separate Storm Sewer System (“MS4”)

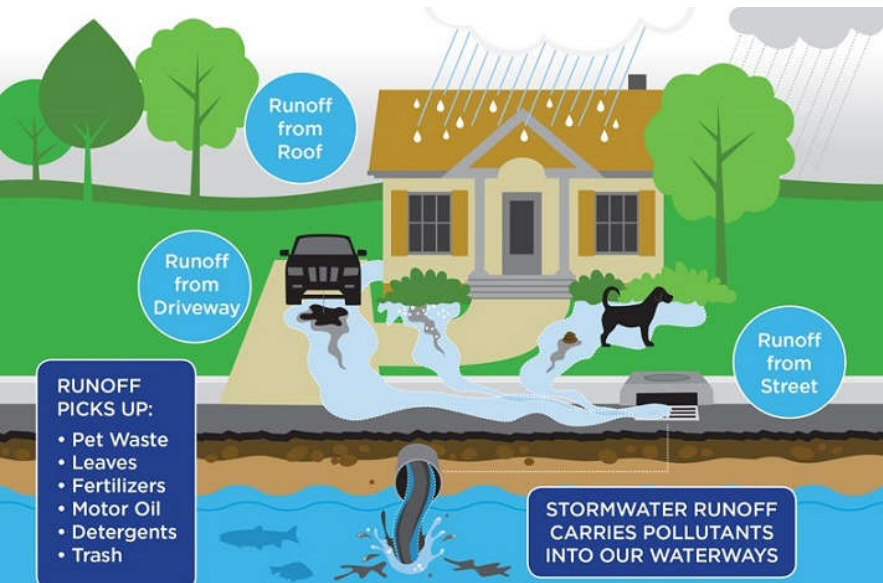
System of conveyances owned by a municipality, or other public entity, used to collect and/or convey stormwater.

Any system of open or closed pipes or ditches that carry runoff from rainwater or snowmelt (not sanitary sewer discharge, not combined)

Owned and operated by a government entity (Town, City, Village, State, County, etc.)

Also includes certain “non-traditional” entities (school and fire districts, government institutions, etc.)





Stormwater and runoff carry pollutants to our waterways:

- Pesticide
- Fertilizers
- Road salt
- Plastic
- Pet waste
- Grease and oil
- Household chemicals

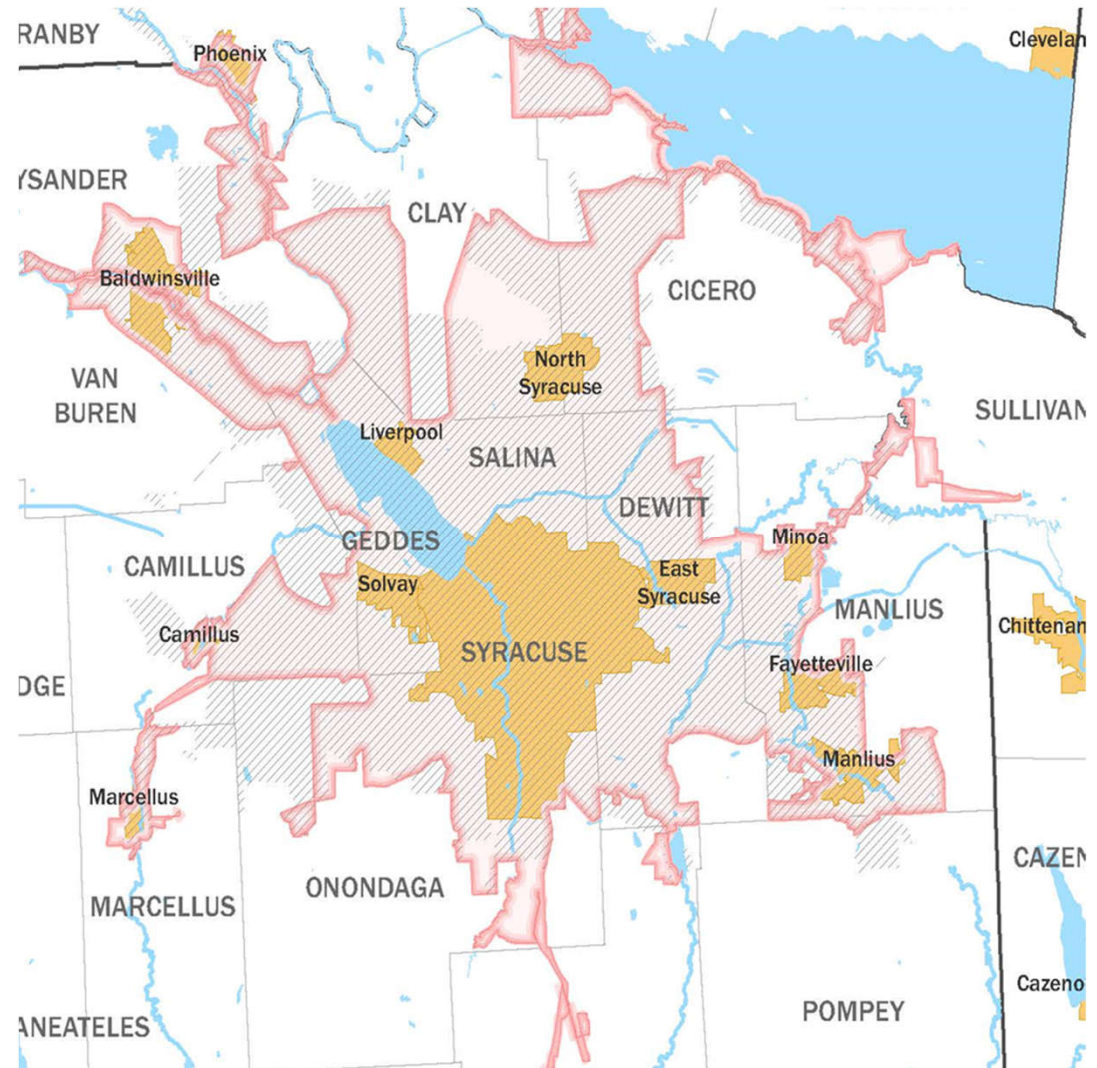
Stormwater Regulatory Framework

- Stormwater Pollution is regulated as part of the **Clean Water Act** under the **Phase II Stormwater Rule**
- The **NYS DEC** is responsible for implementing the stormwater management program in New York
- NYS DEC issues a General Permit with requirements that all MS4 communities must meet and report progress on.
- NYS DEC also issues a general permit for construction



MS4 Regulatory Framework

- NYS DEC issues General Permit requirements that all MS4 communities must meet and report progress on.
- MS4 Permit Requirements: MS4 operators must implement a Stormwater Management Program that and report annually to the DEC across 6 Minimum Control Measures (MCMs)
 1. Public Education & Outreach
 2. Public Participation & Involvement
 3. Illicit Discharge Detection and Elimination
 4. Construction Site Runoff Control
 5. Post-Construction Site Runoff Control
 6. Pollution Prevention & Municipal Good Housekeeping



Components of the Program

- Stormwater Management Plan (SWMP)
- Stormwater Program Officer
- Local Laws to enable program components and enforcement
- Annual reporting

MS4s within the Onondaga Lake Watershed are subject to additional reporting requirements to support Phosphorus Reductions targets

Town Board Role in the MS4 Program

- Pass supporting Local Laws
 - Erosion and Sediment Control Ordinances
 - Stormwater Management Ordinance
 - Illicit Discharge and Detection Ordinances
 - Site Plan Review Protocols
 - Other adjustments to Codes using Better Site Design principles and Low Impact Development
- Fund the SW Program
- Certify the Annual and Semi-Annual Reports
- Provide Opportunity for Public Input

Planning Board Role in the MS4 Program

- Site Plan Review
- SWPPP Review and Acceptance
 - All components and documentation are present
 - Required certifications are completed
 - Municipality certifies that based on their review, SWPPP meets permit requirements
 - May seek technical and/or legal review of SWPPP
 - Owner and designer retain liability for calculations and design elements

Stormwater Pollution Prevention Plan (SWPPP):

A documented plan to prevent runoff pollution from a particular construction site resources during development and after construction.

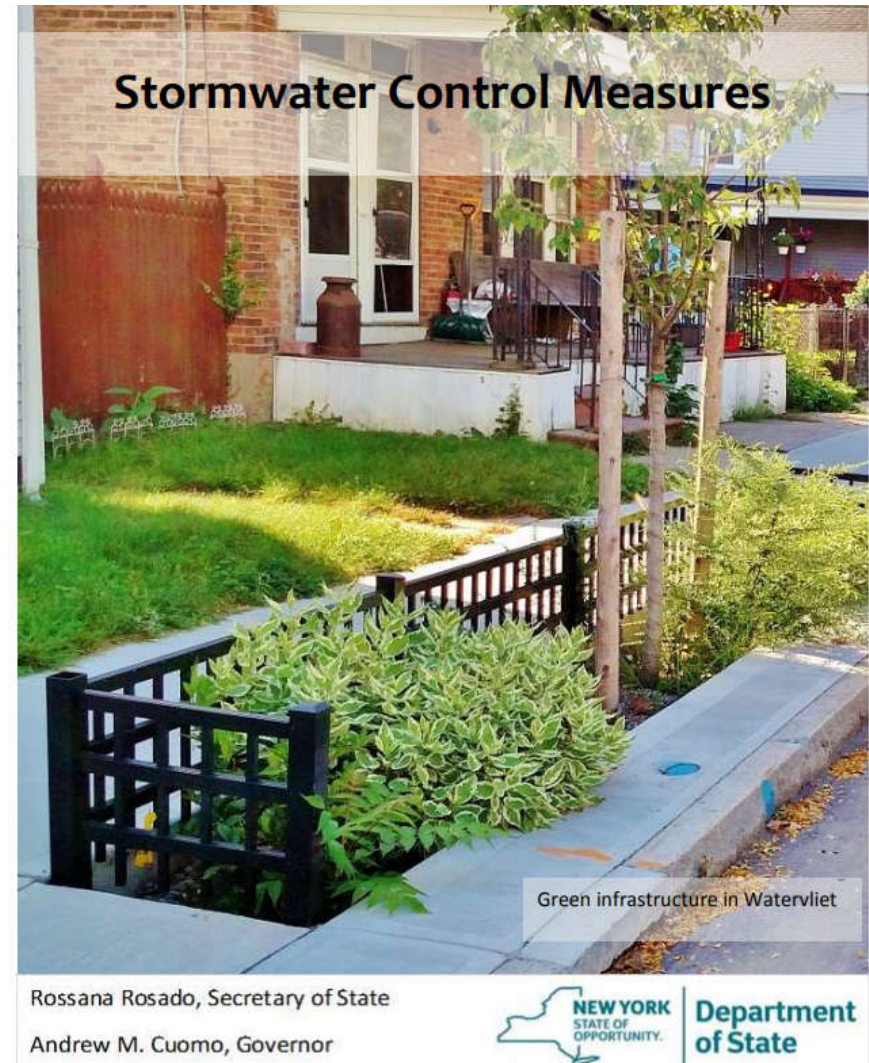
Better Site Design

A set of design principles that protect natural areas, reduce impervious surfaces, and better integrate stormwater treatment in development projects. These can be worked into local ordinances and site plan review requirements.

1. **Avoid** the Impacts
Preserve natural features and use conservation design techniques
2. **Reduce** the Impacts
Limit impervious cover
3. **Manage** the Impacts
integrate green infrastructure to offset impacts that cannot be avoided or reduced.

Stormwater Management for Unregulated communities

Local Stormwater Ordinances, Better Site Design and Low Impact Development techniques can prevent pollution in non-regulated MS4s as well!



Nine Element Watershed Plans

OVERVIEW

Onondaga County Planning Federation

March 9, 2023

Central New York

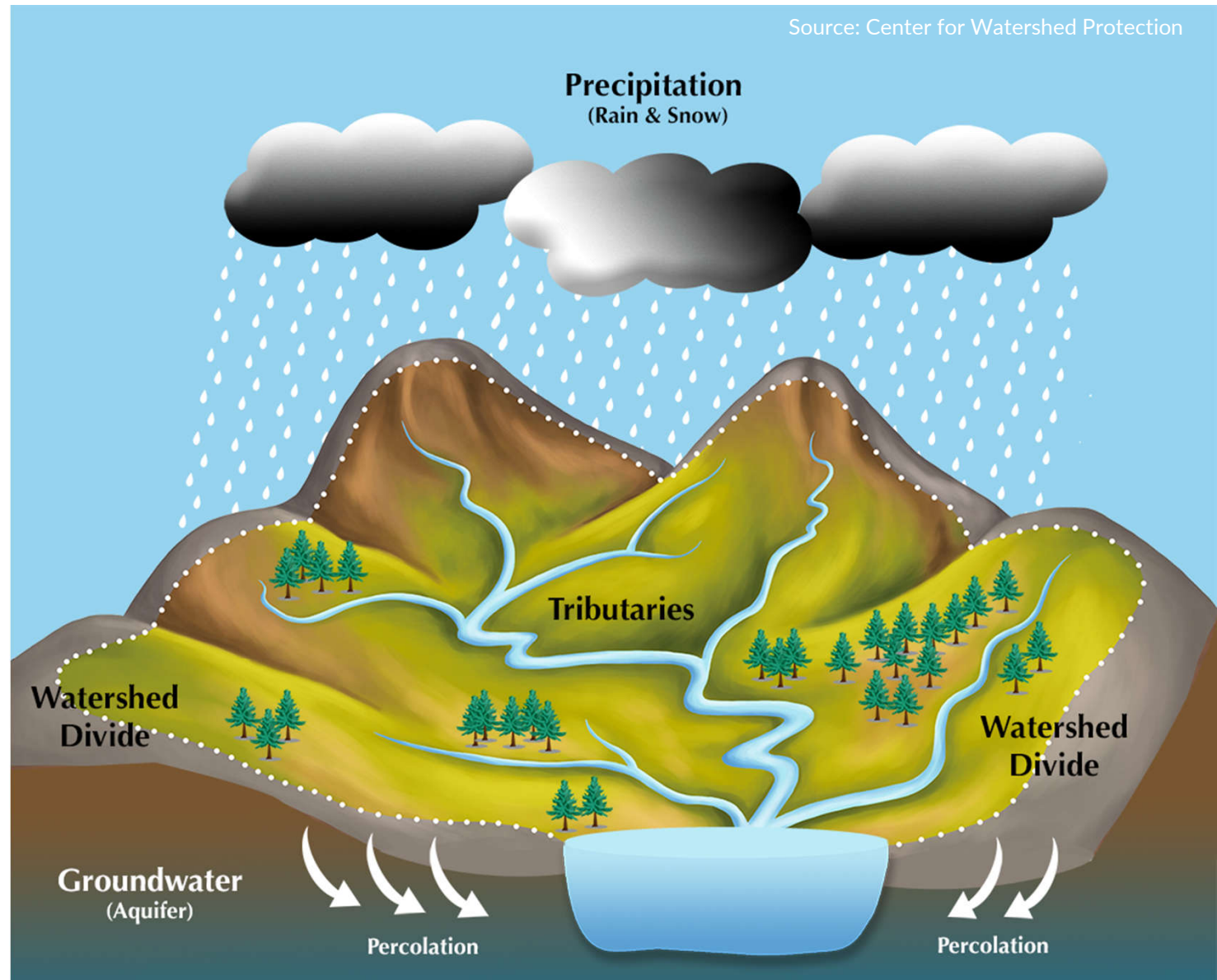


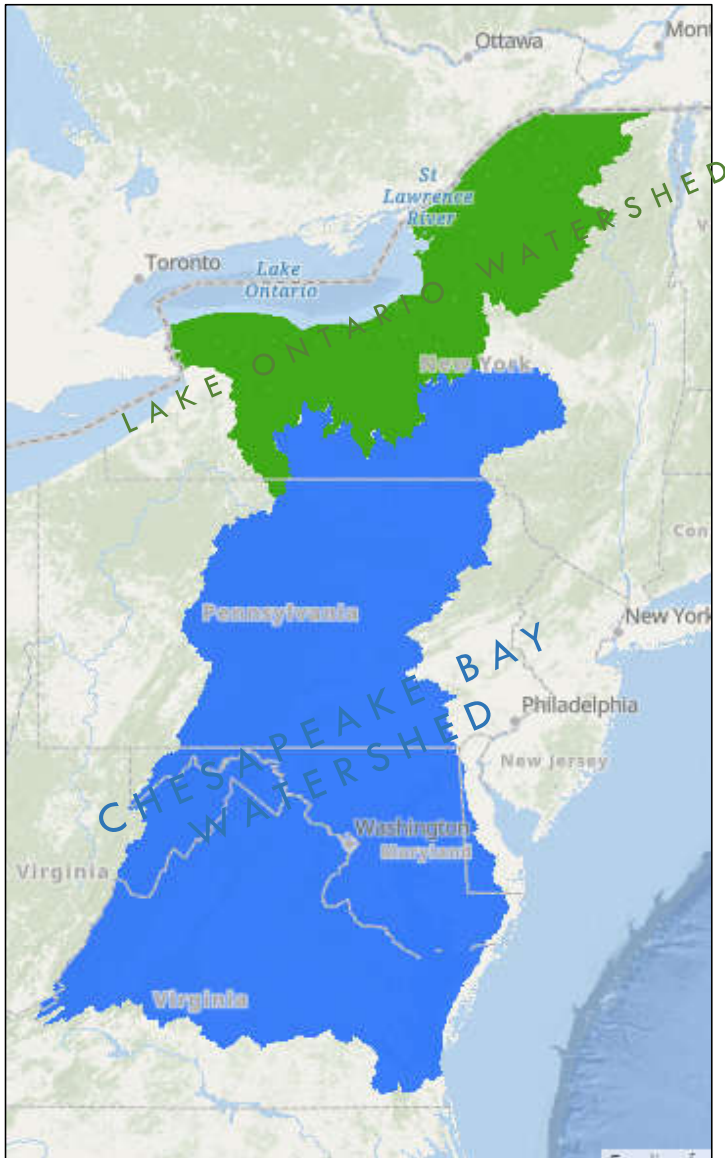
Regional Planning & Development Board

What is a watershed?

The land area that drains to a common body of water, such as a stream, lake, bay, or the ocean.

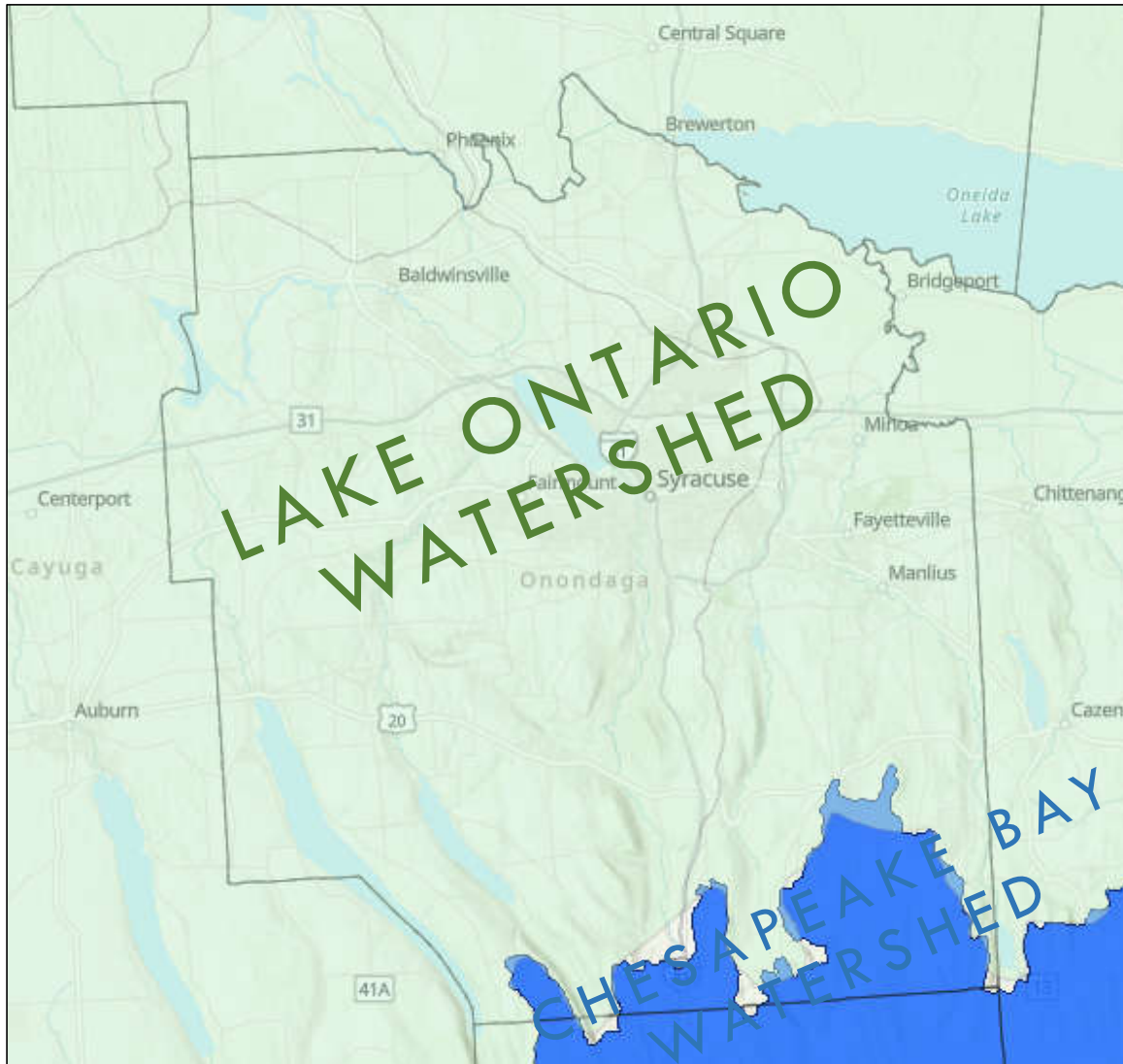
We all live in a watershed.



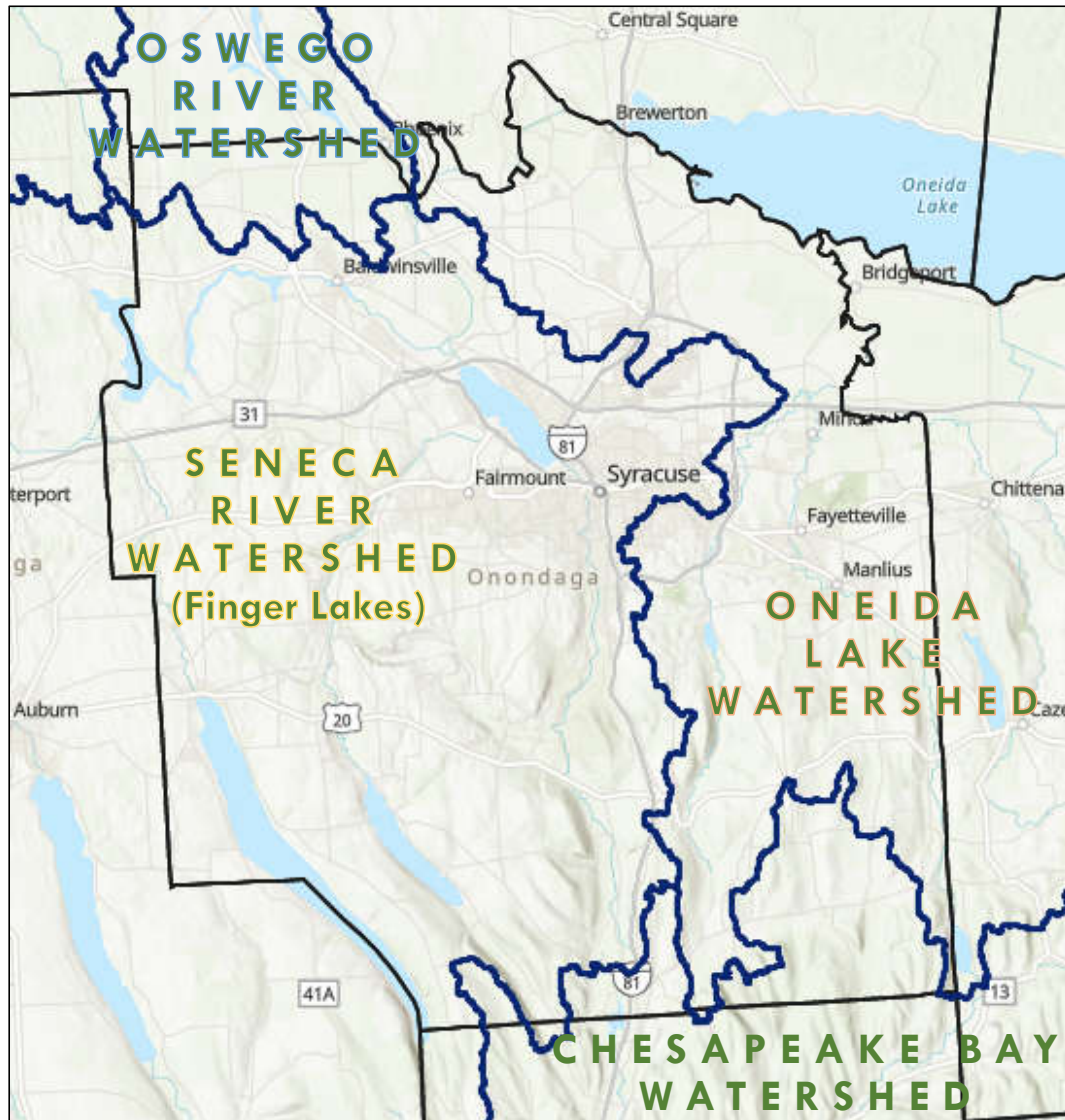


Two examples of 'large' watersheds:

- Lake Ontario Watershed (NY Portion)
- Chesapeake Bay Watershed
- Protecting these large water bodies requires large, multi-state (or international) efforts



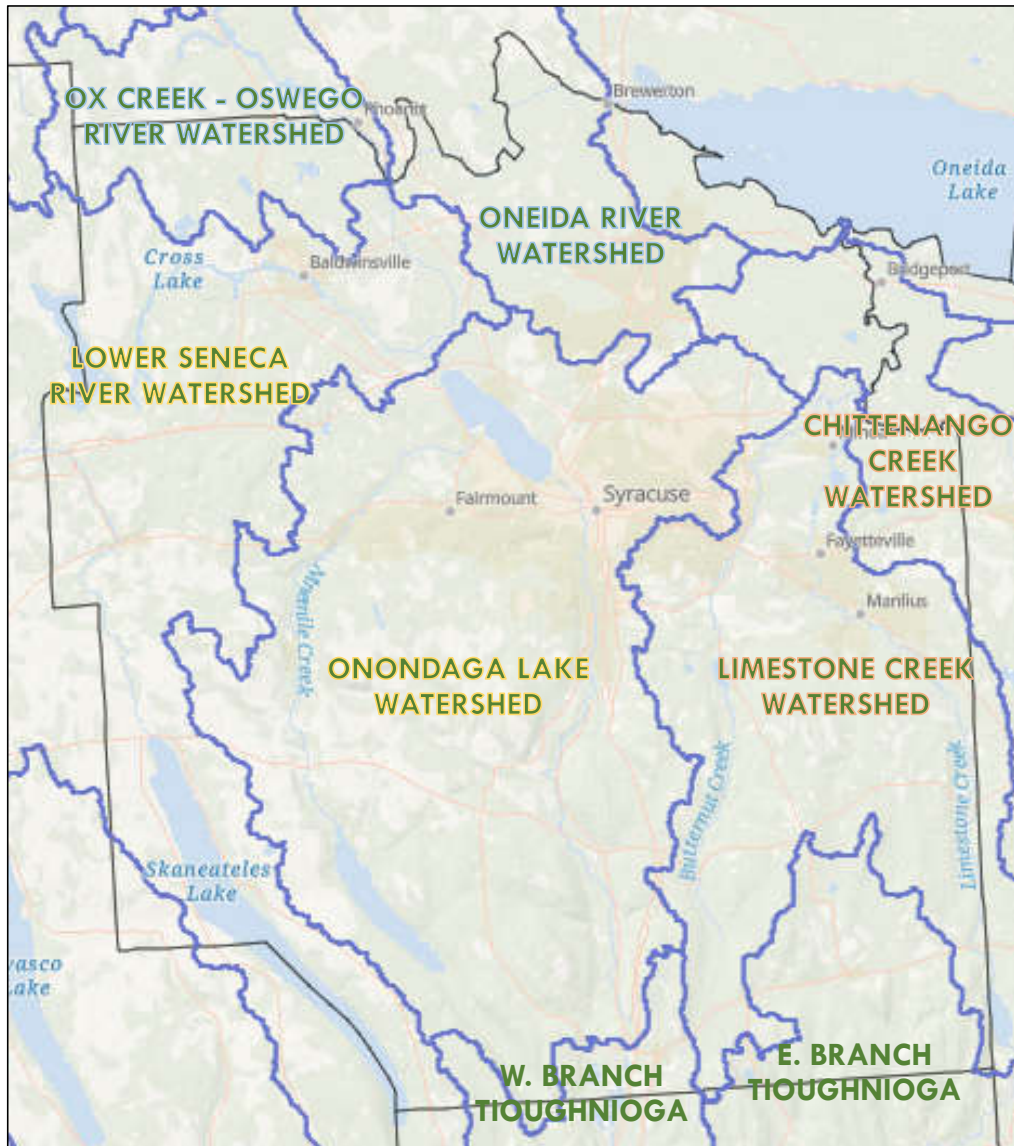
- Most of Onondaga County is in the Lake Ontario watershed
- Northern edge of Chesapeake Bay watershed is in the southern part of the county



Watersheds can be split into progressively smaller subwatershed levels, based on topography and receiving water.

Locally, the Lake Ontario Watershed can be split into:

- Seneca River (Finger Lakes)
- Oneida Lake
- Oswego River



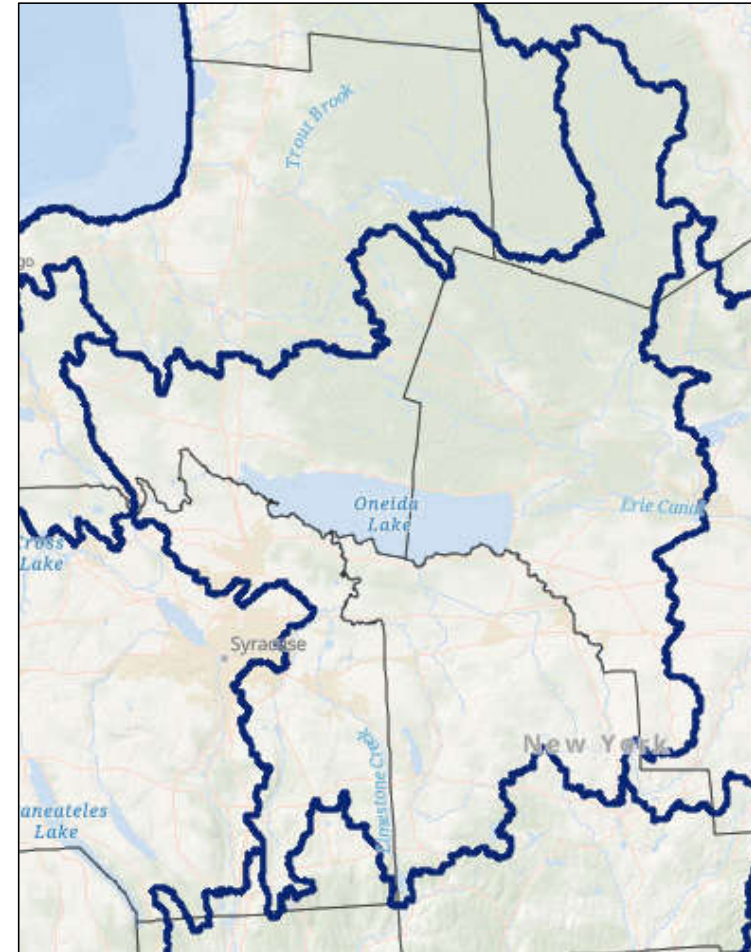
Action / Planning can be easier to focus at smaller scales



At the smallest level, we can think about multiple small watersheds within a county

What is a “watershed plan”?

- Watersheds typically span municipal boundaries
- Watershed planning focuses on the relationship between land use / land cover, the movement and storage of water, and water quality.
- How are economic, social, and natural processes connected? How can they be balanced to promote water quality?



Watershed Plans: Example

A Management Plan for Oneida Lake and its Watershed

2004 – CNY RPDB

EIGHT PRIORITY AREAS

- Reducing Soil Erosion and Sedimentation
- Managing Flooding and Water Levels
- Preventing Septic Waste Runoff From On-Site Sewage Disposal Systems
- Controlling and Preventing Exotic Species
- Promoting Responsible Boating
- Encouraging Safe Road Deicing Application and Storage
- Managing Double-Crested Cormorants
- Strengthening the Fish Community



Nine Element Plan

Like a Watershed Plan:

- Community-driven priorities
- Public engagement
- Uses best available science
- Commitment to adaptive management: build and measure

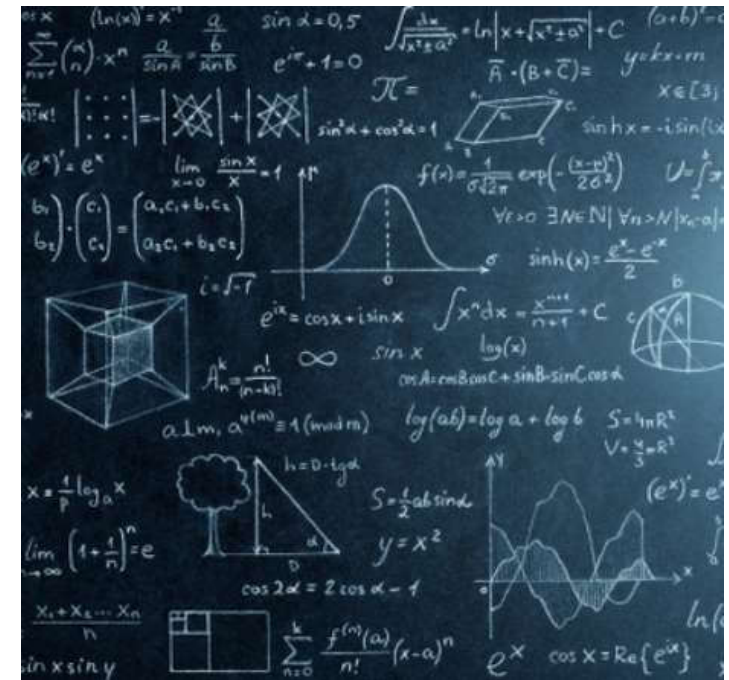
Unlike a Watershed Plan:

- Requires that stakeholders identify a specific pollutant (or pollutants)
- Set a target for future levels
 - “Success” = reaching target level for a pollutant
- Develop a plan, with a scientific basis, for how to get to the target level

What's a “scientific basis” for a future condition?

This brings us to the thing that makes a 9E distinct: modeling

- What's the cumulative impact on water quality of lots of activities spread across the whole watershed?
- No easy way to “see” or measure this
- You need to use a model. Or two.



Skaneateles Nine Element Plan

Watershed Model = 'SWAT'

INPUTS:

- Digital Elevation Model (DEM)
- Land use/land cover
- Meteorology
- Hydrology
- Stream flow data
- Stream water quality data
- Soil types (hydrologic soil class)
- Crop information
- Livestock information

Lake Water Quality Model = 'CE-QUAL-W2'

INPUTS:

■Physical

- Bathymetry
- Water surface elevation
- Watershed area
- Meteorological data
- Hydrology
- Temperature (air and water)
- Light extinction

■Chemical

- Nutrients, Dissolved Oxygen, Carbon Compounds

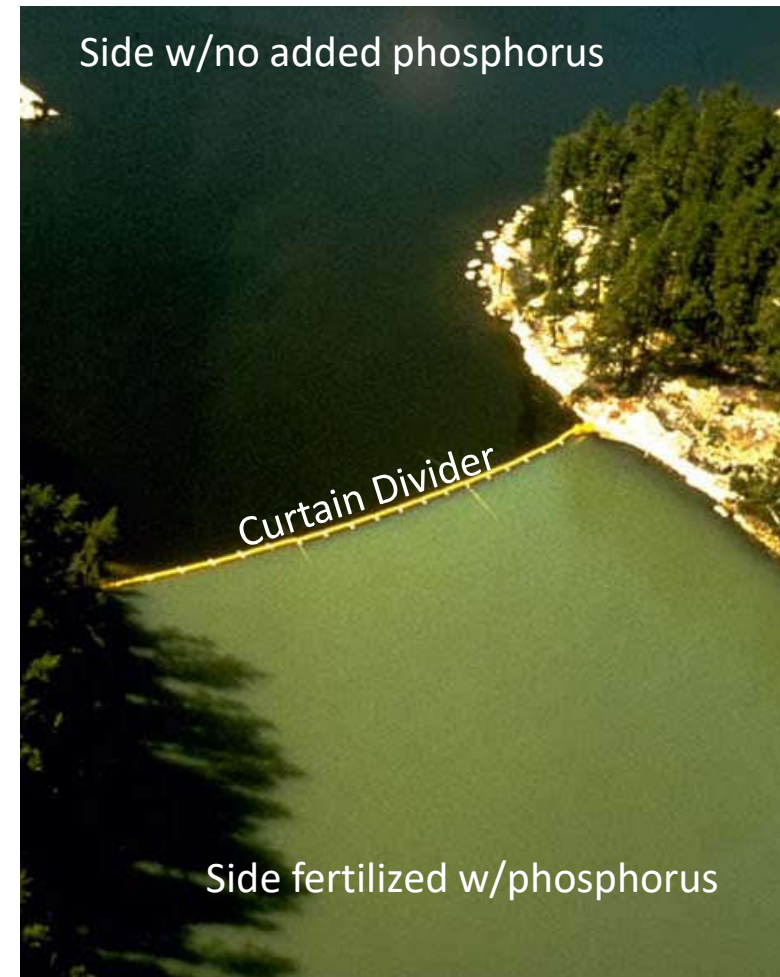
■Biological

- Phytoplankton, Cyanobacteria, Zooplankton
- Benthic mussels

What's the pollutant?

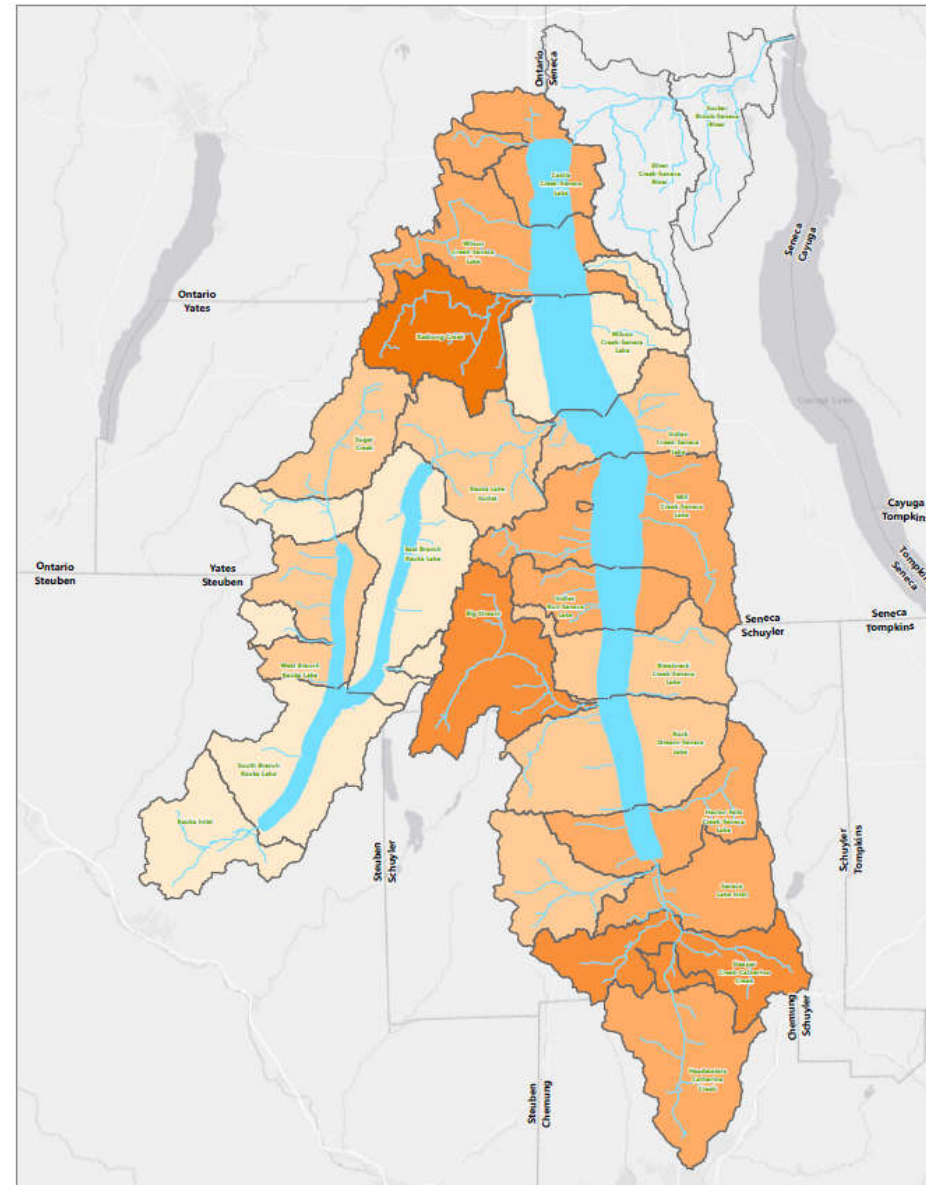
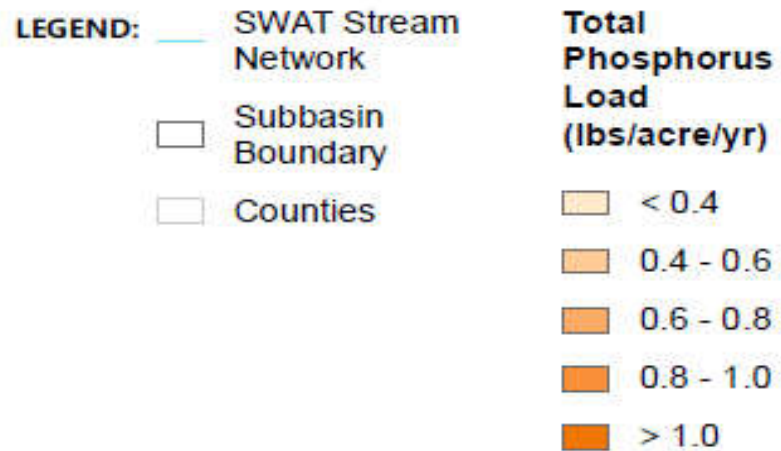
In most cases:

- Nutrients
 - Phosphorus
 - Nitrogen
 - Nutrients feed algae and Harmful Algal Blooms (HABs)
- Sediment
 - Sediments carry pollutants and nutrients



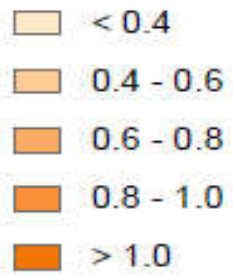
Lake 226 – Canadian Experimental Lakes Area

Modeling Existing Conditions: Where are pollutants coming from?



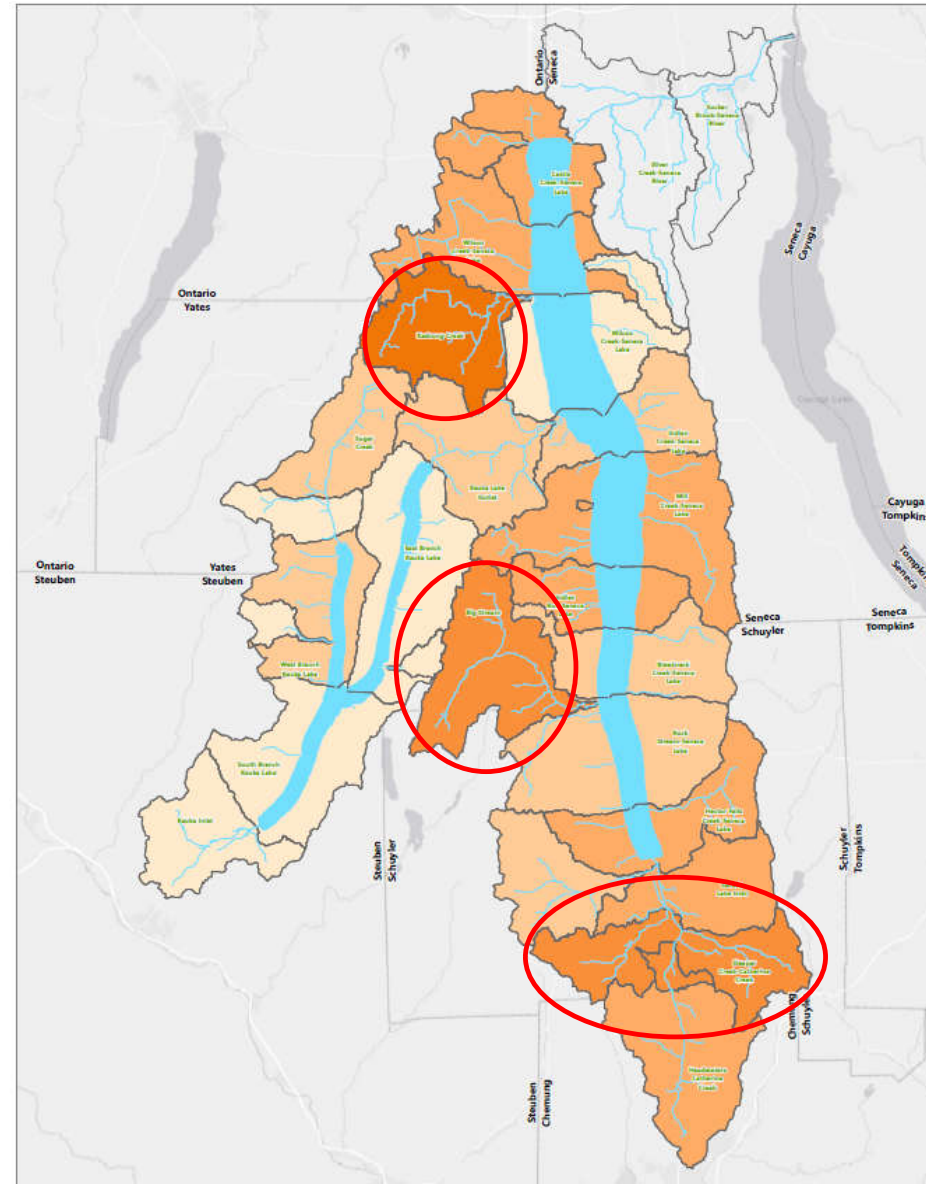
Scenario Modeling

**Total
Phosphorus
Load
(lbs/acre/yr)**



What if...?

- We could replace septic tanks with sewers in 50% of the watershed?
- Implement stream stabilization projects on 10 miles of stream every year?
- Add riparian buffers along all major tributaries?
- Reduce fertilizer runoff from agricultural properties by 30%?



The Nine Elements



Stakeholder Input



Quantify
Pollutant
Inputs and
Sources



Set Pollutant
Reduction
Goals



Identify Best
Management
Practices

Implementation Plan



Schedule



Funding
Sources



Measure
Progress



Monitoring



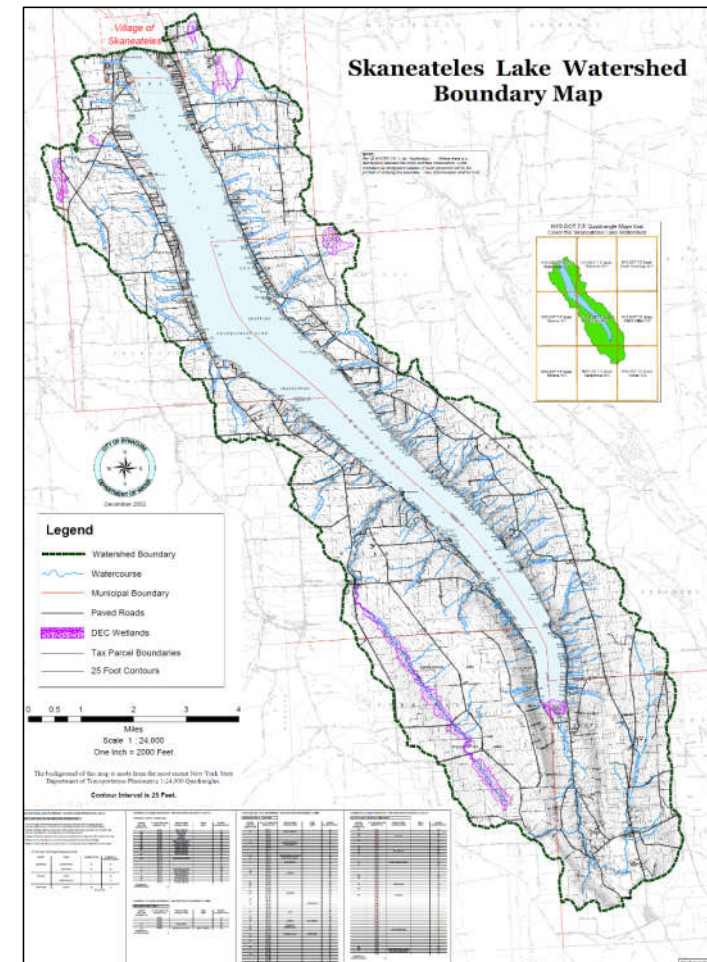
Evaluation

[Dashed border] = 9E elements where water quality models can be used to support evaluations

Example: Skaneateles 9E

Currently in development

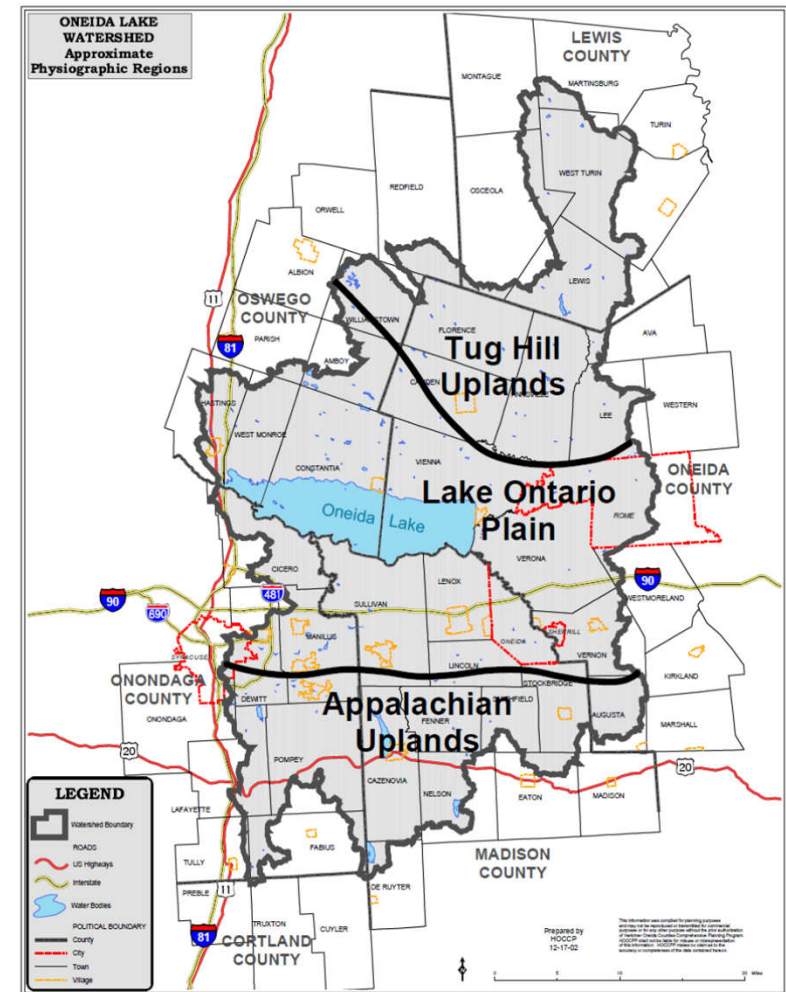
- Funded by the Department of State under Title 11 of the Environmental Protection Fund
- NYS DEC is providing funds for the modeling
 - Additional support from Town of Skaneateles & SLA
- Target pollutant: Phosphorus
- Pollutant level: In progress
- Modeled Scenarios?
 - Climate change & increased development
 - Streambank stabilization
 - Riparian buffers
 - Agricultural BMPs



Example: Oneida 9E

Currently in development

- Funded by the Department of State under Title 11 of the Environmental Protection Fund
- Target pollutant:
 - Phosphorus
 - Sediment?
- Pollutant level: In progress
- Several significant invasive species issues
- Warming is already a major factor
 - Changes in summer water temperatures have been approximately 1.0° F /decade
 - Higher than the global average of 0.6° F/decade
 - Duration of ice cover on Oneida Lake has decreased by 6.5 days/decade from 1975 to 2021



Resources

- Guides / Manuals
 - EPA's *A Quick Guide to Developing Watershed Plans to Restore and Protect Our Waters*
 - NYS DOS: *Watershed Plans: Protecting and Restoring Water Quality*
 - NYS DEC: *Diet for a Small Lake*

Resources

- Websites
 - EPA: “How’s my Waterway?”
 - <https://www.epa.gov/waterdata/how-s-my-waterway>
 - USGS: StreamStats
 - <https://streamstats.usgs.gov/ss/>
 - NYS Department of State: 9E Page
 - <https://dos.ny.gov/9-element-watershed-plans>
 - NYS DEC: 9E Pages
 - https://www.dec.ny.gov/docs/water_pdf/9efaq17.pdf
 - <https://www.dec.ny.gov/chemical/23835.html#Nine>
 - River Runner: watch where a raindrop from anywhere in the US
 - <https://river-runner.samlearner.com/>
 - Center for Watershed Protection
 - www.cwp.org

Questions & Comments

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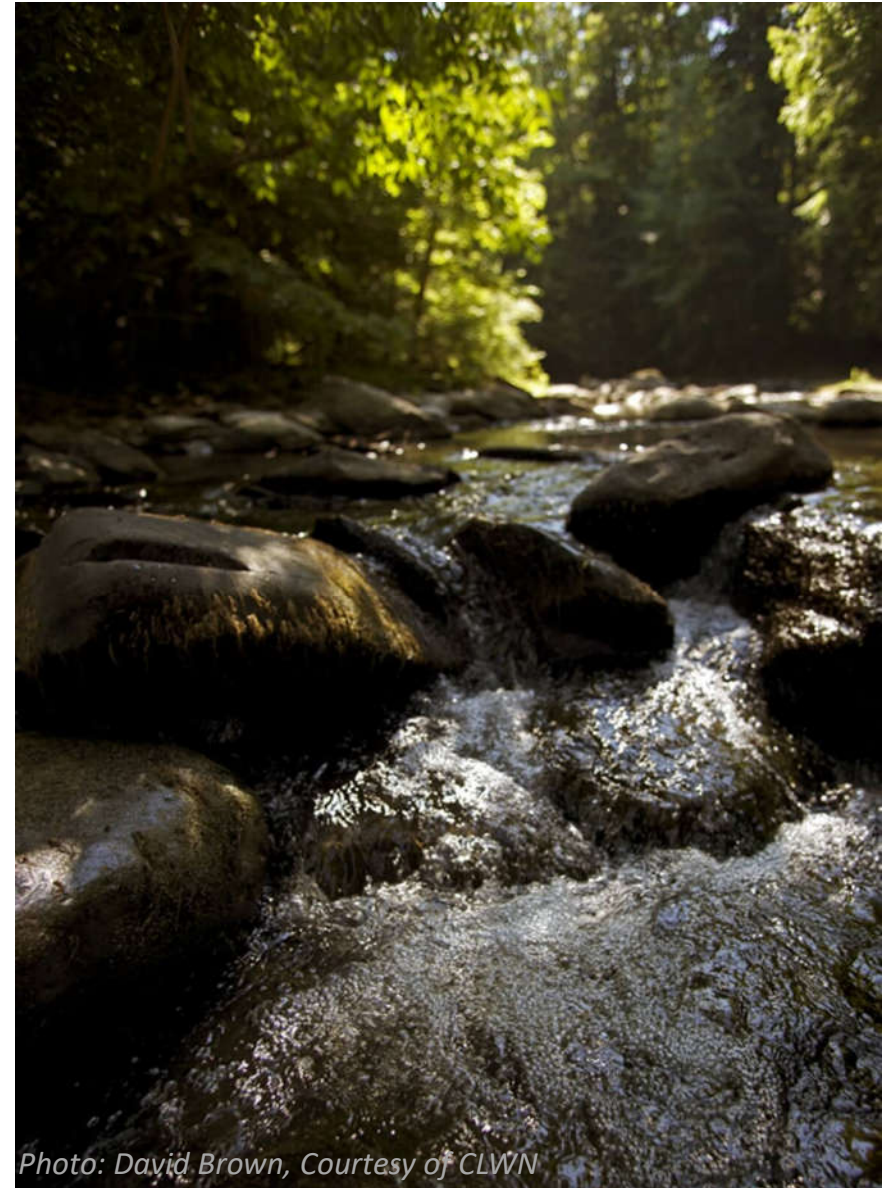


Photo: David Brown, Courtesy of CLWN