Current Issues 2020

Water Resources Management:
Local Control and Local Solutions

1. Understanding How Groundwater and Surface Water Systems Function

2. Understanding the Importance of Water Quality and Quantity as a Foundation in a Healthy Ecosystem

3. Understanding A Variety of Water Quality Indicators in Different Landscapes

4. Understanding a variety of water quantity indicators in different landscapes

5. Understanding how sustainable and best management practices enhance and protect water quality and quantity for humans and wildlife

Water Resources Management: Local Control and Local Solutions

6. Understanding the differences of local, regional, and national systems that manage natural resources and the importance of each in water resources.

7. Understanding the social, economic, political impacts of natural resources management and decision making.

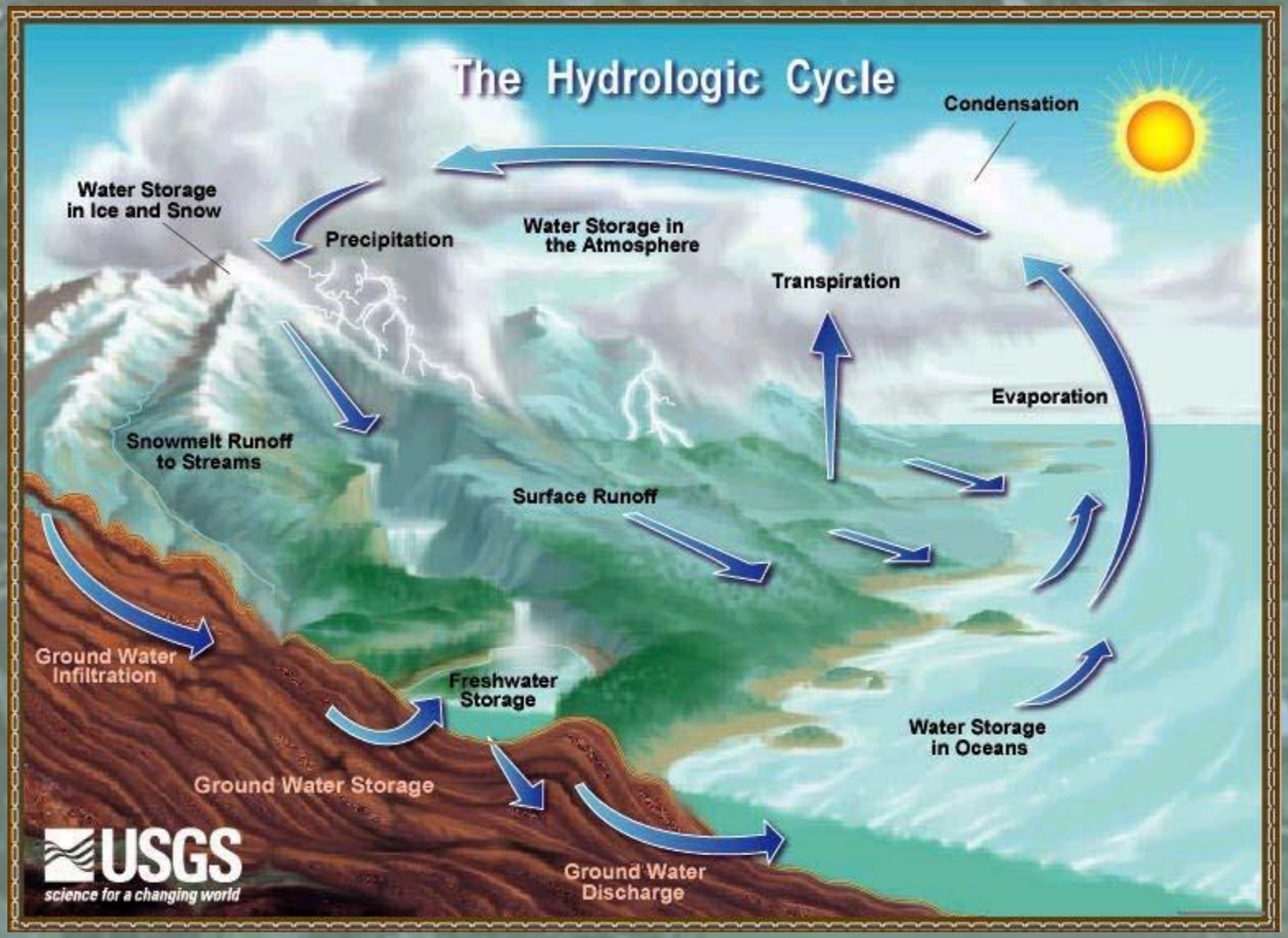
Knowledge of Hydrologic Cycle

- Three phases - solid, liquid and vapor
- Surface Waters in New York State are assigned a letter classification that denotes their best uses (A,B,C,D).
  - (A) source of drinking water
  - (B) primary and secondary contact recreation and fishing
  - (C) fishing – Suitable for wildlife propagation
  - (D) fishing – interment / water condition – not suitable for wildlife propagation
- Grounds Waters in New York State are assigned a letter classification that denotes their best uses (GA,GSA,GSB).
  - (GA) Source of potable water supply
  - (GSA) Source of potable mineral waters – Saline groundwaters
  - (GSB) Waters receiving water for disposal of wastes

Knowledge of Hydrologic Cycle

- Many stream order classification systems have been developed, but no single system has been universally accepted.
  - Stream Order (1 – 7)
  - Rosgen Classification Method
- Streamflow - is the flow of water in streams, rivers, and other channels, and is a major element of the water cycle.
  - Runoff for a specified period and geographic area is computed from all streamgages with complete streamflow record in the geographic area.
  - Used for record keeping, comparison and trends kept by the U.S. Geological Survey (USGS) National Streamflow Network.

Knowledge of Hydrologic Cycle

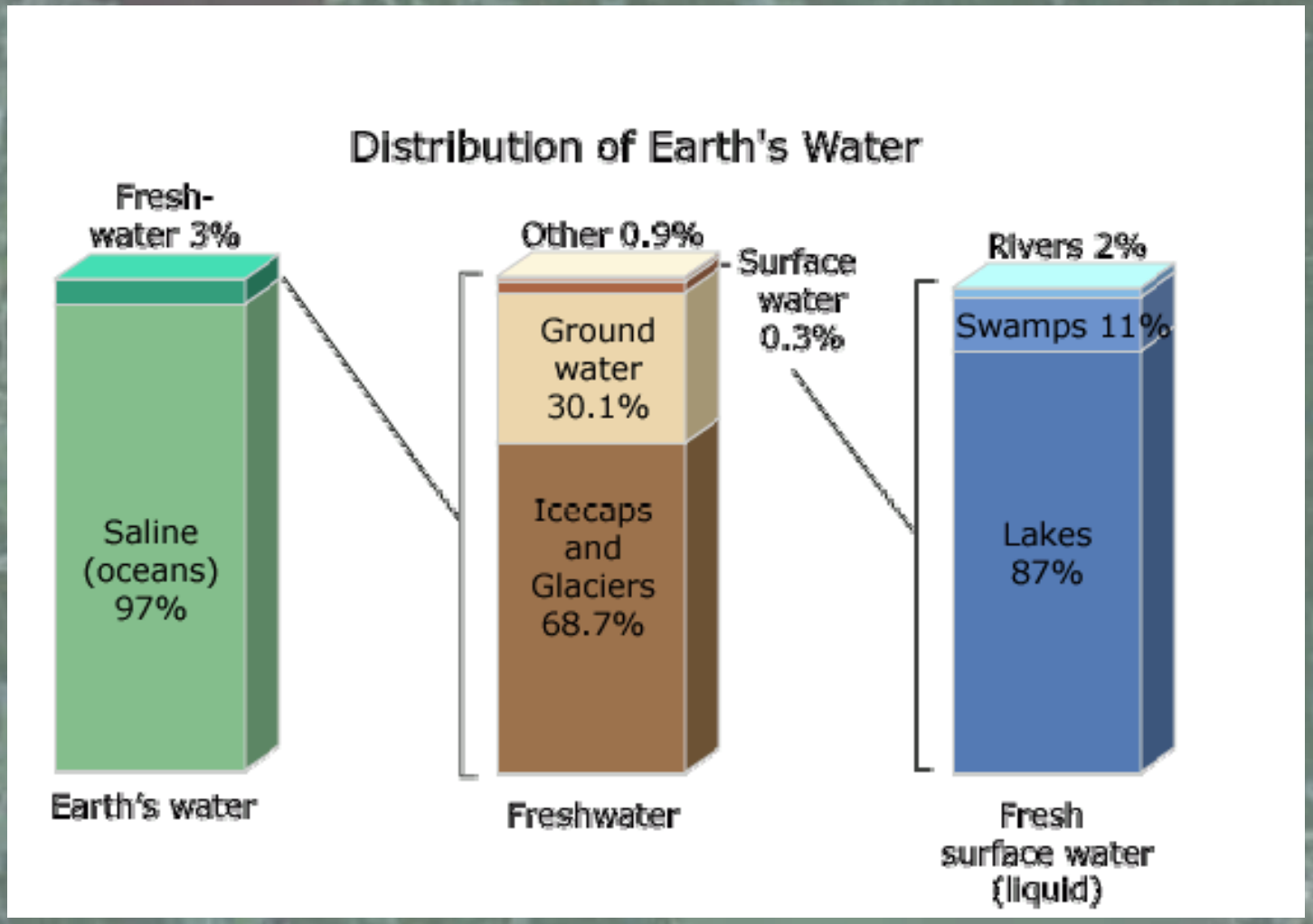


Knowledge of Groundwater and Surface Water Interactions

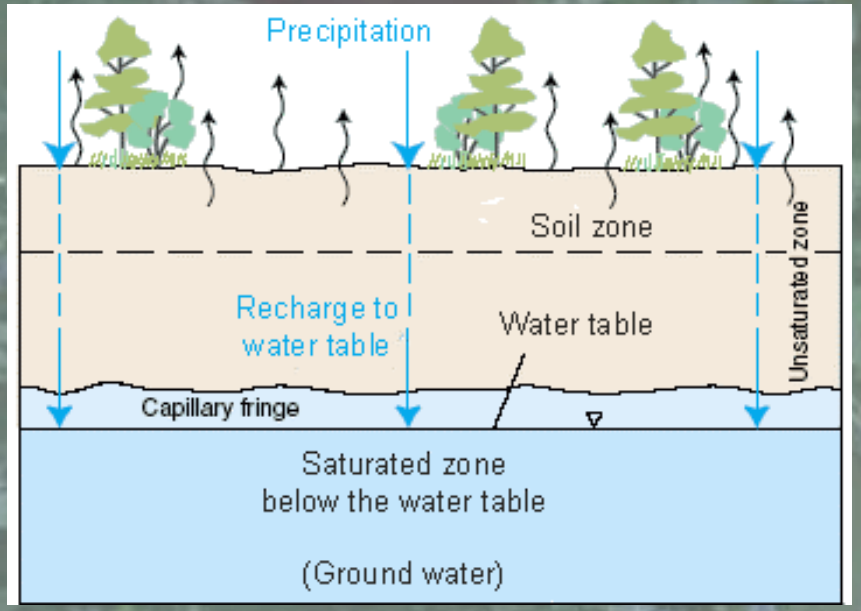
The water cycle describes the existence and movement of water on, in, and above the Earth. Earth's water is always in movement and is always changing states, from liquid to vapor to ice and back again.

- Evaporates
- Sublimate
- Atmosphere
- Evapotranspiration
- Condense
- Precipitation
- Surface Runoff
- Streamflow
- Infiltration
- Aquifers
- Ground-water discharge
- Stored as freshwaters
- Springs

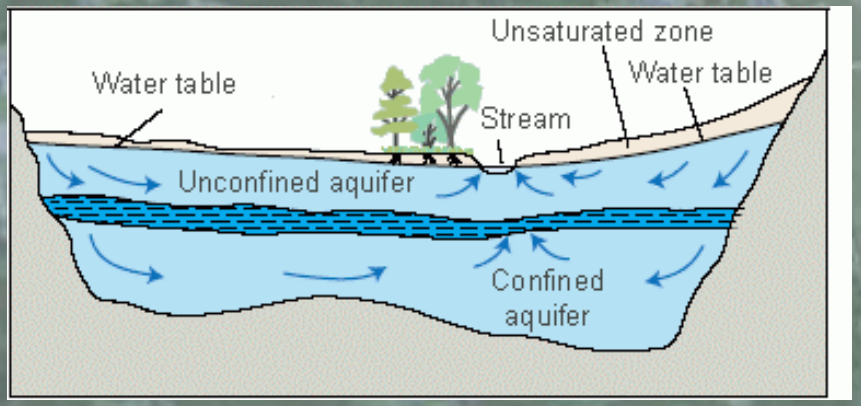
Knowledge of Groundwater and Surface Water Interactions



Knowledge of Groundwater and Surface Water Interactions

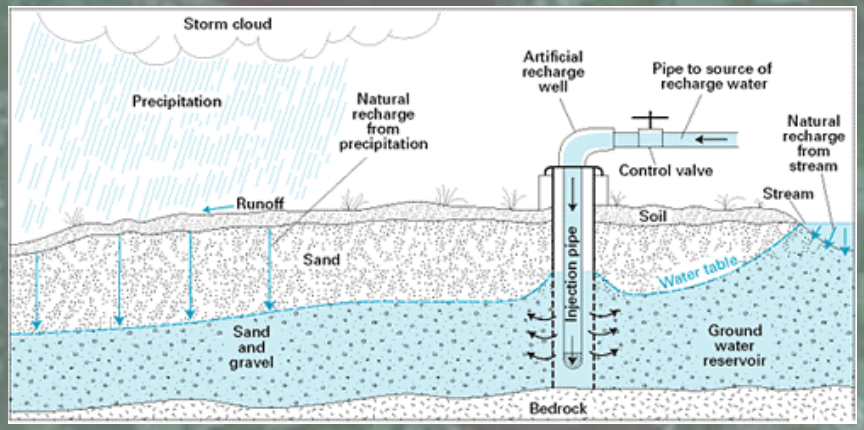


- Subsurface Water

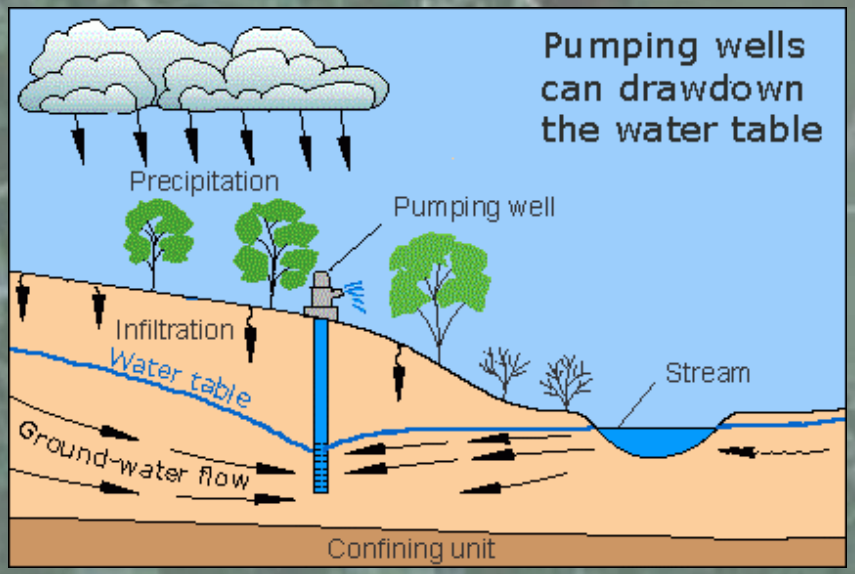


- Infiltration Replenishes aquifers

Knowledge of Groundwater and Surface Water Interactions

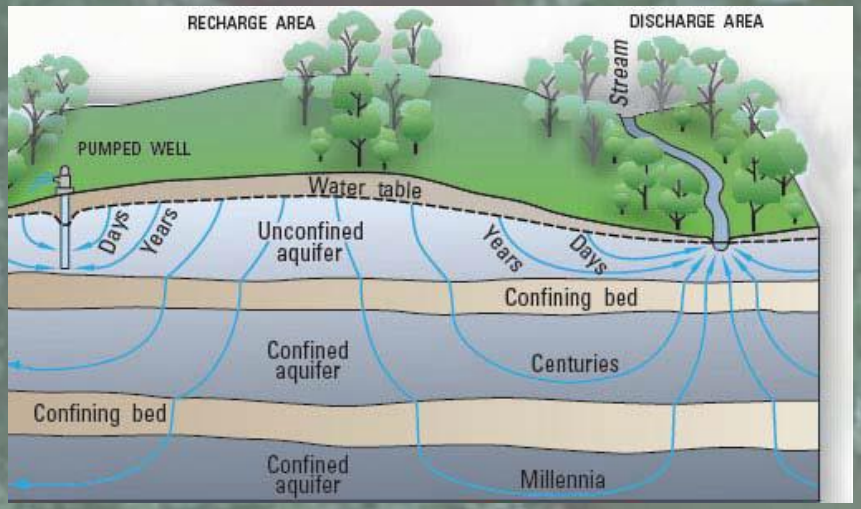


- Natural and artificial recharge of ground water

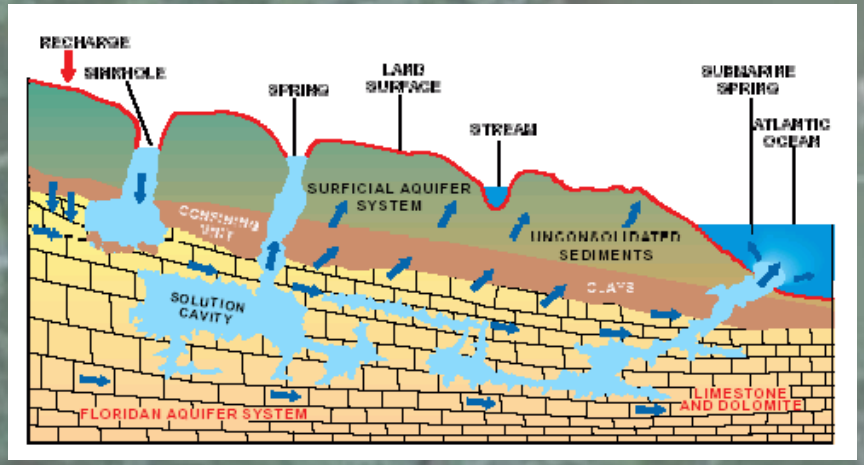


- Pumping can affect the level of the water table

Knowledge of Groundwater and Surface Water Interactions



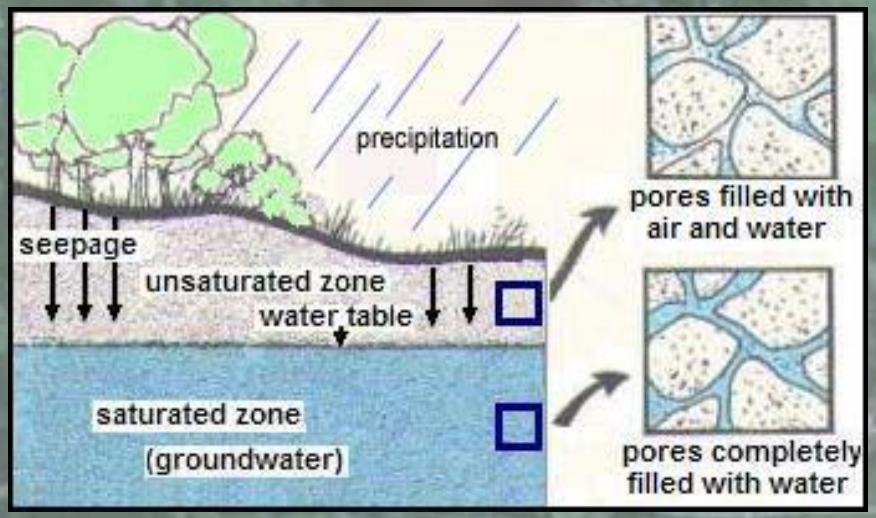
- Ground water flows underground



- Springs are Formed

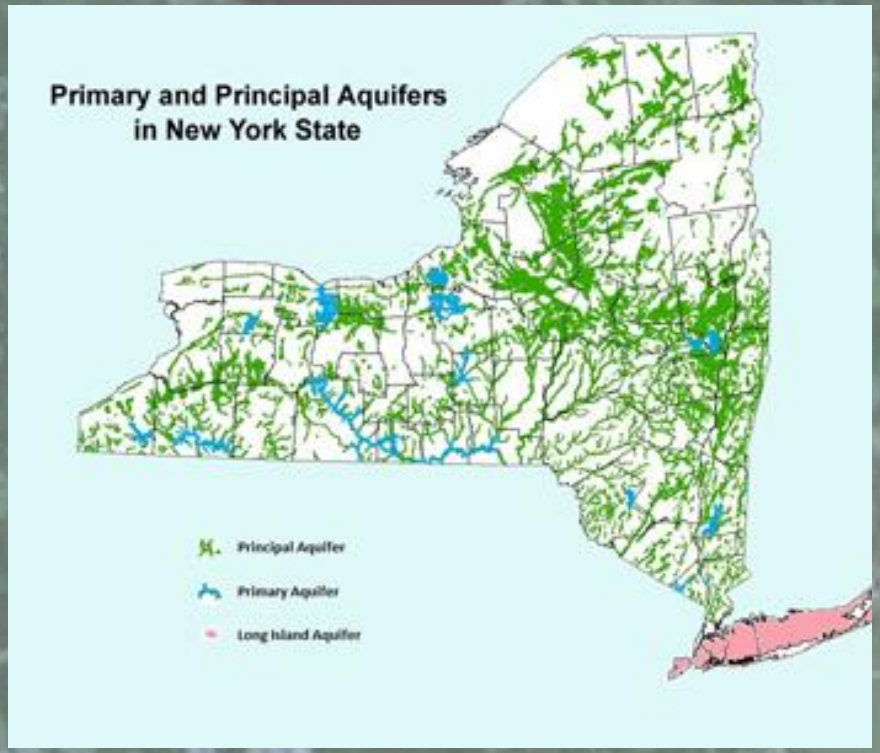
Knowledge of Groundwater and Surface Water Interactions

What is Groundwater?



When rain falls to the ground, some of it is carried off as runoff down-slope into streams, lakes, and other bodies of water or into sewers. But some of it travels downward into the ground and through the underlying sediment, the upper part of which is not completely filled with water (the "unsaturated zone"). Continuing its downward route in the unsaturated zone it moves through the interconnected openings of sand, gravel, silt, and clay or openings in rock until it reaches the "saturated zone" where it becomes groundwater.

Knowledge of Groundwater and Surface Water Interactions

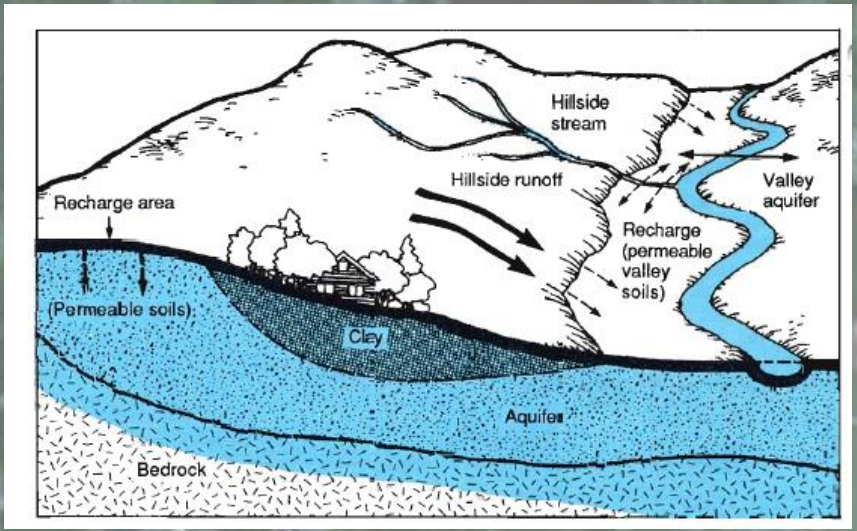


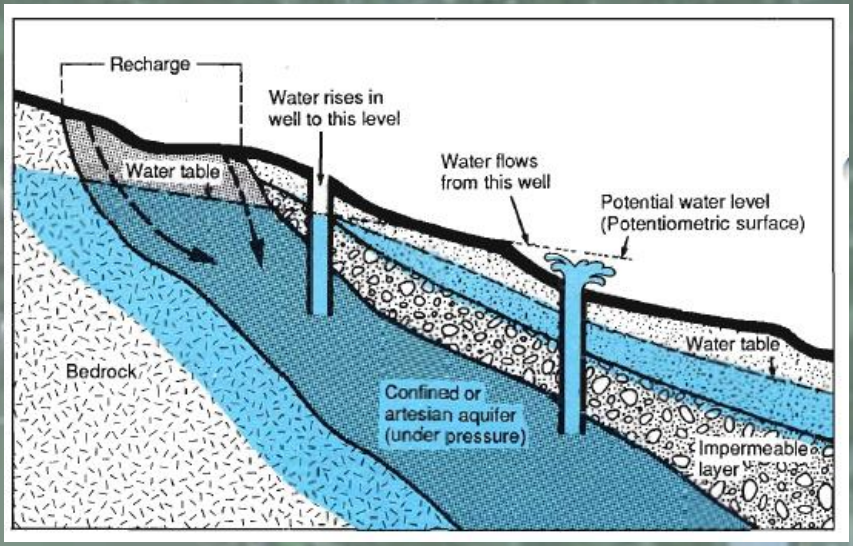
- Primary Aquifer - aquifers that are capable of yielding a great deal of groundwater and are also heavily utilized
- Principal Aquifer - generally capable of providing 10 to 100 or more gallons per minute, not as heavily utilized as Primary Aquifers.
- Long Island Aquifer - one of the most productive aquifers in the United States

Knowledge of Groundwater and Surface Water Interactions

Recharge – Water seeping into an aquifer.

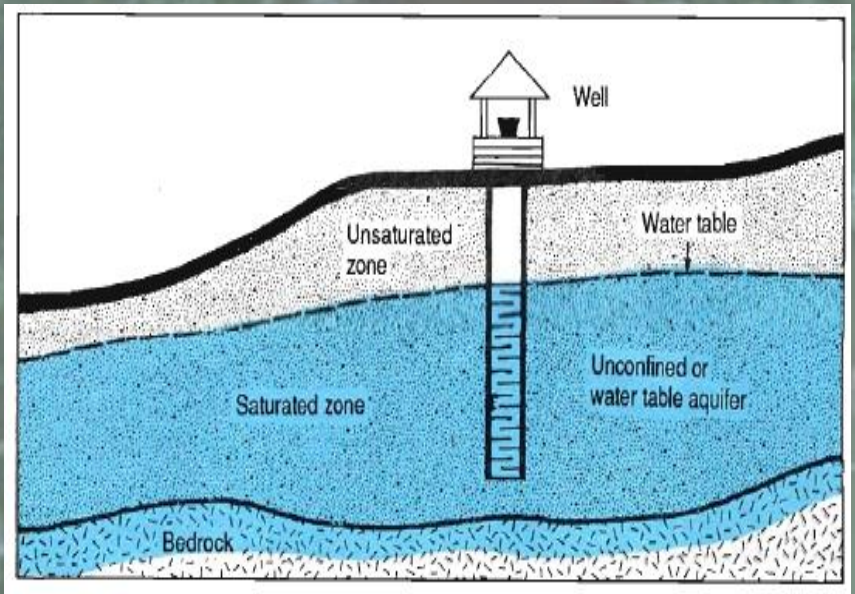
Confined or Artesian Aquifer – Groundwater becomes trapped under impermeable soil or rock may be under pressure.



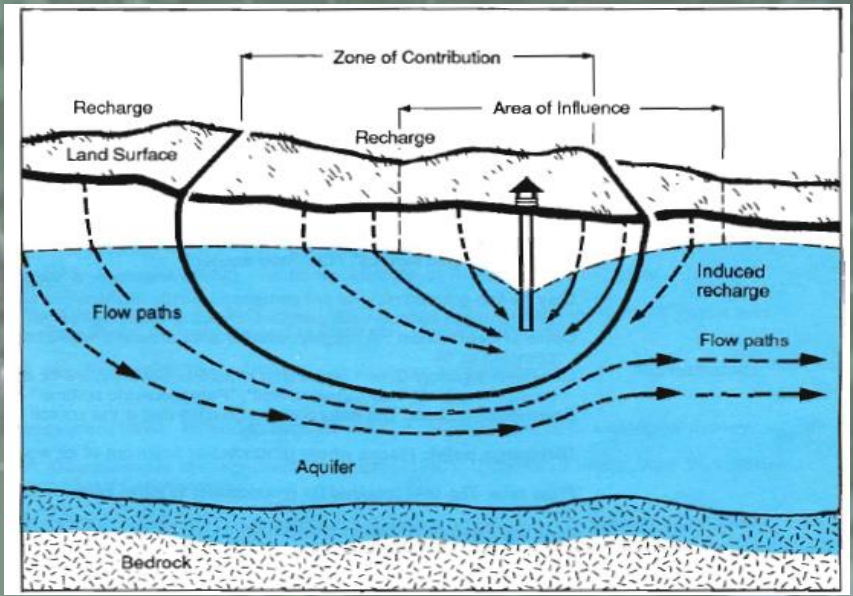


Knowledge of Groundwater and Surface Water Interactions

Unconfined or Water Table Aquifer – not confined under pressure.



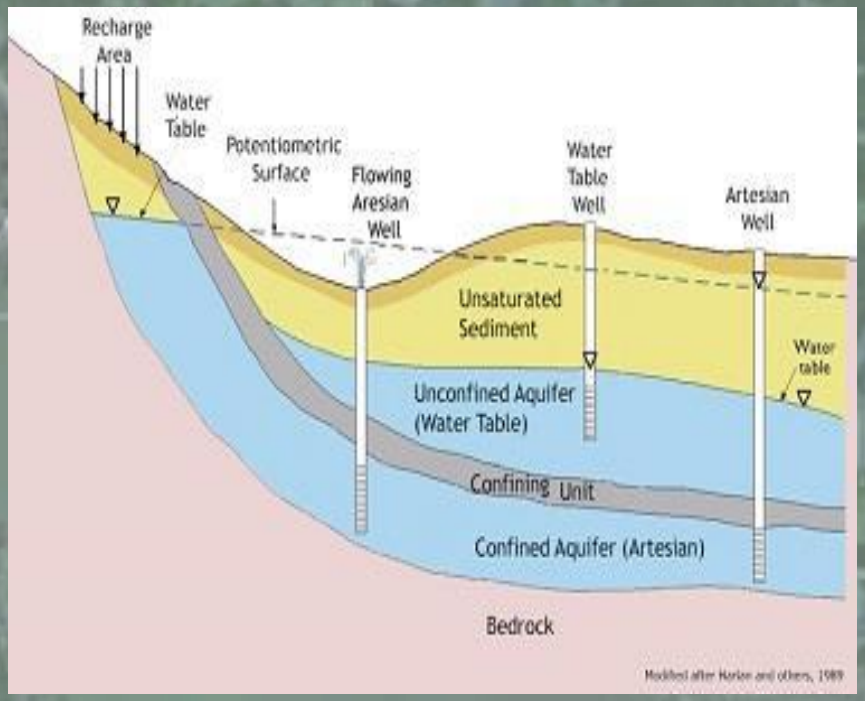
Well Contribution Zone – groundwater recharge area that is the source of water.



Knowledge of Groundwater and Surface Water Interactions

Flowing Wells – When not controlled they waste our precious groundwater resource and can damage the surrounding environment.

The difference between the flowing artesian and non-flowing artesian wells is their relation to the "potentiometric surface", which is the level to which water rises in a well penetrating a confined aquifer.



How Human Activities Effect Groundwater and Surface Water

- Understanding the interaction of ground water and surface water is essential to water managers, water scientists and **all** users of water.

- The interaction of ground water and surface water has been shown to be a significant concern related to water supply, water quality, and degradation of aquatic environments.

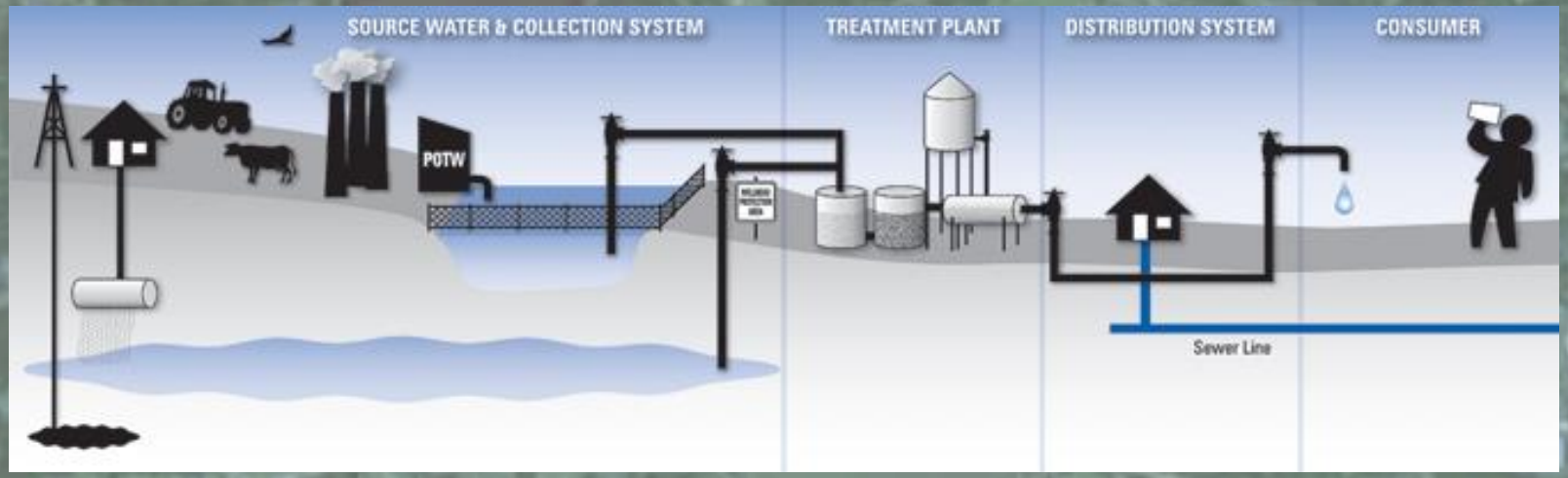
  - Water Supply - Water commonly is not present at the locations and times where and when it is most needed. Water-supply systems, development of either ground water or surface water can eventually affect the other.

  - Water Quality - Nearly every type of water use, whether municipal, industrial, or agricultural, water has increased concentrations of dissolved constituents or increased temperature following its use.

  - Aquatic environments - The interface between ground water and surface water is an areally restricted, but particularly sensitive and critical niche in the total environment.

How Human Activities Effect Groundwater and Surface Water

- Virtually every stream, lake, river and aquifer in this country is used as a drinking water source. Protecting these source waters from contaminants is a major national priority in protecting public health through ensuring a clean, safe drinking water supply.



How Human Activities Effect Groundwater and Surface Water

- Source Water Protection Program – authorized by the 1996 Amendments to the Safe Drinking Water Act (SDWA)

- Comprehensive plan for public health protection, Six Steps.

1. **DELINEATE** your drinking water source protection area
2. I**NVENTORY** known and potential sources of contamination within these areas
3. **DETERMINE THE SUSCEPTIBILITY** of your water supply system to these contaminants
4. **NOTIFY AND INVOLVE THE PUBLIC** about threats identified in the contaminant source inventory and what they mean to their PWS.
5. **IMPLEMENT MANAGEMENT MEASURES** to prevent, reduce, or eliminate threats
6. **DEVELOP CONTINGENCY PLANNING STRATEGIES** to deal with water supply contamination or service interruption emergencies

How Human Activities Effect Groundwater and Surface Water

- Risk Prevention Barrier - The best way to protect drinking water is to keep contaminants from entering source water.
- Risk Management Barrier - The public water system is the first line of defense to reduce or eliminate contaminants in source water.
- Risk Monitoring and Compliance Barrier - Dealing effectively with risks to drinking water requires constant evaluation of the water quality.
- Individual Action Barrier - Constant vigilance to protect water before it becomes your drinking water is essential and involves all of us.

How Human Activities Effect Groundwater and Surface Water

- The Clean Water Act was established by Congress in 1972 and is the primary federal law that protects our nation's waters, including lakes, rivers, aquifers and coastal areas.
- The Clean Water Act's primary objective is to restore and maintain the integrity of the nation's waters.
- TWO fundamental national goals: eliminate the discharge of pollutants into the nation's waters, and achieve water quality levels that are fishable and swimmable.
- Federal Assistance to States – EPA may provide money to states to establish and implement ongoing water pollution control programs.
- Water Quality Standards – under Section 303(C)(1) define water quality goals for water bodies.

How Human Activities Effect Groundwater and Surface Water

- Establishment of Point Source Effluent Limits, or Total Maximum Daily Loads (TMDLs) - States shall set the TMDLs “at a level necessary to implement the applicable water quality standards with seasonal variation and a margin of safety taken into account.”

- The National Water Quality Inventory Report to Congress - States must report to EPA on the quality of their waters.

- Publishing of TMDLs

- Non Point Souce Program

- Dredge and Fill - regulates the discharge of dredged or fill material into waters of the U.S.

- NPDES Program - The National Pollutant Discharge Elimination System Program: regulates point source discharges to surface waters under Section 402 of the Act.

How Human Activities Effect Groundwater and Surface Water

Human Activities affecting Safe Drinking Water

- Septic Systems
- Lawn and Garden Fertilizer
- Pet Waste
- Pesticide Applications
- Agriculture Fertilizer
- Livestock and Poultry Waste
- Above Ground Storage Tanks
- Sanitary and Combined Sewer Overflows
- Injection Wells
- Storm Water Runoff
- Vehicle Washing
- Small Quantity Chemical Use
- Underground Storage Tanks

How Human Activities Effect Groundwater and Surface Water

- Each day, **ground water** directly touches the lives of approximately six million New York State residents, or about one-third of the state's population, as their source of residential drinking water using an estimated average 110 gallons per day each.

- DEC – Department of Environmental Conservation, New York State environment regulating agency.

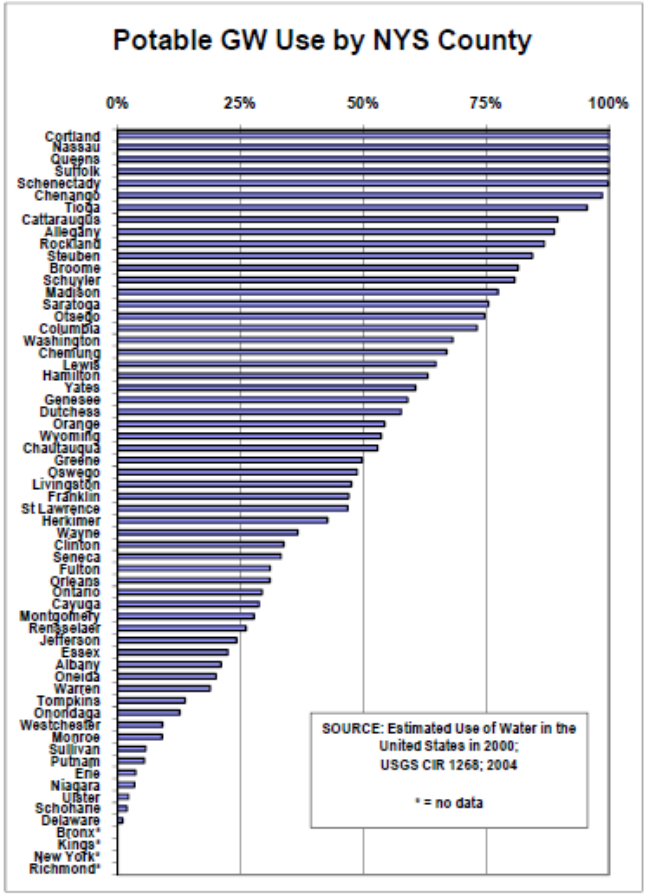


Figure 1

How Human Activities Effect Groundwater and Surface Water

Ground Water Contaminant Source

- Agriculture Activities
- Storage and Treatment Activities
- Disposal Activities
- Other
- Other Sources

List of Contaminants

- Inorganic pesticides
- Organic pesticides
- Halogenated solvents
- Petroleum compounds
- Nitrate
- Fluoride
- Salinity/brine
- Metals
- Radio-nuclides
- Bacteria
- Protozoa
- Viruses
- Other

How Human Activities Effect Groundwater and Surface Water

New York State Ground Water Protection Programs

- Active SARA Title III Program
- Ambient ground water monitoring system
- Aquifer vulnerability assessment
- Aquifer mapping
- Aquifer characterization
- Ground water discharge permits
- Ground water Best Management Practice
- Ground water legislation
- Ground water quality standards
- Nonpoint source controls
- Pollution Prevention Program
- Resource Conservation and Recovery Act(RCRA) Primacy
- Source Water Assessment Program
- State septic system regulations
- Underground Storage Tank Permit Program
- Underground Injection Control Program
- Wellhead Protection Program (EPA-approved)
- Freshwater Wetlands Program
- Clean Water/Clean Air Bond Act

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

Understanding watershed structure and natural processes is crucial to grasping how human activities can degrade or improve the condition of a watershed, including its water quality, its fish and wildlife, its forests and other vegetation, and the quality of community life for people who live there.

- **Watershed** – An area of Land drains water, sediment and dissolved materials to a common receiving body or outlet.

- **Ecosystem** - A functioning natural unit with interacting biotic and abiotic components in a system whose boundaries are determined by the cycles and flux of energy, materials and organisms.

- **Watershed Ecology** - The study of watersheds as ecosystems, primarily the analysis of interacting biotic and abiotic components within a watershed's boundaries.

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

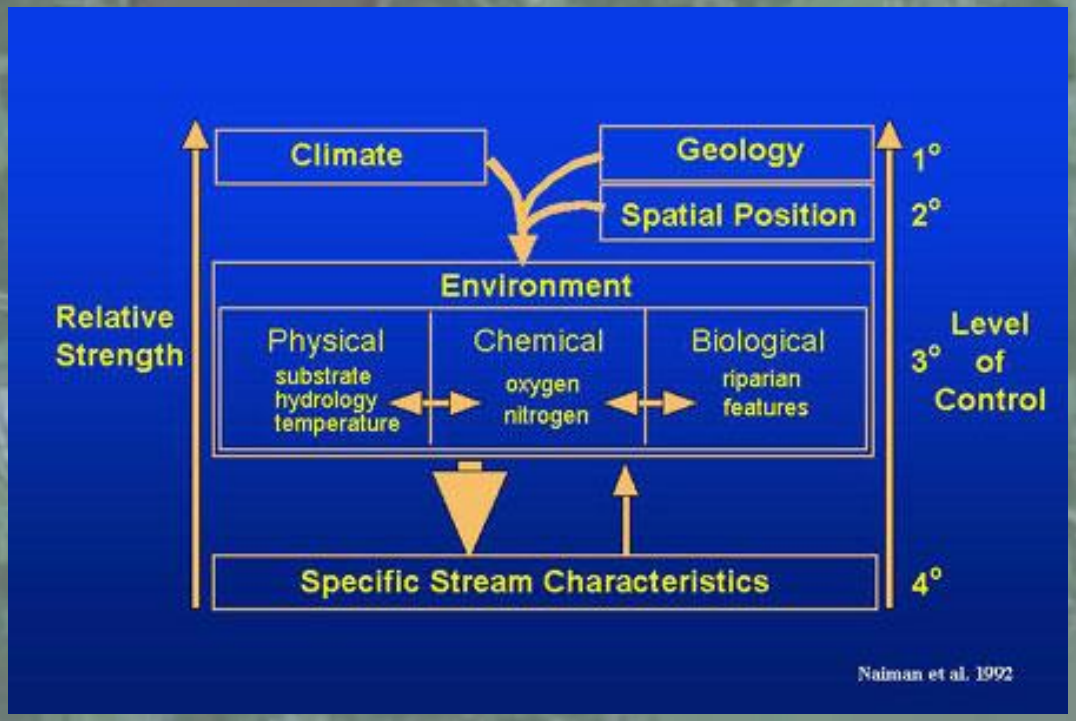
Watershed ecology – 5 major topics

1. The Physical template
2. The Biological setting
3. Natural systems concept
4. Watershed structure
5. Watershed functions

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

The Physical template

- Climate – the science of climate and its causes.
- Geomorphology - the study of the landforms on the earth and the processes that change them over time
- Hydrology - the science of water, as it relates to the hydrologic cycle.



Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

The Biological setting

- Understand and describe the biological setting of watersheds and the interaction of biotic components with the physical template.

  - Ecological Levels (Species, Population, Community, Habitat, Niche, Ecosystem)
  - Soil Ecology - complex mixture of inorganic materials (sand, silt, and clay), decaying organic matter, water, air, and a great array of organisms.
  - Soils Order - Soil is also often referred to within a taxonomic hierarchy. Eleven soil orders are recognized by soil scientists.
  - Food Webs and Trophic Ecology - Terrestrial and aquatic ecosystems have characteristic trophic (feeding) patterns that organize the flow of energy into, through, and out of the watershed ecosystem and support the growth of organisms within the system.

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

The Biological setting

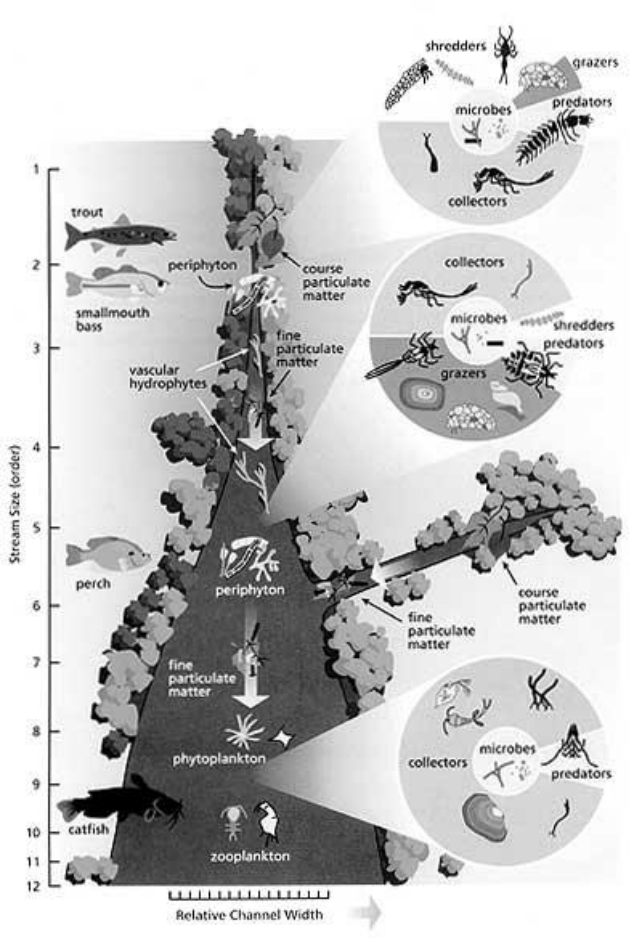
- Understand and describe the biological setting of watersheds and the interaction of biotic components with the physical template.

  - Indicator Species – species whose presence or absence indicates an environmental change.
  - Biodiversity - the relative amount of biological elements existing within a given area.
  - Genetic biodiversity - refers to the total number of genotypes available within a given population.
  - Population biodiversity - refers to the total amount of populations a given species has.
  - Species biodiversity - is the total number of species found within a given area.
  - Habitat or ecological biodiversity - refers to the number of different habitats or ecotypes found within a given region.

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

The Natural Systems Concept

- The interactions and natural processes that link these abiotic and biotic components of watersheds.
- <u>The River Continuum Concept</u>. This concept (Vannote et al. 1980) is a generalization of the physical and biological patterns often seen in different zones of rivers from source to mouth.

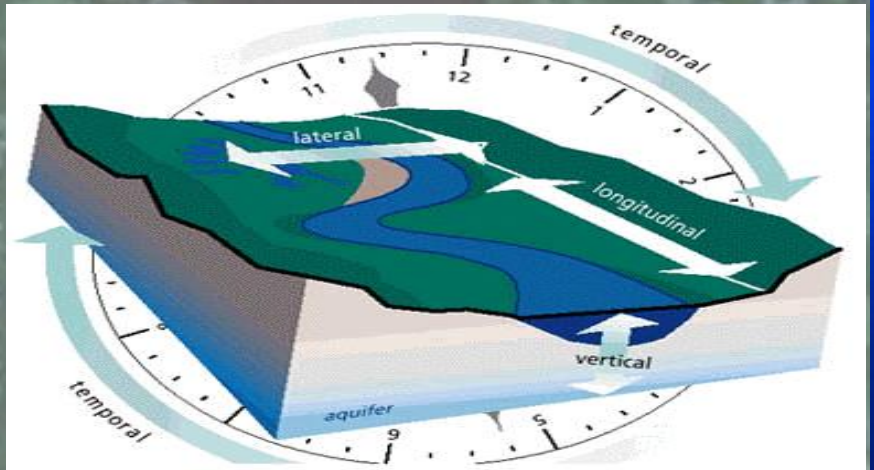


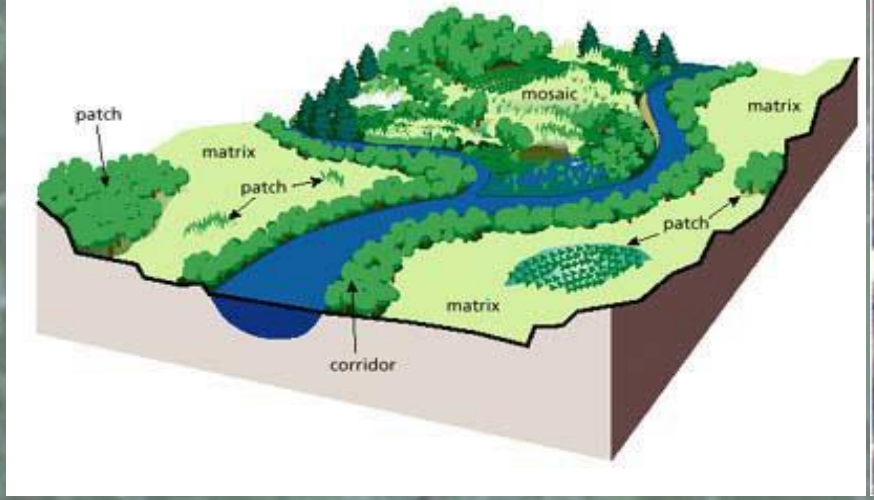
Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

Watershed Structure

- This includes structure of flowing waters (mainly rivers and streams with associated riverine wetlands and riparian zones), still waters (lakes and associated basin-type wetlands and shorelands), and upland areas of watersheds.
- Flowing (Lotic) Systems - Four-Dimensional Concept.
- Still Waters – Lakes and Ponds
- Landscape patterns or Landscape ecology
- Vegetational patterns – Forests, Shrubland, Grasslands, Forbs
- Land-use patterns – urban, agriculture, transportation, rangelands

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other





Functional Differences

Lakes	Streams
*water retained for days/months/years	*water in transit almost immediately
*energy fixed primarily in lake	*energy fixed primarily in watershed
*most organisms suspended in water column	*most organisms near/on or in substrate

Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

Watershed Functions

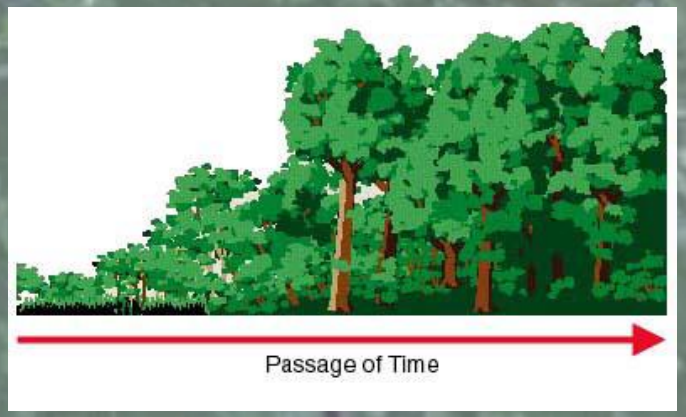
- Transport and storage - Because a watershed is an area that drains to common body of water, one of its main functions is to temporarily store and transport water from the land surface to the water body.

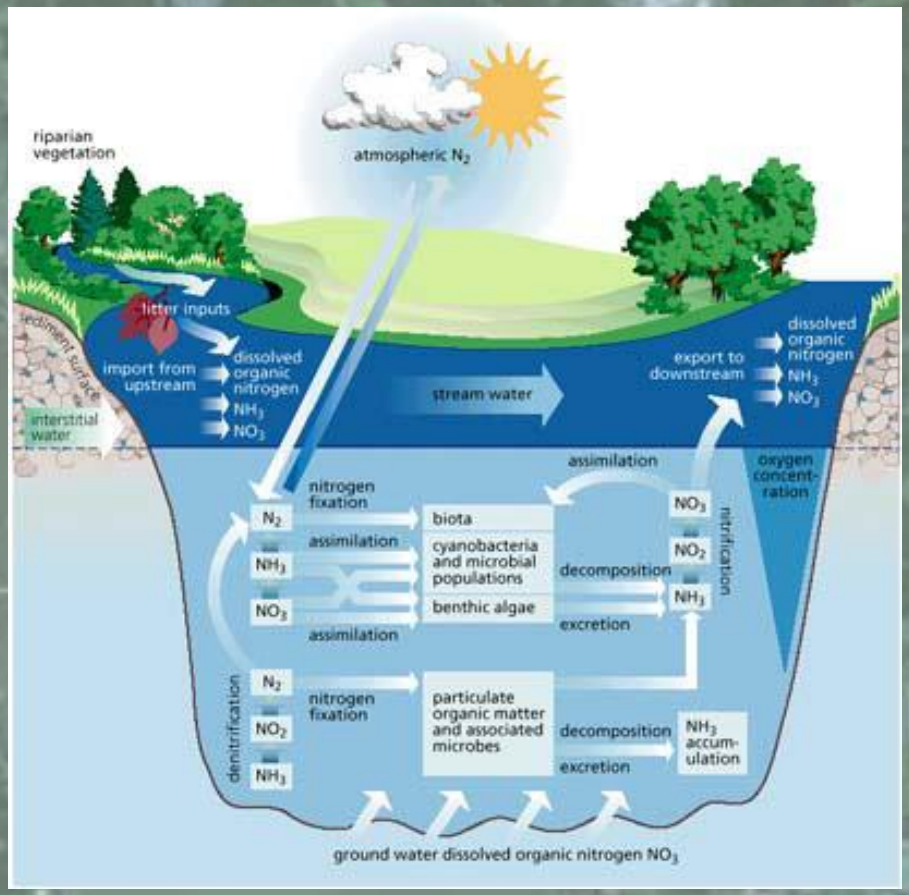
- Cycling and transformation – Various elements and materials (including water) are in constant cycle through watersheds, and their interactions drive countless other watershed functions.

- Ecological succession - succession is a process that circulates significant amounts of the watershed's energy, water and materials from the abiotic environment back into the biotic, and from one set of predominant organisms on to a subsequent set of dominant organisms.

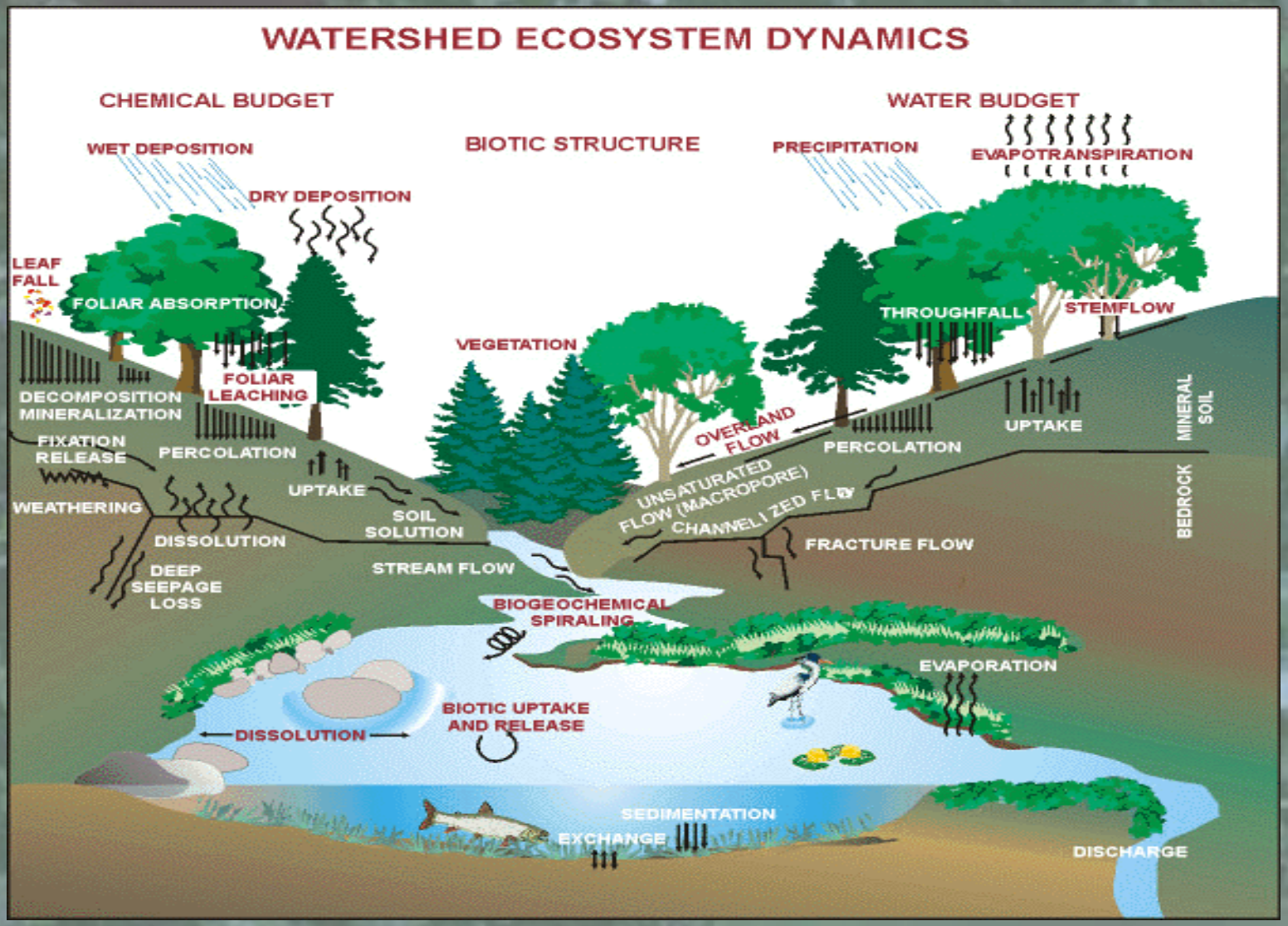
Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other

Watershed Functions





Understanding the Connection Between Groundwater and Surface water and How They Affect Each Other



Knowledge of water quality impacts such as agriculture practices, urban development, nitrates, toxic algae, etc.

- National opinion surveys reflect the public's concern that sediment from agricultural land, pesticides, and fertilizers from animal wastes and chemical applications may be contributing to surface and ground water pollution. *1980's – 90's.

- Soil quality is significant for water quality. Soils vary in ability to absorb, buffer, and transform chemical flows; retain and store floodwaters; support plant growth; and renew quality water supplies.

- Sediment is the product of soil erosion. Eroded soil is deposited in waterbodies. Sediments transport nutrients, pesticides, pathogens, and toxic substances into surface water and the leading cause of impairment for rivers and streams.

- Nutrients, including nitrates and phosphorus from agricultural and nonagricultural sources, are the leading cause of impairment in lakes and reservoirs and in estuaries.

- The principal form of nitrogen found in ground and surface water is nitrate. Nitrate in excess of plant needs travels in runoff, leaches through soil, or volatizes to the atmosphere.

Knowledge of water quality impacts such as agriculture practices, urban development, nitrates, toxic algae, etc.

- High concentration of nitrate in drinking water poses a potential threat to human health, particularly among infants.
- High nitrate concentrations in surface water, especially estuaries, contribute to eutrophication and the excessive growth of aquatic plants, which leads to unpleasant odors and insufficient dissolved oxygen for fish and other organisms.
- Livestock manure is a major source of nitrogen and phosphorus. Excessive concentrations of phosphorus in surface water accelerate eutrophication.
- Fecal contamination sources include runoff from confined animal facilities, pastures, and urban areas; untreated sewage; and effluent from sewage treatment plants.
- Pesticides are heavily used in agriculture. Monitoring indicates that (a) definite problem areas usually involve chemicals that are already banned or restricted; (b) pesticides occur relatively infrequently in ground water, typically at low levels, and then usually in the older, shallow wells; and (c) the most persistent agricultural pesticides are frequently found in surface water during field application, but are not otherwise detected or only at low levels.

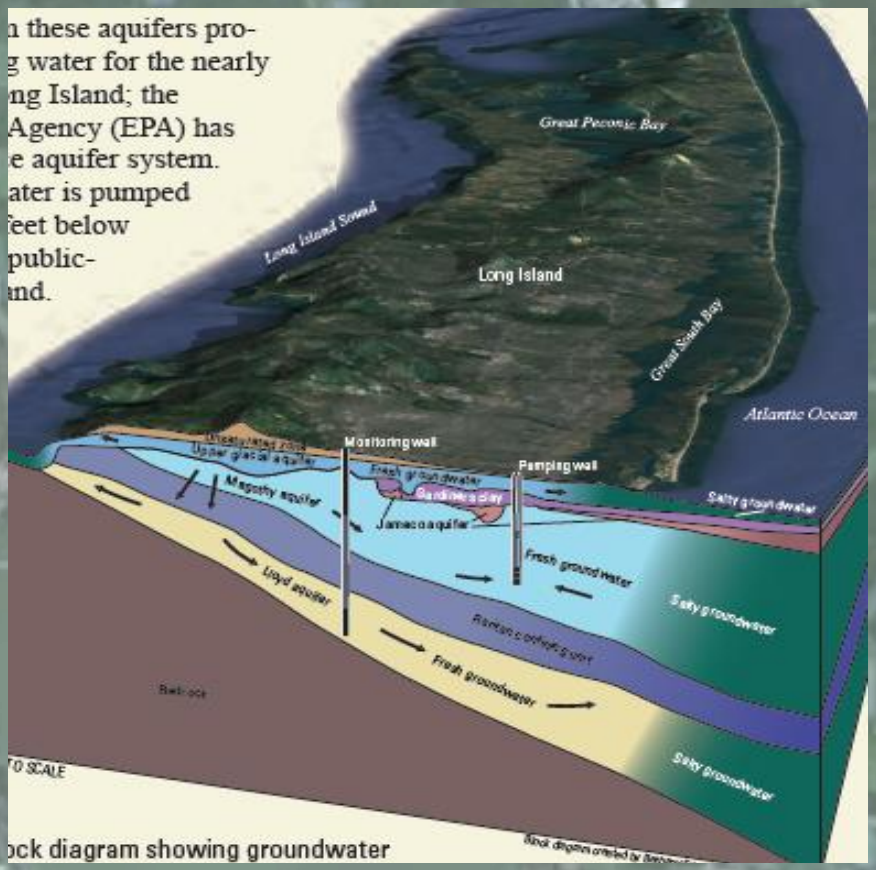
Knowledge of water quality impacts such as agriculture practices, urban development, nitrates, toxic algae, etc.

Relationships between water quality and quantity are complex. For example, excessive livestock grazing affects a watershed by removing protective plant cover and compacting soils. Reducing the vegetation can increase the impact of raindrops, decrease the soil organic matter and aggregates, increase surface crusts, decrease infiltration rates, and increase erosion. These conditions then lead to increased runoff and reduced soil water content, which can decrease water quantity; and to increased transport of topsoil and nutrients, which can decrease water quality. Fortunately, proper land treatment and conservation measures can improve water quality and augment and perpetuate the water supply in streams and ground water systems

Knowledge of water quality impacts such as agriculture practices, urban development, nitrates, toxic algae, etc.

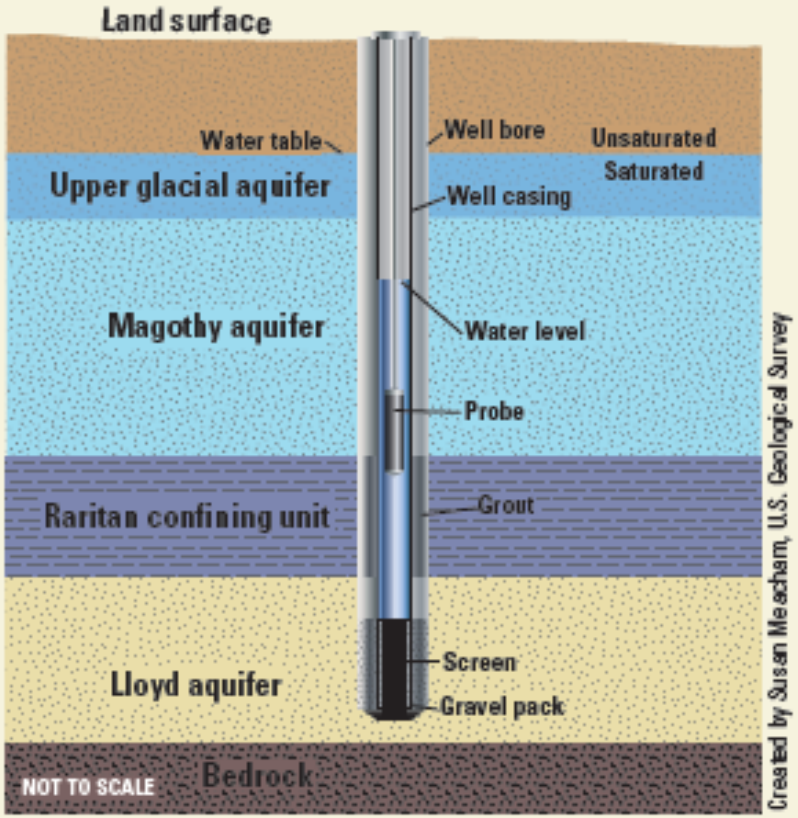
- Long Island has three primary aquifers—the upper glacial, Magothy, and Lloyd—which are part of the Long Island aquifer system. Currently [2019], this aquifer system contains about 50 trillion gallons of freshwater.

- Groundwater pumped from these aquifers pro-vides essentially all the drinking water for the nearly 3 million people that live on Long Island.



Knowledge of water quality impacts such as agriculture practices, urban development, nitrates, toxic algae, etc.

- U.S. Environmental Protection Agency (EPA) has designated them as a sole-source aquifer system. About 425 million gallons of water is pumped daily from tens to hundreds of feet below the ground by more than 1,500 public-supply wells throughout the island.



Cross-sectional diagram of a monitoring well installed in the Lloyd aquifer on Long Island, New York.

Understand the indicators of water health, including physical, chemical, and biological properties and its role in the hydrological system.

- Aquatic macroinvertebrates are found in lakes, streams, ponds, marshes and puddles and help maintain the health of the water ecosystem by eating bacteria and dead, decaying plants and animals.
- Overall water quality effects which types of organisms can survive in a body of water. "Water quality" may include the amounts of dissolved oxygen and the levels of algal growth, pollutants which may be present and the pH level.
  - stoneflies, mayflies and water boatmen require a high level of dissolved oxygen and their abundance is an indication of good water quality.
  - Several species of macroinvertebrates are indicative of water systems with lower dissolved oxygen levels and include aquatic worms and leeches.
- There are several reasons why macroinvertebrates are used as water quality indicators:
  - They are sensitive to changes in the ecosystem.
  - Many live in an aquatic ecosystem for over a year.
  - They cannot easily escape changes in the water quality.
  - They can be collected very easily from most aquatic systems with inexpensive or homemade equipment.

Understand the indicators of water health, including physical, chemical, and biological properties and its role in the hydrological system.

- **Dissolved Oxygen** - Oxygen is essential for the survival and reproduction of aquatic organisms. If the amount of oxygen dissolved in the water falls below the minimum requirements for survival, aquatic organisms or their eggs and larvae may die.

- **pH** - a measure used to indicate degree of acidity of a water solution.

- **FECAL COLIFORM BACTERIA** - Coliform bacteria are present in the digestive tract and feces of all warm-blooded animals, including humans, poultry, livestock, and wild animal species.

- **NUTRIENTS** - Plant nutrients are common substances discharged to the environment by man's activities, through wastewater facilities and by agricultural, residential, and storm water runoff.

Understand the indicators of water health, including physical, chemical, and biological properties and its role in the hydrological system.

- **WATER CLARITY -** Small particles (soil, plankton, organic debris) become suspended in water

- **HEAVY METALS -** Concentrations of cadmium, chromium, copper, lead, mercury, and nickel in water are routinely measured by the Department to compare to State standards intended to protect aquatic life and human health.

- **Water temperature** - Aquatic organisms are dependent on certain temperature ranges for optimal health.

- **Salinity** - Salinity is a measure of the amount of salt and other dissolved solids in water.

Knowledge of water quantity impacts such as agriculture practices, urban development, and groundwater levels.

- Design and Methods of the U.S. Geological Survey Northeast Stream Quality Assessment (NESQA), 2016

  1. Determine the status of stream quality across the region on the basis of contaminants, nutrients, sediments, toxicity of the bed sediments, streamflow, habitat, and biological communities.

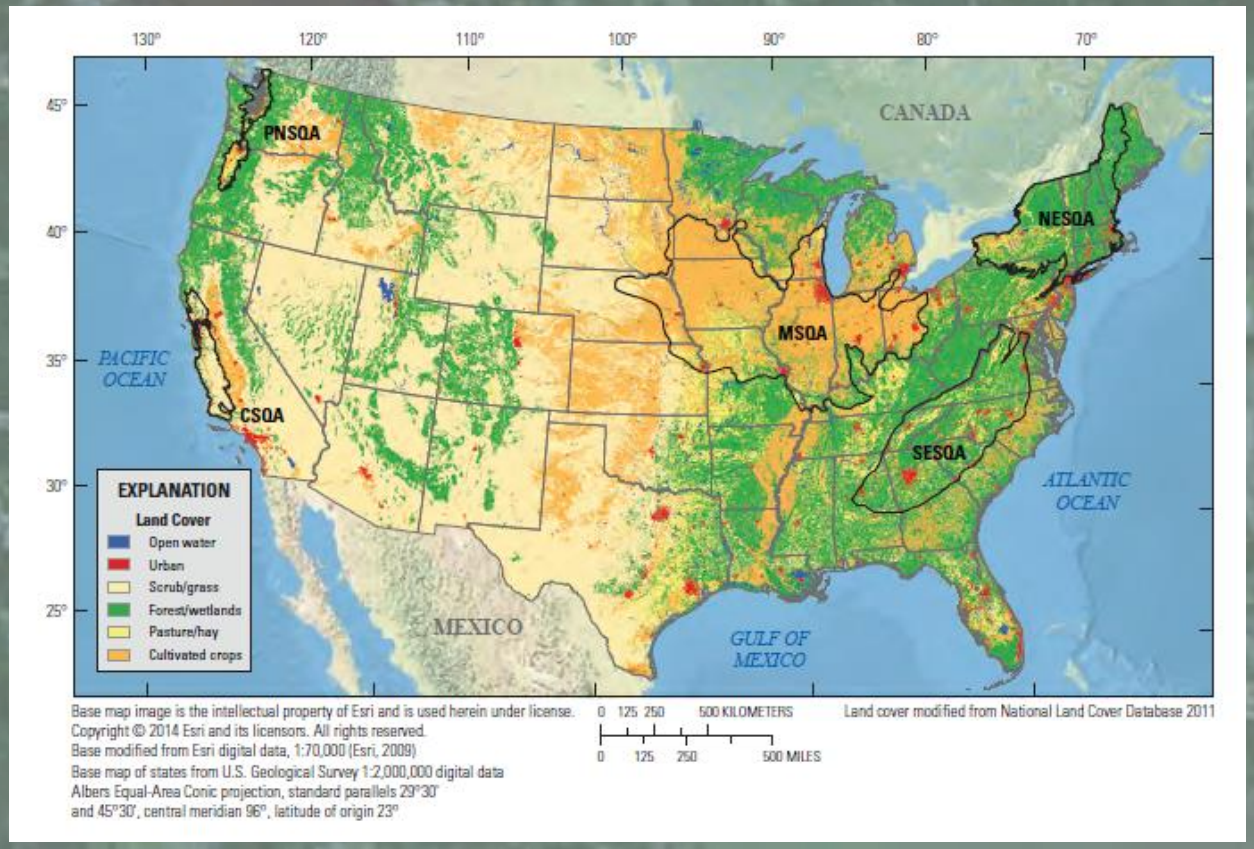
  2. Evaluate the relative influence of contaminants, nutrients, sediment, toxicity, streamflow, and habitat on biological communities in the streams.

  3. Evaluate how the natural and anthropogenic characteristics of the watersheds are related to stressors measured at the stream-reach scale and how the condition of biological communities can be explained by these stressors.

  4. Develop statistical models and management tools to predict the ecological health of wadeable streams throughout the region and how it is associated with concentrations of contaminants, nutrients, and sediment.

Knowledge of water quantity impacts such as agriculture practices, urban development, and groundwater levels.

- Design and Methods of the U.S. Geological Survey Northeast Stream Quality Assessment (NESQA), 2016

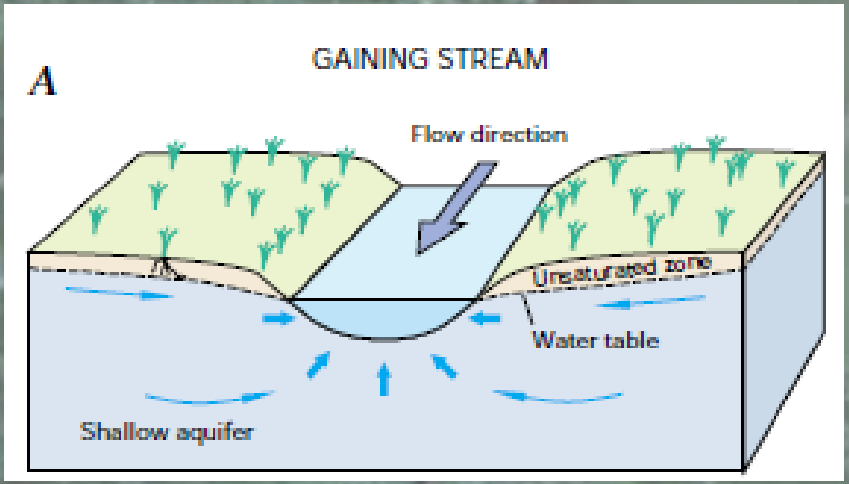


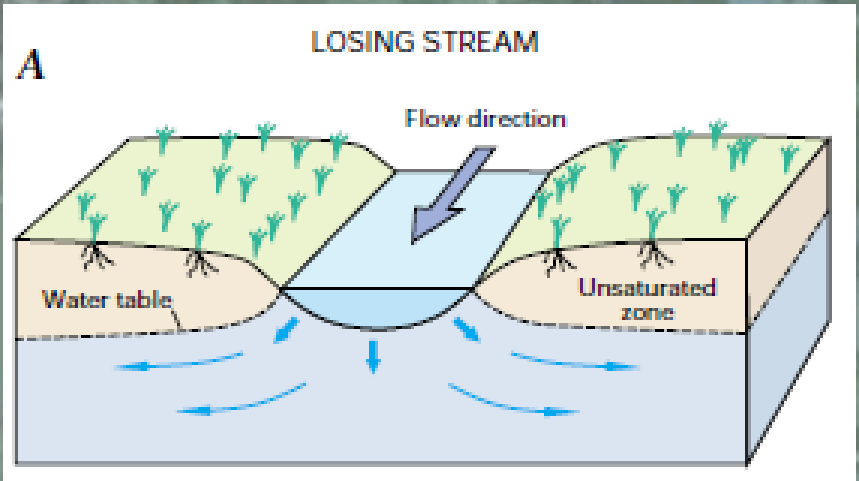
Knowledge of water quantity impacts such as agriculture practices, urban development, and groundwater levels.

Section	Vulnerability	Adaptation
Flooding	1. Uncertain changes in flooding in large basins	Consideration of moving development from flood-prone areas when infrastructure reaches end of life span
	2. Increased flooding in smaller, urbanized watersheds	Implementation of infrastructure that replicates natural hydrologic processes
	3. Uncertain potential for increased flooding of wastewater treatment plants	Design modification of new WWTPs
Drinking water supply	1. Likely increased frequency of deficits in homeowner wells, small community well systems, and run-of-the-river systems	i. Enhanced monitoring of groundwater levels; ii. Stockpiling of equipment for emergency withdrawals; iii. Water conservation
	2. Possible increased frequency of deficits in systems with moderate-to-large storage volumes	i. Enhanced monitoring of reservoir and aquifer levels; ii. Use of rule curves in reservoir or aquifer operation; iii. New basin commissions; iv. Water conservation
Commercial & agricultural water availability	1. Increased demand from additional agricultural irrigation	i. Establish minimum streamflow requirements; ii. Statewide inventory of water withdrawals
	2. Competition for water among human consumption, commercial uses, and ecological needs	i. New basin commissions; ii. Establish minimum streamflow requirements; iii. Statewide inventory of water withdrawals
Water quality	1. Decreased stream low-flows and higher water temperatures decrease assimilative capacity of waterbodies receiving waste	i. Modify waste discharge permits (given further study of likely changes); ii. Further study of low-flow characteristics of streams
	2. Uncertain changes in pathogen levels	Long-term monitoring and data analysis
	3. Uncertain changes in nutrient loading with no land use change	Long-term monitoring and data analysis
	4. Possible changes in CSO frequency (particularly in systems with high thresholds for CSO initiation)	Monitoring of possible changes in CSO frequency and implementation of scalable CSO mitigation plans
	5. Increased sediment and nutrient loads due to expanded agricultural production in water-rich region	Better targeted water and soil conservation measures

Understanding of stream gauges and groundwater maps.

- Streams interact with ground water in all types of landscapes, The interaction takes place in three basic ways:
  1. streams gain water from inflow of ground water through the streambed
  2. they lose water to ground water by outflow through the streambed
  3. or they do both, gaining in some reaches and losing in other reaches.





Understanding of stream gauges and groundwater maps.

- Losing streams can be connected to the ground-water system by a continuous saturated zone or can be disconnected from the ground-water system by an unsaturated zone.
- A rapid rise in stream stage that causes water to move from the stream into the streambanks. This process, termed bank storage, usually is caused by storm precipitation or rapid snowmelt.

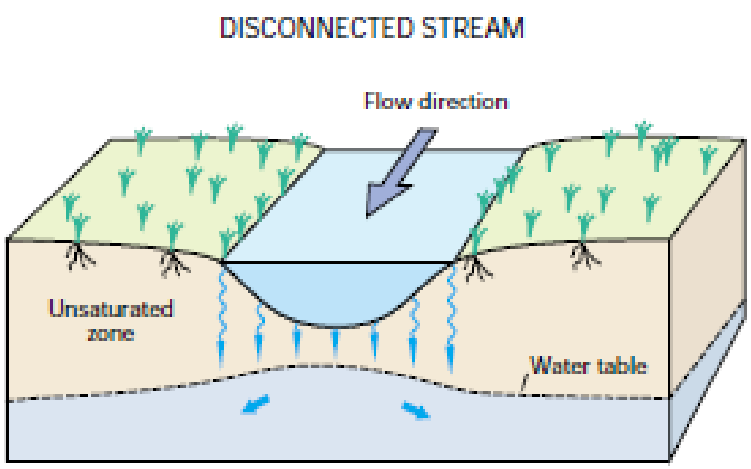


Figure 10. Disconnected streams are separated from the ground-water system by an unsaturated zone.

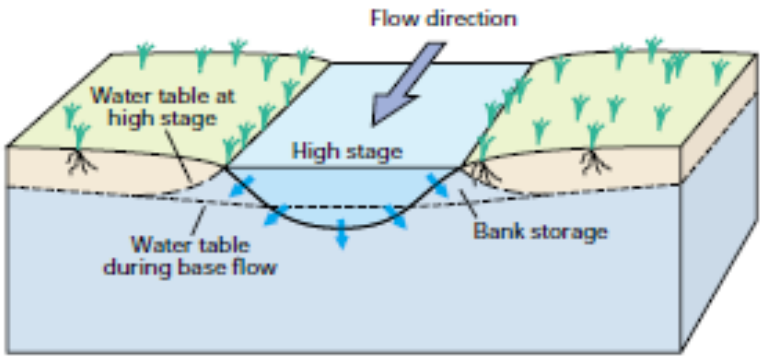
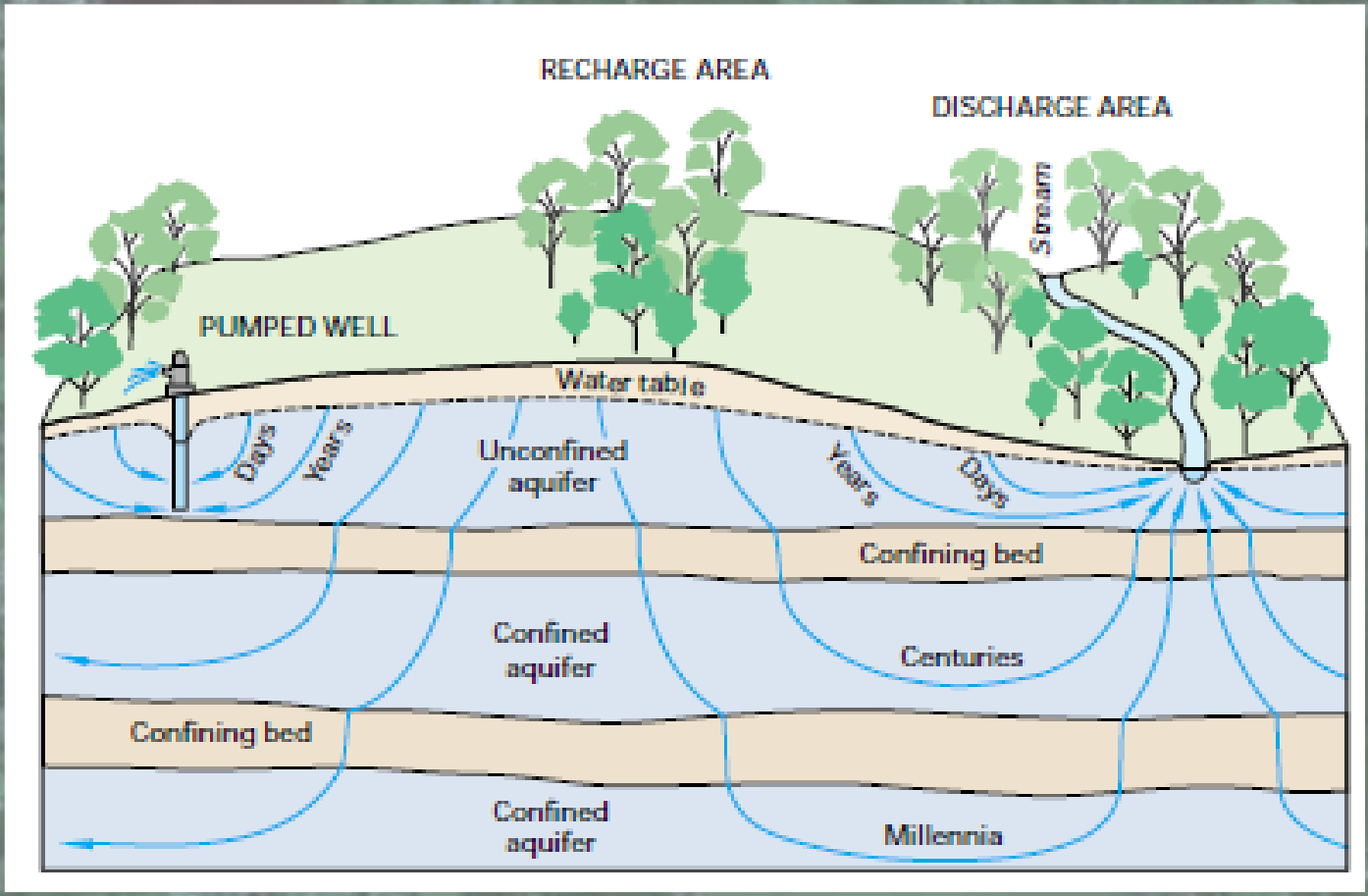
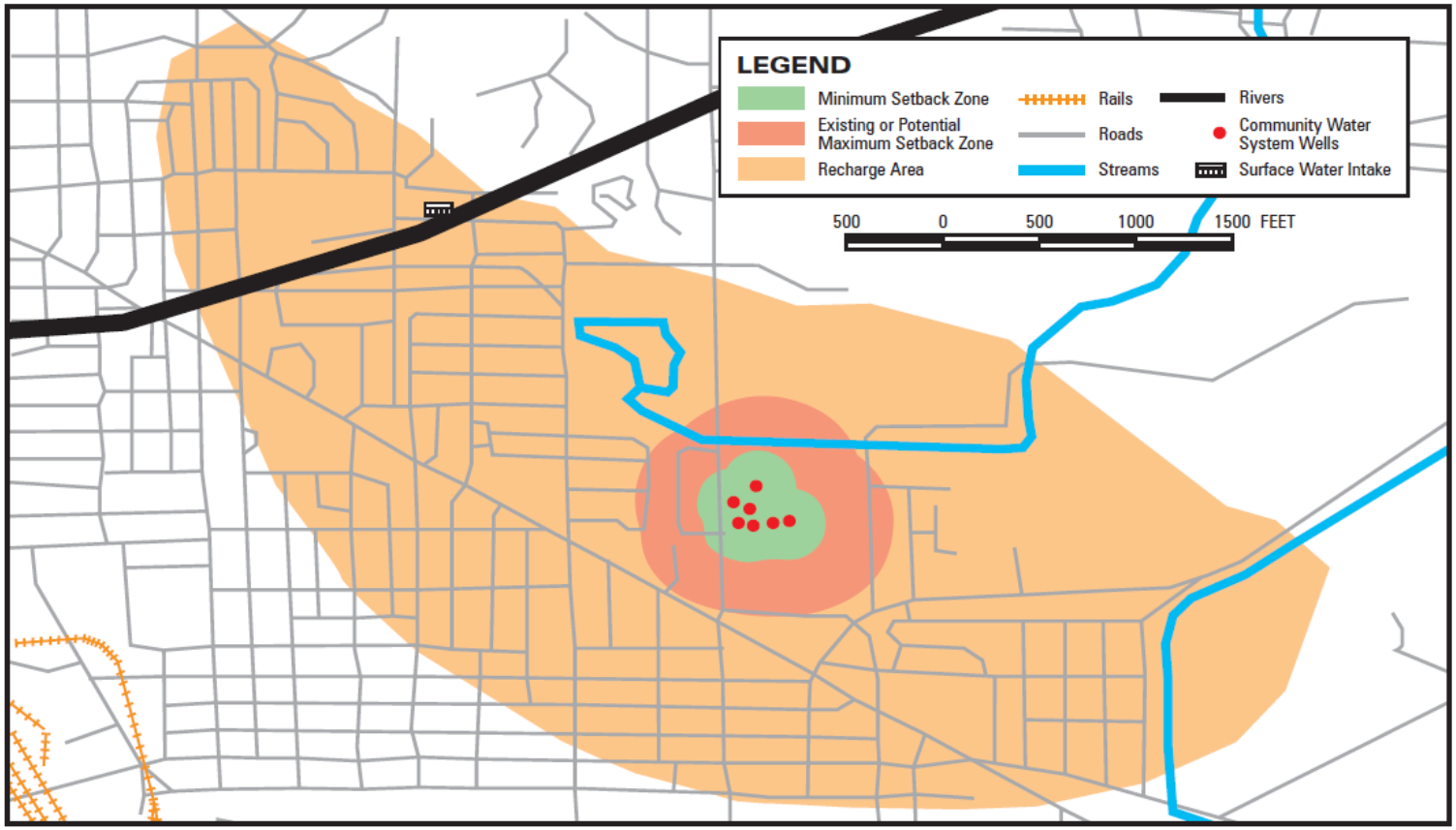


Figure 11. If stream levels rise higher than adjacent ground-water levels, stream water moves into the streambanks as bank storage.

Understanding of stream gauges and groundwater maps.



Understanding of stream gauges and groundwater maps.



This map shows the delineation of a Source Water Protection Area.

Understand the importance of moving toward sustainable practices to protect water quality and quantity.

- Maintain sustainable food, forge and fiber to provide the world.
- Managing soil. Applying practices that build soil quality, resulting in a porous, well-structured soil that allows water to infiltrate and holds it there for use by plants.
- Managing plants and livestock. Selecting plants, such as drought-tolerant species and native varieties that maximize water availability in crop rotations or pastures.
- Managing water. Treating water like a precious resource, capturing, conserving and recycling it among farming enterprises.

Understand best Management practices that improve water quality and quantity such as improved agriculture practices, urban planning and water efficiency.

Agriculture Practices

- Conservation Tillage
- Cover Crop
- Diversion
- Grassed Waterways
- Nutrient Management Plan
- Integrated Pest Management Plan
- Irrigation Water Management Plan
- Filter Strips
- Field Borders
- Waste Storage Facilities
- Agrichemical Handling Facilities

Urban Planning

- Stormwater Management
- Permeable Pavement
- Water Detention Areas
- Water Retention Areas
- Green Infrastructure
- Irrigation Management - Restrictions
- Nutrient Management – Restrictions
- Tree and Shrub plantings

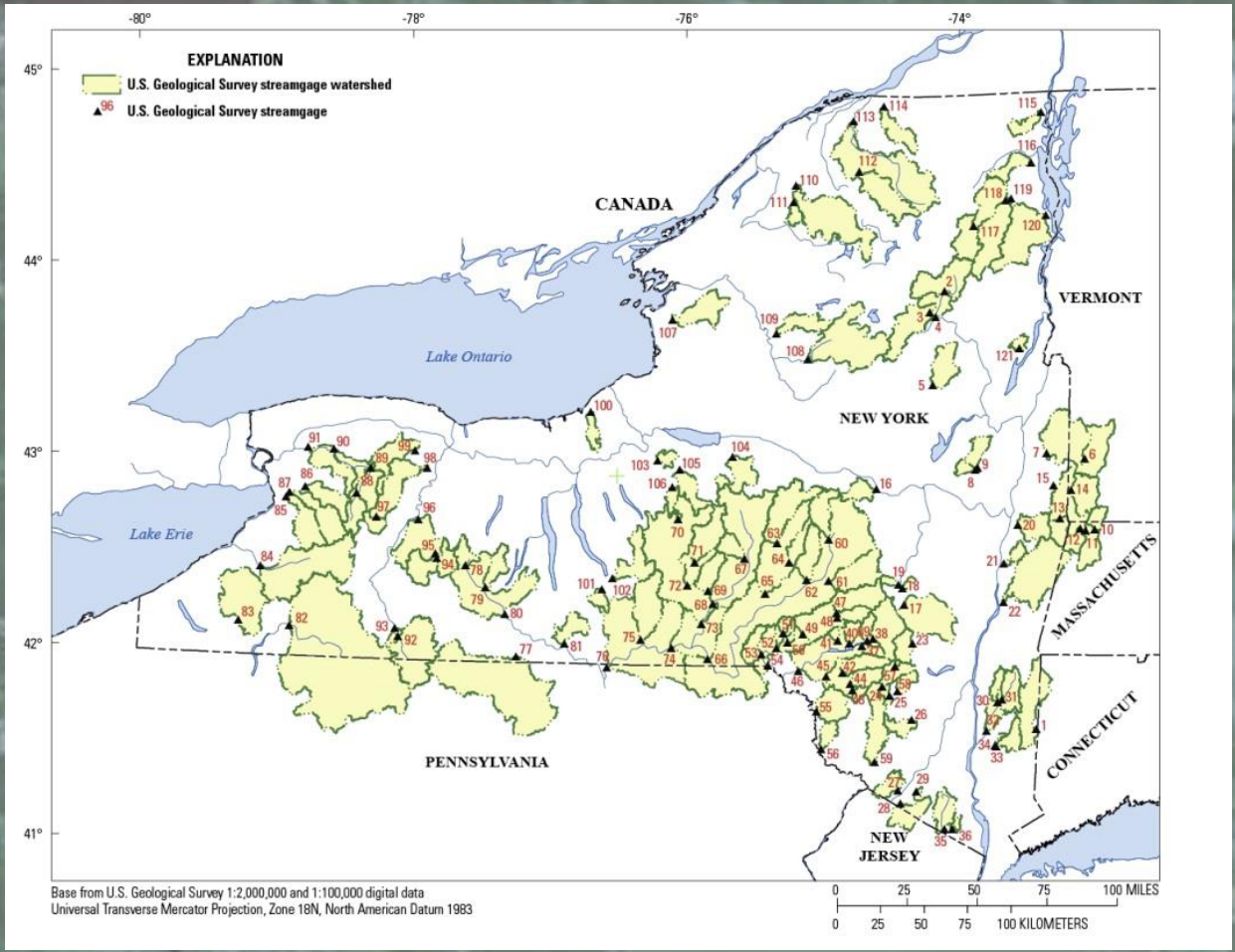
Understand the role of technology: flow meters, observation wells, Airborne Electromagnetic (AEM) Surveys, Unmanned Aerial Vehicles (UAV) (drones, GIS, etc.) precision agriculture, etc.

- The lakes, rivers, and streams of New York State provide an essential water resource for the State. Water management agencies require an understanding of natural and low streamflow characteristics for planning and management of waste-loads to streams, permitting streamflow alterations, water-quality evaluations, water-supply design, groundwater management, and aquatic-habitat protection.

- To aid the understanding of natural streamflows, USGS operates more than 240 streamgages in New York State

- The data are essential to understanding ways to promote healthy instream ecology and to strengthen the scientific basis for sound water management decision making in New York State.

Understand the role of technology: flow meters, observation wells, Airborne Electromagnetic (AEM) Surveys, Unmanned Aerial Vehicles (UAV) (drones, GIS, etc.) precision agriculture, etc.



Understand the role of technology: flow meters, observation wells, Airborne Electromagnetic (AEM) Surveys, Unmanned Aerial Vehicles (UAV) (drones, GIS, etc.) precision agriculture, etc.

- Drones allow access to difficult landscapes to traverse.
- GIS mapping can model landscapes to help identify high risk areas with the relationship between topography and land uses.
- Precision agriculture is a monitoring system to help understand BMP impacts over time.
- Soil maps help identify properties for land use management.
- These tools are all looking at surface and groundwater interactions

Knowledge of various conservation agencies including NY Soil and Water Conservation Districts and how partners work together for conservation success.

- The New York Nonpoint Source Management Program (NPS Program) was originally adopted in 1990. It was updated in 2000 in accordance with criteria established by EPA in the 1997 guidance for Section 319 of the Federal Water Pollution Control Act (Section 319).

- The fundamental goal of New York's NPS Program is a comprehensive management of nonpoint pollutant sources in order to protect and conserve all waters of the state for beneficial uses.

  - Increased Watershed plan coverage meeting EPA 9-element plan criteria
  - Effective best management practice (BMP) project implementation
  - Restoration/delisting of impaired waterbodies;
  - Improved BMP tracking and reporting to EPA

Knowledge of various conservation agencies including NY Soil and Water Conservation Districts and how partners work together for conservation success.

- New York has established a series of NPS Program objectives:
  - Develop Watershed Plans: Develop watershed management plans, and other comprehensive and strategic plans to improve the management of nonpoint pollution sources on a watershed basis.
  - Implement Watershed Projects: Implement nonpoint source watershed projects, including best management practices (BMPs) and other actions which serve to control or reduce the impact of nonpoint source pollution or pollutants on waters of the state.
  - Monitor Water Quality: Assess the quality of waters of the state related to nonpoint source pollution.
  - Protect and Restore Waters: Protect and maintain unimpaired waters of the state from additional nonpoint source pollution, and restore or prevent further degradation of waters of the state impaired by nonpoint source pollution.
  - Integrate NPS Management into Other Programs: Integrate management of nonpoint pollution sources into applicable state and local agency programs (including both regulatory and non-regulatory programs), and provide overall policy coordination among state, local and federal agencies.
  - Provide Guidance and Technical Assistance: Develop and maintain the capacity of state, regional and local agencies and organizations to provide nonpoint source management assistance to communities and landowners through assessment, planning, technical support and education.

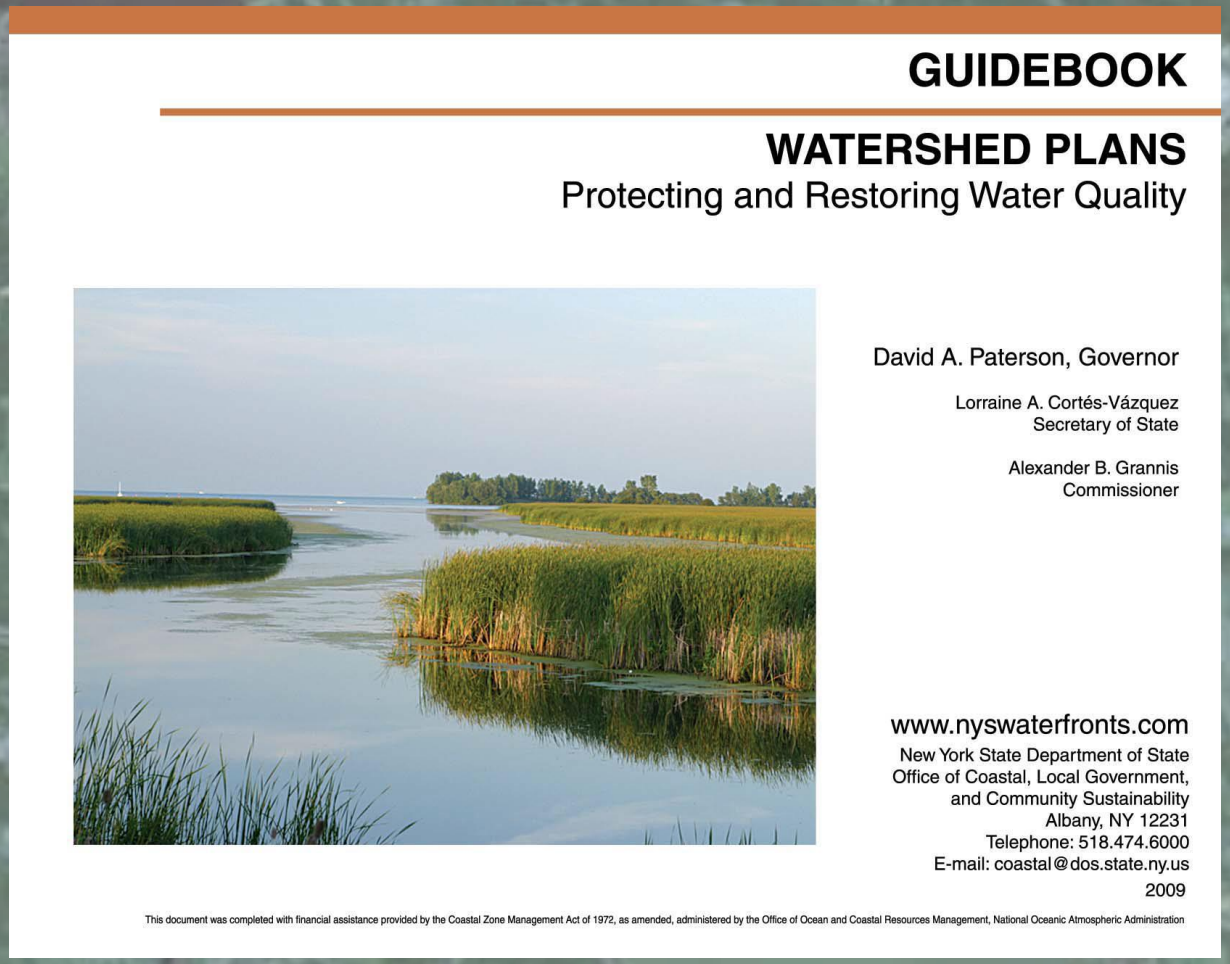
Knowledge of various conservation agencies including NY Soil and Water Conservation Districts and how partners work together for conservation success.

New York is committed to further develop and coordinate the local capacity of regional and county agencies and organizations to address nonpoint source management on a watershed basis, with special emphasis on county Soil and Water Conservation Districts, watershed coalitions (typically multi-county), and regional planning agencies. New York is also committed to enhance the partnerships with key federal agencies which support NPS management within New York State, including the USDA-Natural Resources Conservation Service's National Water Quality Initiative. New York will work closely with EPA to ensure that satisfactory progress is achieved in meeting the goals of the Clean Water Act and this state NPS Program.

Describe the social, economic, and political impacts of regulating water quality and quantity.

- A watershed is the land that drains, or sheds, this water to a single waterbody, such as a wetland, river, lake, coastal embayment or ocean.
- Watersheds are geographic features; they do not reflect local political boundaries.
- Watershed planning focuses on the relationship between land use and land cover, the movement and storage of water, and water quality.
- Watershed planning allows communities to integrate water resource protection and restoration with growth management at the local level, balancing environmental and economic factors.
- Watershed planning provides an opportunity for a community to reach out to its residents and businesses, building support for water quality improvements while planning for economic and community growth.

Describe the social, economic, and political impacts of regulating water quality and quantity.



GUIDEBOOK

WATERSHED PLANS

Protecting and Restoring Water Quality

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2009

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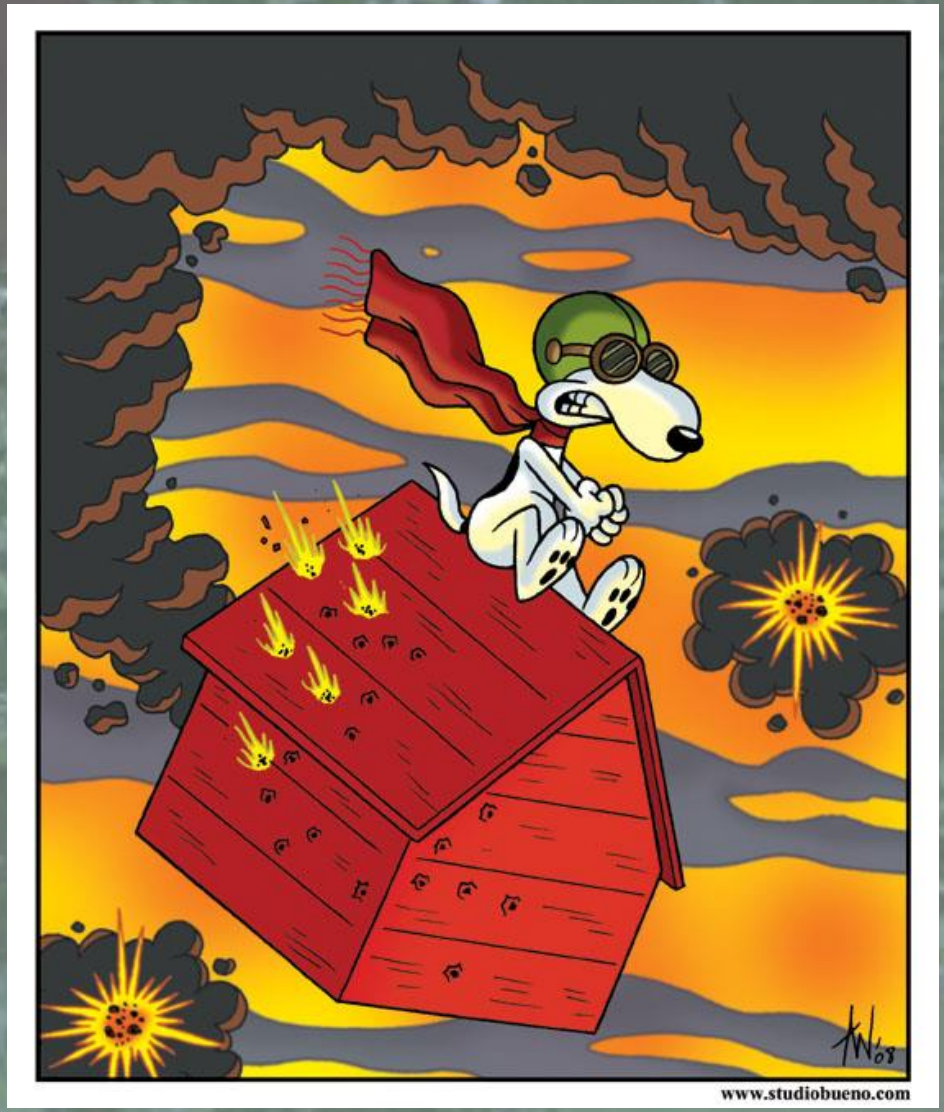
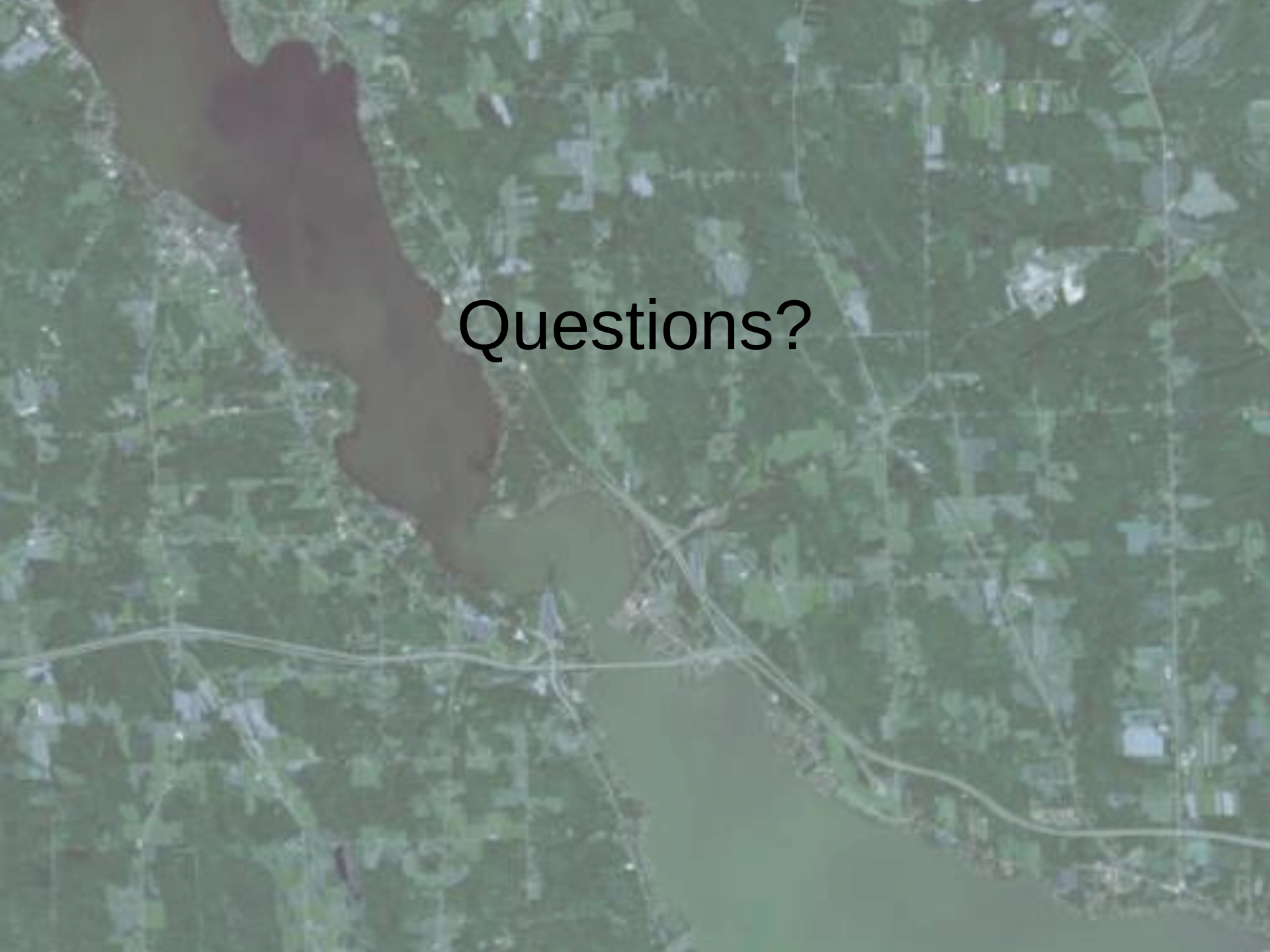
Understand the delicate balance behind decision making-funding projects, social responsibility, and regulatory authority.





Questions?