Long Island:

Water Resources

Water Sayings

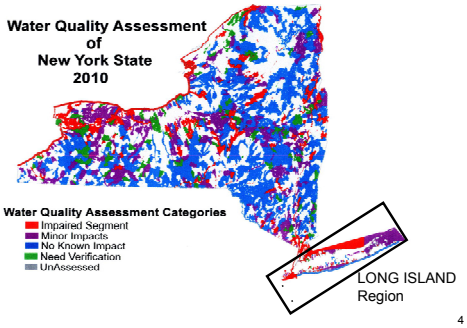
- All living things need water to survive after air.
- Water, water everywhere but not a drop to drink.
- The quality of water is just as important as the quantity.
- We will never know the worth of water till the well is dry.
- Don't make waves.

Water Issues

Among the many water issues that need to be addressed by the residents of Long Island are:

- municipal water supplies
- underground water supplies
- land use and water quality within watersheds
- conservation
- erosion control
- thermal pollution
- industrial, household and agricultural waste disposal
- coastal zone management
- preservation of wetlands
- flood control (runoff, storm surge)
- drought
- fisheries
- water-related recreational use
- control of invasive species
- effect of the imposition of rules and regulations

Water Quality Assessment on and around Long Island



Water Quality Issues specific to LI Coastal Areas

- Land use and water quality within watersheds affect coastal areas
- Disposal of waste water and thermal water can affect coastal waters
- Preservation of wetlands
- Runoff from agricultural, industrial and residential land can affect coastal waters
- Shoreline erosion control
- Flood control (runoff from land and storm surge from the sea)
- Fisheries
- Recreational use
- Commercial use
- Invasive species control
- Effect of the imposition of rules and regulations
- Global warming issues

Agriculture and Water Regulation

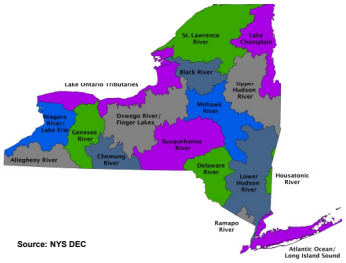
L.I. Duck Farms Struggle With Water Regulation

Officials say the Forge River's nitrogen levels are too high.

High-end restaurants value the free-range ducks from the Jurgielewicz farm in Moriches, N.Y., but regulators call them polluters. *NY Times* 02/25/08

Watersheds of NYS

- NYS has 17 watersheds
- Long Island is in the Atlantic Ocean/Long Island Sound watershed.



Source: NYS DEC

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Watershed

- A watershed is the area of land (also called a drainage basin) where all water flows to the same place.
- A watershed divide separates drainage basins.
- Water flows both along the surface and underground.

Watershed Diagram

Source: US EPA

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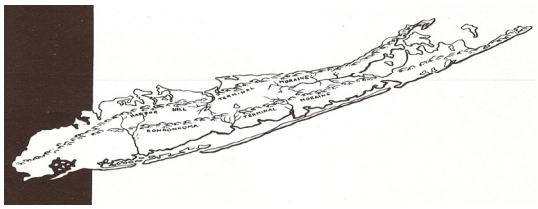
Watersheds of Long Island

The moraines of Long Island define its watersheds.



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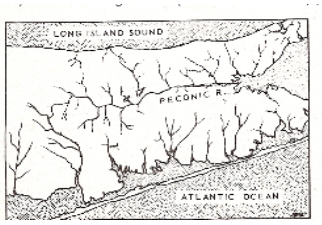
Watersheds of Long Island

Nassau County stream drainage.



Central Suffolk County Stream drainage.

Source: Nassau County Museum of Natural History Leaflet 10

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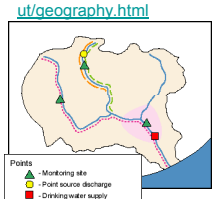
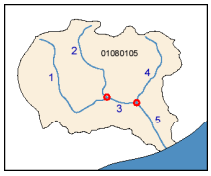
Geography of Waters

- http://www.epa.gov/waters/about/geography.html





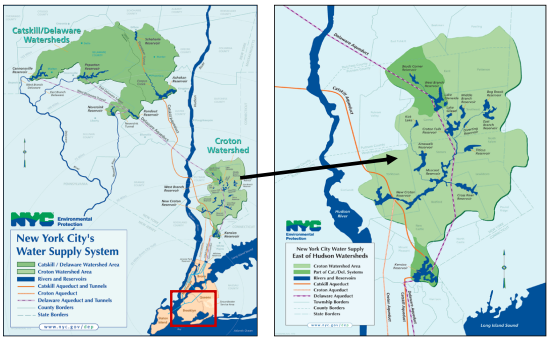
Source: US EPA

Governmental agencies monitor the quality of surface and underground water supplies as a public health issue. 11

NYC Water Supply System

provides water to Brooklyn and Queens on Long Island

http://www.nyc.gov/html/dep/html/watershed_protection/reservoirs.shtml



NYC Water Distribution System

NYC's water supply is a watershed-based system using gravity flow methodology to move water about 125 miles from the Catskills to NYC.

- **1830s - Water shortages on Manhattan Island were common; water-borne cholera epidemic from contaminated groundwater.**
- **1840s - Croton system built.**
- **Mid 1800s – City of Brooklyn searches for water supplies on south shore of Long Island. Villages object.**
- **1880s City of Brooklyn joins the NYC water supply system. Rest of county uses well water. (1898- Kings and Queens counties become part of NYC.)**
- **1907-1927 - Catskill system was built but quickly became taxed as the system supplies water to most of Kings and Queens coun-ties.**
- **1920-1930s - Delaware System started; Cannonsville Reservoir, the last of the system, was put into service in the mid-1960s.**
- **There are 19 reservoirs and 3 controlled lakes.**
- **Water is moved via gravity through a series of aqueducts to terminal reservoirs (Kensico) in Westchester County.**
- **Water goes through a purification process before entering the tunnels of the distribution system.**

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PROBLEMS facing the NYC Water Supply System

Water volume problems exist.

- Supply – cities and towns along the right-of-way tap into the system.
- PA and NJ have sued NYS to get a guaranteed flow of water down the Delaware River.
- Dependent on rain and snow melt. In times of drought, the reservoirs dry up.

Water quality problems exist.

- Salt in the water from winter road salting
- Seepage from septic tanks, gasoline tanks
- Run off from farms and landfills
- Airborne pollutants
- Quality of pipes
- Threat from terrorism

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NYC Drinking Water Report

- NYC and NYS constantly monitor the city's water supply.
- A *Drinking Water Supply and Quality Report* is issued every year.
- See it at: http://www.nyc.gov/html/dep/pdf/wsstate09.pdf.

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Question of the Day

Sustaining Open Space on Long Island

Why should we do it?
How do we do it?
Can it co-exist with population growth and economic development?

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Nassau/Suffolk Water Supply

- In contrast to Brooklyn and Queens, Nassau and Suffolk counties rely on groundwater to supply its fresh water needs.
- There are no surface reservoirs in Nassau and Suffolk counties. Historically local wells provided fresh water.
- To provide "natural" water pressure, groundwater must be pumped up into tall water towers. Gravity flow then gets municipal water from the towers to the taps.

Groundwater Definitions

- **Groundwater** - water occupying the pore spaces and cracks in rocks and unconsolidated material. The best groundwater is found in sand and gravel formations.
- **Water table** – top of the groundwater; varies in depth from the surface with water supply.
- **Most rural areas depend on groundwater.** Long Island is the largest area of the state that uses groundwater. The greatest number of non-rural people in the US who are dependent on it are in Nassau and Suffolk counties.

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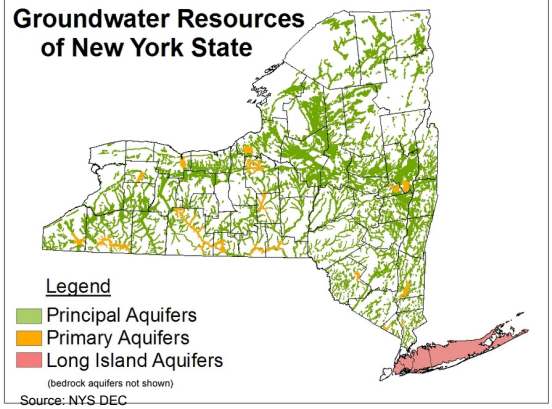

L I Groundwater Situation

- LI is the largest populated area of the country that depends exclusively on groundwater.
- It is rapidly urbanizing.
- There are no dependable surface water sites to supply fresh water to the residential, industrial and agricultural sites.
- Long Island is surrounded by salt water.
- The NYC Water Supply system does not have enough water to share with LI without drastically enlarging the Catskill collection system.

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Physical make up of Long Island

- Created by glaciers.
- Bedrock deeply buried.
- Porous unconsolidated material (sand, silt, clay and gravel) form layers that hold water.
- Long Island is surrounded by salt water.
- Long Island receives an annual average of 44 in. of precipitation.

- There are 4 aquifers:
  - -Upper Glacial
  - -Jameco
  - -Magothy
  - -Lloyd
- There are 2 aquicludes:
  - -Gardiners Clay
  - -Raritan Clay
- The water table varies in depth under the surface.

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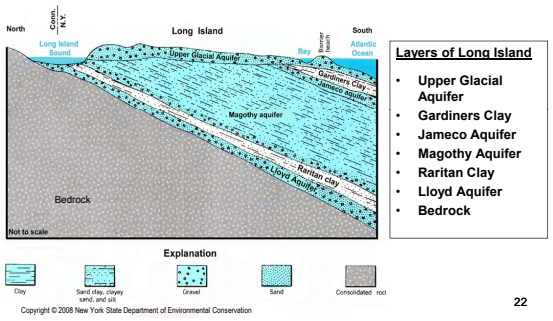
Major Units of the Long Island Aquifer



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Problems affecting LI Groundwater

- Freshwater area under LI is shrinking.
- Surface area for fresh-water recharge has gotten smaller.
- The water table is being lowered (pumping - recharge).
- Reduction in outward pressure is allowing salt water to move inland.

- Rising sea level will submerge more coastal areas reducing recharge and contaminating freshwater.
- Surface pollution has contaminated ground-water closest to the surface.

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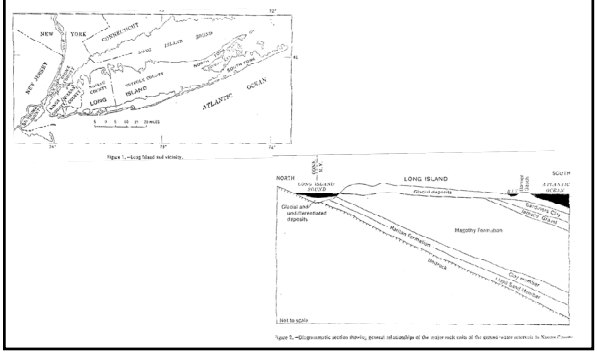
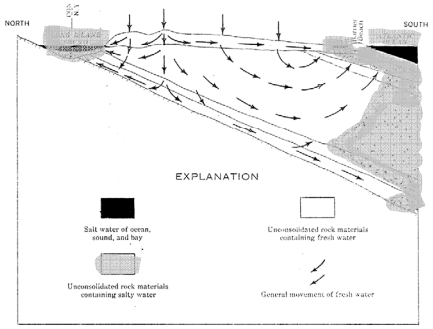
LI Groundwater Setting



LI Groundwater Conditions -1



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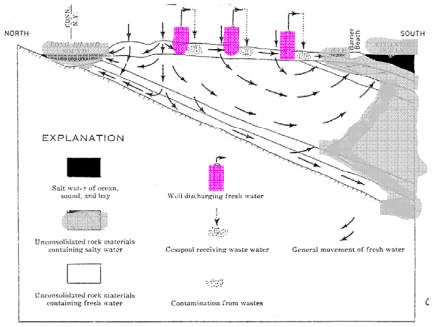
LI Groundwater Conditions - 2



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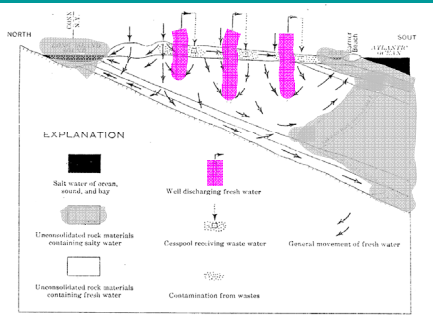
LI Groundwater Conditions - 3



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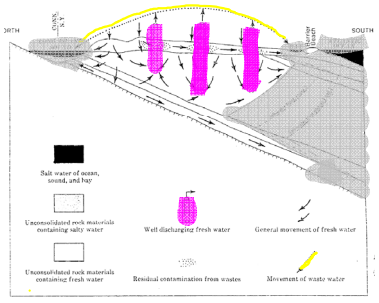
LI Groundwater Conditions - 4



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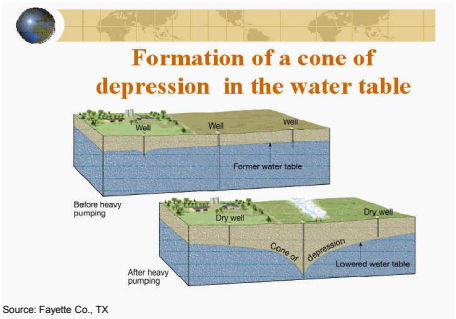
Lowering of the Water Table



Source: Fayette Co., TX

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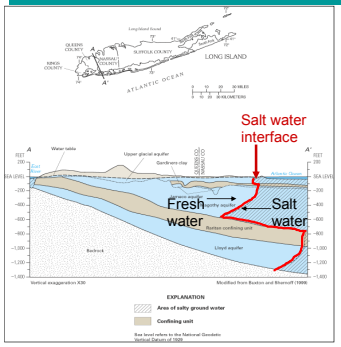
Groundwater: Saltwater Interface



The saltwater interface moves inland when fresh-water with-drawal is greater than freshwater recharge.

Source: USGS Circular 1262

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Groundwater Recharge Basin

Groundwater is the sole source of freshwater for the people who live on Long Island outside of NYC. Rain water needs to be collected to replenish withdrawals.

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Ensuring a Safe Yield on L.I.

Problem		Remedy
Increased use	>>	Conservation programs; regulate consumption
Suburbanization	>>	Preserve open space; restore wetlands
Over pumping	>>	State regulation
Replenishment	>>	Building of recharge basins; open space
Loss of run off	>>	Collection: sanitary sewers, seepage ponds
Irrigated farmland	>	Water conservation methods; hybrid plants
Salt water intrusion	>	Reduced pumping; pressurized recharge

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