Water Resources of NYS:

Underground Water

Prof. Anthony Grande

1

MIDTERM EXAM

- **DATE: Thursday, October 25**
- Extra credit question on county glacial features for the midterm is due Thursday, Oct. 25.
- Extra credit exercises (4, 8, 9) for first half of semester are due Tuesday, Oct. 30 (new date).

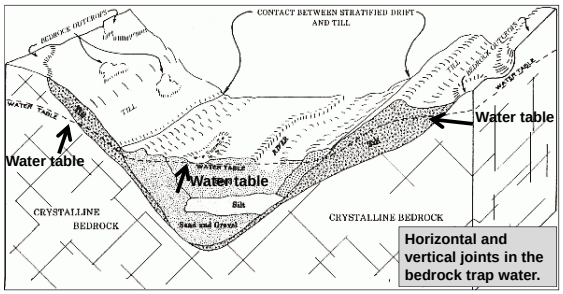
2

GROUNDWATER

- **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.**
- The **largest area** of the state that uses ground-water is **Long Island** and the **greatest number of people in the US** who are dependent on it are in Nassau and Suffolk counties.

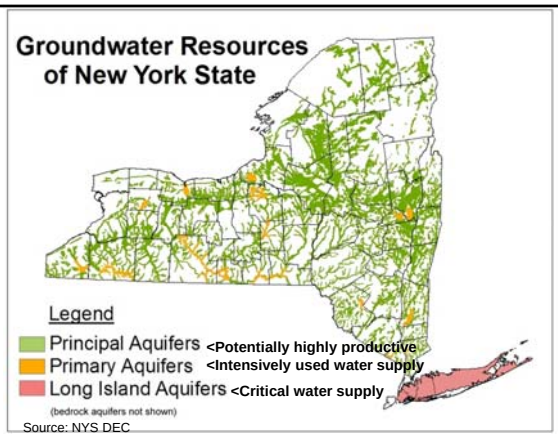
3

Groundwater Environment



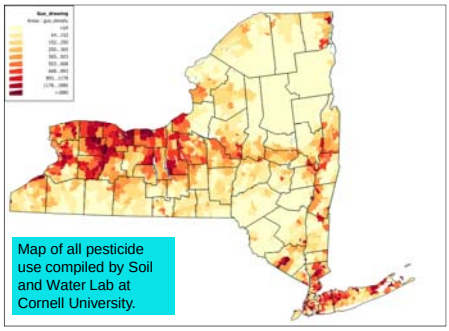
4

Groundwater Resources of New York State



Source: NYS DEC

Potential Pesticide Exposure from Groundwater



Map of all pesticide use compiled by Soil and Water Lab at Cornell University.

6

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 collection system in the Catskills.

7

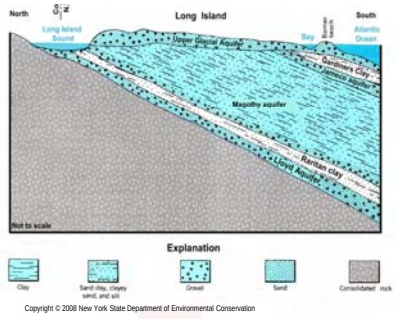
Physical make up of Long Island

- Created by glaciers.
- Bedrock deeply buried.
- Porous unconsolidated material (sand, silt, clay and gravel) form layers that hold water.
- LI is surrounded by salt water.
- LI 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.**

8

Major Units of the Long Island Aquifer



Layers of Long Island

Upper Glacial Aquifer
Gardiners Clay
Jameco Aquifer
Magothy Aquifer
Raritan Clay
Lloyd Aquifer
Bedrock

9

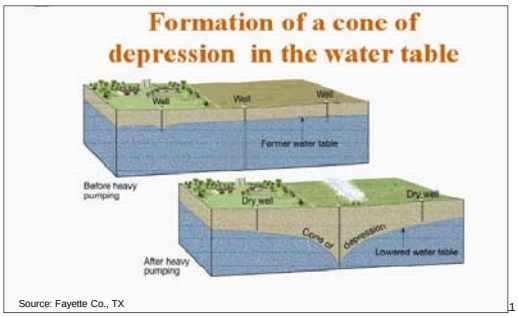
Problems facing LI Groundwater

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

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

10

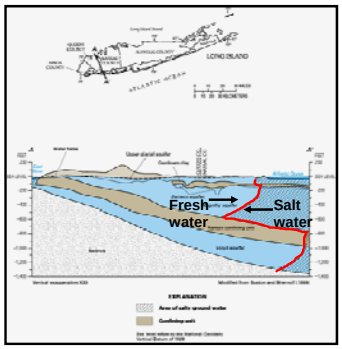
Lowering of the Water Table



Source: Fayette Co., TX

11

Groundwater: Saltwater Interface



The saltwater interface moves landward with increased freshwater withdrawal.

Source: USGS Circular 1262

12

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.

13

Ensuring a Safe Yield on LI

Problem	Remedy
Increased use	>>Conservation; regulate consumption
Suburbanization	>>Preserve open space; restore wetlands
Over pumping	>>State regulation
Contamination	>> Regulation of land fills, cesspools, septic tanks, industry and agriculture
Replenishment	>>Required recharge basins; open space
Loss of run off	>>Move to sanitary sewers, seepage ponds
Irrigated farmland	>>Water conservation methods; hybrid plants
Salt water intrusion	>>Reduced pumping; pressurized recharge

14