Causes, consequences, costs, and policy ramifications of Nitrogen pollution on Long Island NY
Aquifers on Long Island

What goes onto and into the land ends up in our drinking water and in our surface waters.
Key estuarine/coastal biogenic habitats
LI waterways transitioning to alternative less desirable state
Other impacts of excessive algal growth from nitrogen pollution
Algae symptoms are island-wide
Nitrogen enrichment impacts on seagrass from Butler (1999)

Eelgrass is Essential Fish Habitat

Thousands of acres of eelgrass have already disappeared
Nitrogen pollution impacts on saltmarshes

Images from *Nature* 10/2012

- **Normal nutrient levels**
  - *Spartina patens*
  - *Spartina alterniflora*
  - Narrow creek
  - Organic matter

- **High nutrient levels**
  - Wide creek
  - Creek bank collapsing
  - Less organic matter
Marshes protect developed shore from energy every day.
Island Park: Example of vulnerability
Many coastal properties will be more vulnerable as marshes degrade.
Routine windy day in part of bay without expansive marsh islands
Sources of reactive nitrogen to coastal waters

County land use data N-Load and ELM models quantify sources of Nitrogen loaded to LI bays
33 GSB sub-watersheds
~ 1M people live in the GSB groundwatershed

SWSD has ocean outfall

20% GW to Ocean
N loads to GSB from watershed (684,000 kg N/Yr)

- septic/cesspool: 67%
- atm to land: 20%
- Fire Island: 2%
- STPs: 1%
- agriculture: 1%
- lawns: 7%
- golf courses: 2%
Total N Loads to Great South Bay (908,000 kg N/Yr)

- septic/cesspool: 51%
- atm to water: 25%
- atm to land: 15%
- Fire Island: 2%
- golf courses: 1%
- lawns: 5%
- agriculture: 0%
N Loads to PE from watershed (243,000 kg N / Yr)

- Agriculture: 19%
- Lawns: 6%
- Golf courses: 5%
- Septic/cesspool: 36%
- STPs: 7%
- Atm to land: 27%
The Nature Conservancy

Protecting nature. Preserving life.

- Agriculture: 4%
- Septic/cesspool: 7%
- STPs: 1%
- Lawns: 1%
- Golf courses: 1%
- Atmosphere to land: 5%
- Atmosphere to water: 81%
Bay Park STP

Outfall location
In some places like Western Bays, the majority of N is end of pipe

Mean Summer (June, July, August) Ammonia, Nitrate, Nitrite (2000-2009)
Excessive seaweed impacts prime ocean front beaches along Point Lookout
What can we do?
Opportunities for modernization
Living and working in LI coastal communities

Costs and Risk

Benefits and Opportunities
Potential ideas for future work

- Critical Loads approach for estuaries
- Cost per lb of N-load reduction
- Recovery of resources from wastewater
- Decentralized power for alternative septic systems
- Others?
It’s stinky and slimy

This is Great!

No, you can’t go in the water, it’s polluted

Questions?

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