

# Sustainability of Drinking Water: Some Thoughts from a Midwestern Perspective

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## The Upper Midwest

- | Temperate
- | Moderate rainfall
- | Moderate to low relief
- | Agricultural in south
  - Corn, soybeans, wheat
  - Dairy, pigs, poultry
- | Forested in north

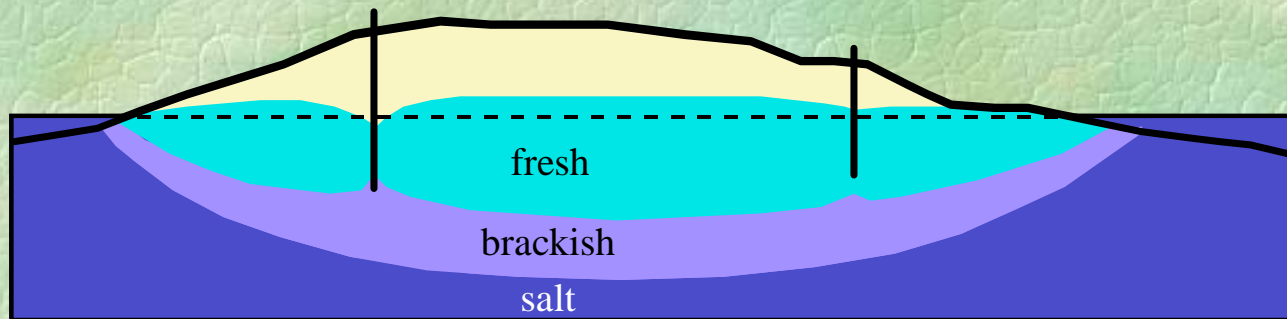


Ocean

Nicaragua

# Sustainability of DW Sources

- § Water quantity
- § Water quality
- § Supply and demand
- § E.g. island aquifer



# Topics: Sustainability and...

- § Water quantity and quality in Great Lakes
- § Water quality in Lake Erie tributaries
- § Water quality in Midwest groundwater
- § Final thoughts

# Water Quantity: the Great Lakes

- § Volume: 22,700 km<sup>3</sup> (5,400 mi<sup>3</sup>)
- § Largest surface fresh water system in the world
- § 84% of North America's fresh water
- § 21% of world's fresh water
- § Only the polar ice caps contain more (and that's changing)
- § Provide drinking water for 25 million people
- § Talk about your ultimate sustainable water supply...

# Water Quantity: the Great Lakes

- § Southwest (and elsewhere) covets Great Lakes water
- § Great Lakes Water Resources Compact severely limits diversions out of Great Lakes watershed
- § "If we want sunshine, we'll move to Arizona," says George Kuper, president of the Council of Great Lakes Industries. "If they want water, let them move to Michigan."
- § What about the poor folks who live 10 miles from Lake Michigan but are outside the watershed?
- § "There's *so much water!*" But how much could be diverted outside the watershed?

# Water Quantity: the Great Lakes

## Š How much could be used?

- | Need to protect St. Lawrence River ecosystems
- | Could perhaps remove 5% of St. Lawrence flow, 10% max
- | St. Lawrence annual discharge <1% of Great Lakes water
- | Thus sustainable yield ~0.05% of volume

## Š Sustainability defined by turnover, not total quantity

## Š And further limited by ecosystem needs

# Water Quality: Lake Erie

- § Generally high quality drinking water source
- § Increasing dissolved phosphorus from tribs, which is not a DW problem per se
- § But it is leading to blooms of Microcystis, Lingbya, which can release toxic substances
- § Threat of reduced quality or increased cost for DW from the lake - threat to sustainability through degradation of water quality leading to ecosystem changes.

# Water Quality: Lake Erie tributaries

Š Sustainability limited by non-point pollution

Š Pesticides

- Insecticides not a DW problem, but can rarely kill fish
- Herbicides atrazine, acetochlor, metolachlor don't exceed MCLs on annual average basis, but are detected in most samples in summer, and atrazine comes close to the MCL in some years

Š Pharmaceuticals etc.: not much known

# Water Quality: Lake Erie tributaries

Š Sustainability limited by non-point pollution

Š Nitrate Nitrogen, MCL 10 mg/L as N

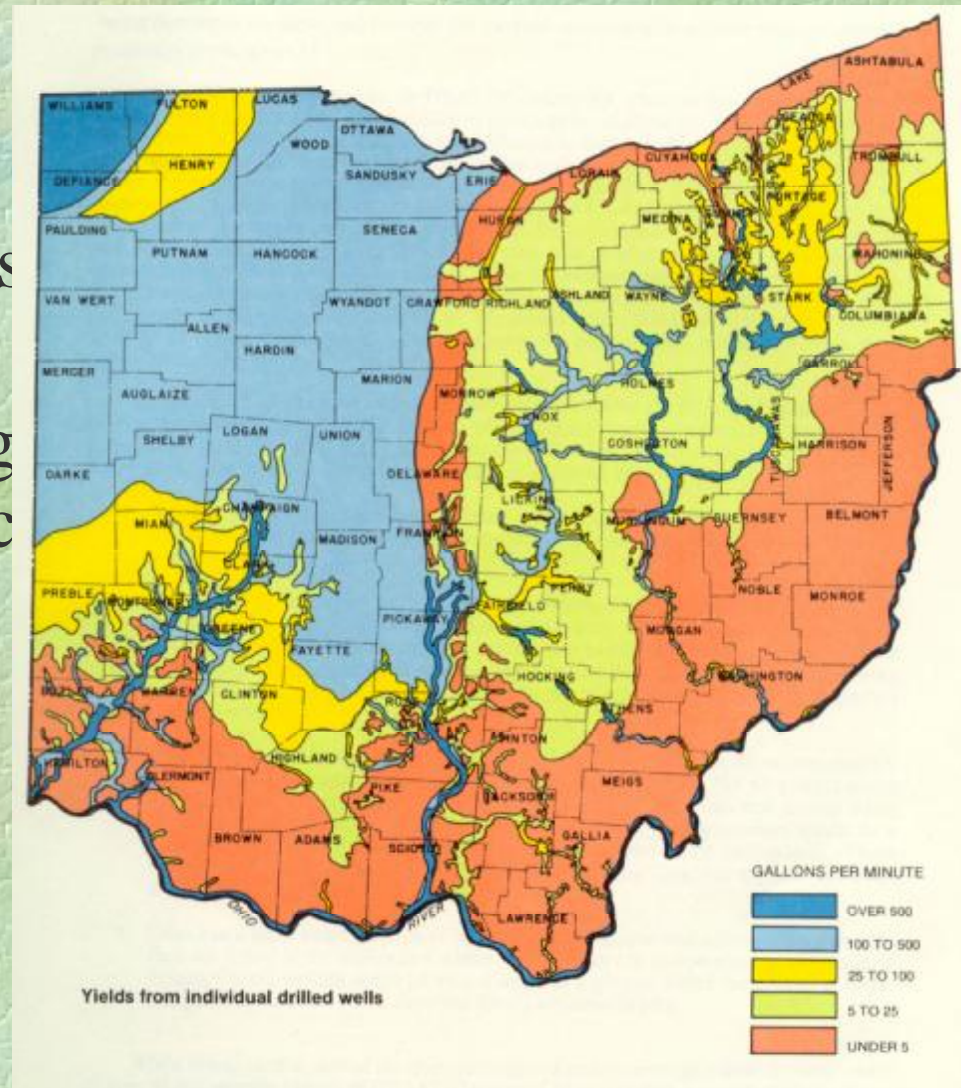
- | Exceeded 6.3% of time in Sandusky River
- | But 25% of the time in June
- | May-June 2000: 41 days in a row >10 mg/L

Š Ethanol a big threat on the horizon!

- | More corn means more nitrate fertilizer
- | Corn replacing CRP land
- | Ethanol process uses lots of water, a major problem farther west (groundwater-based irrigated ag)

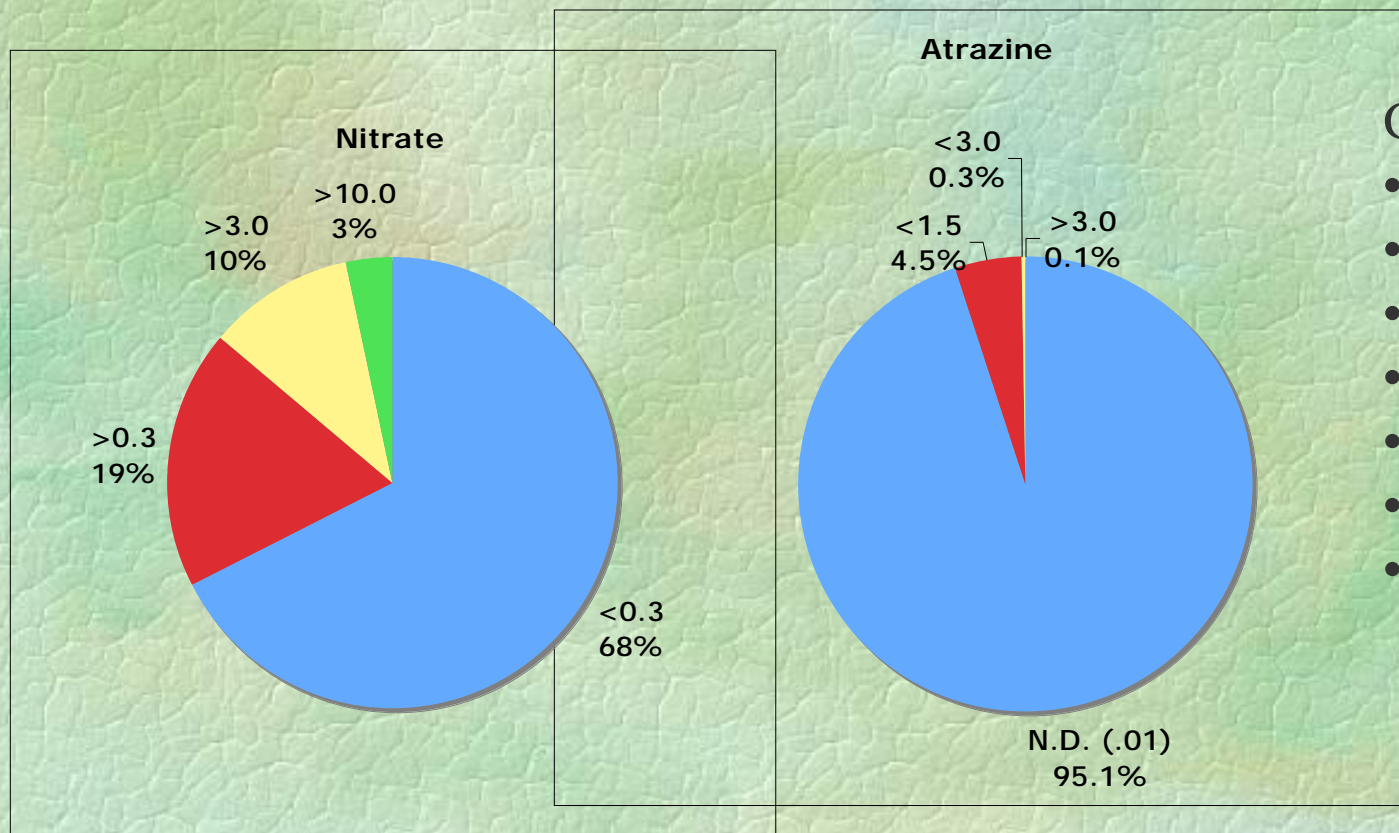
# Water Quality: Groundwater in the Midwest

- § Sustainability varies differing geology
- § Sustainability though pollution from agric



# Water Quality: Groundwater in the Midwest

§ Private well testing program findings:



Greater risk:

- Shallow wells
- Old wells
- Dug wells
- Wells near crops
- Wells near barns
- Sandy soils
- Karst terrain

# Water Quality: Groundwater in the Midwest

Š Sustainability affected by natural chemical contaminants

- | Iron
- | Hydrogen sulfide
- | Radon
- | Arsenic (impact of new MCL of 10 ppb)

Š Rural water authorities

# Sustainability or...

- § Sustainability implies avoiding using up or running out of something - the “supply” side of supply and demand.
- § In Midwest, water is replenished and thereby sustained unless quality becomes compromised
- § “Carrying capacity” involves us more clearly as part of the problem.
- § It’s not how much water there is, it’s how many people want to use it for how many purposes.

# Sustainability or...

Š Proposition: the real challenge of sustainability is learning when to say no! to increasing demand.



The End

Rock Creek 6/25/06