

**3rd Annual**  
**Midwest Soil Improvement Symposium:**  
**2013**

*Research and Practical Insights into Using Gypsum*

*March 7, 2013*

***Soil and Water Quality Improvements from Gypsum:  
Ohio Environmental Research Project***

***Mr. John Andersen***

*President*

*Greenleaf Advisors, LLC, Chicago, IL*



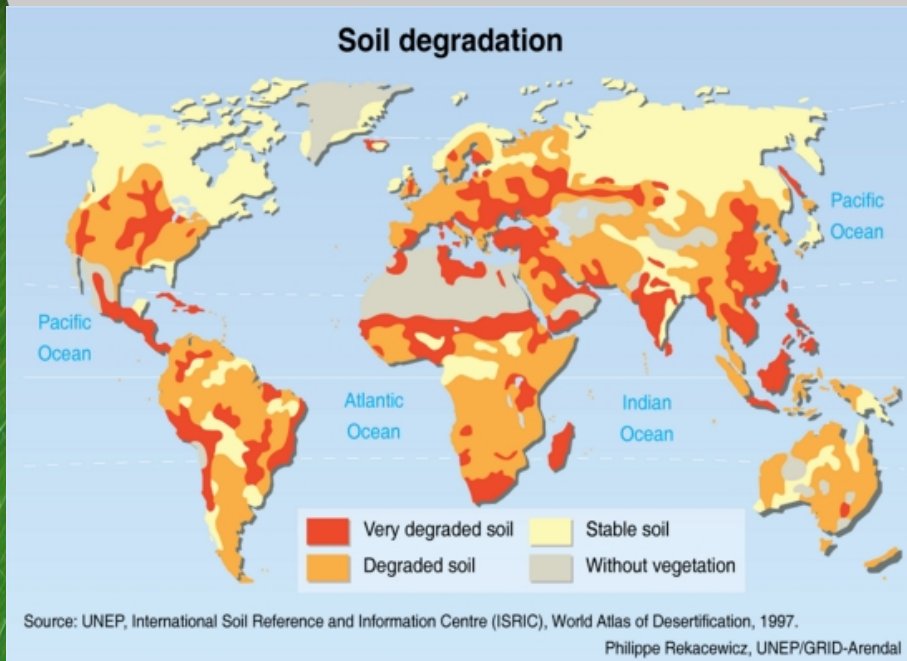
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# Soil & Water Quality Improvements from Gypsum Amendments: *Ohio Environmental Research Project*



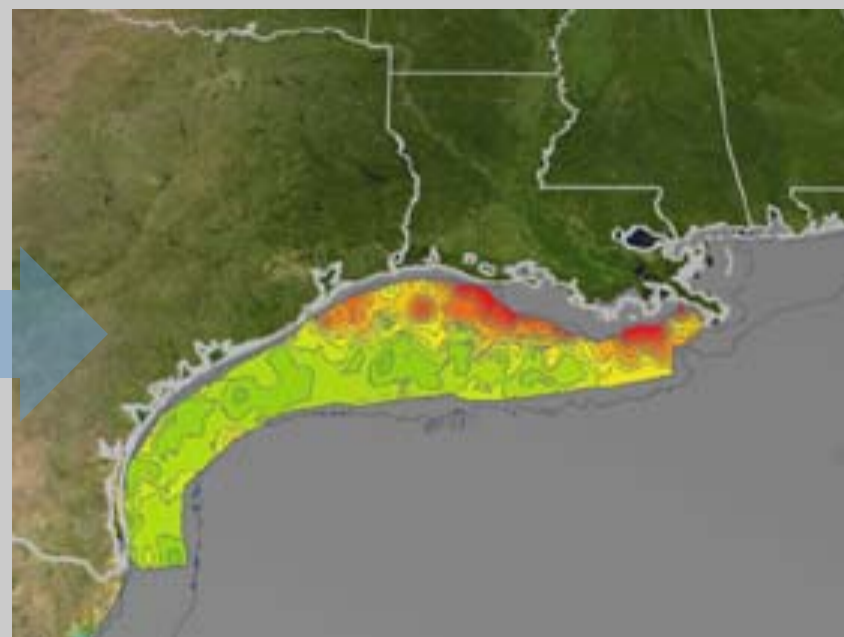
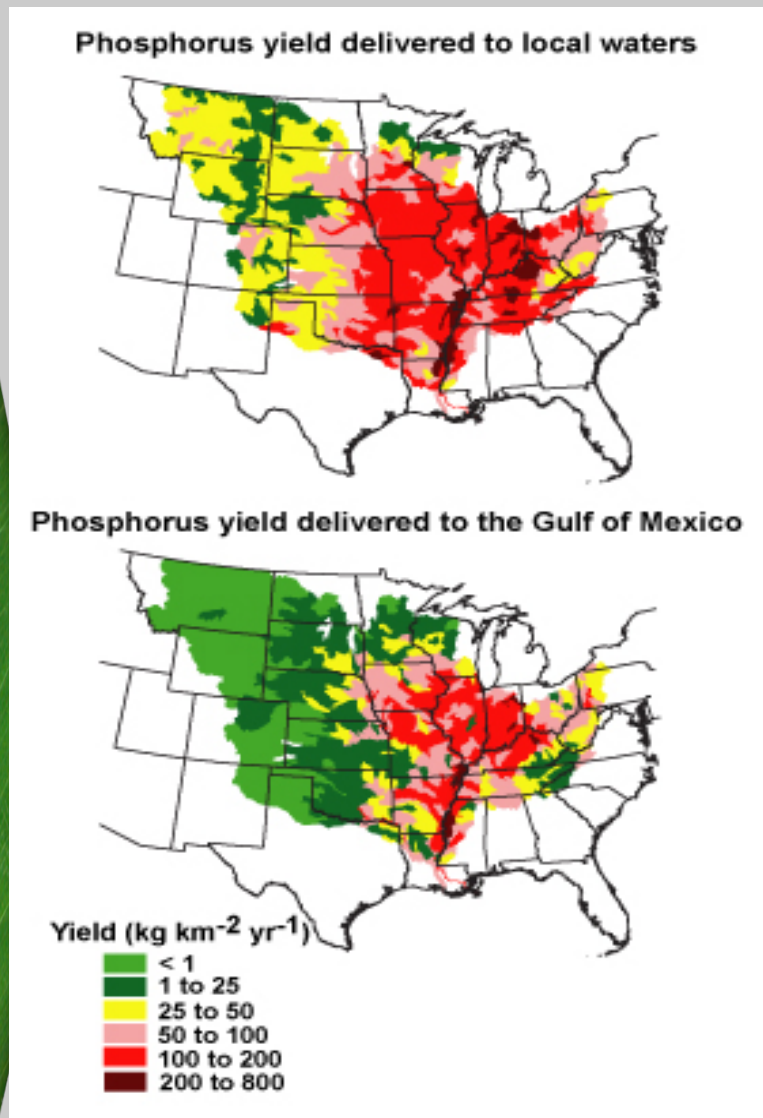
Midwest Soil Improvement Symposium  
March 7, 2013 - Ada, Ohio  
John Andersen, Greenleaf Advisors

# Global Soil Degradation



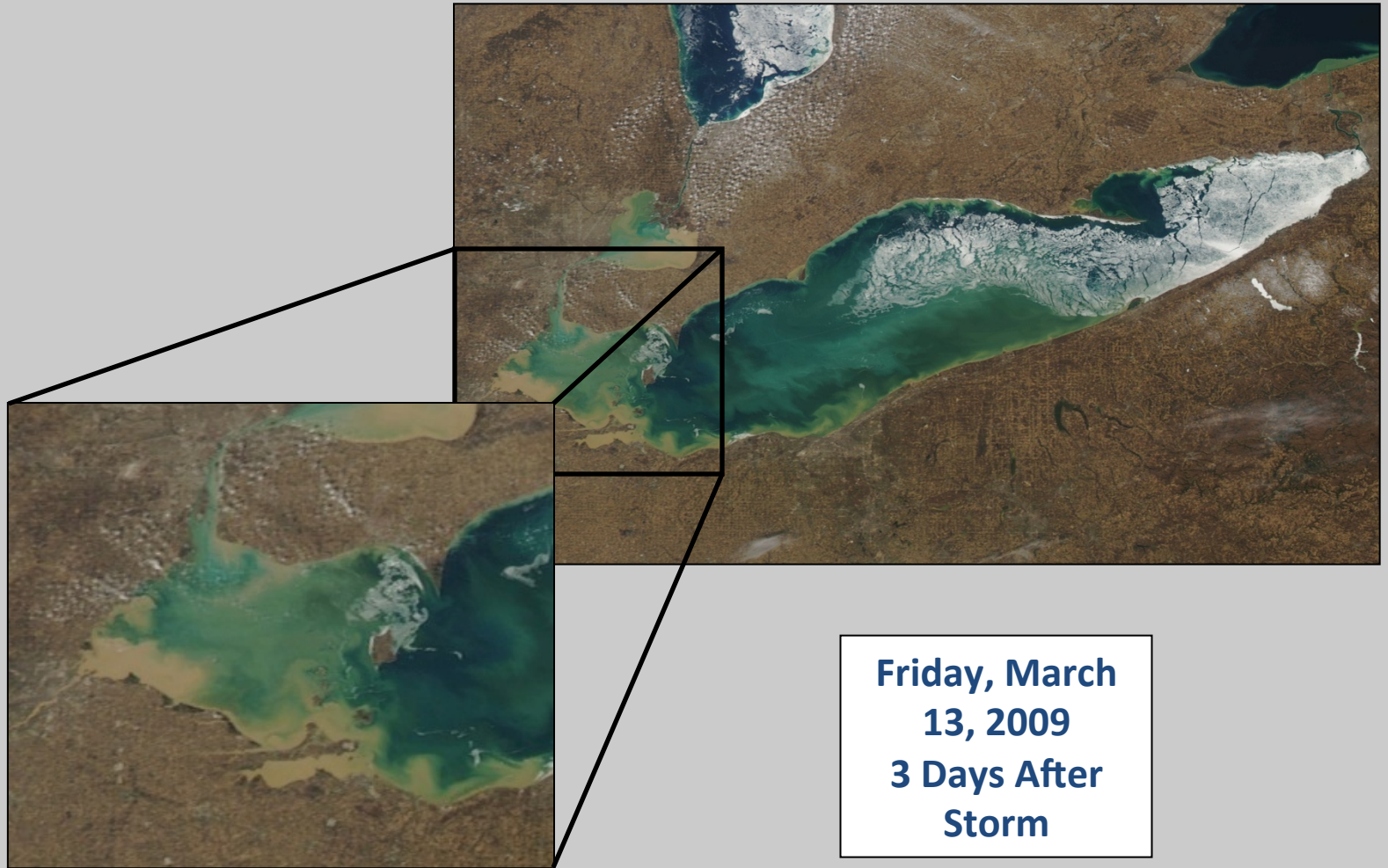
- Disturbance makes soil vulnerable to wind and water erosion
- Soil loss often faster than re-formation
- Topsoil loss reduces productivity
- Leads to...

# Nutrient Loading, a Global Priority






# Nutrient Loading, an Ohio Priority



# Nutrient Loading, a Lake Erie and Ohio Priority

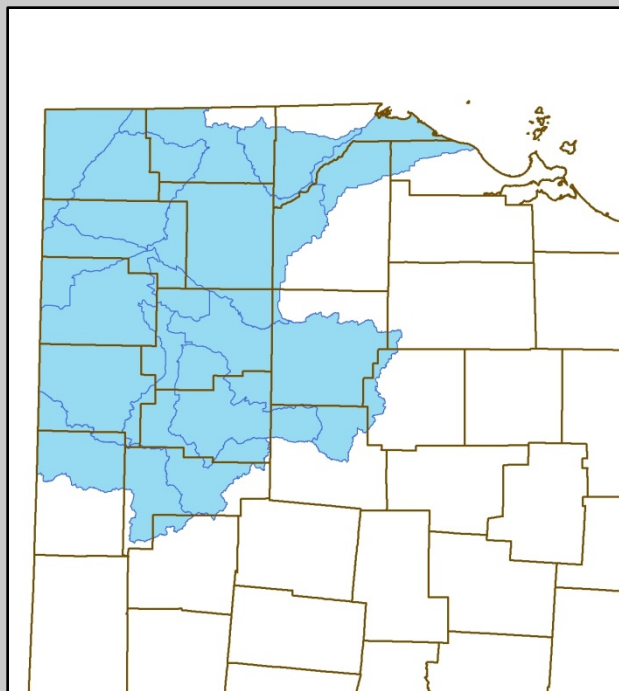
**Eutrophication in Lake Erie**



This glass of water came from this *Microsistis* bloom

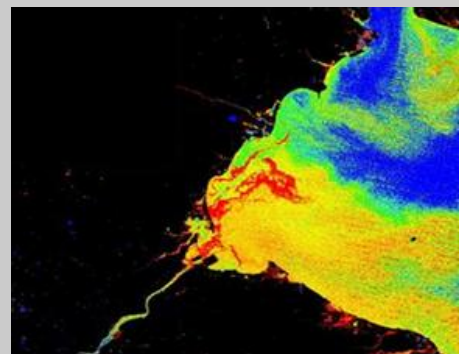
Dr. Douglas R. Smith, USDA-ARS  
National Soil Erosion Research Laboratory, West Lafayette, IN

# The Maumee River Watershed



Primary contributor to P nutrient loading in Lake Erie:

- 1,822 Tons P in 2002
- 64% more than next largest watershed source

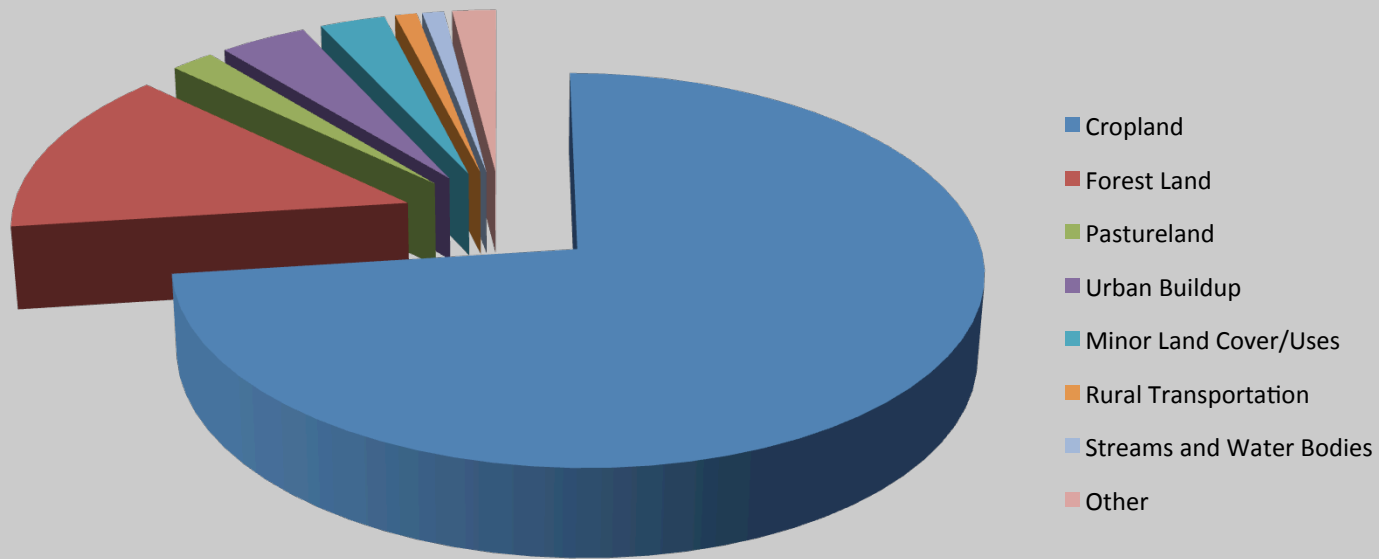




# The Maumee River Watershed

Primary contributor to P nutrient loading in Lake Erie:

*P Sources:*





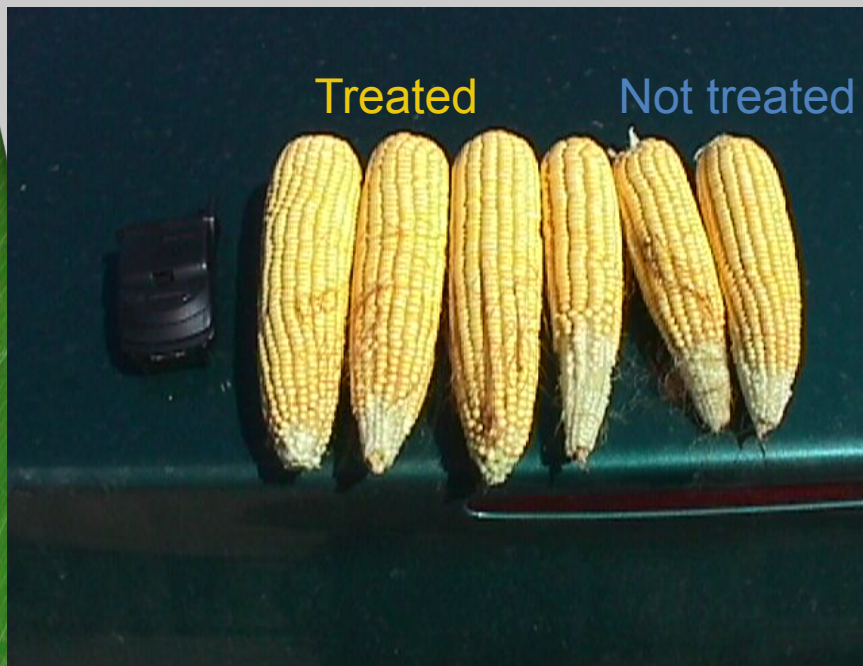
# Gypsum as a Soil Amendment

Can help address this problem:



- Calcium sulfate dihydrate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ )
- Found naturally in sedimentary rocks
- More pure when produced in coal plant scrubbers (FGD)

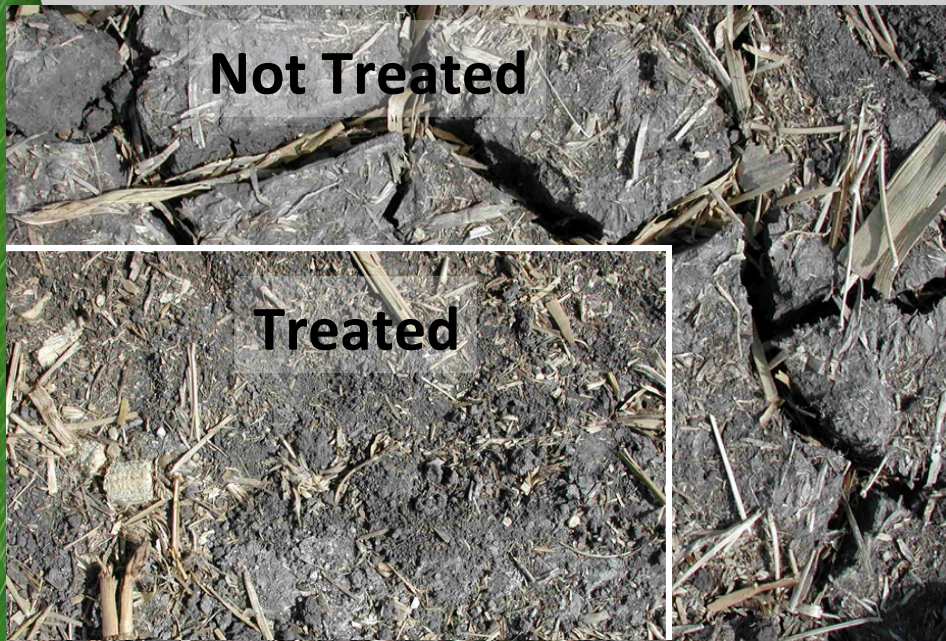
# Gypsum: Crop Benefits



Slide courtesy of Darrell Norton

- Improved nitrogen efficiency
- Increased root mass
- Higher nutrient retention
- Increased yields

# Gypsum: Soil Benefits



- Improves soil structure
- Reduces severe cracking through better moisture retention
- Improves infiltration/drainage

Slide courtesy of Darrell Norton



# Gypsum: Soil Benefits

Reduces sediment detachment and loss through runoff

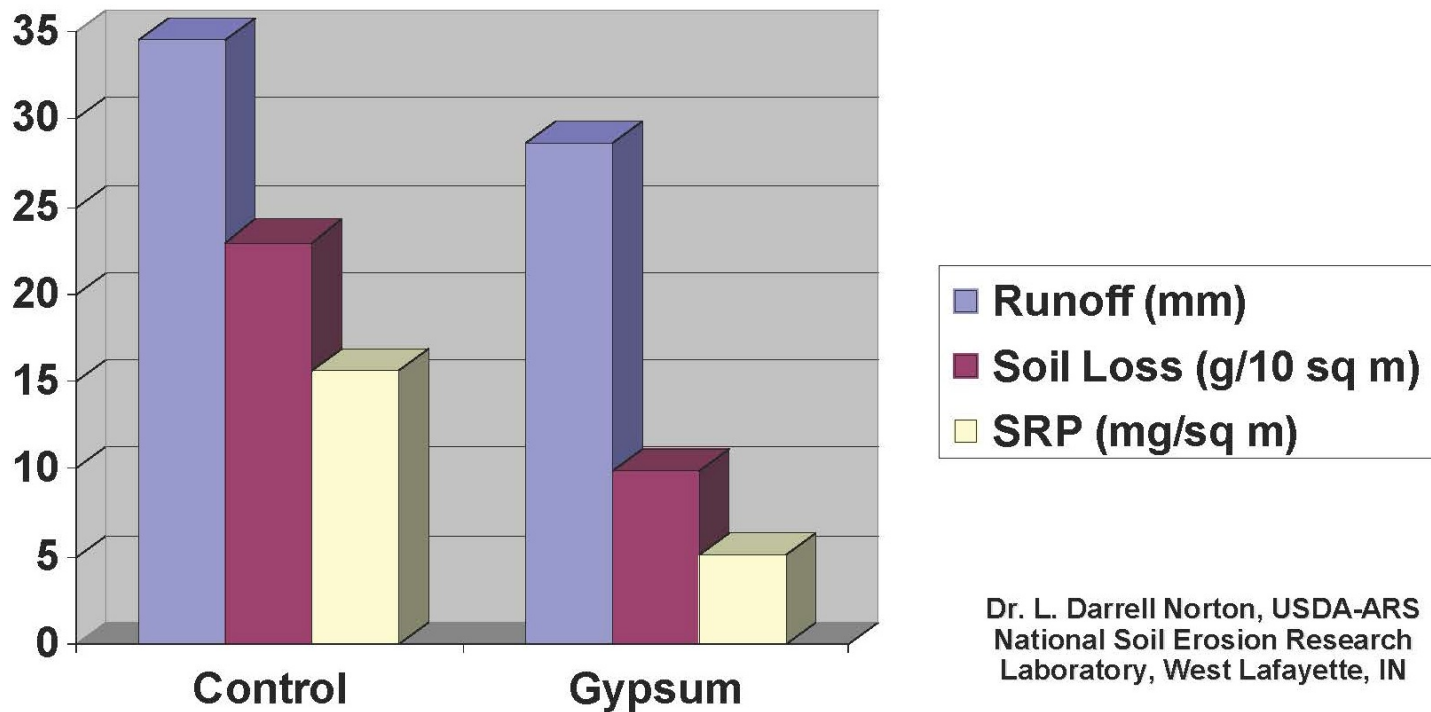


Slide courtesy of Darrell Norton

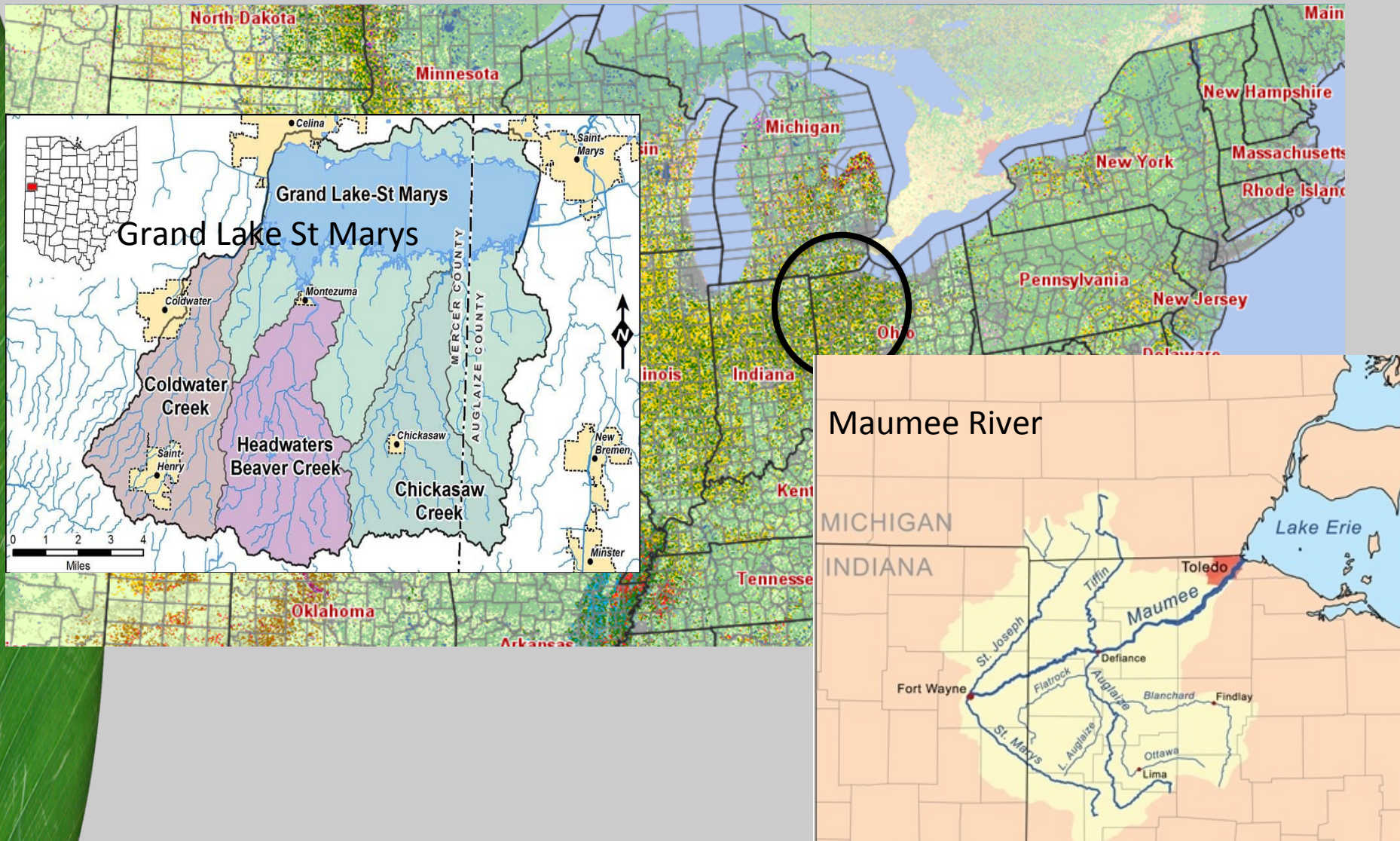


# Gypsum: Water Quality Benefits

## Effect of Gypsum on Erosion



# New Gypsum Research Begins March 2013





# Why Maumee & Grand Lake St. Marys?

- Ag pollution high threat to Lake Erie
- High occurrence of algal blooms
- Threats to biodiversity
- Threats to public health
- Impact on tourism and local economy



Grand Lake St Marys, May 2011

# Project Objectives

- Perform 12 field demonstrations using manual edge-of-field sampling of runoff and discharge
- Monitor 15 additional fields to quantify yield
- Plot-scale studies to refine estimate of appropriate application rates/nutrient reductions
- Work with NRCS and State of Ohio to develop Best Management Practices (BMPs)
- Perform regional education/outreach activities
- Explore connection to water quality trading



# Project Team

- Dr. Warren Dick – The Ohio State University; The Ohio Agricultural Research and Development Center
- Ken Ladwig – Electric Power Research Institute
- Ron Chamberlain – Gypsoil
- Joe Nester – Nester Ag
- John Andersen & Dan Peerless – Greenleaf Advisors
- Darrell Norton – USDA & Purdue University emeritus

# Field Site Selection Criteria

We are seeking fields in Maumee basin, Grand Lake St Marys and elsewhere in Ohio where there are:

- High phosphorus loadings
- Imbalance of calcium and magnesium
- Clay or heavy soils
- History of compaction and ponding
  
- Range of agronomic practices
- Some cases of manure application
- Easy segregation of plots for monitoring
- GPS yield monitors

# Project Timeline

	Year 1				Year 2			
Quarter	1	2	3	4	1	2	3	4
Identify & engage producers								
Layout fields and sample points								
Initial soil and water samples								
Comparative water samples								
Comparative crop yields								
Apply FGD gypsum and lime								
Comparative crop growth and yields								
Study BMPs/practice standards								
Approval process								
Final BMP/practice standards								
Field days								
Printed materials								
Regional/technical conferences								

# Expected Outcomes

- Establish collaborations with crop producers
- Develop a visible state-wide effort on beneficial reuse of FGD gypsum
- Conduct a NW Ohio field day for crop producers on the benefits of FGD gypsum as a soil amendment
- Establish field studies on producer farms and university land to gain long-term agricultural and environmental data
- Increase crop yields and income to crop producers
- Develop enhanced BMPs for using gypsum to reduce phosphorus loadings - approval by Ohio NRCS
- Establish on-farm agronomic recommendations to promote responsible use of FGD gypsum



# In Summary

Research Project intends to demonstrate how gypsum can:

- Improve soil conditions
- Improve crop production/yields
- Improve water infiltration
- Reduce nutrient loading in waterways

We invite farmers and crop consultants to participate by:

- Providing their fields for research
- Participating in workshops and forums
- Contributing their insights and interests
- Receiving communication materials and findings

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***15 Minute Break***

