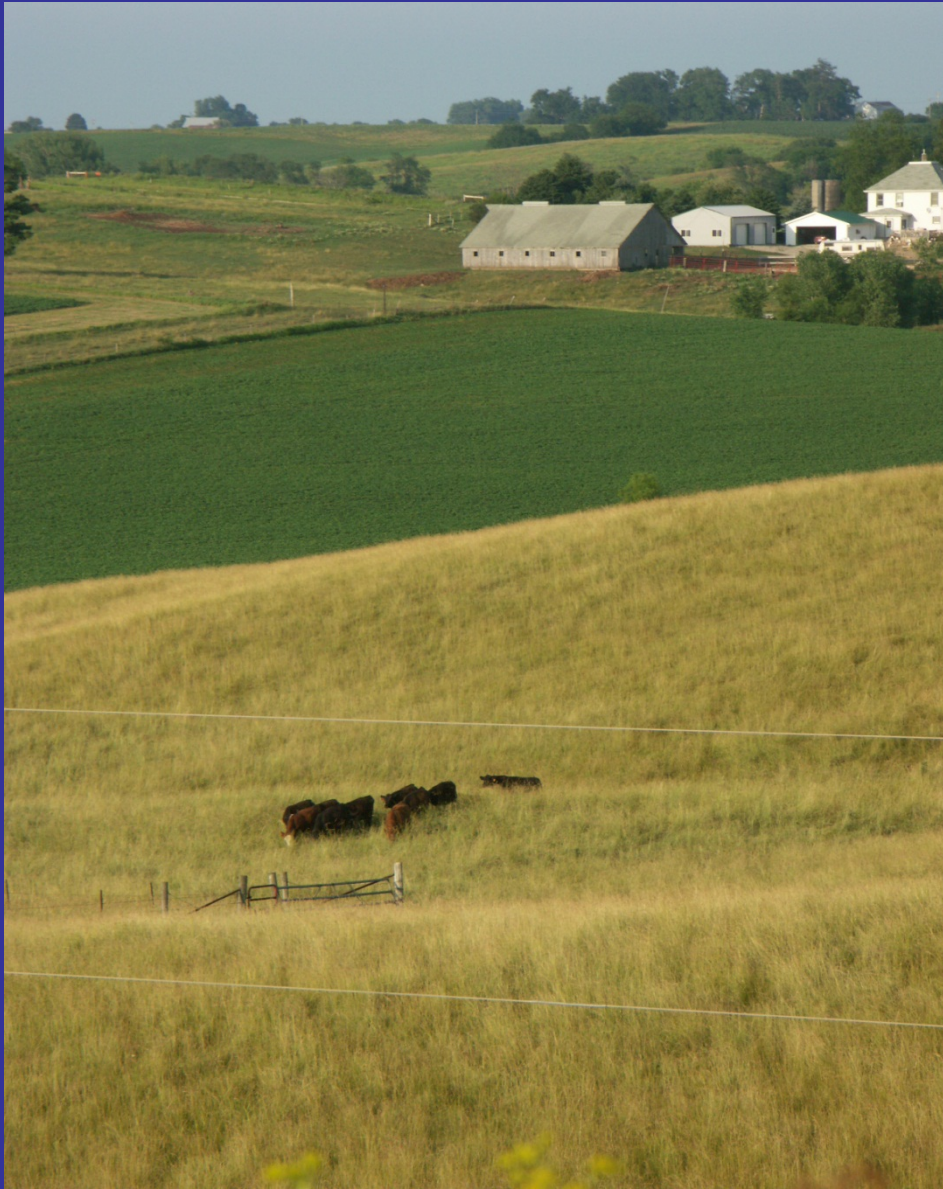


# The Challenges of Sustainable Agriculture in the Corn Belt

Mark Rasmussen

Director

Leopold Center for Sustainable  
Agriculture



# ***The Leopold Center for Sustainable Agriculture***

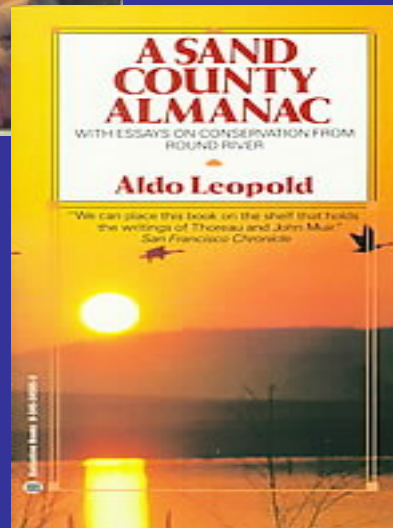


LEOPOLD CENTER



***Established by the  
Iowa General  
Assembly as part  
of the Iowa  
Groundwater  
Protection Act  
(GWPA) of 1987***

# Aldo Leopold 1887-1948



- Burlington native
- Yale: Forestry
- National Forest Service
- Game Management
- University of Wisconsin
- A Founder of the Environmental Movement



# LC Mandated Mission

- *Identify and research the negative **impacts** of today's agriculture*
- *Identify and research **alternatives** for agriculture*
- *Develop a plan to deliver **information** in cooperation with ISU Extension*

# A Forum for Sustainability in Agriculture, Farming and Food

Asking “What if” Questions.

A Place to ask Uncomfortable  
Questions.

Discussions and Debate on  
Sustainability.

# Many Issues and Topics

- Climate
- Environment
- Land Use
- Soil, water, habitat
- Animal welfare
- Transparency
- Labeling
- Co-existence
- Confinement
- Antibiotics
- Slaughter and death
- Industrialization
- Diet and health
- Local food
- Wealth and inequality
- Market power
- Trade
- Exports

# Iowa Agriculture Receipts

- Corn \$13.5 billion
- Soybean \$5.9 billion
- Cattle \$3.8 billion
- Hogs \$7.0 billion
- Eggs \$0.9 billion
- 20% of Iowa GSP
- 2014 IA farm total \$31 billion; PA \$7.6 billion



# Iowa's Pentagon



# Some U.S. numbers, May 2015

- Place 171 million broiler chicks per week
- Slaughter 158 million chickens per week
- Slaughter 566,000 feedlot cattle per week
- Slaughter 2,147,000 hogs per week
- Produce 40.2 million gal. ethanol per day

# Production Intensity in Agriculture





# Capital and Technology Intensive





# Recognizing Our Food Dependency



How is our food produced?

Speed at which it is  
produced?

(At what scale?)

How do we want it  
produced?

# Example: Egg Production





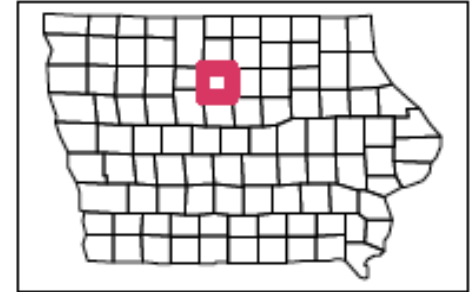
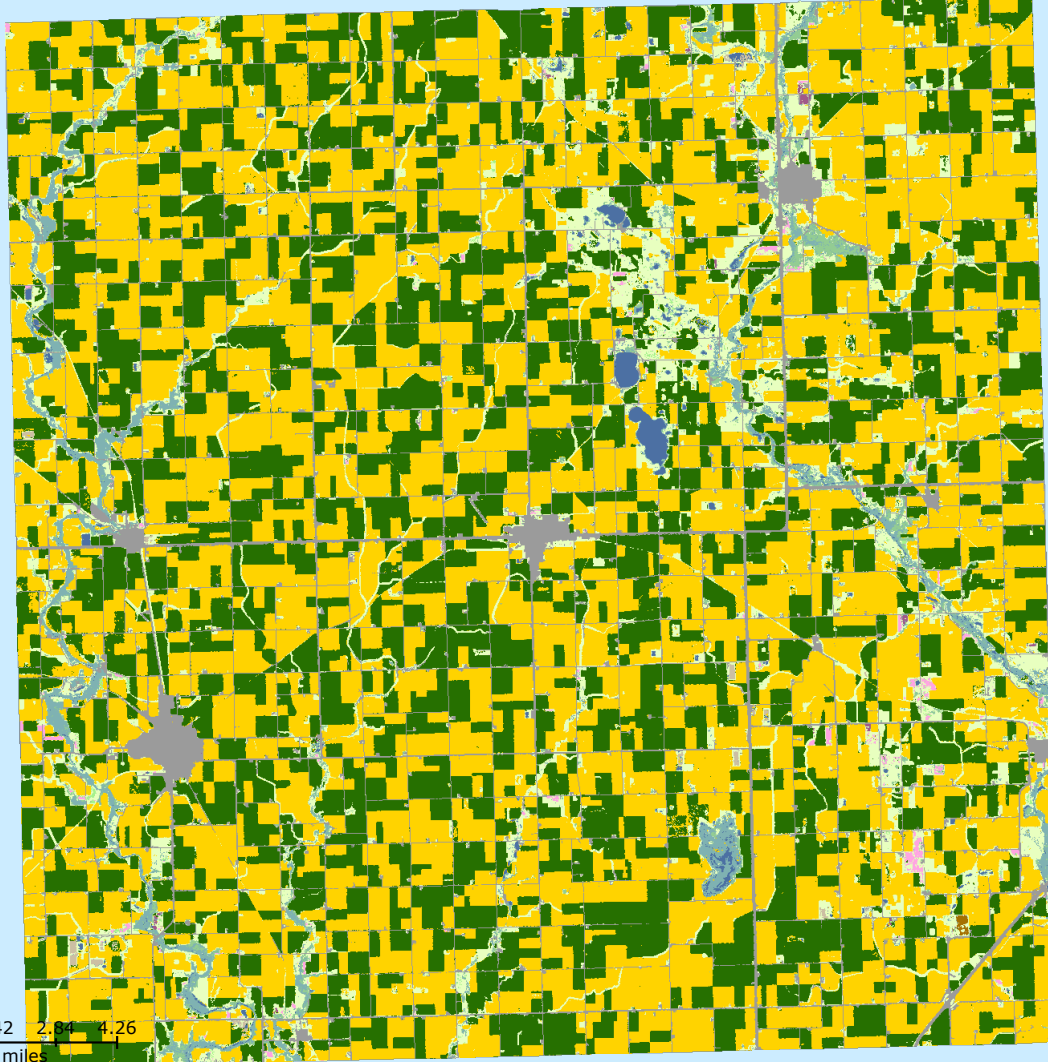
# Intensified Farming has Consequences





# SIMPLIFICATION and HOMOGENEITY of LANDSCAPES

Corn and soybean in Iowa: 63% of total land area, 82% of cropland



**Wright County, 2011**  
583 sq. miles  
(1,509 sq. km.)

**Yellow = corn**  
**Green = soybean**

## Soil: A Resource to Waste?



**Iowa, 2008: Soil loss exceeded 20 tons per acre on 2.3 million acres.  
Photo: USDA-NRCS**



# An Appreciation of Topsoil or Taking it for Granted?





# Elusive Nature of Soil Erosion





# It takes hundreds to thousands of years to form an inch of topsoil.



An acre of soil 1" deep weighs about 167 tons.  
Loss of 20 tons/acre might represent the loss of 100 years of soil formation.

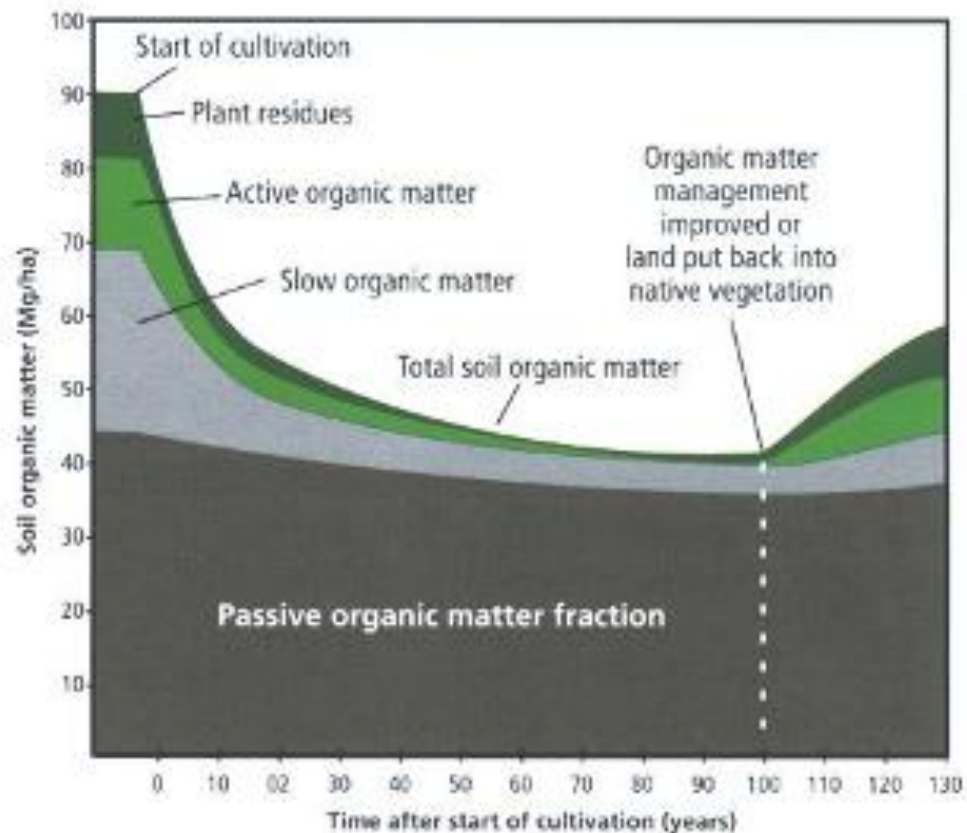


Euro-American settlers in Iowa found a fertile, biological diverse environment.





# Soil Organic Matter Trends



# Farmland Reconstruction





Farming land that used to be grassland





# Farming on the Square





# Row Crop Farming 1937





# Moving the Hillside: 1 inch at a time





Ruminants (cattle) can be an exception in terms of land use



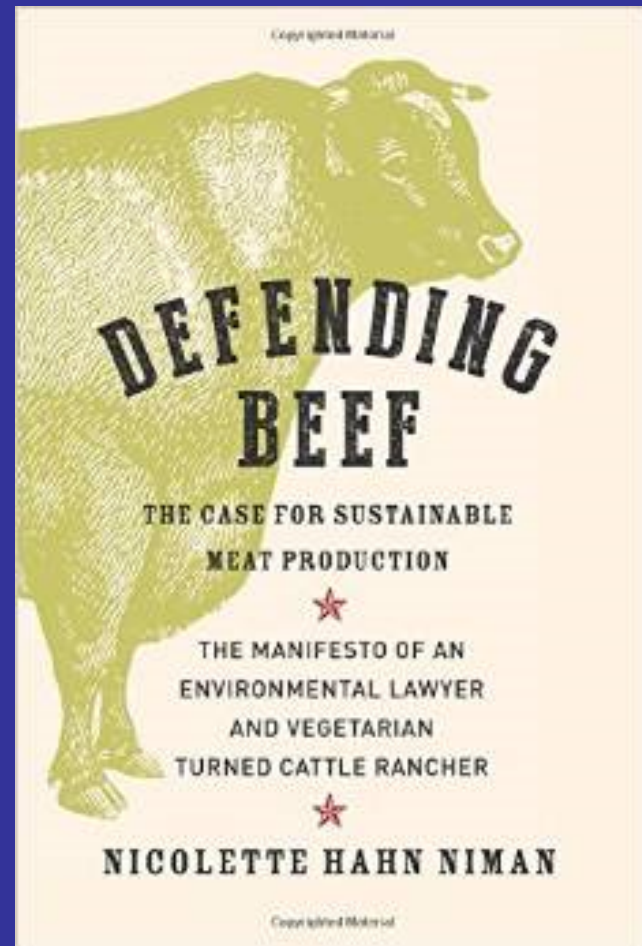
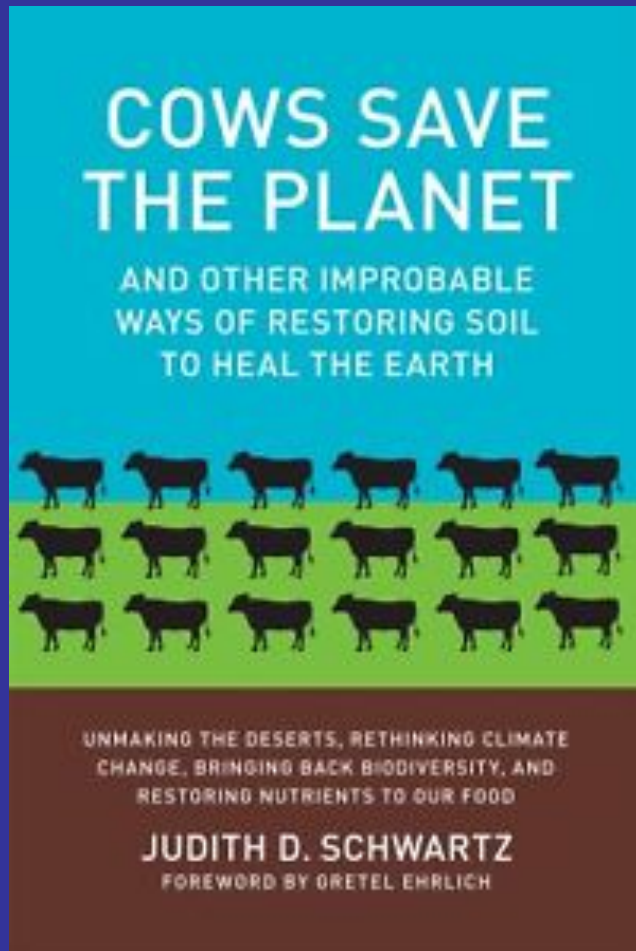


# Many benefits of grazing



- Control soil erosion
- Improve water quality
- Increase soil organic matter
- Sequester carbon
- Multiple land use
- Habitat
- Wildlife
- Management matters!

# Recent Books

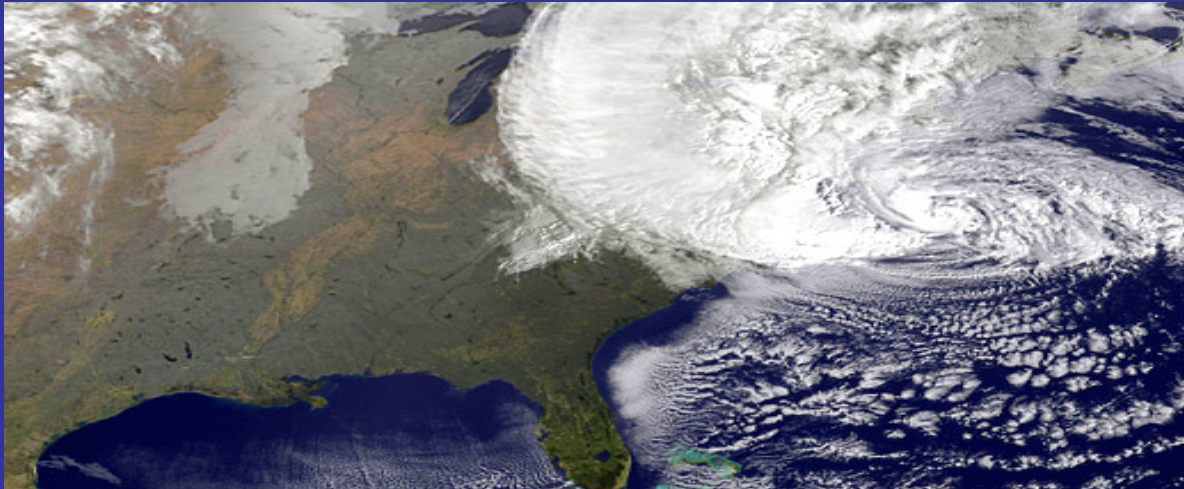


# U.S. Beef Production



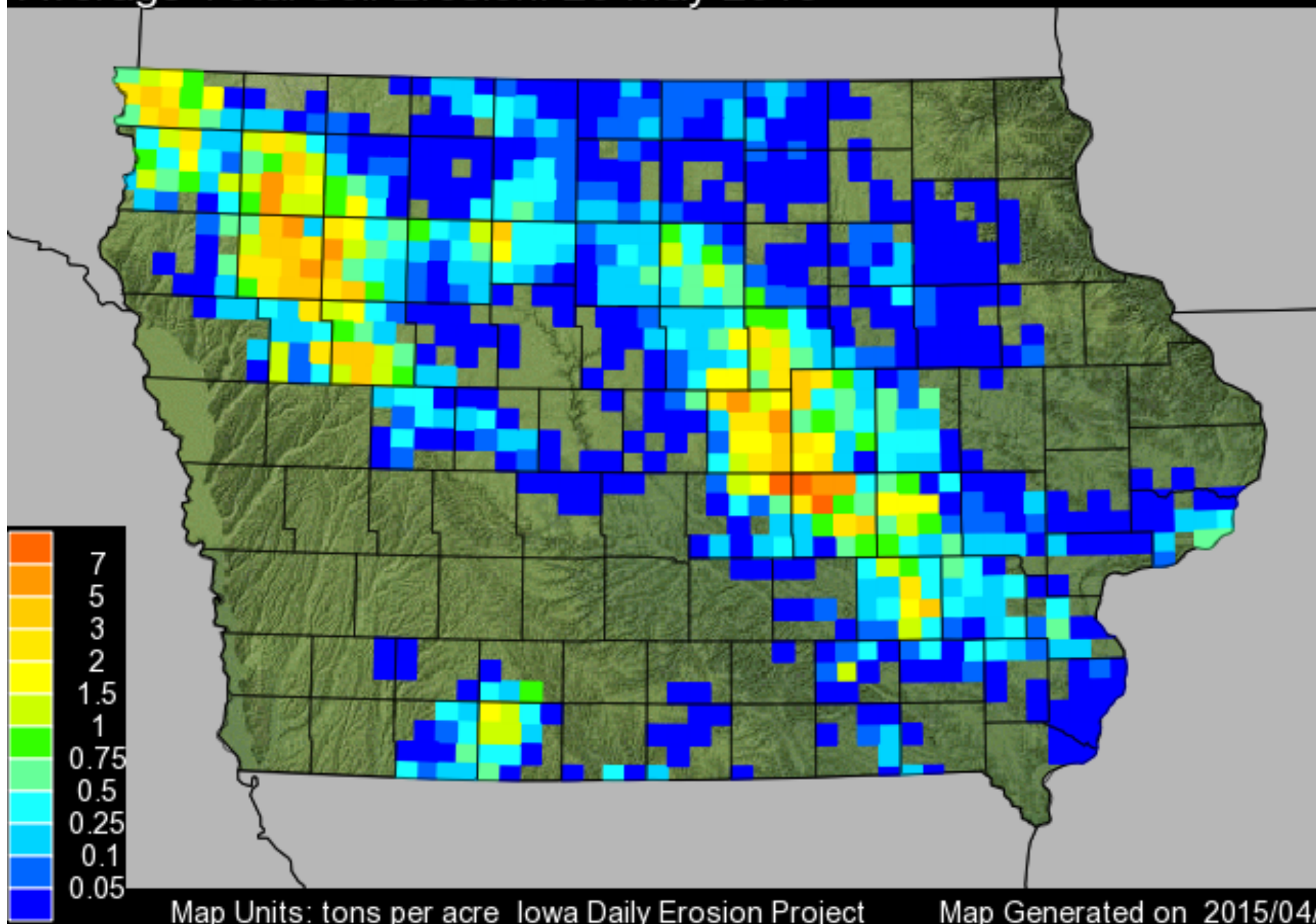
70 % grass & forage





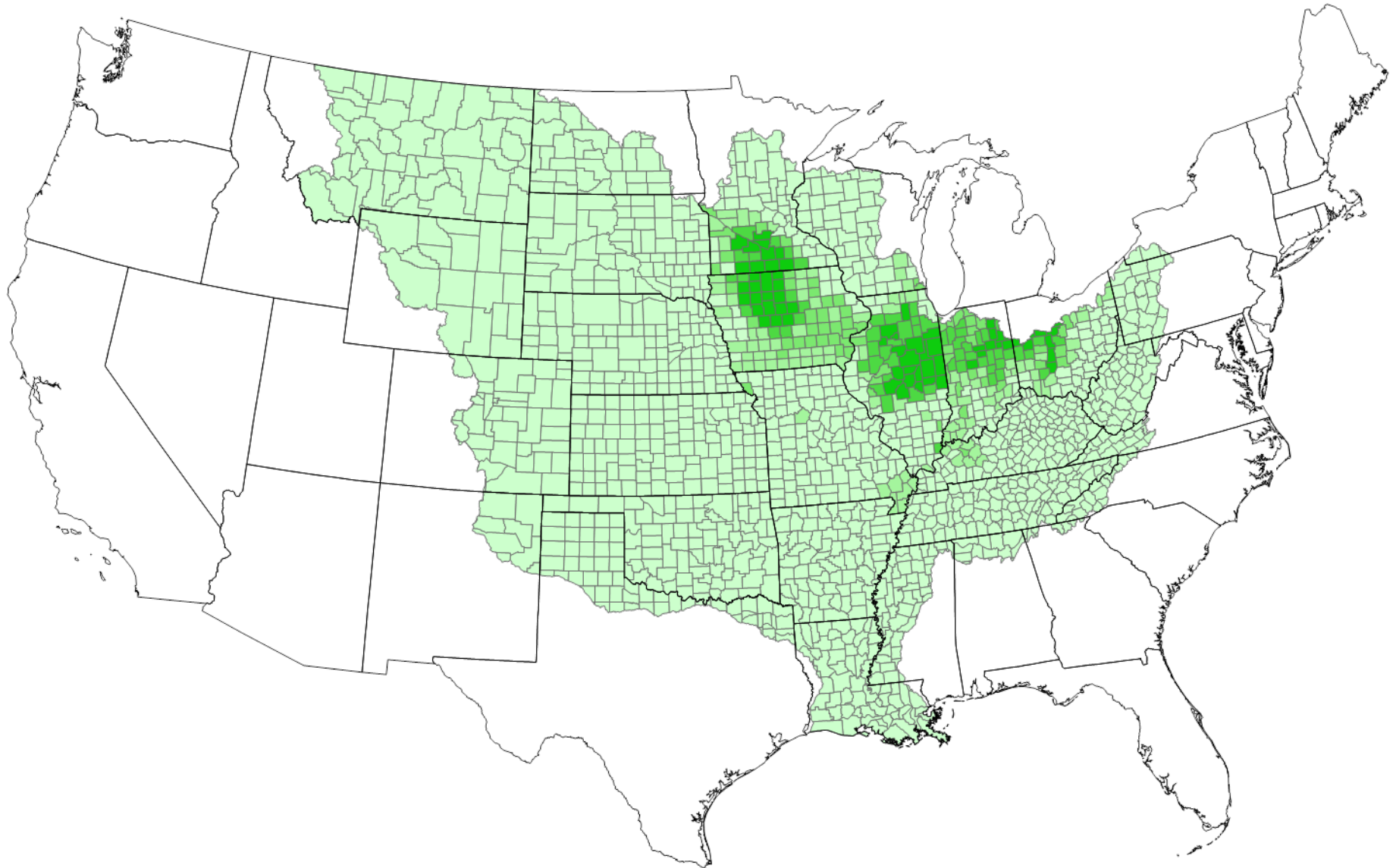
Climate destabilization and erratic weather

# Average Total Soil Erosion: 26 May 2013



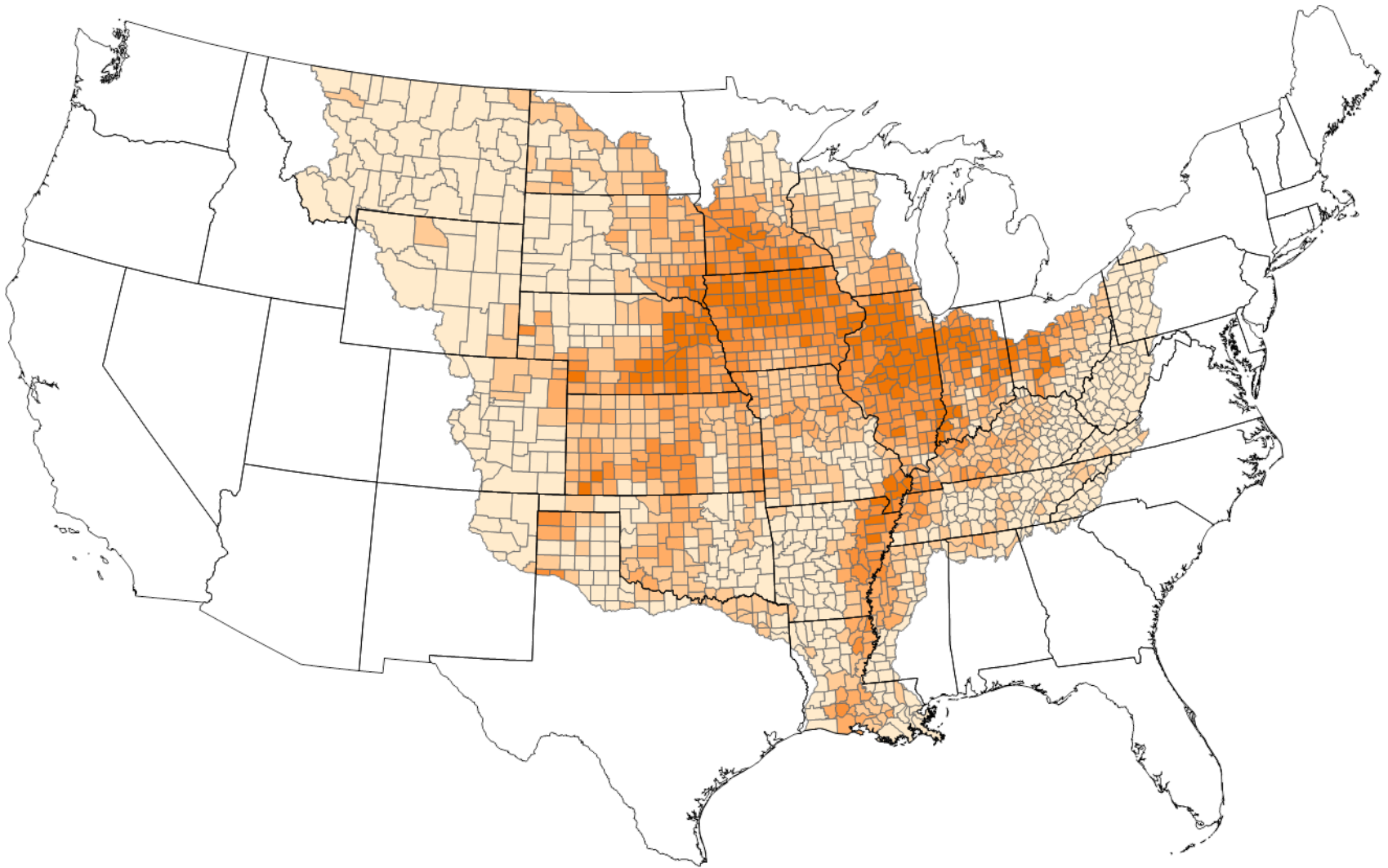


## Tile Drainage in the Corn Belt





## Annual N Fertilizer Application



David et al. 2010

# Pattern Field Tiles Drainage





# Iowa Water Quality Issues

Figure 4. Raccoon River Average Nitrate Concentration 1974-2013





# Valuation of Ag Externalities



Who pays and  
how much?



# A Matter of Restoring and Maintaining Balance





# Creating Change is a Challenge

- Lack knowledge of the problems or solutions.
- Believe they are already doing a good job.
- Dismiss the extent of the problem so no need to act.
- Follow economic incentives in the marketplace regardless of impact.
- Do what is known, familiar and comfortable. Do what is easy/simple.
- Independent-minded . Skeptical of distant experts or critics.
- Private ownership, private decisions.
- Follow agribusiness opinion leaders, who reinforce personal beliefs and do not follow academia.
- Lack a sustainability/ecological perspective.
- Consider personal actions taken to be insignificant to solve the problem.
- Risk averse, have seen other farms fail/lost and see change as risky.
- Near retirement and have no desire to change in last remaining years.

# Our Biological Co-Existence on Planet Earth



Biology & Nature



# Our Choice Our Vote



Each purchase is a vote which the market responds to.

Learning the facts to make a wise choice.



The decision is ours to make with every purchase.

# Thanks for Listening



*The Cornell Farm*, oil on canvas by Edward Hicks, 1848.  
National Gallery of Art, Washington, D.C.