

## **Bonnie Testimony Annotated Bibliography for Mn sub-committee on Water Policy**

### [Conquest of the Land Through 7,000 Years](#)

USDA Natural Resources Conservation Service

Conquest of the Land through 7,000 Years is Dr. Lowdermilk's personal report of a study he made in 1938 and 1939. Dr. Lowdermilk studied the record of agriculture in countries where the land had been under cultivation for hundreds, even thousands, of years. His immediate mission was to find out if the experience of these older civilizations could help in solving the serious soil erosion and land use problems in the United States, then struggling with repair of the Dust Bowl and the Sullied South. He discovered that soil erosion, deforestation, overgrazing, neglect, and conflicts between cultivators and herdsman have helped topple empires and wipe out entire civilizations. At the same time, he learned that careful stewardship of the earth's resources, through terracing, crop rotation, and other soil conservation measures, has enabled other societies to flourish for centuries.

### [The Community Advantages of Family-Sized Dairies](#)

Richard A. Levins, Professor Emeritus of Applied Economics, University of Minnesota, Saint Paul.

This paper concludes “There is considerable evidence for a general conclusion that communities that see fewer, larger dairy farms will experience reduced economic vitality, and virtually no evidence that larger farms improve community vitality... Family-sized dairies not only provide special advantages over their very large counterparts—they also assure that more rural communities will enjoy the economic benefits of dairy farming on any scale.”

### [Well-managed perennial pasture: Setting the gold standard for ecosystem services](#)

University of Wisconsin-Madison, College of Agricultural & Life Sciences, Grassland 2.0 program

This study compares well managed pasture with row crops with no-till and cover crops across several ecosystem services. It finds that the most effective means of generating multiple ecosystem services in agriculture is through well-managed grazing of perennial pastures. Investing in managed grazing systems is a win-win-win for the environment, the farmer, and the community.

## [Sustainable Return on Investment to perennial forage and grazing as a strategy for keeping the soil covered](#)

Green Lands Blue Waters

The analysis takes a benefit-cost approach to estimate the total social, environmental and economic value generated by perennial forage and grazing. The approach compares the estimated outcomes achieved by perennial forage and grazing against the environmental impacts of annual row crops in the Upper Midwest.

The analysis concluded that for every **\$1 dollar in investment** made in supporting the establishment of a perennial pasture and grazing system on farms with livestock, a projected **\$3.46 in social and environmental value** will be generated, with benefits flowing to farms, taxpayers, community members, municipal water users, and the broader global society. The largest outcome monetized was the **projected reduced costs of eutrophication** due to avoided nutrient runoff, followed by the **financial returns accruing to the farm**.

## [Enhancing Agroecosystem performance and Resilience through Increased Diversification of Landscapes and Cropping Systems](#)

Matt Liebma, Lisa A. Schulte, Iowa State University

Abstract: Over the past two decades, ecologists have gained a considerable amount of insight concerning the effects of biological diversity on how ecosystems function. Greater productivity, greater carbon sequestration, greater retention of nutrients, and greater ability to resist and recover from various forms of stress, including herbivorous pests, diseases, droughts, and floods, are among the effects of increased biological diversity noted in a recent review by Cardinale et al. (2012). The latter effect, often called resilience, is particularly important in managed social-ecological systems, including agroecosystems (Walker and Salt, 2006). In addition to being better able to withstand and recover from disturbances due to pests, weather, and other biophysical factors, resilient agroecosystems can be less susceptible to fluctuations in production costs and market prices.

## [Mapping the Soil Vulnerability Index across broad spatial extents to guide conservation efforts](#)

Ellen M. Audia, Lisa A. Schulte (Iowa State University), and David E. James (USDA Agricultural Research Service)

Overall, this study demonstrates the soil vulnerability index methodology for categorizing the vulnerability of Iowa agricultural fields to soil runoff and leaching. Under a targeted conservation framework, these data can be used to help protect soil and water in Iowa and beyond.

### [Payments for Pollution: How federal conservation programs can better benefit farmers and the environment](#)

Institute for Agriculture and Trade Policy

This report examines how the Environmental Quality Incentives Program pays for agricultural practices that are not environmentally beneficial or in some cases actively make the environment worse. This report finds that current resources are being misdirected to large, polluting operations while thousands of farmers are being turned away from contracts that could help them pay for conservation improvements and help their bottom lines. Reforms are needed to ensure that EQIP funds only go toward truly environmentally beneficial practices.

### [Subfield profitability analysis reveals an economic case for cropland diversification](#)

E Brandes, G S McNun, L A Schulte, I J Bonner, D J Muth, B A Babcock, B Sharma, and E A Heaton<sup>1</sup>

Researchers use soil maps in several areas in Iowa and apply the costs of production for corn and soybeans and the average yields to calculate where farmers are often losing money. Authors propose that these areas should be seeded to permanent vegetation to both improve water quality and improve cropland profitability.

Abstract excerpt: Public agencies and private enterprises increasingly desire to achieve ecosystem service outcomes in agricultural systems, but are limited by perceived conflicts between economic and ecosystem service goals and a lack of tools enabling effective operational management. Here we use Iowa—an agriculturally homogeneous state representative of the Maize Belt—to demonstrate an economic rationale for cropland diversification at the subfield scale. We used a novel computational framework that integrates disparate but publicly available data to map ~3.3 million unique potential management polygons (9.3 Mha) and reveal subfield opportunities to increase overall field profitability. Aggregation of these areas to the township level revealed ‘hotspots’ for potential management change in Western, Central, and Northeast Iowa. In these least

profitable areas, incorporating conservation management that breaks even (e.g., planting low-input perennials), into low-yielding portions of fields could increase overall cropland profitability by 80%.

### [Farmer and Farmland Owner Views on Spatial Targeting for Soil Conservation and Water Quality](#)

E. K. Zimmerman, J. C. Tyndall, L. A. Schulte, and G L D. Larson

Abstract excerpt: The U.S. Corn Belt is highly productive with respect to grain and livestock commodities but often neglects to deliver other benefits such as soil stability, nutrient retention, and clean water. New precision technologies and conservation planning frameworks offer opportunities to adapt the current agricultural system to meet environmental goals along with production by strategically placing best management practices (BMPs) to target and address specific in-field resource concerns. To understand farmers' and farmland owners' willingness to participate in (strategically placing best management practices (BMPs) to target and address specific in-field resource concerns)... we conducted in-depth interviews with 18 farmers and farmland owners whose fields were targeted for soil and nutrient loss in two watersheds in central Iowa. We examined their current application of BMPs and opportunities and constraints to further adoption. We found that farmers and farmland owners often recognized the importance of producing a diverse suite of on- and off-farm environmental benefits, but lacked the context, information, certainty, and strong incentives to manage for them... For broad acceptance, a spatially targeted conservation approach would need to be paired with expanded partnerships, trusted technical service, and adaptation incentives to reduce farm-level economic tradeoffs.

### [Tracking carbon dioxide across the globe | NOAA Climate.gov](#)

Scientists at NOAA's Earth Systems Research Laboratory created CarbonTracker: a carbon dioxide measuring and modeling system that tracks sources and sinks around the globe. The video included on this website provides a virtual tour of CarbonTracker, highlights results from recent analyses, and explains the importance of long-term CO<sub>2</sub> monitoring.

### [Real World: The Carbon Cycle - Essential for Life on Earth | Real World | NASA eClips](#)

Learning how carbon is converted through slow- and fast-moving cycles helps us understand how this life-sustaining element moves through the environment. This resource explains how NASA measures carbon through both field work and satellite imagery keeping watch through its eyes on the sky, on Earth, and in space.

Myth Buster "Mega-Dairies = Mega-Benefits for Rural Communities":

<https://landstewardshipproject.org/wp-content/uploads/Myth-Buster-56-Mega-Dairy.pdf>

Improving Riparian Areas with Livestock Grazing:

[https://landstewardshipproject.org/repository/1/1433/riparian\\_grazing\\_fact\\_sheet\\_no\\_23.pdf](https://landstewardshipproject.org/repository/1/1433/riparian_grazing_fact_sheet_no_23.pdf)

When Manure Hits Water: Large-scale livestock factories are a major threat to water quality in rural America:

[https://landstewardshipproject.org/repository/1/188/fact\\_sheet\\_5\\_manure\\_hits.pdf](https://landstewardshipproject.org/repository/1/188/fact_sheet_5_manure_hits.pdf)

How Farms Can Improve Water Quality:

[https://landstewardshipproject.org/repository/1/190/fact\\_sheet\\_7\\_improve\\_farms.pdf](https://landstewardshipproject.org/repository/1/190/fact_sheet_7_improve_farms.pdf)

Continuous Living Cover and Clean Water:

[https://landstewardshipproject.org/repository/1/1738/continuous\\_living\\_fact\\_sheet.pdf](https://landstewardshipproject.org/repository/1/1738/continuous_living_fact_sheet.pdf)