Developing the Market Value of Manure

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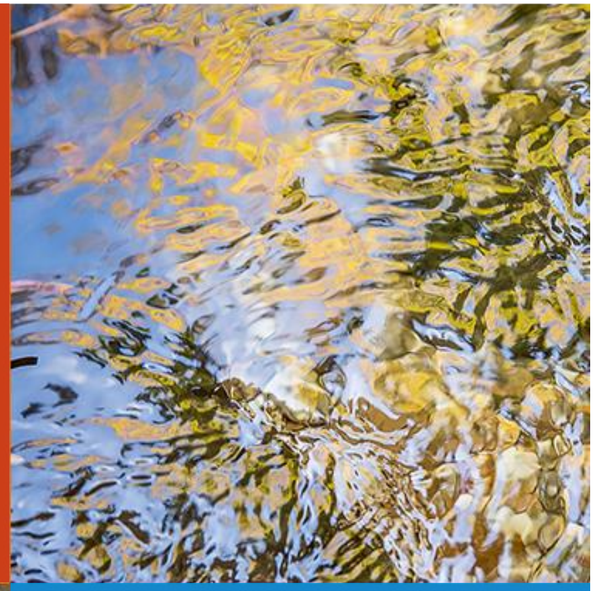
The Nature Conservancy

Size OF THE PRIZE

The Nature Conservancy

25 million
metric tons of greenhouse gas emissions mitigated

116 million
metric tons of soil erosion eliminated



344 million
pounds of nutrient loss to the environment reduced

3.6 million
acre-feet of available water capacity in cropland soils

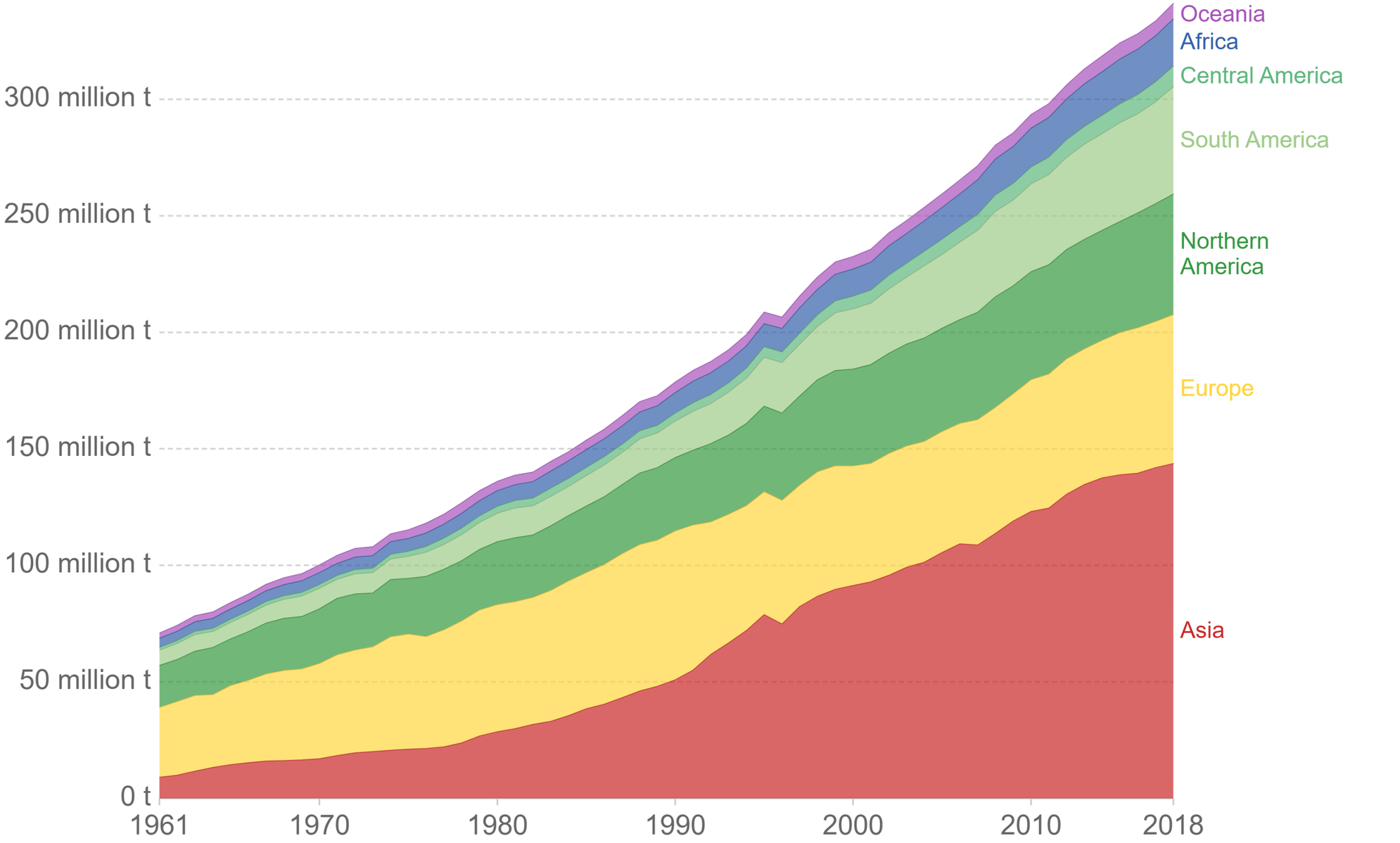
Benefits

(When Do Right)

- Nutrient Cycling
- By-product Utilization
- 4R Strategy
- Soil Health
- Economic
- Grasslands Stewardship
- Edge of Field

Global meat production, 1961 to 2018

Our World in Data



Source: UN Food and Agriculture Organization (FAO)

OurWorldInData.org/meat-production • CC BY

NuGIS Map

1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 **2016**

County Data ▾ | Watershed (HUC8) Data ▾ | Watershed (HUC2) Data ▾

Overlays

Counties

Watershed (HUC8)

Watershed (HUC2)

Rivers

Ag Land Use Mask

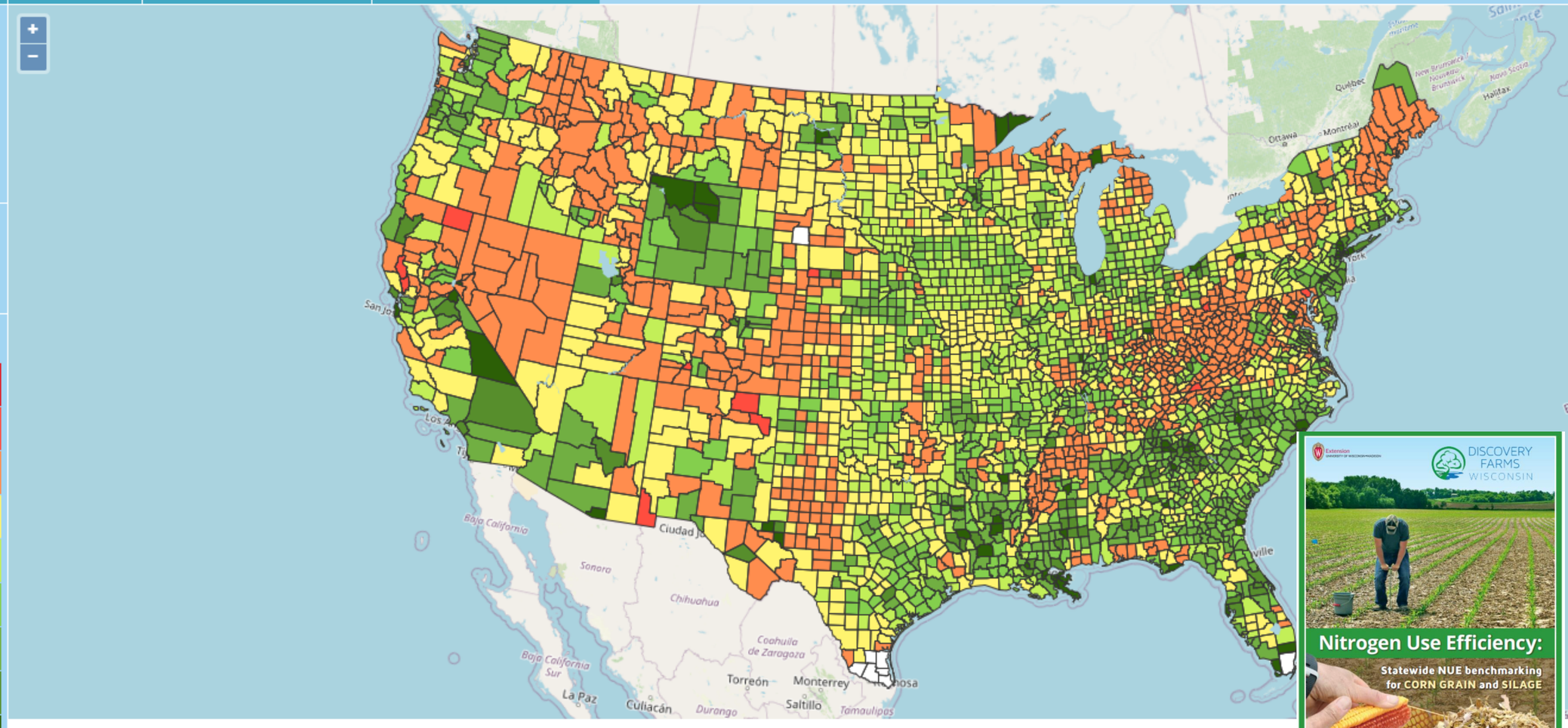
County Data

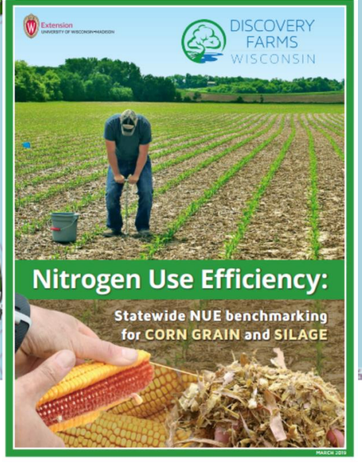
Balances

- N Balance

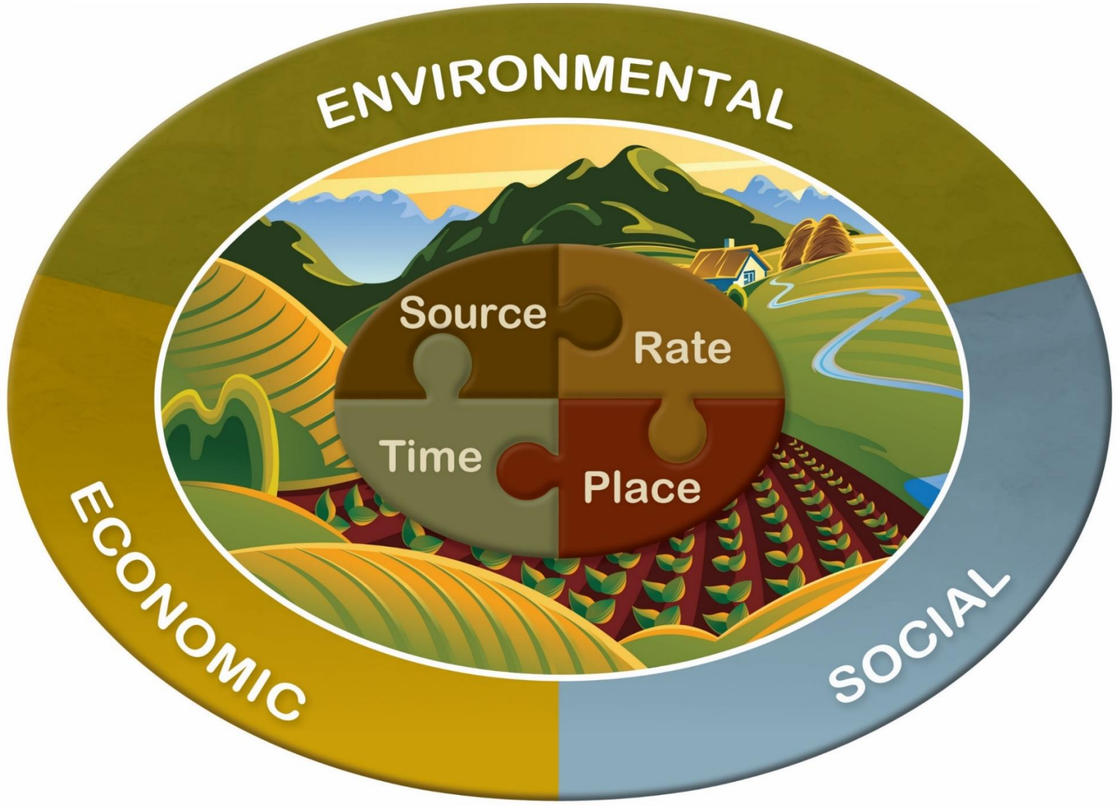
Legend: County N Balance

- less than -100 lbs/ac
- -100 to -50
- -50 to -10
- -10 to 10
- 10 to 30
- 30 to 50
- 50 to 150
- 150 to 300
- greater than 300





nutrient
stewardship



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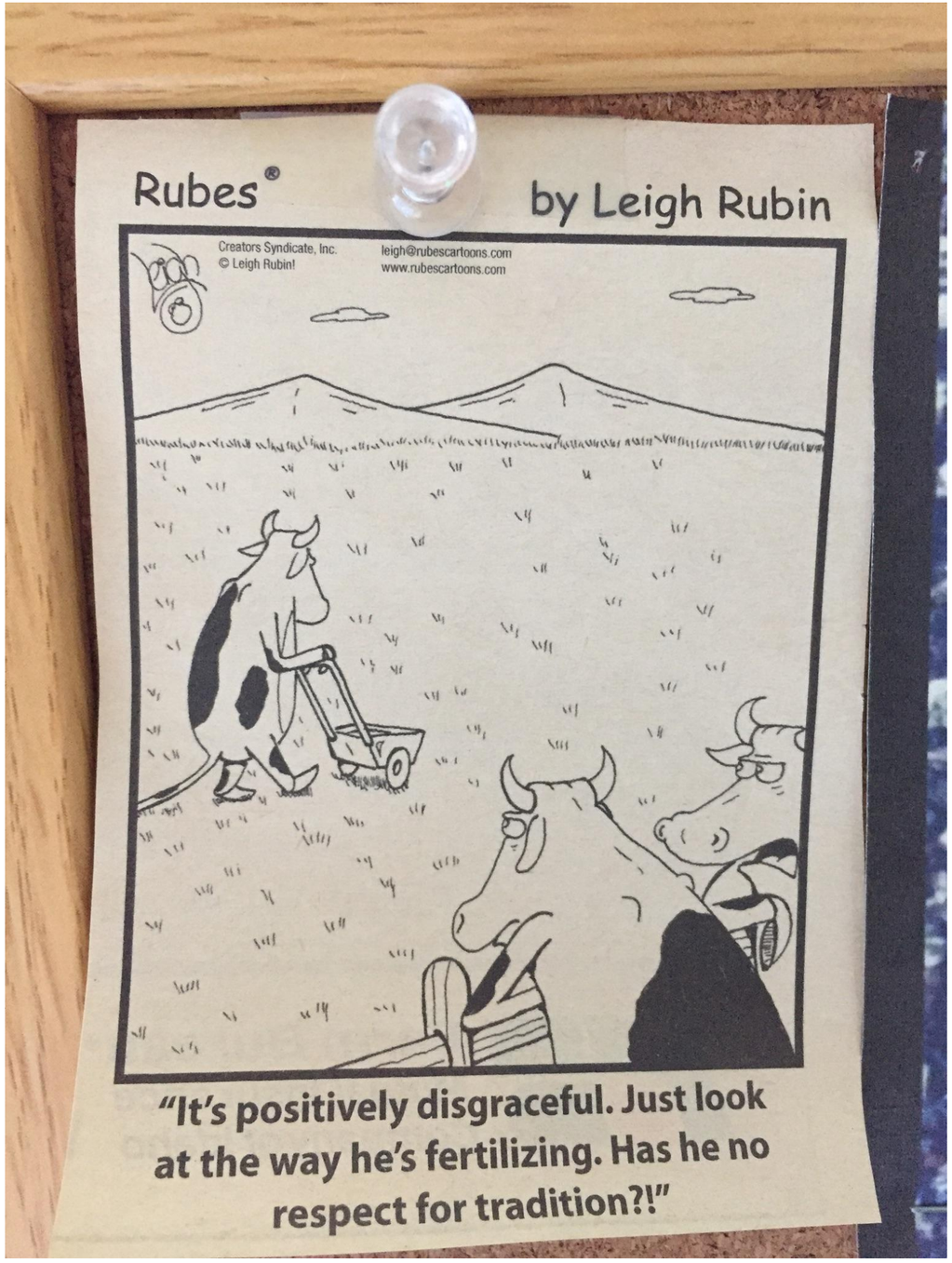
Challenges

- **Social**
  - Traditionally viewed as a waste
- **Agronomic**
  - Application timing
  - Nutrient balance (N:P ratio)
  - Nutrient variability
  - Precision ag integration
- **Economic**
  - Cost of storage
  - Transportation
  - Cost of Technology & In-puts
  - Perceived Value



Precision Technology

- Integrating 4R Stewardship & Measuring Value

Nutrient Recovery

- Nutrient balance – N & P
- Nutrient mobility
- Precision application
- Bedding
- Water recycling
- Storage
- Value-add markets

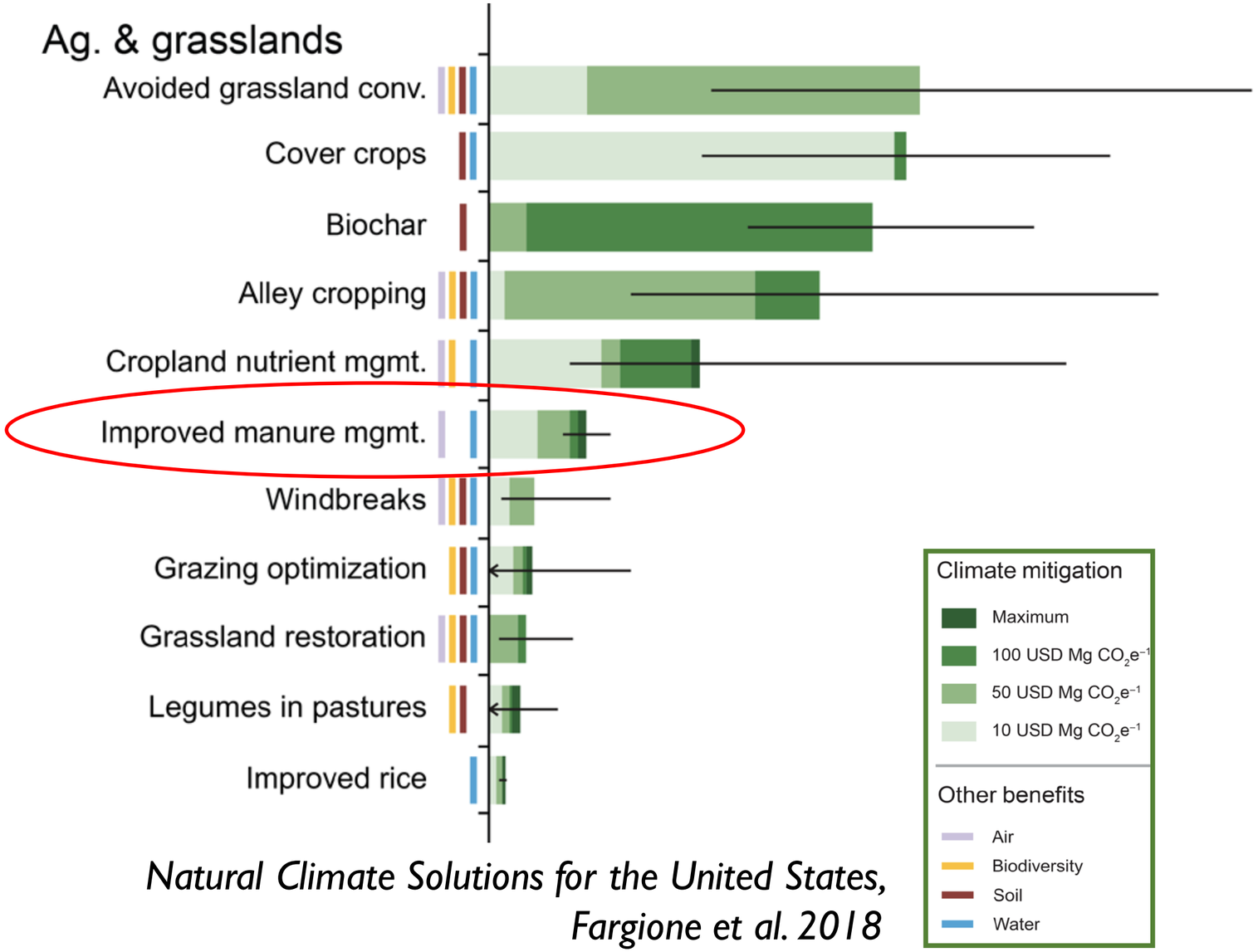
End Game?

“Renewable” Fertilizers

SEDRON
TECHNOLOGIES

ANUVIA™
PLANET INSPIRED PRODUCTS

OSTARA
CrystalGreen®



Natural Climate Solutions for the United States, Fargione et al. 2018

ESMC
Ecosystem Services Market Consortium

Working w/ Supply Chain Partners to Achieve Conservation Outcomes

A collaborative approach to achieve economic and environmental benefits for dairy farms of all sizes

The Nature Conservancy

History of collaboration toward sustainability goals in MI:

2015-2020, Saginaw Bay RCPP

- Collaborative Support
- Still an NRCS program

2019-2021, Pay for Performance

- Added flexibility
- Closer to supply chain
- Higher env. ROI

2021-2024 Supply Chain Farmer Incentives

- Shifts farmer incentives to reside within existing supply chain infrastructure
- Provides risk-free opportunity to pilot a demonstration project and test the market
- More wholistic, “systems approach” to conservation

The Nature Conservancy

VISION

U.S. Dairy as an Environmental Solution

GOALS

By 2050, U.S. dairy collectively commits to:

BECOME CARBON NEUTRAL OR BETTER

OPTIMIZE WATER USE WHILE MAXIMIZING RECYCLING

IMPROVE WATER QUALITY BY OPTIMIZING UTILIZATION OF MANURE AND NUTRIENTS

OVERARCHING STRATEGY

U.S. Dairy Net Zero Initiative (NZI)

KNOCKING DOWN BARRIERS TO ACHIEVE NET ZERO GHG AND SIGNIFICANT IMPROVEMENTS IN WATER FROM FIELD TO FARM GATE

WORKSTREAMS

GROUNDWORK

Foundational work on environmental and economic analysis, research and measurement to inform decisions, update models and advance outcomes that will benefit all dairy farms

DAIRY SCALE FOR GOOD (DS4G)

Expedited economic and environmental projects on a small set of pilot farms to prove the business case, decrease capital cost and create additional revenue streams as a catalyst for solutions on all farms

COLLECTIVE IMPACT

Collaborative action to stimulate greater access to technical, financial and educational support and motivate the adoption of environmental practices across farms of all sizes, regions and designs

DMC · Innovation Center for U.S. Dairy · NMPF National Milk Producers Federation · Newtrient · U.S. Dairy Export Council · IDFA International Dairy Foods Association

and member constituents

US Dairy Project Concept

To support the Net Zero Initiative (NZI), this project aims to pilot, replicate, and scale up the adoption of best management practices in feed/forage production and feed efficiency to drive environmental and economic benefits for farms of all sizes.

What: Reduce greenhouse gas emissions and improve soil health and water quality by implementing field and nutrition focused best practices in partnership with the US dairy industry

Who: The Nature Conservancy& Net Zero Initiative partners in collaboration with dairy value chain partners (TBD)

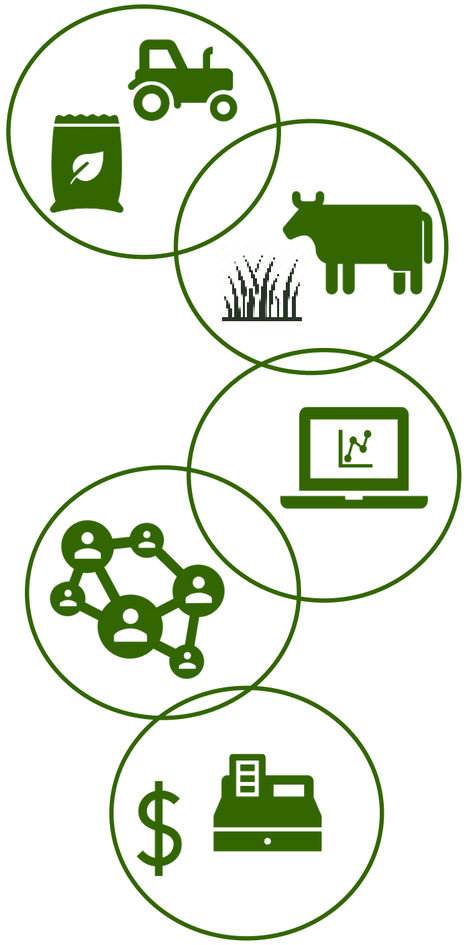
Where: WI and MI

When: Launching in 2021, the project is expected to scale in multi-year phases

US Dairy Project Theory of Change & Objectives

Our Theory of Change focuses on adding value to dairy farms while driving positive environmental outcomes, while assuring the value of participating is greater than the cost of participating for farmers. While other similar initiatives exist, our project has some key differentiators, including:

- **Focused specifically on dairy feed grown by the dairy farmer**, including varieties grown, crop rotation, cover crops, use of manure, etc.
- Less prescription, more choice: **a tiered "menu" approach** that allows for multiple entry points to meet farmers where they are
- **Targeted agronomic advice** and incentives for farmers
- A bottom-up approach to meeting value chain goals and industry commitments
- **Incentives** for data access through cost-share or credits for adoption of conservation practices (e.g., ecosystem services)
- **Access** to knowledge and technical support to inform decisions



Develop suite of management strategies and quantify impacts on environmental and economic outcomes.

Co-create standardized methods/systems for data collection and communication, making transparency easier and increasing value-chain connectivity.

Incentivize and reward producers for adoption of practices and monitoring of outcomes, including through ecosystem services markets.

US Dairy Project Draft Goals

2023 Goal	Onboard **10s to 100s** of dairy farmers in WI and MI to the program by **2023.*** Achieve conservation practice adoption on **10k to 100k acres,** and feed efficiency practices on **1k to 10k cattle** resulting in: • Mitigation of **XX,XXX tons** of **GHG emissions** by **2023** • Prevention of **X,XXX tons of N and P** from impacting water bodies by **2023** • Restoration of **XX acres** of native habitat by **2023**
2030 Goal	Replicate this program with **X** other coops/ processors by **2030**.* Reduce greenhouse gas emissions in the US dairy industry by implementing field and nutrition focused best practices across **100k to 1000k** acres by **2030** (with water quality, soil health, biodiversity outcomes) *Scale will be proportional to resources committed

Questions?

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