Ecosystem Market Programs and Opportunities for IL

IL Agriculture Water Quality Partnership Forum Meeting

March 1st, 2021

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ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY

Outline

- Background – What are ecosystem markets?
- Overview of 4 Ecosystem/Carbon Market Programs
  - Current availability
  - Quick program comparison
- On-farm and Off-Farm Opportunities for IL
- Summary
- Discussion

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Background

What are ecosystem markets?

- According to the US Environmental Protection Agency, ecosystem services markets allow companies, communities and other beneficiaries to pay landowners and managers *to* ***protect, restore*** **or** ***mitigate*** *for* impacts to ecosystems.
- While many of the practices that offer the greatest ecosystem benefits are typically encouraged via traditional state and federal financial assistance programs, market payments are generated via outcomes verified at the field level and are not necessarily practice-specific.
- Current active and pilot markets exist for several ecosystem services including carbon sequestration and greenhouse gas (GHG) reductions, water quality and quantity improvements, as well as wetland and habitat creation, among others.

https://ilsustainableag.org/ecomarkets/

Program Overview

CARBON MARKET ENTITIES

- **Nori** – In pilot phase, project enrollment is currently available nationwide. Two projects have sold and received payment for ~30,000 credits to date. Planning to expand to Canada, Brazil and Eastern Europe in the next 2 to 3 years. https://nori.com/
- **Indigo Ag** – Project enrollment currently available in 21 states including: AR, CO, GA, IA, IL, IN, KS, KY, LA, MN, MO, MS, NC, ND, NE, OH, OK, SC, SD, TN, TX. Piloting expansion in Europe. https://carbon.indigoag.net

CARBON AND ADDITIONAL ECOSYSTEM SERVICES MARKET ENTITIES

- **Soil and Water Outcomes Fund** – Project enrollment currently available in select counties in Iowa, Illinois, and Ohio. Planning to expand to additional geographies in crop year 2022. https://www.theoutcomesfund.com/
- **Ecosystem Services Market Consortium (ESMC)** – In pilot phase, project enrollment currently available in select U.S. regions including: Corn and Soy Belt, Great Plains, Great Lakes, Pacific Northwest, and California. Anticipated national market launch to include payment for water quantity and biodiversity ecosystem services in addition to carbon, net GHGs, and water quality in harvest year 2022-2023. https://ecosystemservicesmarket.org/

Contract Length / Eligibility

	Nori	Indigo Ag	Soil & Water Outcomes	ESMC
Acreage Min/Max	None	One-field min, no max	None	None
Contract Length	10 yrs	5 yrs	Annual with yearly renewal	Pilot – Annual Market Launch – Scope 1: 10 yrs; Scope 3: TBD
New Practice Requirement	Yes, with a look-back of up to 5 years during pilot phase	Yes, with a look-back of 2 growing seasons	Yes	Yes, but investigating potential of payments to producers already implementing conservation practices for Scope 3
Ability to Enroll Same Fields in Gov't Programs/ Other Markets	Designed to stack with both	Designed to stack with both, but other incentives cannot include payments for carbon credits or related assets (financing is okay)	No Note – payment for water quality and carbon outcomes	Designed to stack with gov't programs; individual fields cannot be in two market programs. Note – ESMC internally stacks carbon with GHG reductions, water quality, and water quantity.

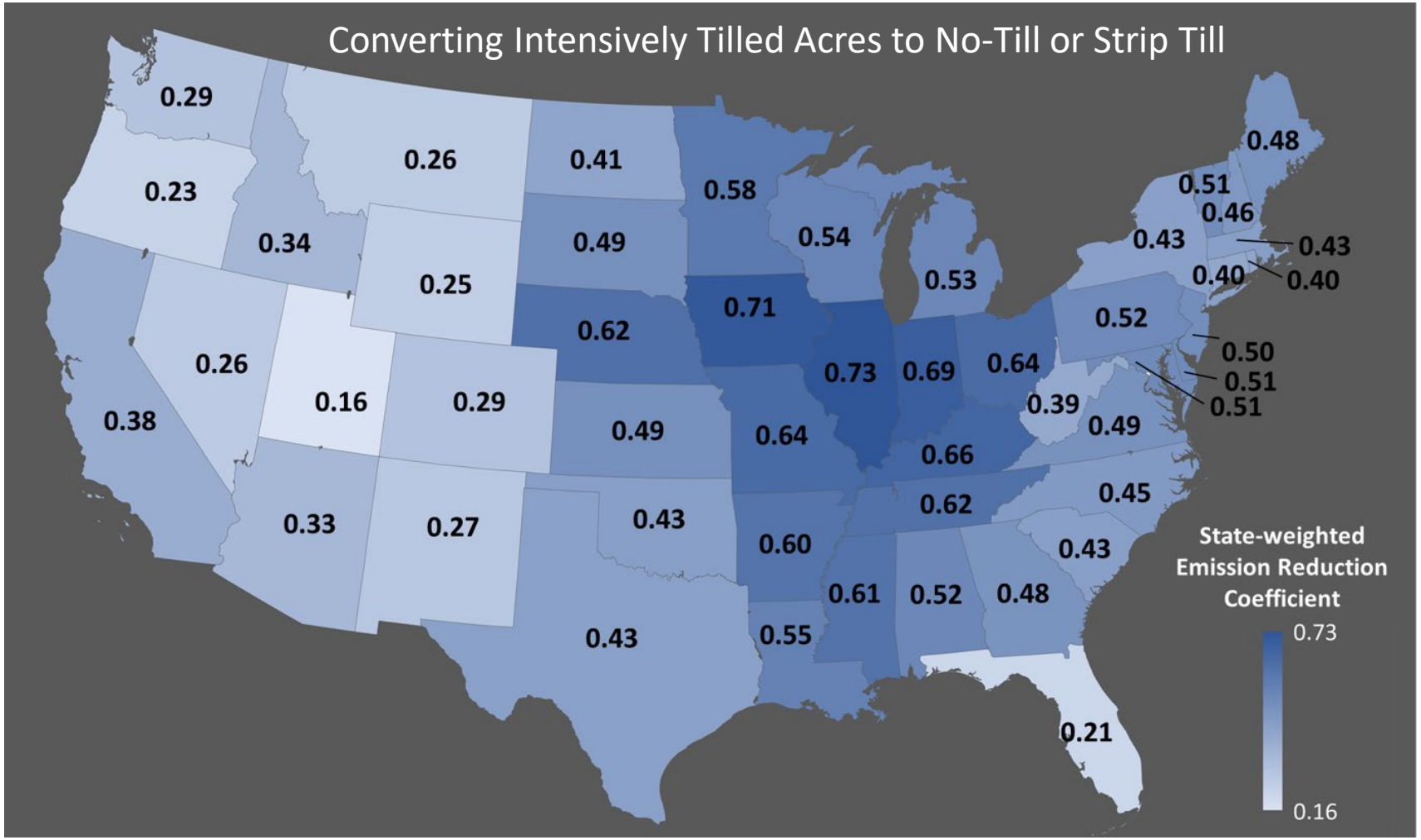
https://ilsustainableag.org/ecomarkets/

Assistance / Verification Requirements

	Nori	Indigo Ag	Soil & Water Outcomes	ESMC
Third Party Practice Verification	Minimum once every 3 years; standard audit procedure (review representative sample of receipts and invoices)	Random site visits and evidence checks, registry-approved methodology.	Yearly field visits, remote sensing	Scope 1– small subset of producers randomly selected for site visit + remoting sensing. Scope 3 –smaller subset of producers randomly selected for site visit +remote sensing.
Data Collected on Enrollment	Farm operational data – previous 10 years OR proprietary "Smart Defaults" option	Basic farmer info, field boundaries, and commitment to new practice(s)	Farm operational data – 2-3 years historical baseline plus 2-3 years of proposed practice change(s)	Scope 1 – detailed farm operational data Scope 3 – some operational data; Soil sampling and remote sensed data for both.
Enrollment Assistance	Supply Account Managers on-call; regular training; direct assistance with enrollment process	Customer success hotline or webchat options	Provided via staff and affiliates	Producer's preferred advisor (e.g. conservation district staff, CCAs) can be trained to assist; option to import data from 3rd party platform
Technical / Agronomic Assistance	NA (but supply account managers include trained agronomists)	Free in-house agronomic guidance, supplemented with on-the-ground help	Free conservation agronomists on staff	Provided by ESMC's member organizations and partners (e.g. conservation district, CCAs, NGOs).

Outcome Estimation / Payment

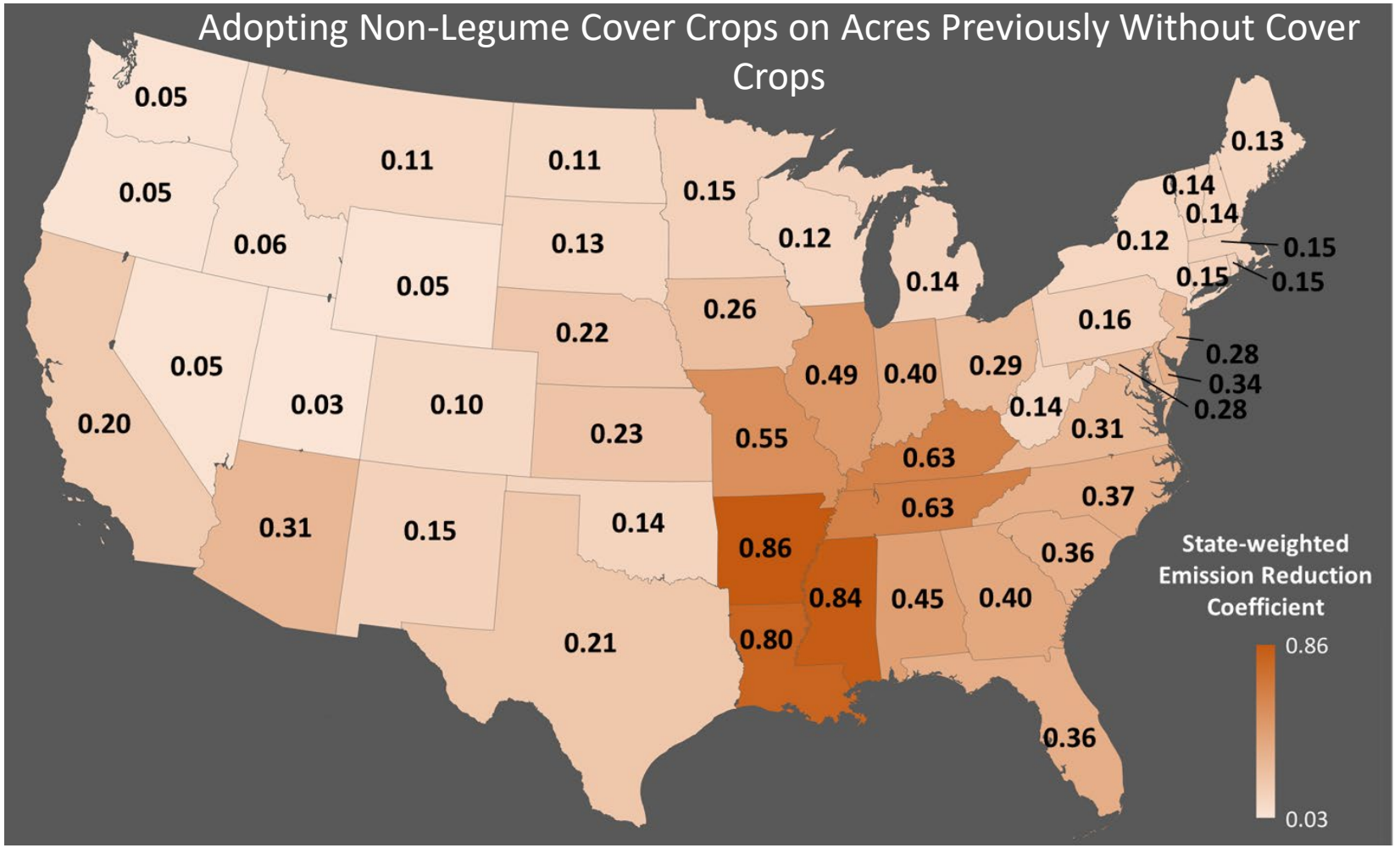
	Nori	Indigo Ag	Soil & Water Outcomes	ESMC
Payment Schedule	End of month when offset credit is sold	50% yr 1, 20% yr 2, 10% yrs 3, 4, 5	Annually, split 50/50–1 shortly after signing, 1 after verification	Pilot – Annual Market- Launch - Annual to every 5 yrs depending on Scope for carbon 1 vs 3, respectively; annual for water quality.
Outcome Estimation	Soil sample reference network-based modeling (Soil Metrics) - cost incurred by Nori. Farmer has option to true-up via soil sampling - farmer incurs sampling cost.	Modeling (biogeochemical and statistical) + soil sampling, Indigo assumes cost (Indigo does not charge growers for anything)	Modeling, with 10% of fields subject to in-field soil and water sampling at no cost to farmer	Modeling (peer reviewed biogeochemical model) + soil sampling. ESMC assumes costs and includes in asset price to buyers.
Penalty for Temporary Break in Practice Implementation	Farmer commits to make best effort to retain C stocks; not bound to any practice plan; not liable for force majeure C losses.	Payment pauses until soil carbon returns to previous level. Methodology prevents credits from being overestimated.	Breach of contract, farmer would not receive payment	Stall in soil carbon gains requires initial gains to be realized before additional credit issuance/payment; no consequences for dropping out of pre-market launch pilots



Opportunities for Illinois

State-weighted average emission reduction coefficients (tonnes CO2e ac-1 y-1) with adoption of no-till or strip-till practices on acres formerly under intensive tillage. Weighted emission reduction coefficients generated using The CaRPE Tool, version 2.03. Values are scaled to the state level and reflect average ERCs across all counties and weighted for cropland acres. They are intended for comparative purposes only.

https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/



Opportunities for Illinois

State-weighted average emission reduction coefficients (tonnes CO2e ac-1 y-1) with adoption of non-legume cover crop with 25% fertilizer nitrogen reduced. Weighted emission reduction coefficients generated using The CaRPE Tool, version 2.03. Values are scaled to the state level and reflect average ERCs across all counties and weighted for cropland acres. They are intended for comparative purposes only.

https://farmlandinfo.org/publications/combating-climate-change-on-us-cropland/

Practice	N Efficiency (% Reduction)	P Efficiency (% Reduction)	Benchmark Treated Area (ac)	Maximum Implementation (ac)	COMET-Planner ERC (Tonnes $CO_2e/ac^{-1}/yr^{-1}$)
Bioreactors	25	0	160 (~2011)	4,736,773	NA
Wetlands	50	0	59,271 (~2011)	2,368,386	NA
Buffers *Non-tile drained*	90	50	624,910 (~2011)	12,297,189	0.97 – 7.12 *Herbaceous vs Forest*
Cover Crops *Non-legume*	30	30	600,000 (~2011) 1,410,000 (2019 NASS)	22,729,042 (CaRPE)	0.49
N Management *40/10/50* *Tile Drained*	18	NA	1,730,000 (~2011) 1,930,000 (2019 NASS)	2,648,905	NA
Nitrification Inhibitor *Non-tile drained*	10	NA	907,200 (~2011) 2,610,000 (2019 NASS)	3,107,955	NA
MRTN	10	NA	8,820,000 (~2011) 3,700,000 (2019 NASS)*	11,200,000	NA
No-till/Strip-till+	NA	50	6,471,985 (CaRPE)	22,217,538 (CaRPE)	0.58 RT to NT 0.73 IT to NT
P Reduction *STP*	NA	7	8,723,535 (~2011) 11,210,000 (2019 NASS)	20,602,515	NA

+Acreages provided specifically for no-till/strip-till, NLRS P reduction estimate is for a broader conservation tillage category

*Does not include the acres reporting N management according to other industry approved techniques

Opportunities for Illinois

Note: *This table is intended to help facilitate discussion, numbers provided are for comparative purposes only and may not reflect updated numbers from the draft 2020 IL NLRS Reduction Strategy Scenarios.*

- *2011 numbers supplied via the Draft 2020 IL NLRS Reduction Strategy Scenarios*
- *2019 numbers supplied via the State NASS Survey*
- *CaRPE numbers supplied via the Carbon Reduction Potential Evaluation Tool* https://farmland.org/project/the-carpe-tool/
- *Maximum Implementation numbers supplied via the Draft 2020 IL NLRS Reduction Strategy Scenarios, unless otherwise indicated.*

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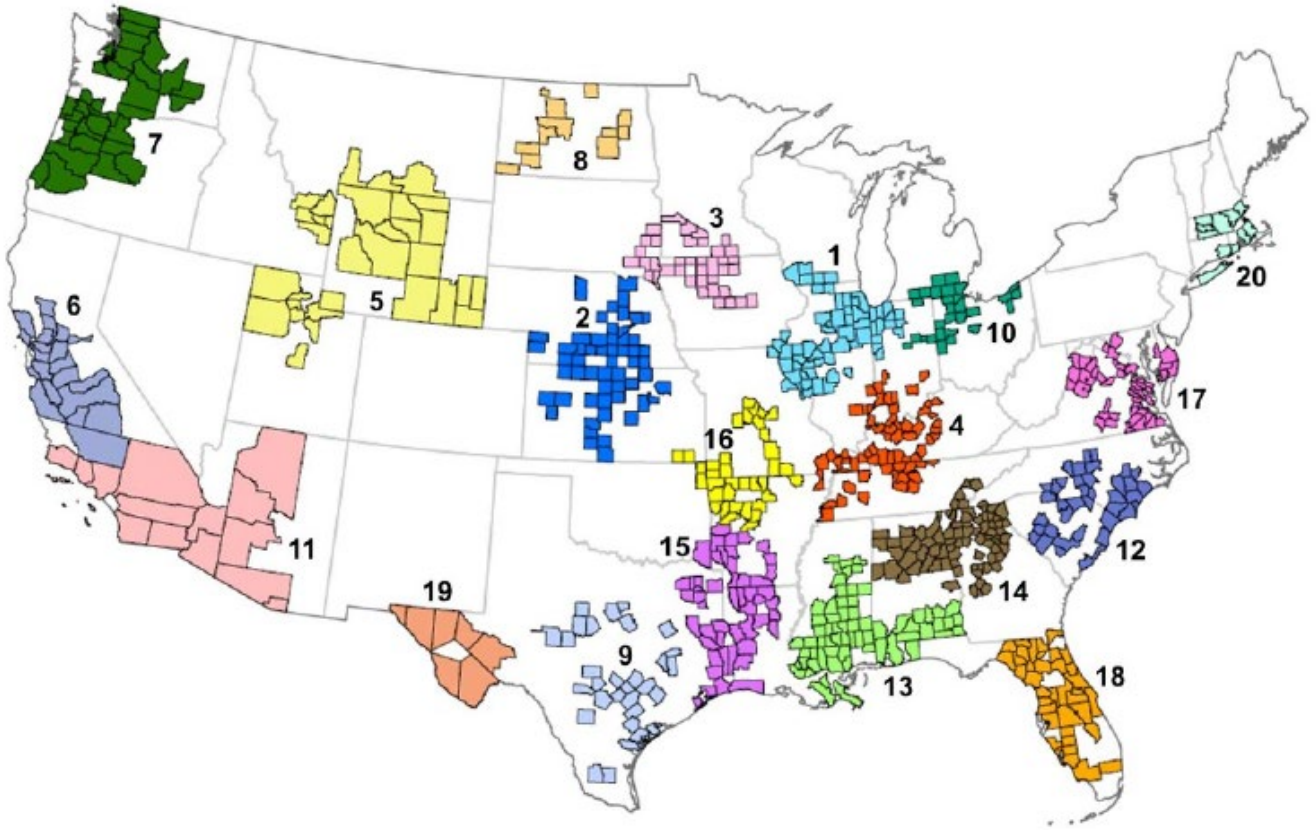
On-Farm Opportunities



Hot spots of opportunity for improved cropland nitrogen management across the United States

Eric D Roy *et al* 2021 *Environ. Res. Lett.* **16** 035004. https://doi.org/10.1088/1748-9326/abd662

"These hot spots collectively account for ~63% of total surplus N balance for croplands but only ~24% of cropland area in the US. N flows for these hot spots indicate variable **opportunities across the US landscape to improve cropland N balances by reducing N fertilizer use**, better managing manure N, and/or increasing N use efficiency."

Reduced Inputs

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On-Farm Opportunities

ELSEVIER

Journal of Environmental Management

Volume 279, 1 February 2021, 111631

Research article

A comprehensive modeling framework to evaluate soil erosion by water and tillage

Sanghyun Lee [a], Maria L. Chu [a], Jorge A. Guzman [a], Alejandra Botero-Acosta [b]

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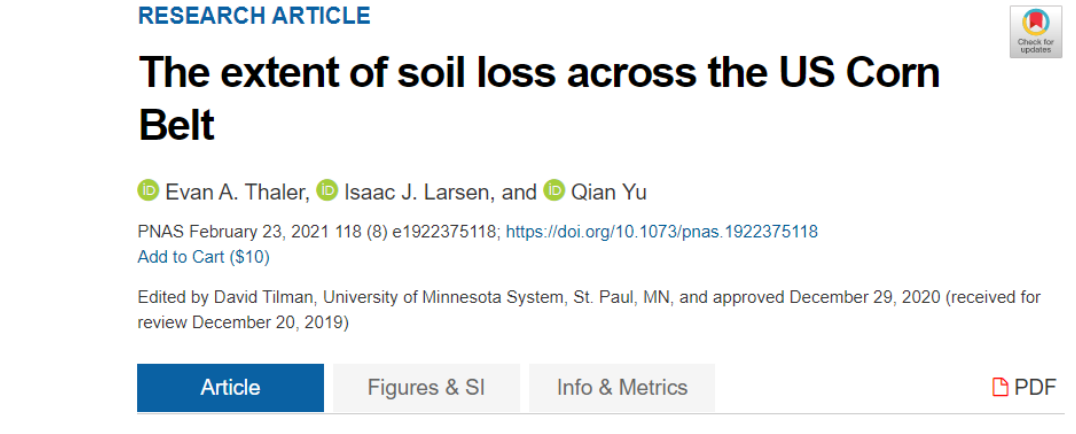
https://doi.org/10.1016/j.jenvman.2020.111631 Get rights and content

"if no-till were implemented for all fields throughout the watershed, **76% and 72% reductions in total soil loss** and sediment yield, respectively, can be achieved.."

Reduced Inputs

"The loss of A-horizon soil has removed 1.4 ± 0.5 Pg of carbon from hillslopes, **reducing crop yields in the study area by ~6% and resulting in $2.8 ± $0.9 billion in annual economic losses**."



RESEARCH ARTICLE

The extent of soil loss across the US Corn Belt

Evan A. Thaler, Isaac J. Larsen, and Qian Yu

PNAS February 23, 2021 118 (8) e1922375118; https://doi.org/10.1073/pnas.1922375118

Add to Cart ($10)

Edited by David Tilman, University of Minnesota System, St. Paul, MN, and approved December 29, 2020 (received for review December 20, 2019)

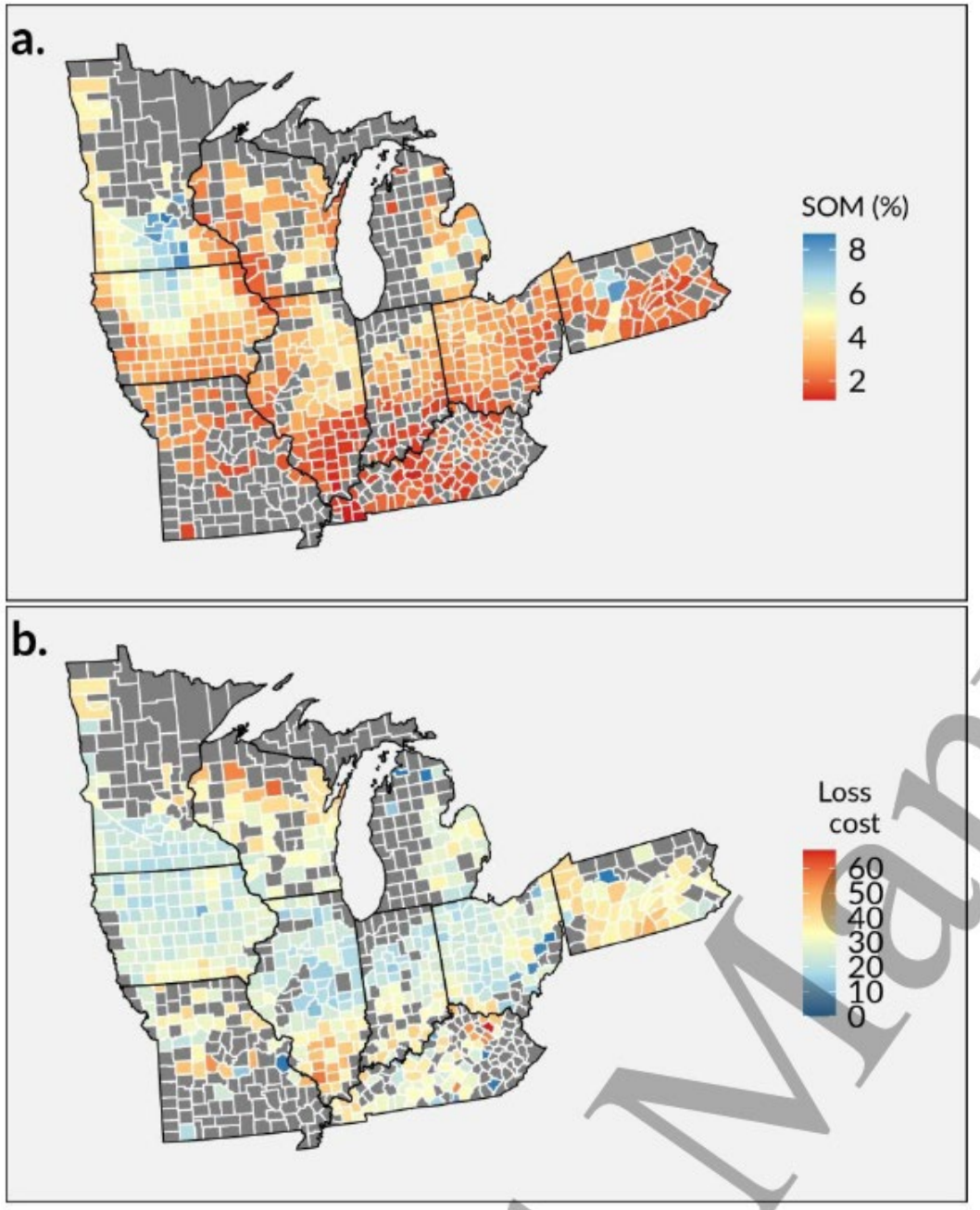
Article Figures & SI Info & Metrics PDF

On-Farm Opportunities

"Under severe drought, an **increase of 1% soil organic matter** was associated with a yield increase of 2.2 ± 0.33 Mg ha-1 (**32.7 bu ac-1**) and a **36 ± 4.76% reduction in the mean proportion of liabilities paid**."

Increased Profitability

Enhanced Resiliency



Soil organic matter protects US maize yields and lowers crop insurance payouts under drought

Kane, D.A., Bradford, M.A., Fuller, E., Oldfield, E.E., Wood, S.A., 2021. Environ. Res. Lett. https://doi.org/10.1088/1748-9326/abe492
Accepted online Feb 9th, 2021

Summary

- **Ecosystem markets allow companies, communities and other beneficiaries to pay landowners and managers to protect, restore or mitigate for impacts to ecosystems. Several ag-based programs are available in IL, with additional pilots planned for CY 2021 and beyond.**

- **Investment in soil health builds on-farm resiliency and increases profitability (*with or without financial assistance or market payments*), while providing water quality and climate benefits.**

Thank You!

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