EESI
Environmental and Energy Study Institute

***Materials will be available at*:**
www.eesi.org/091223farmbill
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Climate-Smart Research for the Farms of the Future

Tuesday, September 12, 2023

About EESI

EESI
Environmental and Energy Study Institute

Non-partisan Educational Resources for Policymakers

A bipartisan Congressional caucus founded EESI in 1984 to provide non-partisan information on environmental, energy, and climate policies

Direct Assistance for Equitable and Inclusive Financing Program

In addition to a full portfolio of federal policy work, EESI provides direct assistance to utilities to develop “on-bill financing” programs

Commitment to Diversity, Equity, Inclusion, and Justice

We recognize that systemic barriers impede fair environmental, energy, and climate policies and limit the full participation of Black, Indigenous, people of color, and legacy and frontline communities in decision-making

Sustainable Solutions

Our mission is to advance science-based solutions for climate change, energy, and environmental challenges in order to achieve *our vision of a sustainable, resilient, and equitable world*.

Policymaker Education

Briefings and Webcasts

Live, in-person and online public briefings, archived webcasts, and written summaries

Climate Change Solutions

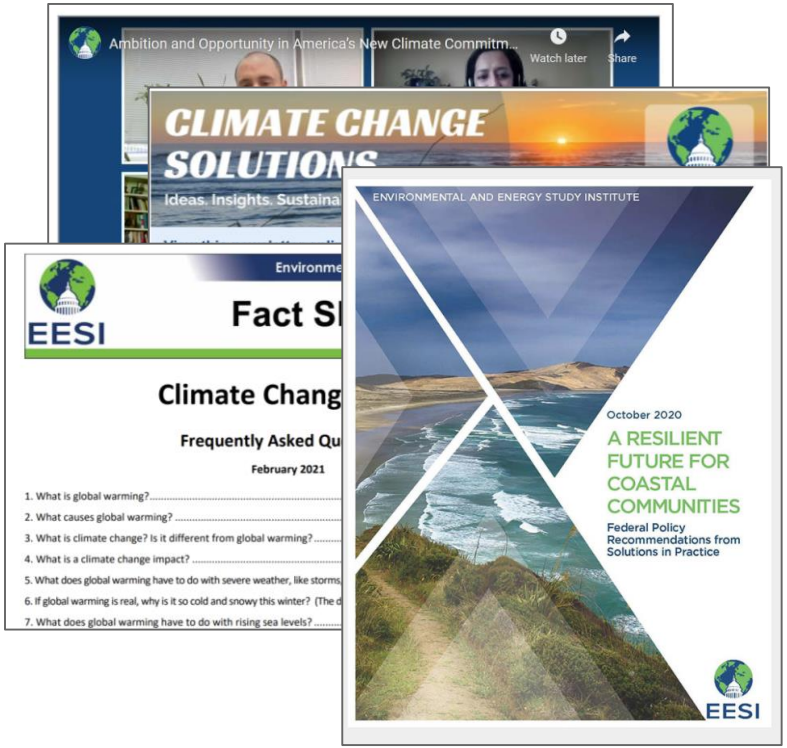
Bi-weekly newsletter with everything policymakers and concerned citizens need to know, including a legislation and hearings tracker

Fact Sheets and Issue Briefs

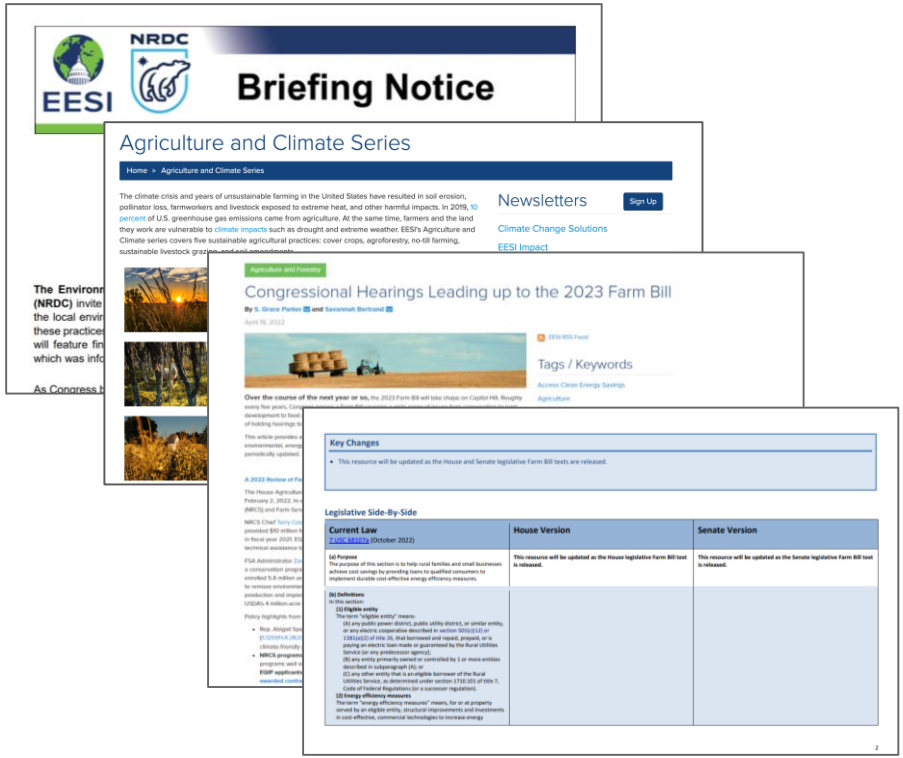
Timely, objective coverage of environmental, clean energy, and climate change topics

Social Media (@EESIOnline)

Active engagement on Twitter, Facebook, LinkedIn, and YouTube



EESI Farm Bill Resources



- Congressional briefings
- Articles and podcasts
- *Climate Change Solutions* newsletter special editions
- Farm Bill hearing tracker
- Legislative side-by-side-by-sides

All resources available at: www.eesi.org/2023-farm-bill

Briefing Series: Farm Bill in Focus

EESI
Environmental and Energy Study Institute

The Process and Path Forward for Passing a Bipartisan Farm Bill | Recording Available

Climate, Energy, and Economic Win-Wins in the Farm Bill | Recording Available

Unlocking Rural Economies: Farm Bill Investments in Rural America | Recording Available

The Future of Forestry in the Farm Bill | Recording Available

Conservation Practices from Farms to Forests and Wetlands | Recording Available

Climate-Smart Research for the Farms of the Future

Funding Climate-Smart Research

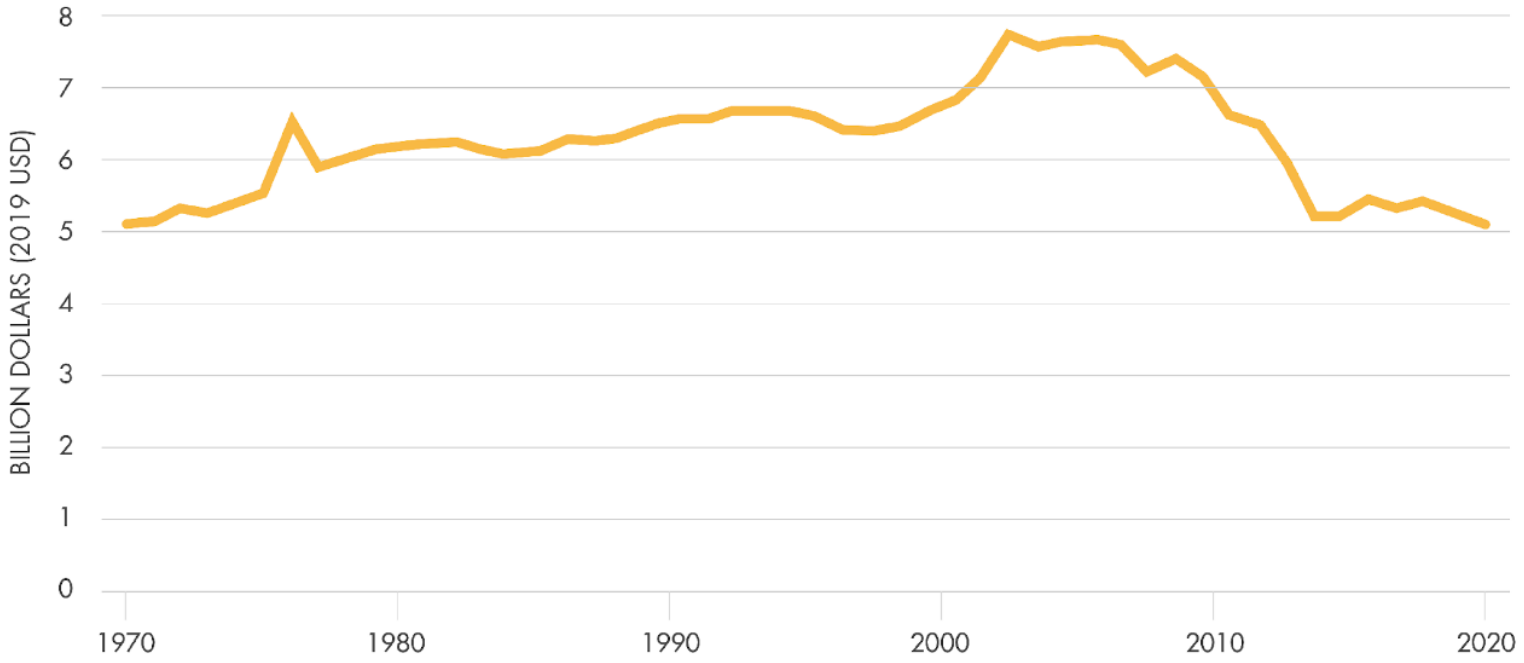
September 12, 2023
Dan Blaustein-Rejto
Director of Food and Agriculture

BREAKTHROUGH INSTITUTE

The Value of Public Agricultural R&D

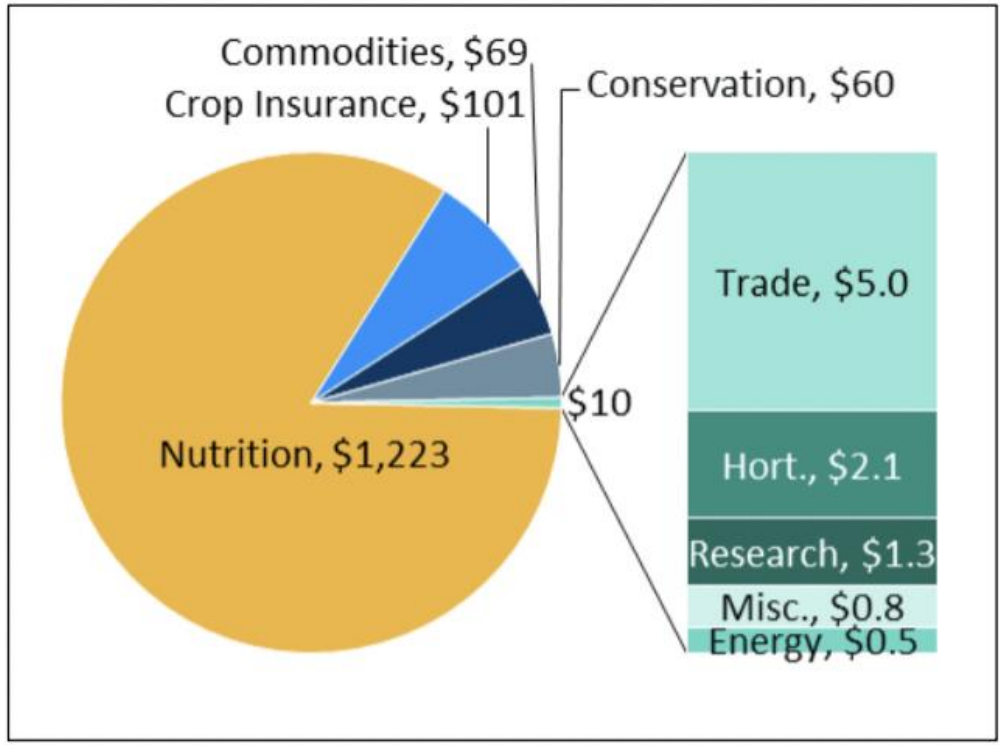
- Key driver of productivity growth, keeping US farmers competitive
- Reduces food prices
- Crowds-in private investment, rather than crowding it out
- $20 benefit-cost ratio
- Develops practices and technologies to address environmental issues
- Reduces greenhouse gas emissions for as low as $12/tCO$_2$e

Public Spending on Agricultural R&D has Fallen by One-Third Since 2002



Notes: Spending on public agriculture R&D includes federal, state, and nongovernment funds used for food, agriculture, and forestry research by the USDA, land-grant universities, and other cooperating institutions. Spending is in 2019 dollars adjusted for inflation using the National Institutes of Health Biomedical Research and Development Price Index. The spike in R&D spending in 1976 was the result of an adjustment in the federal fiscal year, in which 1979 included five quarters of spending.

Farm Bill Title 7: Research, Extension and Related Matters

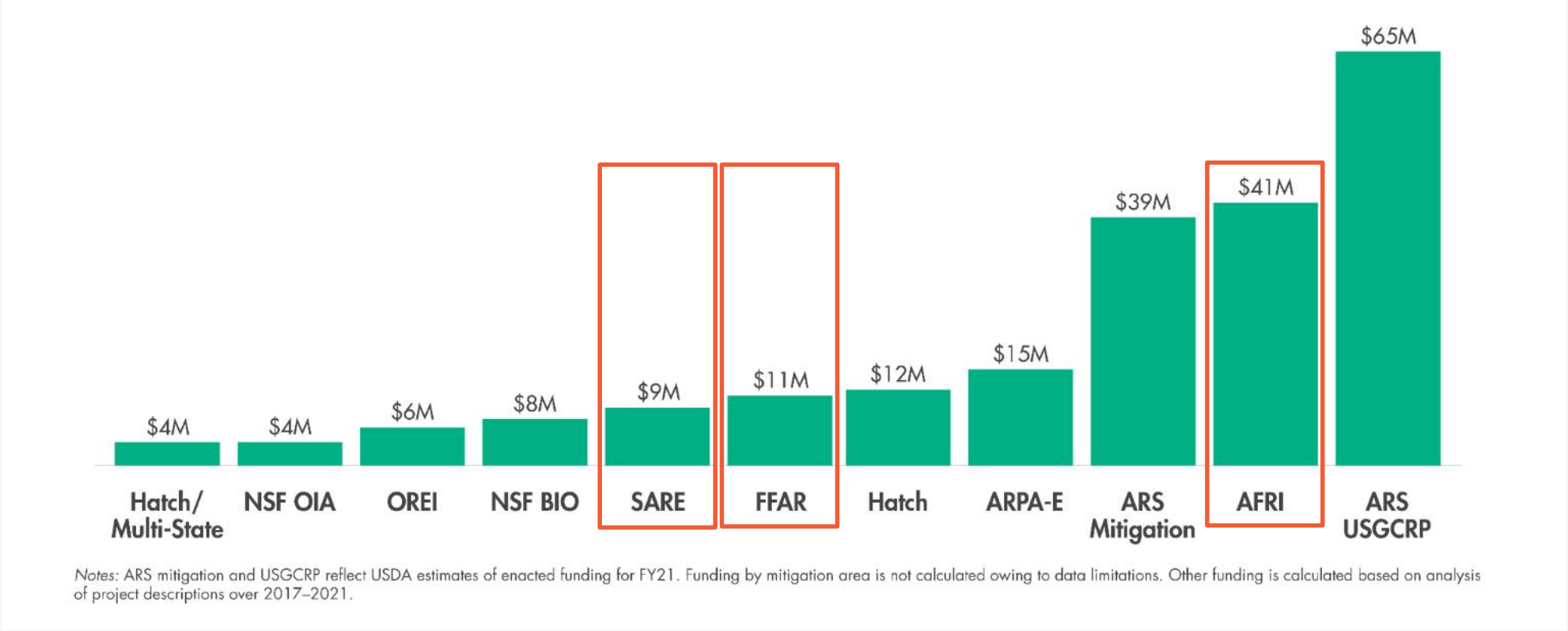


Source: CRS using the CBO Baseline (May 2023) for the five largest titles, and amounts in law for programs in other titles.

Note: Total estimated at $1,463 billion.

- Title 7 supports agricultural research and extension programs to expand academic knowledge and help producers be more productive.
- Research accounted for <0.2% of all 2018 Farm Bill mandatory spending.
- Many research programs are authorized to receive mostly discretionary (appropriated) funds.

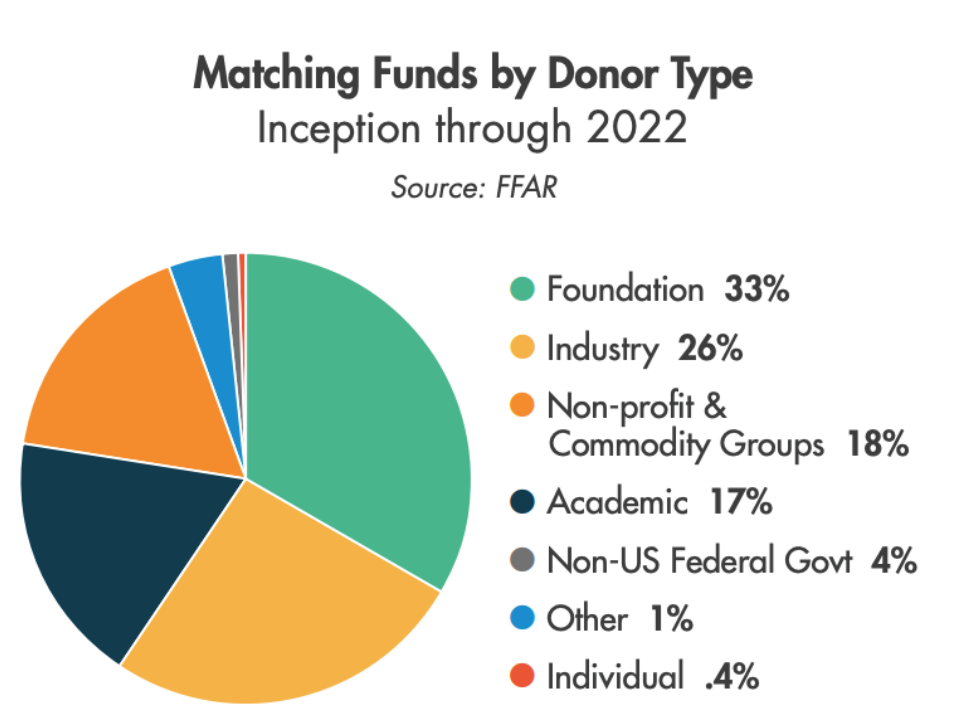
Research Program Funding for Climate Mitigation (2017–2021 average)



Notes: ARS mitigation and USGCRP reflect USDA estimates of enacted funding for FY21. Funding by mitigation area is not calculated owing to data limitations. Other funding is calculated based on analysis of project descriptions over 2017–2021.

Foundation for Food and Agriculture Research

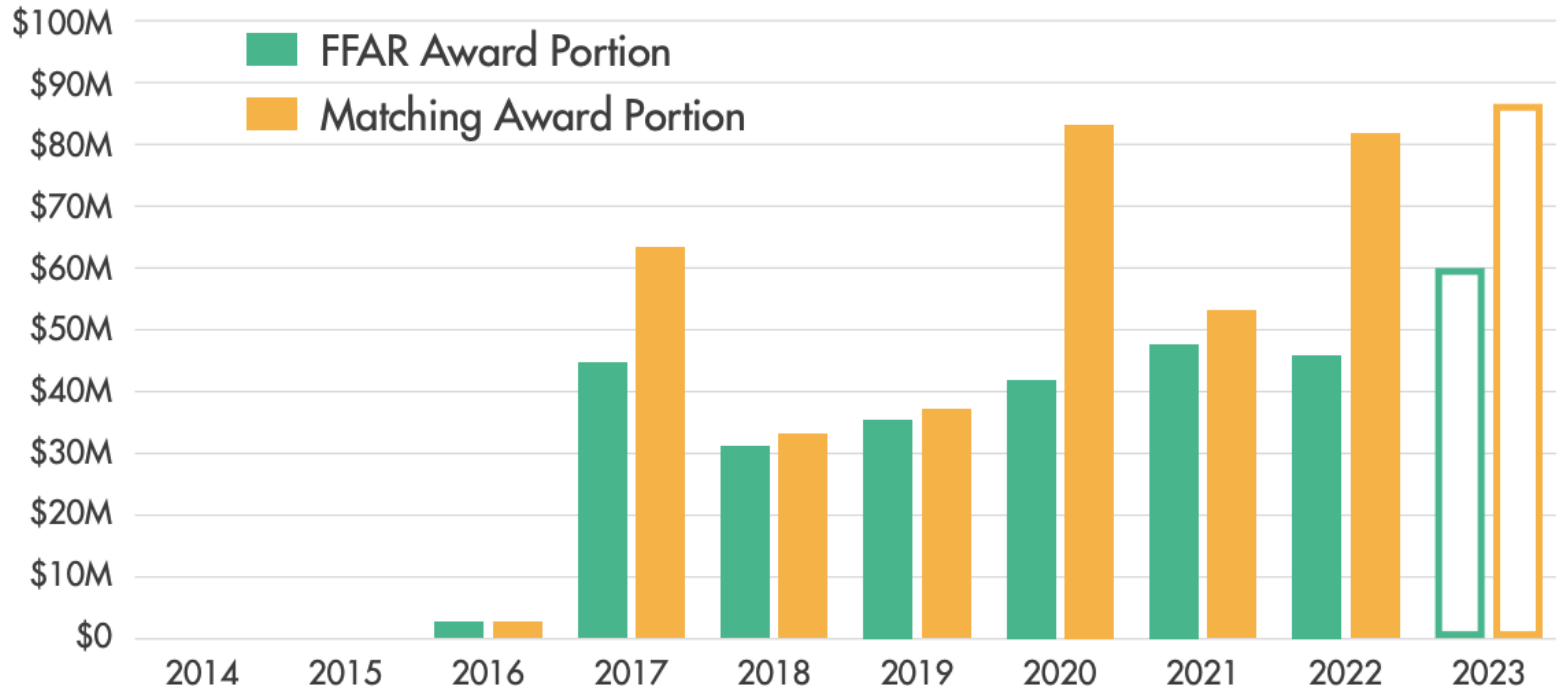
- $600+ million awarded and matched to-date
- $1.40 in non-federal matching funding for every $1 awarded
- Up to 40% of awards support climate-smart agriculture
- Over 40% of projects develop tools for immediate use



Foundation for Food and Agriculture Research

FFAR Awards by Year

Source: FFAR

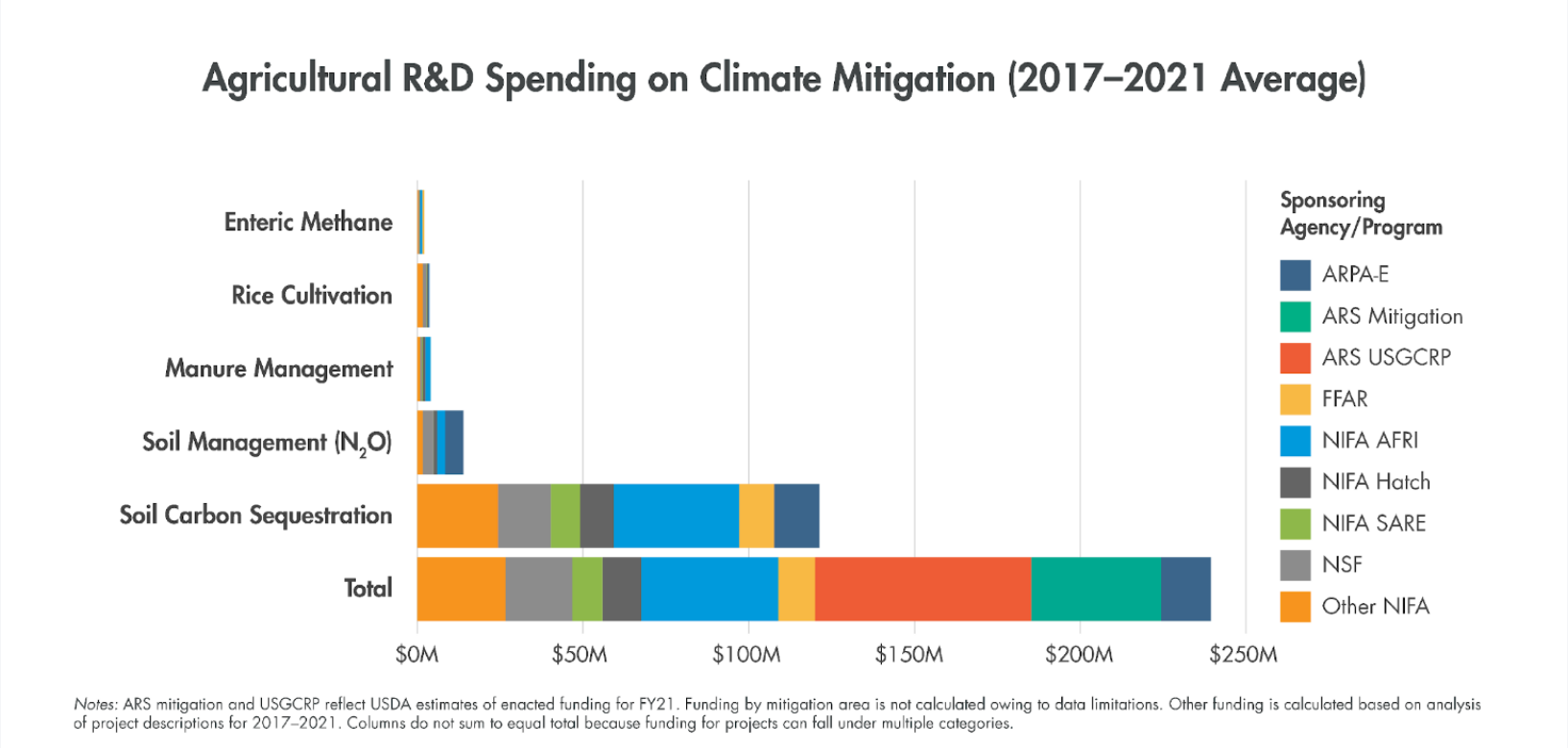


Agriculture Advanced R&D Authority

- Long-term, high-risk, high-return R&D
- Modeled after successful ARPA-style agencies
- Authorized in 2018 Farm Bill for $50M but appropriated $1 million per year

Program	Department	FY 2023 Appropriations
DARPA (Defense Advanced Research Projects Agency)	Defense	$4.1 billion
ARPA E (Advanced Research Projects Agency Energy)	Energy	$470 million
ARPA I (Advanced Research Projects Agency Infrastructure)	Transportation	$3.2 million
ARPA H (Advanced Research Projects Agency Health)	HHS	$1.5 billion
AGARDA (Agriculture Advanced Research and Development Authority)	USDA	$1 million

Gaps in Mitigation-Related R&D Spending



Thank you

Connect to learn more:
www.thebreakthrough.org
dan@thebreakthrough.org @danrejto (Twitter)

BREAKTHROUGH INSTITUTE

Sustainable Agriculture Research and Education

Dr. Kristy Borrelli, Associate Director

EESI Briefing September 12, 2023

SARE
Sustainable Agriculture Research & Education
www.sare.org

Overview

- SARE history
- Overview of SARE grant programs
- Topics of funding
- SARE future

SARE
Sustainable Agriculture
Research & Education
www.sare.org

What is SARE?

Sustainable Agriculture Research and Education (SARE) offers **farmer-driven**, **grassroots** **grants** and **education** programs. Since 1988, SARE grantees have been putting the principles of sustainable agriculture into practice on farms and ranches in every state and island protectorate.

USDA National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

SARE Sustainable Agriculture Research & Education
www.sare.org

First Authorization for a Sustainable Agriculture Program at USDA

1985 Farm Bill – Food Security Act, Title XIV, Section 1409, D(7)

Research to reduce farm input costs through the collection of national and international data and the transfer of appropriate technology relating to **sustainable agriculture systems**, **soil**, **energy**, and **water conservation technologies**, **rural and farm resource management**, and the diversification of **farm product processing** and **marketing systems**.

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First Appropriated funding for Sustainable Agriculture at USDA

1988 Agriculture Appropriations Act – Public Law 100-202, Cooperative State Research Service

LISA - **Low-Input Sustainable Agriculture**

$3,900,000 for low-input agriculture as authorized by the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 4701-4710)

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SARE is Born!

1990 Farm Bill – Food, Agriculture, Conservation, and Trade Act, Title XVI, Subtitle B, Section 1619. **Sustainable Agriculture Research and Education**

Purpose, Definitions, Program Administration, Authorization

Chapter 1 – Best Utilization of Biological Applications

~~Chapter 2 - Integrated Management Systems~~

Chapter 3 – Sustainable Agriculture Technology Development and Transfer Program

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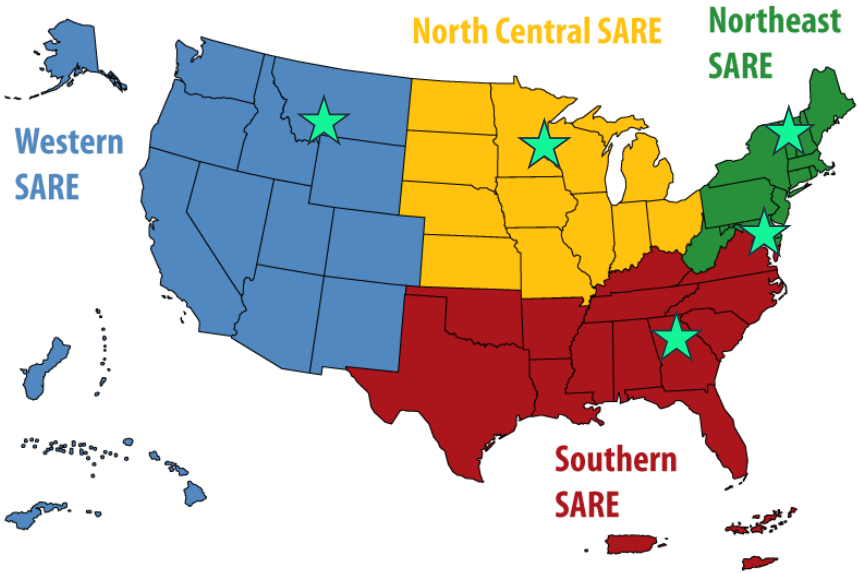
SARE National Overview



- 1 National Outreach Office
- 4 Regional Host Institutions
  - Administrative Councils
  - Staff
- National Committees
- Professional Development Program - 1994

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SARE Grant Types

Grant Type	Lead Audience
Research and Education	Researchers, Educators, Farmers
Farmer/Rancher	Farmers, Ranchers
On-Farm Research/Partnership	Educators, Service Providers, Farmers
Graduate Student	Graduate Students, Farmers
Professional Development Program	Educators, Service Providers

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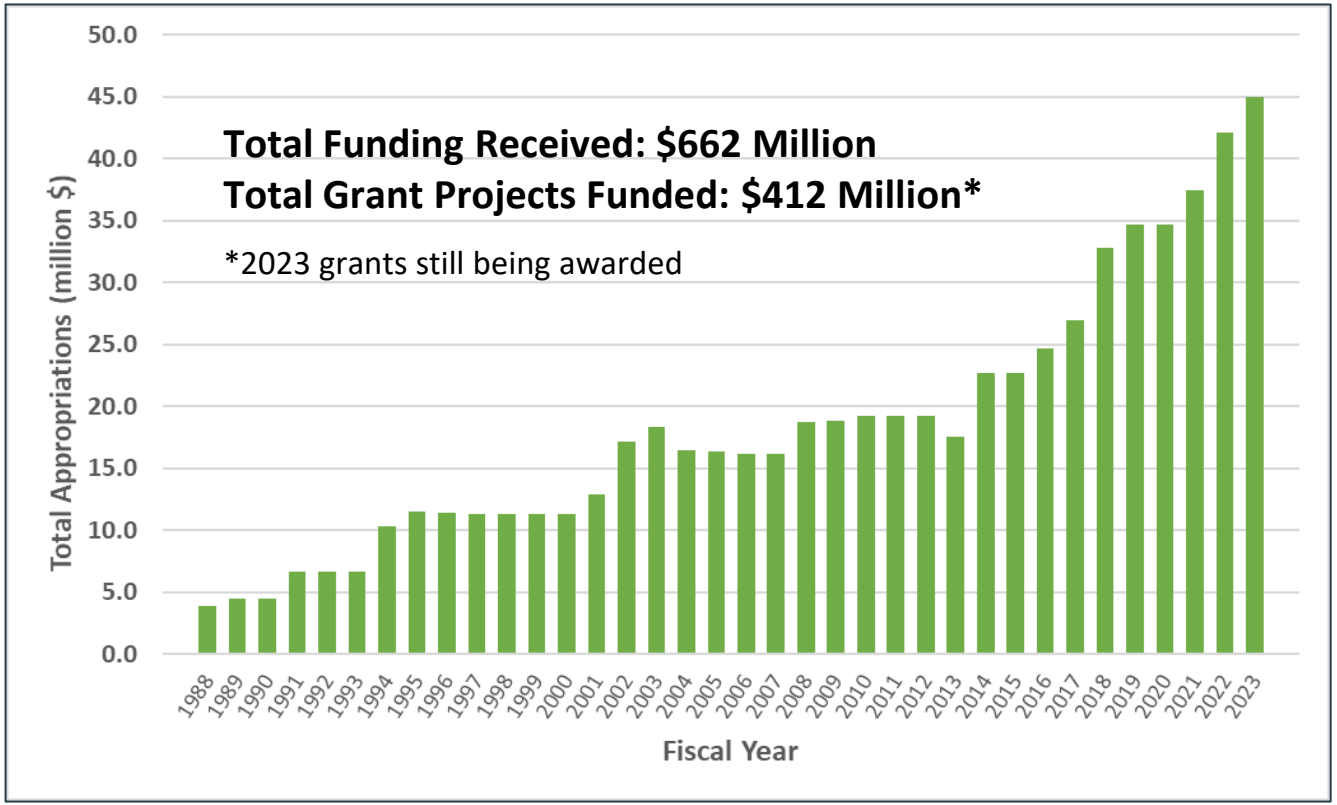
SARE Funding History



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Eligible Topics

- On-farm renewable energy
- Pest and weed management
- Pastured livestock
- Rotational grazing
- Cover Crops
- High Tunnels
- Crop Rotations
- Business Planning
- Farm Succession Planning
- Marketing
- Sustainable Communities
- Integrated Systems
- Pollinators
- Local and Regional Food Systems
- Urban Farming
- Indigenous Practices
- Farmer Mental Health
- Etc.

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SARE Funding by Topic

Search Term	Total Funding	Total Projects
Climate	$4,743,663	74
Regenerative	$1,934,647	32

Includes all projects from 1988-2023

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SARE Funding by Topic

Search Term	Total Funding	Total Projects
Soil Health	$23,337,319	469
Cover Crops	$22,337,320	1331
Organic Matter	$19,748,962	1243
Soil Carbon	$17,101,848	51

Includes all projects from 1988-2022

SARE Sustainable Agriculture Research & Education www.sare.org

SARE into the Future

- Increased annual appropriations for funding SARE - $60 Million
  - More grants, more topics, higher amounts
  - Support to grantee

- Addressing Quality of Life in grant programs
  - Improving DEIA efforts across programs

- Provide Technical Assistance for grant management

- Evaluate program impact

SARE
Sustainable Agriculture Research & Education
www.sare.org

Thank You!

SARE Webpage https://www.sare.org/

SARE Projects Database https://projects.sare.org/

Contact Dr. Kristy Borrelli kborrelli@sare.org

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www.sare.org

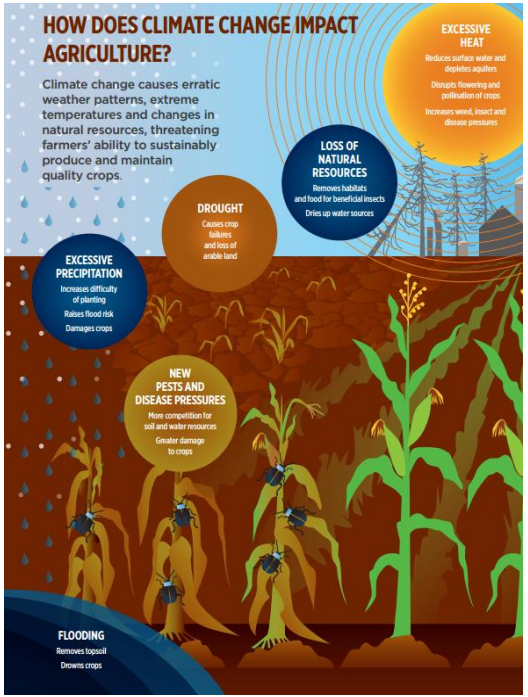
Sustainable Agricultural Research

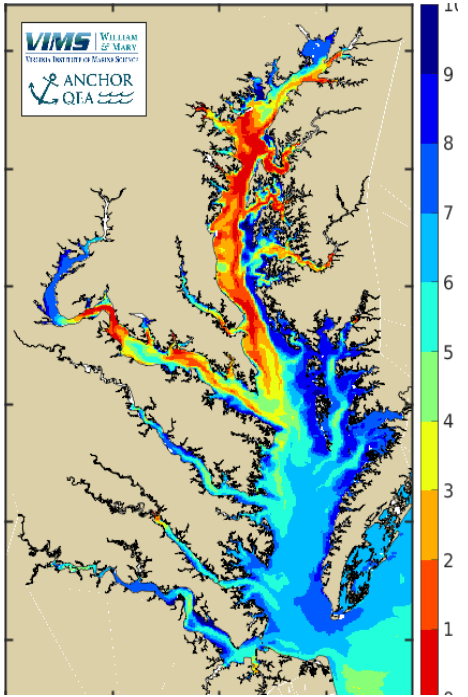
Climate-Smart Research for the Farms of the Future
Briefing Series: Farm Bill in Focus
September 12, 2023

Lawson Connor
Assistant Professor of Agricultural Economics & Agribusiness, University of Arkansas

Farming Impacts and Agricultural Sustainability

- External Concerns
  - Nitrate pollution
  - Eutrophication
  - Dead-zones in downstream waterways
- Internal Concerns
  - Soil erosion
  - Nutrient leeching
  - Increased yield sensitivity to extreme weather events
- Further exacerbated by climate change
  - Droughts, extreme heat, excess wet conditions occur more frequently
- Interactions with Farm Bill Programs
  - Crop insurance effects:
  - Cover crop adoption incentives
  - Higher drought sensitivity

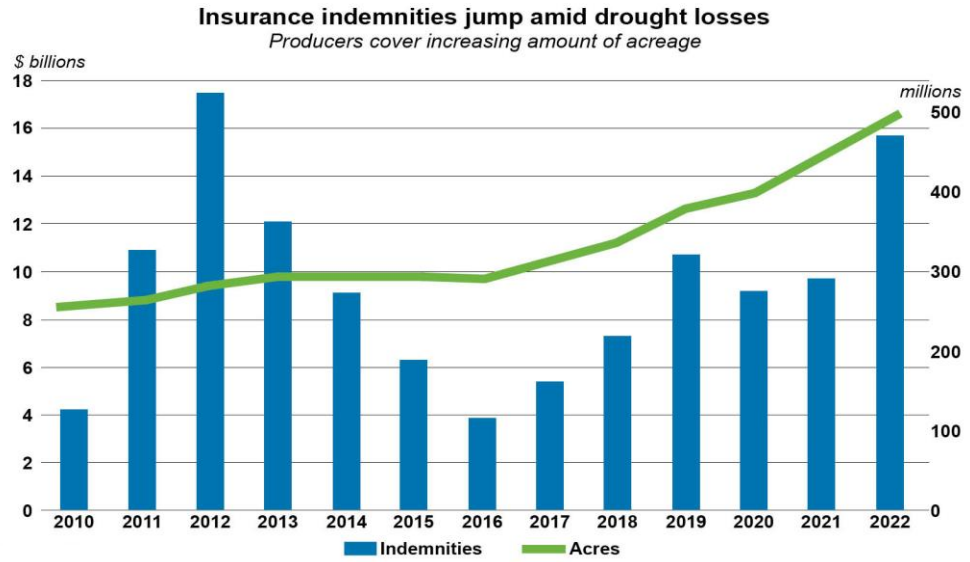




Figures: Impact of climate change on agriculture (left) and Hypoxic zones in Chesapeake bay (right). **Sources:** Crop Life International. VIMS dead-zone report

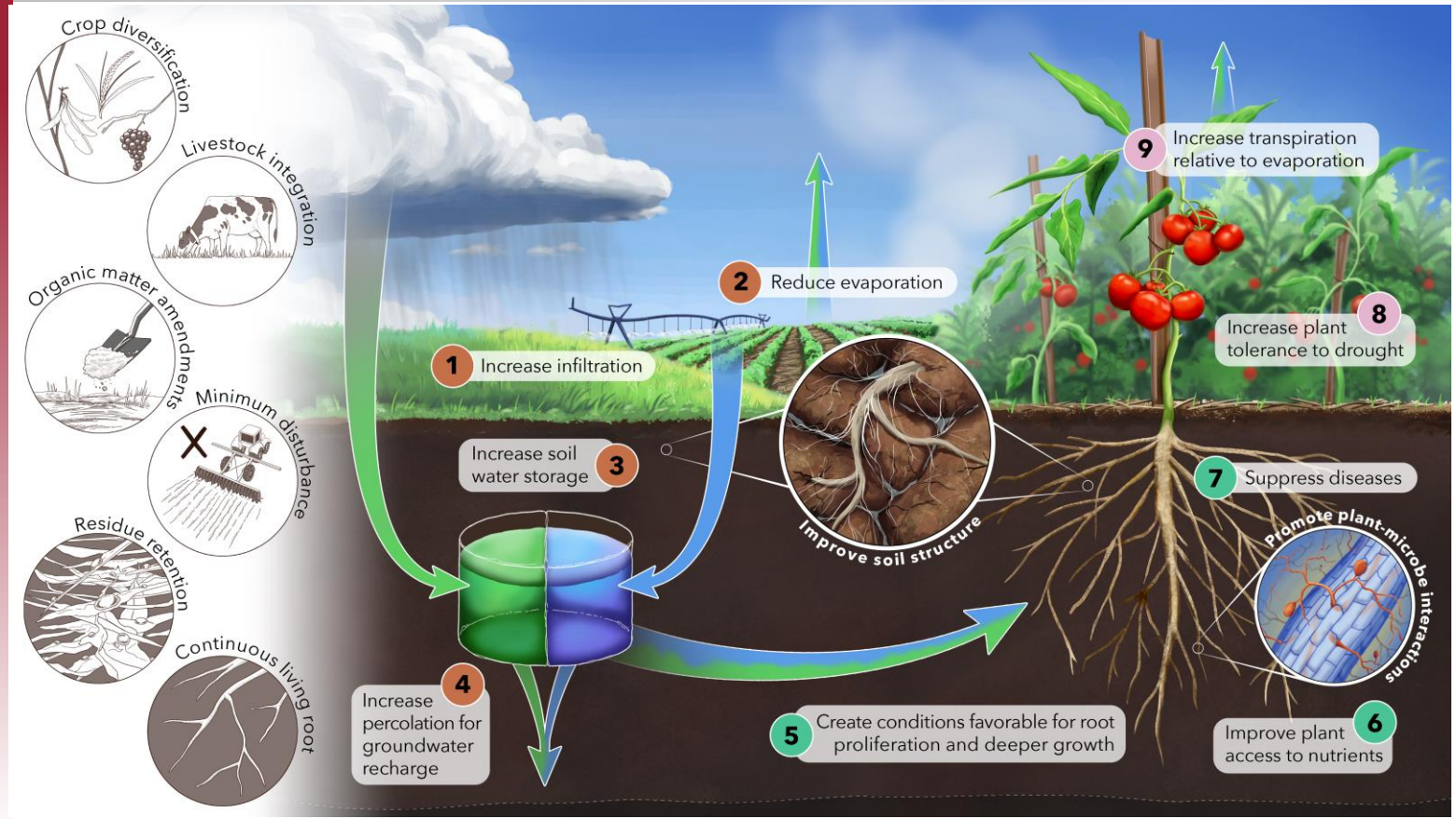
Potential for Increased Cost of Administering Farm Programs

- Increasing indemnity outlays particularly due to dry weather
  - Greater Acreage enrollment in crop insurance
  - Increased drought vulnerability



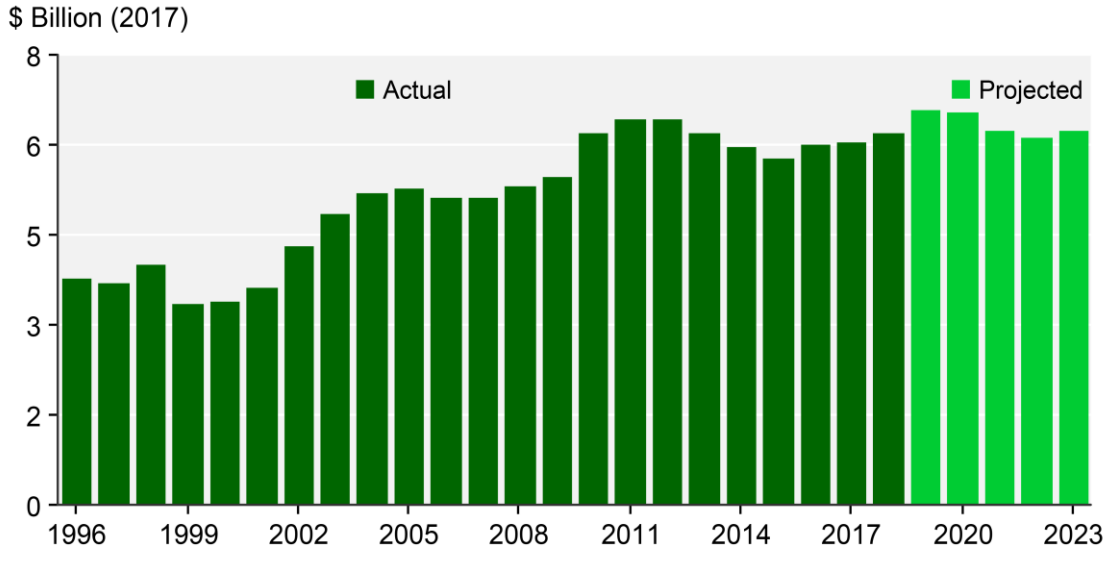
Adapted from Agri Pulse, January 25th, 2023.
Data Source: USDA RMA Summary of Business

Diversified Cropping Systems



UNIVERSITY OF ARKANSAS

Inflation-adjusted annual spending for major USDA conservation programs, 1996-2018, with projections to 2023 1/



1/ Includes these programs and predecessors: Conservation Reserve Program, Agricultural Conservation Easement Program, Environmental Quality Incentives Program, Conservation Stewardship Program, Regional Conservation Partnership Program, and Conservation Technical Assistance (CTA). CTA is funded annually through appropriations; here it is assumed constant at $769 million (nominal). Spending is adjusted to constant (2017) dollars, with assumed annual inflation of 2 percent for 2019-23.
Source: USDA, Economic Research Service analysis of Office of Budget and Policy Analysis (OBPA) data on actual funding for 1996-2018, OBPA estimates for 2019, and Congressional Budget office projections for 2020-23.

Federal Funding For Conservation

- Federal funding for conservation has increased
- The largest chunk of the funding has gone to promote adoption and maintenance of cover cropped acres.

Research Has Three Main Focuses

- Our research has focused on addressing internal concerns in row crop agriculture
- Addresses concerns regarding costs of program administration
- Understanding and mitigating unintended effects

Intended and Unintended effects of farm bill programs on practices adoption

Effects of practice adoption on farm economics: Drivers of heterogeneous effects

Alternative strategies for incentivizing practice adoption

Selected Outcomes

SUBMITTED ARTICLE

AAEA WILEY

Payments from agricultural conservation programs and cover crop adoption

Byungyul Park[1] | Roderick M. Rejesus[2] | Serkan Aglasan[3] | Yuyuan Che[2] | Stephen C. Hagen[4] | William Salas[4]

Journal of Agricultural and Resource Economics 45(1):1–19

SUBMITTED ARTICLE

AAEA WILEY

Crop insurance participation and cover crop use: Evidence from Indiana county-level data

nor[1] | Roderick M. Rejesus[2] | Mahmut Yasar[3]

ISSN: 1068-5502 (Print); 2327-8285 (Online)
doi: 10.22004/ag.econ.298431

Crop Insurance Participation Rates and Asymmetric Effects on U.S. Corn and Soybean Yield Risk

Lawson Connor and Ani L. Katchova

Understanding the effect of cover crop use on prevented planting losses

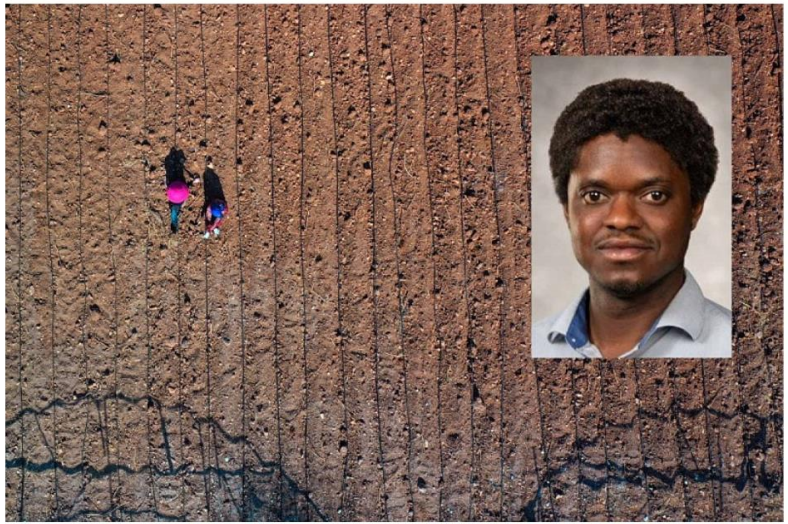
Sunjae Won[1] | Roderick M. Rejesus[2] | Barry K. Goodwin[2] | Serkan Aglasan[3,4]

AFRI and FFAR Funding

Arkansas Democrat Gazette

Health of soil, risks studied

by Ryan McGeeney Special to The Commercial | August 11, 2023 at 2:42 a.m.



Row-crop farmers plant potatoes in the soil in this Sept. 7, 2022 file photo. In the inset, Lawson Connor, an agriculture economist for the University of Arkansas System Division of Agriculture, is the primary investigator for Arkansas' involvement in research examining soil health practices. (Main, AP/Hussein Malla; inset, courtesy photo)

- Key Objectives
  - Develop open access Cover crop dataset
  - Understand heterogeneous economic effects of Rotational complexity and cover crop adoption
  - Develop tool that can inform lenders of risk profiles of practice adopting fields and farms

Thanks

Contact:

Lawson Connor

Email: lconnor@uark.edu

Phone: 479-575-2072

LAND CORE

Federally Recognied Tribal Extension Program

FRTEP

Reparation of Disparities

- Prior to FRTEP, County extension offices were not serving reservations and tribal communities
- The Federally-Recognized Tribes Extension Program (FRTEP) was initially created in the **1990** Farm Bill to address the inequities in agricultural extension offered to Native American farmers and ranchers.
- Agricultural support in the form of Extension in Indian Country is a result of a sovereign-to-sovereign relationship.
- Thirty years later, the FRTEP has never been appropriated the funding or staffing it was originally authorized.

Overview

The main priorities of the FRTEP include but are not limited to:

1. Positive youth development programs, including 4-H for tribal youth
2. Native Farmer and Rancher Productivity and Management
3. Native Community Development:
    a. Economic and Workforce Development
    b. Food Systems, Farm and Community Markets, and Food Sovereignty
    c. Natural Resource Conservation and Adaptation to Environmental Changes
    d. Human Nutrition and Reduction of Childhood and Adolescent Obesity
    e. Native Language and Culture Preservation
    f. Traditional Ecological Knowledge sharing and learning, or knowledge held by indigenous cultures about the environment or cultural practices.

- Cover crop utilizing varieties that also benefit specific local pollinator species
- Hydroponic outdoor system to grow edible perennials for transplant
- Forest garden

Agriculture as Healing

FRTEP installs agriculture programs that empower reservtions and surrounding communities to grow food, restore tribal traditions and culture while building community.

Farmer & Rancher

Delivering science-based, culturally relevant production, marketing and financial management information to help Indian producers becoming economically successful and help build Native Nation food security.

Adaptation to Climate Change

Climate change is already affecting our environment. Certain regions of the U.S. will be disproportionately impacted by climate change, and these regions also often have large Tribal populations. Adaptation to climate change requires funds, innovation, and action.

Community

Providing outreach programs to safeguard water quality, food system development, certify pesticide applicators, preserve traditional plants and facilitate community engagement and leadership.

Regenerative Agriculture

Indigenous cultures have long been privy to the innate knowledge of many of regenerative agriculture's techniques. These practices have existed for centuries. They include a robust environmental ethical.

At present these activities are done on a small and localized scale.

Indigenous Traditional Ecological Knowledge can help shift practices toward more sustainable production nationwide

Indigenous Traditional Ecological Knowledge

Examples of ITEK Agricultural practices from pre-colonial food production

- Multiple Cropping
- No-till farming
- Companion planting
- Fallowing fields,
- Staggering the times of plantings
- Maintaining separate plantings of different varieties
- Polycultures

Climate

Extreme water shortages, drought or flooding

are already impacting food production most of western states

Soil integrity and loss

is a national issue imperaling all current agriculture in the United States

Inconsistent LOGS, first and last frost

Have been observed and impact crops in many areas

Livestock disease and expense

Climate change can exacerbate disease in livestock, and some diseases are especially sensitive to climate change

Climate changes will disproportionately impact Native American lands, reservations, and communities

Conclusion

NRCS: “Rooted in Indigenous wisdom, **regenerative farming** is an alternative decision-making framework that offers a set of principles and practices to grow food in harmony with nature and heal the land from degradation.”

The 35 Federally Recognized Tribal Extension Programs serving Native American communities are assisting in providing food security for select tribes across the country. If expended, these programs have potential to serve all reservations where food insecurity is high.

It is imperative that agricultural systems change and adapt as climate changes. ITEK practices can contribute.

Resources

- Beyond Extension: Strengthening the Federally Recognized Tribal Extension Program (FRTEP) (iltf.org)
- Home - Tribal Extension
- Advocating for the Federally-Recognized Tribes Extension Program » Congressional Hunger Center
- https://tribalextension.org/wp-content/uploads/2022/05/FRTEP_Indian-CountryExtensionCommissionRecs_Final_LowRes.pdf
- http://www.fs.fed.us/rm/pubs_rm/rm_gtr272/rm_gtr272_181_188.pdf
- https://www.bing.com/ck/a?!&&p=3ad47f0b2229950fJmltdHM9MTY5NDQ3NjgwMCZpZ3VpZD0wZTBlMzVhNS1hOWM2LTYyZTktMzYzMy0yNmRmYTg3NTYzOGUmaW5zaWQ9NTIzOQ&ptn=3&hsh=3&fclid=0e0e35a5-a9c6-62e9-3633-26dfa875638e&psq=climate+and+livestock+diseases&u=a1aHR0cHM6Ly91bmZjY2MuaW50L2ZpbGVzL2RvY3VtZW50YXRpb24vc3VibWlzc2lvbnNfZnJvbV9ub24tcGFydHlfc3Rha2Vob2xkZXJzL2FwcGxpY2F0aW9uL3BkZi81MTYucGRm&ntb=1
- https://www.epa.gov/climate-indicators/climate-change-indicators-length-growing-season
- Advancing Racial Justice through Food Distributions on Indian Reservations | USDA
- https://www.feedingamerica.org/sites/default/files/2021-03/National%20Projections%20Brief_3.9.2021_0.pdf
- https://nfu.org/2020/10/12/the-indigenous-origins-of-regenerative-agriculture/

Stanford Law School

Climate-Smart Agriculture Research & Innovations

David J. Hayes
September 12, 2023

Stanford Law School

Why "Climate-Smart" Agriculture?

Agricultural practices can have significant climate impacts – pro and con.

- Carbon dioxide, methane and nitrous oxide emissions or reductions.

Multiple benefits can flow from adopting "climate-smart" agricultural practices.

- Higher yields & reduced costs from precision agriculture.
- Resilience in the face of climate impacts.
- Incentive payments.

Stanford Law School

Statutory/Legal Framework to Incentivize Climate-Smart Ag Practices

funded

Inflation Reduction Act

$19+B Funding

Allocated to existing USDA conservation programs based on Secretary of Agriculture's confirmation of climate benefits.

$300M of the IRA funding is explicitly dedicated for the measurement, monitoring, verification, and reporting (MMRV) of carbon sequestration or methane and nitrous oxide emissions reductions.

USDA "Partnerships for Climate-Smart Commodities" Initiative

$3+B Program

Tests proposition that farmers who produce commodities using "climate-smart" practices can sell products at higher prices.

Includes a significant focus on MMRV; presumes development of a credible MMRV-based certification process.

other

"Climate-Smart Agriculture & Forestry" Initiative via E.O. 14008.

Tasks USDA with evaluating incentives for the voluntary adoption of climate-smart ag and forestry practices.

2023 Omnibus Budget

Requires that USDA identify "widely accepted protocols" and "sampling methodologies" to ensure "programmatic integrity" of voluntary carbon markets.

New Farm Bill -- ???

Stanford Law School

Urgent need for better MMRV of climate smart practices in ag.

Measuring, monitoring, reporting & verification (MMRV) of agricultural GHG fluxes is difficult & expensive . . .	. . . due to the heterogeneity of ag soils and under-investment in ground-truthed MMRV technologies & methodologies.
But potential incentive payments are putting focus on climate and sustainability practices across supply chains . . .	. . . so major agricultural producers and farmer-suppliers need mechanisms to confirm/validate climate benefits.
Some voluntary carbon markets &/or ag producers are generating carbon offset/inset payments for "climate-smart" regenerative ag practices . . .	. . . but the absence of broadly-accepted MMRV standards is limiting incentive payments.

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Factors Holding Back Improved MMRV for Climate-Smart Practices

Investment: USDA traditionally has invested in broad-based models developed by land-grant universities. New technologies and methodologies are available to provide ground-truthing and scaling of area- and practice-specific climate-smart practices.

Soil-Focus: USDA traditionally has focused almost exclusively on carbon uptake in soils. Yet, the large majority of GHG benefits are associated with reduced methane and nitrous oxide emissions from livestock- and fertilizer-related practices.

Data: Proprietary data sampling & software modeling tools are proliferating in voluntary carbon markets, making public confirmation of climate benefits more difficult.

Stanford Law School

Addressing MMRV Deficiencies & Increasing Climate-Smart Payments

Stanford report: "Data Progress Needed for Climate-Smart Agriculture" (April 2023) https://law.stanford.edu/publications/data-progress-needed-for-climate-smart-agriculture/

The USDA has a **historic opportunity** to address key MMRV deficiencies through coordinated implementation of:

(1) new IRA funding, including its $300M for MMRV and required Secretarial confirmation of climate benefits

(2) MMRV innovations piloted under the Partnerships for Climate-Smart Commodities program; and

(3) Omnibus budget-required protocol analysis.

(4) Upcoming Farm Bill.

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Addressing MMRV Deficiencies & Increasing Climate-Smart Payments

Endorse USDA's focus on **specific agricultural practices** regarding soil regeneration; precision fertilizer use; livestock feed & manure management.

Lack of consensus protocols on data collection and modeling, combined with limited public availability of GHG data on soil carbon, N20 and CH4, undermines MMRV efforts.

Underscore need and opportunity for USDA to develop a **comprehensive plan around climate data collection & analysis**. Cite previous USDA data efforts, National Academies and White House initiatives and Congressional direction and funding on this topic.

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Addressing MMRV Deficiencies & Maximizing Adoption of Climate-Smart Agricultural Practices

Marshal outside experts to help USDA develop protocols for field-testing carbon in soils and methane and nitrous oxide emissions.

Support national soil monitoring network built around regional nodes to establish baseline conditions and enable trend-line analyses for both soil carbon and nitrous oxide emissions.

Develop separate methane testing and protocol development initiative.

Identify and deploy a data management platform/mechanism that collects and organizes agricultural GHG data in accessible formats.

Tie into broader White House initiative.

Encourage the development of new/revised GHG-focused agricultural models and conversion factors that are calibrated to MMRV data, with significant focus on methane.

Engage in extensive farmer outreach and technical assistance to encourage broad-based adoption of climate-smart practices.

Evaluate potential "climate-smart" certification standards and mechanisms that may be appropriate for agriculture.

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