StoryMap to share successes of the USDA-ARS Long-Term Agroecosystem Research (LTAR) Network

UI GISday “GIS on the Palouse”

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Land Acknowledgement

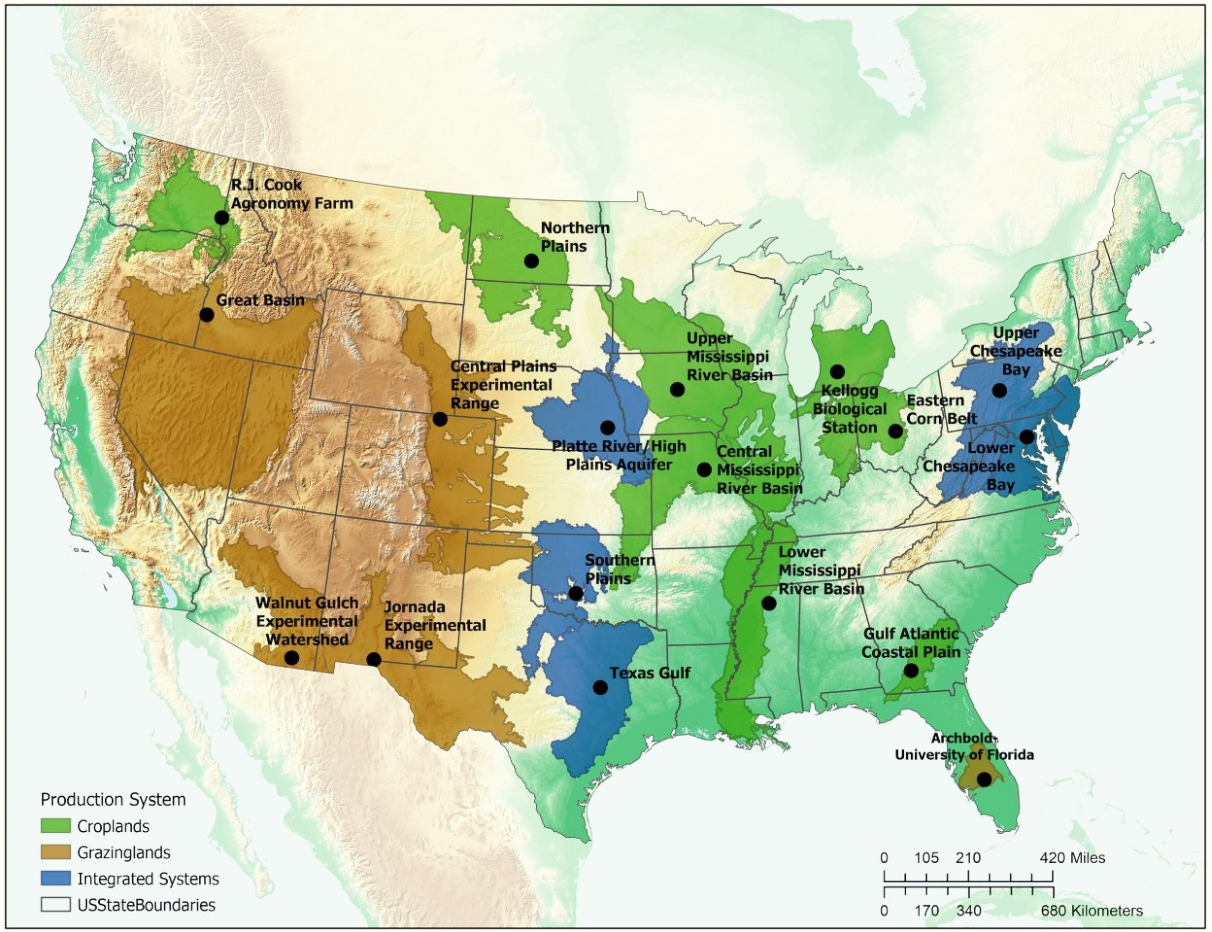
Washington State University acknowledges that its locations statewide are on the homelands of Native peoples, who have lived in this region from time immemorial.

There are 37 federally recognized Tribes that historically shared their traditional homelands and waterways in what is now Washington State. Of these, 29 are federally recognized Tribes in Washington with the remaining Tribes in Idaho, Montana, and Oregon, some of which represent multiple tribes and bands.

The University expresses its deepest respect for and gratitude towards these original and current caretakers of the region.

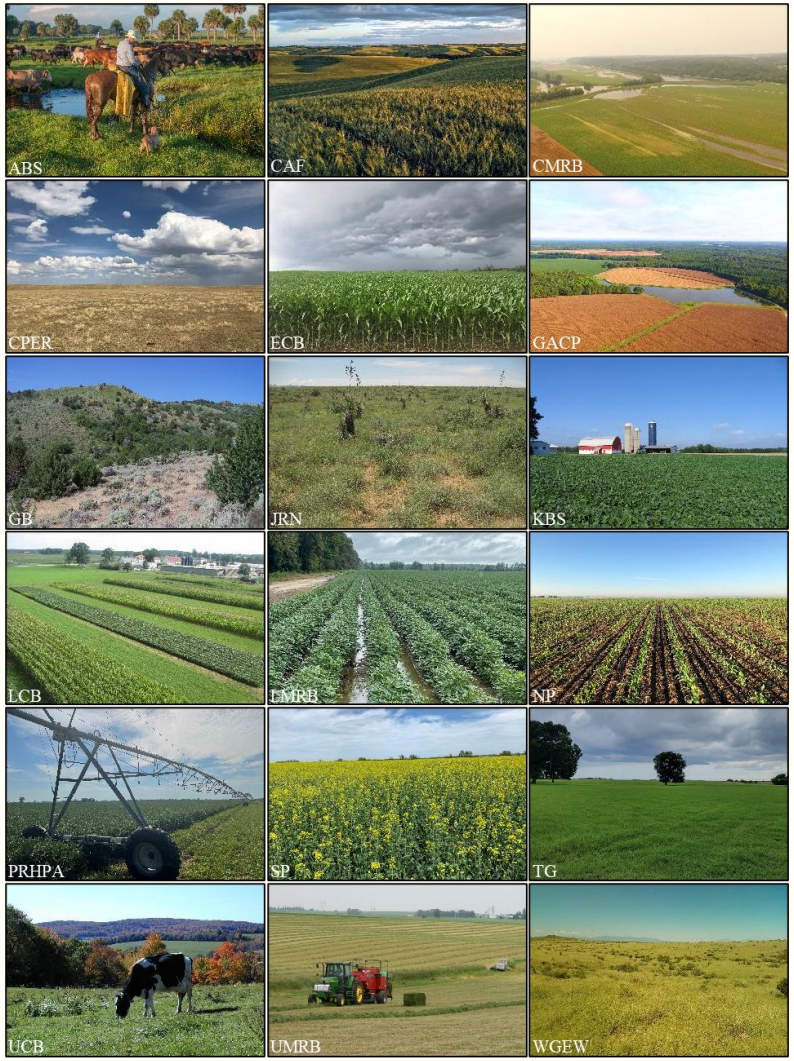
The LTAR Network

- Initiated in 2012 to continue for 30+ years
- Platform for research, education, and outreach
- Improve the current and future capacity of farmers and ranchers to provide ag commodities and agroecosystem services

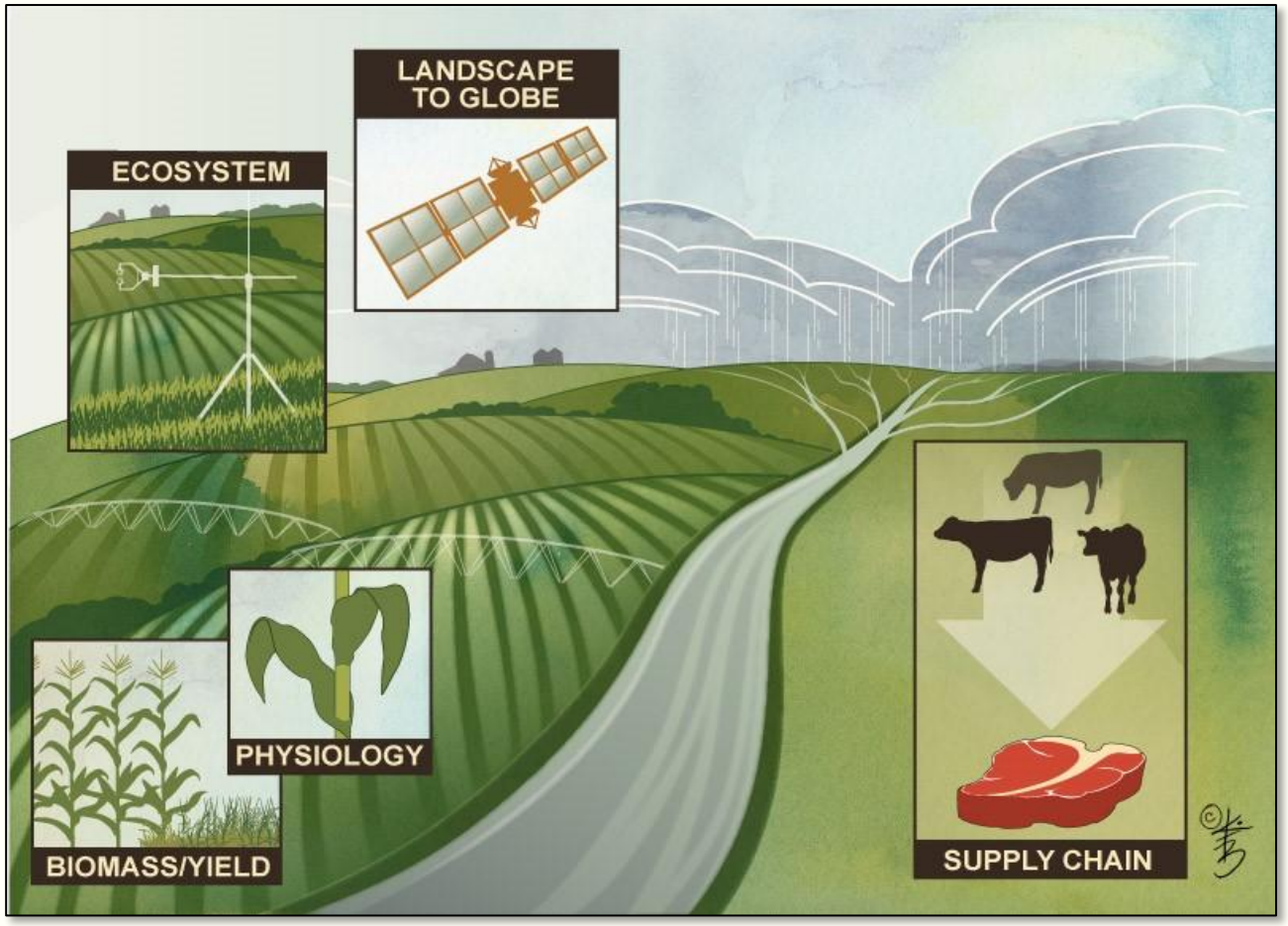


Diversity of LTAR Network

Agroecosystems



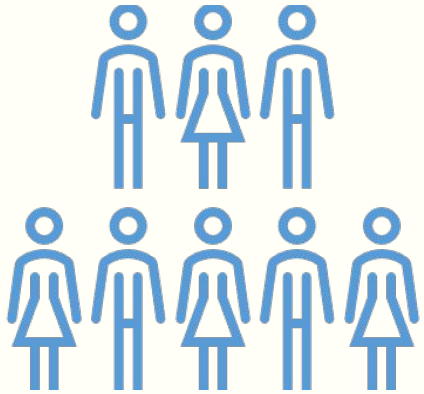
Spatiotemporal Scales



Hoover et al. 2023

LTAR Working Groups

Hundreds of people all over the country



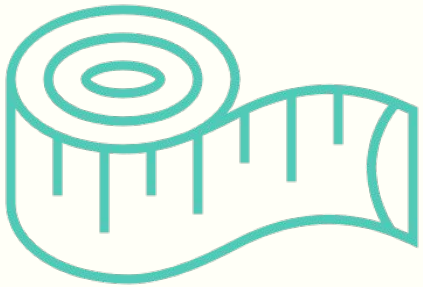
Basecamp

Zoom

Annual Meetings

Workshops

Agreeing on what to measure



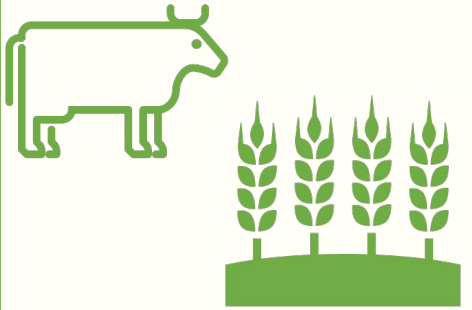
Working groups and subgroups working on indicators and common methods

Different jargon

Common vocabulary

Data dictionaries

Diversity of systems



Metrics and indicator approach

Site specific baselines

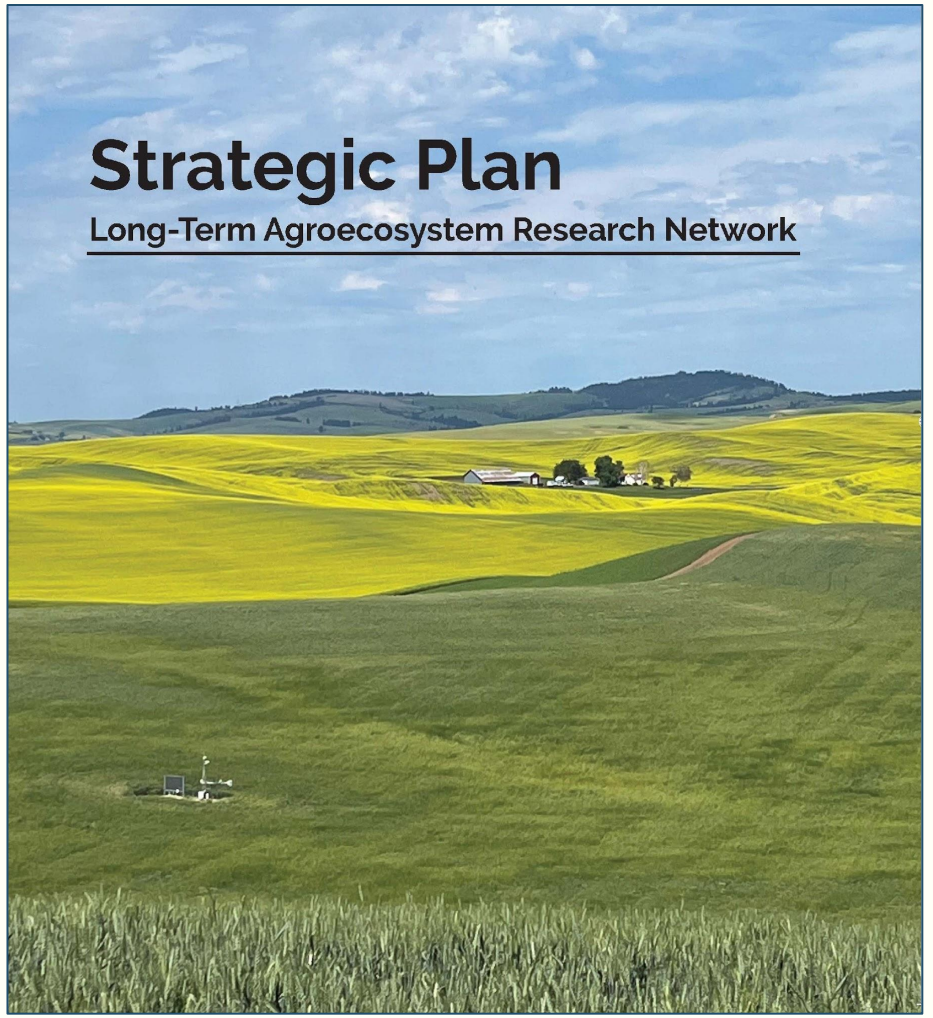
LTAR Strategic Planning

- Vision

A vibrant, inclusive, adaptable, and resilient agricultural community achieving production, environmental, and societal goals sustainably

- Mission

To conduct long-term, transdisciplinary, networked research to create innovative tools and practices and regionally-tailored, evidence-based knowledge supporting adaptable, resilient, sustainable agriculture

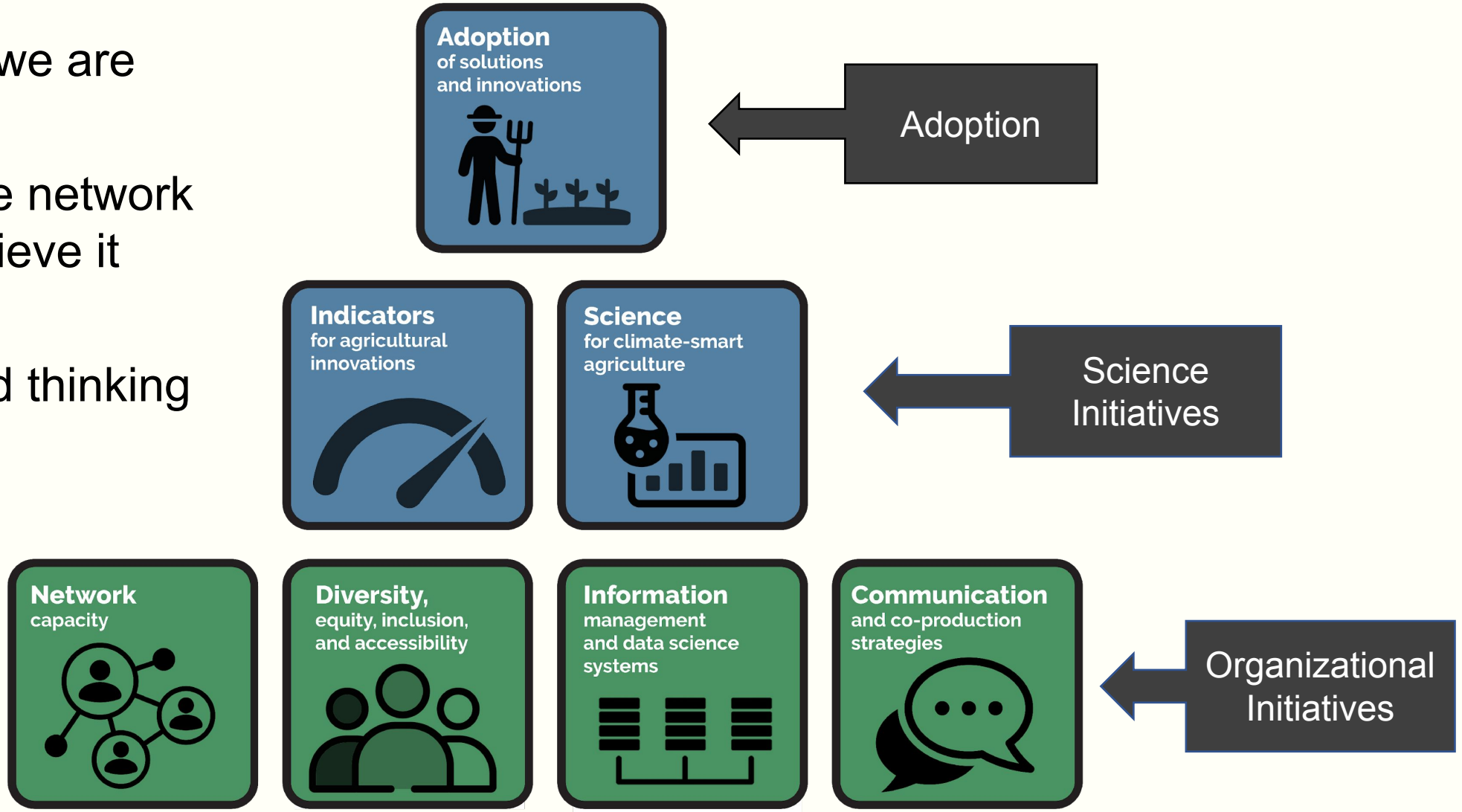


Network accomplishments

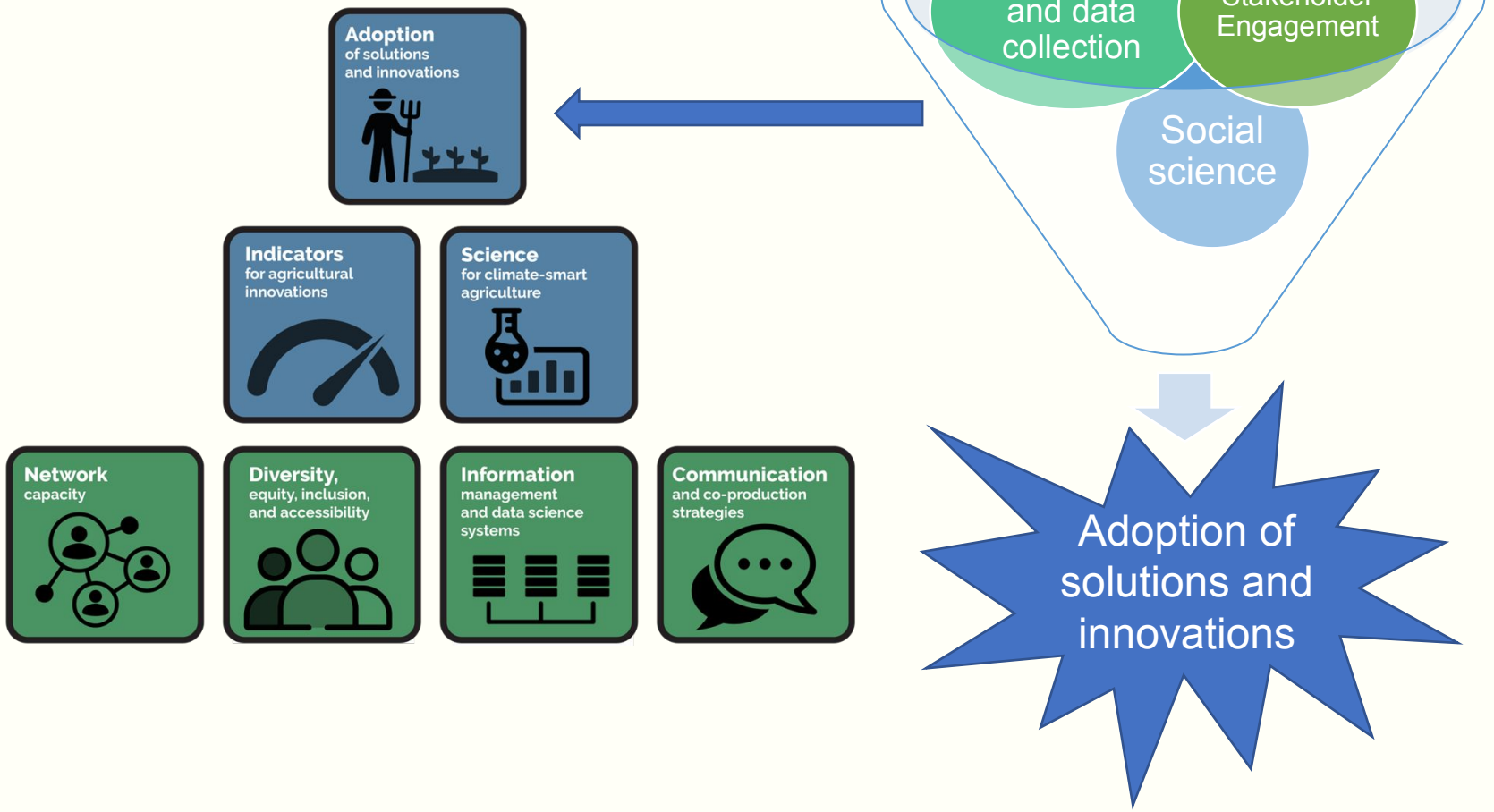
- Seven sessions highlighting accomplishments from LTAR Network Working Groups:
  - Eddy Flux
  - Water Quantity and Quality
  - Soils and Soil Health
  - Data Management
  - Modeling
  - Human Dimensions
  - Remote Sensing
- See special issue in JEQ for LTAR Site descriptions and research highlights.

Seven Initiatives

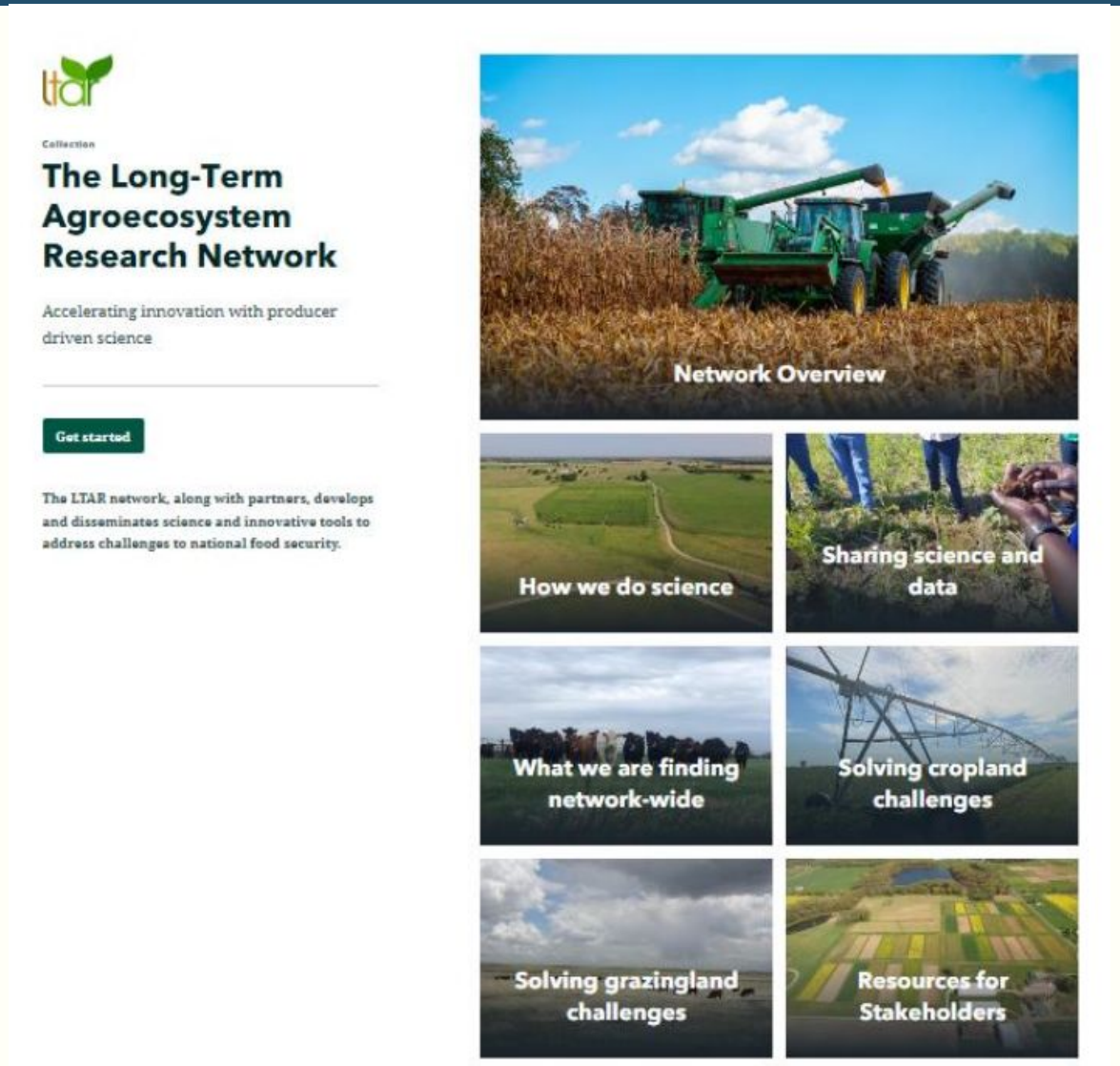
- Where we are going
- How the network will achieve it goals
- Forward thinking



Engaging Stakeholders



ESRI StoryMap as tool



Integrates maps, data, photos, and narrative into one platform

Ideal for multi-site, multi-scale networks like LTAR

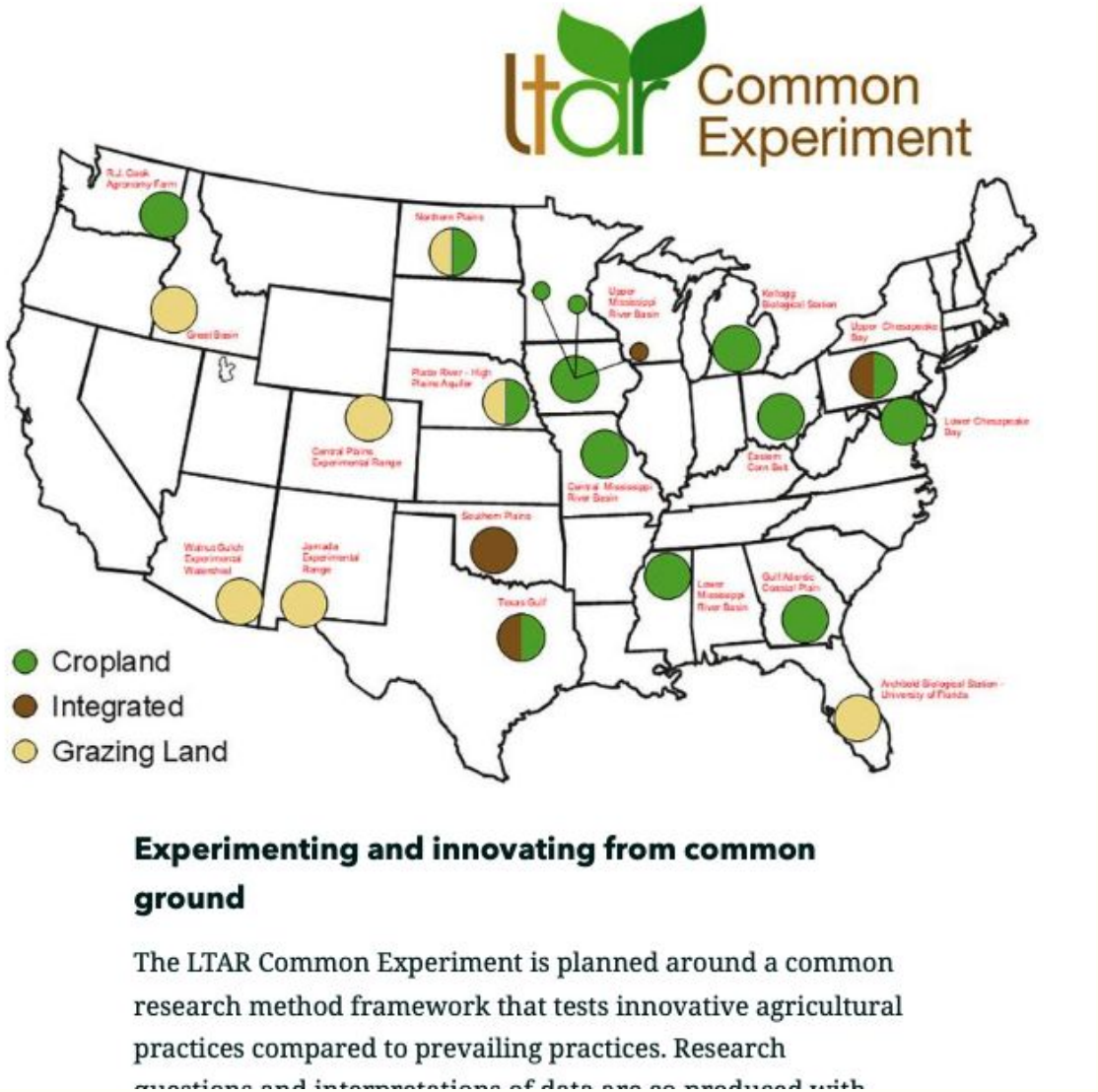
Enables interactive exploration of landscapes, research, and issues

Helps connect local concerns (e.g., water on the Palouse) to national context

Improves public understanding without requiring technical background

Supports ongoing updates—current and accessible

1. How we do science



Long-term, coordinated research

Standardized experiments across all sites

Multi-scale approach (plant → field → landscape)

Integrated disciplines (agronomy, soils, hydrology, ecology)

Stakeholder-informed and place-based

Transparent methods and open data

RJ Cook Agronomy Farm

Washington State University's farm, named for R. James Cook, was launched as a long-term direct-seed cropping systems research program by a team of WSU and USDA-ARS scientists in 2000.

2. How we share science and data

Real-time Impact

By pairing rigorous science with stakeholder collaboration and public transparency, LTAR turns long-term research into real-time impact. Its commitment to open science not only accelerates innovation but also ensures that the benefits of federally funded research are felt across farms, watersheds, and communities nationwide.

Photo: Science and data produced at CAF helps farmers decide what to plant, by A. DeLong

Open access to long-term datasets (Socrata, Ameriflux, PhenoCam)

Standardized methods published on Protocols.io

Clear communication through StoryMaps, dashboards, and other visuals

Science shared with producers, land/water managers, educators, and policymakers

3. What we are finding (network wide)

Managing for multiple agricultural resources

Outcomes of innovation

Innovative management practices have potential to promote multiple economic, environmental and social outcomes. In the Central Mississippi River Basin (CMRB), an alternative cropping system (i.e., four-year rotation of corn, soybean, wheat, and hay with cover crops and no-till) improved soil health, provided resilience to weather extremes, and increased profitability by $75 per acre per year.

Photo: Various crop rotations at CMRB, in Columbia, MO

What We Are Finding at Cook Agronomy Farm (CAF)

Long-term no-till and diverse rotations improve soil organic matter

CAF systems show better water infiltration and reduced runoff on Palouse slopes

Alternative cropping practices increase soil water storage

Precision management reduces nutrient losses and improves efficiency

Conservation-focused systems enhance resilience to variable precipitation

4. Solving cropland challenges (CAF)

The Long-Term Agroecosystem Research Network

Network Overview | How we do science | Sharing science and data | What we are finding network-wide | **Solving cropland challenges** | Solving grazingland challenges

What we know from the Northwest (CAF)

Challenges: Soil erosion and poor nutrient use efficiency

Innovative practice: continuous no-tillage and precision nutrient management

Findings: No-tillage conserved water and energy, improved soil health and reduced labor needs while maintaining or improving yield. Continuous no-till reduced soil erosion by over 500% significantly decreasing sediment and nutrient export from the field as compared to reduced tillage. Precision management of nitrogen fertilizer increased nitrogen use efficiency by over 20% compared to prevailing practices.

Photo: Sensors collecting data at CAF in Pullman, WA

5. Resources for Stakeholders

Resources related to croplands

- Budgeting for Prairie Strips helps farmers calculate where and how prairie strips can be a financial benefit to the farm operation
- Annualized Agricultural Non-Point Source Pollution Model (AnnAGNPS) can be used to evaluate non-point source pollution from agricultural watersheds and to compare the effects of implementing management practices over time within the watershed
- A user-friendly resource optimization tool (Soil and Water Assessment Tool - Multi-Objective Evolutionary Algorithm - SWAT-MOEA) to explore and identify optimal management strategies for land and water resource management in agricultural production systems
- Lime Requirement Calculator helps farmers calculate how much lime to add based on soil properties
- The Cover Crop Chart is a decision aid to help select and manage cover crops
- The Crop Sequence Calculator is designed to assist agricultural managers determine workable cropping sequences for the northern Great Plains

What stakeholders are saying

Thank you!

Special Thanks to LTAR StoryMap Team: Nicole Kaplan, Lina Aoyama, Gerardo Armendariz, Seth Archer, Betsey Boughton, Alia Delong, Dave Huggins, Mark Kautz, and Tayler Ulbrich

Please reach out with ideas to collaborate:
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The Long-Term Agroecosystem Research (LTAR) Network

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