Healthy Climate, Healthy You Speaker Series – January 14 – February 4, 2024

Resilient and Regenerative Precision Agriculture

Dr. Mike Boehm
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Lincoln, NE - 28 JAN 2024

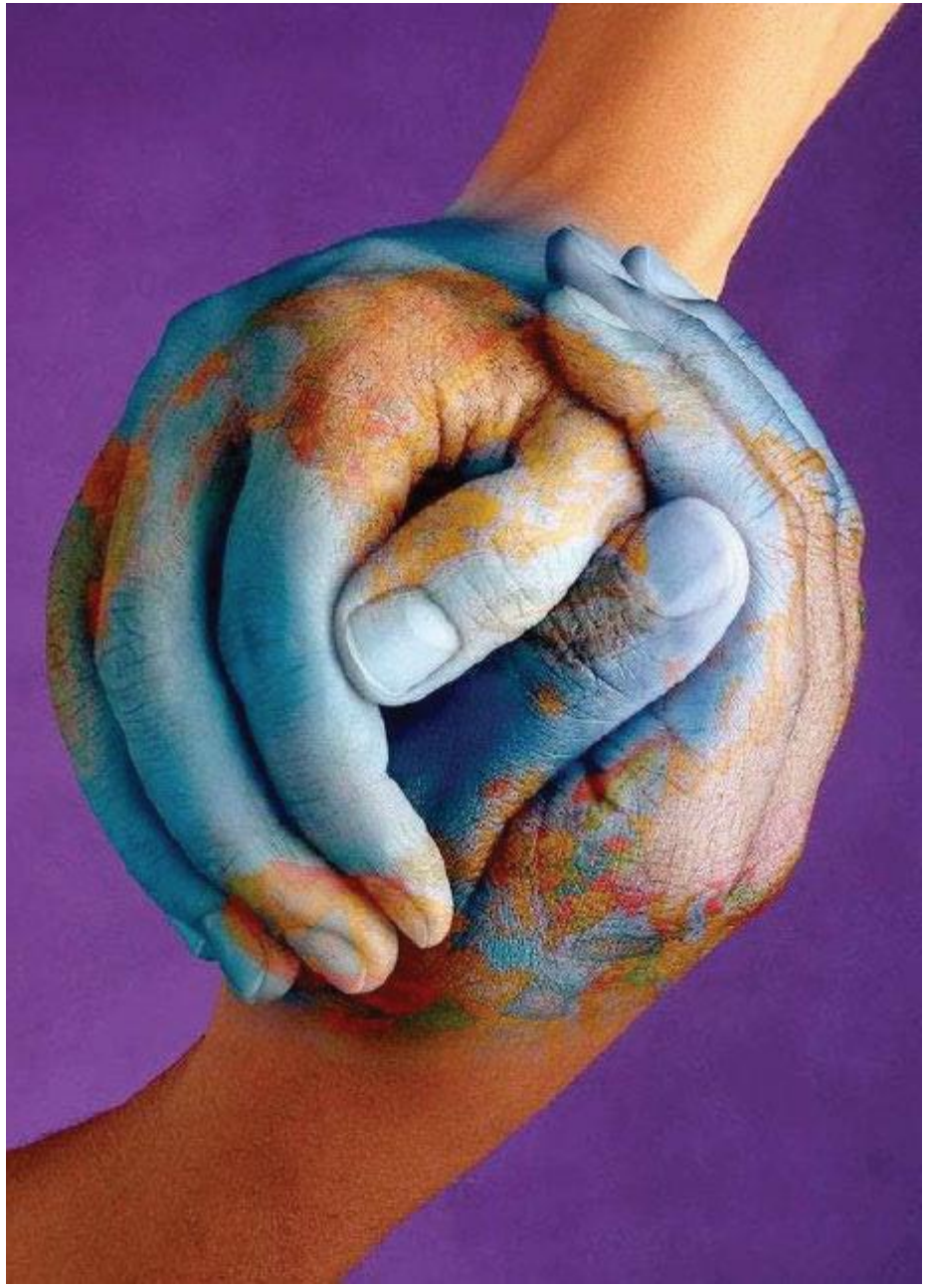
Black Elk, Ogalla Lakota (Sioux)
1863-1950

"Everywhere is the center of the world. Everything is sacred." – Black Elk

- What is resilient and regenerative precision agriculture?
- What impact does it have on:
  - ✓ Nebraska agriculture?
  - ✓ Our soils and water?
  - ✓ Our climate?
- What is the status of regenerative agriculture in Nebraska?
- Can you update us on the status of USDA's new National Center that will be located in Lincoln?
- What can we do to support and promote resilient and regenerative precision agriculture in Nebraska?

Megatrends with the potential to transform the human experience and reshape markets, societies and the global order

Globalization
Demographic shifts
Technological advances
Individual empowerment
Accelerating urbanization
Shift in global economic power
Climate change and resource scarcity
Growing demand for food, water, and energy

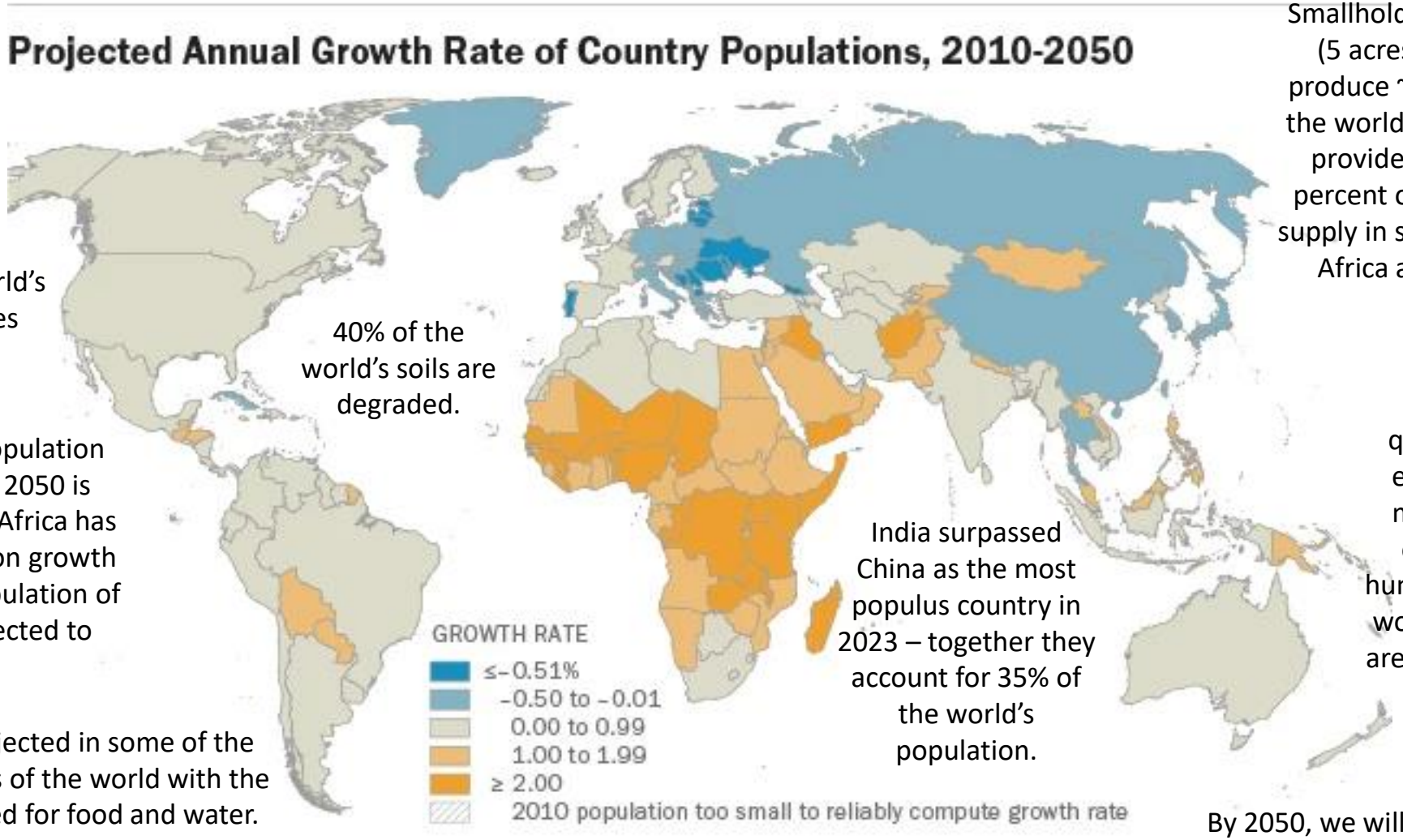


One third of all food produced for human consumption is wasted.

By 2050, nearly 70% of the world's population will be in the cities compared to 55% today.

More than half of global population growth between now and 2050 is expected to occur in Africa. Africa has the highest rate of population growth among major areas. The population of sub-Saharan Africa is projected to double by 2050.

Growth projected in some of the poorest parts of the world with the greatest need for food and water.



40% of the world's soils are degraded.

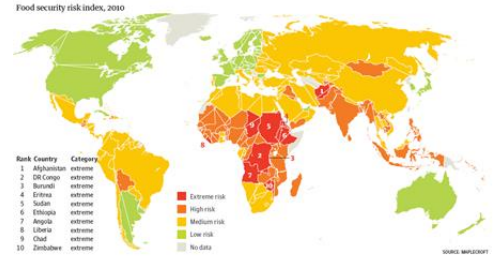
India surpassed China as the most populus country in 2023 – together they account for 35% of the world's population.

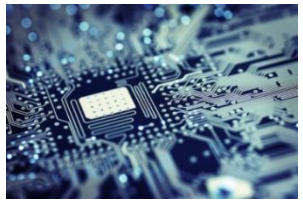
Smallholder farmers (5 acres or less) produce ~30-35% of the world's food and provide up to 80 percent of the food supply in sub-Saharan Africa and Asia.

About three quarters of the estimated 828 million people experiencing hunger around the world live in rural areas — and many of them are farmers.

By 2050, we will need to produce 60-70% more food to feed a world population of 9.3 billion.

Global Sustainability





Global System
Climate, Resources, Energy, Ecosystem

Low-Carbon Society

Human Security

Global warming

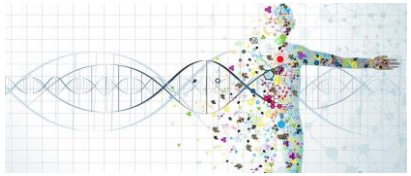
Poverty, Natural disasters, Infectious diseases

Complex problems

Social System
Politics, Economy, Industry, Technology

Mass production, consumption, destruction

Human System
Security,, Lifestyle, Values and Norms, Health



Sustainable Production and Consumption

2 ZERO HUNGER

ZERO HUNGER: WHY IT MATTERS

What's the goal here?

To end hunger, achieve food security and improved nutrition and promote sustainable agriculture

Why?

Extreme hunger and malnutrition remains a barrier to sustainable development and creates a trap from which people cannot easily escape. Hunger and malnutrition mean less productive individuals, who are more prone to disease and thus often unable to earn more and improve their livelihoods. There are nearly 800 million people who suffer from hunger worldwide, the vast majority in developing countries.

A profound change of the global food and agriculture system is needed to nourish today's 795 million hungry + the additional 2 billion increase in global population expected by 2050

SUSTAINABLE DEVELOPMENT GOALS

6 CLEAN WATER AND SANITATION

CLEAN WATER AND SANITATION: WHY IT MATTERS

What's the goal here?

To ensure access to safe water sources and sanitation for all.

Why?

Access to water, sanitation and hygiene is a human right, yet billions are still faced with daily challenges accessing even the most basic of services.

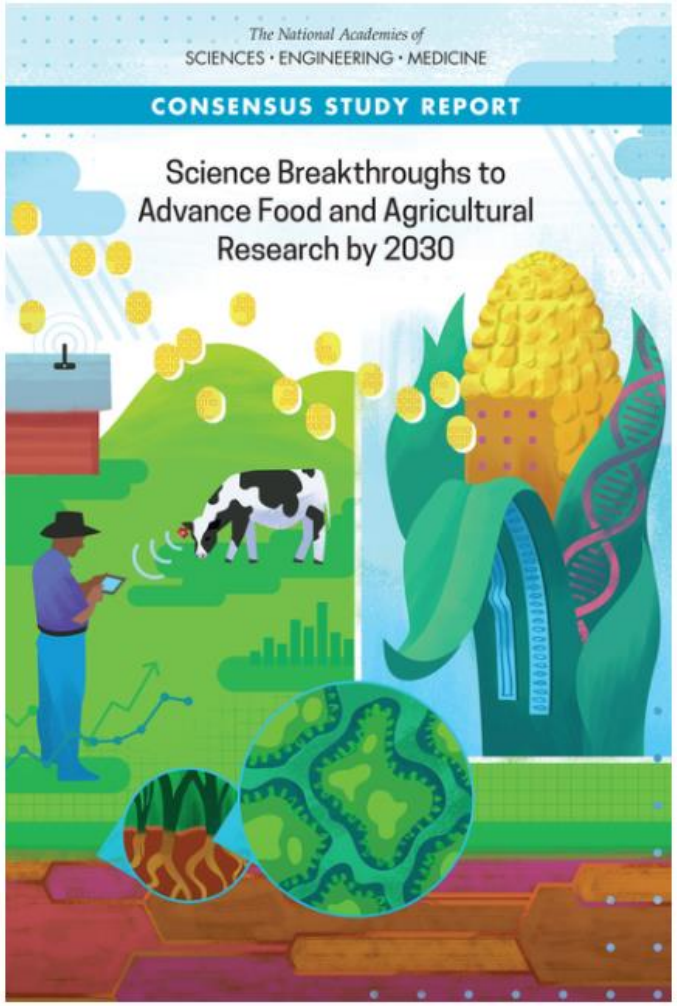
Around 1.8 billion people globally use a source of drinking water that is fecally contaminated. Some 2.4 billion people lack access to basic sanitation services, such as toilets or latrines. Water scarcity affects more than 40 per cent of the global population and is projected to rise. More than 80 per cent of wastewater resulting from human activities is discharged into rivers or sea without any treatment, leading to pollution.

3 in 10 people lack access to safely managed drinking water services

Contents

Science Breakthroughs to Advance Food and Agricultural Research by 2030

A Consensus Study Report of the National Academies of Sciences, Engineering and Medicine
2019



https://www.nap.edu/read/25059/chapter/1

'For nearly a century, scientific advances have fueled progress in U.S. agriculture.'

'U.S. farmers and producers are at the front lines and will need more tools to manage the pressures they face.'

Research Challenges

- Increasing nutrient use efficiency in crop production systems
- Reducing soil loss and degradation
- Mobilizing genetic diversity for crop improvement
- Optimizing water use in agriculture
- Improving food animal genetics
- Developing precision livestock systems
- Early and rapid detection and prevention of plant and animal diseases
- Early and rapid detection of foodborne pathogens
- Reducing food loss and waste through the supply chain

www.usda.gov/sites/default/files/documents/usda-science-research-strategy.pdf

USDA's Science & Research Strategy Aims to Boldly Transform U.S. Agriculture

USDA's five science priorities are:

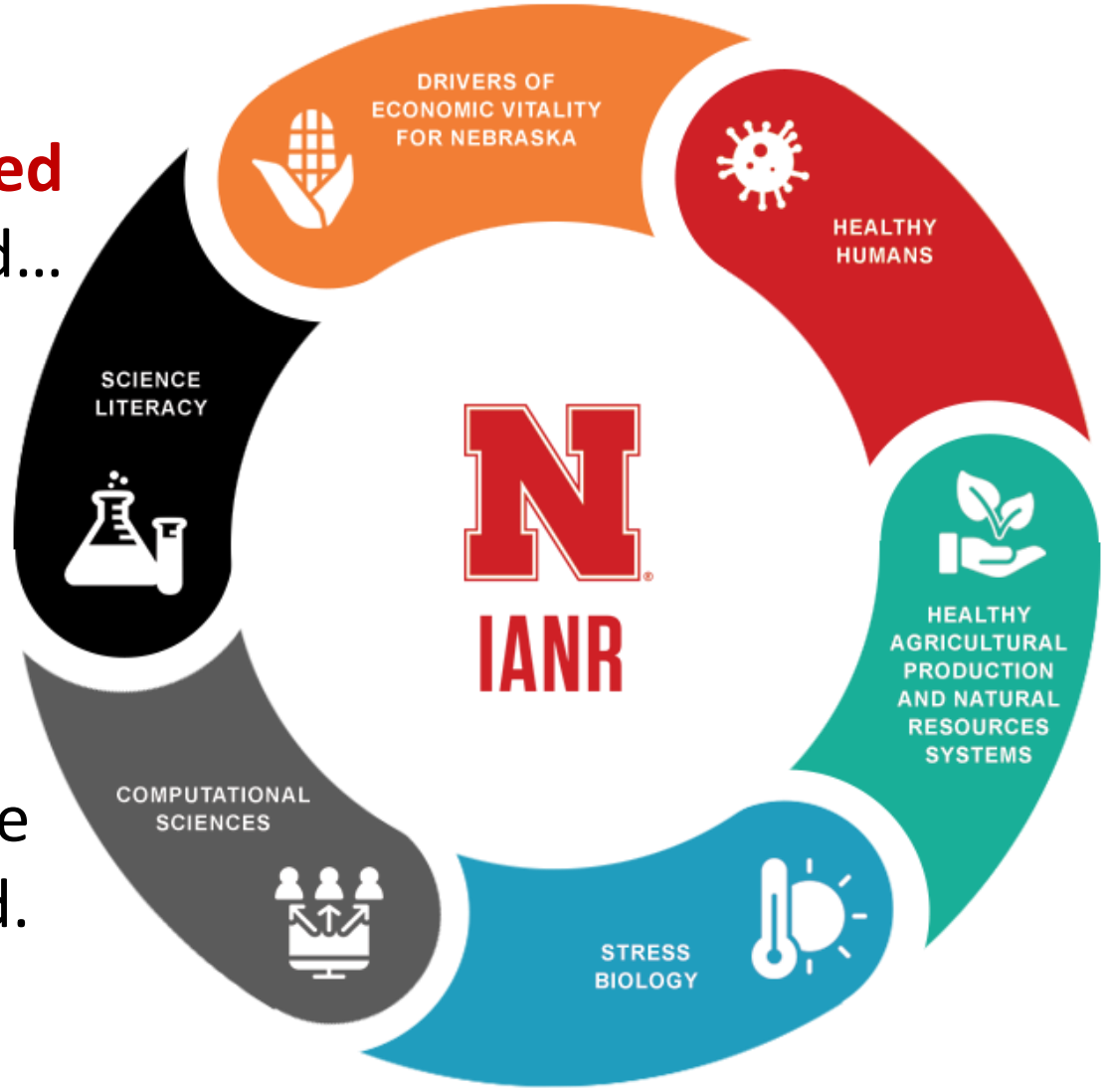
- Accelerating Innovative Technologies & Practices
- Driving Climate-Smart Solutions
- Bolstering Nutrition Security & Health
- Cultivating Resilient Ecosystems
- Translating Research into Action

UNL's Institute of Agriculture and Natural Resources strives to…

… innovate ways to provide **food, fuel, feed and fiber** for a growing world…

… in a way that enhances the **resilience** of our natural and working agricultural landscapes…

…and ensures a **high quality of life** for those in Nebraska and beyond.



Agriculture and Natural Resources in Nebraska

- The 3rd largest Ag economy in the U.S.

46K
farms and ranches

92%
of state's total land area

4,600ft
elevation change from east to west

80,000
miles of rivers and streams

#1
In U.S. for great northern beans, irrigated acres, popcorn – and red meat production.

One in four jobs in Nebraska is related to agriculture.

$6.8B
In annual agricultural exports – corn, beef, soybeans, feed and fodders, processed grain products.

Nebraska ranks #2 in ethanol, light red kidney and pinto beans, Proso millet, bison, and cattle on feed.

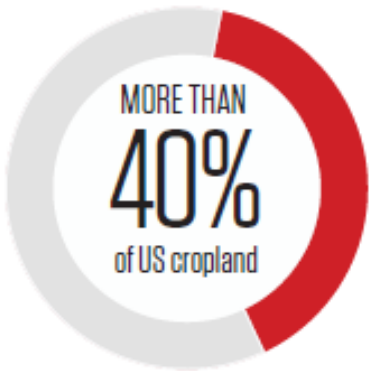
$81.8B
Total output of Nebraska's Agricultural Production Complex
(~34% of state's total business receipts)

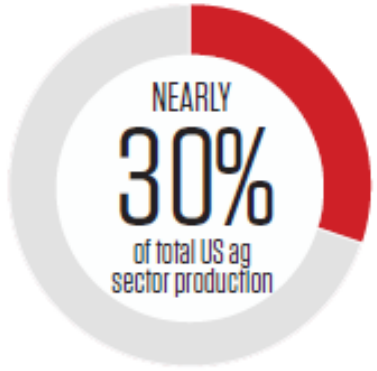
MIDWEST AG: AN ECONOMIC POWERHOUSE

Agriculture plays a tremendous role in the Midwest Region of the United States, particularly in the seven states of Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. The seven-state region accounted for more than 30% of the nation's $487 billion in agricultural production output in 2021 and is home to 411,000 farms and ranches.

80%
of the land in these states is in
AGRICULTURAL PRODUCTION

Although the region accounts for little over 14% of the nation's landmass, it contains:



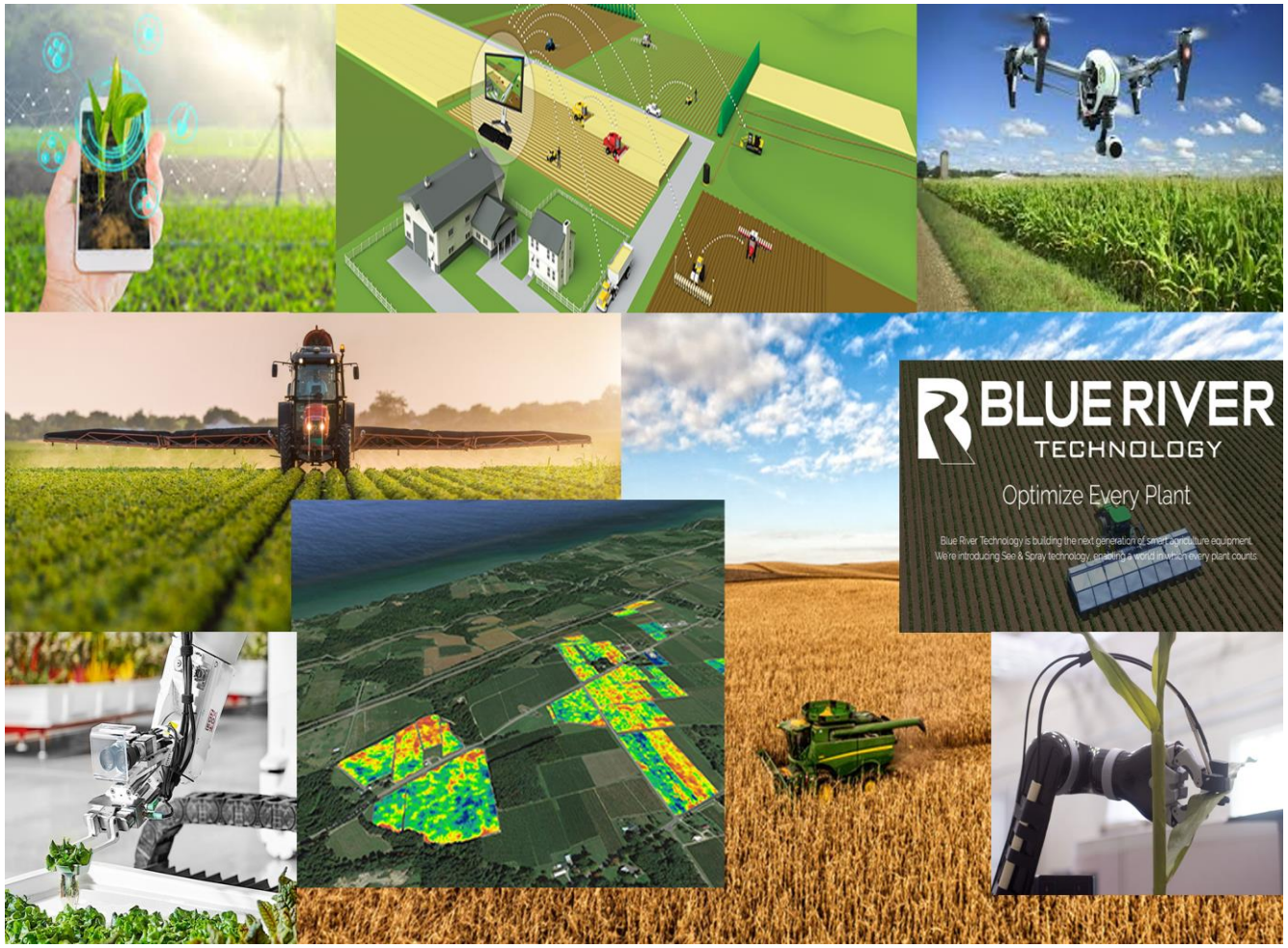


The region's agricultural production: More than **54%** of US corn production. More than **44%** of US wheat production. Nearly **50%** of US soybean production. Nearly **40%** of US cattle production. Nearly **60%** of US hog production.

USDA Economic Research Service (ERS) and USDA National Agricultural Statistics Service (NASS) |

Agriculture is changing rapidly…

In 1900 – ~40% of Americans engaged in Agriculture.



In 2000 – ~2% of Americans engaged in Agriculture.

And Nebraska is leading the way…

‘Agricultural resilience isn’t just about the ability of farms and ranches to cope–it is about their ability to transform.’ – Craig Allen, Director | UNL Center for Resilience in Agricultural Working Landscapes

Why Resilience, Why Now

In a world of rapidly changing landscapes and human and animal populations, there is an urgent need for local and global solutions to the growing list of challenges facing societies. **Agricultural production**, for example, **must increase by more than 70% by 2050** to meet the world’s demand for food, fuel and fiber.

Meeting this goal will require an effort arguably more advanced than any other in human history. Agricultural productivity must dramatically increase, and **it must do so while contending with complex and interacting drivers of global change, including extreme weather, soil degradation and biological invasions.**

The continued success of **modern agriculture is wholly dependent on the natural resources available to sustain it** (soil health, water quality/quantity, pest and disease control). **Continued intensification, left unchecked, will eventually exceed the resource thresholds provided by the landscape**. These critical ‘tipping points’ often signify a **point of no return**. The importance of Nebraska’s agricultural systems demands an understanding of its response to stress and where these tipping points lie.

In its most basic form, **building resilience in agricultural systems is about maintaining agricultural productivity throughout the inevitable uncertainties that exist.** Agricultural resilience ensures that management actions do not push the surrounding landscape beyond its limit.

USDA Agricultural Research Service
U.S. DEPARTMENT OF AGRICULTURE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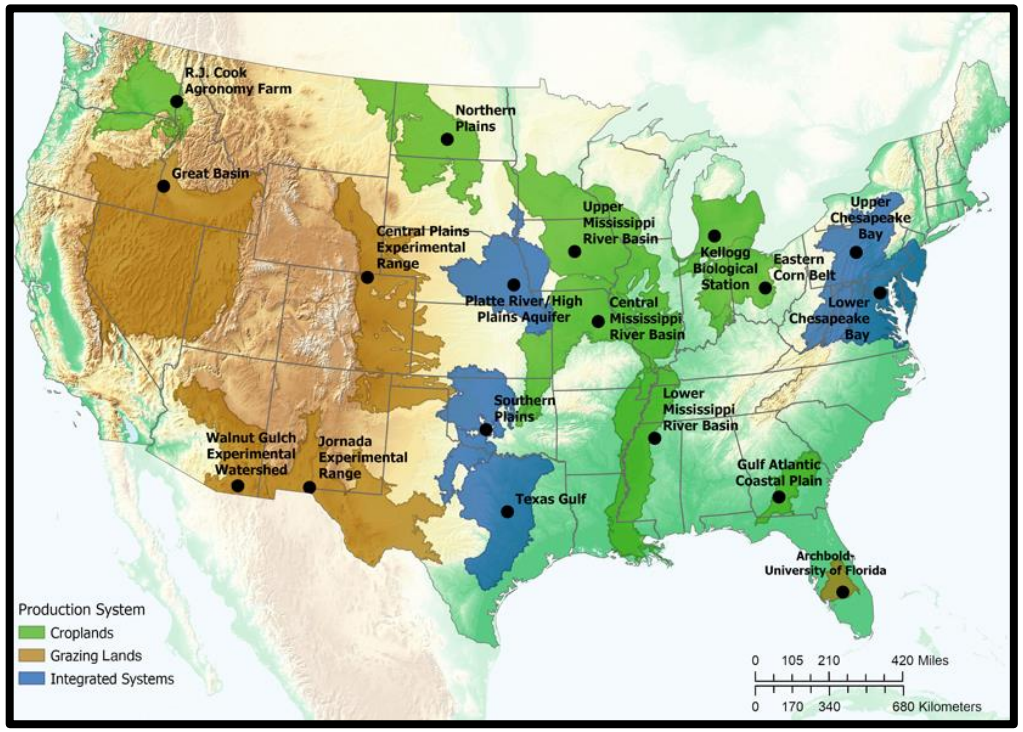
Rob Mitchell, Agronomist


Bryan Woodbury, Ag Engin.



INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES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Troy Gilmore, Hydrology


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Gwendwr Meredith, Social-Ecological Rangeland Science


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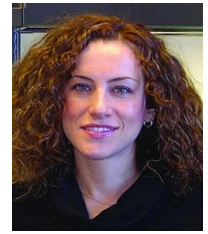
Konstantinos Giannakas, Agricultural Economics


Karina Schoengold, Agricultural Economics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Mark Schroeder, Operations Manager, ENREEC


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PrHpa ltar
Platte River-High Plains Aquifer
Long-Term Agroecosystem Research

Cover: *A prescribed fire in western Nebraska, USA, conducted to reduce Eastern red cedar invasion into the landscape. Eastern red cedar management needs to occur at multiple spatial scales as the effects of invasion, and difficulty in controlling the invasion, scales up as the Eastern red cedar invasion into grasslands progresses. Photograph: Craig Allen.*

JOURNAL ARTICLE

Multiscale adaptive management of social–ecological systems

Ahjond Garmestani ✉, Craig R Allen, David G Angeler, Lance Gunderson, J B Ruhl

BioScience, Volume 73, Issue 11, November 2023, Pages 800–807,
https://doi.org/10.1093/biosci/biad096

December 12, 2023

Lincoln, Neb. —Nebraska figures large in the latest issue of *BioScience*, with the cover showing Nebraska grasslands on fire and the related story cowritten by Craig Allen, natural resources professor at Nebraska.

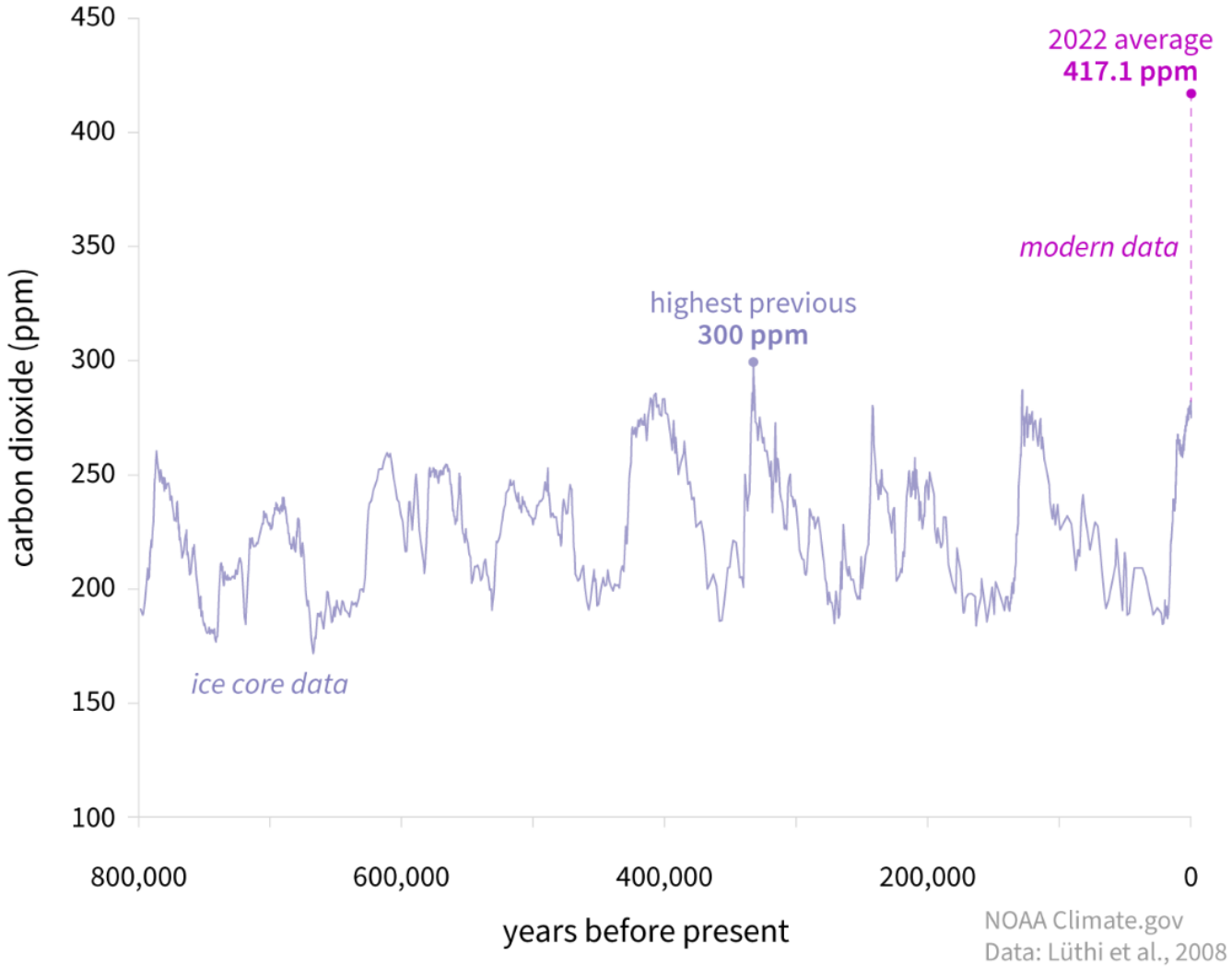
The article, "Multi-scale adaptive management of socio-ecological systems," explains how land managers can adaptively manage complex ecosystems. In adaptive management, people learn as they go.

"People can undergo their normal management or tweaks on their normal management on their properties, while putting in a framework so they can learn over time," Allen said. "The beauty of it is that you're learning by doing it, and you don't wait for experimental results. You can continue with management alternatives while undergoing your normal operations. You learn as you go and adapt with what works instead of waiting for something to fail and then adapt."

In the article, the five authors give examples of how people have used adaptive management to tackle the spread of redcedars in grasslands and of common reed in the Platte River.

Climate.gov
SCIENCE & INFORMATION FOR A CLIMATE-SMART NATION

Atmospheric carbon dioxide (CO_2) in parts per million (ppm) for the past 800,000 years based on ice-core data (light purple line) compared to 2022 concentration (bright purple dot). The peaks and valleys in the line show ice ages (low CO_2) and warmer interglacials (higher CO_2). Throughout that time, CO_2 was never higher than 300 ppm (light purple dot, between 300,000 and 400,000 years ago). The increase over the last 60 years is 100 times faster than previous natural increases. In fact, on the geologic time scale, the increase from the end of the last ice age to the present (dashed purple line) looks virtually instantaneous.



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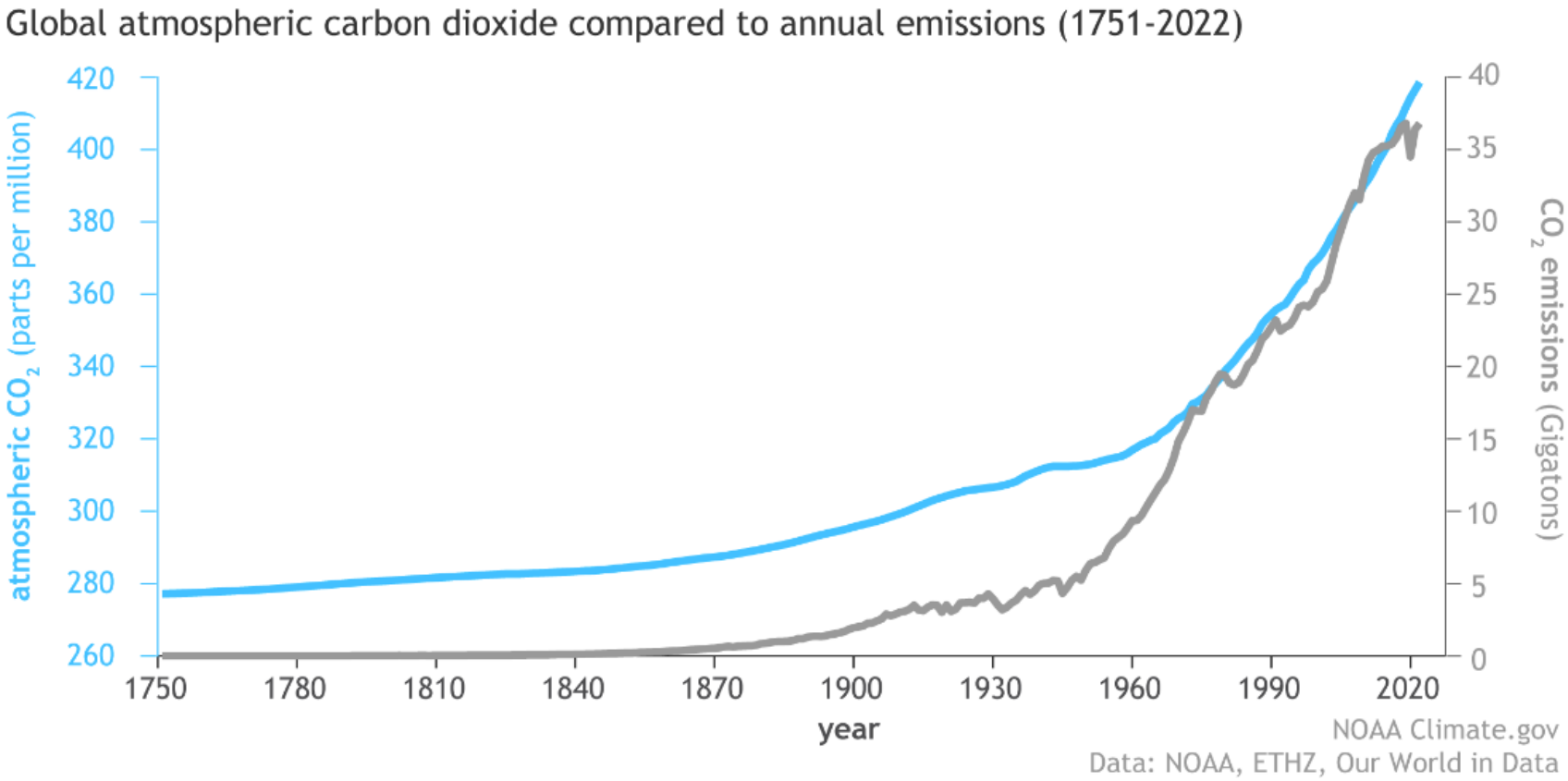
The amount of **carbon dioxide in the atmosphere** (blue line) has increased along with **human emissions** (gray line) since the start of the Industrial Revolution in 1750. Emissions rose slowly to about 5 gigatons—one gigaton is a billion metric tons—per year in the mid-20th century before skyrocketing to more than 35 billion tons per year by the end of the century.



~50-60M Buffalo in early 1800's

~1k Buffalo and 60M cattle in the US in 1890

~90M cattle and buffalo in US today

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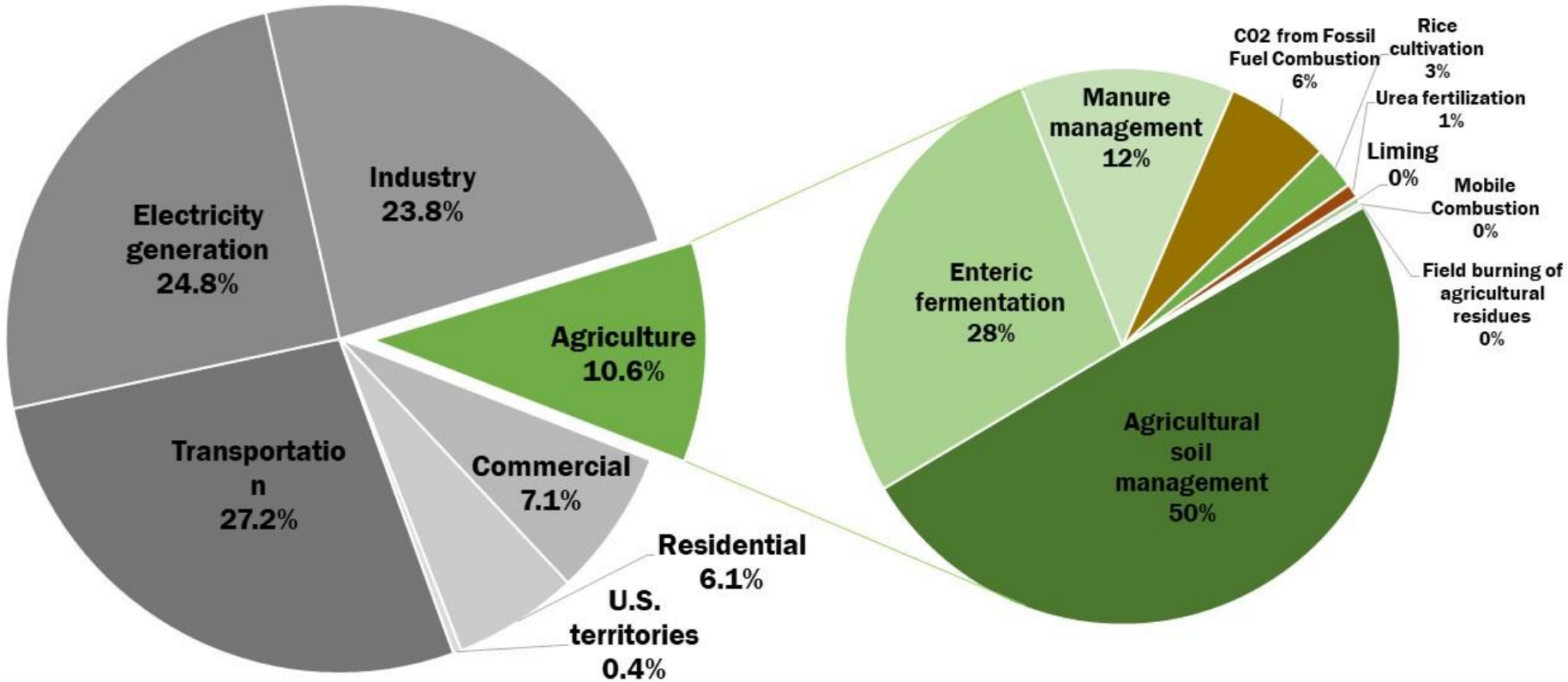
U.S. and Agricultural Emissions By Source, 2020

Agriculture continues to be just 10% of U.S. Greenhouse Gas Emissions



AMERICAN FARM BUREAU FEDERATION®

www.fb.org

Source: Environmental Protection Agency, Farm Bureau Calculations

What Is Regenerative Agriculture?

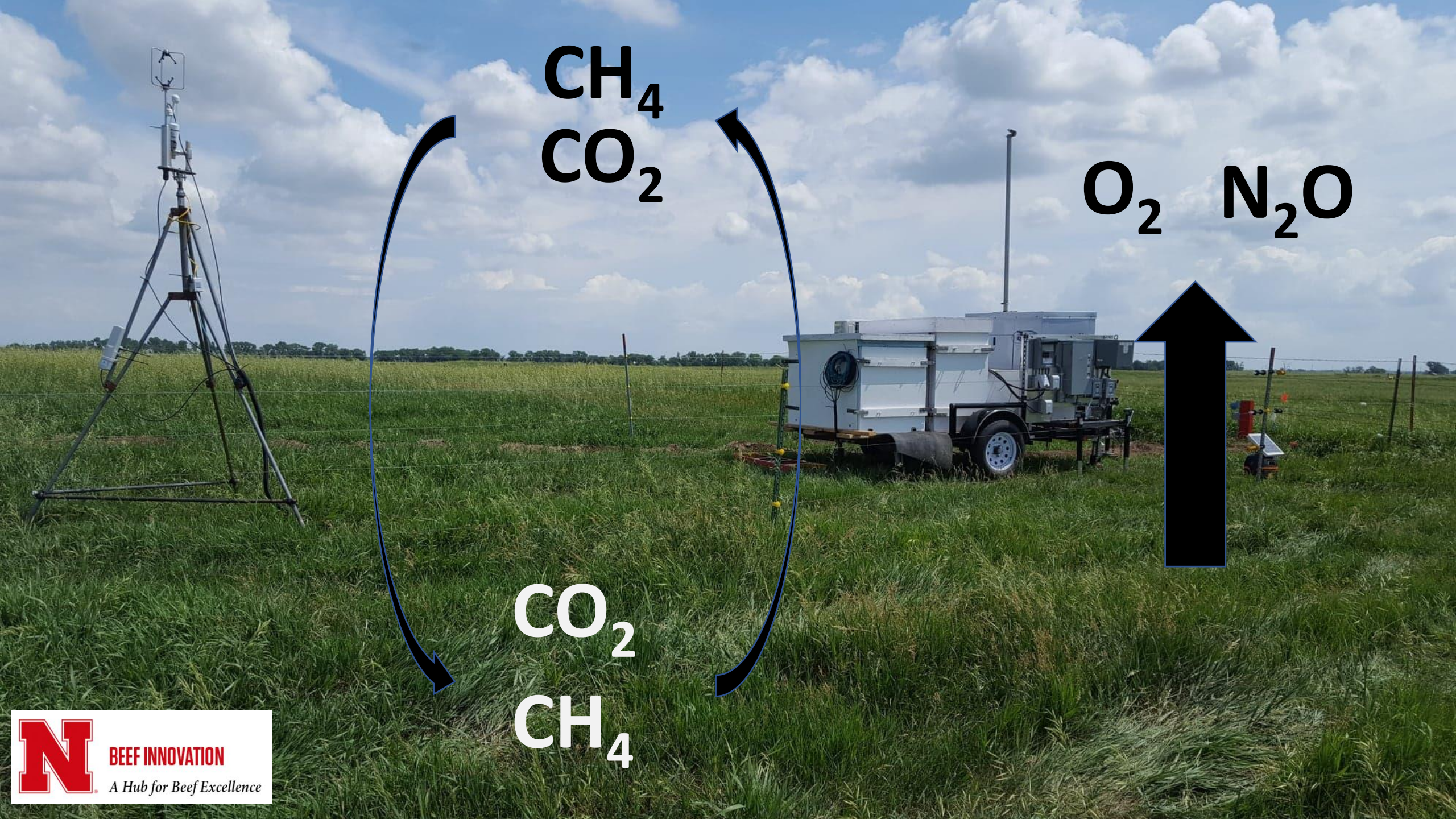
*'As **a philosophy and approach to land management**, regenerative agriculture asks us to think about how **all aspects of agriculture are connected** through a web—a network of entities who **grow, enhance, exchange, distribute, and consume goods and services—instead of a linear supply chain**.*

*It's about **farming and ranching in a style that nourishes people and the earth**, with specific **practices varying** from grower to grower and from region to region. There's **no strict rule book or definition**, but **the holistic principles behind the dynamic system of regenerative agriculture are meant to restore soil and ecosystem health, address inequity, and leave our land, waters, and climate in better shape for future generations.'***

*'Regenerative agriculture is **an outcome-based food production system that nurtures and restores soil health, protects the climate and water resources and biodiversity, and enhances farms' productivity and profitability**. It comprises **a range of techniques**, supported by **innovative technologies**, which can **combat the challenges cause by climate change by restoring the health of soil and protecting the land's ecosystem**.*

*Regenerative agriculture is **an evolution of conventional agriculture, reducing the use of water and other inputs, and preventing land degradation and deforestation**. It **protects and improves soil, biodiversity, climate resilience and water resources while making farming more productive and profitable**.'*

Syngenta Group



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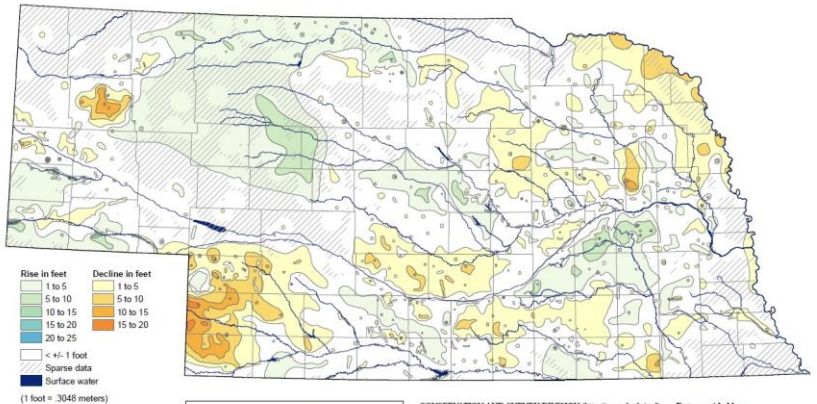
Groundwater-Level Changes in Nebraska - Spring 2012 to Spring 2022



For an explanation of information presented on this map, see the 2022 Nebraska Statewide Groundwater-Level Monitoring Report, available for download at go.unl.edu/groundwater

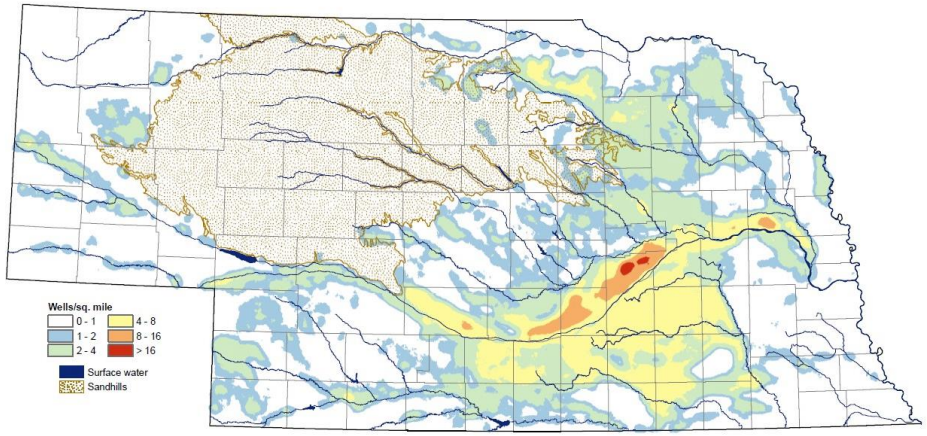
CONSERVATION AND SURVEY DIVISION (http://snr.unl.edu/csd)
School of Natural Resources (http://snr.unl.edu)
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln

Aaron Young, Survey Geologist, CSD
Mark Burbach, Water Levels Program Supervisor, CSD

Data provided by:
Nebraska Natural Resources Districts
Central Nebraska Public Power and Irrigation District
U.S. Geological Survey Nebraska Water Science Center
U.S. Bureau of Reclamation Kansas-Nebraska Area Office
Conservation and Survey Division, University of Nebraska - Lincoln

February 2023

Density of Active Registered Irrigation Wells -December 2022



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Data source:
Nebraska Department of Natural Resources

Nebraska Statewide Groundwater-Level Monitoring Report

2022

Aaron R. Young, Mark E. Burbach, Susan Olafsen Lackey, R.M. Joeckel and Jeffrey P. Westrop

Conservation and Survey Division
School of Natural Resources

130 YRS
CSD
1893-2023

Nebraska Water Survey Paper Number 91

Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln

UNIVERSITY *of* NEBRASKA–LINCOLN

Institute of Agriculture and Natural Resources

NEBRASKA ON-FARM RESEARCH NETWORK

Best Management Practices for Reducing Nitrogen Leaching

1. Soil analysis to accurately account for N available in the soil at planting, this includes quantifying nitrogen from all sources in the soil: 1) releases from soil organic matter; 2) releases by decomposition of crop residue and cover crops; 3) applications of organic waste (manure, biosolids, biochar, compost, etc.); and 4) carry over from previous fertilizer applications.

2. Irrigation water analysis and accurate crediting N available in water applications.

3. Account for credits of previous crop based on scientifically proven data (example: legume credit).

4. Timely application of N to crop when needed thereby reducing the potential for N leaching by large rainfall events, or intense irrigation events.
    a. With greater weather extremes, timing application to crop needs reduces potential for N to go unused in the event of a crop disasters/defoliation due to hailstorms, severe drought, etc.

5. Accurately quantifying water stored in the root zone before irrigation begins.

6. Timing water application to meet crop water demand, and not exceeding the water holding capacity of the soil in the crop root zone, thereby minimizing leaching into the vadose zone.

7. Site-specific, variable rate, precision application of N to avoid overapplication in lower yielding areas of the field.

8. Site-specific irrigation water application in each field to avoid overapplication in lower yielding areas of the field.

9. Precise placement of N so it is only to the plant, either to the foliage or in the root zone, and tracking the root zone as it increases during the growing season.

10. Managing each form of nitrogen fertilizer applied to ensure timing of plant available N matches timing of plant uptake.

11. Eliminating, or significantly reducing, preplant applications of N.

12. Follow the basics of the 4R's of nitrogen: Right rate, Right time, Right source, Right placement.

UNL CORN NITROGEN RECOMMENDATION DIGITAL TOOL

Laura Thompson

WRAP Meeting | Lincoln | December 13, 2023

UNIVERSITY of NEBRASKA–LINCOLN

NEBRASKA EXTENSION
DIGITAL AGRICULTURE

SENTINEL FERTIGATION

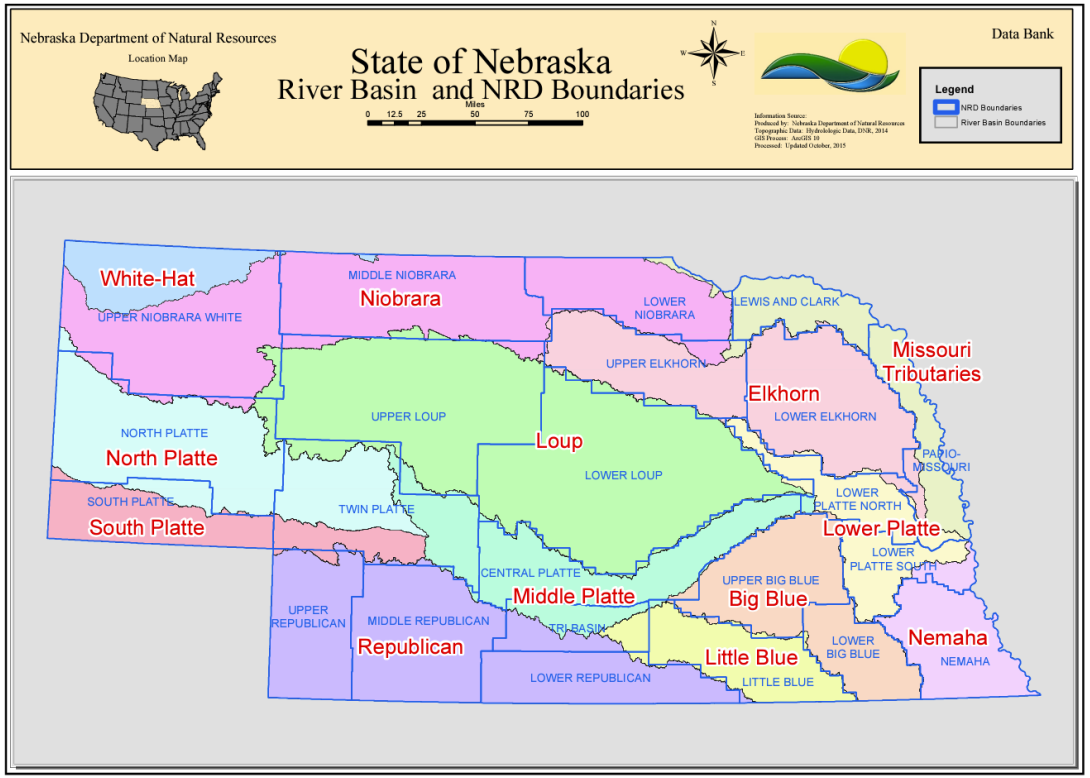
AGRONOMIC INTELLIGENCE FOR OPTIMAL NUTRIENT MANAGEMENT

WRAP Meeting – December 13, 2023

Nebraska's Natural Resources Districts

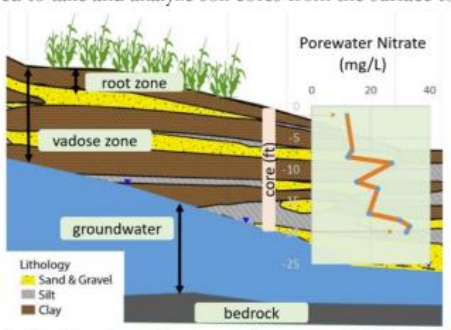
www.nrdnet.org

Protecting Lives • Protecting Property • Protecting the Future



Vadose studies snapshot

The vadose zone is the interval between the crop root zone and the water table, and is a critically important region for storage, transport and transformation of chemicals that can impact groundwater quality. Standard methods are used to take and analyze soil cores from the surface to groundwater.

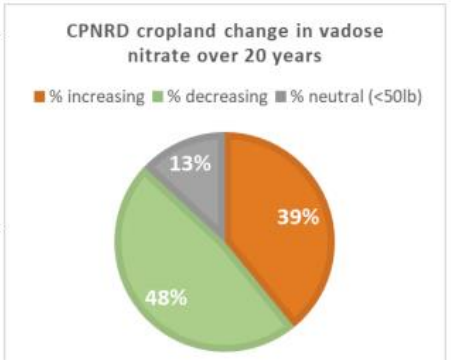


Left: Model vadose with core results overlayed. Middle: Deep soil drilling rig. Right: Soil cores.

CPNRD Results

Change over 20 years (~2016 vs 1996), 23 sites

Average: 1437 lb N/ac (-7%)		
% fields increasing nitrate	% decreasing	% neutral (<50lb)
39%	48%	13%
Average increase	Ave decrease	
492 lbs N/ac	-878 lbs N/ac	
per year		
25 lb N/ac yr	-44 lb N/ac yr	



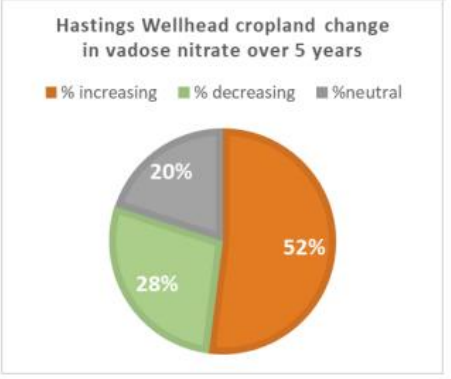
Hastings Wellhead Results

Change in cropland sites over 5 years (2016 vs 2011), 25 sites

Key results: Study link

- Irrigated fields have more vadose N than non-irrigated
- Gravity irrigation has more vadose N than pivot
- Significant ammonia is also stored in vadose

Average: 528 lb N/ac (+42%)		
Increasing: 52%	Decreasing: 28%	Neutral: 20%
Average increase	Average decrease	
347 lbs N/ac	-120 lbs N/ac	
per year		
69 lb N/ac yr	-24 lb N/ac yr	



Upcoming: Bazile, Lower Platte South

For more information: Dan Snow, UNL Water Sciences Lab

dsnow1@unl.edu | nebraskavadose.unl.edu

WRAP

NRD Programs

Russ Callan – Lower Loup NRD
Annette Sudbeck – Lewis and Clark NRD
Lyndon Vogt – Central Platte NRD

Programs That Work

- All programs can assist with N management and decrease vadose zone loading while increasing profitability – dependent on management.
  - No Fall Fertilizer – promotes in-season N application
  - Sensor based nutrient management – current adoption rate is low
  - In season application of nitrogen – limits on pre-plant nitrogen
  - Mesonet system – crop irrigation requirements - Crop Watch

Programs That Could Work - Programs That Aren't Working

- Education – Not everyone sees nitrate as a problem – hard to fix if not identified as a problem.
  - EPA drinking water standard has established level for concern.
  - Health concerns could be a driver for change.
- Accounting for residual N in soil and water – works if accounted for.
- Crop consulting – no certification standards
- Irrigation efficiency – over application of water.
  - Example: >17" irrigation applied in areas with 8" irrigation requirement.

Programs That Need To Be Adopted

- Statewide Fall fertilizer ban – except fall planted crops
- Sensor based nutrient management – current adoption rate low
- In season application of nitrogen – limits on pre-plant nitrogen
- Mesonet system – crop irrigation requirements - Crop Watch
- Utilize UNL N calculator at a minimum - realistic yield goals
- Irrigation water management
- Livestock waste (nutrient) management

Strategies to reduce vadose loading and that increase profitability – why are/aren't they adopted?

Examples of IANR research related to resilient and regenerative beef systems:

- **General efficiency increases.** Wide-ranging IANR work over the decades has contributed to such advances, on topics including feed efficiency, breeding specifics and bovine health.
- **Proper cattle grazing techniques/grassland health.** Leaving adequate native grasses helps long-term rangeland sustainability as root strength is encouraged and biodiversity promoted. IANR, home to the Center for Grassland Studies, does major work about enhancing legume establishment and persistence.
- **Nitrogen retention.** IANR scientists do extensive research on nitrogen retention through forage legumes and through altered nitrogen cycling in dung and urine excretions.
- **Feed efficiency.** A key focus of study is the development of low-protein feed for cattle in the effort to reduce methane emissions.
- **Nitrification inhibitors.** This is among the cattle-related topics that Nebraska on-farm research addresses extensively, involving chemicals added to manure or soil to slow down the conversation of ammonia to nitrate.
- **Genetic solutions.** IANR scientists are leaders in exploring genetic options to achieve greater feed efficiency. Genetic markers offer the opportunity to identify cattle that are more efficient in converting nitrogen from feed into meat and milk, helping to reduce ammonia emissions.

The U.S. cattle sector has made **notable environmental progress** in recent decades, and with a wide array of promising new research underway and building momentum.

Research by universities such as UNL and outreach by Extension have helped the industry achieve these advances and is leading the way to continued improvements. The Beef Quality Assurance initiative, to which IANR research contributes, illustrates the industry's work to move forward strategically on this front.

- **Production efficiency has resulted in fewer cattle but more meat.** Compared to the 1970s, the U.S. cattle sector now has 15% fewer cattle but produces 20% more meat.
- **U.S. beef production is, in fact, the most efficient system in the world.** We have about 9% of global cattle numbers yet produce approximately 22% of the world's beef supply.
- **These greater efficiencies have enabled the U.S. cattle sector's greenhouse gas intensity to decrease over the decades.** Since 1961, the industry has more than doubled its volume of meat produced, yet total direct greenhouse gas emissions from U.S. livestock have fallen by 11.3%, according to the FAO.
- **Livestock agriculture's program on water productivity** is significant. Since 1960, the unit of livestock product (beef, pork, chicken meat, turkey meat, milk, and eggs) per unit of water (water productivity) has increased, from 1.8 times for beef to 5.1 times for milk.

DWFI to lead new $19 million USAID Feed the Future Innovation Lab

OCTOBER 26, 2023

Lincoln, Nebraska, U.S.A. — The U.S. Agency for International Development (USAID) has selected the Daugherty Water for Food Global Institute (DWFI) at the University of Nebraska to lead its new Feed the Future Innovation Lab for Irrigation and Mechanization Systems (ILIMS). The award was announced at the World Food Prize Borlaug Dialogue event in Des Moines, Iowa by Dina Esposito, the Assistant to the Administrator for the Bureau for Resilience, Environment, and Food Security (REFS) at USAID.

"Feed the Future Innovation Labs are driving novel solutions to the increasingly complex challenges we face today," said Dina Esposito, Feed the Future Deputy Coordinator and USAID's Assistant to the Administrator for Resilience, Environment, and Food Security. "Advancing this research is key to equipping small-scale farmers with the tools they need to boost yields, use resources more efficiently and be more resilient to shocks."

The Innovation Lab will generate research-based evidence to support the growth of vibrant irrigation and mechanization markets, develop strong institutions and local capacity for their sustainability, and foster opportunities for equitable access in Feed the Future focal countries. The $19 million core fund is provided over a five-year term with a potential extension to an overall ceiling of $40 million.

Despite the development of many technologies, irrigation and use of agricultural equipment remains extremely low in most low- and middle-income countries. This is especially true for smallholder producers, including women, youth, and other marginalized groups. To address this, the Innovation Lab will conduct research to catalyze increased irrigated and mechanized

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Tags

IRRIGATION | GLOBAL | FOOD PRODUCTION | SUB-SAHARAN AFRICA

Innovation Lab For Irrigation And Mechanization Systems

The Feed the Future Innovation Lab for Irrigation and Mechanization Systems (ILIMS) is one of more than 20 Feed the Future Innovation Labs. These labs leverage U.S. university research to advance agricultural science and reduce poverty.

Learn more

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Nebraska Innovation Campus

USDA ARS Agricultural Research Service

120 years of partnership advancing agriculture and natural resources stewardship

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES

USDA Agricultural Research Service

The USDA-ARS National Center for Resilient and Regenerative Precision Agriculture

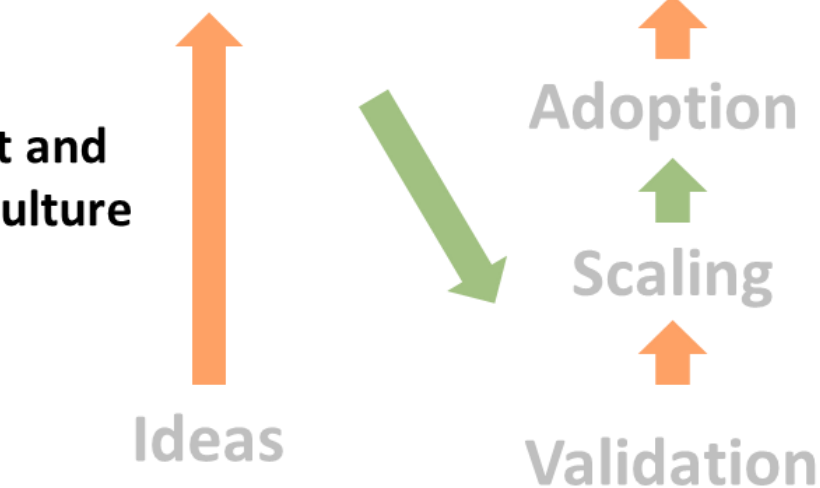
Water, Climate and Resilience, resulting in improved irrigation systems and water resource management and acceleration of development of climate-smart cropping system and nutrient management for animal protein production.

Precision Crop Production, which would compliment UNL world-class research development in plant sciences for new crop varieties ideal for production in Nebraska climatic zone, reduction of inputs such as nitrogen, phosphorous, and water for efficient production, and development of sustainable aviation fuel, biodiesel, and advanced biomaterials.

Precision Livestock Management, which would build on Nebraska's world-class research in animal protein production, including beef, dairy, swine and poultry, and develop new opportunities for plant nutrient production ideal for conversion to animal protein, reduction of enteric methane production and waste management for energy and fertilizer development for enhance nutrient management.

National Center for Resilient and Regenerative Precision Agriculture

(NCR2PA)



U.S. & International
5 / 50 / 500 / 5,000 acres or animals

Testbeds & Proving Grounds

- Nebraska SmartFarms
- Center for Plant Science Innovation
- Feed Yard Innovation Center
- Ranch of the Future
- Center for Ag Profitability
- Food Innovation Center
- Nebraska Food for Health Center
- Nebraska Center for the Prevention of Obesity Diseases
- Greenhouse Innovation Center
- Global Yield Gap Atlas
- USDA Long-term Agroecosystem Research (LTAR) Network
- USDA ARS USMARC

USDA ARS National Center for Resilient and Regenerative Precision Agriculture

- **USDA ARS National Center for Resilient and Regenerative Precision Agriculture on Nebraska Innovation Campus (NIC) announced and in $11M in Congressionally appropriated funding secured - December 2021.**
- $20M allocated for construction in 2022, and $25M is included in recently passed Ag/FDA/DoD Senate minibus appropriations bill. $3M in House Appropriations Ag Bill. Congress to appropriate funds over the next four years (FY25-FY28).
- **Total project cost - $140M - plus $20M for increased staffing.**
- Construction of first phase of the project – a state-of-the-art plant growth facility in 2024.
- The National Center will **double the number of USDA ARS researchers in Lincoln** to **150** and will house **four USDA ARS research units** – including two new teams focused on **regenerative and precision production systems** and another on **water and climate resilience**. These are high wage, high skill, and high demand jobs.


VIEW FROM SALT CREEK ROADWAY
Nebraska Ag-Tech Innovation Accelerator

Local news tips? Call the City Desk at (402) 473-7306

LOCAL

SUNDAY, NOVEMBER 26, 2023 | journalstar.com | SECTION B

Work to start on USDA facility in '24

Lab expected to double agency's science, support staff at UNL

CHRIS DUNKER
Lincoln Journal Star

As Nebraska Innovation Campus has grown out of the former State Fairgrounds, bringing with it state-of-the-art classrooms, startup companies spun out of research labs and new places to hang or grab a bite to eat, one piece has remained missing.

The University of Nebraska-Lincoln's research park, which opened in 2015, has been without a U.S. Department of Agriculture research laboratory that was once envisioned as a cornerstone of the public-private partnership in the heart of the campus.

Locating an Agricultural Research Service facility in Lincoln is no longer an elusive goal, however.

Beginning next year, construction will begin on the National Center for Resilient and Regenerative Precision Agriculture, a $160 million USDA laboratory expected to double the federal agency's science and support staff presence at UNL.

The first phase of construction, slated to start sometime in mid-2024, will build 15,000 square feet of new greenhouses and 10,000 square feet of headhouse space that connects with the existing Greenhouse Innovation Center.

In the future, a 120,000-square-foot lab and office building standing four stories above Salt Creek Roadway will be a hub for research into precision crop production, precision livestock management, water and climate resiliency, as well as innovations into digital agriculture.

"It's exciting to see the investment of the USDA in Nebraska, creating a national platform that is focused, really, on the future of agriculture innovation," said Mike

Please see **FACILITY**, Page B2

HDR COURTESY PHOTO

The National Center for Resilient and Regenerative Precision Agriculture will research ways to improve water and climate resiliency, precision crop and animal production, and digital agriculture at Nebraska Innovation Campus.

Nebraska Ag-Tech Innovation Accelerator

DESIGNED TO ACCELERATE THE DEVELOPMENT OF AG-TECH SOLUTIONS THAT ENHANCE THE PROFITABILITY OF NEBRASKA'S FARMERS, RANCHERS, AND PROCESSORS.

PART IDEA LABORATORY, PART MAKER SPACE, AND ALL AG-TECH, THIS PLATFORM OFFERS ENTREPRENEURS CONCIERGE SERVICES TO RAPIDLY UP-SCALE CONCEPTS INTO VALUE-ADDED COMMERCIAL APPLICATIONS.

NEW HOME OF INVEST NEBRASKA'S COMBINE, GRIT ROAD PARTNERS, NUTECH VENTURES, AND MORE.

CONNECTED TO THE USDA ARS NATIONAL CENTER AND OUTFITTED WITH TECHNOLOGIES THAT AUGMENT THOSE ALREADY AVAILABLE AT THE NIC.

LOCATED TO LEVERAGE TALENT PIPELINES FROM ACROSS UNL TO ADDRESS KEY WORKFORCE NEEDS OF THE FUTURE.

TOTAL PROJECT COST - $50M. $25M APPROPRIATED BY THE UNICAMERAL IN 2022 VIA LB703 TO BE MATCHED BY $25M IN PRIVATE FUNDS.

BROAD SUPPORT FROM NEBRASKA'S AG COMMODITIES, THE NEBRASKA FARM BUREAU, CHAMBERS OF COMMERCE, INDUSTRY PARTNERS, INVEST NEBRASKA, BIO NEBRASKA, AKSARBEN, AND OTHERS.

NEBRASKA
Good Life. Great Roots.
DEPARTMENT OF AGRICULTURE

INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES

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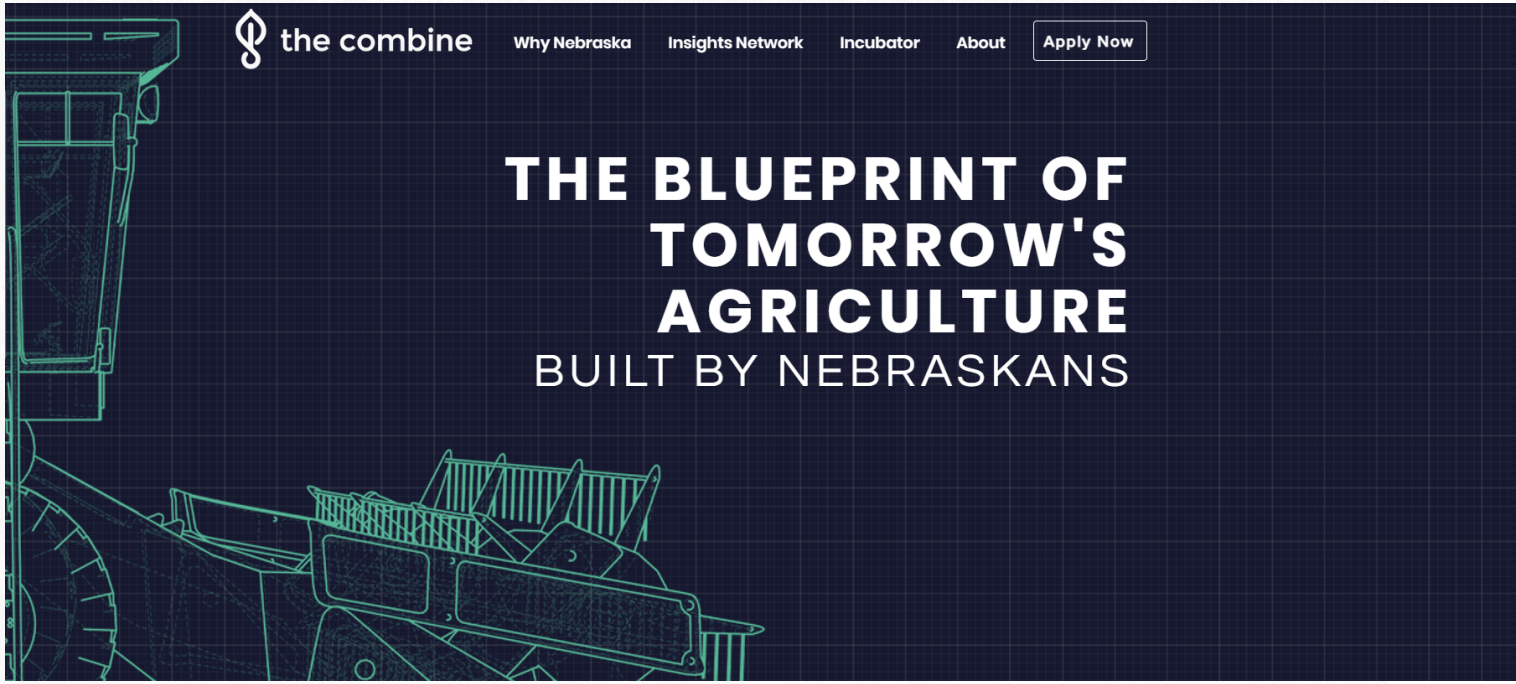

- Supporting technology leaders in our states largest industry
- **BREAKTHROUGHS IN AGRICULTURE** aren't created alone
- Connecting cutting-edge technology with producers across Nebraska

“Everywhere is the center of the world. Everything is sacred.” – Black Elk

‘When I first encountered the Sandhills after moving to Nebraska the better part of a decade ago, I immediately wished that as a kid I had received a postcard from Valentine or Mullen or Callaway or any of the ranch communities I have been privileged to visit and have come to love. It felt like the center of the world, and I wished I would have realized the magic of this region sooner.

As it was, I had just passed the mid-century mark when I first set off for the Sandhills on a frigid December morning. The shift in landscape on that drive was subtle at first starting in a place that reminded me of Ohio and Indiana before the trees became fewer, the center pivots more uniform, and the air more crisp and less humid. And as I crossed the Kingsley Dam, the fog from Lake McConaughy lifting, I realized that I was enveloped by Nebraska’s famous sea of grass, a place unlike anywhere I had ever visited – majestic, mysterious, and incredible, even on a frigid winter day…’

– mike boehm | from the preface of the Nebraska Sandhills