

# **GROWING A HEALTHY FUTURE**

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FOOD • FUEL • WATER • LANDSCAPES • PEOPLE

# Roadmap for Today's Conversation

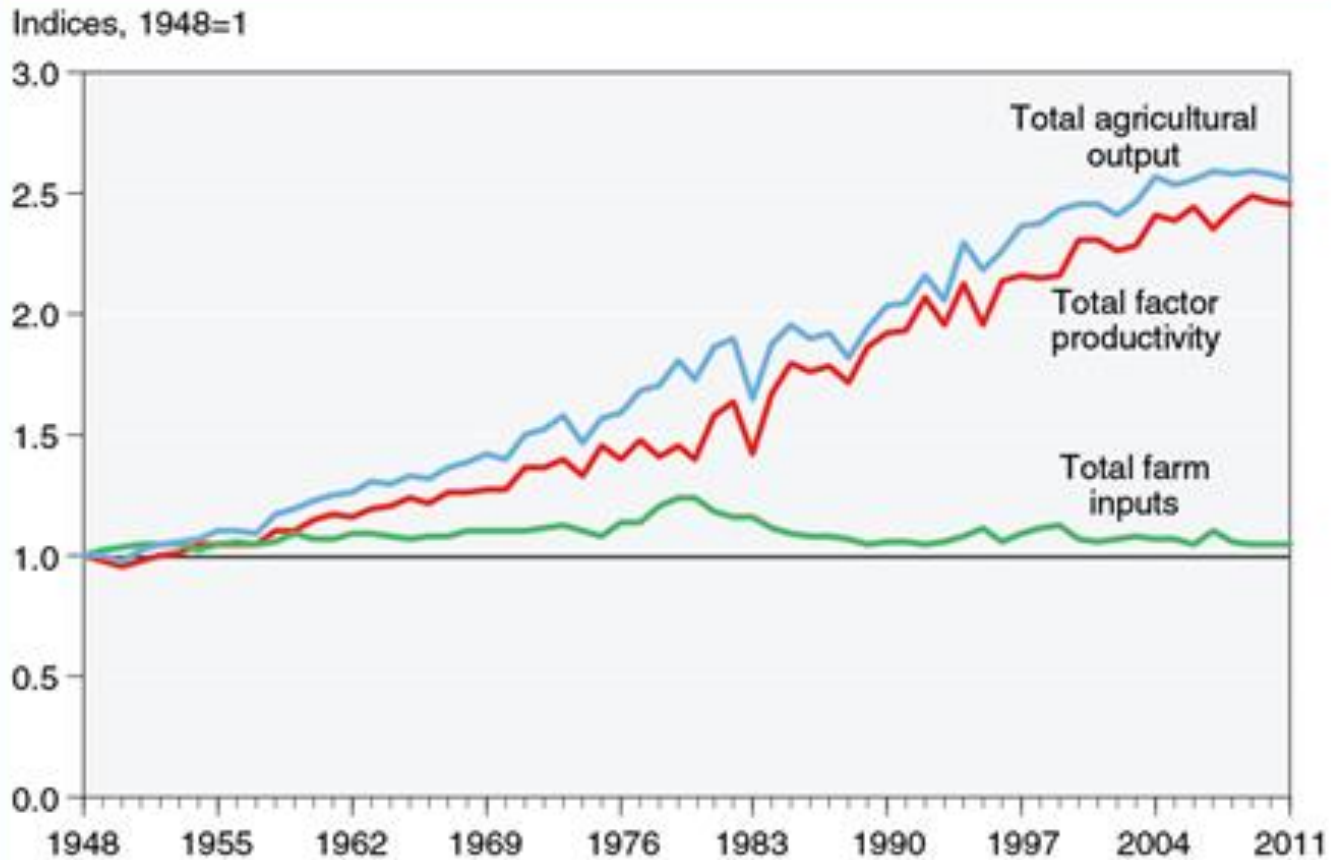


- **21<sup>st</sup> century landscape**
- **Why NU-IANR is leading the way globally**
  - **Growth trajectory**
  - **Focusing on strategic interdisciplinary investments**
  - **Public-private partnerships**
  - **Balancing the funding portfolio**
  - **Local to global**





U.S. agricultural output, inputs, and total factor productivity, 1948-2011



Source: USDA, Economic Research Service, Agricultural Productivity in the U.S. data



## Ag and natural resources at the center



- Growing global population in a closed system
- Recognition of links between local and global food security, health, poverty and social/political stability
- Increased demand per capita for food, water, fiber and energy – tradeoffs loom large; need for disruptive technologies



*Living in 2014,*  
*Thinking in 2050!*



**50 – +2B – 2X – 70 – +3B**

**Key Data**



In **50** years,  
the world **population**  
will require



**100%**  
more **food**,<sup>1</sup> and



**70%**  
of this food must come from  
efficiency-improving **technology**<sup>3</sup>

**Source: Food Economics and Consumer  
Choice (Simmons, 2013)**

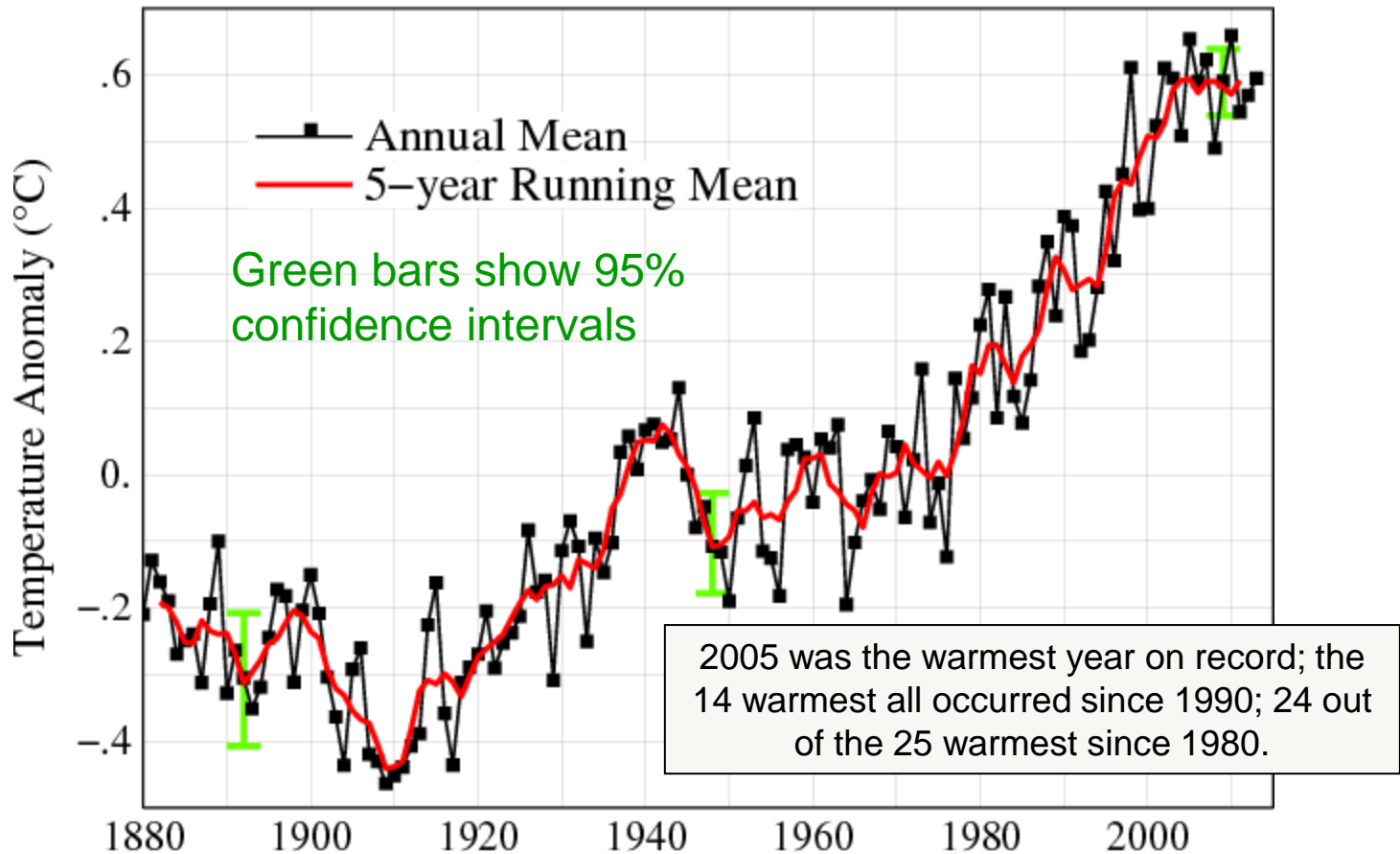
# Competition for limited resources





# Future change is expected . . .

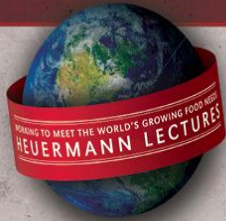
## Global Land-Ocean Temperature Index



<http://data.giss.nasa.gov/gistemp/graphs/>

HEUERMANN LECTURES

Understanding and Assessing Climate Change:  
Implications for Nebraska



Speaker and Moderator DONALD WILHITE,  
Emeritus Director and Professor,  
National Drought Mitigation Center

With panelists ROBERT OGLESBY,  
DEBORAH BATHKE, and  
CLINTON ROWE,  
University of Nebraska-Lincoln Professors

SEPTEMBER 25, 2014 | 3:30 P.M.

NEBRASKA INNOVATION CAMPUS CONFERENCE CENTER,  
2021 TRANSFORMATION DRIVE, LINCOLN, NE



The University of Nebraska-Lincoln is an equal opportunity educator and employer.

LIVE STREAMING  
of each  
lecture at

HEUERMANNLECTURES.UNL.EDU



Understanding and Assessing Climate Change  
Implications for Nebraska



University of Nebraska-Lincoln



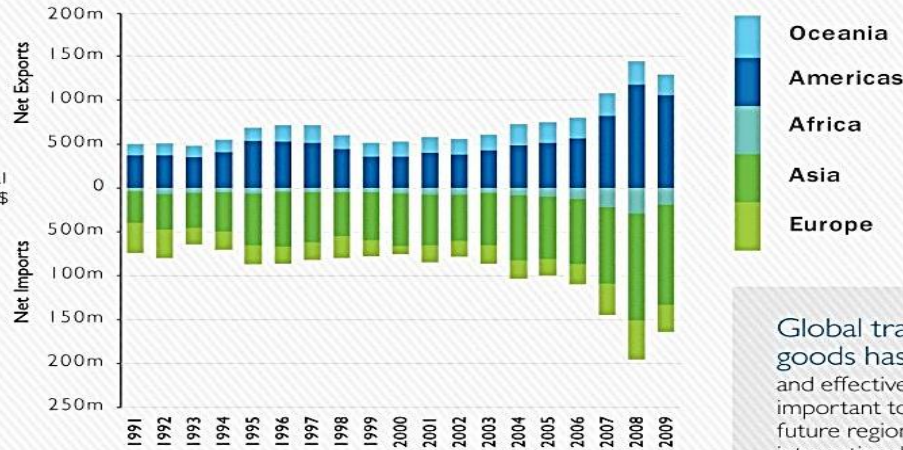


## NET TRADE For Major Regions of the World



© 2012 Global Harvest Initiative

Value of Agricultural Products Traded US\$



Global trade in agricultural goods has steadily increased, and effective trade policies will be important to help sustainably meet future regional demands by facilitating international trade flows.

### NET EXPORTS: AMERICAS

**\$117m**  
1999

**\$267m**  
2009



### NET IMPORTS: ASIA

**\$120m**  
1999

**\$280m**  
2009

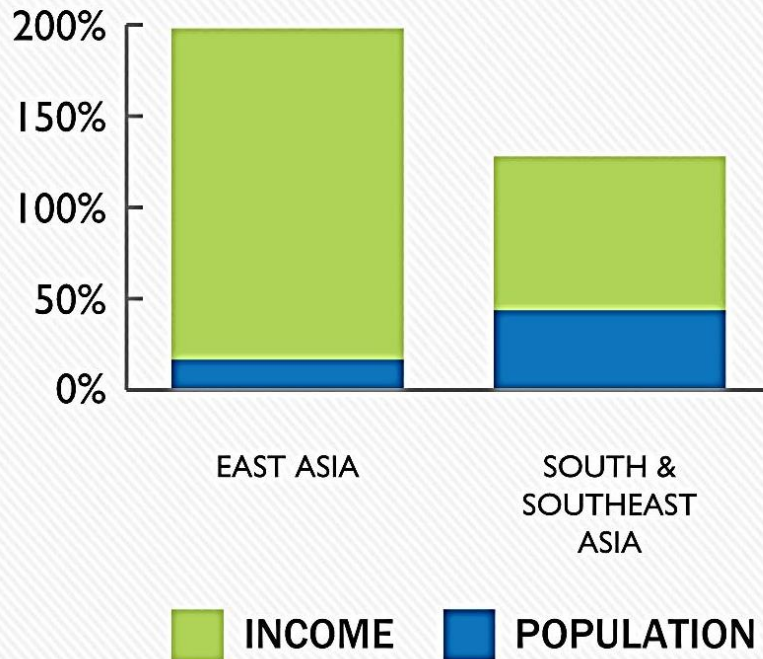


Source: FAOSTAT





## PROJECTED INCREASE IN FOOD DEMAND 2000 - 2030



Most of the projected growth in Asia's total food demand will result from rising incomes.



© 2012 Global Harvest Initiative

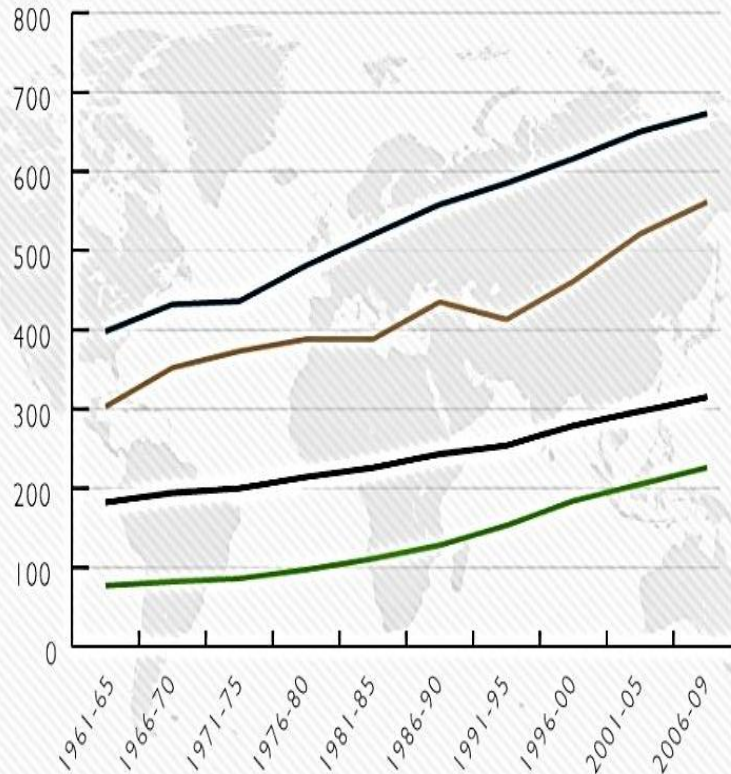


# ANNUAL OUTPUT OF ANIMAL PRODUCTS

Per Head of Livestock



© 2012 Global Harvest Initiative



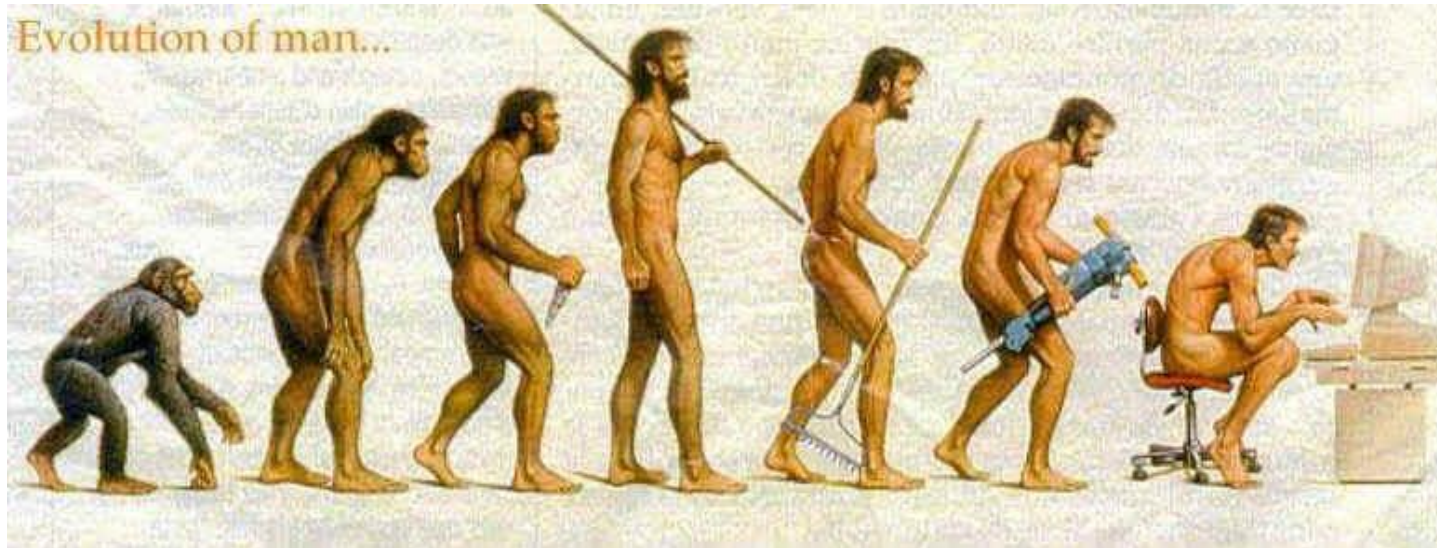
Constant \$ of meat, milk, and egg production per head of "cattle-equivalents" in stock

- DEVELOPED COUNTRIES
- TRANSITION COUNTRIES
- WORLD
- DEVELOPING COUNTRIES

Worldwide demand for animal protein is expected to double over the next 40 years. Productivity increases are necessary to meet future demand.



## We must continue to evolve....



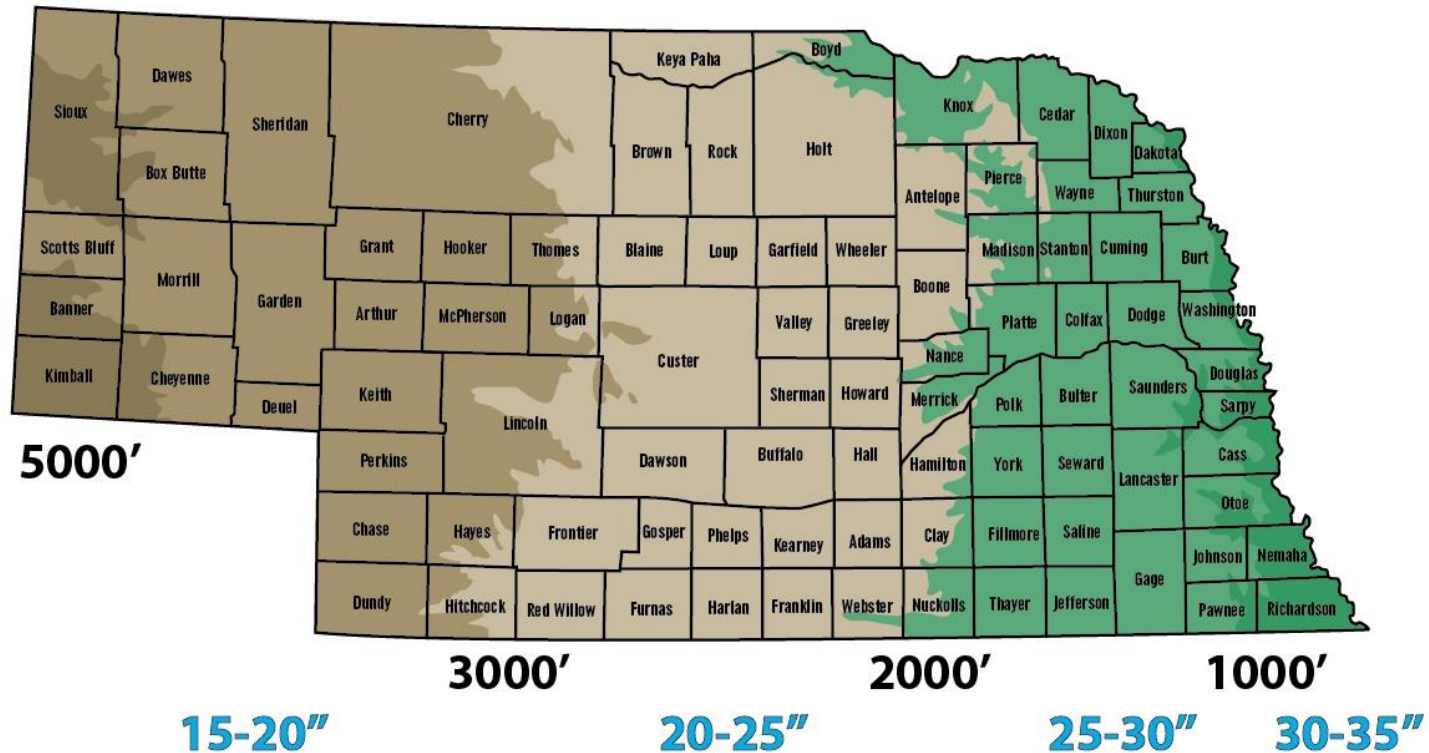
<http://www.naute.com/images/evolutionofman.jpg>



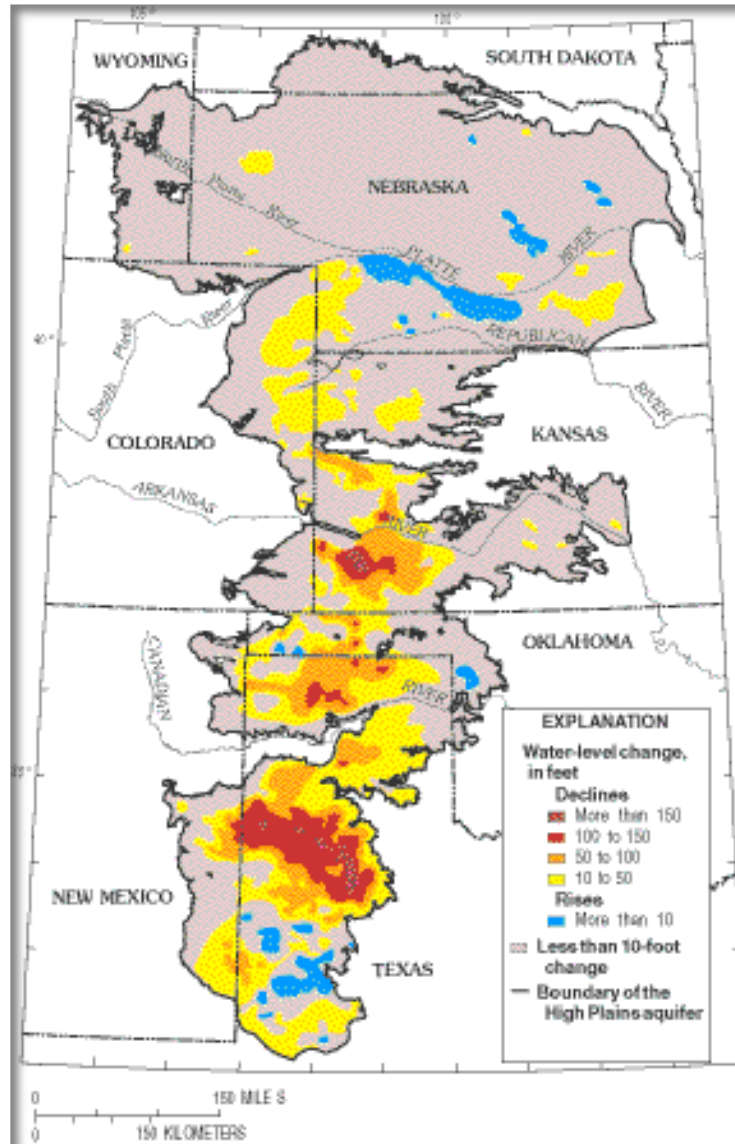


*Living in 2014,*  
*Thinking in 2050!*

# A living laboratory for the world

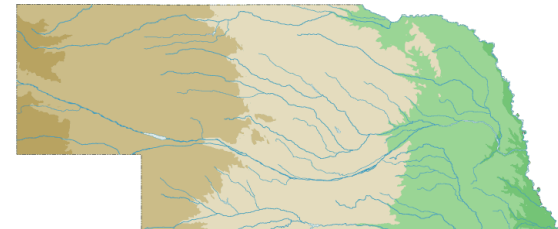




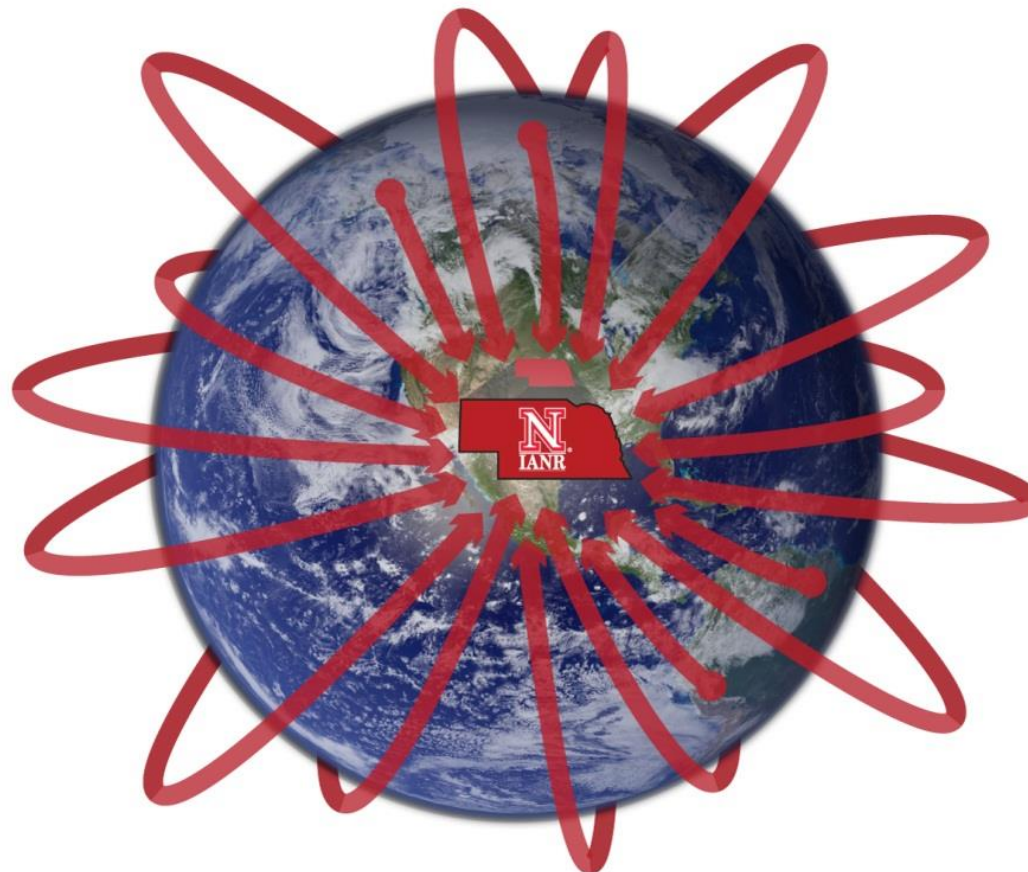


## Nebraska = Ag and Natural Resources

- 49,969 farms and ranches + largest aquifer
- 45.5M acres of farmland, ***largest irrigated state and watershed network***
- 1<sup>st</sup> nationally in commercial red meat production
- 1<sup>st</sup> nationally in cattle on feed
- 1<sup>st</sup> in eggs for food processing
- 2<sup>nd</sup> nationally in ethanol production capacity
- 3<sup>rd</sup> in corn for grain production
- 5<sup>th</sup> in soybean production
- 6<sup>th</sup> in all hogs and pigs
- 7<sup>th</sup> commercial hog slaughter
- 8<sup>th</sup> in all hay production







# **GROWING A HEALTHY FUTURE**

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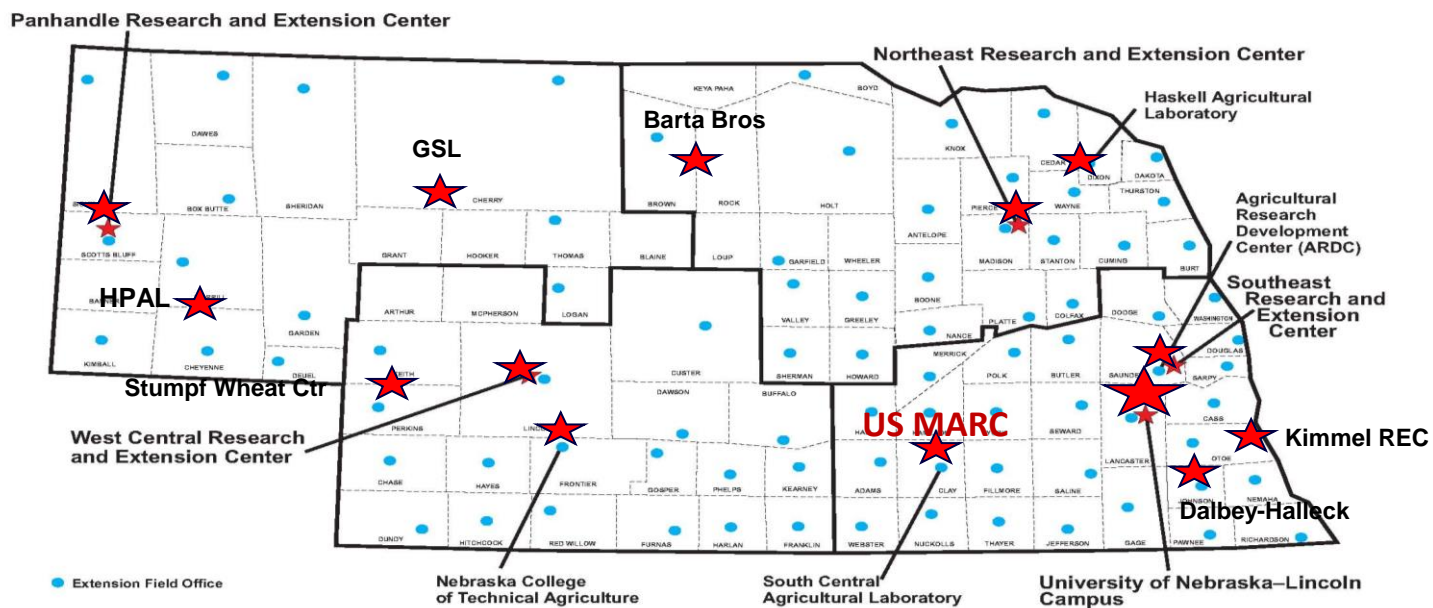
***To be one of the premier leading universities in the world in “feeding the future” . . . through advancing food, energy, natural resource and rural landscape security.***







# Integrated Teaching, Research and Extension





## Goals



- Increase Enrollment to 30,000
- Increase Faculty by ~170
- Increase 6-year graduation rate to 70%
- Increase research expenditures to \$300 M
- Increase national/international recognition of faculty
- Successfully launch Phase I of Nebraska Innovation Campus

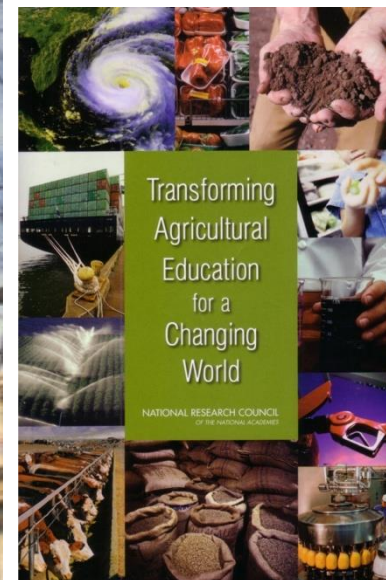
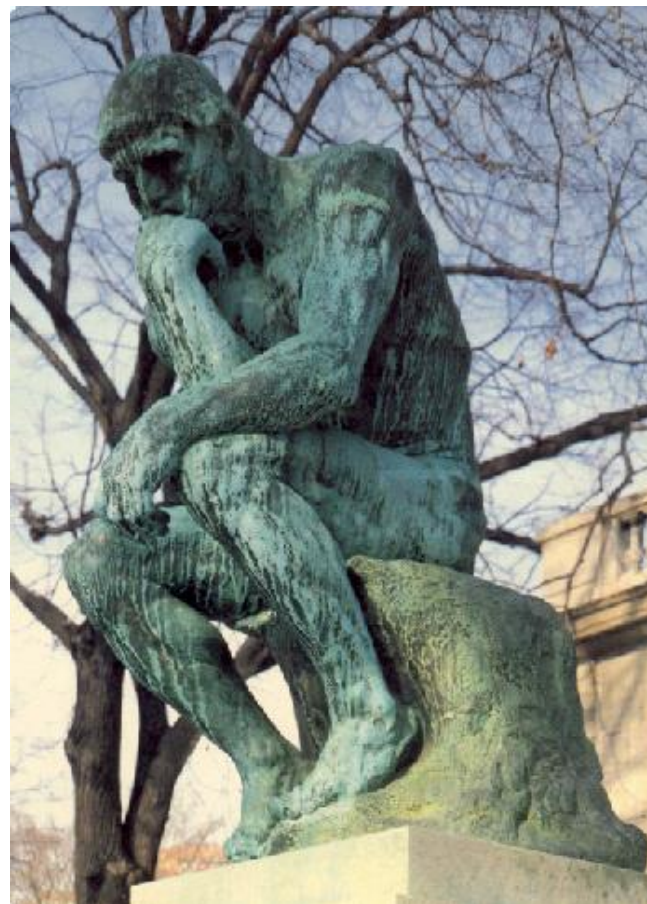




# Leading UNL Goals

- 1) 10<sup>th</sup> consecutive year of enrollment growth in Ag & Nat Res (~3,500 students, 6.6% increase)  
(NCTA up 28%, 384 students).
- 1) FY 2014 exceeded record in 2012 in research expenditures (\$80M).
- 2) 6-year graduation rate of ~78%
- 3) Increasing tenure-track faculty by ~13% (46 FTE) with additional 34 planned in Phase II.
- 4) Leading the population and development of Phase I of Nebraska Innovation Campus
- 5) Grow IANR budget from \$180 to \$300M pa (currently \$220M)

# We must build innovators . . .





# Paul F. Engler Agribusiness Entrepreneurship Program

*This gift is in support  
of students who have  
the entrepreneur's  
“fire in the belly.”*



## The interfaces are as important as the historically primary domains



The challenges we face do not fit neatly into academic departments.

They are complex problems that require multiple areas of expertise and diverse skill sets.





# Faculty Growth Plan



**Since 2012:**

**Total of 67 Faculty Hires**

**New Phase II = 34**

**GRAND TOTAL by 2016 = 101**

**~20% ↑**



# Faculty Growth Plan



**Stress Biology**  
**Healthy Humans**  
**Ag & Food Science Literacy**  
**Computational Sciences**  
**Healthy Agroecosystems**  
**Drivers of Economic Vitality**





The Robert B. Daugherty  
Water for Food Institute



Rural Future Landscape

Center for Food,  
Fuel & Water Policy



Center for Plant Science  
Innovation

Center for Red Meat  
Innovation

Food for  
Health

Gut Function Initiative  
Nebraska Gateway for Nutrigenomics  
Redox Biology Center  
Nebraska Center for Virology

UNIVERSITY OF  
**Nebraska**  
*Number One in Feeding Our Future*

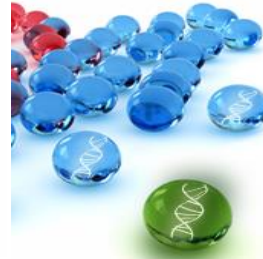
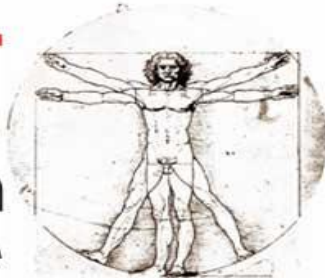




Center for Plant Science Innovation



# GUT function initiative

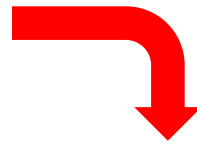


## Translating discovery Into Innovation

### Focus on Fundamental Discovery

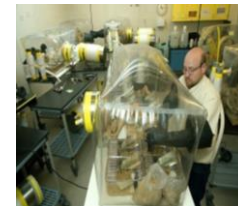
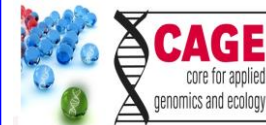
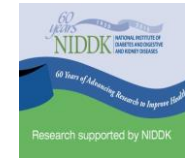
How does the gut ecosystem  
develop and function in individuals?

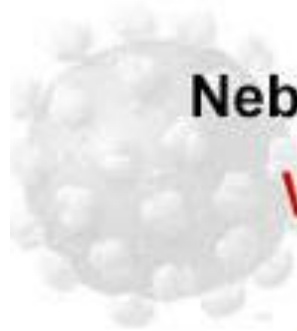
- Host factors
- Microbial factors
- Dietary factors



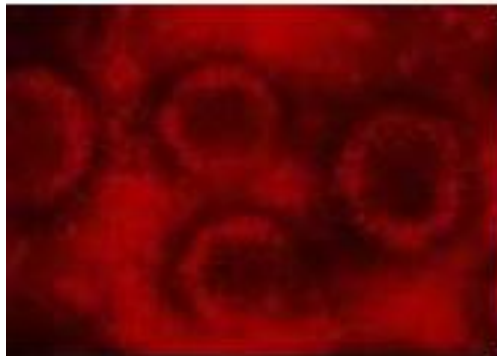
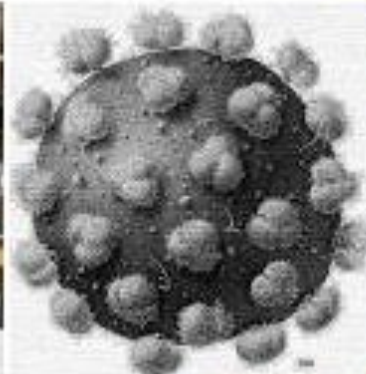
## Translation

- novel anti/pro-microbials
- prebiotics and functional foods
- animal breeding (markers)





Nebraska  
Center for  
**VIROLOGY**





# UNIVERSITY OF Nebraska Rural Futures Institute

Officially launched: September 27, 2012



rural futures



# Water *for* Food

ROBERT B. DAUGHERTY INSTITUTE  
University of Nebraska





# Innovation Campus

Phase 1 Building – 350,000 sq. feet



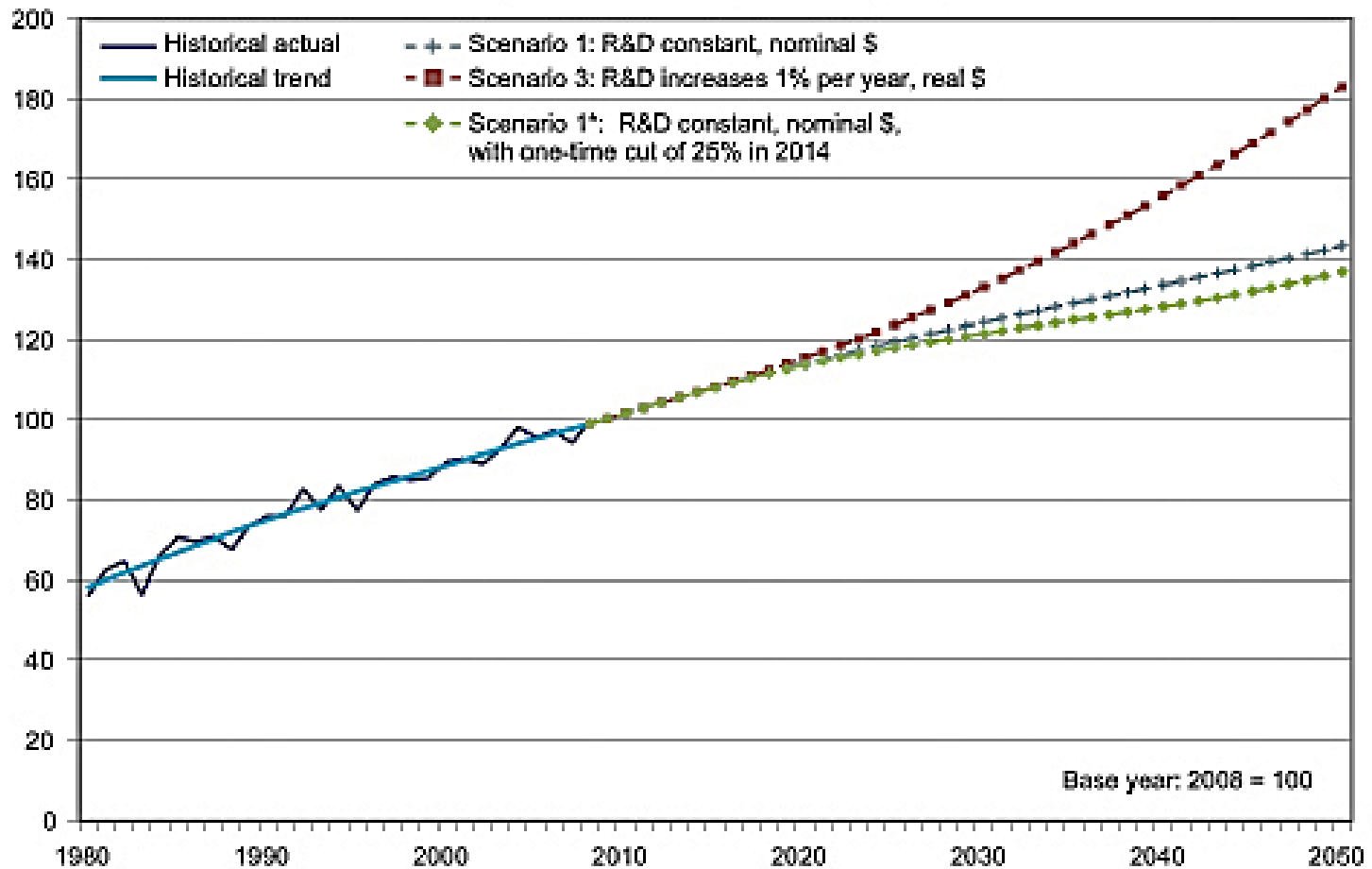
**UNL Dept. of Food Science and Technology!**



**Follow the action through the web cam**  
[www.truelook.com/clients/tetrad-webcam/](http://www.truelook.com/clients/tetrad-webcam/)



### Total factor productivity index projections



Source: Economic Research Service.



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- **PCAST**
- **AGree**
- **Chicago Council on Global Affairs**
- **Council on Competitiveness**
- **SOAR (Supporters of Ag Research)**
- **Foundation for Food and Ag Research**
- **NAAAS**



# Feeding the World

By 2050 we'll need to feed two billion more people. How can we do that without overwhelming the planet?

PHOTOGRAPHS BY GEORGE STEINMETZ

EDITORIAL

## Building agricultural research

**W**hile billion people are expected to inhabit Planet Earth by 2050. Without agricultural research, there is little hope of sustaining this population surge, given that arable land and water supplies are finite commodities. Yet for decades the agricultural sector has suffered from neglect. Few want to combat new strains of pests that destroy crops, find new crop varieties enriched in nutritional value, improve yields, develop resistance to disease and drought, and provide environmentally sensitive cultivation practices, then agricultural research must be a priority. Why isn't it? In the 1970s, as a biology professor at Stanford University, I worked with the Office of Science and Technology Policy in the White House to discover what incentives might encourage the growth of competitive peer-reviewed agricultural research. At the time, other major federal agencies such as the U.S. National Institutes of Health were enjoying booms in competitive research funding. On the other hand, the U.S. Department of Agriculture (USDA) used "formula" funding on a regional or commodity-focused basis, largely through the public land-grant universities. That process yielded key advances, increasing our ability to feed more people: improved fertilizers, artificial irrigation, harvest mechanization, and hybridization. But many researchers believed that advances in basic science would provide new ways to revolutionize agricultural production. We found it hard to understand why a brilliant cell biologist had to seek support from another agency to fund innovative research, rather than make a major contribution to how we grow food through support from USDA. A modest competitive grant program was launched then, but its survival in future budget cycles turned out to be perilous.

What happened? Over the past 35 years, new ventures in U.S. public investment in agriculture research and development confronted a steady decline. At the same time, great advances in biochemistry, cell and molecular biology, and genetics were being made through increased funding to other agencies for competitive merit-based

research grants. Because of the earlier history, agricultural research is now in a deficit position with respect to the infrastructure, human capital, and policies needed to address the challenges of food security.

A real revolution in agricultural research is possible if today's deeper knowledge, new tools, and advanced capacities could be effectively harnessed. Fortunately, in response to a USDA task force (headed by William Dauterib, then the chancellor of Washington University), Congress created the National Institute of Food and Agriculture (NIFA) within USDA in 2006 as a means to modernize the management of fundamental agricultural research. NIFA

now manages \$200 million in competitive merit-based grants for fundamental agricultural research through its Agriculture and Food Research Initiative. That new agency is one of the rare federal research programs to have shown steady increases over the past 3 years, making this a major turnaround in competitive research support.

Despite this success, the current level of funding for USDA falls short of the opportunity presented by the agricultural sciences. Certainly, today's fiscal climate makes it hard to argue for extending discretionary federal spending. That is why nonpartisan science-based groups that have seen the need to bolster research in agriculture and are willing to work for its improvement are important players. One is the recently created organization called Supporters of Agriculture Research (SoAR).

William Dauterib, appropriately, is its chairman. SoAR includes eminent scientists across disciplines as well as representatives of consumer and commodity groups, and I am eager to work with them. High on SoAR's agenda is to increase funding for competitive grants, so that USDA can encourage interdisciplinary and innovative research.

The much-needed revolutions in agriculture can only come about through the investments that we make now. Two billion people will, we hope, reap the benefits of today's wise decisions.

— Donald Kennedy



Donald Kennedy is president emeritus at Stanford University, Stanford, CA, and a former editor-in-chief of Science. E-mail: [dkennedy@stanford.edu](mailto:dkennedy@stanford.edu)



"nonpartisan science-based groups that have seen the need to bolster research in agriculture...are important players."

10.12.12/Science 1203112

## SCIENCE, TECHNOLOGY *and* INNOVATION

Whether it's improving our health or harnessing clean energy, protecting our security or succeeding in the global economy, our future depends on reaffirming America's role as the world's engine of scientific discovery and technological innovation.

— President Barack Obama



- Increase AFRI from \$265 to **\$500 M**
- Increase NSF basic funding for food and ag from \$120 to **\$250 M**
- **\$180 M** in USDA fellowship funding for graduate students and postdocs
- **Create six innovation clusters at \$150 M per year focused on emerging challenges in ag and food**
- Create a permanent scientific advisory committee to advise the USDA Chief Scientist





NEBRASKA ALLIANCE FOR ADVANCED FOOD SANITATION 



Opportunities

**MORE EFFECTIVE AND EFFICIENT SANITATION APPROACHES:**  
Create more environmentally friendly methods, reduce time and cost, improve food safety and food security.

**COOPERATIVE TECHNOLOGY DEVELOPMENT:**  
Extend internal resources of members, explore new technologies and get first look at new discoveries.

**EDUCATION:**  
Dissemination of science critical to industry partners and regulators.

**CONSULTING:**  
Problem solving and evaluation of emerging technologies.

INNOVATION AND ADVANCEMENT IN PRODUCTION SANITATION

A unique opportunity exists for the creation of the Nebraska Alliance for Advanced Food Sanitation. The University of Nebraska- Lincoln and industry partners in the alliance will conceptualize, create, and disseminate improved sanitation approaches and practices. More efficient and effective sanitation will result in a reduction in the quantities of chemicals used in sanitation, savings in time and operational costs resulting in more affordable foods at the consumer level, and consistently safer food products.

The timing for this initiative is opportune to support the mandates for validated preventive controls for food safety hazards that will be promulgated by the U.S. Food and Drug Administration's Food Safety Modernization Act (2011). Alliance activities are envisioned to focus on all manner of food safety concerns including microbial pathogens, allergens, and toxic chemicals; food quality and shelf life; cost and risk benefit assessments; water conservation and reusability; and genetically engineered foods.

General Information:

Ann Willet Pharm D., MBA, Director of Strategic Alliances 402 472 5535 awillet2@unl.edu

Department of Food Science and Technology:

Steve Taylor Ph.D. University of Nebraska-Lincoln 402 472 2833 staylor2@unl.edu

Joe Baumert Ph.D. University of Nebraska-Lincoln 402 472 3070 jbaumert2@unl.edu

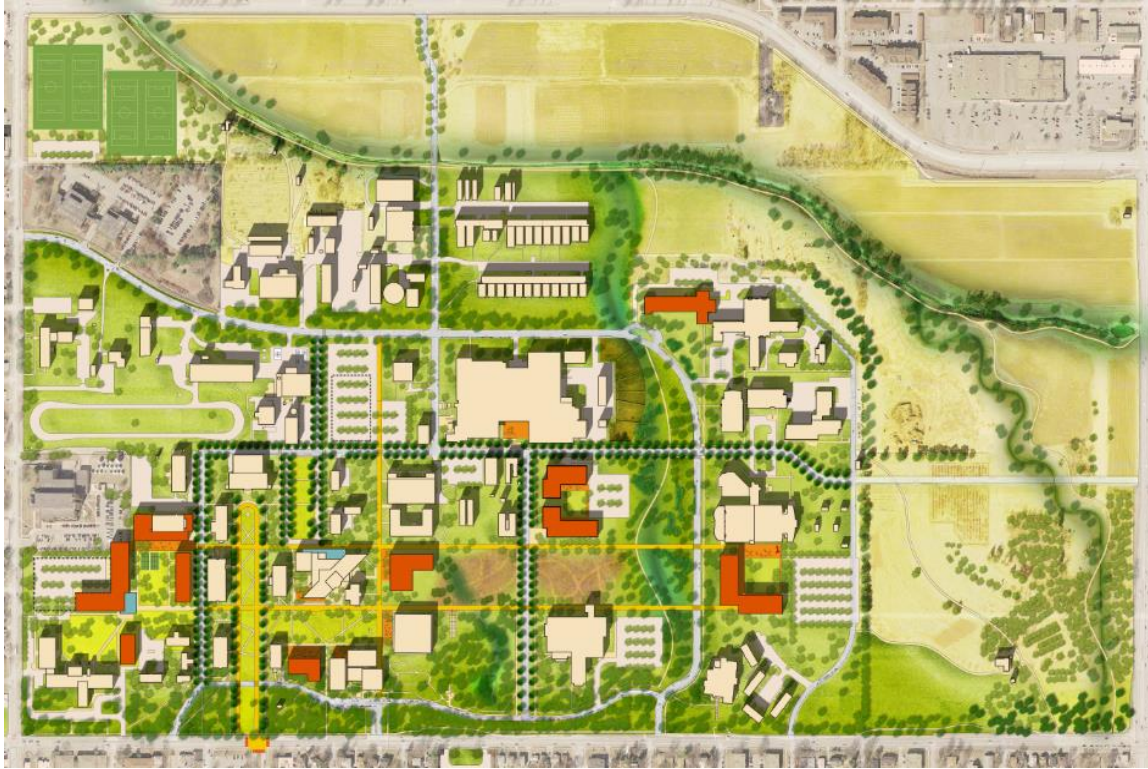
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# East Campus Master Plan



... The map to follow for any project

# UNIVERSITY OF NEBRASKA – LINCOLN

<b>Project</b>	<b>Completion Date</b>	<b>Cost</b>	<b>State Funding</b>	<b>Private Funding</b>
Biofibers Research Lab	Fall 2013	\$376K		
Havelock Farm Popcorn Building	Fall 2014	\$450K		\$450K
Entomology Bldg (WCREC)	Winter 2014	\$337K	\$337K	
Snyder Addition (WCREC)	March 2014	\$412K	\$412K	
Elliot Bldg Upgrade (PHREC)	Fall 2014	\$3,75M	\$3,75M	
Animal Handling Facility (PHREC)	Fall 2013	\$320K	\$320K	
High Plains Ag Lab (Sydney)	June 2014	\$510K	\$10K	\$500K
Commodity Trading Room	Fall 2014	\$763K		\$763K
Stumpf International Wheat Center	December 2014	\$1.02M	\$20K	\$1M
East Campus Rec	Summer 2015	\$14.9M	\$14.9M	
Raising Nebraska – State Fair	Summer 2015	\$5M		\$5M
Veterinary Diagnostic Center	Fall 2017	\$45M	\$40M	\$4.5M
Legacy Plaza	Ongoing	\$3.8M		Ongoing
Nebraska Innovation Campus	Ongoing	\$85M	\$30	\$55
East Campus Residence Hall	Ongoing	\$41M	\$41M	
East Campus Learning Commons	Ongoing	\$22.5M	\$11.25M	\$11.25M



# Biofibers Research Lab



Opened in Fall 2013

# Havelock Farm – Popcorn Research



**Completion – 2014**



# Holdrege Street – 35 East



**Open Fall 2014**

# WCREC – New Entomology Bldg



**Expected Completion – Fall 2014**



# WCREC – Snyder Addition



**Completed March 2014**

# PHREC Elliott Building Upgrade





# Animal Handling Facility Panhandle REC



# High Plains Ag Lab New Headquarters Building at Sidney



**Dedicated June 2014**



# Commodity Trading Room

## Dept. of Ag. Economics, Filley Hall 57



Opened in Fall 2014

# “Legacy” Plaza



**J. Sterling Morton**

3rd Secretary of the U.S. Department of Agriculture  
1893-1897

**Clifford Morris Hardin**

17th Secretary of the U.S. Department of Agriculture  
1969-1971  
Chancellor of the University of Nebraska, 1954-1969

**Clayton Yeutter**

23rd Secretary of the U.S. Department of Agriculture  
1989-1991

**Mike Johanns**

28th Secretary of the U.S. Department of Agriculture  
2005-2007







**LEGACY PLAZA**  
UNL EAST CAMPUS

Site Plan





# Raising Nebraska

Your food & the families who grow it







## South "Gates" to East Campus

Nov 2014

# Stumpf International Wheat Center



**Dedication Dec 2014**



# East Campus Recreation Center



**Open Late  
Summer 2015**



# Veterinary Diagnostic Center



Opening in 2017







**Follow the action through the web cam**  
[www.truelook.com/clients/tetrad-webcam/](http://www.truelook.com/clients/tetrad-webcam/)



# Burr/Fedde Residence Halls



**Board of Regent (BOR) Vote – Nov 2014**



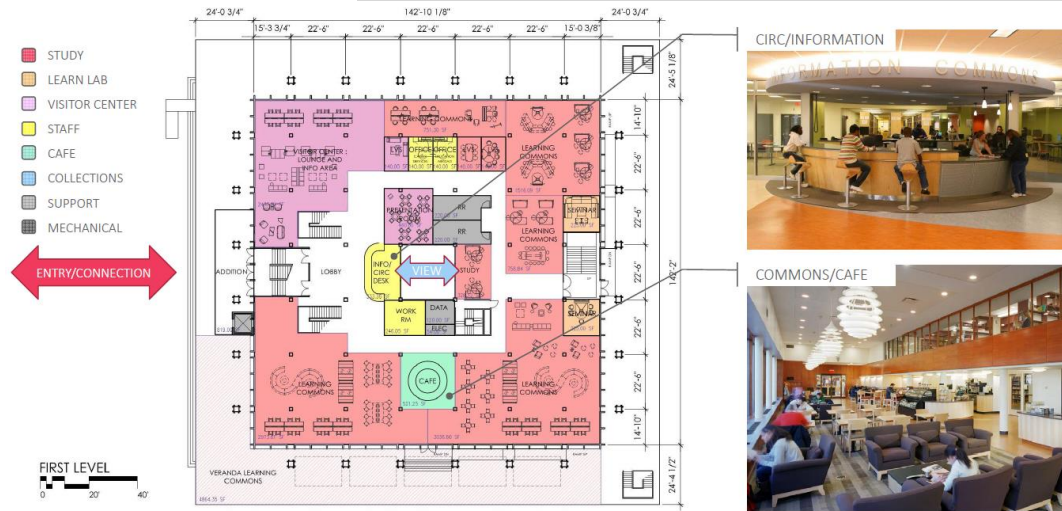
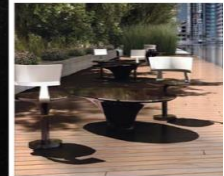
# Biochemistry Hall



**Potential space for new housing**

# C.Y. Thompson Student Learning Commons BOR Vote – Sept 2014

## EXTERIOR | veranda

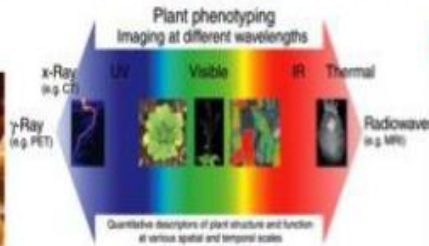


FLOOR PLANS | scheme (1)



**Consortium for Integrated Translational Biology**  
Creating a transdisciplinary environment to bridge the  
genotype to phenotype gap

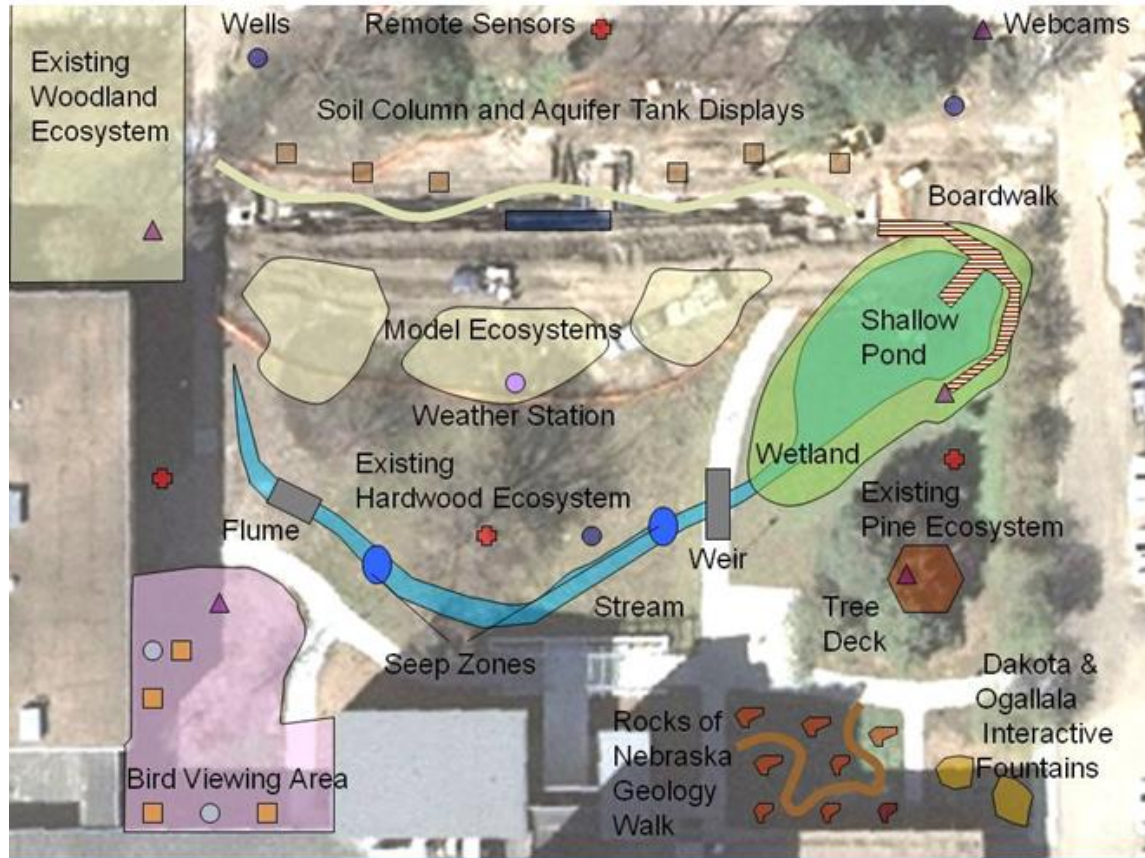
**Plant Genetic Variation**



**Capturing Phenotype**



**Lab to Field  
Infrastructure**

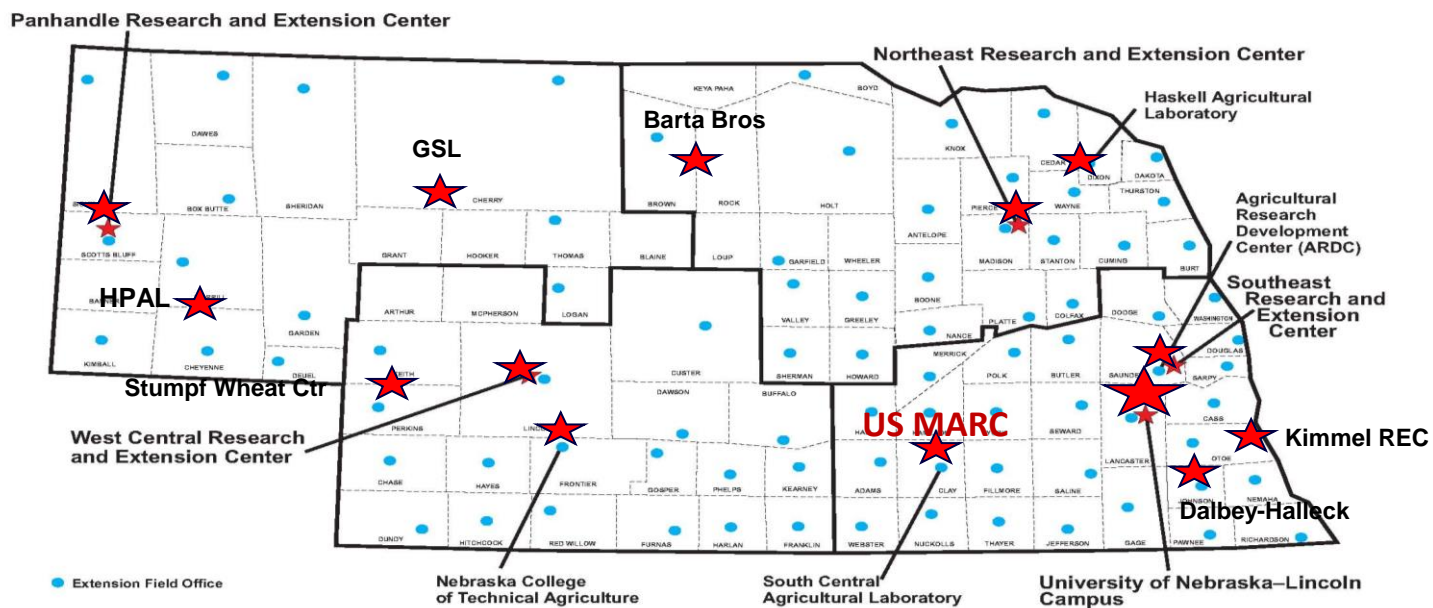


# SNR / Hardin Hall Outdoor Nature Classroom



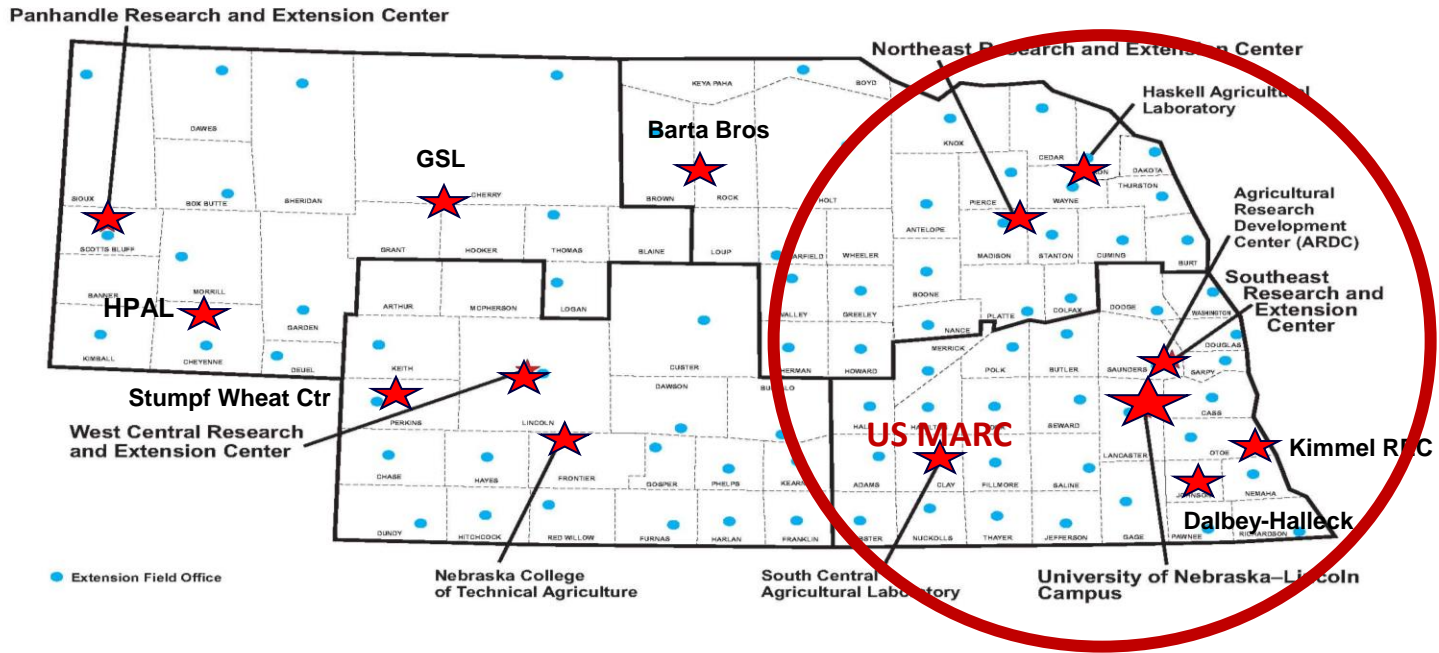


# Statewide Resource Optimization Task Force – Implementation Steps





# “Renewed” 21<sup>st</sup> Century Eastern Nebraska Research Capacity





# Private Giving to the University is at an All-Time High . . .



> \$1.8 B



~ \$140 M

\$250 M



**“25 by 2025”**

Endowed Chair Campaign





**“25 by 2025”**  
**Endowed Chair Campaign**

***Nebraska Wheat Growers Presidential***  
***Nebraska Soybean Board Presidential***  
***Engler Agribusiness Entrepreneurship***  
***Robert B. Daugherty Water for Food***  
***Heuermann Agronomy***





**“25 by 2025”**

**Nebraska Corn Board  
Presidential Chair**

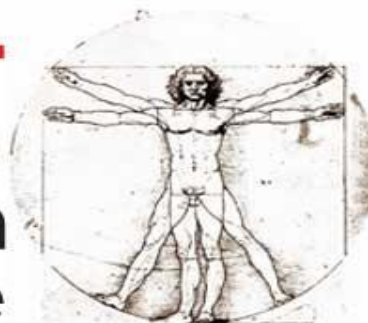




**“25 by 2025”**

**Allen Food for Health  
Presidential Chair**

**GUT**  
function  
initiative

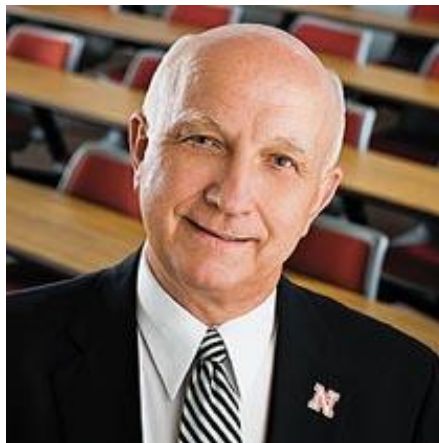






**“25 by 2025”**

**Ron Hanson Chair in  
Agricultural Banking**





**“25 by 2025”**  
**Endowed Chair Campaign**

***Currently – 8 funded Chairs***  
***Active Fund Raising for CY 2014 – 4***  
***Plan for 2015 – 3***



# Paying Attention to the World





## Funding Growth

- **IANR** keeps its enrollment growth funding
- Modest increases over past 4 years in state funding
- Increased availability of NUF funding
- Some increases from PoE funds
- Increase in FY 2015 is approx. **\$4.0M**
  - **Expectation for FY 2016 = \$2 to 2.5M increase beyond salaries**



# State Funding



## ➤ FY 16/17 Biennium NU Budget Request

### ➤ *Nebraska Innovation Campus*

➤ **\$3.8M permanent funding**

➤ **\$25M one-time capital fund**

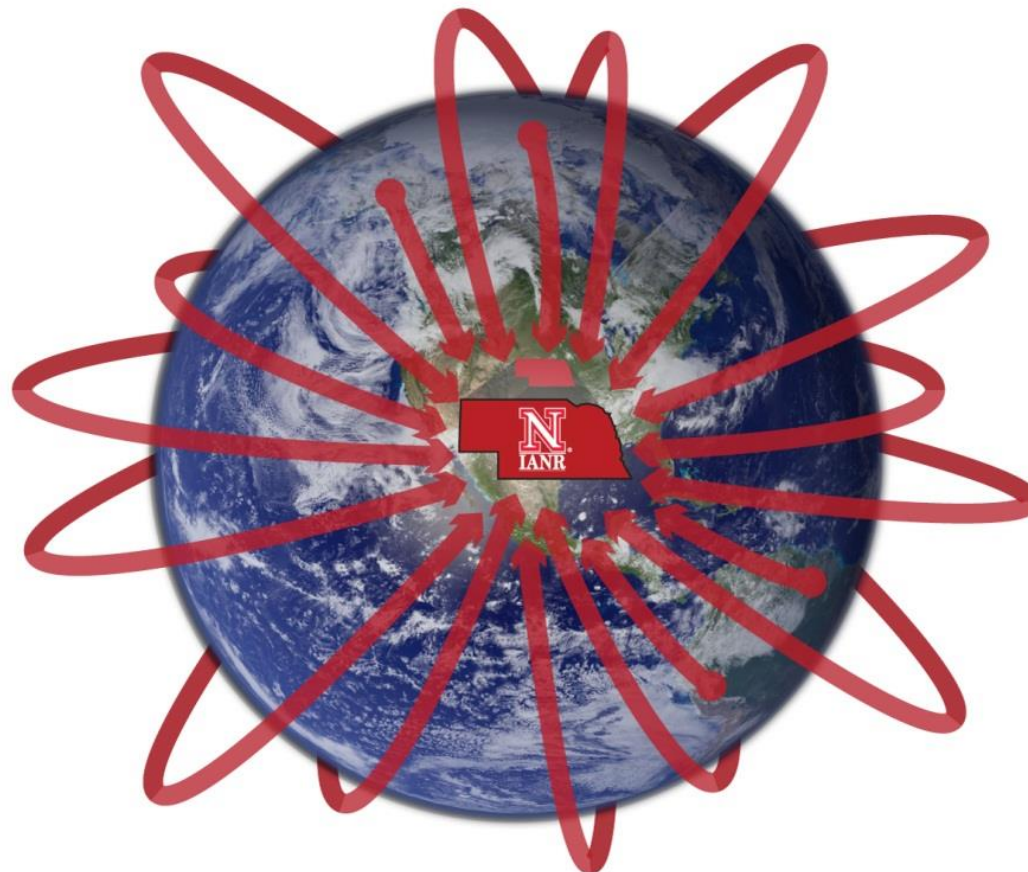
### ➤ *Rural Futures Institute*

➤ **~\$2.5M to add to \$500K in 2014**

### ➤ *Nebraska College of Technical Ag (NCTA)*

➤ **~\$1M permanent budget increase**





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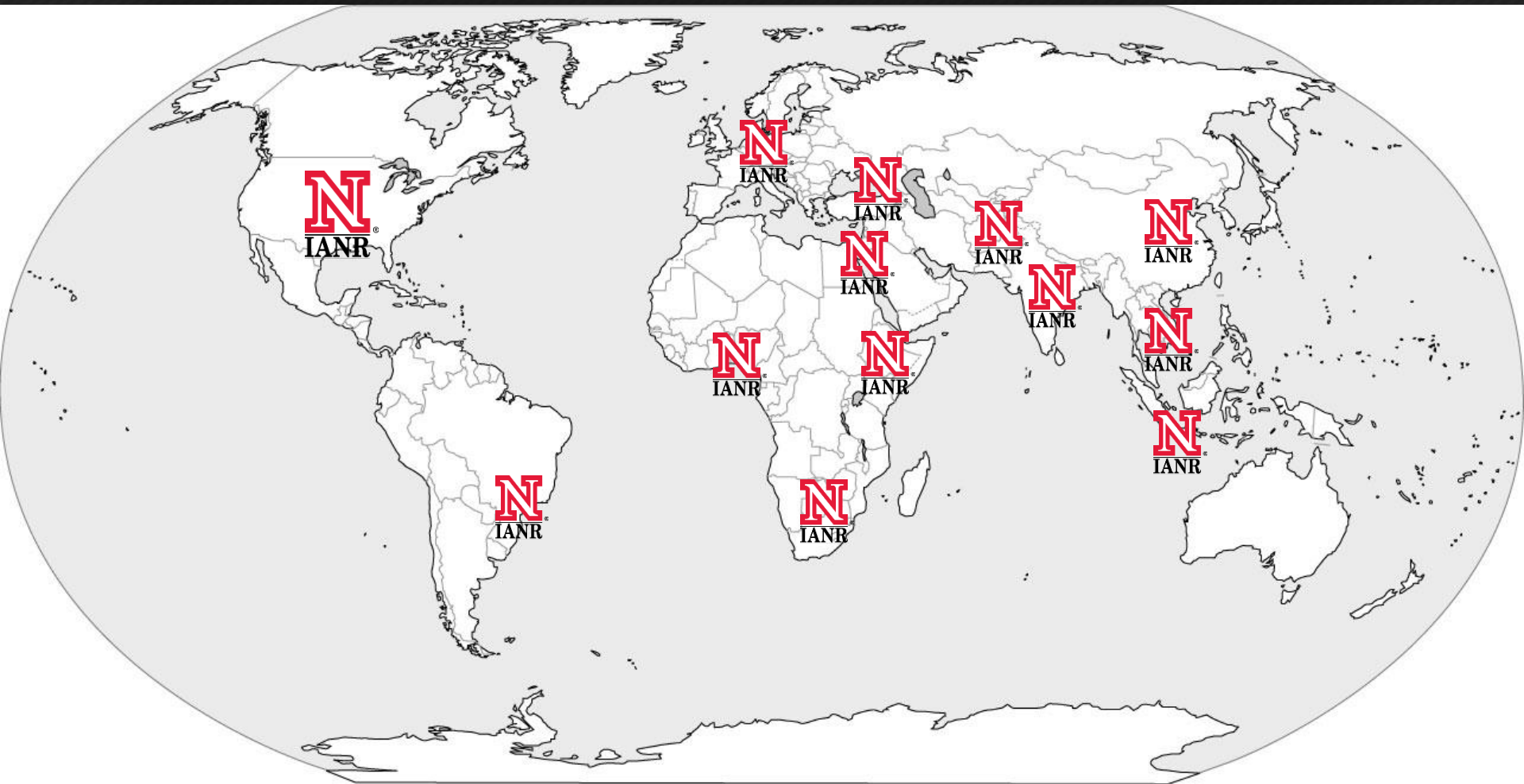
*Living in 2014,*  
*Thinking in 2050!*

# And We Need to Work Globally!





# UNIVERSITY OF NEBRASKA-LINCOLN

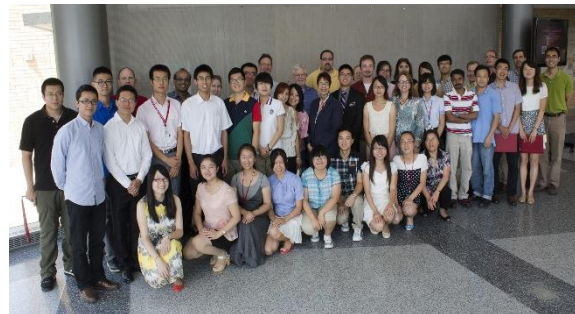


**AFGHANISTAN** (DOD ADT), **BRAZIL** (USP-ESALQ, CAPES), **GHANA** (FARA), **ETHIOPIA**,  
USAID (MENA, NASA Drought), **ZAMBIA** (IDE), UNESCO-IHE, **CHINA** (SAG, China Ag, Northwest A&F),  
**INDIA** (IARI, MSSRF, JAIN, NIFTEM), **VIETNAM** (LMPPI-Harvard Kennedy School)  
**INDONESIA** (Bogor, USBI), **TURKEY** (Ataturk)

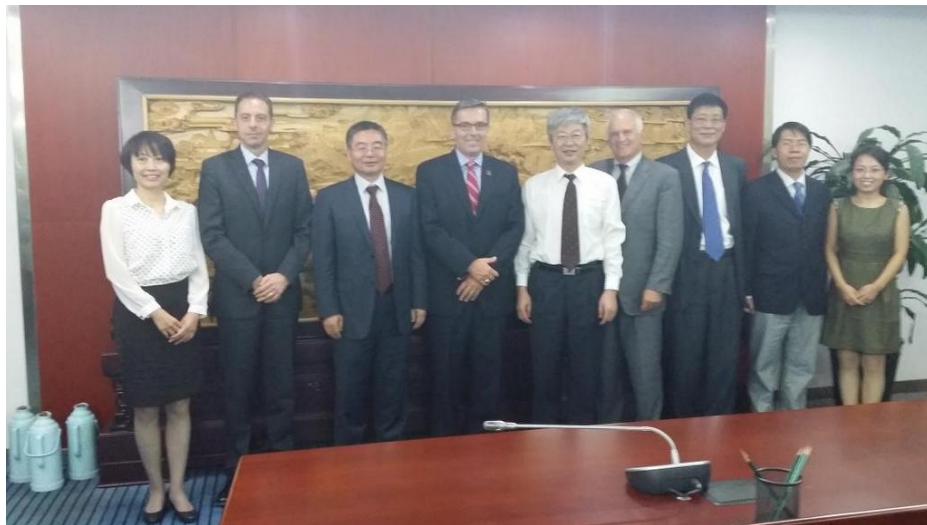




NORTHWEST A&F UNIVERSITY















## Lower Mekong Public Policy Initiative



HARVARD Kennedy School

**ASH CENTER**

for Democratic Governance  
and Innovation





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# Point of Inflection!

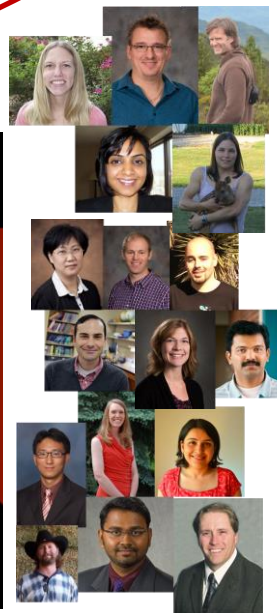
The next 6 years  
are going to dwarf  
the last 4 . . .

Defensive  
Vulnerable  
Top Down Mentality  
Budget Uncertainty  
Economic Downturn  
**2010**

“Turning  
the  
Culture!”  
**IANR**  
to  
**2025**  
**2011**



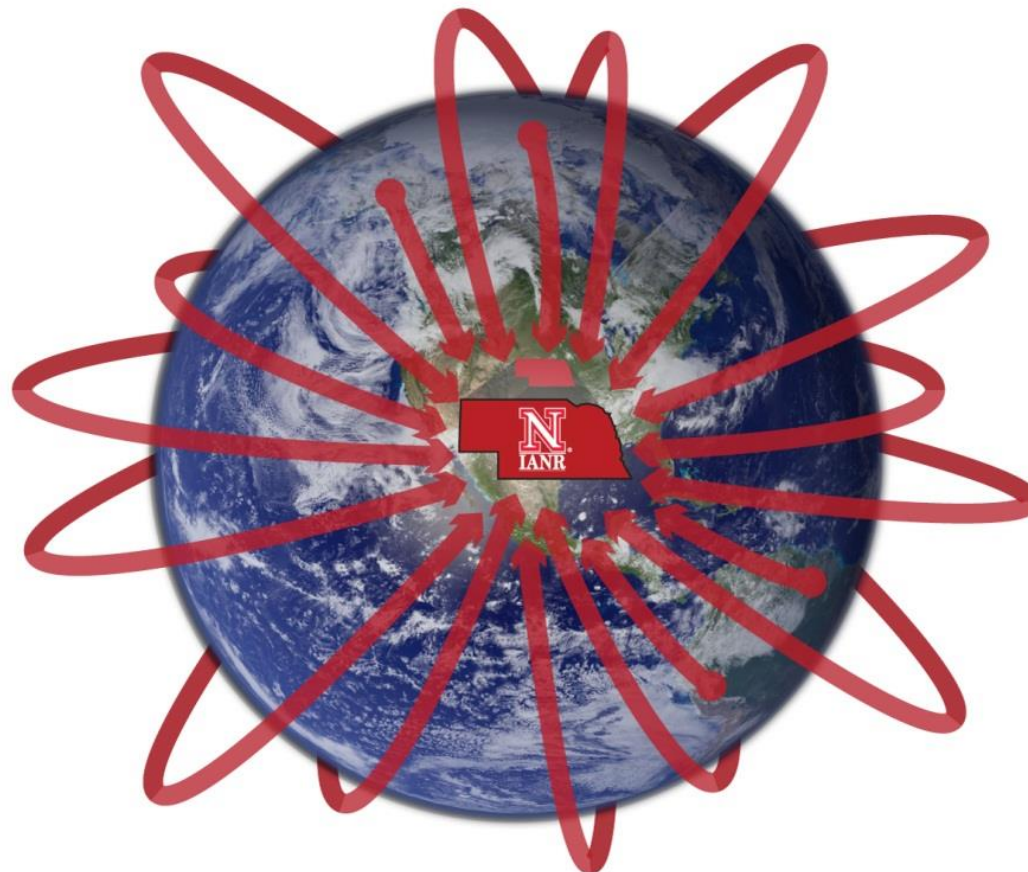
**2012**



**2013-14**



**2020**



# **GROWING A HEALTHY FUTURE**

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