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* IANR - Institute of Agriculture and Natural Resources

** SNR - School of Natural Resources

LR 455

Michelle R. Waite

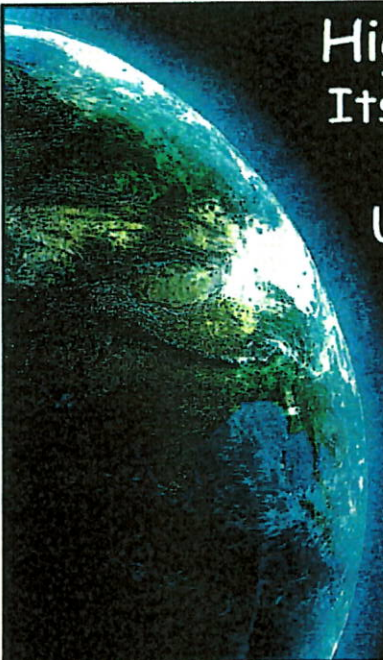
on behalf of Chancellor Green

November 10, 2016

Senators Haar and Larson, my name is Michelle Waite, Assistant to the Chancellor of Community Relations here to testify on behalf of Chancellor Ronnie Green with the University of Nebraska-Lincoln. Chancellor Green sends his apologies for not being here himself – he is attending a funeral this morning. I would like to thank you for the opportunity to testify today regarding legislative resolution 455, exploring the important issues surrounding climate change and its potential impact on our state. I would like to commend the Unicameral for its foresight in tasking this special committee to review various public policies, data, and resources available in order to create a framework for a climate action plan - at least 34 states have developed such plans.

In 2014, the University of Nebraska-Lincoln was pleased to be able to produce the report "Understanding and Assessing Climate Change: Implications for Nebraska" and in 2015 participate in many of the subsequent round table discussions. Professor Emeritus Dr. Don Wilhite, with Drs. Clint Rowe and Bob Oglesby led that effort.

As you may know, the University has a variety of expertise on our campus that has earned national and international recognition to include everything from water law and water sustainability through our College of Law as well as embedding the principles of sustainability and resiliency into the curriculum within the Landscape Architecture program. Research in plant breeding and soil carbon sequestration projects, in the Department of Agronomy & Horticulture, both address a future, changed climate. Our Department of Earth & Atmospheric Sciences, as you will hear, has extensive experience in global climate models and atmospheric processes. The High Plains Regional Climate Center, National Drought Mitigation Center and

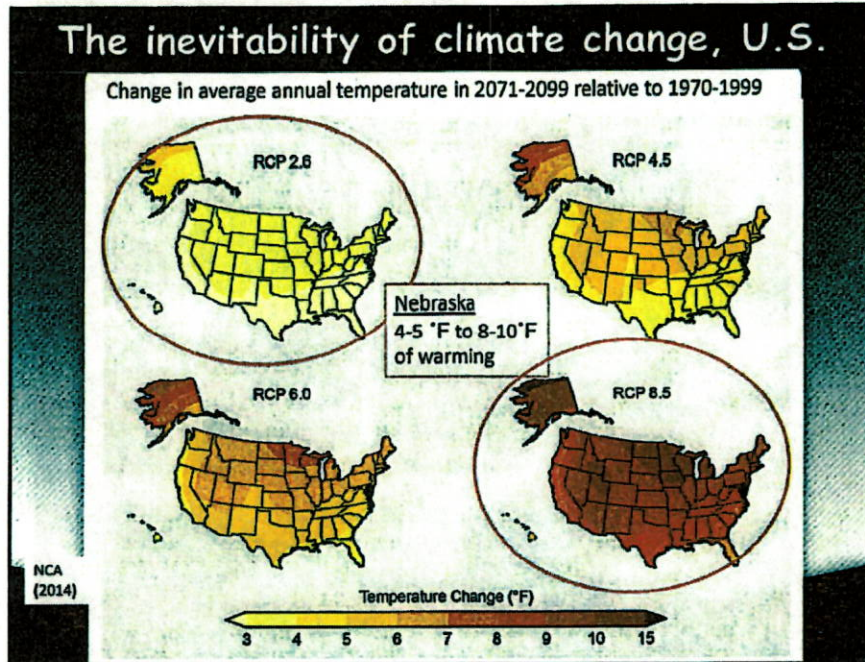


Higher Education: Its Role in Fostering Awareness and Understanding of Climate Change

Donald A. Wilhite
Professor Emeritus
School of Natural Resources
University of Nebraska-
Lincoln

Climate Change: The Facts

- Climate change is real and human activities are the primary drivers of these changes.
- Climate change will have profound impacts on all Nebraskans.
- 61% of rural Nebraskan support the development of a climate action plan.
- BUT, the level of understanding of climate change is **low** and the **urgency** of addressing this issue **NOW** is not well understood.
- **Higher education institutions are critical in raising the level of understanding of this issue.**
- **CONTINUED AND ENHANCED leadership from UNL—one of the primary conclusions from the 8 roundtables.**
- **CHALLENGE: How to engage physical, biological, medical and social scientists in addressing this complex issue?²**



The Implications of Climate Change for Nebraska: Summary Report of Sector-Based Roundtable Discussions (September-October 2015)

The roundtable report is available at:

<http://go.unl.edu/climatechange>

2016

University of Nebraska - Lincoln

Climate Change Research and Education Program

- 2009 study commissioned by UNL's Vice-Chancellor for Research
- Findings
 - Current and projected changes in Nebraska's climate will have significant repercussions on our region's water resources and will affect the sustainability of agriculture and other activities.
 - Universities are playing and will continue to play an enormous role in conducting research on all aspects of climate change.
 - The education, research and service mission of universities provide both the intellectual leadership and the capacity to conduct research to facilitate adaptation to projected changes and actions to reduce the emission of GHGs, i.e., mitigation strategies.
 - In 2009, 39 climate change centers/programs had been established by universities across the nation.

Climate Change Research and Education Program

- Findings (continued)
 - 2009 survey, 156 faculty from diverse UNL units expressed interest in being part of a coordinated campus-wide initiative on climate change.
 - Three notable conclusions:
 - UNL faculty have the expertise to conduct end-to-end research on climate change education, impacts, and adaptation and mitigation actions.
 - UNL's expertise is fragmented across campus—requires leadership, coordination & collaboration.
 - **RECOMMENDATION:** Establish an umbrella entity at UNL to coordinate climate change research, education and service activities.

UNL Center for Climate Change Research and Education

VISION:

- To harness and augment the talents of faculty and other resources to investigate complex research, education and service-related issues associated with climate change;
- To enhance collaborations with faculty at other institutions of higher education in Nebraska;
- To foster student and stakeholder engagement in addressing the challenges and opportunities of climate change.

UNL Center for Climate Change Research and Education

• OBJECTIVES:

- To increase competitiveness for external funding in climate change research and education/outreach programs through interdisciplinary collaborations.
- To better understand the science of climate change and investigate adaptation and mitigation strategies that reduce vulnerability and enhance climate resiliency.
- To develop new and enhance existing risk-based decision-support tools for improved management of water and other natural resources.
- To create a comprehensive climate change science curriculum at the undergraduate and graduate level.
- To develop K-12 and adult-based educational programs on climate change to inform leaders, decision makers and the public.
- To engage stakeholders in discussions regarding the science of climate change, projected impacts, adaptation and mitigation strategies and the identification of policy options.

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Dear President:

I am the co-chair of the LR 455 Special Committee authorized to create the framework for a Nebraska plan to respond to the challenges and opportunities of climate change. One aspect of our study is the role of post secondary education in climate change resiliency and sustainability planning efforts for the State of Nebraska.

We appreciate the vital role that academic research, education, and outreach plays in helping to improve our understanding of issues in the world. The LR 455 committee is interested in determining whether your institution is involved in issues related to climate change resiliency and sustainability and if so, the nature and extent of such involvement.

Please respond to the following questions:

1. A vital part of the role of colleges and universities are research, education, and outreach. Is your institution involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Yes, Central Community College is a Cum Laude Leader since 2011 and signatory of the Climate Commitment as part of the Climate Leadership Network (previously the ACUPCC), and as a signatory of the Sustainability Education & Economic Development (SEED) Initiative, we have made a commitment to educate, implement and model the practices needed for a sustainable future. For our communities and ultimately globally, we believe environmental sustainability is important and necessary for healthy communities, people and economic sustainability.

Some of the education and outreach activities at Central Community College include the launch of an e-badge in Leadership in Environmental Stewardship awarded in courses and co-curricular experiences, Annual Groundwater Festival, Earth Day activities, America Recycles Day, a monthly Sustainability Leadership Presentation Series (SLPS) in partnership with many other Nebraska higher education institutions and non-profit organizations, a monthly 30 conversation in which students discuss environmental sustainability issues, a faculty committee on Environmental Sustainability Across the Curriculum (ESATC), bike share program, beekeeping, and various community sustainability outreach events in the CCC district.

ongoing initiatives include reducing emissions from commuting by adapting a four-day summer work week, increasing the hybrid vehicle fleet, and a composting program.

Central Community College is also a founding signatory of the Alliance for Resilient Campuses. Resiliency and the Community College is an emerging vision of a nimble, adaptive, inclusive society, and its embrace of social and natural capital and how it intersects with the emerging education and employment demands of regional economies designed for resilience. There is a need for an urgent Nebraska climate change and resiliency action plan around extreme weather events, agriculture, diseases, ecological health, and water quantity immediately and long term.

More community colleges need to participate in moving beyond their institution and campus, by providing leadership for other stakeholders engaged in resiliency conversations to bring community colleges — with their local roots, educational infrastructure, and institutional capacity — to take action.

The community college, as a workforce developer, as a community educator and convener, and as a site of model practice and planning, can and should be central to designing a coherent and sustainable local response to the existential threats of climate change.

4. Are there members of your institution working on climate change issues in their individual capacity? If so, please provide names of faculty and their areas of involvement.

Benjamin Newton
Environmental Sustainability Director
benjaminnewton@cccneb.edu
308-398-7962

Brent Adrian
Environmental Sustainability Across the Curriculum Co-Chair
badrian@cccneb.edu
308-398-7313

Amy Novak
Project Manager, NPACE
amynovak@cccneb.edu
402-461-2425

Rhonda O'Brien
Sustainable Culinary Instructor
rhondaobrien@cccneb.edu

LR 455 Special Committee Questions

- I. A vital part of the role of colleges and universities is research, education, and outreach. Is your institution involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Metropolitan Community College (MCC) is committed to educating the public on issues and topics related to Sustainability. In fact, MCC was the first public higher education institution in the greater Omaha area to dedicate a full-time staff person to lead sustainability efforts, from both operational and educational standpoints. MCC's Campus Planning & Sustainability department's Coordinator of Sustainable Practices is Sarah Murray, who coordinates education and outreach activities related to sustainability and resiliency. The two links below provide a succinct overview of current efforts and recent outcomes.

[Information about our current efforts](#)

[Our 2015 annual sustainability report](#)

In March 2016, MCC voluntarily submitted a report to the [Associate for the Advancement of Sustainability in Higher Education \(AASHE\)](#) accounting for our Sustainability, Tracking, Assessment and Reporting System (STARS). MCC is the first community college in Nebraska to do so, and we are very proud of our Bronze Rating.

A multifaceted sustainability committee, with subgroups focusing on sustainability goals, such as LEED construction, energy efficiency, and transportation, help ensure comprehensive and well-executed strategies for improving our sustainability college-wide.

As a two-year associate degree-granting institution, most of our students are not involved in research in the traditional sense; however, many MCC faculty incorporate sustainability into their class assignments. This quarter, for example, a Marketing class is conducting a Marketing Study to help us better promote our Pass to Class program, which encourages the use of public transportation. Another Graphic Design class is developing the signage and visuals for our new LEED buildings to ensure the materials are easily relatable to students and will encourage students to more conscientiously consider their options.

In terms of outreach, MCC is consistently involved in Sustainability efforts, locally, regionally, and nationally. MCC is a member of Waste Cap Nebraska, aimed at reducing our waste; the U.S. Green Building Council, aimed at making our buildings more efficient; the Nebraska Community Energy Alliance, which builds and promotes advanced technologies to save energy, reduce pollution, and cut costs; and Green Omaha Coalition, which promotes the education, outreach and advocacy for sustainability issues within Omaha, to name a few.



LR 455 Brief

The role of postsecondary education in climate change resiliency and sustainability planning efforts for the State of Nebraska

Northeast Community College
October 31, 2016

Northeast
community college

- Students from the Collegiate Farm Bureau Club effectively developed and lobbied a Nebraska Farm Bureau resolution to support the use of technologies that conserve water up to 35% compared to simply measuring water consumption in Natural Resource District (NRD) areas that don't have irrigation flow meter mandates.
- For the last ten years, area kindergarteners were brought to campus to learn about and plant trees with college students as part of the Northeast's Arbor Day celebration.
- Students in grades 9-12 participate in Nebraska Construction Career Days where they handle wind power generation tools, operate HVAC smart climate controls, and learn smart electrical controls wiring.
- Northeast's Center for Enterprise collaborates with the Lower Elkhorn NRD to provide curriculum to train producers on irrigation flow meter installation and usage.
- Northeast has hosted and sponsored forums for sustainability organizations including Clean Energy Nebraska, WasteCap Nebraska, and the Nebraska Farmers Union to discuss renewable energy options and natural resource protection, "zero waste community" considerations, and climate change issues.

2. Is there someone in your institution that our office should contact related to issues of climate change, resiliency and sustainability?

- **Dr. Tracy Kruse**, Associate Vice President of Development & External Affairs
tracyk@northeast.edu -- (402)844-7056
Lifelong Learning Center 100, 801 E Benjamin Ave, Norfolk, NE 68702
- **John Blaylock**, Vice President of Educational Services
johnb@northeast.edu -- (402) 844-7292
Maclay Building 102, 801 East Benjamin Ave, Norfolk, NE 68702

3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your institution who would be willing to testify at that hearing regarding your institutions work in that area? If so, please let us know the name of person and the topic of testimony. Unfortunately, Northeast leadership has a prior commitment that day and will not be available to testify. If you have any additional questions, please contact us.

4. Are there members of your institution working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.

- **Robert Noonan**, Agriculture Instructor – Curriculum: Advanced Fertilizers and Forage Pasture and Grassland – topics: soil health, carbon sequestration, water conservation, and erosion prevention; Research project: 10 yr study investigating cover crop mitigation for improved soil health
- **Michael Lechner**, Agriculture Instructor – Curriculum: Ag Economics and International Agriculture - topic: Global warming
- **Mike Roeber**, Agriculture Instructor – Curriculum: Animal Science and Animal Health – topic: sustainability in management practices
- **Chris Burbach**, Agriculture Instructor – Curriculum: Introduction to Agriculture Technology and Precision Agriculture Theory – topics: the effect of technology on agriculture practices and stewardship and use of data to assist in decision making and agriculture efficiencies
- **Bernie Thyen**, Agriculture Instructor – Curriculum: Soil Science and Plant Science
- **Irina Weitzman, Erin Kucera, and Angie Jackson**, Biology Department – Curriculum: Intro to Environmental Issues - topic: onsite comparison of United States and Costa Rican biodiversity and environmental stability
- **Erin Kucera**, Biology Instructor – Curriculum: General Biology - topics: reducing ecological footprints; wildlife restoration
- **John Liewer**, Wind Instructor – Curriculum: Wind Energy Fundamentals - topics: wind energy principles and reliability, and the economic, environmental, and political issues involving wind energy
- **Paul Bailey**, HVAC Instructor – Curriculum: Heat Pump Technology - topic: geothermal ground source energy supplies

5. Are there members of your institution who have indicated an interest working on climate change issues if provided an opportunity to do so? If so please provide names and their areas of interest.

- **Irina Weitzman**, Biology/Physical Science Instructor – Environmental Monitoring: Measuring environmental levels of methyl salicylate and ground-level ozone; Remote imaging to measure photosynthesis and plant stress

Success starts here.

WIND ENERGY



Estimated tuition and fees for an associate degree in this program is \$8,335.
Estimated tool cost: \$900.

Wind energy is a rapidly growing industry in Nebraska and throughout the nation. The students in the wind energy program will learn the necessary safety skills and engage in higher skill levels needed to work in positions in the wind energy field. Students will develop their basic skills with courses in wind energy fundamentals, basic electricity, wind turbine systems, and continue with motor controls, mechanical systems, blue print reading, and fluid fundamentals. The second year, students will engage in wind electronics for control systems that interface with programmable controllers and SCADA systems. Students will understand rigging and climbing safety in and around a wind turbine. Wind turbine siting will be introduced for awareness of economic and development compliance. Successful graduates will be prepared for a position in the wind energy industry. (Enrollment into this program is limited and based on the date of application.)

Required Program of Study for Associate of Applied Science Degree (2 years)

FRESHMAN YEAR

First Semester		Credits
WIND 1010 Basic Electricity	.....	3
WIND 1020 Basic Electricity Lab	.....	2
WIND 1080 Wind Energy Fundamentals	.....	3
WIND 1085 Wind Energy Fundamentals Lab	.....	2
WIND 1255 Blue Print Reading	.....	2
INFO 1000 Basic Computer Applications	.....	2
HLTH 1710 First Aid	.....	2
MATH 1020 Technical Mathematics I	.....	3
		<u>19</u>

Second Semester		Credits
WIND 1155 Mechanical Systems for Wind Energy	.....	3
WIND 1160 Mechanical Systems for Wind Energy Lab	.....	2
WIND 2055 Fluid Fundamentals	.....	3
WIND 2065 Fluid Fundamentals Lab	.....	1
WIND 1030 Electrical & Operations Safety for Wind Energy	.....	1
WIND 1230 Motor Control	.....	2
WIND 1240 Motor Control Lab	.....	2
MATH 1060 Technical Mathematics II	.....	3
		<u>17</u>

Summer: 12 weeks		Credits
WIND 1300 Cooperative Internship I	.....	8

SOPHOMORE YEAR

First Semester		Credits
WIND 2110 Control Systems	.....	3
WIND 2045 Programmable Logic Controllers	.....	4
WIND 2070 Wind Electronics II Theory	.....	2
WIND 2075 Wind Electronics II Lab	.....	2
WIND 2080 Generator Theory	.....	2
WIND 2085 Generator Lab	.....	1
ECON 1010 Personal Finance	.....	2
PSYC 1000 Human Relations	.....	2
		<u>18</u>

Second Semester		Credits
WIND 2210 Mechanical Systems II	.....	1
WIND 2220 Mechanical Systems II Lab	.....	3
WIND 2095 Airfoils and Composite Repair Lab	.....	2
WIND 2270 Data Communications and Acquisition	.....	4
WIND 2280 Wind Turbine Siting	.....	2
WIND 2290 Power Generation and Distribution	.....	2
BSAD 2050 Business Communications	.....	3
		<u>17</u>

Total Credit Hours **79**

Required Program of Study for Diploma (1 year)

Successful completion of the freshman year of the wind energy associate of applied science degree program and the Summer Cooperative Internship I.

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit our website at <http://www.northeast.edu/Gainful-Employment/>



Dear Senator Haar,

Below please find our response to your request for information on Southeast Community College's involvement in issues related to climate change.

Question 1: Research, Education & Outreach

As Southeast Community College is not a research institution, our faculty are not actively conducting research on these topics. There are, however, several academic departments which teach on the subject as part of their curriculum.

With regards to our career and technical programs, our Associate of Applied Science degree program in Energy Generation Operations incorporates education about clean energy and sustainability. Two required core courses in the program deal directly with this issue. Green Energy Technologies (ENER 2130) is an introduction to various green energy technologies including wind, solar, hydro and other types of renewable energy. Emission Control Systems (ENER 1250) is an introduction to types of pollutants, methods of monitoring and reporting requirements for electrical generating plants as well as biofuels plants. Identification of the major sources of pollution, explanation of control devices used to minimize polluting emissions; and the importance of reducing emissions, in compliance with state and federal regulations are discussed. Additionally, carbon emissions and climate change are discussed throughout the program curriculum.

Southeast Community College provides a broad selection of freshman and sophomore level courses in the arts and sciences. Several of our courses address the topic of climate change, in disciplines varying from Biology to Philosophy. As a two-year institution SCC is unable to provide advanced coursework or specialization in any of these fields.

SCC's Office of Institutional Research sent out requests for additional information to faculty teaching on the topic of climate change. We received responses from two instructors.

- Leo Iacono, Philosophy instructor, teaches a course (PHIL 2250) on environmental ethics, which is devoted to the issue of climate change. Students study the issue of climate change, the evidence for anthropogenic global warming, and its likely consequences. The readings and lecture focus on several issues related to climate change, including (i) what we should believe when a majority of experts hold one view but a small minority of experts disagree, (ii) why global warming is an example of the "tragedy of the commons" and why implementing effective policies to combat climate change is not easy, (iii) environmental justice and in particular the question whether less developed nations should shoulder less of the burden of mitigating climate change than the developed nations. Students also participate in a discussion forum about practical steps individuals or organization can take to combat global warming.

Question 3:

Our institution does not have anyone willing to testify at the hearing regarding our institution's work in the area of climate change.

Question 4:

Our office is not aware of any members of our institution working on climate change in a personal capacity.

Question 5:

Leo Iacono, Instructor of Philosophy, indicated he is willing to be contacted by the legislative committee on this issue, and would be interested in opportunities to work on climate change issues. His area of interest is environmental ethics.

David Madcharo, Instructor of Energy Generation Operations, also indicated he is willing to be contacted by the legislative committee on this issue, and would be interested in opportunities to work on climate change issues. His area of interest is Green Energy Technologies and Energy Generation Operations.

Testimony for Public Hearing, LR455 Special Committee
The role of post secondary education in establishing a climate action plan.
10 November 2016, 9am

Nicholas Brozovic, PhD
Director of Policy

Robert B. Daugherty Water for Food Global Institute at the University of Nebraska
Nebraska Innovation Campus, 2021 Transformation Drive, Suite 3220
Lincoln, NE 68583

Good morning Special Committee members. My name is Nicholas Brozovic and I am Director of Policy at the Robert B. Daugherty Water for Food Global Institute at the University of Nebraska, as well as an Associate Professor in the Department of Agricultural Economics at UNL.

Higher education has two important roles to play in helping the State of Nebraska to plan for extreme climatic events such as extended droughts.

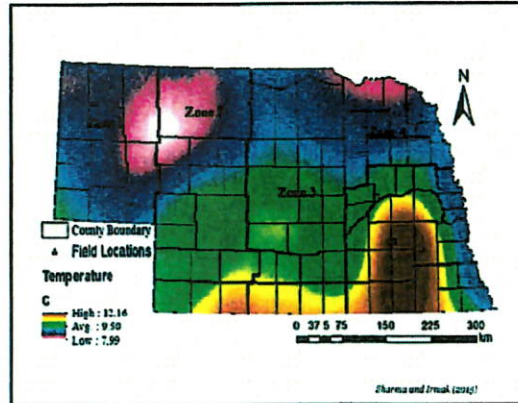
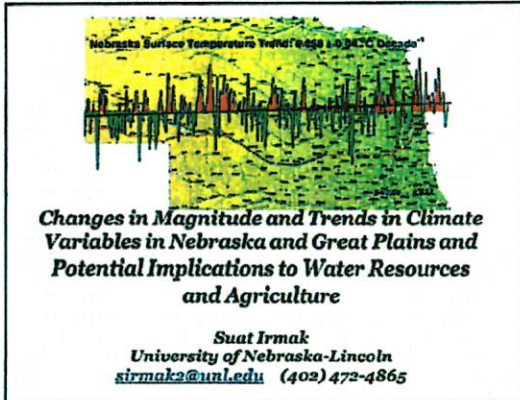
First, much of Nebraska's economy depends on agriculture. The production of food and fuel, as well as the business and industrial activities that support agriculture, is greatly affected by climate. Having the best information available and a deep understanding of how climate can impact business represents an important competitive advantage. Within the University of Nebraska system, there are world-class experts in disciplines such as atmospheric science, agronomy, engineering, and agricultural economics. These researchers can help in understanding and planning for current and future climate. At the Water for Food Global Institute we have partnered with both public and private sectors to analyze the impacts of climate on food and water security. Our products are used to improve water management and food production around the world.

Second, while future droughts and climate extremes create challenges, it's also important to acknowledge the opportunities for Nebraska and for the state's higher education system. As other states and countries increasingly develop and implement their own climate action plans, there is demand for talented scientists, engineers, water managers, and policy and finance specialists. This is an important opportunity for the University of Nebraska and the state's higher education system. Nebraska is an ideal place to train students that will become a climate-smart workforce that understands how to thrive in complex and increasingly stressed systems.

In summary, the University of Nebraska, including the Water for Food Global Institute, has the leadership and experience to provide advanced climate information and decision support to policymakers, the business community, and the public.

Thank you for your time.

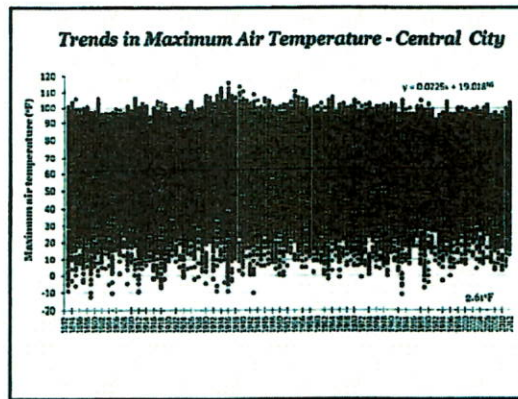
Sincerely,
Nicholas Brozovic



Background

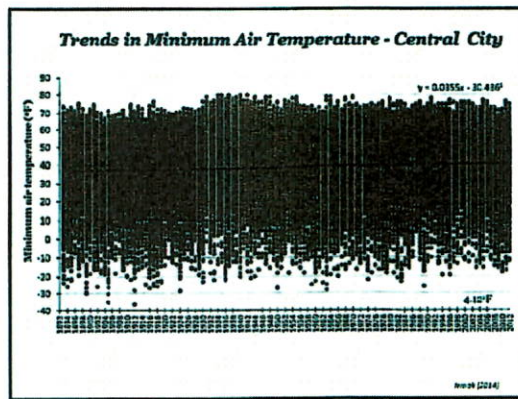
- Warming of the earth's atmosphere between 0.54°F and 1.08°F since the late 19th century has been reported.
- These warming trends are most likely a result of the combination of growth of greenhouse gas emission (external) and natural changes in air temperature.
- The global mean land-surface air temperature has risen by about 1.33°F over the past 100 years (1906-2005) and is predicted to increase by 1.98°F to 11.52°F by 2100 (IPCC, 2007).

From: Mutibwa and Irmak (2013) (Water Resource Research)



Background

- While these increases in air temperature and CO₂ concentration may seem to be small for humans, the implications of these small increases in air temperatures for plant physiological functions and, in turn, their impact(s) on agricultural practices and productivity can be significant.
- While so much discussion and analyses take place on global climate change, it is imperative that the analyses are conducted for local/regional conditions so that local changes can be documented and local best agricultural management practices can be developed in response to changes in climatic variables.*



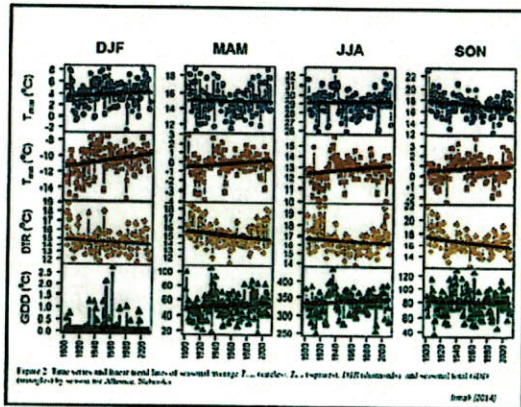
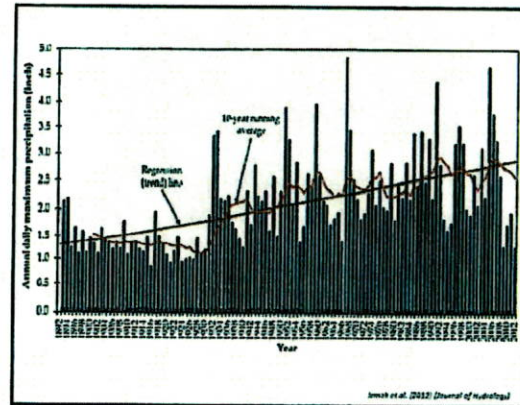
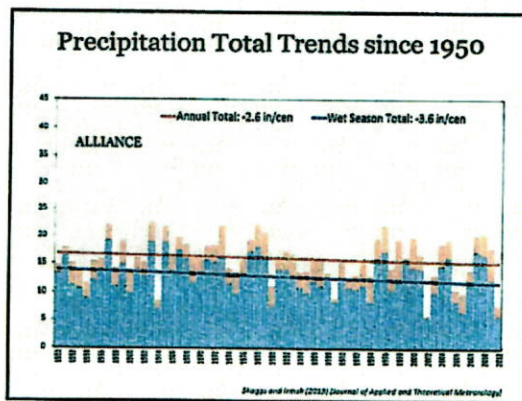


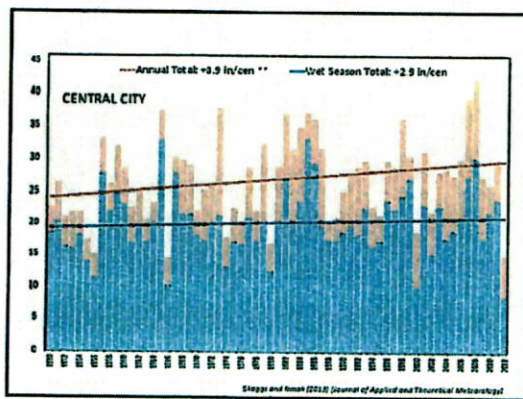
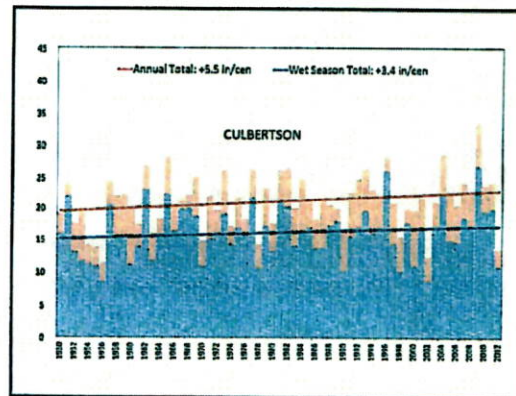
Figure 2. Time series and linear trend lines of seasonal mean T_{max} , T_{min} , T_{max} , T_{min} , DPR , and GDD (top to bottom) for the Allamogosa, Nebraska. Inmoh (2014)



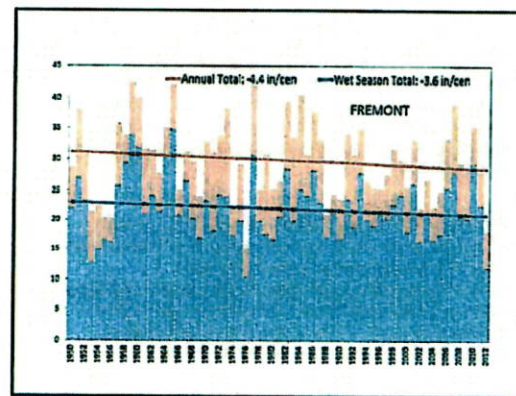
Inmoh et al. (2015) Journal of Hydrology

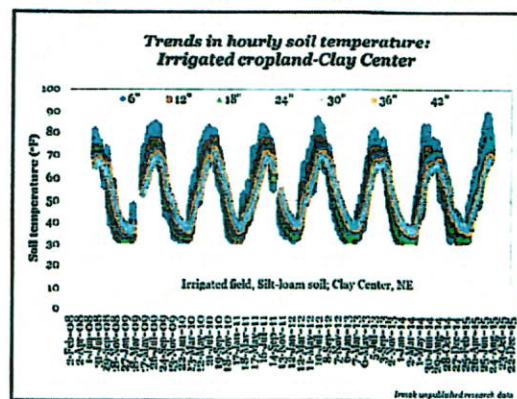
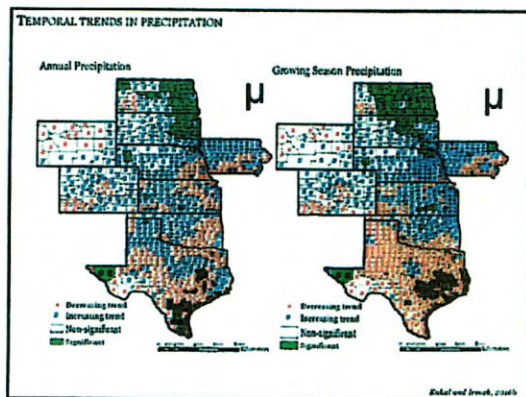
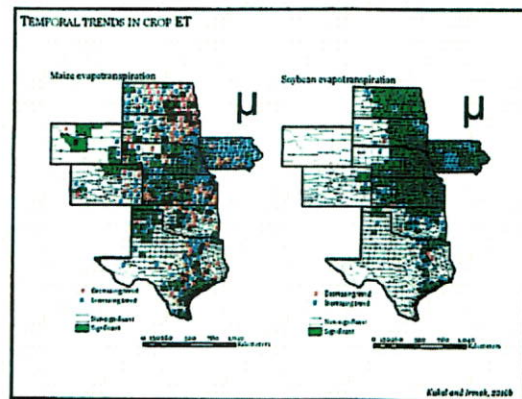
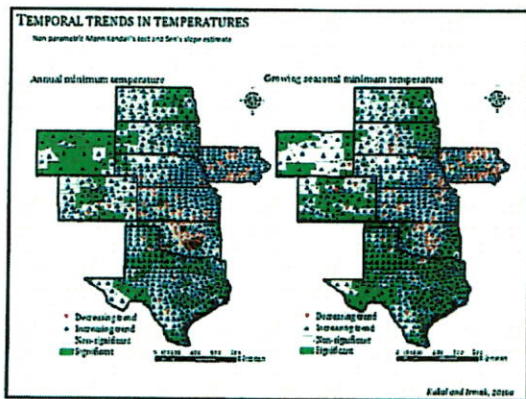
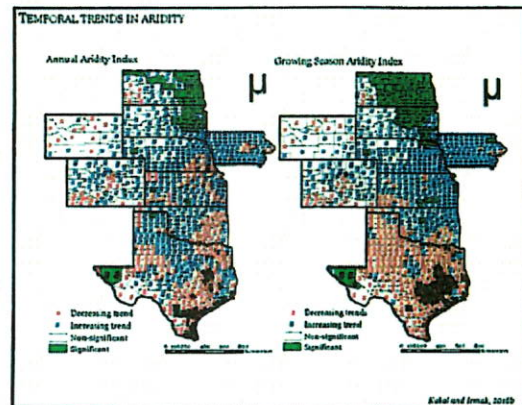
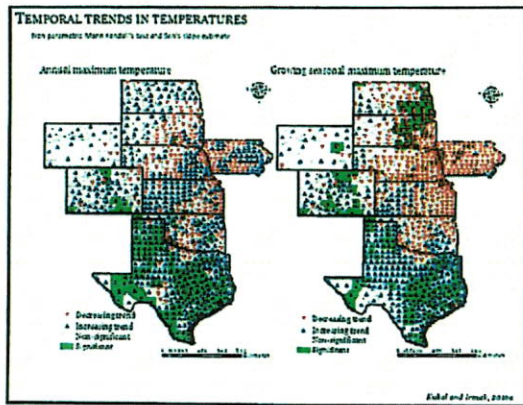


Shaga and Inmoh (2015) Journal of Applied and Theoretical Meteorology



Shaga and Inmoh (2015) Journal of Applied and Theoretical Meteorology





AGENDA FOR NOVEMBER 10TH LR 455 COMMITTEE HEARING
Role of Post-Secondary Education in establishing a State Climate Plan
Evidence Based, Data Driven
Testifiers as of 11-9-16

9:00 a.m. Introduction, Senator Ken Haar
9:10 a.m. Michelle Walte for Chancellor Ronnie Green
9:20 a.m. Dr. Donald Wilhite, Background: University role to date, including 2014 report and 2015 roundtables

College of Arts and Sciences

9:40 a.m. Dr. Robert Oglesby, Department of Earth and Atmospheric Sciences

Engineering

9:55 a.m. Dr. Lance Perez, Dean

School of Natural Resources

10:10 a.m. Dr. Martha Shulski, Nebraska State Climate Office

10:25 a.m. Dr. Mike Hayes, Overview of climate initiatives

Law

10:40 a.m. Maggie Wittlin, J.D., climate communication

Architecture

10:50 a.m. Tim Hemsath, sustainability in design

Daugherty Water for Food Institute

11:00 a.m. Nick Brozovic, water policy responses to climate change

Biological Systems Engineering

11:10 a.m. Dr. Suat Irmak, climate impacts on water and agriculture

Doane University

11:20 a.m. Dr. Ramesh Laungani

UNO

11:30 a.m. Dr. Beth Chalecki

11:40 a.m. Rick Yoder

12:00 noon Break

UNO

1:30 p.m. Dr. Alan Kolok

Dear President:

I am the co-chair of the LR 455 Special Committee authorized to create the framework for a Nebraska plan to respond to the challenges and opportunities of climate change. One aspect of our study is the role of post secondary education in climate change resiliency and sustainability planning efforts for the State of Nebraska.

We appreciate the vital role that academic research, education, and outreach plays in helping to improve our understanding of issues in the world. The LR 455 committee is interested in determining whether your institution is involved in issues related to climate change resiliency and sustainability and if so, the nature and extent of such involvement.

Please respond to the following questions:

1. A vital part of the role of colleges and universities are research, education, and outreach. Is your institution involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.
2. Is there someone in your institution that our office should contact related to issues of climate change, resiliency and sustainability?
3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your institution who would be willing to testify at that hearing regarding your institutions work in that area? If so, please let us know the name of person and the topic of testimony.
4. Are there members of your institution working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.
5. Are there members of your institution who have indicated an interest working on climate change issues if provided an opportunity to do so? If so please provide names and their areas of interest.

I appreciate the work of many institutions on many facets of this highly important issue. We will call you soon to follow up on this letter.

Please provide a response no later than November 3rd. Feel free to contact my office if you have questions or need more information.

Sincerely,

Senator Ken Haar
District 21

Excerpts from the 2009 Proposal: *Climate Change Research and Education Program: A Campus-wide Initiative*, prepared by Donald A. Wilhite, Director School of Natural Resources and the Climate Change Initiative Advisory Committee

Introduction and Justification

Universities are playing and will continue to play an enormous role in conducting research on all aspects of climate change. ... Equally critical is the role universities can play in educating their constituents about the issues and actions they can take both individually and collectively to reduce the impacts of climate change now and in the future. Universities are a key translator of reliable, science-based information for the public. ... Quality of life depends on three critical elements: (1) environmental quality, such as air, water, climate, soils, plants, and animals; (2) economics, such as employment, income, wealth, technologies, trade, and markets; and (3) socio-political principles, such as justice, education, health care, science, culture and the arts, governance, and liberty. ... the communication of this information to the public must incorporate a broad range of disciplines.

Climate Change: What Does It Mean for Nebraska and the Great Plains?

In September 2014, a group of UNL scientists led by Don Wilhite put together a report entitled: *Understanding and Assessing Climate Change—Implications for Nebraska*. This report is a compilation of peer-reviewed scientific information from many disciplines and many resources, both global and local. It outlines the risks of climate change for Nebraska and its potential implications for the people of the state. The report highlights eleven Nebraska sectors that are threatened by climate change: crops, livestock, water resources, energy, forestry, ecosystems, urban systems, rural communities, insurance, invasive species and health.

In 2015 Dr. Wilhite led a series of sector roundtables as a follow up to the 2014 report. The report from the roundtables included recommendations for responses by each sector to the risks of climate change. The conclusion of the report stated as follows: "Given the expertise of the University of Nebraska and the leadership provided to date, it should be actively engaged in the development of a climate action plan and provide leadership for that process."

UNL's Competitive Advantage

The University of Nebraska-Lincoln is uniquely positioned to address the full array of climate change research and education questions facing the state, the nation, and the global community. UNL has outstanding faculty in the natural, biological, social, and computer sciences that possess both the expertise and interest in being a part of a coordinated campus-wide initiative on climate change.

Responses from our recent UNL-wide faculty survey [2009] on climate change expertise and interests, and the discussions that occurred at a series of listening sessions on both campuses in January, clearly demonstrate our capacity and great interest in embarking on a new campus-wide climate change initiative. In total, 156 faculty from a diverse array of UNL departments responded to our survey, expressing a great interest in participating in climate change research, teaching, and outreach. ...

Level of interest in initiative - interest range between 0 (no interest) and 7 (high interest)	
Level 7	62
Level 6	25
Level 5	28

Vision, Objectives and Projected Outcomes

The vision of the [Proposal] is to provide scientifically based information to decision makers to effectively address the far-reaching implications of climate change in Nebraska and beyond. The objectives and outcomes of a coordinated climate change research and educational program will be:

1. To increase competitiveness for external funding in climate change research and education/outreach programs.

The range of faculty research expertise in climate change was ascertained through our campus-wide faculty survey. The survey identified numerous specific areas of faculty expertise, including:

- modeling and monitoring impacts of climate change on various aspects of ecosystems;
- invasive species;
- biodiversity;
- detecting, monitoring, and modeling changes in biological populations (soil microbial communities, species diversity, vertebrates, pest distribution; insect population growth, vector-borne disease transmission; infectious diseases);
- modeling past and future climate at the global and regional scale;
- paleoclimatology (ANDRILL);
- drought mitigation, planning, and management;
- land-atmosphere interactions and feedbacks (plant-CO₂ interaction, temperature-soil interactions, aerosol interactions);
- remote sensing and GIS;
- ground water and surface water quality and resource management (lake salinity, aquifers, hydrologic balance/cycle, pollution, water scarcity);
- climate monitoring and climate data;
- human-environment interaction and human perceptions/behavior;
- methods for measuring and monitoring climate change and impacts (stable isotope analysis, statistics, sediment cores);
- monitoring greenhouse gas emissions for managed landscapes, urban areas, and animals;
- climate change impacts on livestock;
- crop resilience;
- energy and alternative energy (wind, corn ethanol);
- sustainable economic growth;
- legal and policy issues; and
- observing and modeling atmospheric chemistry.

Many of the most pressing climate change questions facing our state, nation, and global society require interdisciplinary teams from natural, biological, computer, and social sciences, including the humanities. Social sciences are critically important to address the human dimensions-related issues associated with climate change.

1) University of Nebraska

i) **UNL** – *Land Grant mandates: Research, Education & Outreach*

(1) Colleges

(a) Architecture

(i) Landscape Architecture

(b) Arts & Sciences

(i) Earth & Atmospheric Sciences

(c) Business

(d) Education & Human Services (*see IANR below*)

(e) Engineering – *Departments/Schools*

• *At City Campus, East Campus & in Omaha at The Peter Kiewit Institute*

(i) Biological Systems Engineering

(ii) Chemical and Biomolecular Engineering

(iii) Civil Engineering

(iv) Computer Science and Engineering

(v) Electrical and Computer Engineering

(vi) Mechanical and Materials Engineering

(vii) THE DURHAM SCHOOL - Architectural Engineering, Construction Engineering,

Construction & Construction Management

(f) Fine & Performing Arts

(g) Journalism & Mass Communication

(h) Law

(2) Institute of Agriculture and Natural Resources (IANR)

• *Core areas of focus: Livestock, Youth, Food, Water, Crops*

(a) College of Agricultural Sciences and Natural Resources (CASNR)

(i) School of Natural Resources (SNR)

• *Mission areas: Applied Ecology, Applied Climate Science, Environmental Science, Geography and Spatial Science*

(1) State Climate Office

(2) Nebraska Forestry Service

(b) Agricultural Research Division (ARD)

(c) Nebraska Extension

• *Note: The ARD & Extension components of 3 departments in the College of Education & Human Services*

(3) Other

(a) NU-wide Institutes

(i) Daugherty Water for Food Institute

(ii) Rural Futures Institute

(b) National Drought Mitigation Center

(c) High Plains Regional Climate Center

ii) UNO

**LR 455 Special Committee Report – University of Nebraska at Omaha
November 3, 2016**

1. A vital part of the role of colleges and universities are research, education, and outreach. Is your institution involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Beyond work specifically focused on climate change, UNO is also involved with a wide variety of sustainability-related areas in research, teaching and outreach.

Examples include:

1. Curriculum – UNO's vision and goal is that all graduates, faculty, and staff are sustainability literate. Sustainability literacy is embedded in curricular and co-curricular programs, and it is realized in the classroom (physical and virtual) and through experiential learning on and off campus. During Academic Year 2015-2016, UNO listed 72 courses considered focused on sustainability, and 174 courses considered related to sustainability. They range from core courses in Biology, Geography and Business to electives in virtually all programs of study. Examples include: Environmental Ethics (PHIL 3180) which contains a substantive section on climate change and sustainability; Principles of Sustainability (BSAD 2100), an honors course taught in the College of Business Administration, focuses heavily on climate change issues and the impact of business and consumer decision-making as well as public policy impacts on the planet; Sustainable Supply Chain Management (SCMT 3410) which looks at sustainability and competitive advantage within business processes; and Introduction to Sustainable Landscape Design (ENVN 3660) which addresses sustainable approaches to land development, low impact development, and maximization of biodiversity and human quality-of-life within urbanized and rural landscapes.

Additionally, UNO has an approved Sustainability Minor open to all undergraduate students at UNO; a Bachelor's in General Studies with a Sustainability Concentration, and a Master of Business Administration with a Sustainability Concentration.

2. Transportation Planning and Research - Due to its size, UNO's campus has a significant impact on traffic and parking in midtown Omaha. Adopting policies that encourage the use of active or lower-emission transportation options can reduce road and parking congestion, reduce pollution, promote healthy lifestyles, and preserve infrastructure. Research by Drs. Angie Eickenberry and Craig Maher in the College of Public Affairs and Community Service identified parking constraints and potential solutions. Enhancements implemented to reduce fossil fuel emissions include two B-cycle stations; Metro Transit bus passes for all faculty, staff and students; UNO ride matching; ZipCars; and Emergency Ride Home service.

3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your institution who would be willing to testify at that hearing regarding your institutions work in that area? If so, please let us know the name of person and the topic of testimony.

1. Dr. Alan Kolok is available to testify to the role that citizen science, within the state, plays in data collection relative to climate change.
2. Rick Yoder, P.E. is available to testify on the mitigation of climate change.
3. Prof. Steven N. Rodie is available to testify on 1) bioretention plant research and adaptability for use in green infrastructure as a best management practice for stormwater management, and 2) background information on the Center for Urban Sustainability at UNO.
4. Dr. Elizabeth Chalecki is available to testify on developing climate and sustainability-based curriculum at UNO.

4. Are there members of your institution working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.

A. Research

1. The Global Land Ice Measurements from Space (GLIMS) project is an international collaboration with involvement from the Geography/Geology department via Professor Emeritus Dr. John (Jack) Shroder. This project monitors the world's glaciers and continues to develop tools to aid in glacier mapping. Dr. Shroder's primary research interests are in Pakistan and Afghanistan.
2. Dr. Beth Chalecki, Political Science, researches climate change, environmental security, and global environmental threats, as well as the role of science in policy making. She would be happy to supplement the Nebraska Plan for Climate Change with her research on military responses to climate-related threats.
3. Dr. Bradley Bereitshcaft, Geography/Geology, focuses on urban livability and sustainability, which has implications for climate change. Dr. Bereitshcaft is interested broadly in advancing urban sustainability, and even though Nebraska is a largely rural state, over half the population lives in mid-to-large cities. There is great opportunity to make our cities (particularly Omaha and Lincoln) more livable and sustainable, and in doing so help mitigate and adapt to climate change.
4. Dr. Bruce E. Johansen, Communication and Native American Studies, has written extensively on climate change. Publications include "Melting Ice and Burning Tundra: Climate Change and Native Peoples

B. Teaching and Outreach

1. Dr. Alan Kolok directs the Nebraska Watershed Network, which conducts citizen science events, known as Watershed Days. In these events, the individuals accumulate water quality data which they then share electronically. In a similar fashion to the data collected at the station, these data provide data related to the interaction between water quality and climate change. Additionally, the Network is initiating a program, (the Nebraska Environmental Sustainability Taskforce, NEST) that will be an electronically linked, data acquisition system that will be used to monitor state wide environmental variables. The data will be collected by citizen scientists, in conjunction with institutes of higher education that are located near their communities. These data will provide state-wide information that will be valuable relative to generating an understanding of climate change on a state wide basis.
2. The UNO Center for Urban Sustainability (directed by Professor Steve Rodie) and the UNO Sustainability Office (led by Sarah Burke) are developing a student Campus Sustainability Network aimed at integrating all interested students in a hands-on, student-led and mentored, campus program aimed at addressing food security and waste, energy and water conservation, stormwater quality and quantity, and other issues deemed important by the students.

5. Are there members of your institution who have indicated an interest working on climate change issues if provided an opportunity to do so? If so please provide names and their areas of interest.

1. Dr. Laura Gram, Philosophy: The Philosophy department, perhaps in conjunction with the Human Rights minor, could expand the options for teaching and research in this area. At the moment the department is searching for faculty who have a background in these issues and could develop our curriculum further, but budget limitations prevent us from taking significant steps in this direction. Personally, she would be interested in doing research and teaching related to ethics and climate change if the opportunity presented itself.
2. Dr. Beth Chalecki, Political Science: Dr. Chalecki is interested in supplementing the Nebraska Plan for Climate Change with her research on military responses to climate-related threats.
3. Dr. Erin Bass, Department of Management: Dr. Bass is interested in corporate social responsibility and strategy in natural resource-based industries.
4. Dr. Christian Janousek, School of Public Administration: Continuing research on solar policy and deployment in Nebraska.

Landscape Architecture

Dr. Kim Wilson, Professor & Director

1. The mandates of a land grant university are research, education, and outreach, is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Sustainability and resiliency is an underlying principle and goal of the Landscape Architecture profession and thus, embedded in almost all of the professional program specific course work. The Landscape Architecture Program develops upper level design studio topics (LARC 311, 411 and DSGN 410) with a focus on green infrastructure and site planning and design focused on resiliency and sustainability where students learn about ways to address certain aspects of climate change. We offer professional elective classes on green roofs, green infrastructure and storm water management. The LARC 211, Materiality course focuses on the life cycle and resiliency of construction materials. Five of the program faculty are addressing climate change through their specific research on green roofs, historic green infrastructure, wetlands, materials, waste, brownfields and site life cycles.

Architecture

Dr. Jeffrey Day, Professor & Director

1. There are three individuals in particular whose work centers on sustainable practices in architecture as related to climate change:

The focus of Tim Heimsath's research and teaching is building energy modeling and performance. He seeks to improve the Energy Efficiency of Buildings, specifically the geometric sensitivity of energy use in commercial and residential buildings both new and existing

Mark Hostad: Sustainable Urbanism as manifest in the following trajectories:

- Heritage Integration (preservation strategies)
- Economic Inclusion (diversity and support structures)
- Food Integration (use integration)
- Ecological Frameworks (in conjunction with water systems)
- Energy Consideration (macro scale vs. micro scale)
- Density (vertically layered cities)
- Sustainable Urban Design (frameworks for sustainability)

Sharon Kuska:

The bulk of my research efforts will focus on the areas of sustainability and women in architecture. In my role as Vice President of the Joslyn Institute for Sustainable Communities, I am involved in a variety of projects centered around the 5-domain EcoSTEP ideology developed by JISC. Along with promotion of the Sustainometrics book and assessment program, I am co-authoring another manuscript on Making Sense of Sensible Making. Another project involves idea generation and coordination assistance with the Pershing Auditorium conversion into a downtown Lincoln Food Hub development. Also working with EcoStores Nebraska in the area of Waste to Energy and Recycling Transfer Station Development. In

College of Arts & Sciences

Question 1: The mandates of a land grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Yes, along with my Department of Earth and Atmospheric Sciences (EAS) faculty colleague Clint Rowe, we have developed the UNL Regional Climate Modeling Task Force (RCMTF). Climate scientists from EAS have a long history of using regional and global climate models to predict the weather, make projections of future climate states, and, most importantly, expand our understanding of atmospheric processes at all time and space scales as well as the interactions between the land surface and the atmosphere. Over the past decade, EAS scientists, led by Professors Oglesby and Rowe, have been utilizing these regional climate models to downscale the output from global climate models (generally at a spatial scale of about 100 km) to scales of around 10 km (or less) to provide information about future climates at a scale that is more useful to policymakers, resource managers, urban planners, private companies, and citizens.

These projections are based on climate change scenarios developed to describe plausible future conditions that provide assumptions for analyses of potential impacts and responses to climate change. Scenarios are not predictions or forecasts; rather, they provide a range of future conditions to help quantify the uncertainty inherent in any attempt to anticipate future developments in a complex system such as the Earth's climate. Such climate information is of value if its limitations are known and made explicit and climate-sensitive decisions are addressed appropriately. Much of the uncertainty in climate projections arises from the unknown uncertainty in the underlying scenarios, which are based on assumptions of fossil fuel usage, land use changes, population growth, economic trends, and the like -- all aspects of societal development (i.e., aggregated human behavior) that are even more difficult to predict than the weather!

Specific RCMTF activities include running numerous workshops over the past three years to provide training in dynamical downscaling of global model simulations of future climate change to the local and regional scale. The focus has been on Mesoamerica. In addition, we have also been part of a team that developed and ran Workshops on the Impacts of Climate Change for South and Southeast Asia. (Our role in these more expansive Asia workshops was similar that for the more focused workshops we ran in Mesoamerica.) The work in Mesoamerica has been funded by the Interamerican Development Bank (IDB) and, more recently as well, directly by the Ministry for the Environments in Bolivia and in Guatemala, as well as the National University of Honduras. The work in Asia was funded by the United Nations University, in conjunction with the Japanese Ministry for the Environment.

Question 2: *Is there someone in your college or department that our office should contact related to issues of climate change, resiliency and sustainability?*

Yes, for climate change Professor Robert J. Oglesby 402-472-1507 roglesby2@unl.edu and Professor Clinton Rowe 402-472-1946 crowe1@unl.edu. Please realize our expertise is in climate change science, not resiliency or sustainability. As discussed more fully in the response to question 5, it would be very useful to have a college-wide (or better yet university-wide) survey of who the experts are in these areas.

Question 3: *The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your college or department who would be willing to testify at that hearing regarding your college or department's work in that area? If so, please let us know the name of person and the topic of testimony.*

Yes, Professors Oglesby and Rowe can testify about the activities described above they are involved in, as well as those others in the Department and College they are aware of.

Question 4: *Are there members of your department or college working on climate change issues in their individual capacity? If so, please provide names of faculty and their areas of involvement.*

Yes, see the above. (We're not quite sure what is being asked here. By 'individual capacity' is it meant as a private citizen? Or as an individual researcher not involved in a collaborative effort?)

Question 5: *Are there members of your department or college who have indicated an interest in working on climate change issues if provided an opportunity to do so? If so, please provide names and their areas of interest.*

We are not aware of such faculty, but would be most willing to assist them in any way possible. Indeed, it would be worthwhile broadcasting such a call. Perhaps the college, or better yet the University could send out a survey to all Faculty and associated research staff focused on questions 4 and 5. It might also be useful to convene a college or university-wide meeting or perhaps better a half-day or full day workshop devoted to this topic.

Also, the new CAS VSIR Climate Change cluster hire is a major step forward in this regard. Reiterating from the Executive Summary of the proposal that spawned this new initiative:

Dear Senator Haar:

Please find below the responses to the questions that you posed to the College of Engineering on October 14, 2016. If you have any additional questions or require additional information, please do not hesitate to contact me. Thank you for your interest in the College of Engineering.

Sincerely,



Lance C. Pérez, PhD
Professor of Electrical and Computer Engineering
Interim Dean, College of Engineering

1. The mandates of a land grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Faculty and academic units in the College of Engineering are involved in many research, teaching and outreach activities broadly related to climate change, resiliency and sustainability. Faculty in the Department of Electrical and Computer Engineering are involved in renewable energy research (federally funded) and education (courses and graduate research), including advanced transportation technology. They also have some outreach activities partnering with the Department of Energy National Renewable Energy Lab in wind energy. Faculty in the Department of Civil Engineering are involved in research that examines water use, the resiliency of buildings to natural and man made disasters, and building efficiency.

The faculty in the Durham School of Architectural Engineering and Construction is heavily involved with the conservation and generation of energy for buildings. In the US, buildings consume 40% of the energy and produce the associated level of carbon and other greenhouse chemicals (refrigerants). The curricula focus on such topics as LEED, building energy modeling, photovoltaic solar generation, heating ventilation and air conditioning, day lighting, and indoor air quality. The faculty research similar topics with extensions to system-level energy optimization with respect to the energy generation source, time of day, intermittency, specifically the blending of renewables with conventional sources.

involvement. I may not be interpreting this question correctly. I am not aware of faculty in the College of Engineering who are involved in these issues outside of their faculty work.

4. Are there members of your department or college who have indicated an interest working on climate change issues if provided an opportunity to do so? If so, please provide names and their areas of interest

Not that I am aware of.

Biological Systems Engineering

Dr. Mark Riley, Professor and Department Head

1. The mandates of a land-grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.
 - Yes, we have research and extension activities that are directly or indirectly engaged in the response to changing climate. One set involves collecting information on planting and irrigation needs and how they have changed over time. We also have research that develops models on how change in climate impacts precipitation.
2. Is there someone in your college or department that our office should contact related to issues of climate change, resiliency and sustainability?
 - Suat Irmak has collected data on planting dates and how farmers have adapted to soil and air temperature changes.
3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your college or department who would be willing to testify at that hearing regarding your college or department's work in that area? If so, please let us know the name of person and the topic of testimony.
 - I cannot speak as to whether Dr. Irmak would testify, but he has been engaged in such activities previously.
4. Are there members of your department or college working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.
 - Francisco Munoz Arriola is a hydroinformaticist who is developing models on how changing climate impacts precipitation.
 - Adam Liska was involved in the report from UNL in recent years on climate change. His activities focus on life cycle assessments of the impact of agricultural practices on carbon sequestration.
 - Suat Irmak has published on changing planting dates from 100 year historic data in Nebraska.
5. Are there members of your department or college who have indicated an interest working on climate change issues if provided an opportunity to do so? If so please provide names and their areas of interest.
 - See above.

Date: Friday, October 14, 2016 at 3:51 PM

To: UNL <mmarron2@unl.edu>

Subject: LR 455 Special Committee

Dear Dean Marron:

I am the co-chair of the LR 455 Special Committee authorized to create the framework for a Nebraska plan to respond to the challenges and opportunities of climate change. One aspect of our study is the role of higher education in climate change resiliency and sustainability planning efforts for the State of Nebraska.

UNL has shown leadership on many aspects of climate change research and education, including the 2014 report *Understanding and Assessing Climate Change, Implications for Nebraska*. The LR 455 committee is interested in determining whether your college or department is involved in issues related to climate change resiliency and sustainability and if so, the nature and extent of such involvement. I have discussed this issue with Chancellor Green and he is aware that we are seeking input from colleges and departments of UNL about activities and level of interest related to climate change resiliency and sustainability.

In 2009, Don Wilhite engaged in a survey of UNL faculty about climate change and their involvement in the issue. The survey led to recommendations about UNL's involvement in responding to climate change. A summary of the survey, updated to reflect more recent work in this area, is attached for your reference.

Please respond to the following questions:

1. The mandates of a land grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

The College of Journalism is not directly involved in research, education or outreach related to climate change, sustainability, etc.

1. Is there someone in your college or department that our office should contact related to issues of climate change, resiliency and sustainability?

Dr. Mary Kay Quinlan, associate dean, is involved in the Rural Futures Institute. If the RFI examines issues of sustainability, she would be the relevant college contact.

1. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your college or department who would be willing to testify at that hearing regarding your college or department's work in that area? If so, please let us know the name of person and the topic of testimony.

NA

1. Are there members of your department or college working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.

None known of

October 28, 2016

Senator Ken Haar
District 21
State Capitol Rm 1015
PO Box 94604
Lincoln, NE 68509

Dear Senator Haar:

I am writing in response to your October 14, 2016 email requesting information from the University of Nebraska College of Law regarding the role of higher education in climate change resiliency and sustainability planning efforts for the State of Nebraska. Specifically, you requested that I respond to five questions. My answers are below:

1. The mandates of a land grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Our educational program addresses climate change, resiliency and sustainability in several ways.

Professor Sandi Zellmer is one of the leading experts in the country on water law issues. She also is involved in research, education, and outreach related to climate change, resiliency and sustainability. Professor Zellmer has written about adaptive management and mitigation in the face of climate change, particularly as it relates to public lands management and water resources. She also teaches about climate change in most of her classes, primarily Environmental Law and Disaster Law.

Professor Anthony Schutz spent two years in 2010-2012 working on water sustainability issues in the Republican River Basin. Since then, he has written on the subject and he incorporates sustainability principles and considerations into his classes, including his courses in water law, agricultural law, state and local government law, and land use regulation. Because climate variability has an impact on agricultural production and water management, it has become a consideration. So Professor Schutz's classes and work tend to take it into account, at least to the extent we should consider how existing legal rules, standards, or institutions are up to the task of dealing with the changes that lie ahead.

Professor Jessica Shoemaker discusses climate change in her Rural Development and Energy Law seminar. She and the students discussed climate change as one of many themes related to changing rural landscapes (socially, economically, and ecologically).
103 Ross McCollum Hall / P.O. Box 830902 / Lincoln, NE 68583-0902 / (402) 472-2161 / FAX (402) 472-5185

<http://www.nature.com/nclimate/journal/v2/n10/abs/nclimate1547.html>) on climate change risk perception. Some commentators have suggested that people deny that climate change poses a large risk because they fail to understand the science behind it. She and her co-authors tested this hypothesis by measuring subjects' climate change risk perceptions, science literacy, and numeracy, and found no support for it. Those most able to understand the science were not the ones who held the greatest belief that climate change poses a serious risk; instead, those people were most culturally polarized on the issue. Professor Wittlin would be happy to talk about this paper with the Special Committee.

4. *Are there members of your department or college working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.*

The College of Law has no response to this question.

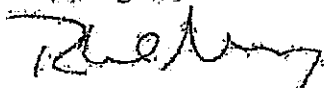
5. *Are there members of your department or college who have indicated an interest working on climate change issues if provided an opportunity to do so? If so please provide names and their areas of interest.*

The College of Law runs an Entrepreneurship Clinic, which provides free advice and legal representation to start-up business clients throughout the State of Nebraska. The E-Clinic handles a variety of early-stage legal matters, including entity formation, contract drafting and review, intellectual property protection, regulatory, compliance and other transactional legal matters. Law students provide these legal services under direct supervision of Professor Brett Stohs. Professor Stohs would be happy to consider working on climate change issues by, for example, providing legal services to Nebraska startups that are directly contributing to combatting climate change. Or, if the State were to provide incentives for Nebraska startups to tackle climate change issues, the E-Clinic could become expert in those programs and perhaps do public programming on them as part of its outreach mission.

For Professor Schutz, it would depend on the commitment and role he would play. If it can be done in conjunction with research and teaching he already has planned, then he would be willing to be considered.

Please let me know if you need any more information. Thank you for the work you and your committee are doing on behalf of the citizens of Nebraska.

Kind regards,



Richard Moberly
Interim Dean
Richard & Catherine Schmoker Professor of Law

cc: Ronnie Green, Chancellor, University of Nebraska-Lincoln

UNL Public Policy Center

ABOUT THE PUBLIC POLICY CENTER

The University of Nebraska Public Policy Center provides a unique opportunity for policy makers and researchers to work together to address the challenges of local, state, and federal policy. Center researchers combine professional expertise with rigorous academic methods and stakeholder involvement. The Center brings commitment to collaborations as well as timely processes and outcomes.

Public Policy Center researchers come from diverse disciplines, including: Business, Economics, Family and Consumer Sciences, Law, Political Science, Psychology, and Sociology. Our staffers typically participate in projects through grants and contracts. The Center has worked with a wide variety of local, state, and federal organizations for over 15 years.

We are leaders in utilizing university resources to research important questions and bring about real world solutions. The Center is poised to assist you with policy-oriented research, consulting, data collection (e.g., interviews, focus groups, surveys) and analysis, program evaluation and management, as well as strategic planning and facilitation. Faculty and staff are dedicated to employing their disciplinary approaches, along with the expertise of policymakers, and the voices of stakeholders, to create responsive public policy.

SERVICES PROVIDED

Program Evaluation Design and Analysis

The University of Nebraska Public Policy Center conducts high quality, program evaluations, with our efforts to date concentrated in the areas of criminal justice, mental health, healthcare, emergency management, and human services. Our approach is to work in partnership with stakeholders to define evaluation questions, plan evaluation activities, interpret results, and use findings to make (and sometimes implement) program changes. We use quantitative and qualitative techniques, or the combination of the two (mixed methods), in order to answer key questions for decision makers. We have the capacity to scale our approach and work across multiple sites. Our capabilities include survey design, data analysis, report generation, interviews, focus groups, geographic or photographic data, and processes to increase evaluation capacity of stakeholders.

Project Management

The Center brings high-level expertise in managing and integrating projects, from small to statewide and from short-term to multi-year. Examples of the Center's program integration and management services include: managing the work of multiple committees and boards to achieve a common purpose, negotiating with sub-

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HIGH PLAINS REGIONAL CLIMATE CENTER

hprcc.unl.edu

Providing timely climate data and information to the public for cost effective decision-making

Supporting Research Across the Nation and Beyond

Mission

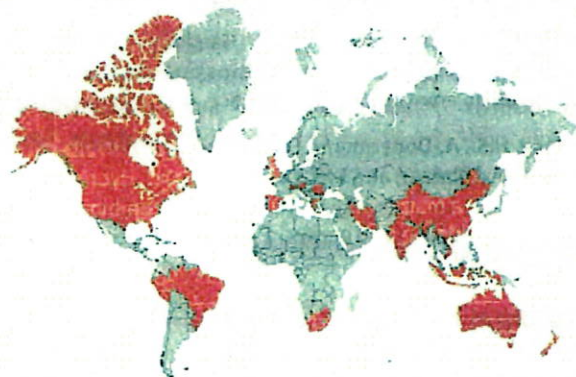
The High Plains Regional Climate Center (HPRCC) serves to increase the use and availability of climate data and information. We achieve this by providing climate services, developing climate data and information products, and engaging our stakeholders. Our six-state region covers Kansas, Colorado, Nebraska, Wyoming, South Dakota, and North Dakota. The Regional Climate Centers are supported by NOAA/NCEI as part of a three-tiered approach, emphasizing services that are local, regional, and national in scope.

HPRCC supports 5 full time employees working in the areas of: climate services, database and product development, stakeholder engagement and outreach, climate monitoring, and applied regional climate research.

Broad Reach

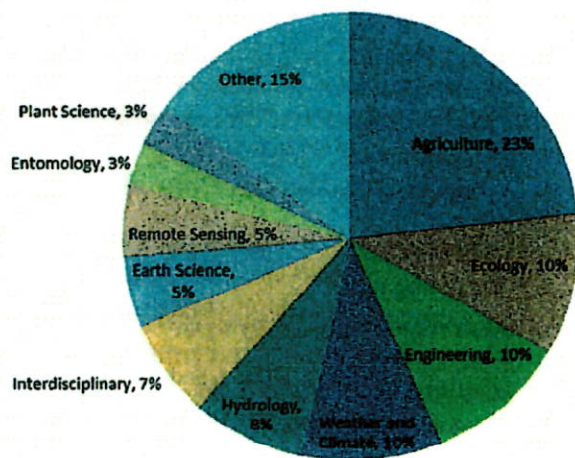
The customer base for the Center is large and varied, including researchers, educators, NGOs, utilities, insurance, legal, media, engineering, and the private sector, in addition to state, federal and tribal government, among others.

In the past 5 years alone, the HPRCC has served the applied climate data needs of every state in the nation and over 20 countries and U.S. territories.



Countries served by the HPRCC.

Research Areas Served



Based on a review of 550 peer-reviewed articles.

Approximately 28 percent of all the HPRCC's direct customer contacts originate from research, teaching, and extension personnel at universities. These inquiries range from simple data retrievals to more complex data analyses.

HPRCC data, information, services, and expertise have been utilized in hundreds of peer-reviewed articles from a broad range of disciplines, the majority of which are outside the field of meteorology/climatology. The opportunities for use of HPRCC services or collaboration with HPRCC staff are endless.



3.

Climate Masters of Nebraska

Thursday evenings, January 15-March 19, 6:00-8:30pm, 163 Hardin Hall

Course Description and Guidelines

The goal of the Climate Master program is to increase understanding among individuals and households about the causes of climate change and to encourage and achieve reductions of personal greenhouse gas (GHG) emissions.

What is a Climate Master?

Climate Masters participate in 10 weeks of training on climate change and action strategies for reducing personal GHG emissions. The training topics include identifying and reducing emissions in food choices, home energy use, yards, consumption, and waste practices. Other topics that will be discussed are renewables, water conservation, and drought.

Volunteer Commitment

In exchange for the training, Climate Masters will volunteer for at least 30 hours within six months from the start of the course, sharing the information they have learned and supporting behaviors that reduce GHG emissions. Climate Masters will receive their certification upon completion of their volunteer time.

Fulfilling the Commitment

Our staff will work with volunteers directly to set up appropriate, fulfilling, and enjoyable opportunities to share their skills and knowledge. All volunteer work must be pre-approved by the project coordinator or it will not count toward qualifying hours. The following choices are acceptable options for fulfilling your obligation:

1. Outreach events

The public is interested in information on what they can do in their own lives to reduce their GHG emissions. When we work at outreach events, we may help people calculate their carbon footprint and provide information on reducing emissions.

2. Litter pick up events

There will be an organized group litter pick up during the course. While it is not mandatory it is highly recommended that you participate. You could also volunteer to organize one yourself. Getting family, friends, colleagues, or other social group members to participate is a fun and rewarding experience.

3. Other activities

Other volunteer opportunities include public speaking, writing or editing materials, volunteering time at a reuse or recycling store, and special events. We are also open to your suggestions for ways to fulfill the volunteer commitment. Previous volunteers have helped divert tile flooring waste from the landfill by convincing businesses to donate it to a reuse store, set up a drip irrigations system, started the Lincoln Citizen's Climate Lobby chapter, and more.

Climate Masters of Nebraska 2015 Course Agenda



DATE	TOPIC
January 15	Class introduction Cleaner, Greener Lincoln
January 22	Climate Change
January 29	Recycling
February 5	Food and Composting
February 12	Communicating Climate Change
February 19	Home Energy
February 26	Consumption and Waste
February 28	Landfill Tour-10 am
March 5	Yards
March 12	Water Conservation and Drought
March 14 or 15	Litter Pick Up
March 19	Graduation/Potluck


*Classes are held on Thursdays from 6:00 to 8:30 pm in 163 Hardin Hall unless noted otherwise.
Volunteer opportunities and tours may fall on weekends.*

CLIMATE AND SOCIETY, NRES 452/852
Lecture Schedule—Spring 2016
Dr. Michael Hayes
 Revised: March 28, 2016*

Week	Date	Topic	Assignment
1	Jan. 12	Introduction	Syllabus and Reading List
	Jan. 14	Climate and Society	<ul style="list-style-type: none"> ◦ Lazo et al. 2011 U.S. Economic Sensitivity to Weather Variability ◦ Wuebbles 2012 Celebrating the "Blue Marble"
2	Jan. 19	Climate, Society, and Vulnerability	Guest: Dr. Theresa Jedd <ul style="list-style-type: none"> ◦ Gordon and Ojima 2015 Colorado Climate Change Vulnerability Study: Chapter 1
	Jan. 21	Climate, Society, and Vulnerability	Guest: Dr. Theresa Jedd <ul style="list-style-type: none"> ◦ Gordon et al. 2015 Colorado Climate Change Vulnerability Study: Chapter 3
3	Jan. 26	Climate, Society, and Management	Guest: Dr. Theresa Jedd <ul style="list-style-type: none"> ◦ Jedd et al. 2015 Colorado Climate Change Vulnerability Study: Chapter 9
	Jan. 28	Climate, Society, and Management	Guest: Dr. Theresa Jedd <ul style="list-style-type: none"> ◦ In-class activity
4	Feb. 2	Snow Days and Society	
	Feb. 4	Climate and Society	
5	Feb. 9	Historical Climate	
	Feb. 11	Historical Climate	<ul style="list-style-type: none"> ◦ Buentgen et al. 2011 2500 Years of European Climate Variability and Human Susceptibility


	Mar. 31	Climate Change Science	<ul style="list-style-type: none"> • Maibach et al. 2016 AMS 2016 Climate Change Survey Results • Ruddiman 2015 How Did Humans First Alter Global Climate?
12	Apr. 5	Climate Change Science	<ul style="list-style-type: none"> • Wardlekker et al. 2009 Exploring the Christian Voices in the U.S. Climate Change Debate • Sovacool 2013 The Complexity of Climate Justice • Hayhoe 2015 http://www.scientificamerican.com/article/science-and-faith-can-solve-climate-change-together/
	Apr. 7	Test	Covers assignments through Part 2, Weeks 7-12
13	Apr. 12	Climate Change Impacts	
	April 14	Climate Change Impacts	
14	April 19	Climate Change: Mitigation and Adaptation	
	April 21	Climate Change Attitudes	
15	April 26	Final Exam?	
	April 28	Final Exam?	
16	May 6	FINAL EXAM? 10am-noon	

*Schedule is tentative and subject to changes during the semester.

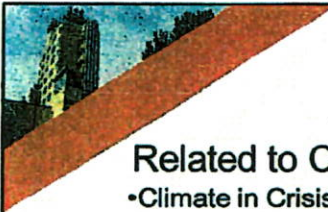


SNR Centers

- Center for Advanced Land Management Information Technologies (CALMIT)
- Conservation and Survey Division (CSD)
- Great Plains Cooperative Ecosystem Studies Unit (GP-CESU)
- High Plains Regional Climate Center (HPRCC)
- National Drought Mitigation Center (NDMC)
- Nebraska Cooperative Fish & Wildlife Research Unit
- Nebraska State Climate Office (NSCO)




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Sample SNR Courses Related to Climate and Climate Change Issues

- Climate in Crisis
- Climate and Society
- Hydroclimatology
- Microclimatology
- Applied Climate Science
- Global Climate Change
- Climate Masters of Nebraska



2




SNR Linkages with:

- UNL Extension
 - “Climate Resiliency”
 - “Weather-Ready Farms”
- USDA Regional Climate Hubs
- Department of Interior Climate Science Centers
- NIDIS Regional Drought Early Warning Systems

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SNR: Recent Journal Articles

- Why different drought indices show distinct future drought risk outcomes in the U.S. Great Plains? *Journal of Climate*, 2016.
- Pharaoh's Dream Revisited: An Integrated U.S. Midwest Field Research Network for Climate Adaptation. *Bioscience*, 2015.
- Mapping the decision points and climate information use of agricultural producers across the U.S. Corn Belt. *Climate Risk Management*, 2015.
- The effects of extreme drought on climate change beliefs, risk perceptions, and adaptation attitudes. *Climatic Change*, 2016.
- Agricultural Advisors as Climate Information Intermediaries: Exploring Differences in Capacity in Communicating Climate. *Weather, Climate, and Society*, 2015.

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SNR: Recent Dissertation Titles

- Adaptation to Climate Change via Insurance and Financial Incentives
- Resilience Thinking, Adaptive Management, and Optimization for Structured Decision Making in Social-Ecological Systems
- Improving Drought Management for Transboundary River Basins in the United States through Collaborative Environmental Planning
- Essays on Decision Support for Drought Mitigation Planning: A Tale of Three Tools
- Interpreting Temperature- and Precipitation-related Scientific Information for the Agricultural Community in the U.S. Corn Belt (in progress)
- Measuring and Characterizing Adaptive Capacity of Agricultural Producers in the U.S. Great Plains in the context of Climate Vulnerability and Resilience Models (in progress)

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Holland Computing Center Schorr Center and the Peter Kiewit Institute

- Supercomputing resources
 - 25,000 compute cores, 6 PetaBytes of data
- Serve more than 1,000 NU researchers across 4 campuses
- “Open Science Grid” collaborative research infrastructure allows collaboration with researchers world wide
 - 18 PetaBytes of data transfers per month
- Provided more than 41 million CPU hours to UNL climate modelers and their international collaborators over the past 5 years

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Climate Variability and Climate Change Capacity within the Climate and Spatial Science Applications (CASSA) Mission Area in the School of Natural Resources at the University of Nebraska-Lincoln

Approximately one-third of the U.S. Gross Domestic Product (GDP) is sensitive to weather and climate impacts, potentially affecting close to \$4 trillion every year in economic sectors such as agriculture, energy, transportation, insurance, engineering, manufacturing, health care, recreation, and tourism. In addition to this present threat to society and the nation's natural resources, projected increases in temperature and changes in the amount and seasonal distribution of precipitation, along with increases in evapotranspiration, runoff, and groundwater recharge suggest profound effects on agriculture, water supplies, and other ecosystem services in the coming decades. The potential for more frequent and severe extreme events such as droughts, heat waves, and heavy rainfall events will lead to greater threats to the Great Plains region's water resources with concomitant impacts on agricultural activities, unique natural and protected areas, and the health and prosperity of its inhabitants.

Increased climate variability and changes in climate state will offer enormous management and policy challenges for Nebraska given the region's fragile ecosystems. The School of Natural Resources (SNR) is a unique unit in the Institute of Agriculture and Natural Resources (IANR) because of the multitude of disciplines represented. The interdisciplinary nature of the faculty and staff in our unit provides the capacity to study complex natural resources and environmental issues that are at the cutting edge of key scientific questions currently facing societies globally. An increased understanding of the potential impacts, adaptation strategies and mitigation actions, policy implications, and ecological consequences of climate variability and change on natural resources and agricultural productivity in Nebraska and elsewhere is needed. This includes needs for research, teaching, and outreach. This will require a multidisciplinary and interdisciplinary effort across SNR and with multiple IANR and UNL units. In 2009-10, a survey of UNL faculty interest in climate change in association with the Climate Change Program of Excellence proposal development process determined that 156 faculty from 62 units across the UNL campus had an interest in engaging in climate change-related research, teaching, and outreach activities.

The broad range of academic activities of SNR's Climate and Spatial Science Applications Mission Area and other mission areas are targeted at conducting research on and training students and educating clientele about the interrelationships between climate and the environment. Our goal has been, and will continue to be, to provide usable and more timely information to decision makers to lessen the risks associated with changes in climate and its variability.

The responses below are for specific questions submitted by Nebraska State Senator Ken Haar.

1. The mandates of a land grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Research Topics that Address the Climate Variability and Climate Change Issue

- Historical climate trends and climate variability

- Bob Oglesby and Clint Rowe (EAS) provide considerable training worldwide related to climate modeling and downscaling techniques related to climate models.
- Both the NDMC and HPRCC promote capacity building (directly related to long-term sustainability and resilience) on local, regional, national and international scales in the form of training, workshops, consultancies, reports, guides/handbooks, etc.

-Outreach/Extension Activities

- Faculty and staff are engaged in the Nebraska Extension "Climate Resiliency" and "Weather Ready Farms" initiatives
- Use of climate information in decision-making and the dissemination of climate data and information
 - Workshops on the use of climate data for decision making
- When funding is available, a course for the public called "Climate Masters" is also offered. This is a 10-week course on action based climate change education for community members in Nebraska. The impacts of the program will be measured in terms of the individual behavior changes to mitigate greenhouse gas emissions and to enhance environmental sustainability.
- Climate and drought monitoring and early warning for tribes
- Climate data collection and archiving for the state, region, and nation
- Drought monitoring/early warning and drought risk management
- Regular regional webinars
- Regular interactions, meetings, workshops with the USDA Regional Climate Hubs and the Department of Interior's Regional Climate Science Centers
- Both the NDMC and HPRCC promote capacity building (directly related to long-term sustainability and resilience) on local, regional, national and international scales in the form of training, workshops, consultancies, reports, guides/handbooks, etc.

2. Is there someone in your college or department that our office should contact related to issues of climate change, resiliency and sustainability?

At the moment, Martha Shulski already serves in that capacity as both the Mission Area Leader and as a representative of the Nebraska Extension's climate and weather programs. Michael Hayes is willing to assist in these efforts also, particularly if it relates to research and teaching-related activities.

3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your college or department who would be willing to testify at that hearing regarding your college or department's work in that area? If so, please let us know the name of person and the topic of testimony.

Depends on the time of the hearing. If the hearing is in the morning, Martha Shulski or Michael Hayes can participate. If the hearing is in the afternoon, Mark Svoboda can participate. The topic would be on the climate variability and climate change activities taking place within the Climate and Spatial Science Applications Mission Area within the School of Natural Resources.

INFORMING DECISIONS.

We deliver science-based weather and climate info so *you* can make informed decisions.

HIGGINS RANCH



OUR DATA

- Operation of the **Nebraska Mesonet** with nearly 70 stations in the field to monitor the environment
- Automated observations of:
 - air temperature
 - humidity
 - wind speed and direction
 - precipitation
 - solar radiation
 - soil temperature
 - soil moisture



OBJECTIVES

- Provide high quality and timely services to the user community
- Manage and maintain a statewide weather network
- Engage stakeholders to understand information needs



OPERATIONS

- A recognized climate office by the American Association of State Climatologists (stateclimate.org)
- Operates within a three-tiered system of climate services: state, regional and federal
- Funding comes from the State of Nebraska through the Department of Natural Resources and the University of Nebraska-Lincoln (IANR)



WHERE WE ARE

School of Natural Resources
153 Hardin Hall
*Institute of Agriculture
and Natural Resources
University of Nebraska-Lincoln*

OFFICE HOURS
8 a.m. – 4:30 p.m.

PHONE
402.472.5206

EMAIL
nsco@unl.edu



Concordia University, Nebraska's Response to LR455

1. A vital part of the role of colleges and universities are research, education, and outreach. Is your institution involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Currently, Concordia University, Nebraska is not actively engaged in climate change research. However, research is a part of coursework within the natural sciences. For instance, in upper level Conservation Biology and Ecology, we look at how current niches will shift or disappear in response to global and local climate trends. We use these data to calculate population viability analyses of various species and propose conservation and natural reserve plans accordingly. In lower level, general education biology, we look at the science and data of climate change realities and analyze research and websites to determine whether it is based on good science, unreliable blogs, or special interest funding. In response to general education student interest and evident need for learning sustainable business practice, educational application, and general sustainable living practice, we are investigating the development of a new course "Biology and Sustainability" to engage students in practical service learning and sustainability research. In the future, this will be connected with a sustainable agriculture and nutrition mission trip.

Presently, our institution is at a critical crossroads where we can add value to our environmental science and natural science programs as effective contributors to research and careers that can effectively integrate the overwhelming body of climate change and conservation data. We are planning a new natural sciences building, and our Science and Technology faculty overwhelmingly voted for a forward thinking, measurably sustainable and energy efficient building. We want the capability to measure our energy use and run data to market our commitment to our environmental science majors as well as communicate our outward and cutting edge *stewardship* of the resources God gives us. While these are merely words and wishes, it *does* communicate our united natural science faculty in regards to the science behind climate change and our need to respond with action.

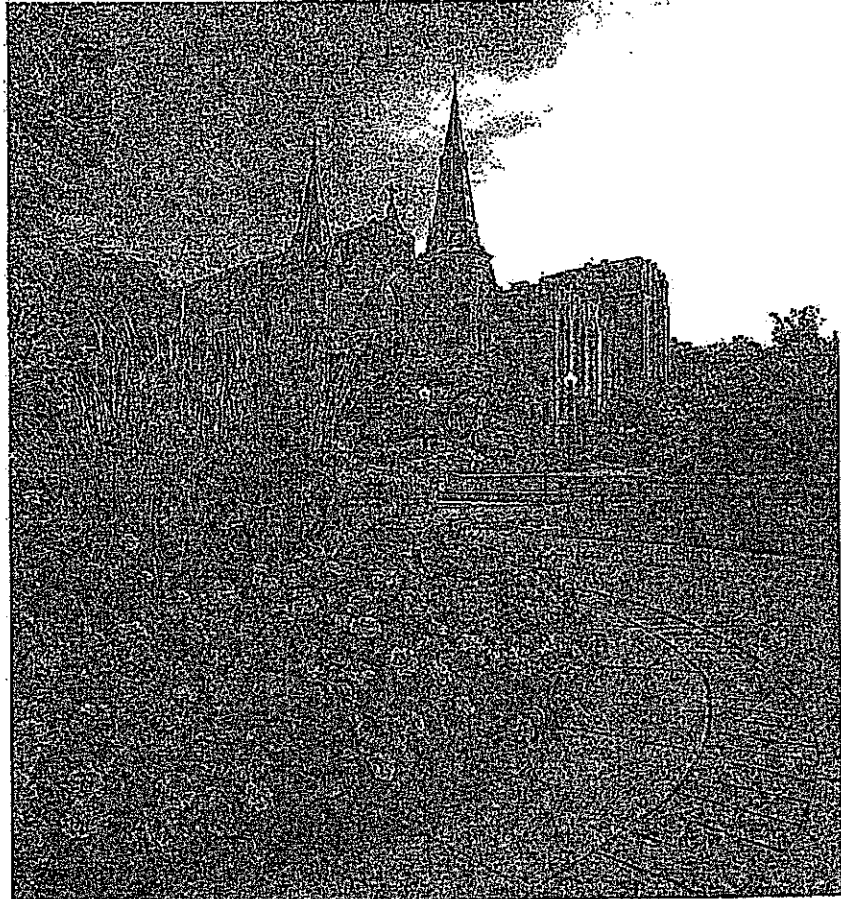
2. Is there someone in your institution that our office should contact related to issues of climate change, resiliency and sustainability?

While we have an environmental officer within the buildings and grounds office, his role is more concerned with functioning of current facilities. Members of our natural science department, as well as the university provost, have historically been the voice of natural resource stewardship and sustainability. The primary contact should be the Chair of the Department of Natural and Computer Sciences, Dr. Robert Hermann (Robert.Hermann@cu-ne.edu).

3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your institution who would be willing to testify at that hearing regarding your institutions work in that area? If so, please let us know the name of person and the topic of testimony.

Creighton

UNIVERSITY

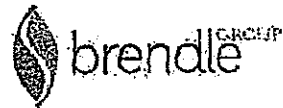


CREIGHTON UNIVERSITY

Climate Action Plan

May 2013

Prepared for Creighton University by



1 INTRODUCTION AND BACKGROUND

1.1 Sustainability and the Catholic, Jesuit Mission

The Catholic Church has supported environmental stewardship for decades. Pope John Paul II issued a World Day of Peace message, *Ecological Responsibility*, in 1990. The U.S. Bishops wrote *Renewing the Earth: An Invitation to Reflection and Action on Environment in Light of Catholic Social Teaching* in 1991 and followed that with *Global Climate Change: A Plea for Dialogue, Prudence and the Common Good* in 2001.

Building on this, the Catholic Coalition on Climate Change was developed in 2006; it is comprised of over a dozen national Catholic organizations and focuses on exploring issues and faith implications of climate change. According to this group, the Catholic vision "emphasizes the pursuit of the common good, promotion of the virtue of prudence and the protection of the poorest of our brothers and sisters already suffering disproportionate impacts from climate change."¹

A group of Catholic Associations, including the Association of Jesuit Colleges and Universities, convened to develop a document to help Catholic colleges and universities integrate their mission with the call for environmental stewardship and concern for the poor. That document, *Sustainability and Higher Education: A Toolkit for Mission Integration*, was released in 2011 and cited Creighton as an example in two instances.

The Jesuits are, of course, a part of the call to preserve the environment, and by extension, the creation and the poorest populations. The 32nd General Congregation of the Society of Jesus (G.C. 32, Decree 4, #37, 1974) maintained that the Jesuits' mission was not only about the service of faith, but also the promotion of justice. Ecology is now, as a result of the most recent Jesuit Congregation (G.C. 35, Decree 3, #35, 2008), recognized as integral to this mission, and it is considered of particular importance for Jesuit "universities and research centres".

In 2010, the Society of Jesus established the Task Force on Jesuit Mission and Ecology. This task force produced a document titled "Healing a Broken World", which examines the environmental situation through an Ignatian lens and offers concrete suggestions for Jesuit universities to respond to the challenges presented.

1.2 Why Address Climate Change

1.2.1 The Science

Climate change refers to the wide range of impacts resulting from the increase in accumulated concentrations of greenhouse gases (GHG) in the atmosphere as a result of human activity, primarily the combustion of fossil fuels and deforestation.^{1,2} Climate change is one of the most urgent problems for sustaining earth's life support system.

¹ US National Academy of Science, *Advancing the Science of Climate Change*, 2010, pp. 21-22
http://www.nap.edu/openbook.php?record_id=12782&page=21

1.2.2 Justice for All

"At its core, global climate change is not about economic theory or political platforms, nor about partisan, advantage or interest group pressures. It is about the future of God's creation and the one human family."

-U.S. Bishops

With increases in droughts, floods, and hunger, the world's poor are likely to be the hardest hit by the impacts of climate change. The Catholic faith demands prudent action to address climate change as a matter of protecting God's Creation and advocating on behalf of the poor. Included in this plan is guidance for integrating sustainability and action towards climate change into Creighton's mission as a Catholic institution.

1.2.3 Cost-Effectiveness

Addressing climate change also has an economic benefit. For example, energy efficiency and renewable energy programs typically require an upfront investment but will save energy and/or cost over time. Included in this Climate Action Plan (CAP) is a cost benefit analysis for all proposed strategies as well as the entire CAP package. This analysis includes estimates of savings and costs over the planning horizon to aid in securing financing for implementation as well as prioritizing strategies.

1.3 Creighton's Commitment to Climate Neutrality and Sustainability

1.3.1 American College and University President's Climate Commitment

To show its commitment to sustainability and climate change in early 2010, Creighton's President, Fr. John P. Schlegel, S.J., signed the American College and University President's Climate Commitment (ACUPCC) along with 20% of the nation's university and college presidents. Current president, Fr. Timothy Lannon, S.J., has upheld this commitment. As part of this commitment, Creighton has agreed to:

1. Complete an emissions inventory.
2. Within 2 years, set a target date and interim milestones for becoming climate neutral.
3. Take immediate steps to reduce GHG emissions by choosing from a list of short-term actions.
4. Integrate sustainability into the curriculum and make it part of the educational experience.
5. Make the action plan, inventory, and progress reports publicly available.

This report is intended to serve as Creighton's deliverable for the second action item in the list above. Creighton will be able to use the data presented in this GHG emission inventory to identify critical areas for improvement, develop an action plan to reduce its GHG emissions, and achieve climate neutrality.

2 THE CLIMATE ACTION PLANNING PROCESS

Greenhouse Gas Inventory

The greenhouse gas inventory is the first step in the climate action planning process and is used to establish a baseline from which to establish a set of emission reduction strategies. This section of the CAP also includes a business-as-usual forecast of emissions through the 2050 planning horizon.

Mission and Vision

To ensure the long-term viability of sustainability efforts at Creighton it has been realized that it will take more than a grassroots effort. This section of the report includes a summary of Creighton's existing mission and vision as well as a summary of how sustainability can be woven through both.

Aligning with the Strategic Plan

Creighton is currently in the process of developing its Strategic Plan and a concerted effort has been made to coordinate that planning effort with the development of this CAP. This section summarizes key goals from the Strategic Plan and how to align the CAP with the identified goals.

Sustainability in the Curriculum

As a higher education institution, integrating sustainability into the curriculum at Creighton is a crucial part of the CAP. This section summarizes existing programs at Creighton that address sustainability in some way as well as programs or projects that are either underway or being proposed as part of this plan to further the integration of sustainability into curriculum at the University.

Emission Reduction Strategies

This section makes up the majority of the content in the CAP. Emission reduction strategies are split into three focus areas: Energy, Transportation, and Other. Each strategy is summarized with the emissions reduction potential, cost savings, and implementation cost estimated. A summary of all reduction strategies and their contribution towards Creighton's goal of climate neutrality are also included in this section.

Implementation and Continuous Improvement

To ensure this CAP is more than a plan sitting on a shelf, this section outlines a plan for implementation. It includes a summary of how to integrate sustainability into the existing organizational structure at Creighton; an approach for continuous improvement including a summary of key players, next steps, and performance indicators for each strategy; and finally a summary of funding needs and various financing options for the plan.

Doane

1. A vital part of the role of colleges and universities are research, education, and outreach. Is your institution involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

Yes Doane is involved in research and education related to climate change and sustainability. Research students are examining the ecological impacts of a climate change mitigation strategy (the addition of biochar to soil) on the growth of plant communities and release of CO₂ from the soil. A conservation biology class (BIO345) is also taught where climate change is a major focus of the class. For example, we have had students in this class produce educational materials for the larger Doane community about climate change. Our students have also carried out a series of tree plantings on campus with the intent to reduce the carbon footprint of the college. Students have designed and planted two pollinator gardens on campus that will help fight pollinator decline, an issue that impacts human food supply. And in addition faculty, students and staff I have carried out the first carbon footprint calculations for the college.

In the area of human health and the health professions programs, faculty and students are involved in education about Lifestyle Medicine both human and planetary health. In educating about LM, faculty talk about the inseparable links between the food we eat and the impact it has on our health, the impact our food choices and how that food is produced have on climate change and how climate change itself affects human health. Faculty have developed a course, "An Introduction to Lifestyle Medicine". This is the first of more courses that discuss the issues of food and climate, including agricultural practices and public policy. And on October 30th, we are presenting on campus a premier showing of the documentary Eating You Alive that focuses on the issue of food and climate.

The Office of Residential Life and Education is committed to educating our residential community on how a sustainable lifestyle can make a positive impact on the Earth's environment. Their aim is to encourage all residents to adopt a sustainable lifestyle as part of being an overall responsible citizen in their community. Actions include:

1. Education and Awareness: Increase awareness on the topic through programming, bulletin boards, flyers etc.

2. Practical application: Create checklists of daily sustainability habits and share them with the residential community. It will include things students can do in their room/suite, in the residence hall building, on move-in and move-out days, and in general when they are out and about.

3. Facility improvement: Work with facilities to find ways in which we can make our residence halls more sustainable when it comes to (energy consumption, eco-friendly lighting, recycling etc.)

Research

Below are a few examples:

- Environmental Policy and Climate Change - My sabbatical this fall investigates the Platte River Recovery Implementation Program and includes a report I'm to prepare on the potential characteristics of its three year Second Increment. Among other things this includes investigation of the impact of climate change on snowfall and snowmelt in the Rocky Mountains. This snow melt is an important source of water for the three-state Platte River Basin. The program is a 13-year, basin-wide, \$200 million cooperative program to "improve and maintain habitat for four threatened and endangered species – the whooping crane, interior least tern, piping plover and pallid sturgeon in the Platte River."
- Invasive Species – Preliminary work has begun on the invasive species *Dreissena polymorpha*, the Zebra Mussel which has been found in Nebraska. This preliminary work will involve participating in Doane's DIVA (Digital Imaging and Vision Applications in Science) program to better visualize the development of their byssal threads. It is hoped this initial work will lead to further studies on the impact of climate change (i.e. water temperature) on the development of byssal threads.
- Alternative Energy and Climate Change - A project developed by an Environmental Science major and supported by the Green Fund, involved installing photovoltaic panel on the roof of the art/education building. Monthly email reports are received from the manufacturer relate to the output of these panels including the carbon offset which is typically about 1000 pounds of carbon.

Service Learning

Below are a few examples.

- Food Waste and Climate Change. As a senior research project an Environmental Science major helped local nursing homes reduce food waste which plays a significant role in climate change. This student's service learning project was developed as a result of experiences in the class EVS 271 Principles of Environmental Public Health.
- Low Flow Showerheads. As part of a class assignment in EVS 330 Earth, Climate and Energy a low-flow shower head product was selected for installation in all showers in Hansen Leadership hall. This reduced the amount of hot water (and greenhouse gas releasing energy used) by students in the residence hall.
- Residence Hall Energy Monitoring – A dorm energy monitoring project was begun in 2009. Working with Facilities, Information Technology Services, Siemens and the Frees

russ.soucek@doane.edu
402-826-8238

Dennis Amoateng
Director, Office of Residential Life and Education
dennis.amoateng@doane.edu
402-826-6796

3. The LR 455 committee is holding a hearing on November 10th related to the role of higher education in climate change, resiliency and sustainability. Is there someone from your institution who would be willing to testify at that hearing regarding your institutions work in that area? If so, please let us know the name of person and the topic of testimony.

Ramesh Languni – research from Students on examining the ecological impacts of a climate change mitigation strategy (the addition of biochar to soil) on the growth of plant communities and release of CO₂ from the soil.

Amanda McKinney – Lifestyle Medicine – Human and Planetary Health

Russ Soucek – Environmental & Earth Sciences

4. Are there members of your institution working on climate change issues in their individual capacity? If so please provide names of faculty and their areas of involvement.

Ramesh Laungani, Ph.D.
Assistant Professor of Biology
ramesh.laungani@doane.edu
402.826.8270

Amanda McKinney, MD
Director of Prerequisites for Health Professions
amanda.mckinney@doane.edu
402.826.8115

Russell Soucek, Ph.D.
Professor of Environmental Science
russ.soucek@doane.edu
402-826-8238

Dennis Amoateng
Director, Office of Residential Life and Education
dennis.amoateng@doane.edu
402-826-6796

Hastings College Response

In regards to question 1: Our College is working to expand the education for students in regards to small scale projects that would benefit the sustainable efforts of our campus and our community. For example, we have a Student Environmental Action Coalition as well as an outdoor club that is working to reach out to students on our campus and really focus recycling, composting and community clean ups. We have dreams of acquiring solar panels and a solar walk way so as to introduce a renewable energy alternative.

We also are hosting a panel discussion that is focusing on engaging students in climate action and creating a better future for themselves, the college and the community.

Diane Beechly or Bill Beechly would be the people I would recommend contacting in regards to climate change initiatives. Diane is one of the other sponsors of SEAC and is also a professor who touches on climate change in her classes and is the one who is setting up the solar panel proposal.

Here are several sustainability efforts we are doing on campus. It is relatively informal and also very important to our students.

Sodexo is employing efforts to be more environmentally aware (e.g., to-go boxes are paper and not styrofoam). Whenever possible, they try to purchase products that are locally grown. The dining center director will be able to provide additional input on other things they are doing should that be helpful.

Ty Garner, a junior at NWU, has re-vitalized our Earth Week initiatives. Ty is pursuing an interdisciplinary major dealing with environmental sustainability. He pushed to have plastic bottles banned from campus – an on-going effort. NWU is exploring the possibility of switching our U-Haul rental vehicles to electric instead of fossil fuels. While it didn't seem to happen this summer, we have regularly participated in the LES energy curtailment program when the summer days get really hot.

Our director of grounds would be able to share what efforts have been taken to be more environmentally aware when we have done significant remodeling in buildings. I know that in preparation for construction of a new academic facility on campus, trees that must be removed on the building site will be milled. It's possible as much as 6,000 board feet of lumber will be returned to us for use for furniture or interior building finishes. The building itself will be LEED certifiable.

We cannot think of anyone who is specifically focusing on research in the area of climate change.

Judy Muyskens
Provost
Nebraska Wesleyan University
5000 Saint Paul Avenue
Lincoln, NE
68504
phone: 402 465-2110 or 402 465-2146

York College

1. Our involvement in climate change research basically takes two forms. First, as is true with most campuses, climate change is a major interest with our students. Our student government is taking the lead on this issue by planning for recycling efforts across the campus. Second, being in the epicenter of agricultural research in Nebraska, our campus has started partnering with FFA groups to help them develop their presentations and plans for the FFA State Convention. The College is also in the initial process of partnering with the local seed companies, cooperatives, etc. to promote programs designed to aid the agricultural firms in the area. All of these companies are developing ways to work around the changes in growing seasons, the changes in rain and drought patterns, etc. Our involvement will not be in the actual research since we are a teaching college, but in support of the firms doing the actual research.

2. The best person to contact on our campus is Stacie Turnbull (smtturnbull@york.edu) who is currently working to develop our agriculture initiatives.

3. Unfortunately, this is the day of our FFA event which involves most of the campus.

4. I am not aware of individual initiatives other than student leadership.

5. Possibly Stacie Turnbull.

Steve Eckman

Nebraska State College System

Courses that may deal with climate change and/or food policy

Chadron State

- Physics 435: World Environmental Issues
- First Year Inquiry 169E: Environmental Policy Beyond Sound Bites
- Biology 138: General Biology-Botany
- Physics 334: Meteorology
- Family and Consumer Sciences 236: Food and Meals Across the Lifespan
- Family and Consumer Sciences 436: Global Food System

Peru State

- Biology 350: Conservation and Management
- Biology 409: Advanced Ecology
- Earth Science 240: Introduction to Meteorology and Climatology
- Honors 305: Microscopic Monarchs: Disease in History

Wayne State

- Biology 104: Environmental Concerns
- Chemistry 500: Environmental Chemistry
- Biology 145: Environmental Studies Seminar
- Biology 345: Conservation Biology
- Geography 430: Geographic Information Systems
- Political Science 430: Public Policy
- Sociology 420: Environmental Sociology
- Biology 325: Ecology
- Business 418: Legal Environment of Business
- Chemistry 400: Environmental Chemistry
- Earth Science 110: Introduction to Meteorology
- Earth Science 120: Introduction to Geology
- Economics 360: Global Economics
- Geography 315: World Economic Geography
- Psychology 316: Social Psychology
- Sociology 355: Human Populations

Wayne State offers a minor in Environmental Studies

Stan Carpenter
Chancellor
Nebraska State College System
402-471-2505

November 17, 2016

Senator Ken Haar
Room #1014
P.O. Box 94604
Lincoln, NE 68509

Dear Senator Haar,

The College of Public Health at the University of Nebraska Medical Center is actively engaged in research and promotion of climate change, particularly as it impacts Nebraska residents. Some of the areas where the COPH is working or would like to develop regarding climate change include:

1. Create a data repository for the state of climate and environmental data to be linked to health outcomes.
2. Provide technical advice and support to state and local health departments, the private sector, and others in implementing state preparedness measures related to the health effects of climate change.
3. Hire a lead climate change scientist at the University to address scientific issues and serve as resource.
4. Create a training course for all health care providers and public health practitioners to recognize the effects and treat health effects of climate change.
5. Conduct research on the relationship between the condition of Nebraska waterways and chronic diseases such as various types of cancer and birth defects.
6. Develop a network of institutions using citizen science to monitor the condition of Nebraska waterways and to educate the public about the effects of climate change on the environment.

Thank you for the opportunity to provide information regarding the College of Public Health's Initiatives to decrease the impact of climate change in Nebraska.

Sincerely,

Ali S. Khan, MD, MPH
Retired Assistant Surgeon General (USPHS)
Dean, College of Public Health

November 16, 2016

Melanie Stewart
University of Nebraska Medical Center
987100 Nebraska Medical Center
Omaha, NE 68198-7100

Senator Ken Haar
Room #1014
P.O. Box 94604
Lincoln, NE 68509

Dear Senator Haar,

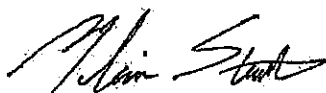
In anticipation of the changes facing Nebraska and our country and in order to be good stewards of both our natural and fiscal resources, the University of Nebraska Medical Center (UNMC), along with its clinical health partner Nebraska Medicine, have created a Sustainability Master Plan. This plan provides strategic direction across our operations for more than a decade and aligns with our mission to create a healthy future for all individuals and communities.

From 2010-2015, UNMC and Nebraska Medicine have:

- Reduced energy by more than 25%, with plans to reduce an additional 20% by 2020
- Reduced greenhouse gas emissions by 20%, with plans to achieve zero net emissions by 2050
- Cumulatively reduced water use by 508 million gallons
- Increased the percentage of employees and students using active transportation to 20%
- Reduced annual outgoing waste by 9%, with plans to reduce an additional 16% by 2023
- Engaged and educated employees and students in order to achieve these goals

The efforts have resulted in cost-avoidance of over \$15 million, improved the condition of our environment, and reduced the consumption of natural resources. The improvement in air quality alone has resulted in the reduction of symptoms of lung ailments, hospital visits, and lost work days in the community. Our progress to these goals continues to enhance our ability to provide premier educational programs, innovated research, and extraordinary patient care.

Sincerely,



Melanie Stewart
Sustainability Manager
University of Nebraska Medical Center

1. The mandates of a land grant university are research, education, and outreach. Is your college or department involved in research, education or outreach related to climate change, resiliency and sustainability? If so, please describe the activities.

1. University of Nebraska at Kearney faculty engage in research and teaching to help promote learning of issues surrounding climate and sustainability. In particular, our biology department faculty conduct research on aquaponics (Nate Bickford), basic cell research and identifying new fuel sources (Paul Twigg), salinity of sand hills lakes (Julie Shaffer), among other areas. Twigg and Shaffer are collaborating on the UNL EPSCOR project on root and rhizobiome research. Mary Harner, with specialties in communication and science, researches river ecology; and Letitia Reichert teaches a graduate biology course in conservation biology. Several UNK faculty have strong interest in protecting specifically the Platte River Basin and do research – involving undergraduates – in their teaching and outreach activities. UNK has a new (summer 2016) sustainability master plan that outlines campus strategies and goals for making a more sustainable campus over the next decades, with a goal of climate neutrality by 2050. UNK completed the STARS report (2012) and has obtained campuswide buy-in from students, faculty/staff, administration and alumni in obtaining sustainability goals. Measures incorporated to date include implementing a bike-share program and a rental car program, increasing our recycling, and improving our purchasing to focus on sustainable products. UNK faculty are on the leading edge of outreach and education for the community on climate issues, hosting forums and awareness events throughout the year

2. Is there someone in your college or department that our office should contact related to issues of climate change, resiliency and sustainability?

1. Lee McQueen, Facilities Management and Planning Director, led the development of the sustainability master plan, and is the campus point of contact: mcqueenlv@unk.edu

Erin Cooper

Administrative Assistant & Project Coordinator

University Affairs | University of Nebraska

3835 Holdrege Street | Lincoln, NE 68583-0745

Direct Line: [\(402\) 472-3777](tel:4024723777) | Fax: [\(402\) 472-1237](tel:4024721237)

