

40TH ANNUAL GREAT PLAINS SYMPOSIUM

DROUGHT

in the Life, Cultures, and Landscapes of the Great Plains



APRIL 1 - 4, 2014 • LINCOLN, NEBRASKA





2011 and 2012 witnessed two of the worst Great Plains droughts in recent memory, a tragic counterpoint to the damaging floods of 2011 and a return to the stressful times of 1998-2006. Drought is a recurring pattern in this semi-arid region, with severe droughts in the 1890s, 1930s, 1950s and 1980s. Indeed, using tree ring, lake sediment, and dune records, scientists have documented the periodic return of severe droughts. Based on such evidence, some scientists have observed that drought was the dominant feature of climate rather than the exception. Drought has been and will continue to be a normal part of the climate of the Great Plains and may increase in frequency and severity in the future as a result of projected changes in climate.

Drought or the ever-present threat of it has had a pervasive effect on the region and its people. It molded the region's settlement patterns, agriculture and commerce, stimulated innovation, aroused conflict between agriculturalists and environmentalists, and fueled litigation between states. Drought has shaped how the people of the Great Plains think of themselves and their region and influenced their culture, literature, and art. Today it raises concern about whether the region will have sufficient water for its future.



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Concurrent sessions will take place on the Nebraska Union's second floor and the connected Gaughan Center: Unity 212 (Gaughan Center), Ubuntu 202 (Gaughan Center), Heritage (Union), Regency A, B, or C (Union).

FOLLOW THE CONFERENCE ONLINE:



FACEBOOK.COM/UNLGREATPLAINSSTUDIES

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INSTAGRAM: UNLGREATPLAINS

TUESDAY, APRIL 1

5:30 - 7:30 PM **REGISTRATION AND RECEPTION:**
1155 Q STREET Food and drinks at the Great Plains Art Museum:
View the drought-related artwork in the exhibit
“Dry Times” by ceramic artist Jess Benjamin

WEDNESDAY, APRIL 2

7 - 8 AM **REGISTRATION AND BREAKFAST**
NEBRASKA UNION Registration in hallway outside Auditorium
Continental breakfast inside Centennial Room

8 - 8:30 AM **WELCOME AND INTRODUCTION**
AUDITORIUM **Richard Edwards**, Director, Center for Great Plains Studies
Don Wilhite, Symposium Co-Chair, Professor, School
of Natural Resources, University of Nebraska-Lincoln

8:30 - 10 AM **PLENARY SESSION 1: DROUGHT PAST AND FUTURE**
AUDITORIUM *Moderator: Don Wilhite, School of Natural Resources, UNL*
Sherilyn Fritz, Earth and Atmospheric Sciences, UNL,
“Great Plains Droughts and Megadroughts in Prehistory”
Marty Hoerling, NOAA/Earth Science Research Laboratory,
“Preludes to Drought...What Recent Drought Behavior Foretells
of the Future”

10 - 10:30 AM **BREAK**
CENTENNIAL RM Exhibitors, posters, drought infographic display

10:30 - 12 PM

AUDITORIUM

PLENARY SESSION 2: ADVANCING DROUGHT EARLY WARNING, PREDICTION AND PREPAREDNESS

Moderator: Martha Shulski, School of Natural Resources, UNL

Annarita Mariotti, Climate Program Office, NOAA

Claudia Nierenberg, Climate Assessments and Services, NOAA

“Coordinating Research and Networks to Advance Understanding Monitoring, Prediction of Droughts and Society’s Preparedness”

Mike Hayes and **Mark Svoboda**, National Drought Mitigation Center, UNL, “The Role of Monitoring, Early Warning and Information Systems and Planning in Managing Future Droughts”

12 - 1:15 PM

BALLROOM

LUNCH SPEAKER: JASON CLAY, SENIOR VICE PRESIDENT, WORLD WILDLIFE FUND

Moderator: Ronnie Green, Vice President and Vice Chancellor, Institute for Agriculture and Natural Resources, UNL

“Global Food Systems and Conservation in an Age of Weather Variability”

1:30 - 3 PM

REGENCY B/C

CONCURRENT SESSIONS

1.) Drought and Climate Change: Impacts on Human and Ecosystem Health

Moderator: Charlie Bicak, Senior Vice Chancellor for Academic and Student Affairs, University of Nebraska at Kearney

Michelle Podgornik, Centers for Disease Control and Prevention, “The Public Health Impact of Drought”

Andrew Jameton, Professor Emeritus, University of Nebraska Medical Center, “Extended Health Effects of Drought in the Central High Plains”

Rick Schneider, Nebraska Game and Parks Commission, “Effects of Climate Change on Wildlife and Ecosystems”

concurrent sessions
continued on next page >

UBUNTU

2.) Drought: A Prehistoric Perspective

Moderator: Sherilyn Fritz, Earth and Atmospheric Sciences, UNL

Paul Hanson, School of Natural Resources, UNL,
“Records of Prehistoric Droughts from Sand Dunes in the
Central Great Plains”

Rolfe Mandel, University of Kansas, “The Past 10,000 Years:
Evidence for Periods of Aridity from Rivers
of the Central Great Plains”

Connie Woodhouse, University of Arizona,
“Great Plains Drought in a Long-Term Context:
The Tree-Ring Perspective”

UNITY

3.) The Dust Bowl Revisited, Part 1

Moderator: John Wunder, Emeritus Professor, History, UNL

W. Brett Anderson, Eastern Illinois University,
“*The Grapes of Wrath* and the Oklahoma Dust Bowl”

Stephen Behrendt, English, UNL, “One Man’s Dust Bowl:
Recounting 1936 with Don Hartwell, Inavale, Neb.”

Donald Berg, South Dakota State University,
“Dusting Off the Dust Bowl: 1930s Northern Plains
Historical Geography”

HERITAGE

4.) Drought Monitoring, Early Warning and Impacts

*Moderator: Mark Svoboda,
National Drought Mitigation Center, UNL*

Jesslyn Brown, Earth Resources Observation and Science,
USGS, “Assessment of Recent Drought Impacts on Great Plains
Land Cover”

Tegenu Engda, University of Wyoming,
“Soil Water Dynamics and Soil Water Based Drought Analysis
of Wyoming Rangelands”

Doug Kluck, Central Region Climate Services Director, NOAA,
“Developing a Drought Early Warning Information System
in the Missouri River Basin”

3 - 3:30 PM

BREAK

CENTENNIAL RM

Exhibitors, posters, drought infographic display

3:30 - 5 PM

CONCURRENT SESSIONS

UNITY

1.) The Dust Bowl Revisited, Part 2

Moderator: John Wunder, Emeritus Professor, History, UNL

Drew Folk, Oklahoma State University, “Burglaries, Bank Robberies and Booze: The Social Impact of Crime Caused by Drought and Economic Depression in Nebraska Sandhills’ Communities during the 1930s”

Douglas Sheflin, Colorado State University, “Working in the Dust: Migrant Labor and the Dust Bowl in Colorado”

Steve Potts, Hibbing Community College, “So Far from Paradise: Drought, Depression and Migration in a Prairie Town”

REGENCY A

2.) Drought Preparedness in the Yellowstone River Basin: A Citizen-Based Effort

Moderator: Crystal Bergman,

Natural Resources graduate student, UNL

Susan Gilbertz, Montana State University-Billings, **Damon Hall**, St. Louis University, **Luke Ward**, Rocky Mountain College, **Matt Anderson**, Montana State University-Billings, and **Alyson Rode**, Montana State University-Billings, “Building Local Capacities to Deal with Drought via Citizen Councils”

“Using Q Sort to Illuminate Conflicting Visions”

“Beneficial Use as a Modality of Dispossession: The Role of the ‘Imaginary Collective’ in the Politics of Water Rights in Montana’s Yellowstone River Basin”

“Unraveling Citizen Council Challenges: The Yellowstone Basin Advisory Council and its Dilemmas”

concurrent sessions
continued on next page >

REGENCY B/C

**3.) Drought and Water Management:
Native American Perspectives**

Moderator: Dennis Smith, History, University of Nebraska at Omaha

Micaela Young, Montana State University,
“Negotiating the Non-negotiable: Water Infrastructure and
Social Issues in Montana”

Richard Thomas, University of Oklahoma, “Using Historical
Sources to Reconstruct 19th Century Climate in Indian Territory”

Alan Neville and **Alyssa Kaye Anderson**, Northern State
University, “Water Quality Challenges and Initiatives Impacting
South Dakota’s Nine Reservations”

UBUNTU

4.) Water Management, Conservation, and Law

*Moderator: Sandi Zellmer, College of Law,
Water for Food Institute, UNL*

Charlie Bicak, Sr. Vice Chancellor for Academic and Student
Affairs, University of Nebraska at Kearney and **Peter Longo**,
Economics, University of Nebraska at Kearney,
“Nebraska’s Natural Resource Districts:
Dealing with Drought on the Great Plains”

Stephen Gasteyer, Michigan State University,
“Shifting Intermediaries: Tracing the Land Grant Role
in Water Management”

Ken Baake, Texas Tech University,
“Attitudes Toward Water Conservation in West Texas:
A Literary Example”

HERITAGE

**5.) Drought Impacts on Settlement and Population
in the Great Plains**

Moderator: Jacob Friefeld, History graduate student, UNL

David Wishart, Geography/School of Natural Resources, UNL,
“Climatic and Human Dimensions of the 1893-1896
Drought on the Western High Plains”

Barbara Mayes Boustead, National Weather Service, NOAA,
“Little Drought on the Prairie”

Kevin Gallo, NOAA/National Environmental Satellite, Data,
and Information Service, and **Eric Wood**, USGS,
“Historical Drought Episodes Recorded by Native Americans”

7 - 9 PM

EMBASSY
SUITES HOTEL

DINNER SPEAKER: MICHAEL FORSBERG,
WILDLIFE PHOTOGRAPHER

*Moderator: Roberto Lenton, Executive Director,
Robert B. Daugherty Water For Food Institute*

“Pulse of the Plains: A Photographer’s Journey Connecting
Water, Wildlife and Landscape in the Heart of the Continent”

THURSDAY, APRIL 3

7 - 8 AM

REGISTRATION AND BREAKFAST

Registration in hallway outside Auditorium
Continental breakfast inside Centennial Room

8 - 9 AM

AUDITORIUM

**PLENARY SESSION 3: ADAPTATION TO DROUGHT
IN THE GREAT PLAINS**

Moderator: Lilyan Fulginiti, Agricultural Economics, UNL

Richard Hornbeck, Dept. of Economics, Harvard University,
“Economic Adaptation to the Environment:
Lessons from the Dust Bowl and the Ogallala Aquifer”

9 - 10:15 AM

AUDITORIUM

**PLENARY SESSION 4: THE GLOBAL CONTEXT FOR DROUGHT
IN SIMILAR ENVIRONMENTS, CASE STUDIES**

*Moderator: Mike Hayes, Director, National Drought Mitigation
Center, University of Nebraska*

Northeast Brazil: **Erwin De Nys** and **Nathan Engle**,
World Bank, “Institutionalizing Proactive Drought Policy and
Management in Brazil”

Canada: **Harvey Hill**, Agriculture and Agri-Food Canada,
“Dealing with the Lumbering Walrus of Canadian Natural
Disasters – Drought: Past, Present, and Future”

10:15-10:45 AM

BREAK

CENTENNIAL RM

Exhibitors, posters, drought infographic display

10:45 - 12 PM

AUDITORIUM

**PLENARY SESSION 5: AGRICULTURAL DROUGHT
MANAGEMENT: COPING WITH CHANGING CLIMATE EXTREMES**

*Moderator: Christopher Neale, Director for Research,
Robert B. Daugherty Water for Food Institute*

Theib Oweis, ICARDA, “Coping with Increasing Water Scarcity:
From Efficiency to Productivity”

P. Stephan Baenziger, Agronomy and Horticulture, UNL,
“The Importance of Genetics During Drought”

12 - 1:15 PM

BALLROOM

LUNCH SPEAKER: IAN FRAZIER, *THE NEW YORKER*

*Moderator: Ellen Weissinger, Senior Vice Chancellor for
Academic Affairs, UNL*

“American Desert or Garden in the Grasslands:
The Nervousness of Not Knowing”

1:30 - 3 PM

UNITY

CONCURRENT SESSIONS

1.) Drought and Ecosystem Health

*Moderator: John Carroll, Director,
School of Natural Resources, UNL*

David Wedin, School of Natural Resources, UNL

Walter Schacht, Agronomy/Horticulture, UNL

Jerry Volesky, West Central Research & Extension Center, UNL,
“Grassland Resilience, Drought and the Stability
of the Nebraska Sandhills”

Elaine Wheaton, Saskatchewan Research Council,
“Dust Storms of the Canadian Prairies:
A Dustier and Muddier Outlook”

Larkin Powell, School of Natural Resources, UNL,
“Born of Crisis: Drought Delivered Conservation
Programs to Private Lands”

concurrent sessions
continued on next page >

1:30 - 3 PM

CONCURRENT SESSIONS CONTINUED

UBUNTU

2.) Drought in Literature: Indigenous and Settler Perspectives

Moderator: Tom Lynch, English, UNL

Tom Gannon, English, UNL “The Blue Man and the Great American Desert: Climatic Tropes in Great Plains Literature”

Fran Kaye, English, UNL “Osage Dustbowl: ‘a hell of a thing that a depression would come along durin’ such hard times”

Tom Lynch, English, UNL “Climate, Literature, and the Limits of the Settler-Colonial Agrarian Imaginary on the Great Plains and Australian Outback”

HERITAGE

3.) Mental Health and Farm Crises

Moderator: Alan Tomkins, University of Nebraska Public Policy Center

Alan Tomkins, University of Nebraska Public Policy Center

Denise Bulling, University of Nebraska Public Policy Center

Marilyn Mecham, Executive Director, Mentors Foundation

REGENCY B/C

4.) Climate, Drought, and Risk

Moderator: Peter Longo, Economics, University of Nebraska at Kearney

Chad McNutt, NOAA, National Integrated Drought Information System,
“Tribal Engagement on Climate and Weather Extremes in the Upper Great Plains”

Heather Lazrus, NCAR, “Water Decisions for Sustainability: Drought and Risk in South-Central Oklahoma”

Gabriela Burian, Monsanto, “Towards Sustainable Agriculture Landscapes: Global Commitments and Global Partnerships”

3 - 3:30 PM

BREAK

CENTENNIAL RM

Exhibitors, posters, drought infographic display

UBUNTU

1.) Drought and Fire: Its Role on Ecosystem Management

Moderator: Gary Willson, Editor, Great Plains Research, Center for Great Plains Studies, University of Nebraska-Lincoln

Scott Josiah, State Forester and Director,
Nebraska State Forest Service,
“The Impacts of Recent Megafires on Nebraska’s
Coniferous Forest Ecosystems”

Dirac Twidwell, Agronomy and Horticulture, UNL,
“Opportunistic Management with Fire During Drought”

Rich Guyette, University of Missouri,
“A Great Plains Story of Fire and Climate”

REGENCY A

2.) Climate Variability, Climate Change and Management

Moderator: Cody Knutson, National Drought Mitigation Center, UNL

Tucker Hamilton, University of Wyoming, “Climate Change
and Variation: Management Implications for Cattle Producers”

Nicole Wall, National Drought Mitigation Center, “Exploring
Perceptions of Bias in Climate Change Survey Measures”

Shawn Salley, Alan Knapp, Patrick Martin, and Gene Kelly,
Colorado State University,
“Great Plains Soil Moisture:
Contemporary Record and Climate Change Forecasts”

concurrent sessions
continued on next page >

HERITAGE

3.) How Do Droughts Make Place?

Moderator: David Wishart, Geography/School of Natural Resources, UNL

Joshua Ewalt and **Julia Moore**, Communications, UNL,
 “Dust, Drought, and Dreams Gone Dry: Using Dust Bowl
 Memories as Resources for Contemporary Message Construction”

Kent Fricke, Chris Helzer, Larkin Powell, School of Natural
 Resources, UNL and Nebraska Nature Conservancy,
 “Effects of Drought on Biodiversity in the Great Plains”

Jason Hertz, English, UNL, “Rethinking ‘Drought’
 for a Sustainable Prairie Discourse”

Aubrey Streit Krug, English, UNL,
 “Just Dust: Native and Settler Poetics of Drought”

REGENCY B/C

4.) Drought, Grasslands, and Community Preparedness

Moderator: Jerry Volesky, Agronomy and Horticulture, UNL

Benjamin Rashford, University of Wyoming,
 “Climate in the Northern Great Plains”

Sarah Olimb, World Wildlife Fund, “Identifying Corridors
 in the Northern Great Plains Using Topological Data Analysis”

Milan Wall, Heartland Center for Leadership Development,
 “Using Community Capitals as a Tool to Prepare
 Drought Ready Communities”

UNITY

5.) Drought and Public Health

Moderator: Andrew Jameton, professor emeritus, UNMC

Michelle Podgornik, Centers for Disease Control and Prevention

Bryan Buss, U.S. Public Health Service Commander, CDC field
 officer, Nebraska Department of Health and Human Services

Ellen Yard, Epidemiologist, Centers for Disease Control
 and Prevention

Dinner on your own

FRIDAY, APRIL 4

7 - 8 AM

REGISTRATION AND BREAKFAST

Registration in hallway outside Auditorium
Continental breakfast inside Regency Room

8 - 10 AM

PLENARY SESSION 6: DROUGHT IMPACT SECTORS

AUDITORIUM

Moderator: Mike Hayes, Director, National Drought Mitigation Center, UNL

Water: **Chad McNutt**, NOAA, National Integrated Drought Information System, "Drought in the Great Plains: Are We Closer to an Early Warning System?"

Energy: **Kristen Averyt**, Western Water Assessment, NOAA's Regional Integrated Sciences & Assessments, University of Colorado, "Drought: Where Energy, Land Use, and Water Collide"

Livestock: **John Paterson**, National Cattlemen's Beef Association, "The Impacts of Recent Droughts on the Beef Industry"

10 - 10:30 AM

BREAK: REGENCY ROOM

10:30 - 12 PM

PLENARY SESSION 7: RESEARCH AND POLICY CHALLENGES FOR A SUSTAINABLE FUTURE FOR THE GREAT PLAINS IN THE CONTEXT OF A CHANGING CLIMATE

AUDITORIUM

Moderator: Prem Paul, Vice Chancellor for Research and Economic Development, UNL

Ronnie Green, Vice President and Vice Chancellor Institute of Agriculture and Natural Resources, UNL, "The Role of Land Grant Universities and the Rural Futures Institute"

Roberto Lenton, Executive Director, Water for Food Institute, UNL, "The Role of Science and Technological Innovation"

Mark Rosegrant, Director of the Environment and Production Technology Division, International Food Policy Research Institute

Chuck Schroeder, Executive Director, Rural Futures Institute

CLOSING REMARKS from **Richard Edwards**, Director, Center for Great Plains Studies, UNL, and symposium co-chair **Don Wilhite**, School of Natural Resources, UNL

POSTER SESSION PARTICIPANTS

See the posters inside the Centennial Room at the Nebraska Union Wednesday and Thursday during the Symposium

Crystal J. Bergman, Natural Resource Sciences, UNL
Improving Drought Management for Transboundary River Basins in the United States

Shuwei Dai, Natural Resource Sciences, UNL
Growing Season Climate Change in the Midwest U.S. from 1981 to 2012

Denise D. Gutzmer, National Drought Mitigation Center, UNL
Far-Reaching Impacts of the 2012 Midwestern Corn Production Shortfall

Tonya Haigh, National Drought Mitigation Center, UNL
Managing Drought Risk on the Ranch: Perspectives on Planning and Impacts

Tonya Haigh, National Drought Mitigation Center, UNL
Stuart Carlton, Purdue University
The Effect of the 2012 Drought on Agricultural Climate Risk Perceptions

Toni Klemm, South Central Climate Science Center
Improving Seasonal Climate Projections for Agricultural Producers

Susan Knight
Photographic Documentation of “Watered Down”
An Installation About Groundwater

Joseph Robine, Natural Resource Sciences, UNL
Developing a Drought Resiliency Index

Jamie Royer, Texas State University
The Timber Culture Act and the Great Plains in U.S. Land Policy

Brock Ternes, University of Kansas
A Study of Domestic Water Conservation among Kansans

EXHIBITORS IN THE CENTENNIAL ROOM

Robert B. Daugherty Water For Food Institute

National Drought Mitigation Center

Center for Great Plains Studies

Visit the Prairie ecotourism campaign

UNL School of Natural Resources

World Wildlife Fund

University of Nebraska Bookstore

Michael Forsberg Photography

Explore Evolution exhibit: This exhibit describes the work of Professor Sherilyn Fritz on the evolution of the Yellowstone diatom. It was funded by a grant from the National Science Foundation to Professor Judy Diamond. The entire Explore Evolution gallery is on display at the University of Nebraska State Museum.

STUDENT ART DISPLAY, CENTENNIAL ROOM

A UNL advanced graphic design class' semester-long project to develop water- and food-related infographics is displayed in the Centennial Room April 2 and 3 during the conference. This course is a collaborative design research project with advanced graphic design students from University of Nebraska–Lincoln and San Francisco State University taught by Stacy Asher and Joshua Singer respectively.

The course investigates the systemic connections between these two regions within the framework of water for food. How are they connected? What forces and agents affect the other? How can these be visualized and communicated?

SPECIAL THANKS TO

The Center for Great Plains Studies staff, especially **Gretchen Walker** and **Katie Nieland**, who expertly organized all the many particulars of the Symposium.

Dana Ludvik (Water for Food) and **Kelly Helm Smith** (National Drought Mitigation Center) for help in promotions.

Jacki Loomis at UNL's Maps and More Store for handling online registration.

PLENARY BIOGRAPHIES

KRISTIN AVERYT

Averyt is the associate director for science at the Cooperative Institute for Research in Environmental Sciences at the University of Colorado, and the director of the NOAA-funded Western Water Assessment. Averyt received a Ph.D. in geological and environmental sciences from Stanford University. She has earned several honors, including a Fulbright Fellowship to New Zealand, and a NOAA Congressional Fellowship, during which she worked with the U.S. Senate. As the staff scientist for Working Group I of the Intergovernmental Panel on Climate Change, she was one of the many scientists who received the 2007 Nobel Peace Prize. She is a lead author for the current National Climate Assessment. Her research revolves around climate variability and change, with a particular focus on the interplay between climate mitigation and adaptation, including the energy-water nexus.

P. STEPHAN BAENZIGER

Baenziger earned degrees from Harvard and Purdue Universities. Before joining the faculty at the University of Nebraska, he worked eight years for the USDA-ARS, and three years with the Monsanto Corporation. His research focuses on improving the agronomic performance and winter hardiness of small grains and on developing new breeding methods. He has co-released 44 cultivars and 36 germplasm lines or populations. His teaching and service activities emphasize graduate education and outreach in plant breeding and genetics, as well as leadership roles in numerous scientific societies and initiatives.

JASON CLAY



Clay is the senior vice president of market transformation for the World Wildlife Fund. Clay ran a family farm, taught at Harvard and Yale, worked at the U.S. Department of Agriculture, and spent more than 25 years working with human rights and environmental organizations before joining WWF in 1999. Clay's degrees include a Ph.D. in anthropology and international agriculture (Cornell University), a master's in anthropology (Cornell University), and a bachelor's in anthropology (Harvard). His areas of expertise include indigenous people, corporate social responsibility to reduce social and environmental risks, agriculture and aquaculture, impact assessments of large-scale development projects, and analysis on the impact of biofuels, agriculture and aquaculture, and animal protein consumption. In 2010, Clay appeared on the influential TED Talks, speaking about how big brands can help save biodiversity.

NATHAN ENGLE

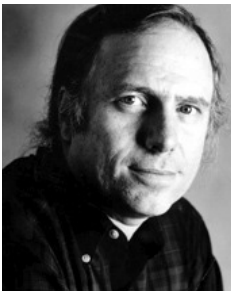
Engle is the climate change adaptation specialist at the World Bank in Washington, D.C. He is helping lead projects on drought policy and management, climate change, and water resources in the Latin American and Caribbean regions (mainly Brazil). Engle completed his Ph.D. at the University of Michigan's School of Natural Resources and Environment, and also earned master's degrees at the University of Michigan in public policy and natural resources and environment. He was recently policy advisor and AAAS congressional fellow in the office of Senate Majority Leader Harry Reid and has published regularly on climate change resilience, drought preparedness, and water policy and governance.

MICHAEL FORSBERG

Forsberg is a conservation photographer and Nebraska native who has focused much of his work in North America's Great Plains. He is the award-winning author of *On Ancient Wings – The Sandhill Cranes of North America* and *Great Plains – America's Lingering Wild*. A documentary film based on the Great Plains book, produced by NET Television in 2012, was released to a national audience on PBS in 2013. Forsberg serves as faculty at UNL's Institute of Agriculture and Natural Resources where he is co-founder and co-director of the Platte Basin Time Lapse Project. Forsberg is a contributing editor of *NEBRASKAland Magazine* and is a fellow with the International League of Conservation Photographers, the University of Nebraska's Center for Great Plains Studies, and the Water for Food Institute. He owns and operates Michael Forsberg Gallery in Lincoln, Neb.



IAN FRAZIER



Frazier is a staff writer and humorist at *The New Yorker* where he has been contributing since 1974 when he published his first piece in *The Talk of the Town*. A year later, the magazine ran his short story, "The Bloomsbury Group Live at the Apollo." Since then, he has published numerous nonfiction, *Shouts and Murmurs*, *Talk of the Town* pieces, and short stories in the magazine. Frazier is the author of eight books. His 1989 book, *Great Plains*, began as a three-part "Reporter at Large" series for the magazine. *Family*, (1994) tells the history of his family in America from the early colonial days to the present, reconstructing 200 years of middle-class life. His other books include *Coyote v. Acme*, (1996), *On the Rez*, (2000), *The Fish's Eye*, (2002), and *Gone to New York: Adventures in the City*, (2005). He published a collection of humor essays, "Lamentations of the Father," in 2008.

SHERILYN FRITZ



Fritz is the George Holmes University Professor at the University of Nebraska-Lincoln, with appointments in the department of earth and atmospheric sciences and the School of Biological Sciences. Her research interests are in long-term environmental change, particularly using fossil record to reconstruct landscape evolution and natural patterns of climate variation. She has major research projects in the U.S. Great Plains and northern Rocky Mountains, in the tropical Andes and Amazon Basin of South America, and in Southeast Asia.

RONNIE GREEN

Green is the University of Nebraska Vice President and Harlan Vice Chancellor of the Institute of Agriculture and Natural Resources (IANR) at the University of Nebraska - Lincoln. IANR innovation in research, teaching, and extension education places Nebraska on the leading edge of food production, environmental stewardship, human nutrition, business development, and youth engagement. A native of southwestern Virginia, Ronnie most recently was with Pfizer Animal Health where he oversaw global technical services for animal genetics. Prior to that role, Ronnie served as the national program leader for animal production research with the USDA's Agricultural Research Service, and on the animal science faculties of Texas Tech University and Colorado State University. He received B.S. and M.S. degrees in animal science from Virginia Tech and Colorado State University, respectively. His Ph.D. program was completed jointly at the University of Nebraska and the USDA U.S. Meat Animal Research Center in animal breeding in 1988.

MICHAEL HAYES

Hayes is currently the director for the National Drought Mitigation Center (NDMC) located within the School of Natural Resources at the University of Nebraska-Lincoln. He became the NDMC's director in August 2007 and has worked at the NDMC since its formation in 1995. The NDMC now has 16 faculty and staff working on local, tribal, state, national, and international drought-, climate-, and water-related issues. Hayes' main interests focus on drought risk management strategies. Hayes received his academic degrees from the University of Wisconsin-Madison and the University of Missouri-Columbia.

HARVEY HILL

Hill is the lead of the Climate Decision Support and Adaptation Unit, National Agro-Climate Information Service at Agriculture and Agri-Food Canada. His unit concentrates on linking climate information to decision-making at a wide range of scales in the agricultural sector, both temporally and spatially. His current projects include developing: a) A simulation adaptation tool known as the Invitational Drought Tournament, which allows stakeholders to consider proactive and alternative drought responses in a team game format, b) The Landscape Infrastructure and Resiliency Assessment vulnerability and adaptation cost benefit analysis tool to support disaster risk reduction from flooding on agricultural landscapes, c) Exploring how to better integrate climate with crop models to improve decision support at the farm level, d) Linking interpolated climate data to natural oscillations and decision making issues influenced by oscillations and trends and e) An on-farm tool (CANPARTAKE) to help producers estimate their vulnerability to climate-related hazards in the context of their farming system.

MARTIN HOERLING

Hoerling is a research meteorologist, specializing in climate dynamics in NOAA's Earth System Research Laboratory located in Boulder, Colo. He recently served as convening lead author for the Southwest U.S. Assessment Report, a contribution to the National Climate Assessment. He is currently co-editor of the Special Supplement to the Bulletin of the American Meteorological Society on Explaining Extreme Events from a Climate Perspective. Hoerling has published more than 70 scientific papers dealing with climate variability and change. In a 2013 study, he examined the question of whether a transition to semi-permanent drought conditions is imminent in the U.S. Great Plains due to human-induced climate change.



RICHARD HORNBECK



Hornbeck is the Dunwalke Associate Professor of American History in the economics department at Harvard University. His research and teaching focuses on economic history, environmental economics, and development economics. Research topics include adaptation to the environment; impacts of property rights and labor scarcity on economic development; local economic spillover impacts from agriculture and manufacturing; rigidities in urban development; and impacts of market integration on development. Hornbeck

received his Ph.D. in economics from MIT in 2009, and a B.A. in economics from the University of Chicago in 2004.

ROBERTO LENTON

Lenton is the founding executive director of the Robert B. Daugherty Water for Food Institute at the University of Nebraska and professor of biological systems engineering at the University of Nebraska-Lincoln. A specialist in water resources and sustainable development with 40 years of international experience in the field, Lenton earned a civil engineering degree from the University of Buenos Aires and a Ph.D. from the Massachusetts Institute of Technology (MIT). He has served as chair of the Water Supply and Sanitation Collaborative Council and of the Technical Committee of the Global Water Partnership, and is a coauthor of *Applied Water Resources Systems*, a coeditor of *Integrated Water Resources Management in Practice*, and a lead author of the final report of the United Nations Millennium Project Task Force on Water and Sanitation, which he co-chaired. Lenton was formerly the chair of the Inspection Panel of the World Bank. Earlier, he was senior advisor at the Earth Institute at Columbia University, director of the Sustainable Energy and Environment Division of the United Nations Development Programme in New York, director general of the International Water Management Institute in Sri Lanka, and program officer in the Rural Poverty and Resources program of the Ford Foundation in New Delhi and New York.



ANNARITA MARIOTTI

Mariotti leads the NOAA Climate Program Office, Modeling, Analysis, Predictions and Projections (MAPP) Program, a mission-driven research program to advance NOAA's capabilities to understand and predict natural variability and changes in Earth's climate system. In this role, Mariotti has spearheaded efforts to engage and organize the scientific community on research topics of high-relevance to NOAA. These include research to advance North America's drought monitoring and prediction capabilities in support of NIDIS, better understanding of regional long-term outlooks in support of assessments, and the development of advanced climate prediction systems such as the National Multi-Model Ensemble system. Before joining NOAA, Mariotti was a research scientist at ENEA, a research laboratory in Italy, and then at the Earth System Science Interdisciplinary Center of the University of Maryland, College Park. As a research scientist, Mariotti investigated water cycle – climate linkages in an interdisciplinary Earth system framework considering the broad range of processes and impacts relevant to the water cycle. Her studies have focused on understanding climate and water cycle variability and predictability on seasonal to centennial time-scales, and on the representation of regional climate in global models.

CHAD MCNUTT

McNutt is a member of the National Integrated Drought Information System (NIDIS) Program Office housed at NOAA's Earth System Research Laboratory in Boulder, Colo. McNutt has been involved in working with federal, state, and local governments, as well as individuals to improve capacity for responding to drought. McNutt and other colleagues at the NIDIS Program Office have been working to draw on the personnel, accumulated experiences, and networks to develop regional drought early warning systems around the U.S. He served as a John A. Knauss Marine Policy Fellow in Washington D.C. and also as a policy advisor and executive director of NOAA's office of the assistant secretary where he primarily worked on climate science policy related to NOAA and the U.S. Climate Change Science Program. He received a Ph.D. from the University of Houston in biology and biochemistry and a bachelor's from Texas A&M University.

CLAUDIA NIERENBERG

Nierenberg is director of NOAA's Climate and Societal Interactions Program. She has worked for the past 20 years in global change research, focusing on the development of research and related activities to support climate risk management. In recent years, her focus has been on adaptation, collaborative research networks, and federal coordination in adaptation science. Nierenberg holds a bachelor's in English literature from the University of Virginia, and a master's in international affairs from Columbia University.

ERWIN DE NYS



De Nys is a senior irrigation and water resources specialist at the World Bank in the sustainable development department of the Latin America and Caribbean Region. He obtained his master's in water resources management from the International Centre for Higher Education in Agricultural Sciences (Montpellier, France) and his Ph.D. in irrigation management from the University of Leuven – KU Leuven, Belgium. De Nys is currently coordinating the World Bank's portfolio in Brazil related to investment projects and analytical work in the field of water resources management, irrigation management, and adaptation to climate change. Prior to joining the World Bank in 2005, he served as food security officer for the European Commission.

THEIB OWEIS

Oweis is the director of the Integrated Water and Land Management Program of the International Center for Agricultural Research in the Dry Areas (ICARDA), Amman, Jordan. Earlier he joined the University of Jordan in Amman as an assistant professor and Dar Al Handash Consultants (Shaer and Partners) as an irrigation specialist. Oweis received M.Sc. and Ph.D. degrees in agricultural and irrigation engineering from Utah State University. He has more than 40 years of experience in research and education, development and human capacity building, and in management of water and agriculture related issues, especially in the dry environments. Oweis has published more than 200 refereed journal, books/book chapters and conference proceedings in the areas of supplemental irrigation, water harvesting, agricultural water productivity, deficit irrigation, salinity, and the management of scarce water resources.

JOHN PATERSON

Paterson serves as the Executive Director of Producer Education for the National Cattlemen's Association. This team is part of a group focused on education and innovation in the beef industry. Specifically, educational programs are aimed at areas of animal welfare, sustainability, beef safety, increased production efficiencies, beef quality assurance, and consistently delivering a high quality product to our domestic and global consumers. Paterson received his Ph.D. in beef cattle nutrition from the University of Nebraska, and from 1979 to 1993 was on the faculty of the Animal Science Department at the University of Missouri. He was a beef extension specialist at Montana State University from 1996 to 2012. Among the numerous industry awards Paterson has received are the Pfizer Animal Health National Extension Award from the American Society of Animal Science and the Distinguished Service Award from the Western Section of the American Society of Animal Science. He was recently named a Fellow in Extension from the American Society of Animal Science and an Emeritus Professor.



MARK ROSEGRANT

Rosegrant is the director of the Environment and Production Technology Division at the International Food Policy Research Institute (IFPRI) in Washington, D.C. With a Ph.D. in public policy from the University of Michigan, he has extensive experience in research and policy analysis in agriculture and economic development, with an emphasis on water resources and other natural resource and agricultural policy issues as they impact food security, rural livelihoods, and environmental sustainability. He currently directs research on climate change, water resources, sustainable land management, genetic resources and biotechnology, and agriculture and energy. He is the author or editor of seven books and more than 100 refereed papers in agricultural economics, water resources, and food policy analysis.

CHARLES SCHROEDER

Schroeder is a native of western Nebraska ranch country and the founding executive director of the Rural Futures Institute at the University of Nebraska. Schroeder also served as president and executive director of the National Cowboy & Western Heritage Museum in Oklahoma City. Prior to that, he held other leadership positions in the public, private, and nonprofit sectors, including serving as founding CEO of the National Cattlemen's Beef Association. Schroeder also served as executive vice president and director of development at the University of Nebraska Foundation and director of the Nebraska Department of Agriculture. Schroeder was with his family's company, the Schroeder Cattle Company, for about 30 years, the last 10 as owner and president. Chuck is a graduate of the University of Nebraska with a degree in animal science.



MARK SVOBODA

Svoboda has been with the National Drought Mitigation Center since its formation in 1995. As the NDMC's monitoring program area leader, his duties include overseeing the center's operational drought monitoring activities and in providing expertise on climate and water management issues. Mark co-founded the development of the U.S. Drought Monitor in 1999 and currently sits on the American Meteorological Society's Applied Climate Committee as well as the National Integrated Drought Information System Implementation Team. In addition, he has extensive experience working with the international drought, water, and climate community via project collaboration and consultation with more than 50 countries and international organizations. Mark earned his bachelor's in geography specializing in climatology and a master's in geography with a specialization in remote sensing, climatology, and GIS from the University of Nebraska-Lincoln.

SYMPOSIUM PARTICIPANTS

W. Brett Anderson, Eastern Illinois University

Alyssa Kaye Anderson, Northern State University

Matt Anderson, Montana State University-Billings

Kristen Averyt, Western Water Assessment/NOAA/RISA, University of Colorado

Ken Baake, Texas Tech University

P. Stephan Baenziger, Agronomy and Horticulture, University of Nebraska-Lincoln

Stephen Behrendt, English, University of Nebraska-Lincoln

Donald Berg, South Dakota State University

Crystal Bergman, Graduate Student, Natural Resource Sciences, University of Nebraska-Lincoln

Charlie Bicak, Senior Vice Chancellor for Academic and Student Affairs, University of Nebraska Kearney

Barbara Mayes Boustead, National Weather Service, NOAA

Jesslyn Brown, Earth Resources Observation and Science/United States Geological Survey

Denise Bulling, University of Nebraska-Lincoln Public Policy Center

Gabriela Burian, Monsanto

Bryan Buss, U.S. Public Health Service Commander, CDC field officer, Nebraska Department of Health and Human Services

John Carroll, Director, School of Natural Resources, University of Nebraska-Lincoln

Jason Clay, Senior Vice President, World Wildlife Fund

Erwin De Nys, World Bank

Tegenu Engda, University of Wyoming

Nathan Engle, World Bank

Joshua Ewalt, Great Plains Graduate Fellow, Communication Studies graduate student, University of Nebraska-Lincoln

Richard Edwards, Director, Center for Great Plains Studies, University of Nebraska-Lincoln

Drew Folk, Oklahoma State University

Michael Forsberg, wildlife photographer

Ian Frazier, *The New Yorker*

Jacob Friefeld, History graduate student, University of Nebraska-Lincoln

Kent Fricke, Great Plains Graduate Fellow, Natural Resource Sciences graduate student, University of Nebraska-Lincoln

Sherilyn Fritz, Earth and Atmospheric Science, University of Nebraska-Lincoln

Lilyan Fulginiti, Agricultural Economics, University of Nebraska-Lincoln

Kevin Gallo, NOAA/National Environmental Satellite, Data, and Information Service

Tom Gannon, English, University of Nebraska-Lincoln

Stephen Gasteyer, Michigan State University

Susan Gilbertz, Montana State University-Billings

Ronnie Green, Vice Chancellor for the Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln

Rich Guyette, University of Missouri

Damon Hall, St. Louis University

Tucker Hamilton, University of Wyoming

Paul Hanson, School of Natural Resources, University of Nebraska-Lincoln

Mike Hayes, National Drought Mitigation Center, University of Nebraska-Lincoln

Chris Helzer, The Nature Conservancy

Jason Hertz, Great Plains Graduate Fellow, English graduate student, University of Nebraska-Lincoln

Harvey Hill, Agriculture-Canada

Marty Hoerling, NOAA/Earth Science Research Laboratory

Richard Hornbeck, Economics, Harvard University

SYMPOSIUM PARTICIPANTS CONTINUED

Andrew Jameton, Professor Emeritus,
University of Nebraska Medical Center

Scott Josiah, State Forester and Director,
Nebraska State Forest Service

Fran Kaye, English, University of
Nebraska-Lincoln

Gene Kelly, Colorado State University

Doug Kluck, Central Region Climate Services
Director, National Oceanic and Atmospheric
Administration

Alan Knapp, Colorado State University

Cody Knutson, National Drought Mitigation
Center, University of Nebraska-Lincoln

Aubrey Streit Krug, Great Plains Graduate
Fellow, English graduate student, University of
Nebraska-Lincoln

Heather Lazrus, National Center for
Atmospheric Research

Roberto Lenton, Executive Director, Robert B.
Daugherty Water for Food Institute

Peter Longo, Economics, University of
Nebraska Kearney

Tom Lynch, English, University of
Nebraska-Lincoln

Rolfe Mandel, University of Kansas

Annarita Mariotti, acting director, NOAA
Modeling, Analysis, Predictions and Projections
program

Patrick Martin, Colorado State University

Chad McNutt, NOAA, National Integrated
Drought Information System

Marilyn Mecham, Executive Director, Mentors
Foundation

Julia Moore, Communication Studies,
University of Nebraska-Lincoln

Christopher Neale, Director for Research,
Robert B. Daugherty Water for Food Institute

Alan Neville, Northern State University

Claudia Nierenberg, director, NOAA Climate
and Societal Interactions Program

Sarah Olimb, World Wildlife Fund

Theib Oweis, International Center for
Agricultural Research in the Dry Areas

Prem Paul, Vice Chancellor for Research and
Economic Development, University of
Nebraska-Lincoln

John Paterson, National Cattlemen's Beef
Association

Michelle Podgornik, Health Scientist,
Emergency Coordinator, Centers for Disease
Control and Prevention

Steve Potts, Hibbing Community College

Larkin Powell, School of Natural Resources,
University of Nebraska-Lincoln

Benjamin Rashford, University of Wyoming

Allyson Rode, Montana State University-Billings

Mark Rosegrant, Director of the Environment
and Production Technology Division,
International Food Policy Research Institute

Shawn Salley, Colorado State University

Walter Schacht, Agronomy and Horticulture,
University of Nebraska-Lincoln

Rick Schneider, Nebraska Game and Parks
Commission

Chuck Schroeder, Executive Director, Rural
Futures Institute

Douglas Sheflin, Colorado State University

Martha Shulski, School of Natural Resources,
University of Nebraska-Lincoln

Dennis Smith, History, University of Nebraska
at Omaha

Mark Svoboda, National Drought Mitigation
Center, University of Nebraska-Lincoln

Richard Thomas, University of Oklahoma

Alan Tomkins, Public Policy Center, University
of Nebraska-Lincoln

Dirac Twidwell, Agronomy and Horticulture,
University of Nebraska-Lincoln

Jerry Volesky, West Central Research and

SYMPOSIUM PARTICIPANTS CONTINUED

Extension Center, University of
Nebraska-Lincoln

Nicole Wall, National Drought Mitigation
Center, University of Nebraska-Lincoln

Milan Wall, Heartland Center for Leadership
Development

Luke Ward, Rocky Mountain College

David Wedin, School of Natural Resources,
University of Nebraska-Lincoln

Ellen Weissinger, Senior Vice Chancellor for
Academic Affairs, University of
Nebraska-Lincoln

Elaine Wheaton, Saskatchewan Research
Council

Don Wilhite, School of Natural Resources,
University of Nebraska-Lincoln

Gary Willson, Editor, *Great Plains Research*,
Center for Great Plains Studies, University of
Nebraska-Lincoln

David Wishart, Geography/School of Natural
Resources, University of Nebraska-Lincoln

Eric Wood, United States Geological Survey

Connie Woodhouse, University of Arizona

John Wunder, Professor Emeritus, History,
University of Nebraska-Lincoln

Ellen Yard, Epidemiologist, Centers for Disease
Control and Prevention

Micaela Young, Montana State University

Sandi Zellmer, College of Law, Robert B.
Daugherty Water for Food Institute, University
of Nebraska-Lincoln

2014 SYMPOSIUM COMMITTEE MEMBERS

Sherilyn Fritz

Martha McCollough

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Jerry Volesky

Co-chairs:

Don Wilhite, School of Natural Resources, University of Nebraska-Lincoln

Mike Hayes, Director, National Drought Mitigation Center, University of
Nebraska-Lincoln

Rick Edwards, Director, Center for Great Plains Studies, University of Nebraska

Major support is provided by the Vice Chancellor of the Institute for Agriculture and Natural Resources, Senior Vice Chancellor for Academic Affairs, Vice Chancellor for Research and Economic Development, and CESU (Cooperative Ecosystems Studies Unit).



Southwest Nebraska, photo by Ken Dewey, courtesy the National Drought Mitigation Center

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