

MICHAEL J. HAYES

PERSONAL

Work Address: University of Nebraska-Lincoln
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EDUCATION

Ph.D.	1994	University of Missouri-Columbia	Atmospheric Science
M.S.	1989	University of Missouri-Columbia	Atmospheric Science
B.S.	1986	University of Wisconsin-Madison	Meteorology

PRESENT POSITION

10/2016-current, *Professor*, School of Natural Resources, University of Nebraska-Lincoln
Current appointment: 64% research/outreach, 34% teaching, and 2% university service.
Conduct research on drought risk management and climate-related risk and vulnerability, as well as teach courses in Applied Climate Science within the Applied Climate and Spatial Sciences Program Area of SNR.

EXPERIENCE AND TRAINING

7/2011-9/2016, *Professor/Director*, National Drought Mitigation Center, Lincoln, NE
Appointment: 30% NDMC Director, 35% service/outreach, 23% research, 10% teaching, and 2% university service. Administer the research and outreach programs of the NDMC; conduct research on the impacts of drought and assist with post-drought evaluations; develop new monitoring and impact assessment methodologies; analyze current drought plans and assist local, state, tribal, and federal officials, as well as the private sector, with drought preparedness and drought mitigation issues; and assist in the organization and conduct of workshops and conferences, as well as the preparation of technical and non-technical reports.

8/2007-6/2011, *Associate Professor/Director*, National Drought Mitigation Center, Lincoln, NE
Appointment: 30% NDMC Director, 35% service/outreach, 23% research, 10% teaching, and 2% university service. See the description above.

4/2006-7/2007, *Research Associate Professor/Associate Director*, National Drought Mitigation Center, Lincoln, NE
Appointment: 58% research, 40% service/outreach, and 2% university service.
Researched new drought monitoring, impact assessment, and planning methodologies; assisted local, state, tribal, and federal officials with drought planning and mitigation; helped organize and conduct drought workshops and conferences; and prepared technical and non-technical reports.

7/2003-3/2006, *Research Associate Professor/Climate Impacts Specialist*, National Drought

Mitigation Center, Lincoln, NE
See position description above.

7/1995-6/2003, *Research Assistant Professor/Climate Impacts Specialist*, National Drought Mitigation Center, Lincoln, NE
See position description above.

2/1995-7/1995, *Physical Scientist*, AScI Corporation, Columbia, Missouri
Worked with the National Biological Service in support of the Long-Term Ecological Monitoring Program within the National Park Service. Responsible for developing the protocols for monitoring the climate and weather conditions that impact the populations of two endangered prairie plant species; one in southwest Missouri and one in southwest Minnesota.

1987-1994, *Graduate Research Assistant*, Department of Atmospheric Science, University of Missouri-Columbia
Responsible for thesis and dissertation research, and interacted with the Food and Agricultural Policy Research Institute (FAPRI) and the NOAA Climate Applications Branch, both located in Columbia, Missouri.

AWARDS/HONORS

2014-2020: Robert B. Daugherty Water for Food Institute Faculty Fellow
2015: WMO Commission on Agricultural Meteorology Expert Team on Drought
Irv Omtvedt Innovation Award, 2013: in recognition of exceptional service at the University of Nebraska and the Institute of Agriculture and Natural Resources throughout the drought of 2012.

RESEARCH INTERESTS

Drought risk management strategies and technology; natural hazards and disaster management; drought planning; impacts and vulnerability assessments; climate variability and change; extreme events; adaptation strategies; and water and related socio-economic issues.

PROFESSIONAL MEMBERSHIPS

American Meteorological Society
American Geophysical Union
Robert B. Daugherty Water for Food Institute (Faculty Fellow)
Center for Great Plains Studies (Fellow)

CURRENT GRANTS

A Multi-Spatial Approach to Monitoring Forage Characteristics of Western U.S. Grasslands. PI: M. Hayes. Co-PI: D. Bathke, M. Podebradska, M. Svoboda, B. Wardlow. U.S. Department of Interior. \$254,900. 7/1/2020 to 6/30/2023.

Providing Drought Risk Management Services for the World Bank. PI: M. Svoboda. I: D. Bathke, B. Fuchs, M. Hayes, C. Knutson, K. Smith, T. Tadesse, B. Wardlow. World Bank Group. \$199,994. 5/8/2020 to 3/24/21.

Anticipating Social Unrest. PI: L.-K. Soh. I: R. Werum, M. Hayes, A. Samal. Citadel University. \$521,451. 7/10/2019 to 7/9/2021.

Developing a Tool to Monitor Drought Impacts on Semi-Arid U.S. Grasslands using an Ecosystem Performance Approach. PI: M. Hayes. Co-PI: B. Wardlow, M. Svoboda, D. Bathke, and M. Poděbradská. Department of Interior, U.S. Geological Survey. \$84,995. 3/4/2019 to 3/3/2022.

INFEWS/T1: Towards Resilient Food-Energy-Water Systems in Response to Drought Impacts And Socioeconomic Shocks: New Mexico. PI: H. Geli. Co-PI: M. Hayes, A. Cibils, J. Peach, and A. Fernald. NSF. \$1,547,959. 9/1/2017 to 8/31/2021.

Providing Drought Information Services for the Nation: The National Drought Mitigation Center. PI: M. Svoboda. Co-PI: C. Knutson, T. Tadesse, D. Bathke, B. Fuchs, M. Hayes. NOAA/SARP, \$2,400,000. 6/1/2015 to 8/31/2021.

RECENT GRANTS (since 2010)

Drought Risk Management in South Africa. PI: M. Svoboda. I: M. Hayes, B. Wardlow, T. Tadesse, B. Fuchs, and C. Knutson. World Bank Group, \$40,000. 6/7/2019 to 8/15/2020.

USAID MENAdrought. PI: M. Svoboda. I: N. Brozovic, M. Hayes, C. Knutson, D. Bathke, T. Jedd, C. Neale. International Water Management Institute. \$429,694. 4/26/2019 to 9/30/2020.

Improving Water Management, Agricultural Production and Food Security in Drought-Prone Areas. PI: C. M. U. Neale. Co-I: R. Kaur, T. Clemente, M. J. Hayes, D. M. Heeren, M. D. Svoboda, T. Tadesse, and H. Walia. Indo-U.S. 21st Century Knowledge Initiative. \$171,000. 9/1/2016 to 8/31/2020.

Enhancing Drought Early Warning Capabilities for Agricultural and Tribal Stakeholders in the Missouri River Basin Using Fast Response Drought Indicators. PI: T. Haigh. Co-I: M. Hayes and T. Mucia. NOAA. \$80,354. 7/1/2016 to 6/30/2020.

Development of the MENA Regional Drought Management System. PI: M. Hayes. I: M. Svoboda, C. Neale, B. Wardlow, D. Wilhite and C. Knutson. International Center for Biosaline Agriculture. \$1,025,440. 1/1/2016 to 6/30/2019.

Seasonal Prediction of Hydro-Climatic Extremes in the Greater Horn of Africa under Evolving Climate Conditions to Support Adaptation Strategies. PI: T. Tadesse. Co-Is: B. Zaitchik, S. Habib, Chris Funk, G. Senay, T. Dinku, F. Policelli, P. Block, G. Baigorria, S. Beyene, B. Wardlow, and M. Hayes. NASA. \$1,625,032. 01/01/2014 - 2/31/2018.

Drought Information Services. PI: M. Hayes. I: M. Svoboda and B. Fuchs. USDA-Office of the Chief Economist, \$839,442. 9/30/2015 to 1/29/2017.

Drought Risk Management for the U.S. PI: M. Hayes. Co-PIs: M. Svoboda, C. Knutson, B.

Fuchs, T. Tadesse, and D. Bathke. University of Oklahoma, \$693,696. 9/1/2014 to 8/31/2017.

Platte River-High Plains Aquifer LTAR. PIs: T. Awada and B. Wienhold. Co-PIs: T. Arkebauer, R. Ferguson, M. Hayes, M. Shulski, A. Suyker, B. Wardlow, B. Woodbury. Collaborators: G. Baigorria, D. Adams, D. Billesbach, X.-H. Chen, G. Erickson, G. Hergert, S. Irmak, V. Jin, A. Kilic, M. Kuzila, D. Martin, G. Varvel, E. Walter-Shea, W. Schacht, D. Wedin, and A. Zygielbaum. USDA-ARS-Long-term Agroecosystem Research (LTAR) Network, \$0.00. 2/1/2014 to 1/31/2017.

The Quick Drought Response Index (QuickDRI): an Integrated Approach to Maximizing the Use of NASA Data Sets for Rapid Response Drought Monitoring. B. Wardlow, M. Svoboda, M. Hayes (Co-I), T. Tadesse, M. Anderson, M. Rodell, D. Mocko, J. Brown, C. McNutt, M. Brewer, and C. Hain. NASA. \$1,150,701. 8/14/2012 to 8/13/2017.

Drought Monitoring for MENA. PI: M. Hayes. I: M. Svoboda, B. Fuchs, T. Tadesse, and K. Smith. Development Alternatives Inc., \$40,052. 2/11/2015 to 1/29/2016.

Drought Monitoring System for Austrian Agriculture. PI: J. Eitzinger. Co-PIs: S. Thaler, J. Schaumberger, W. Loiskandl, P. Macaigne, G. Bodner, A. Schaumberger, E. Murer, C. Wittman, A. Kann, B. Bica, F. Weidle, M. Trnka, P. Hlavinka, J. Balek, D. Semeradova, Z. Zalud, and M. Hayes. Austrian Climate Research Program, \$394,990. 6/1/13 to 5/31/16.

Drought Early Warning and Policy in the Eastern Caribbean. PI: B. Fuchs. Co-I: M. Hayes, C. Knutson, M. Svoboda, and T. Tadesse. Organization of Eastern Caribbean States. \$49,227. 1/22/2016 to 5/20/2016.

Center for Agricultural and Food Industrial Organization—Policy Research Group (CAFIO-PRG). PI: K. Giannakas. Co-Is: J. Anderson, M. Burbach, P. Calow, L. Fulginiti, M. Hayes, B. Lubben, G. Lynne, R. Perrin, K. Schoengold, E. Thompson, and A. Yiannaka. US Department of Agriculture-NIFA, \$766,166. 4/15/12 to 4/14/16.

Improving U.S. Drought Monitoring. PI: M. Hayes. Co-PIs: M. Svoboda, B. Fuchs, and T. Tadesse. USDA-OCE, \$150,000. 10/31/2014 to 1/31/2016.

Improving U.S. Drought Monitoring – Integrating Soil Moisture Data and Developing a Drought Blends Portal. PI: M. Hayes. Co-PIs: M. Svoboda and B. Fuchs. USDA-OCE, \$240,000. 7/16/2014 to 1/15/2016.

Drought Information Services in Support of the National Integrated Drought Information System. PI: M. Hayes. Co-PIs: M. Svoboda, C. Knutson, B. Fuchs, T. Tadesse, and D. Bathke. NOAA-NIDIS. \$739,803. 10/1/2013 to 9/30/2015.

SBES Medium: Investigating the Role of Distrust in Unauthorized Online Activities Using an Integrated Sociotechnical Approach. PI: L. Pytlik-Zillig. Co-Is: M. Hayes, A. Samal, L.-K. Soh, and A. Tomkins. NSF. \$490,758. 9/1/12 to 8/31/15.

Enhancing Decision Support for Drought Risk in the United States: the Drought Risk Atlas. M. Svoboda, M. Hayes (co-PI), B. Fuchs, M. Shulski, M. Timofeyeva, and M. Brewer. NOAA-OAR-CPO. \$273,822. 8/1/2012 to 7/31/2015.

Drinking Water Utilities. PI: C. Knutson. Co-PIs: M. Svoboda and M. Hayes. Cadmus Group Inc., \$17,072. 9/25/2014 to 6/15/2015.

Climate Masters of Nebraska Revised. PI: M. Hayes. Co-PIs: T. Bernadt, T. Pathak, and N. Umphlett. Nebraska Department of Environmental Quality, \$31,847. 1/1/2014 to 6/30/2015.

Regional Climate Services Support in the High Plains Region. PI: B. Fuchs. Co-PIs: M. Svoboda and M. Hayes. NOAA, \$265,000. 10/1/2013 to 3/31/2015.

NDMC Drought Information Services for Agriculture. PI: M. Hayes. Co-PIs: M. Svoboda and B. Fuchs. U.S. Department of Agriculture. \$200,000. 9/28/2013 to 2/28/2015.

Technical Assistance on Drought Preparedness. PI: M. Hayes. Co-PIs: M. Svoboda, C. Knutson, B. Fuchs, and K. Smith. The World Bank. \$70,000. 10/3/2013 to 6/30/2015.

Implications of Climate Change in Nebraska. Co-PIs: D. Wilhite and M. Shulski. Co-Is: C. Rowe, R. Oglesby, and M. Hayes. IANR, \$20,000. 12/1/2013 to 10/1/2014.

Drought in the Great Plains Symposium. Co-PIs: D. Wilhite and M. Hayes. IANR and Daugherty Water for Food Institute. \$50,000. 7/1/2012 to 6/30/2014.

Transition of an Interactive Drought Management Database for the Identification and Comparison of Drought Mitigation and Response Strategies. C. Knutson, M. Hayes (Investigator), K. Smith, M. Widhalm, J. Nothwehr, and T. Haigh. NOAA Climate Program Office. \$209,685. 9/1/2011 to 8/31/2013.

Forty-first Parallel Agro-Ecosystem Sustainability and Productivity. L. Fulginiti, T. Powers, D. Walters, S. Verma, K. Cassman, R. Perrin, T. Awada, F. E. Harvey, A. Liska, B. Oglesby, and M. Hayes (co-PI). IANR. \$373,720. 7/1/2010 to 6/30/2013.

The Support of a Global Drought Information System Workshop. PI: M. Hayes. NASA, \$29,343. 5/7/12 to 5/6/13.

Regional Climate Service Support in the High Plains Region. M. Shulski, M. Svoboda, M. Hayes, and D. Bathke. NOAA. \$830,000. 9/1/2011 to 3/31/2013.

The Role of Science in the Policy Process: Responding to Drought in Australia and the USA. L. Botterill, D. Wilhite, and M. Hayes (Investigator). The Australian National University. \$62,000. 10/26/2009 to 10/25/2012.

Drought Mitigation, Nebraska. M. Hayes (PI), M. Svoboda, C. Knutson, and B. Wardlow. USDA-CSREES. \$558,401. 8/1/2010 to 7/31/2012.

NIDIS Portal Content Development and Help Desk Support. M. Svoboda and M. Hayes (co-PI). NOAA. \$162,221. 8/15/2009 to 8/14/2012.

Development of a Pilot Drought Information System for National Drought Disaster Reduction. J. Ryu and M. Hayes (Co-PI). Kongju National University in Korea. \$70,000. 10/1/2008 to 12/31/2011.

Hawaii Drought Plan. M. Hayes (Co-PI), M. Svoboda, Y. Ding, K. Smith, S. Scott, and M. Widhalm. Commission on Water Resource Management, State of Hawaii. \$100,000. 6/23/2008 to 6/30/2012.

Drought Mitigation, Nebraska. M. Hayes (PI), M. Svoboda, C. Knutson, and B. Wardlow. USDA-CSREES. \$437,243. 8/1/2009 to 7/31/2011.

Transitioning the Drought Impact Reporter into an Operational System. PI: M. Hayes. Co-PIs: D. Wilhite, M. Svoboda, G. Garfin, C. Knutson, D. Wood, and M. Higgins. NOAA's Transition of Research Applications to Climate Services Program. \$453,523. 8/1/2007 to 7/31/2011.

Estimating the Impacts of Complex Climatic Events: the Economic Costs of Drought in Colorado, Nebraska, and New Mexico. Co-PIs: D. Wilhite, R. Pulwarty, M. Hayes, R. Supalla, and C. Howe. NOAA Climate Program Office. \$328,971. 8/1/2006 to 7/31/2011.

Drought Mitigation, Nebraska. M. Hayes (PI), M. Svoboda, C. Knutson, and B. Wardlow. USDA-CSREES. \$347,246. 7/15/2008 to 7/14/2011.

Colorado Drought Planning Assistance. M. Hayes (PI), C. Knutson, D. Bathke, and M. Widhalm. Colorado Water Conservation Board. \$12,000. 11/1/2009 to 9/30/2010.

Rangeland and Forage Geospatial Decision Support System for Drought Risk Management. Co-PIs: D.A. Wilhite, K. Hubbard, M. Svoboda, T. Tadesse, J. Brown, M. Hayes, C. Knutson, J. Volesky, and M. Tooze. USDA/RMA. \$1,023,038. 10/1/2005 to 9/30/2010.

Drought Risk, Impact, and Mitigation Information System. Co-PIs: S. Goddard and D. Wilhite. Collaborators: M. Hayes, M. Svoboda, T. Tadesse, C. Knutson, K. Schoengold, and K. Hubbard. USDA/RMA. \$6,407,472. 9/1/2005 to 8/31/2010.

Low Flow Impact Study for the Upper Colorado. M. Hayes (Co-PI), M. Svoboda, C. Knutson, and D. Woudenberg. NOAA. \$87,000. 10/01/2008 to 3/1/2010.

Low Flow Project in the Alabama, Coosa, and Tallapoosa (ACT) River Basins, and the Appalachian, Chattahoochee, and Flint (ACF) River Basins. M. Hayes (Co-PI), M. Svoboda, C. Knutson, D. Woudenberg, M. Widhalm. NWS Southern Region Headquarters. \$24,999. 9/15/2008 to 9/14/2010.

An Assessment of Decadal Drought Information Needs of Stakeholders and Policymakers in the

Missouri River Basin for Decision Support. V. Mehta, N. Rosenberg, M. J. Hayes (Co-PI), C. L. Knutson and J. R. Olsen. NOAA. \$294,111. 5/1/2008 to 4/30/2010.

PENDING GRANTS

Establishing Drought Triggers to Support the Development of Drought Annexes to Agricultural Disaster Risk Management Plans in the Caribbean. PI: C. Knutson. Co-PI: D. Bathke, B. Fuchs, M. Hayes, K. Smith, and M. Svoboda. USAID, \$64,999. 1/1/2021 to 9/30/2021.

RECENT PUBLICATIONS (2010-Current)

Journal Articles

Cravens, A. E., J. Henderson, J. Friedman, N. Burkardt, A. E. Cooper, T. Haigh, M. Hayes, J. McEvoy, S. Paladino, and A. K. Wilke, 2020. A Typology of Drought Decision Making in the Western United States: Synthesizing Across Cases to Understand Drought Preparedness and Response (In)actions. Submitted to *Regional Environmental Change*.

Fragaszy, S., T. Jedd, N. Wall, C. Knutson, M. B. Fraj, R. McDonnell, M. Svoboda, and M. J. Hayes, 2020. Drought monitoring in the MENA region: participatory engagement to inform early warning systems. Accepted to *Bulletin of the American Meteorological Society*.

Gim, H.-J., C.-H. Ho, S.-J. Jeong, J. Kim, S. Feng, J. Kim, and M. J. Hayes, 2020. Improved mapping and change detection of the start of the crop growing season in the US Corn Belt from long-term AVHRR NDVI. Accepted to *Agricultural and Forest Meteorology*.

Haigh, T., M. Hayes, J. Smyth, L. Prokopy, C. Francis, M. Burbach, 2020. Ranchers' Use of Drought Contingency Plans in Protective Action Decision-Making. *Rangeland Ecology and Management*. <https://doi.org/10.1016/j.rama.2020.09.007>.

Jedd, T., S. Fragaszy, C. Knutson, M. Hayes, M. Belhaj Fraj, M. Svoboda, and R. McDonnell, 2020. Drought management norms: Is the Middle East and North Africa (MENA) Region managing risks or crises? *Journal of Environment and Development*. <https://doi.org/10.1177/1070496520960204>.

Johnson, L. E., H. M. E. Geli, M. J. Hayes, and K. Smith, 2020. Using New Tools to Build an Improved Drought Climatology for Food-Energy-Water System (FEWS) Impacts in New Mexico. *Frontiers in Climate*. Volume 2. <https://doi.org/10.3389/fclim.2020.576653>

Noel, M., D. Bathke, B. Fuchs, D. Gutzmer, T. Haigh, M. Hayes, M. Poděbradská, K. Smith, and M. Svoboda, 2020. Linking drought impacts to drought severity at the state level. *Bulletin of the American Meteorological Society*, 101(8): 1312-1321. <https://doi.org/10.1175/BAMS-D-19-0067.1>.

Poděbradská, M., M. Noel, D. Bathke, T. Haigh, and M. Hayes, 2020. Ready for Drought? A Community Resilience Role-Playing Game. *Water*. <https://doi.org/10.3390/w12092490>.

Smith, K., M. Burbach, M. Hayes, P. Guinan, A. Tyre, and B. Fuchs, 2020. Whose ground truth is it? Harvesting lessons from Missouri's 2018 bumper crop of drought observations. Accepted

to *Weather, Climate, and Society*.

Smith, K., A. Tyre, J. Hamik, M. J. Hayes, Y. Zhou, and L. Dai, 2020. Using climate to explain and predict West Nile Virus risk in Nebraska. *GeoHealth*.
<http://dx.doi.org/10.1029/2020GH000244>.

Smith, K., A. J. Tyre, Z. Tang, M. Hayes, and F. A. Akyuz, 2020. Calibrating human attention as indicator: Monitoring #drought in the Twittersphere. Accepted to *Bulletin of the American Meteorological Society*.

Trnka, M., P. Hlavinka, M. Mozny, D. Semeradova, P. Stepanek, J. Balek, L. Bartosova, P. Zahradnick, M. Blahova, P. Skalak, A. Farda, M. Hayes, M. Svoboda, W. Wagner, J. Eitzinger, M. Fischer, and Z. Zalud, 2020. Czech Drought Monitor System for monitoring and forecasting of agricultural drought and drought impacts. *International Journal of Climatology*, 40: 5941-5958, <http://dx.doi.org/10.1002/joc.6557>.

Yoon, D-H., W-H. Nam, H-J. Lee, E-M. Hong, S. Feng, B. Wardlow, T. Tadesse, M. Svoboda, M. Hayes, and D-E. Kim, 2020. Agricultural drought assessment in East Asia using satellite-based indices. *Remote Sensing*, 12 (444), <http://dx.doi.org/10.3390/rs12030444>.

Zhang, L., Q. Hu, M. Hayes, M. Burbach, T. Messer, Y. Zhou, and Z. Tang, 2020. Integrating wetland conservation efforts into local comprehensive plans: learned from Nebraska, USA. Submitted to *Wetlands*.

Bumann, E., T. Awada, B. Wardlow, M. Hayes, J. Okalebo, C. Helzer, A. Mazis, J. Hiller, and P. Cherubini, 2019. Assessing responses of *Betula papyrifera* to climate variability in a remnant population along the Niobrara River Valley in Nebraska through dendroecological and remote sensing techniques. *Canadian Journal of Forest Research*, 49: 423-433, doi.org/10.1139/cjfr-2018-0206.

Haigh, T., J. Otkin, A. Mucia, M. Hayes, and M. Burbach, 2019. Drought early warning and the timing of range managers' drought response. *Advances in Meteorology*,
<https://doi.org/10.1155/2019/9461513>.

Haigh, T. R., W. Schacht, C. L. Knutson, A. Smart, J. Volesky, C. Allen, M. Hayes, and M. Burbach, 2019. Socio-ecological determinants of drought impacts and coping strategies for ranching operations in the Great Plains. *Rangeland Ecology and Management*, 72(3): 561-571.

Hua, L., H. Wang, H. Sui, B. Wardlow, M. Hayes, and J. Wang, 2019. Mapping the spatial-temporal dynamics of vegetation response lag to drought in a semi-arid region. *Remote Sensing*, 11, 1873; doi:10.3390/rs11161873.

Jedd, T., D. Bhattacharya, C. Pesek, and M. Hayes, 2019. Drought impacts and management in prairie and Sandhills state parks. *Journal of Outdoor Recreation and Tourism*, 26, 1-12;
<https://doi.org/10.1016/j.jort.2019.02.003>.

Mariano, D., C. Santos, B. Wardlow, and M. Hayes, 2019. Drought impacts on crop yields, wildfire occurrence, and the carbon budget in the southeastern Amazon. Submitted to *Global Change Biology*.

Poděbradská, M., B. K. Wylie, M. J. Hayes, B. D. Wardlow, D. J. Bathke, N. B. Bliss, and D. Dahal, 2019. Monitoring drought impact on annual forage production in semi-arid grasslands: a case study of Nebraska Sandhills. *Remote Sensing*, 11, 2106; doi:10.3390/rs11182106.

Raheem, N., A. Cravens, M. Cross, S. Crausbay, A. Ramirez, J. McEvoy, D. Zionne, D. Bathke, M. J. Hayes, S. Carter, M. Rubenstein, A. Schwend, K. Hall, and P. Suberu, 2019. Planning for ecological drought: integrating ecosystem services and vulnerability assessment. *WIREs Water*, <https://doi.org/10.1002/wat2.1352>.

Wickham, E., C. Knutson, M. Hayes, T. Haigh, K. Smith, M. Svoboda, S. Burke, J. DeAngelis, and D. Wood, 2019. Exploring new drought perspectives; understanding drought perceptions and awareness of land use planners. Submitted to *Land Use Policy*.

Jedd, T. R., M. J. Hayes, C. M. Carrillo, T. Haigh, C. J. Chizinski, and J. Swigart, 2018. Measuring park visitation vulnerability to climate extremes in U.S. Rockies National Parks tourism. *Tourism Geographies*, 20(2): 224-249. <http://dx.doi.org/10.1080/14616688.2017.1377283>

McEvoy, J., D. Bathke, N. Burkardt, A. E. Cravens, T. Haigh, K. R. Hall, M. J. Hayes, T. Jedd, M. Poděbradská, and E. Wickham, 2018. Ecological drought: Accounting for the non-human impacts of water shortage in the Upper Missouri Headwaters Basin, Montana, USA. *Resources*. doi:10.3390/resources7010014

Tadesse, T., N. Wall, M. J. Hayes, M. Svoboda, and D. Bathke, 2018. Improving national and regional drought early warning systems in the Greater Horn of Africa. *Bulletin of the American Meteorological Society*, 99(8): ES135-138.

Trnka, M., M. Hayes, F. Jurečka, L. Bartosova, M. Anderson, R. Brazdil, J. Brown, J. Camarero, P. Cudlin, P. Dobrovolny, J. Eitzinger, S. Feng, T. Finessey, G. Gregoric, P. Havlik, C. Hain, I. Holman, D. Johnson, K. Kersebaum, F. Ljungqvist, J. Lutenbacher, F. Micala, C. Hartl-Meier, M. Mozny, P. Nejedlik, J. Olesen, M. Ruiz-Ramos, R. Rotter, G. Senay, S. Vicente Serrano, M. Svoboda, A. Susnik, T. Tadesse, A. Vizina, B. Wardlow, Z. Zalud, and U. Buentgen, 2018. Priorities in multidisciplinary drought research. *Climate Research*, 75: 241-260.

Crausbay, S., A. Ramirez, S. Carter, M. Cross, K. Hall, D. Bathke, J. Betancourt, S. Colt, A. Cravens, M. Dalton, J. Dunham, L. Hay, M. Hayes, J. McEvoy, C. McNutt, M. Moritz, K. Nislow, N. Raheem, T. Sanford, 2017. Defining ecological drought for the 21st century. *Bulletin of the American Meteorological Society*, 90(12): 2543-2550. <http://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-16-0292.1>

Feng, S., M. Trnka, M. Hayes, and Y. Zhang, 2017. Why do different drought indices show distinct future drought risk outcomes in the U.S. Great Plains? *Journal of Climate*, 30: 265-278.

<http://journals.ametsoc.org/doi/pdf/10.1175/JCLI-D-15-0590.1>

Nam, W.-H., E.-M. Hong, J.-Y. Choi, T. Kim, M. J. Hayes, and M. D. Svoboda, 2017. Assessment of the extreme 2014-2015 drought events in North Korea using weekly Standardized Precipitation Evapotranspiration Index (SPEI), 59(4): 65-74. <https://doi.org/10.5389/KSAE.2017.59.4.065>

Nam, W.-H., T. Tadesse, B. Wardlow, M. Hayes, M. Svoboda, E. Hong, Y. Pachepsky, and M.-W. Jang, 2017. Developing the Vegetation Drought Response Index for South Korea (VegDRI-SKorea) to assess the vegetation condition during drought events. *International Journal of Remote Sensing*, 39(5): 1548-1574.

Stiles, C. and M. Hayes, 2017. Recommendations for collaborative drought management in transboundary river basins. *Water Resources Impact*, 19(3): 17-19.

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Conference Proceedings and Poster Presentations (since 2010)

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Flanagan, P., R. Mahmood, T. Sohl, M. Svoboda, B. Wardlow, M. Hayes, and E. Rappin, 2020. Impacts of future land-use land-cover on boundary layer development in the north-central United States. American Meteorological Society Annual Meeting, Boston, MA, January 2020.

Lachenmeier, E., R. Mahmood, T. Franz, M. Hayes, E. Rappin, U. Nair, R. Pielke Sr., A.

Kaulfus, C. Phillips, W. Brown, and S. Oncley, 2020. The impacts of irrigated and rainfed agriculture on near surface atmosphere: preliminary results from GRAINEX. American Meteorological Society Annual Meeting, Boston, MA, January 2020.

Hayes, M., M. Noel, T. Tadesse, and L. Niyonkuru, 2019. Linking public health impacts with drought severity in the U.S. and the Greater Horn of Africa. American Geophysical Union Annual Meeting, San Francisco, December 2019.

Johnson, L., M. Hayes, and H. Geli, 2019. Using new tools to build an improved drought climatology for Food-Energy-Water system (FEWS) impacts in New Mexico. American Geophysical Union Annual Meeting, San Francisco, December 2019.

Nam, W.-H., T. Kim, E.-M. Hong, S. Feng, and M. Hayes, 2019. Multi-model ensemble projections of the climate change effect on the mega-drought. American Geophysical Union Annual Meeting, San Francisco, December 2019.

Poděbradská, M., B. Wylie, M. Hayes, B. Wardlow, and D. Bathke, 2019. Monitoring drought impacts on annual forage production in semi-arid grasslands. American Geophysical Union Annual Meeting, San Francisco, December 2019.

Gim, H.-J., C.-H. Ho, S.-J. Jeong, J. Kim, S. Feng, and M. Hayes, 2019. Long-term variations of cropland growing season start at a sub-county level using AVHRR NDVI over the Midwestern United States. Asia Oceania Geosciences Society Annual Meeting, Singapore, July 2019.

Noel, M., D. Bathke, T. Haigh, K. Smith, M. Svoboda, and M. Hayes, 2018. Developing a framework to link drought impacts and drought severity state by state. American Meteorological Society Annual Meeting, Phoenix, AZ, January 2019.

Petersen, B., B. Fuchs, M. Hayes, M. Brusberg, and D. Bathke. Using GIS to show drought impacts on North American agricultural commodities. American Meteorological Society Annual Meeting, Phoenix, AZ, January 2019.

Nam, W.-H., S. Feng, M. J. Hayes, M. D. Svoboda, B. A. Fuchs, E-M Hong, T. Kim, and C.-H. Ho. Flash drought risk assessment over China and Korea using the Evaporative Demand Drought Index (EDDI). American Geophysical Union Fall Meeting, Washington, D. C., December 2018.

Smith, K. H., A. J. Tyre, J. Hamik, and M. J. Hayes, 2018. Anticipating years with weather-related increased risk of West Nile Virus to humans in Nebraska. American Geophysical Union Fall Meeting, Washington, D. C., December 2018.

Noel, M., D. Bathke, T. Haigh, K. Smith, M. Svoboda, and M. Hayes, 2018. Developing a framework to link drought impacts and drought severity state by state. American Geophysical Union Fall Meeting, Washington, D. C., December 2018.

Hayes, M. J., L. E. Johnson, and H. M. E. Geli, 2018. Building an improved drought climatology for FEW system impacts in New Mexico using new drought monitoring tools. American Geophysical Union Fall Meeting, Washington, D. C., December 2018.

Gim, H.-J., C.-H. Hoi, S.-J. Jeong, J. Kim, S. Feng, and M. J. Hayes, 2018. AVHRR-retrieved crop green-up date at sub-county level over the Midwestern United States. Korean Meteorological Society Annual Meeting, October 2018.

Wickham, E., M. J. Hayes, and M. Svoboda, 2018. U.S. drought vulnerability analysis: using climatological and social data to evaluate urban drought vulnerability at the country scale. European Drought Conference, Utrecht, Netherlands, October 2018.

Neale, C., R. Kaur, M. J. Hayes, D. Heeren, A. Kilic, M. Khanna, A. Sarangi, V. Sehgal, and R. Sahoo, 2018. Improving water management, agricultural production and food security in drought prone areas. American Society of Agricultural and Biological Engineers (ASABE), Detroit, MI, July 2018.

Podebradska, M., B. Wylie, M. J. Hayes, B. Wardlow, and D. Bathke, 2018. Developing a tool to monitor drought impacts on Nebraska Sandhills grasslands using an ecosystem performance approach. Great Plains Grassland Summit, Denver, CO, April 2018.

Paltz, E., M. Hayes, and M. Van Den Broeke, 2018. Impact of past experiences with tornadoes on future decisions in Nebraska. American Meteorological Society Annual Meeting, Austin, TX, January 2018.

Bumann, E., T. Awada, B. Wardlow, M. Hayes, C. Helzer, J. Hiller, and P. Cherubini, 2017. Assessing climatic responses of *Betula papyrifera* (Paper Birch) in a remnant population along the Niobrara River in Nebraska through dendroecological and remote sensing techniques. Ecological Society of America Annual Meeting, Portland, OR, August 2017.

Paltz, E. and M. Hayes, 2017. Impact of past experiences with tornadoes on future decisions. UCARE Annual Research Fair, Lincoln, NE, April 2017.

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Okalebo, J., B. Weinhold, A. Suyker, G. Erickson, M. Hayes, T. Awada, 2015. "The Platte River –High Plains (PR-HPA) Long-Term Agro-Ecosystem Research (LTAR) Network –Data and Technological Resources to Address Current and Emerging Issues in Agroecosystems.," AGU, San Francisco, California, December 18, 2015.

Okalebo J., K. Hubbard, A. Kilic, R. Oglesby, and M. Hayes, 2015. An Evaluation of In-Season Water Stress Sensitivity Using a Multiplicative Evapotranspiration - Grain Yield Model for *Zea mays* L. Growing in Mead, Nebraska. American Water Resources Association. 2015 Summer Specialty Conference. Climate Change Adaptation, New Orleans, Louisiana, June 15 - 17, 2015.

Okalebo J., Hubbard K., Kilic A., Oglesby R. and M. Hayes. 2013. In-season water stress sensitivity of Zea mays L. Mead NE. Poster presentation: Too Hot, Too Wet, Too Dry: Building Resilient Agroecosystems May 5-8 at the 2013 Water for Food Conference, Lincoln, NE.

Hayes, M. 2011. Delivering Drought Information Services to the Great Plains and the World. Proceedings of the UNL Climate, Water and Ecoystems: Shaping the Great Plains Conference, October 11, 2011.

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Hayes, M. 2011. The Drought Interest Group: Lessons Learned from 16 Years of Delivering Drought Information Services to the World. Proceedings of the Open Science Conference of the World Climate Research Program, Denver, CO, October 24-28, 2011.

Hayes, M., C. Bergman, D. Bathke, J. Nothwehr, N. Wall, M. Svoboda, T. Bernadt, and J. Robine, 2011. Engaging Drought Decision-Makers across the United States. Proceedings of COST 734 Final Conference, Topolcianky, Slovakia, May 4-5, 2011.

Knutson, C. L., V. M. Mehta, N. Rosenberg, J. R. Olsen, N. A. Wall, T. K. Bernadt, and M. J. Hayes. 2011. Potential Applications of Decadal Climate Predictions in Water and Agriculture Sectors in the Missouri River Basin, Proceedings of the UNL Climate, Water and Ecoystems: Shaping the Great Plains Conference, October 11, 2011.

Swain, S., S. Narumalani, B. Wardlow, D. Rundquist, and M. J. Hayes. 2011. Relationships among vegetation indices, canopy temperatures, and root-zone soil moisture in the U.S. Corn Belt: a close-range sensing approach. *Association of American Geographers Annual Meeting*, Seattle, WA, April 12-16.

Tadesse, T., B. D. Wardlow, M. J. Hayes, M. D. Svoboda, J. Li, C. C. Poulsen, and K. Callahan. 2010. Predicting general vegetation condition using different scenarios over the central U.S. Second Annual International Conference of "Water for Food: Growing More with Less", May 2-5, 2010, Lincoln, Nebraska.

Tadesse, T., B.D. Wardlow, K. Callahan, and C.C. Poulsen. 2010. Integrating satellite, climate, oceanic, and biophysical information to predict the general vegetation condition. *Association of American Geographers' Annual Meeting*, Washington, DC, April 14-18.

Tadesse, T, B. Wardlow, M. Hayes, M. Svoboda, J. Li, K. Callahan, and C.C. Poulsen. 2010. Scenario-based vegetation outlook (S-VegOut): predicting general vegetation condition using different scenarios over the central United States. 90th Annual American Meteorological Society Annual Meeting, Atlanta, GA, January 17-21.

STATION PROJECTS (since 2010)

M. Shulski, M. Hayes, and D. Wilhite. Development of a Climate Impact Reporter for the U.S. Great Plains. 2013-2018. NEB 38-097.

D. Wilhite and M. Hayes. Drought Management: Mitigation, Planning, and Policy Options. 2007-2012. NEB-38-054.

PRESENTATIONS (since 2010)

2020

2 “invited” presentations

2019

14 “invited” presentations

9 volunteer presentations

2018

6 “invited” presentations

11 volunteer presentations

2017

11 “invited” presentations

1 volunteer presentations

2016

19 “invited” presentations

2015

18 “invited” presentations

8 volunteer presentations

2014

17 “invited” presentations

3 volunteer presentations

2013

32 “invited” presentations

2012

21 “invited” presentations

2011

19 “invited” presentations

3 conference poster presentations

2010

19 “invited” presentations

2 volunteer presentations

1 conference poster presentation

DROUGHT RISK MANAGEMENT WORKSHOPS (NATIONAL)*

2019

Santee Sioux, NE (9 Tribes in Lower Missouri River Basin): November 13-14

*Includes my involvement with organization and participation

NDMC-ORGANIZED WORKSHOPS (NATIONAL)*

2011

Chicago, IL: June 8-9

2010

Lincoln, NE: November 15-16

2009

Kansas City, MO: April 27-28

Helena, MT: June 24-25

Austin, TX: October 7-8

Lincoln, NE: December 8-11

2008

Kansas City, MO: June 18-19

Maui, HI: June 24

Hawaii, HI: June 26

Lincoln, NE: October 20-24

2007

Rapid City, SD: April 11

Portland, OR: October 10-11

2006

El Reno, OK: March 8-9

DeKalb, IL: March 13-14

Roswell, NM: May 23

North Platte, NE: June 5

Chadron, NE: June 6

2005

Billings, MT: February 22-23

Kansas City, MO: March 24

Washington, D.C.: March 28

2004

Flagstaff, AZ: June 29-30

*Includes my involvement with organization and participation

INTERNATIONAL PROGRAM ACTIVITIES

Drought Planning/Policy Workshops

Amman, Jordan, 10/19
Amman, Jordan, 5/19
Beirut, Lebanon, 4/19
Dubai, United Arab Emirates, 6/18
Dubai, United Arab Emirates, 5/17
Basseterre, St. Kitts and Nevis, 5/17
St. John's, Antigua and Barbuda, 5/17
St. George's, Grenada, 3/17
Castries, Saint Lucia, 3/17
Dresden, Germany, 11/16*
Basseterre, St. Kitts and Nevis, 3/16*
St. Johns, Antigua and Barbuda, 2/16*
Castries, Saint Lucia, 1/16*
Budapest, Hungary, 9/97
Cuernavaca, Mexico, 10/98*
Recife, Brazil, 12/98
Fortaleza, Brazil, 12/98
Budapest-Felsögöd, Hungary, 4/00
Culiacán, Mexico, 5/00*
Rabat, Morocco, 2/01
Prague, Czech Republic, 5/03
Vienna, Austria, 6/04
Bamako, Mali, 9/09*

*Workshops organized by the NDMC

Visiting Scientists

Since the beginning of 2009, the NDMC and I have helped host visiting scientists for extended stays from Japan, Korea, China, India, Ethiopia, Australia, Slovakia, Czech Republic, Spain, and the Netherlands.

International Travel (since 2010)

2019. **Jordan.** Organized and helped host two workshops in Amman in May and October with the International Water Management Institute (IWMI).
2019. **Lebanon.** Organized and helped host a workshop in Beirut in April with the International Water Management Institute (IWMI).
2018. **United Arab Emirates.** Worked with the International Centre for Biosaline Agriculture (ICBA) to organize and conduct a follow-up drought vulnerability assessment workshop in June.
2017. **Ethiopia.** Participated in a workshop and meetings held in Addis Ababa for the project titled NASA IDS: Seasonal Prediction of Hydro-Climatic Extremes for the GHA.
2017. **United Arab Emirates.** Worked with the International Centre for Biosaline Agriculture (ICBA) to organize and conduct a drought vulnerability assessment workshop in May.
2017. **St. Kitts and Nevis.** Worked with the Caribbean Institute of Meteorology and Hydrology to organize and conduct a drought policy workshop in May.

2017. **Antigua and Barbuda.** Worked with the Caribbean Institute of Meteorology and Hydrology to organize and conduct a drought policy workshop in May.
2017. **Grenada.** Worked with the Caribbean Institute of Meteorology and Hydrology to organize and conduct a drought policy workshop in March.
2017. **Saint Lucia.** Worked with the Caribbean Institute of Meteorology and Hydrology to organize and conduct a drought policy workshop in March.
2016. **Brazil.** Invited to participate in a workshop on the Assessment of the 2010-2016 Drought in the Brazilian Semiarid Region held in Fortaleza, and provided assistance on the Monitor de Secas do Nordeste (the Drought Monitor product for Northeast Brazil).
2016. **Germany.** Worked with the German Weather Service to organize and conduct a drought workshop for central Europe in Dresden in November.
2016. **Tunisia.** Worked with the International Centre for Biosaline Agriculture to organize and conduct stakeholder engagement meetings in Tunis in October.
2016. **St. Kitts and Nevis.** Worked with the Caribbean Institute of Meteorology and Hydrology to organize and conduct a drought policy workshop in March.
2016. **Saint Lucia.** Worked with the Caribbean Institute of Meteorology and Hydrology to organize and conduct a drought policy workshop in January.
2015. **Austria.** Participated within the AgroDroughtAustria project workshop in November.
2015. **Switzerland.** Participated as a member in the Advisory Committee for the Integrated Drought Management Programme in September.
2015. **Czech Republic.** Visiting scientist at Mendel University in Brno in February, June, and November, and organizer of the InterDrought Summer School held in Mikoluv in June.
2014. **Switzerland.** Participated as a member in the Advisory Committee for the Integrated Drought Management Programme in September.
2014. **Brazil.** Invited by Sebrae in Recife, Pernambuco, to make several presentations on drought and meet with drought managers and officials in August.
2014. **Czech Republic.** Visiting scientist at Mendel University in Brno, and organizer of the InterDrought Summer School held in Mikoluv in June.
2013. **Sweden.** Participated in a World Water Week Seminar sponsored by the Daugherty Water for Food Institute, as well as attended a meeting of the organizing committee for the Integrated Drought Management Programme, held in Stockholm in September.
2013. **Austria and Czech Republic.** Hosted as a visiting scientist for 10 weeks during May and June at Mendel University in Brno, Czech Republic. Also participated in an interdisciplinary climate change resilience conference hosted by CzechGlobe and participated within the InterDrought Summer School held in Telc.
2013. **Switzerland.** Made multiple presentations at the High-Level Meeting on National Drought Policy held at the United Nations in Geneva in March.
2012. **India.** As part of a delegation involving University of Nebraska and Daugherty Water for Food Institute officials, met with officials of the Indian Agricultural Research Institute (IARI) and visited field sites where climate change adaptation projects are taking place, November 12-15.
2012. **Czech Republic.** Met with scientists involved in the large interdisciplinary drought project (InterDrought), August 27-29.
2012. **China.** Participated in an international climate change and drought conference and met with officials of several universities and governmental organizations and made multiple presentations, June 1-9.

- 2012. **Austria and Czech Republic.** Met with scientists and participated in the Scientific Advisory Board meeting for the interdisciplinary climate change project, CzechGlobe, May 10-16.
- 2012. **India.** As part of a delegation involving University of Nebraska and Daugherty Water for Food Institute officials, participated and presented at a meeting taking place at the Indian Agricultural Research Institute (IARI) in Delhi, May 7-8.
- 2012. **Italy.** Served on the Steering Committee organizing the Global Drought Information System Workshop held in Frascati and participated within the Workshop, April 11-13.
- 2011. **China.** Met with officials of several universities and governmental organizations and made multiple presentations, July 5-8.
- 2011. **Australia.** Participated in a drought workshop at the University of Canberra, May 27-28.
- 2011. **Slovakia and Czech Republic.** Participated and presented in the COST 734 Final Conference, and met with collaborators at Mendel University in Brno, Czech Republic, May 2-6.
- 2010. **Switzerland.** Participated in the Consultation Meeting on the Integrated Drought Management Programme hosted by the World Meteorological Organization and held in Geneva, November 15-16.
- 2010. **Brazil.** Attended the Second International Conference on Climate, Sustainability, and Development in Semi-Arid Regions held in Fortaleza, August 16-20.

COURSES TAUGHT

- NRES 370: “Basic and Applied Climatology”, 3 credits
2018, 2019, 2020
- NRES 452/852: “Climate and Society”, 3 credits
2008, 2010, 2012, 2014, 2016, 2018, 2020
- NRES 478/878: “Regional Climatology”, 3 credits
2019

STUDENTS

- Served on M.S. Committees for:
 - Polly Ann Najarian (2000)
 - James George (2001, UNO)
 - Melissa Melvin (2006)
 - Jeff Nothwehr (2007)
 - Prabhakar Shrestha (2009)
 - Amir Vafa (2010)
 - Jeff Henson (2013)
 - Chris Carparelli (2014, advisor)
 - Shrikanth Kondabolu (2014, advisor)
 - Brian Monk (2015)
 - Eric Holley (2016, co-advisor)
 - Evan Bumann (2017)
 - Xeng Du (2018)
 - Mary Noel (2019, co-advisor)
 - Azariah Lawal (2020, co-advisor)
 - Emilee Lachenmeier (2020)

Haeli Leighty (current)
Alexis Chaves (current, advisor)

Served on Ph.D. Committees for:

Olga Wilhelmi (1999)
Tsegaye Tadesse (2002)
Hong Wu (2002)
Patrick Guinan (2004, University of Missouri-Columbia)
Donna Woudenberg (2006)
Yacoubou Tawaye (2007)
Sharmistha Swain (2012)
George Limpert (2013)
Hussain Alsarraf (2013)
Crystal Bergman (2014, advisor)
Jane Okalebo (2015)
Eric Hunt (2015)
Mark Svoboda (2016)
Juliana Dai (2016)
Azar Abadi (2018)
Yared Bayissa (2018)
Richie Donahou (2018, University of Arkansas)
Zion Schell (2018)
Elliot Wickham (2019, advisor)
Tonya Haigh (2019)
Kelly Smith (2019)
Natalie Umphlett (2019)
Eric Holley (2020, co-advisor)
Matthew Collier (current, University of Oklahoma)
Nicole Wall (current)
Stonie Cooper (current)
Marketa Podebradska (current, advisor)
Sabrina Jauernic (current)
Lindsay Johnson (current, advisor)
Ligang Zhang (current)
Beichen Zhang (current, co-advisor)
Andrew Mwape (current, co-advisor)

PROFESSIONAL SERVICE (since 2010)

Member, 2020-present, AGU Hazard Equity Working Group (HEWG).
Chair, 2020-present, Applied Climate and Spatial Science Curriculum Committee.
Member, 2019-present, CASNR Teaching and Learning Improvement Council.
Member, 2018-present, CASNR Faculty Advisory Committee.
Series Editor, 2016-present, Drought and Water Crises Book Series Editor, CRC Press.
Coordinator, 2016-present, SNR Applied Climate Science Curriculum.
Member, 2016-present, SNR Undergraduate Curriculum Committee.
Chair, 2019, Applied Climate Science Recruitment Committee.

Chair, 2017-2018, High Plains Regional Climate Center Director Search Committee.
Chair, 2017-2018, ARD Faculty Advisory Council.
Chapter Co-Author, 2016-2018, Northern Great Plains Chapter for the National Climate Assessment.
Member, 2016-2018, SNR Recruitment Committee.
Member, 2016-2018, UNL Threat and Hazard Identification and Risk Assessment (THIRA) Advisory Committee.
Member, 2016-2017, SNR Teaching Structure Subcommittee.
Co-Editor, 2016, Special Issue of *Climate Research Journal*: Drought in Central Europe—from Drought Response to Preparedness.
Member, 2015-present, WMO Commission on Agricultural Meteorology Expert Team.
Member, 2015-2017, ARD Faculty Advisory Council.
Member, 2015-2017, Central Plains Research Data Center Steering Committee.
Chair, 2015-2016, National Drought Mitigation Center Director Search Committee.
Member, 2015-2016, Daugherty Water for Food Institute Executive Director Search Committee.
Member, 2014-2016, Integrated Drought Management Programme Advisory Committee.
Member, 2015-2016, SNR 5-Year Review Planning Committee.
Member, 2013-2014, Daugherty Water for Food Institute 2014 Conference Steering Committee.
Contact, 2013-present, Ph.D. and M.S. Climate Assessment and Impacts Specializations for Natural Resource Sciences.
Member, 2012-2013, NIDIS Carolinas Pilot Steering Committee.
Member, 2012-2013, NIDIS Chesapeake Bay Pilot Steering Committee.
Co-Chair, 2012-2014, Center for Great Plains Studies 2014 Symposium Steering Committee.
Member, 2011-2015, Global Drought Information System Workshops Steering Committee.
Member, 2011-2016, Scientific Advisory Board, CzechGlobe project in the Czech Republic.
Co-Chair, 2009-2016, National Integrated Drought Information System (NIDIS) Program Implementation Team.
Member, 2009-present, NIDIS Engaging the Preparedness Communities Working Group.
Member, 2009-2013, SCIPP RISA Stakeholder Services Committee.
Member, 2007-2017, Nebraska Climate Assessment and Response Committee.
Member, 2013, Micrometeorologist Position Search Committee.
Member, 2012-2013, Daugherty Water for Food Institute 2013 Conference Steering Committee.
Member, 2012-2013, SNR Director Search Advisory Committee.
Leader, 2012, Applied Climate Science Faculty Area.
Member, 2012, National Drought Forum Steering Committee, held in Washington, D.C., December 11-12.
Member, 2012, Global Drought Information System Workshop Steering Committee, held in Frascati, Italy, April 11-13.
Co-Convener, 2010, AGU Fall Meeting Session on Drought and Food Security.
Faculty Member, 2010, Summer Institute on Climate Change held in Lincoln, May 11-13.
Board Member, 2007-2010, Center for Great Plains Studies Board of Governors.
Member, 2009-2010, Nominating Committee, Center for Great Plains Studies.
Member, 2006-2012, Promotion and Tenure Committee, School of Natural Resources, University of Nebraska-Lincoln.
Member, 2000-2016, Nebraska Risk Assessment Committee.
NDMC Liaison, 1998-2016, Nebraska Agriculture, Natural Resources, and Wildlife

Subcommittee.

NDMC Liaison, 1998-2016, Nebraska Municipal Water Supply, Health, and Energy
Subcommittee.

Member, 1996-2016, Nebraska Water Availability and Outlook Committee.