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Appointments

- Research Scientist III, CIRES, University of Colorado, Boulder (2013-present)
- Climate Science Lead, USGS's North Central Climate Adaptation Science Center (2015-present)
- CIRES lead for Attribution & Predictability Assessment team at NOAA PSD (2016-2018)
- Research Associate, Dept. of Marine and Coastal Sciences, Rutgers U., NJ (2011-2013)
- UCAR PACE Postdoctoral Fellow, NOAA Physical Sciences Div., Boulder, CO (2009-2011)
- Lecturer, Dept. of Geography, Rutgers University, NJ (2009)

Education

Ph.D. (2008), Environmental Sciences, Rutgers University, NJ
Dissertation: "Influence of Increasing Surface Humidity on Winter Warming at High Altitudes through the 21st Century"

M.S. (2003), Environmental Sciences, Rutgers University
Thesis: "Silver deprivation limits fecundity and survivability in the freshwater crustacean Daphnia magna"

B.S. (1999), Chemical Engineering, University of Mumbai, India
Thesis: "Denitrification of heavy metal effluent using a fluidized bed reactor"

Research

Research Scientist, Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado at Boulder (Apr 2013-present)
- Regional climate change, drought and weather extremes
- Climate data and science support for resource management
- Drought monitoring and situational awareness
- High elevation climate change

Research Associate, Dept. of Marine and Coastal Sciences, Rutgers University (Nov 2011-Apr 2013)
- Climate feedbacks in mountain regions - Tibetan Plateau/Himalayas, Colorado Rocky Mountains
- Climate projections in high elevation regions

Postdocs Applying Climate Expertise (PACE) Research Fellowship, UCAR (2009-2011)
- Collaborative research with NOAA, Western Water Assessment and Bureau of Reclamation to understand the impact of climate and hydrological changes in the Colorado River Basin
- Analysis of regional climate model projections for the southwestern US
- High elevation climate change

Environmental Sciences, Rutgers University (1999-2009)

- Analysis of observed and modeled climate data to elucidate the mechanisms of observed and projected climate change over different regions of the world including Mainland China, Tibetan Plateau, and the southern Colorado Rocky Mountains.
  Postdoctoral Research: Oct 2008 – Aug 2009
  Doctoral Research: Jan 2004 – Oct 2008 (Advisor – James R. Miller)
- Effect on calcifying ability of marine coccolithophore, *Emiliana huxleyi*, due to acidification of the ocean caused by increasing concentrations of atmospheric carbon dioxide
  Pre- Doctoral Research: Jan – Aug 2003 (Advisor – Paul Falkowski)
- Investigation of deprivation of silver on the fecundity and lifespan of freshwater crustacean, *Daphnia magna*
  M.S. Thesis Project: Sep 2001 – Dec 2002 (Advisor – Kathleen. I. Keating)
- Sampling and analysis of Polycyclic Aromatic Hydrocarbons (PAHs) in the New Jersey air
  Masters Rotation Project: Jan 2000 – Aug 2001 (Advisor – Steve Eisenriech)

Publications

Guinotte J.M., S. Torbit, B.J. Grizzle, J.J. Barsugli, A.J. Ray, **I. Rangwala**, C. F. Dewes, A. Heldmyer and B. Livneh (2021). Spatially Explicit Analysis of Future Persistence and Availability of Snow in Occupied and Potential Wolverine Habitat in the Rocky Mountains. *Journal of Wildlife Management* (in review).

Rangwala I. (2021). Warming-Induced Aridification of the United States Northern Great Plains during the 21st Century Further Exacerbated by Projected Decreases in Summer Rains. *Climate Dynamics* (in revision)

Esit, M., S. Kumar, A. Pandey, D. Lawrence, **I. Rangwala**, S. Yeager (2021). Seasonal to Multi-Year Soil Moisture Drought Forecasting. *npj Climate and Atmospheric Science*. https://doi.org/10.1038/s41612-021-00172-z

Barsugli J.J., A.J. Ray, B. Livneh, C. F. Dewes, A. Heldmyer, **I. Rangwala**, J. M. Guinotte, S. Torbit (2020). Projections of mountain snowpack loss for wolverine denning elevations in the Rocky Mountains. *Earth's Future*. https://doi.org/10.1029/2020EF001537

Crausbay, S., Ramirez, A., Betancourt, J., Bradford, J.B., Cartwright, J., Dunham, J.B., Enquist, C., Frazier, A., Hall, K., Littell, J.S., Luce, C.H., Palmer, R**., Rangwala, I.**, Thompson, L., Carter, S. (2020). Unfamiliar territory: emerging themes for ecological drought research and management. *One Earth*. 3(3), 337-353. https://doi.org/10.1016/j.oneear.2020.08.019

Bradford, J.B., Weltzin, J.F., McCormick, M., Baron, J., Bowen, Z., Bristol, S., Carlisle, D., Crimmins, T., Cross, P., DeVivo, J., Dietze, M., Freeman, M., Goldberg, J., Hooten, M., Hsu, L., Jenni, K., Keisman, J., Kennen, J., Lee, K., Lesmes, D., Loftin, K., Miller, B.W., Murdoch, P., Newman, J., Prentice, K.L., **Rangwala, I.**, Read, J., Sieracki, J., Sofaer, H., Thur, S., Toevs, G., Werner, F., White, C.L., White, T., and Wiltermuth, M. (2020). Ecological forecasting—21st century science for 21st century management. *U.S. Geological Survey Open-File Report* 2020–1073, 54 p., https://doi.org/10.3133/ofr20201073.

Clifford K., L. Yung, W. Travis, R. Rondeau, B. Neely, **I. Rangwala**, N. Burkhardt, C. Wyborn (2020). Navigating Climate Adaptation on Public Lands: How Views on Ecosystem Change and Scale Interact with Management Approaches. *Environmental Management*. https://doi.org/10.1007/s00267-020-01336-y

Gude, J., N. DeCesare, K. Proffitt, S. Sells, R. Garrott, **I. Rangwala**, Q. Kujala, M. Biel, J. Coltrane, J. Cunningham, T. Fletcher, J. Golla, K. Loveless, R. Mowry, J. Newby, M. O'Reilly, R. Rauscher, K. Rose, M. Thompson, and J. Vore (2020). Recommendations for

managing mountain goats in Montana: A Decision Analysis Approach. Technical Report, Wildlife Division, Montana Fish, Wildlife & Parks, Helena, Montana. 68 pp.

Lukas, J., E. Payton, J. Deems, **I. Rangwala**, and B. Duncan (2020). Observations—Hydrology. Ch. 5 in *Colorado River Basin Climate and Hydrology: State of the Science*, edited by J. Lukas and E. Payton, 154-219. Western Water Assessment, University of Colorado Boulder. doi:10.25810/3hcv-w477 https://wwa.colorado.edu/publications/reports/CRBreport/ColoRiver_StateOfScience_WWA_2020_Chapter_5.pdf

Sanderson, J.S., …**I. Rangwala,** and others (2020). Cattle, conservation, and carbon in the western Great Plains. *Journal of Soil and Water Conservation*, 75(1), pp.5A-12A. https://doi.org/10.2489/jswc.75.1.5A

Rangwala I., Palazzi E., Miller J.R. (2020) Projected Climate Change in the Himalayas during the Twenty-First Century. *In: Dimri A., Bookhagen B., Stoffel M., Yasunari T. (eds) Himalayan Weather and Climate and their Impact on the Environment*. Springer, Cham. ISBN 978-3-030-29683-4. https://doi.org/10.1007/978-3-030-29684-1_4

Adhikari A., K.P. Mainali, **I. Rangwala**, A.J. Hansen (2019). Various measures of potential evapotranspiration have species-specific impacts on species distribution models. *Ecological Modelling* 414 (2019): 108836. https://doi.org/10.1016/j.ecolmodel.2019.108836

Hanberry, B., M. C. Reeves, A. Brischke, M. Hannemann, T. Hudson, R. Mayberry, D. Ojima, H. R. Prendeville, and **I. Rangwala.** (2019). Management effects of drought in the Great Plains. Chapter in *Effects of Drought on Forests and Rangelands in the US: Translating Science into Management Responses*. Edited by J. M. Vose, D. L. Peterson, C. H. Luce. T. Patel-Weynand, Gen. Tech. Rep. WO-98. Washington, DC: U.S. Department of Agriculture Forest Service, Washington Office. 227 p. https://doi.org/10.2737/WO-GTR-98

Adhikari A., A. J. Hansen and **I. Rangwala** (2019). Ecological water stress under projected climate change across hydroclimate gradients in the north central United States. *Journal of Applied Meteorology and Climatology* https://doi.org/10.1175/JAMC-D-18-0149.1

Rangwala I. and M. Hobbins (2019). Flash Droughts in the Mountain West: Emerging Risks under a Warmer Climate. *Mountain Views*, Vol. 13(1), May 2019, pg 34-37. https://www.fs.fed.us/psw/cirmount/publications/pdf/Mtn_Views_may_19.pdf

Hobbins M.T., **I. Rangwala**, J. J. Barsugli, and C. Dewes (2019), Extremes in evaporative demand and their implications for drought and drought monitoring in the 21st Century. Chapter 25 in *Extreme Hydrology and Climate Variability: Monitoring, Modeling, Adaptation and Mitigation*, edited by A. M. Melesse, W. Abtew, and G. B. Senay; Elsevier, New York, ISBN-9780128159989.

Rangwala, I., Smith, L.L., Senay, G., Barsugli, J., Kagone, S., and Hobbins, M. (2019). Landscape Evaporative Response Index (LERI): A high resolution monitoring and assessment of evapotranspiration across the Contiguous United States. *ScienceBase,* https://doi.org/10.21429/43r4-3q68

Lyon N. J., D. M. Debinski and **I. Rangwala**. (2019). Evaluating the Utility of Species Distribution Models in Informing Climate Change-Resilient Grassland Restoration Strategy. *Frontiers in Ecology and Evolution*. https://doi.org/10.3389/fevo.2019.00033

Hoell, A., J. Perlwitz, C. Dewes, K. Wolter, **I. Rangwala**, X.-W. Quan, J. Eischeid (2019), Anthropogenic Contributions to the Intensity of the 2017 United States Northern Great

Plains Drought. In *Explaining Extreme Events of 2017 from a Climate Perspective*, Bulletin of the American Meteorological Society. https://doi.org/10.1175/BAMS-D-18-0127.1

Hobbins M.T., C.F. Dewes CF, J.L.Huntington, D.J.McEvoy , **I. Rangwala**, S. Shukla, and H.M. Yocum (2019), Evaporative demand: dynamics and opportunities in drought early warning, monitoring, and vulnerability assessment. Extended abstract in: Latimer, James S.; Trettin, Carl C.; Bosch, David D.; Lane, Charles R., eds. 2019. Working watersheds and coastal systems: research and management for a changing future—*Proceedings of the Sixth Interagency Conference on Research in the Watersheds*. July 23-26, 2018, Shepherdstown, WV. e-Gen. Tech. Rep. SRS-243. https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs243.pdf

Buono P., **I. Rangwala**, R. Rondeau and M. Bidwell (2018). Identifying Climate Refugia in the Spruce-Fir Ecosystem: Connecting Modeling Outputs with Field Characteristics and Managers' Needs in the Upper Gunnison Basin. *Mountain Views*, Vol. 12(2), Dec. 2018, pg 6-10. https://www.fs.fed.us/psw/cirmount/publications/pdf/Mtn_Views_dec_18.pdf

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Dole, R. M., Spackman, J. R.,...**I. Rangwala**…& Wolter, K. (2018). Advancing Science and Services during the 2015-16 El Niño: The NOAA El Niño Rapid Response Field Campaign. Bulletin of the American Meteorological Society, https://doi.org/10.1175/BAMS-D-16-0219.1

McNeeley S.M., C. Dewes, C. J. Stiles, T. Beeton, **I. Rangwala**, M. Hobbins, C. Knutson (2018). Anatomy of an interrupted irrigation season: Micro-drought at the Wind River Indian Reservation. *Climate Risk Management*, https://doi.org/10.1016/j.crm.2017.09.004

Hobbins, M.T., J. J. Barsugli, C. F. Dewes, and **I. Rangwala** (2017). Monthly Pan Evaporation Data across the Continental United States between 1950-2001. *ScienceBase,* https://doi.org/10.21429/C9MW25

Dewes C., **I. Rangwala**, M. Hobbins, J. Barsugli and S. Kumar (2017). Drought risk assessment under climate change is sensitive to methodological choices for the estimation of evaporative demand. *PLoS ONE*, 12(3): e0174045. https://doi.org/10.1371/journal.pone.0174045

Rangwala, I., C. Dewes, and J. Barsugli (2016). High Resolution Climate Modeling for Regional Adaptation. *Eos*, Vol. 97, https://doi.org/10.1029/2016EO048615, March 25.

Rangwala I., E. Sinsky and J. Miller (2016). Potential Drivers for Projected Elevation Dependent Warming in Boreal Midlatitude Winter in CMIP5 Climate Models. *Climate Dynamics*, 46(7-8), 2115-2122, https://doi.org/10.1007/s00382-015-2692-0

Pepin, N., R. Bradley, H. Diaz, M. Baraer, E. Caceres, N. Forsythe, H. Fowler, G. Greenwood, M. Hashmi, X. Liu, J. Miller, L. Ning, A. Ohmura, E. Palazzi, **I. Rangwala**, W. Schoener, I. Severskiy, M. Shahgedanova, M. Wang, S. Williamson, and D. Yang (2015). Elevation-dependent warming in mountain regions of the world. Nature Climate Change, 5, 424-430, https://doi.org/10.1038/NCLIMATE2563

Rangwala I., N. Pepin, M. Vuille and J. Miller, (2015). Influence of Climate Variability and Large-Scale Circulation on Mountain Cryosphere. Chapter 2 in *The High-Mountain Cryosphere: Environmental Changes and Human Risks*, edited by C. Huggel, J Clague, A. Kääb and M. Carey. Chapter 2. Cambridge University Press. https://doi.org/10.1017/CBO9781107588653.002

Naud C., **I. Rangwala**, M. Xu and J.A. Miller (2014). A satellite view of the radiative impact of clouds on surface downward fluxes in the Tibetan Plateau. *Journal of Applied Meteorology and Climatology*, https://doi.org/10.1175/JAMC-D-1114-0183.1171

Chen, Y., C. Naud, **I. Rangwala**, C. Landry and J. Miller (2014). Comparison of the sensitivity of surface downward longwave radiation to changes in water vapor at two high elevation sites. *Environmental Research Letters*. 9(11): 114015. https://doi.org/10.1088/1748-9326/9/11/114015

Lukas J., J. Barsugli, N. Doesken, **I. Rangwala** and K. Wolter (2014). Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation. *A Report for the Colorado Water Conservation Board.* http://wwa.colorado.edu/climate/co2014report/

Naud C., Y. Chen, **I. Rangwala** and J. Miller (2013). Sensitivity of downward longwave surface radiation to moisture and cloud changes in a high elevation region. *Journal of Geophysical Research*. 118, 10,072–10,081, https://doi.org/10.1002/jgrd.50644

Rangwala I., E. Sinsky and J. Miller, (2013). Amplified warming projections for high altitude regions of the Northern hemisphere mid-latitudes from CMIP5 models. *Environmental Research Letters.* 8 (2013) 024040. https://doi.org/10.1088/1748-9326/8/2/024040

Cayan, D., M. Tyree, K. E. Kunkel, C. Castro, A. Gershunov, J. Barsugli, A. J. Ray, J. Overpeck, M. Anderson, J. Russell, B. Rajagopalan, **I. Rangwala**, and P. Duffy, (2013). Future Climate: Projected Average. In *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 101–125. A report by the Southwest Climate Alliance. Washington, DC: Island Press.

Miller, J., **I. Rangwala** and D. Ghatak, (2012). Potential Climate and Hydrological Changes in the Aral Sea Region. In *Disaster by Design*, Edited by Michael R. Edelstein, Astrid Cerny and Abror Gadaev, ISBN: 978-1-78190-375-9, Chapter 5. Emerald Group Publishing Limited.

Rangwala I., (2012). Amplified Water Vapor Feedback at High Altitudes during Winter. *International Journal of Climatology*. https://doi.org/10.1002/joc.3477

Rangwala I. and J. Miller, (2012). Climate Change in Mountains: A Review of Elevation Dependent Warming and its Possible Causes. *Climatic Change*. https://doi.org/10.1007/s10584-012-0419-3

Rangwala I., J. Barsugli, K. Cozzetto, J. Neff and J. Prairie, (2012). Mid-21st Century Projections in Temperature Extremes in the Southern Colorado Rocky Mountains from Regional Climate Models. *Climate Dynamics*. https://doi.org/10.1007/s00382-011-1282-z

Rangwala I. and J. Miller, (2011). Long-Term Temperature Trends In The San Juan Mountains. Chapter 6 in *Eastern San Juan Mountains: Their Geology, Ecology and Human History*, edited by Rob Blair and George Bracksieck, ISBN: 978-1-60732-084-5, University Press of Colorado. https://www.jstor.org/stable/j.ctt46nssv

Rangwala I. and J. Miller, (2010). 20th Century Temperature Trends Colorado's San Juan Mountains. *Arctic, Antarctic and Alpine Research*, 42(1): 89-97. https://doi.org/10.1657/1938-4246-42.1.89

Rangwala I., J. Miller, G. L. Russell and M. Xu, (2010). Using A Global Climate Model To Evaluate The Influences Of Water Vapor, Snow Cover And Atmospheric Aerosol On Warming In The Tibetan Plateau During The 21st Century. *Climate Dynamics*, 34: 859-872, https://doi.org/10.1007/s00382-009-0564-1

Rangwala I., J. Miller and M. Xu, (2009). Warming In The Tibetan Plateau: Possible Influences Of The Changes In Surface Water Vapor. *Geophysical Research Letters*. 36, https://doi.org/10.1029/2009GL037245

Rangwala I. and K.I. Keating, (2007). Silver Deprivation Limits Fecundity And Survivability In The Freshwater Crustacean Daphnia Magna. *Biological Trace Element Research*. https://doi.org/10.1007/s12011-007-0016-x

Rangwala I., J. Miller, G. L. Russell and M. Xu, (2006). Analysis of Global Climate Model Experiments to Elucidate Past and Future Changes in Surface Insolation and Warming in China. *Geophysical Research Letters*, 33 (20), CiteID L20709. https://doi.org/10.1029/2006GL027778

Other Publications

Hobbins M.T., Glaudemans M., Huntington J.L., McEvoy D.J., **Rangwala I.**, Ray A.J., Tan X., and Yocum H.M. (2020), Operationalizing an Evaporative Demand Drought Index (EDDI) service for drought monitoring and early warning. Final project report to NOAA Joint Technology Transfer Initiative Program, NOAA Physical Sciences Division, Boulder, CO, March 19. https://tinyurl.com/wpxn3xb

Rangwala I. (2020). Monitoring and Predicting Drought on our Grasslands. *Grasslands News.* USDA's National Grasslands Council's Spring 2020 Newsletter, pg. 6-8. https://tinyurl.com/sbb7bag

Burkardt, N., Bidwell, M., Clifford, K., Neely, B., Orth, P., **Rangwala, I.**, Rondeau, R., Wyborn, C., and Yung, L., (2019), Natural resource management decision-making under climate uncertainty: Building social-ecological resilience in southwestern Colorado. U.S. Geological Survey, Cooperators' Report for the North Central Climate Adaptation Science Center. https://www.sciencebase.gov/catalog/item/5c913ca7e4b09388245480f5

Page, R., Dilling, L., Rick, U., Duncan, B., **Rangwala, I.**, Lukas, J. (2018). Final Workshop Report for Vulnerability Consequences and Adaptation Planning Scenarios (VCAPS) for the City of Durango. Western Water Assessment: Boulder CO. https://co-durango.civicplus.com/DocumentCenter/View/14429/WWA-VCAPS-in-Durango-Final-Report

Rangwala I. and A. Hoell (2018). 2017 U.S. Northern Plains Drought Evolution. https://www.drought.gov/drought/sites/drought.gov.drought/files/NorthernPlains_2017DroughtEvolution.pdf

Hoell A. and **I. Rangwala.** (2018). Historical Character of U.S. Northern Great Plains Drought. https://www.drought.gov/drought/sites/drought.gov.drought/files/NorthernPlains_HistoricalCharacter.pdf

Hoell A. and **I. Rangwala.** (2018). 2018 Experimental Northern Plains Drought Outlook. https://www.drought.gov/drought/sites/drought.gov.drought/files/NorthernPlains_2017AttributionDroughtOutlook_Droughtgov.pdf

Rangwala I. (2018). Contr. to "Voices in the Wind". *Mountain Views*, Vol 12(1), May 2018, pg. 22. https://www.fs.fed.us/psw/cirmount/publications/pdf/Mtn_Views_may_18.pdf

Lukas, J., M. Hobbins, **I. Rangwala** and the EDDI team (2017). The EDDI User Guide v1.0. https://esrl.noaa.gov/psd/eddi/pdf/EDDI_UserGuide_v1.0.pdf

Rondeau, R., B. Neely, M. Bidwell, **I. Rangwala**, L. Yung, K. Clifford, and T. Schultz (2017), Spruce-Fir Landscape: Upper Gunnison River Basin, Colorado. Social-Ecological Climate

Resilience Project. Report prepared for the North Central Climate Science Center, Ft. Collins, Colorado, pp. 55. http://www.cnhp.colostate.edu/download/documents/2017/SECR_Spruce-Fir_Landscape_Report_4-30-2017_Final_with_Appendices.pdf

Rondeau, R., B. Neely, M. Bidwell, **I. Rangwala**, L. Yung, K. Clifford, and T. Schultz (2017), Sagebrush Landscape: Upper Gunnison River Basin, Colorado: Social-Ecological Climate Resilience Project. Report prepared for the North Central Climate Science Center, Ft. Collins, Colorado, pp. 56. http://www.cnhp.colostate.edu/download/documents/2017/SECR_Sagebrush_Landscape_Report_4-30-2017_Final_and_Appendices.pdf

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Rangwala, I., Bardsley, T., Pescinski, M., and J. Miller (2015). SNOTEL sensor upgrade has caused temperature record inhomogeneities for the Intermountain West: Implications for climate change impact assessments. Western Water Assessment Climate Research Briefing. http://wwa.colorado.edu/publications/reports/snotel_report.pdf

Rangwala, I., M. Hobbins, J. Barsugli, and C. Dewes (2015). EDDI: A Powerful Tool For Early Drought Warning. WWA 2-pager document. http://wwa.colorado.edu/publications/reports/EDDI_2-pager.pdf

Pepin N., **Rangwala I.** and Tandong Y. (2014). Proposal to Quantify Elevation Dependent Surface Warming [EDW] at the Mountain Surface. White paper for the Mountain Research Initiative's (Switzerland) *"Global Campaign to Assess Elevation Dependent Warming."*

Rangwala I. (2014). Contribution to "Voices in the Wind". *Mountain Views*, Vol 8(2), Nov. 2014, pg. 55. https://www.fs.fed.us/psw/cirmount/publications/pdf/Mtn_Views_nov_14.pdf

Cozzetto, K., **I. Rangwala** and J. Lukas, (2011). Examining Regional Climate Model (RCM) projections: What do they add to our picture of future climate in the region? *Featured article in the July issue of "Intermountain West Climate Summary" by NOAA's Western Water Assessment*.

Cozzetto, K., **I. Rangwala** and J. Neff, (2011). Downscaled Air Temperature And Precipitation Projections For The San Juan Mountain Region. *Narrative on regional climate model projections submitted to the San Juan Public Land Center, Durango, Colorado*.

Nydick, K., Crawford, J., Bidwell, M., Livensperger, C., **Rangwala, I.**, and Cozetto, K. 2012. Climate Change Assessment for the San Juan Mountain Regions, Southwestern Colorado, USA: A Review of Scientific Research.

Research Grants/Awards

- USDA FACT (2020) for "Interactive Deep Learning Platform and Multi-source Data Integration for Improved Soil Moisture Forecasting"
- USGS NC CASC (2020) for "The Impact of Future Changes in Climate on Breeding Waterfowl Pairs in the US Prairie Pothole Region"
- USGS NCASC (2020) for "Synthesis of Transformational Ecological Drought Processes Across the United States"
- USGS NC CASC (2020) for "Synthesis of climate impacts and stakeholder needs in Northern Great Plains grassland ecosystems"

- NOAA Sector Application Research Program (SARP) (2019) for "Identifying and quantifying triggers, time scales, and tools to support management of different drought types in the Northeastern United States"
- USGS CDI (2019) for "Open-source and open-workflow Climate Scenarios Toolbox for adaptation planning"
- US Forest Service (2018) for "Analysis of climate and water flow data and long-term observed trends and future scenarios for a Vulnerability Assessment for the Pike-San Isabel National Forest"
- NIDIS/NOAA (2017) for "The Causes, Predictability and Historical Context of the 2017-18 Northern Plains Drought"
- USGS NCCSC & Colorado State University (2017) for "Evaporative Demand, Drought Monitoring and Assessment across Timescales: Climate Foundational Sciences & Services for DOI's North Central Climate Science Center"
- USACE/SERDP (2017) for "Proposal to process, disseminate and add value to the NACORDEX simulations for use by the impacts and adaptation communities to produce pilot study analyses in two US subregions, and statistical downscaling evaluations using NA-CORDEX"
- USGS NCCSC & Colorado State University (2014) for "Evaporation, Drought, and the Water Cycle Across Timescales: Climate Foundational Sciences for the North Central Climate Science Center"
- NOAA Sectoral Applications Research Program (2014) for "Balancing Severe Decision Conflicts under Climate Extremes in Water Resource Management"
  http://sciencepolicy.colorado.edu/research_areas/bsdc/index.html
- North Central Climate Science Center (2013) for "Natural Resource Management Decision-Making under Climate Uncertainty: Building Social-Ecological Resilience in Southwestern Colorado"
- NSF – AGS (2011) for "Quantifying Feedbacks Affecting High Altitude Climate Change"
- UCAR PACE Fellowship (2009-2011)
- Mountain Studies Institute (2007) for "Assessment of changes in the hydrological cycle in the San Juan Mountains due to the past and projected future climate changes in the region"

Resources & Tool Development

- Landscape Evaporative Response Index
  https://psl.noaa.gov/leri/
- Drought Index Portal (DrIP)
  https://droughtindexportal.colorado.edu/
- Evaporative Demand Drought Index
  https://psl.noaa.gov/eddi/
- Forest Stress Drought Index (FDSI) projections for CONUS
  https://github.com/irangwala/FDSI-Projections-for-CONUS
- In-situ Soil Moisture Data Extraction & Standardization
  https://github.com/krosenberg01/usgs-nccasc-soil-moisture
- High-Resolution Climate Modeling: Application & Usability
  https://ciresevents.colorado.edu/hrcm/
- Climate Scenarios for Natural Resource Management

https://tinyurl.com/2u63pxxs

Presentations

- **Rangwala I.** (September 15, 2020). Understanding and Quantifying Impacts of Regional Climate Change. Guest lecture presented to the graduate class *Climate Change Response: Adaptation, Mitigation & Transformation* at the University of Wyoming.
- **Rangwala I.** (July 29, 2020). Q&A with a Climate Scientist. NC CASC Tribal Climate Adaptation Webinar.
- **Rangwala I.** (June 8, 2020). Climate Change & its Consequences for Drought and Wildfire in Colorado. Colorado's Teachers Workshop for the Hazard Education Awareness and Resilience Task Force. (Invited)
- **Rangwala I.** (April 28, 2020). Projections of Climate Change for Wyoming. Wyoming Game and Fish Department. Virtual workshop to inform the 2020 WY Statewide Habitat Plan (Invited)
- **Rangwala I.** (February 12, 2020). Climate Change & its Consequences for Colorado. The Nature Conservancy, Boulder, CO. (Invited)
- **Rangwala I.** (November 13, 2019). Future Climate Scenarios for Pike, San Isabel, Arapaho and Roosevelt National Forests. U.S. Forest Service Meeting, Fort Collins, CO.
- **Rangwala I.** (September 24, 2019). Presentation on development of climate information for resource management to US Fish and Wildlife Region 6 Biologists Meeting, Grand Junction, CO. (Invited)
- **Rangwala I.** (September 3, 2019). Future Climate Prospects for Montana: How can we better understand their plausible impacts and plan more robustly? Seminar to Montana's Fish Wildlife and Parks, Helena, MT. (Invited)
- **Rangwala I.** (May 29, 2019). Value of "Early Warning" from Near-Realtime Observed Datasets to Ecological Forecasting. USGS Workshop on *Building capacity for Applied Short-Term Ecological Forecasting*. USGS Powell Center, Ft. Collins. (Invited)
- **Rangwala I.** (May 20, 2019). Synthesizing Climate Data for Adaptation. Workshop on Climate Change, Human Migration and Health: Integrating social and environmental data to accelerate innovative science, University of Colorado, Boulder. (Invited)
- **Rangwala I.** and Miller B. (May 17, 2019). The Art and Science of Developing Scenarios of Future Climate for Resource Management. CIRES Rendezvous 2019.
- **Rangwala I.** (April 25, 2019). Climate Information for Scenario Planning. National Adaptation Forum 2019, Madison, WI.
- **Rangwala I.** (April 19, 2019). Developing Climate Information for Adaptation. NC CASC and Earth Lab Open House.
- **Rangwala I.** (April 11, 2019). Climate Change and its impact to Native Lands in the Missouri Basin. USGS Western South Dakota Hydrology Conference, Rapid City, SD. (Invited)
- **Rangwala I.** (November 30, 2018). EDDI & LERI: An "emerging" tale of two drought indices. Earth Lab Incubator. University of Colorado, Boulder.
- **Rangwala I.**, Smith L.L., Senay G., Barsugli, J., Kagone S. and Hobbins M. (September 24, 2018). Landscape Evaporative Response Index (LERI): High-resolution monitoring of evapotranspiration across the Contiguous US. Seminar to NOAA NIDIS. (Invited) https://www.esrl.noaa.gov/psd/leri/resources/LERI_Rangwala_NIDIS-BrownBag_092418_PDF.pdf

- **Rangwala I.**, Smith L.L., Senay G., Barsugli, J., Kagone S. and Hobbins M. (September 21, 2018). Landscape Evaporative Response Index (LERI): High-resolution monitoring of evapotranspiration across the Contiguous US. MtnClim 2018 Conference, Gothic, CO.
- **Rangwala I.** (July 18, 2018). Climate Science Briefing. WWA VCAPS, Durango, CO
- **Rangwala I.,** (July 12, 2018). Future Climate Scenarios for the Upper Gunnison Basin. Adapting to Future Climate in the Gunnison Basin, Colorado: Opportunities, Barriers and Next Steps Workshop, Gunnison, CO.
- **Rangwala I.**, Hoell A., Perlwitz J., Wolter K., Dewes C. and Eischied J. (May 23, 2018). Did Climate Change Increase the Intensity and Likelihood of the 2017 U.S. Northern Plains Drought?16th Annual Climate Prediction Applications Science Workshop (CPASW), Fargo, ND. https://www.ag.ndsu.edu/cpasw/documents/program-pdfs/session-6/05-rangwala-cpasw18-wedsess6-npdx-updated.pdf
- **Rangwala I.**, Barsugli J., Smith L.L., Senay G., Dewes C. and Hobbins M. (May 23, 2018). High-resolution monitoring of evapotranspiration across the Contiguous US. 16th Annual Climate Prediction Applications Science Workshop (CPASW), Fargo, ND.
- Dewes C., **Rangwala I.** and Smith L.L. (April 11, 2018). Downscaled Projections of Extremes in Evaporative Demand. Great Plains Grassland Summit, Denver, CO.
- Yocum H.M. and **Rangwala I.** (April 11, 2018). Stakeholder Engagement and Applications for the Evaporative Demand Drought Index (EDDI). Great Plains Grassland Summit, Denver, CO.
- **Rangwala I.** (Mar 9, 2018) Climate Change in Colorado: Past & Future. Colorado Natural Heritage Program Stakeholder Meeting, Ft. Collins, CO. (Invited) https://cnhp.colostate.edu/aboutus/meetings/cnhp-partners-meeting/
- Hobbins MT, Barsugli J, Dewes C, Huntington J, Lukas J, McEvoy D, Morton C, **Rangwala I**, Ray A, Smith C, Wood A, and Yocum Y (Mar 25, 2018), The Evaporative Demand Drought Index (EDDI): early warning and monitoring of drought from the demand side. American Water Works Association Sustainable Water Management Conference, Seattle, WA, 25 March. (Invited)
- Hobbins MT, Barsugli J, Dewes C, Huntington J, Lukas J, McEvoy D, Morton C, **Rangwala I**, Ray A, Smith C, Wood A, and Yocum H (Mar 14, 2018), The Evaporative Demand Drought Index (EDDI): early warning and monitoring of drought from the demand side. NOAA-Physical Sciences Division Webinar, Boulder, CO.
- **Rangwala, I.** and C. Dewes (Nov 14, 2017). Hydroclimate Analysis for the Wind River Indian Reservation as Relevant to Water Resources and Impacts from Climate Extremes. Wind River Indian Reservation Drought Preparedness Project - Final Workshop, Ft. Washakie, WY. http://wrir.wygisc.org/content/drought-mitigation-plan
- **Rangwala, I.,** C. Dewes, M. Hobbins and J. Barsugli (Sep 7, 2017). PET Discussions. NCCSC Evapotranspiration workshop (Sep 7-8, 2017), Ft. Collins, CO.
- Lyon N.J., D. M. Debinski, and **I. Rangwala** (Aug 7, 2017). Species distribution modeling to predict prairie restoration success under climate change. Ecological Society of America Annual Meeting, Portland, OR.
- **Rangwala, I.**, M. Hobbins and J. Lukas (May 11, 2017). Evaporative Demand Drought Index (EDDI): Tracking the "atmospheric demand" side of drought for monitoring and early warning. Western Water Assessment/NIDIS Webinar. https://cirescolorado.adobeconnect.com/_a1166535166/p1l4r3ibhbe/
- Dewes, C.F., **I. Rangwala**, T.W. Fish. (May 2-4, 2017) Recent trends in snow and rain in Wyoming's Wind River Area. 15th Climate Prediction Applications Science Workshop.

- Dewes, C.F., **I. Rangwala**, M.T. Hobbins, J.J. Barsugli. (May 2-4, 2017) Assessing drought risk under climate change in the US Great Plains via evaporative demand from downscaled GCM projections. 15th Climate Prediction Applications Science Workshop.
- **Rangwala, I.** (Mar 29, 2017). Developing "actionable" climate change scenarios for "a more" robust decision-making process: *Examples from the Intermountain West*. Plenary talk presented at the session titled "Robust Decision Making in a World of Uncertainty" at the Utah State University's Spring Runoff Conference. http://water.usu.edu/conference/2017/index
- **Rangwala, I.** and G. Senay (Mar 21, 2017). Monitoring the exchange of moisture between the land and atmosphere to improve our understanding of drought. NCCWSC Ecological Drought webinar series presentation. https://nccwsc.usgs.gov/webinar/DroughtSenayRangwala
- **Rangwala, I.** and R. Rondeau (Feb 8, 2017). Developing Scenarios for the Landscape-Scale. Presentation made to the Social-Ecological Resilience and Changing Landscapes Webinar Series. https://www.fs.fed.us/rmrs/social-ecological-resilience-and-changing-landscapes-webinar-series
- **Rangwala, I.** (Jan 25, 2017). NCCSC's Climate Foundational Science Area. Webinar presented to the review committee of the NCCSC 5-year review.
- **Rangwala, I.** (Jan 27, 2017). Development and Use of Climate Scenarios for Natural Resource Management in Southwestern Colorado. Lecture to graduate course @ Masters in Environmental Management at Western State Colorado University, Gunnison
- Clifford, K.R., W. Travis, **I. Rangwala**, R. Rondeau and L. Yung (Dec, 2016). Using Interviews And Focus Groups With Resource Managers To Explore Risk Perceptions And Responses To Climate Scenarios. AGU Fall 2016 Meeting.
- Dewes C., **I. Rangwala**, M. Hobbins, and J. Barsugli (Dec 13, 2016). Assessing drought risk under climate change in the US Great Plains via evaporative demand from downscaled GCM projections. AGU Fall 2016 Meeting.
- **Rangwala I.**, M. Hobbins, C. Dewes, J. Lukas and D. McEvoy (Oct 24, 2016). EDDI Drought Indicator: Development and Outreach. Western Water Assessment Stakeholder Meeting.
- **Rangwala, I.**, C. Dewes and T.W. Fish. (Oct 18, 2016). Trends in snow, rain and streamflow in Wyoming's Wind River Mountain Range. MTNCLIM 2016 Conference, Leavenworth, WA.
- Dewes C., **I. Rangwala**, M. Hobbins, J. Barsugli and S. Kumar (Oct 18, 2016). Uncertainties in drought risk assessment under climate change because of differences in methodological choices for the estimation of evaporative demand. MTNCLIM 2016 Conference, Leavenworth, WA. (Presented by I. Rangwala)
- **Rangwala I.** (Aug 28, 2016). Changing Water Regimes in the US West during the 21st century: *Useful Insights from Our Current State of Scientific Understanding*. NSF Western Water Workshop, Lake Tahoe, NV. (Invited)
- Fish, T.W. and **I. Rangwala** (Jul 28, 2016). Trends in snow, rain and streamflow in Wyoming's Wind River Mountain Range. RECCS Summer Intern Poster Session at UCAR Center Green, Boulder, CO.
- **Rangwala, I.**, C. Dewes, T.W. Fish, J. Barsugli and M. Hobbins (Jul 26, 2016). Climate Change and Hydrological Impacts in the Wind River Indian Reservation region. Wind River Drought Preparedness Project's Workshop, Fort Washakie, WRIR, WY.
- Dewes C., **I. Rangwala**, M. Hobbins, J. Barsugli and S. Kumar (May 13, 2016). Drought risk under climate change: Uncertainties in drought risk assessment under climate change because

of differences in methodological choices for the estimation of potential evapotranspiration. CIRES Rendezvous, CU-Boulder.

- **Rangwala I.** (Apr 27, 2016). Climate Change and its Influence on Land Surface Processes in the US Great Plains. Soil Carbon in Semi-Arid Grasslands Workshop at Colorado's Nature Conservancy in Boulder, CO. (Invited)
- **Rangwala I.** (Jan 29, 2016). Atmospheric foundations of Climate Science. Presentation to "Science of Climate Mitigation and Adaptation" Course at WSCU, Gunnison.
- Dewes C., **I. Rangwala,** M. Hobbins and J. Barsugli (Dec 16, 2015). Evaluating Evaporative Demand in CMIP5 Models and its Role in Characterizing Drought over the U.S. Northern Great Plains. AGU Fall 2015 Meeting.
- Arvidson, L and **I. Rangwala**, (Dec 17, 2015). Trends in Observed Summer Daily Temperature Maximum Across Colorado. AGU 2015 Fall Meeting, San Francisco, CA
- **Rangwala I.** and coauthors (Dec 15, 2015). The Understanding of Elevation Dependent Warming from Climate Models. AGU Fall 2015 Meeting (Invited Talk).
- **Rangwala I.** and coauthors (Dec 18, 2015). Development and Application of Future Climate Scenarios for Natural Resource Management in Southwestern Colorado. AGU 2015 Fall Meeting.
- **Rangwala I.** and G. Senay (Dec 7, 2015). Emerging Drought Risk Under Climate Change: Consideration of new tools and approaches. USGS sponsored workshop on Ecological Drought: Impacts. Resistance and Recovery.
- **Rangwala I.** (Nov 16, 2015). Climate Science for Ecological Impacts Assessment and Adaptation Planning. Webinar presented to the participants of the Climate Adaptation Workshop at Fort Collins, CO (Dec 9-10).
- **Rangwala, I.**, J. Barsugli and C. Dewes (Oct 27, 2015). Briefing on the workshop on "High Resolution Climate Modeling in the Northern Great Plains". Webinar presented at the NCCSC monthly call.
- **Rangwala, I.**, J. Lukas, J. Barsugli, C. Dewes and A. Ray (Jul 28, 2015). 2015-16 El Niño: Potential Impacts for the North Central US. NCCSC Webinar.
  https://wwa.colorado.edu/about/news/WLRU.pdf
  http://www.wylr.net/water/188-weather/5659-el-nino-impacts-predicted-to-influence-warm-dry-winter-in-west
- Rondeau, R., D. Anderson and **I. Rangwala** (May 20, 2015). Climate Change and Mesa Verde Rare Plants. NCCSC Open Science Conference, Ft. Collins.
- **Rangwala, I.,** R. Rondeau, C. Wyborn and K. Clifford (May 20, 2015). Development and Use of Climate Scenarios for Natural Resource Management in Southwestern Colorado. NCCSC Open Science Conference, Ft. Collins.
- **Rangwala, I.** and Joe Barsugli (May 20, 2015). NCCSC Foundational Science Area – Climate (*Plenary Talk)*. NCCSC Open Science Conference, Ft. Collins.
- **Rangwala, I.,** R. Rondeau, C. Wyborn and K. Clifford (May 1, 2015). Development and Use of Climate Scenarios for Natural Resource Management in Southwestern Colorado. CIRES Rendezvous, CU-Boulder.
- **Rangwala, I.** (Mar 24, 2015). Climate Scenarios for Southwest Colorado. Webinar in preparation of the Social Ecological Response Model (SERM) workshops in Gunnison and San Juans.
- **Rangwala, I.** (Mar 3, 2015). Climate Scenarios for Southwest Colorado. Ecological response model development workshop for Sagebrush and Spruce Fir landscapes. Gunnison.

- **Rangwala, I.**, R. Rondeau and C. Wyborn (2014). "Actionable" Climate Scenarios for Natural Resource Managers in Southwestern Colorado. AGU Fall meeting.
- Miller J., C. Naud, Y. Chen, D. Ghatak, **I. Rangwala**, E. Sinsky and M. Xu (2014). The Impact of Changes in Water Vapor, Clouds, and Snow Cover on Elevation Dependent Warming. AGU Fall meeting.
- **Rangwala, I.** (Dec 4, 2014). Developing Usable Climate Information For Decision Making. APA meeting. Physical Sciences Division, NOAA ESRL, Boulder.
- **Rangwala, I.** (Nov 20, 2014). Climate Scenarios for Upper Gunnison Basin. *In* workshops to develop ecosystem response models for "sagebrush landscapes" and "spruce-fir ecosystem" in the Upper Gunnison Basin. Western State Colorado University, Gunnison.
- **Rangwala, I.** (2014). Elevationally-Sensitive Warming Response: What insights do climate models provide? *MtnClim 2014*, Homestead, Utah
- Johnstone, J. and **I. Rangwala** (Jul 31, 2014). Analysis of Streamflow in Upper Gunnison Basin: Is there a climate change signal? Research Experience for Community College Students (RECCS) Poster Session at UCAR.
- **Rangwala, I.** (Oct 3, 2014). Climate Change in Colorado: Evidence, Projections & Uncertainties. Seminar for Master in Environmental Management Program, Western State Colorado University, Gunnison, CO.
- **Rangwala, I.** and E. Gordon (Jul 28, 2014). Past and Future Climate on the Colorado Front Range. NREL, Golden, CO.
- **Rangwala, I.** (May 7, 2014). Climate Change in Southwest Colorado. Presentation made to the *Gunnison Climate Working Group* at the Upper Gunnison River Water Conservancy District Office.
- **Rangwala, I.**, E. Sinsky and J. Miller (May 2, 2014). Amplified Warming Projections For High Elevation Regions From CMIP5 Models. *CIRES Rendezvous – 2014*, University of Colorado, Boulder.
- **Rangwala, I.** (Apr 30, 2014). Developing Actionable Climate Scenarios For Decision Making at Regional Scales. Presentation made to UCAR's *Regional Climate Group*.
- Miller J., C. Naud, Y. Chen, D. Ghatak, **I. Rangwala**, and E. Sinsky (Ap 29, 2014). Amplified Warming Rates in High Elevation Regions. *EGU Meeting 2014* (EGU2014-14674).
- **Rangwala, I.** (Apr 16, 2014). Reconciling Global Climate Projections at Regional Scales in the Southwest US Hydrologic Sciences and Water Resources Engineering Seminar.
- **Rangwala, I.** (Apr 14, 2014). Climate Change in Colorado: Evidence, Projections & Uncertainties. *Brown Bag Seminar at the Nature Conservancy, Boulder, CO*.
- Clifford, K. R., **I. Rangwala,** W. Travis (2013). Co-Producing Future Climate Scenarios for Adaptation and Management in the Gunnison Basin: An Integrative Framework for Developing Usable Climate Information. *AGU Fall Meeting, 2013*.
- Chen, Y., C. M. Naud, **I. Rangwala,** and J. Miller (2013). Sensitivity of downward longwave surface radiation to humidity and clouds at a high elevation site. *AGU Fall Meeting, 2013*.
- **Rangwala, I.**, E. Sinsky and J. Miller (2013). Amplified Warming Projections For High Elevation Regions From CMIP5 Models. *AGU Fall Meeting, 2013*.
- **Rangwala, I** (Nov 6, 2013). CMIP5 vs. CMIP3 - Do the new Global Climate Model results give a different picture of future Colorado River streamflows? *Upper Colorado River Basin Water Conference*. Grand Junction, Colorado.
- **Rangwala, I** (2013). CMIP5 Updated Climate Models: Implications for Western Water Management. *Webinar presented for Carpe Diem West*. Oct 15, 2013

- **Rangwala, I** (Jul 24, 2013). CMIP3 vs CMIP5 Projections: With relevance to the western US. *Front Range Climate Change Working Group (FRCCG) meeting*. Univ. of Colorado, Boulder.
- **Rangwala, I.**, J. Miller, C. Naud and Y. Chen (2012). Quantifying Climate Feedbacks in High Elevation Regions. *AGU Fall Meeting, 2012*.
- Sinsky, E., **I. Rangwala** and J. Miller (Nov 9, 2012). Examining elevation sensitive warming in global climate models. Symposium by Climate Change Initiative at Rutgers.
- **Rangwala, I.**, J. Miller and J. Barsugli (2012). Amplified Water Vapor Feedback at High Elevation during Winter. *MtnClim 2012, Estes Park, Colorado (Oct 1-4)*.
- **Rangwala, I.** (2012). Climate Change in Colorado Rocky Mountains from Regional Climate Models. *Rutgers' Environmental Sciences Graduate Student Seminar Series – Spring 2012.*
- **Rangwala, I.**, J. Barsugli and J. Miller (2011). Amplified Water Vapor Feedback at High Altitudes during Winter. *AGU Fall Meeting, 2011*.
- J. J. Barsugli, Mearns, L. O., Prairie, J. R., **I. Rangwala,** Brekke, L. D., Briggs, J. (2010). Does Dynamical Downscaling Matter for Climate Change Adaptation on the Colorado River? *AGU Fall Meeting, 2010*.
- **Rangwala, I.** and J. Barsugli (2010). Investigating Future Warming in the Colorado Rocky Mountains from High Resolution "NARCCAP" Models. *AGU Fall Meeting, 2010*.
- **Rangwala, I.** (2010). Observed and Expected Warming in the San Juans. *"Managing For Resiliency In The San Juan Mountains–Adaptation and Planning for Climate Change"*, October 7-9, 2010 in Silverton, Colorado.
- **Rangwala, I.** (2010). Examining Climate Change in the Colorado Rocky Mountains from High Resolution Climate Models. *"Global Change and the World's Mountains"* at Perth, Scotland, September 2010.
- **Rangwala, I.** and J. Barsugli, (2010). Examining climate change between the late 20th and mid 21st century in Colorado's San Juan Mountains from high resolution climate models. *MtnClim 2010, Blue River, Oregon (Jun 7-10)*.
- **Rangwala I.** (May 12, 2010). Recent and Expected Temperature Changes in the San Juan Mountains. *SJPLC Meeting: Adapting to Climate Change on the San Juan National Forest*. Durango.
- **Rangwala I.** and J. Miller, (2009). 20th Century Temperature Trends Colorado's San Juan Mountains. *AGU Fall Meeting,* San Francisco, CA, 2009.
- **Rangwala I.** and J. Miller, (2009). 20th Century Temperature Trends Colorado's San Juan Mountains. *Rocky Mountain Hydrologic Research Center Meeting, October 2009*.
- **Rangwala, I.** The climatic changes in the San Juan Mountain region during the 20th century. *MtnClim 2008, Silverton (Jun 9-12)*. http://www.fs.fed.us/psw/mtnclim
- **Rangwala, I.**, Miller, J. R., Russell, G. L. and Xu, M. Influence of Increasing Surface Humidity on Winter Warming at High Altitudes through the 21st Century. *AGU Fall Meeting,* San Francisco, CA, 2008.

Climate Services

- Facilitated a training session on how to use climate projections data at the National Tribal and Indigenous Climate Conference (NTICC) (September 14, 2020). https://nticc2020.pathable.co/meetings/virtual/D4eDu9qHxmbhasGpm
- Climate material and expertise for Colorado's Teachers Workshop for the Hazard Education Awareness and Resilience Task (HEART) Force (June 2020).

- Climate material and expertise for Wyoming Game and Fish Dept's workshop to revise the Statewide Habitat Plan (SHP) (April 28-30, 2020)
- Interview by KCUR 89.3 (Kansas City Public Radio) journalists on climate change impacts to Kansas City and opportunities for adaptation (July 15, 2019)
- Structured Decision Making for Montana's Mountain Goat with Montana State Fish, Wildlife and Parks (2018-19).
- Climate change scenario planning for Wind Cave National Park (WICA) with NPS's Climate Change Response Program and WICA's staff (2019)
- John Guinotte, Steve Torbit and Craig Hansen. Species status assessment of White-tailed Ptarmigan in Colorado (2018)
- Climate science and data guidance on Colorado Nature Conservancy's "*Climate Impacts and Opportunities*" project (2017-2018).
- Providing historical EDDI data for impacts research to Multiple land managers and ecologists incl. Renee Rondeau (CNHP), Chris Pague (TNC), Zachary Wurtzebac (CSU, USFS), Shelley Crausbay (NCCSC).
- Advised and reviewed the report on temperature and precipitation extremes for Boulder and Larimer counties by Rocky Mountain Climate Organization (Nov 2015, Sep 2016). http://rockymountainclimate.org/images/extremes/BoulderExtremesFinal.pdf
- Karin Decker & Renee Rondeau. Colorado Natural Heritage Program, Ft. Collins, CO. Guidance on future climate scenarios and providing EDDI datasets for research (2016-)
- Zachary Wurtzebac, CSU and US Forest Service. Guidance related to potential strategies for broad-scale climate and water monitoring, and information delivery to individual Forests and Regions. (Aug 2016 – present)
- Outreach re. Climate Adaptation Planning with the Public Water Works personnel (Ashlee Grace and others) at the City of Denver (July 2016)
- Media outreach with Climate Wire (Erika Bolstad) about climate change in northern Great Plains (July 2016). http://www.eenews.net/stories/1060042691
- Media outreach with Mountain Magazine (Evelyn Spence) on farming in mountain regions under climate change (May 2016).
- Alexander Bryan, UMass and North East CSC. Reviewed and provided guidance for a Scenario Planning summary report for Acadia National Park. (Feb-Apr, 2016)
- Glenn Patterson, Colorado State University. Guidance with diagnosing physical process in analysis of observed data from Rocky Mountain National Park (Jan 2016).
- Outreach with media on the 2015 *Nature Climate Change* (CIRES, DOI, Boulder's Daily Camera, KGNU radio)
- Outreach with Southern Rockies Landscape Conservation Cooperatives (SRLCC) on developing climate scenarios for their Regions 2 and 4 (2015).
- Outreach with GLISA scientists on climate scenarios (July 6, 2015)
- Panelist, Landscape Conservation Cooperatives (LCC): Landscape by Design, NCCSC Open Science Conference (May 21, 2015)
- Technical reviewer for Bureau of Reclamation's West-wide Climate Risk Assessment's (WWCRA) Climate Projection Selection technical document (October, 2015). http://www.usbr.gov/watersmart/wcra/docs/WWCRAClimateProjectionSelection.pdf
- High school climate change curriculum development with the Mountain Studies Institute, Durango & Silverton, Colorado. (2012-present)
- Science and Filmmaking Outreach with Earth Explorers. Westview Middle School, Longmont (Spring 2014) (contact: Carolyn Wiley)

- Climate outreach with Carpe Diem West (2013-2014) (contact: Kimery Wiltshire) http://www.carpediemwest.org/reports/confluence-march-2014
- Reviewer and advisor to Aspen Global Change Institute, Aspen, Colorado (2013-2014) (contact: James Arnott)
- Member and frequent contributor to *"A Global Campaign on Accelerated Climate Warming at High Elevations"* led by the Mountain Research Initiative, Switzerland. (2012-present) (contact: Greg Greenwood)
- AGU 2013 press outreach effort with CIRES, CU-Boulder (contact: Katy Human)
- Contributor and reviewer to the four page WWA/CIRES preliminary assessment report on *"Severe Flooding On the Colorado Front Range, September 2013"* (Sept. 25, 2013)
- Panelist, 3rd annual RMBL Geek Week Panel Discussion, titled "What Will the Gunnison Country Look Like in 25 Years?" Organized by Rocky Mountain Biological Lab. August 1, 2013 in Crested Butte.
- Speaker and Panelist, 4H Climate and Environmental Change Teen Summit, December 12, 2012 at Rutgers University.
- Contributor to the 2012 Southwest Climate Assessment Technical Report, Chapter 6.
- Speaker and Panelist, 4H Climate and Environmental Change Teen Summit, March 15, 2012 at Rutgers University.
- Technical reviewer, *Climate Projections FAQ*, Gen. Tech. Rep. RMRS-GTR-277WWW, prepared by Rocky Mountain Research Station, Forest Service, USDA.
- Regional climate expert at the Gunnison Vulnerability Assessment Review Workshop, May 12-13, 2011 at Western State College, Gunnison.
- Speaker and facilitator, "Dealing with Drought-Adapting to a Changing Climate" workshop Oct. 2009 organized by NOAA-WWA. http://wwa.colorado.edu/climate_change/drought09.html
- Conducted four workshops on climate change titled "Rapid Changes Demand Rapid Solutions: Greedy Actors vs. Conscious Citizens" at Franklin Ave Middle School, Franklin Lakes NJ. April 9, 2009.
- Panelist, Panel Discussion on Global Warming organized by the Rutgers Undergraduate Environmental and Ecological Club (EEC). November 15, 2007.

Organizational Experience and Leadership

- Co-organizer, Monthly NC CASC Webinars. https://nccasc.colorado.edu/webinars
- Climate Science Lead, USGS's North Central Climate Adaptation Science Center (2015-present)
- Advisory Board, Aspen Global Change Institute, Colorado. https://www.agci.org/about/our-team
- CIRES lead for Attribution & Predictability Assessment team at NOAA's PSD (2016-2018)
- Physical climate team co-lead, Wind River Indian Reservation Drought Preparedness Project (2015-2018).
- Convener, High Resolution Climate Modeling workshop for adaptation in northern Great Plains. September 24-25, 2015. https://ciresevents.colorado.edu/hrcm/
- Co-chair, AGU 2014 session (GC21G) on "Climate Change in Mountains: Elevational Dependency and Diverse Impacts"
- Co-chair, AGU 2013 special session (A11A) on "Accelerated Warming at High Elevations: Evidence, Processes, and Future Projections"

- Member, Climate Change Technical Advisory Group, Colorado Water Conservation Board (2013-present)
- Member, Center for Conservation Science & Strategy, The Nature Conservancy at Colorado – Boulder (2013-present)
- Member, Gunnison Climate Working Group (2013-present)
- Member, Eco-Dharma Sangha, Boulder, CO (2013-present)
- Co-organizer, 2010 Climate Conference: Managing for Resiliency in the San Juan Mountains–Adaptation and Planning for Climate Change, Silverton, CO, October 7-9, 2010. http://wwa.colorado.edu/climate_change/Silverton_Oct_2010.html
- Member, Colorado River Hydrology Work Group, Bureau of Reclamation (2009-2011)
- Coordinator, *Science Inquiry Course*, Summer 2009, offered by the Office of Special Programs at the School of Environmental and Biological Studies, Rutgers.
- President (2004-07), Vice President (2002-04) and Seminar Coordinator (2001-02), Environmental Science Graduate Student Association (ESGSA), Rutgers.
- Extensive interdisciplinary participation in environmental sciences, ecology, human ecology, geography, oceanography, geology and environmental microbiology.

Other Recognition

- Review paper on "elevation dependent warming in mountains" cited in a news article (*Glaciologists to target the third pole*) in *Nature* on April 2, 2012 (Vol. 484, Issue 7392)
- Research on the San Juan Mountains reported in media - *The Durango Herald* (April 10, 2008), *High Country News* (Jul 19, 2010) and *Silverton Standard* (Vol. 136, Issue 16, Oct 14, 2010)
- Postdoctoral Fellowship, UCAR Postdocs Applying Climate Expertise (PACE) program 2009-2011
- Recipient of the mini-grant ($2,500) from the Mountain Studies Institute, Silverton, Colorado (2007).
- Climate change research on China featured in the AGU Journal Highlights - 6 November 2006
- Certificate in "Human Dimensions of Environmental Change", Rutgers University (2005).
- Recipient of the PVSC (Passaic Valley Sewerage Commissioners) Award ($1,500) from the N.J. Water Environment Association Scholarship Committee (2002)
- Selected as an Intern at the Chemical Engineering Division at Bhabha Atomic Research Centre, India, for undergraduate research and training (1998).

Teaching

Research Associate - Rutgers University

- **Byrne Seminar: Climate Change & Water Resources** *(Spring 2013)*

Lecturer - Rutgers University

- **Earth Systems** *(Spring 2009)*
  Geography-101 course co-taught with Roger Balm.
- **Science Inquiry Course** *(Summer 2009)*
  Syllabus designing and supervision of the course.

Teaching Assistant - Rutgers University

Lab Instructor to Courses in Biology and Environmental Sciences

- **Concepts in Biology** *(Spring 2002- Spring 2008)*
- **Principles in Biology** *(Fall 2001)*
- **Introduction to Environmental Sciences** *(Spring 2000)*
- **General Biology** *(Fall 2000)*

Mentoring

- Kendall Rosenberg, Earth Lab Capstone Project, U. Colorado, Boulder, 2020
- Travis Williams, Visiting Research Associate, CIRES, U. Colorado, Boulder, 2018-2019
- Candida Dewes, Postdoctoral Research Scientist, CIRES, U. Colorado, Boulder, 2015-2018
- William Radmacher, RECCS undergraduate summer intern, CIRES, U. Colorado, Boulder, 2017
- Thomas Ward Fish, RECCS undergraduate summer intern, CIRES, U. Colorado, Boulder, 2016
- Lisa Arvidson, RECCS undergraduate summer intern, CIRES, U. Colorado, Boulder, 2015
- Jessica Johnstone, RECCS undergraduate summer intern, CIRES, U. Colorado, Boulder, 2014
- Katie Clifford, MS Geography, U. Colorado, Boulder, 2013
- Eric Sinsky, Undergraduate, Rutgers University, 2012-2013
- Marcus Pescinski, Undergraduate, Rutgers, 2013
- Justin Briggs, intern with Western Water Assessment, U. Colorado, Boulder, 2010-11
- Neil Ramchandani, Undergraduate, Rutgers, 2008

Areas of expertise

Climate diagnostics
Global/regional climate models
Large Dataset: Analysis and Visualization
Earth system science
Extensive outreach experience with land/water managers
Ecosystem & hydrological modeling
Environmental field sampling
Social-ecological systems

Scientific Reviewing

Journals & Technical Documents

- *Climatic Change*
- *Climate Dynamics*
- *Global and Planetary Change*
- *Theoretical and Applied Climatology*
- *Water Resources Research*
- *International Journal of Climatology*
- *Arctic, Antarctic and Alpine Research*
- *Journal of Climate*
- *Climate Risk and Management*
- *Oxford University Publications*
- *USBR Technical Document*
- *Bulletin of the American Meteorological Society*
- *Rangeland Management*

Proposal

- *Graduate Women in Science – National Fellowship Program (2014)*