

Benjamin L. Ruddell, Ph.D., P.E.

BIOGRAPHY

Dr. Ruddell's professional experience is research and education in an interdisciplinary university setting. He works with a variety of federal, local, and private partners to accomplish cutting-edge projects. His research interests fall broadly in the area of the engineering and management of complex coupled natural-human systems, especially ecological, water, and climate systems strongly connected to the human economy and society. He is a specialist in informatics, analytics, and data-driven approaches. His professional goals are the advancement of the science, engineering, and sustainable management of complex systems, and excellence in education in a university setting.

EDUCATION

- 2008 Ph.D. Civil & Environmental Engineering, University of Illinois
- 2004 M.S. Civil & Environmental Engineering, University of Illinois
- 2002 B.S. Engineering with Civil Concentration, Calvin College

APPOINTMENTS AND PROFESSIONAL EXPERIENCE

- 2016 – Associate Professor, School of Informatics, Computing, and Cyber Systems (SICCS), Northern Arizona University
- 2017 – Affiliate, Center for Ecosystem Science and Society (ECOSS), Northern Arizona University
- 2016 – Adjunct, School of Earth Sciences and Environmental Sustainability (SESES), Northern Arizona University
- 2009 – 2015 Assistant Professor, The Polytechnic School, Arizona State University

PEER REVIEWED ARTICLES (lab affiliates)

Jing Liang, Yueming Qiu, Timothy James, Benjamin L. Ruddell, Michael Dalrymple, Stevan Earl, Alex Castelazo, Do energy retrofits work? Evidence from commercial and residential buildings in Phoenix, In Journal of Environmental Economics and Management, 2017, ISSN 0095-0696, <https://doi.org/10.1016/j.jeem.2017.09.001>.

Daniel Burillo, Mikhail V. Chester, Benjamin Ruddell, Nathan Johnson, Electricity demand planning forecasts should consider climate non-stationarity to maintain reserve margins during heat waves, Applied Energy, Volume 206, 2017, Pages 267-277, ISSN 0306-2619, <http://dx.doi.org/10.1016/j.apenergy.2017.08.141>.

Ryan A. McManamay, Sujithkumar Surendran Nair, Christopher R. DeRolph, Benjamin L. Ruddell, April M. Morton, Robert N. Stewart, Matthew J. Troia, Liem Tran, Hyun Kim, and Budhendra L. Bhaduri, US cities can manage national hydrology and biodiversity using local infrastructure policy, PNAS 2017 ; published ahead of print August 21, 2017, doi:10.1073/pnas.1706201114.

Ahams, I.C., Paterson, W., Garcia, S., Rushforth, R., Ruddell, B.L., and Mejia, A. (2017), Water Footprint of 65 Mid- to Large-Sized U.S. Cities and Their Metropolitan Areas, J Am Water Resour Assoc, 1752-1688, <http://dx.doi.org/10.1111/1752-1688.12563>.

Scanlon, B. R., Ruddell, B. L., Reed, P. M., Hook, R. I., Zheng, C., Tidwell, V. C. and Siebert, S. (2017), The food-energy-water nexus: Transforming science for society. Water Resour. Res.. doi:10.1002/2017WR020889

- Gerken, T., B.L. Ruddell, J.D. Fuentes, A. Araujo, N.A. Brunsell, J. Maia, A. Manzi, J. Mercer, R.N. dos Santos, C. von Randow, P.C. Stoy (2017), Investigating the mechanisms responsible for the lack of surface energy balance closure in a central Amazonian tropical rainforest, <https://doi.org/10.1016/j.agrformet.2017.03.023>.
- Kang, M., B.L. Ruddell, C. Cho, J. Chun, and J. Kim (2017), Identifying CO₂ advection on a hill slope using information flow, *Agricultural and Forest Meteorology*, v.232, pp.265-278, <http://dx.doi.org/10.1016/j.agrformet.2016.08.003>
- Groffman, P.M., M.L. Cadenasso, J. Cavender-Bares, D.L. Childers, N.B. Grimm, J.M. Grove, S.E. Hobbie, L.R. Hutya, G.D. Jenerette, T. McPhearson, D.E. Pataki, S.T.A. Pickett, R.V. Pouyat, E. Rosi-Marshall, and B.L. Ruddell (2016), Moving Towards a New Urban Systems Science, *Ecosystems*, DOI: 10.1007/s10021-016-0053-4.
- Mayer, A., Mubako, S. and Ruddell, B. L. (2016), Developing the greatest Blue Economy: Water productivity, fresh water depletion, and virtual water trade in the Great Lakes basin. *Earth's Future*, 4: 282–297. doi:10.1002/2016EF000371
- Rushforth, R. R., and B. L. Ruddell (2016), The vulnerability and resilience of a city's water footprint: The case of Flagstaff, Arizona, USA, *Water Resour. Res.*, 52, 2698–2714. doi:10.1002/2015WR018006
- Shaffer, S., M. Moustouai, B.L. Ruddell, and A. Mahalov (2016), A method of aggregating heterogeneous subgrid land cover input data for multi-scale urban parameterization, *Journal of Applied Meteorology and Climatology*. <http://dx.doi.org/10.1175/JAMC-D-16-0027.1>
- Sturtevant, C., B.L. Ruddell, S.H. Knox, J. Verfaillie, J.J. Matthes, P.Y. Oikawa, and D. Baldocchi (2016), Identifying scale-emergent, non-linear, asynchronous processes of wetland methane exchange, *Journal of Geophysical Research – Biogeosciences*, doi://10.1002/2015JG003054.
- Vanos, J.K., A. Middel, G.R. McKercher, E.R. Kuras, and B.L. Ruddell (2016), Multiscale Surface Temperature Analysis of Urban Playgrounds in a Hot, Dry City, *Landscape and Urban Planning*, 146, 29-42, <http://dx.doi.org/10.1016/j.landurbplan.2015.10.007>. Cover Story for the Issue. Editor's Choice for the Issue. Winner of the 2017 Tromp Scientific Award from the International Society of Biometeorology.
- Hab, K., B.L. Ruddell, and A. Middel (2015), Mobile sensor lag correction for urban climate applications, *Urban Climate*, doi://10.1016/j.uclim.2015.10.003.
- Jenerette, G.D., S.L. Harlan, A. Buyantuev, W.L. Stefanov, J. Delect-Barreto, B.L. Ruddell, S. Myint, S. Kaplan, and X. Li (2015), Micro-scale urban surface temperatures are related to land-cover features and residential heat related health impacts in Phoenix, AZ USA, *Landscape Ecology*, doi:10.1007/s10980-015-0284-3. *Awarded Outstanding Paper in Landscape Ecology 2017.*
- Ruddell, B.L., R. Yu, and D. Childers (2015), Seasonally varied controls of climate and phenophase on terrestrial carbon dynamics: Modeling eco-climate system state using Dynamical Process Networks, *Landscape Ecology*, pp.1-16, doi:10.1007/s10980-015-0253-x.
- Hall, S.J., J. Learned, B.L. Ruddell, K. L. Larson, J. Cavender-Bares, N. Bettez, P.M. Groffman, J. M. Grove, J.B. Heffernan, S.E. Hobbie, J.L. Morse, C. Neill, K.C. Nelson, J.P.M. O'Neil-Dunne, L. Ogden, D.E. Pataki, W.D. Pearse, C. Polsky, R.R. Chowdhury, M.K. Steele, and T.L.E. Trammell (2015), Convergence of microclimate in residential landscapes across diverse cities in the US, *Landscape Ecology*, doi:10.1007/s10980-015-0297-y.
- Sanchez, C.A., B.L. Ruddell, R. Schiesser, and V. Merwade (2015), Enhancing the T-shaped learning profile when teaching hydrology using data, modeling, and visualization activities, *Hydrol. Earth Syst. Sci. Discuss.*, 12, 6327–6350, www.hydrol-earth-syst-sci-discuss.net/12/6327/2015/, doi:10.5194/hessd-12-6327-2015.
- Rushforth, R.R. and B.L. Ruddell (2015), The Hydro-Economic Interdependency of Cities: Virtual Water Connections of the Phoenix, Arizona Metropolitan Area, *Sustainability*, 7(7), 8522-8547; doi:10.3390/su7078522.

- Paterson W, Rushforth R, Ruddell BL, Konar M, Ahams IC, Gironás J, Mijic A, Mejia A. Water footprint of cities: A review and suggestions for future research. *Sustainability*. 2015 Jun 30;7(7):8461-90.
- Hab, K., B.L. Ruddell, and A. Middel (2015), TraVis – A Visualization Framework for Mobile Transect Data Sets in an Urban Microclimate Context, *IEEE PacificVis*, April 2015, Hangzhou, China, 10.1109/PACIFICVIS.2015.7156374.
- S.R. Shaffer; W.T.L. Chow; M. Georgescu; P. Hyde; G. D. Jenerette; A. Mahalov; M. Moustaoui; B. L. Ruddell (2015). "Multi-scale modeling and evaluation of urban surface energy balance in the Phoenix metropolitan area", *J. Appl. Meteorol. Climatol.*, 54(2):322-338, 10.1175/JAMC-D-14-0051.1.
- Volo, Thomas J., Enrique R. Vivoni, and Benjamin L. Ruddell (2015). An ecohydrological approach to conserving urban water through optimized landscape irrigation schedules. *Landscape and Urban Planning*, 133: 127-132, doi:10.1016/j.landurbplan.2014.09.012.
- Chow, W. T., Salamanca, F., Georgescu, M., Mahalov, A., Milne, J. M., & Ruddell, B. L. (2014). A multi-method and multi-scale approach for estimating city-wide anthropogenic heat fluxes. *Atmospheric environment*, 99, 64-76., doi:10.1016/j.atmosenv.2014.09.053.
- Ruddell, B.L., E.A. Adams, R. Rushforth, and V.C. Tidwell (2014), Embedded Resource Accounting for Coupled Natural-Human Systems: An application to water resource impacts of the Western U.S. electrical energy trade, *Water Resources Research*, v.50, no.10, pp.7957-7972, DOI:10.1002/2013WR014531.
- Ruddell, B.L., F. Salamanca, and A. Mahalov (2014), Reducing a Semiarid City's Peak Electrical Demand Using Distributed Cold Thermal Energy Storage, *Applied Energy*, 134, pg. 35-44, DOI:10.1016/j.apenergy.2014.07.096.
- Harlan, S.L.; Chowell, G.; Yang, S.; Petitti, D.B.; Morales Butler, E.J.; Ruddell, B.L.; Ruddell, D.M. (2014), Heat-Related Deaths in Hot Cities: Estimates of Human Tolerance to High Temperature Thresholds. *Int. J. Environ. Res. Public Health*, 11, 3304-3326, doi:10.3390/ijerph110303304
- Volo, T. J., E. R. Vivoni, C. A. Martin, S.R. Earl and B.L. Ruddell (2014), Modeling soil moisture, water partitioning, and plant water stress under irrigated conditions in desert urban areas. *Ecohydrology*, DOI:10.1002/eco.1457.
- Chow, W. T.L., T. J. Volo, E. R. Vivoni, G. D. Jenerette and B. L. Ruddell (2014), Seasonal dynamics of a suburban energy balance in Phoenix, Arizona. *International Journal of Climatology*, DOI:10.1002/joc.3947.
- Ruddell, B.L., I. Zaslavsky, D. Valentine, B. Beran, M. Piasecki, Q. Fu, and P. Kumar (2014), Sustainable Long Term Data Publication: Lessons Learned from a Prototype Observatory Information System for the Illinois River Basin, *Environmental Modelling and Software*, 54, pg.73-87, DOI:10.1016/j.envsoft.2013.12.015
- Ruddell, B.L. and T. Wagener (2013), Grand Challenges for Hydrology Education in the 21st Century, *Journal of Hydrologic Engineering*, doi://10.1061/(ASCE)HE.1943-5584.0000956.
- Ouyang, Y., E. Wentz, B.L. Ruddell, and S. Harlan (2013), A Multi-Scale Analysis of the Relationship of Single-Family Residential Water Use with its Determinants in the Phoenix Metropolitan Area, *Journal of the American Water Resources Association*, 50(2), pg.448-467, DOI: 10.1111/jawr.12133.
- Ruddell, B.L., N.A. Brunsell and P. Stoy (2013), Applying information theory to quantify process uncertainty, feedback, and scale in the Earth system. *EoS*, doi:10.1002/2013EO0500007, 94, 56.
- Rushforth, R.R., E.A. Adams, B.L. Ruddell (2013), Generalizing ecological, water, and carbon footprint methods and their worldview assumptions using Embedded Resource Accounting, *Water Resources and Industry*, 1-2, pg.77-90.
- Mubako, S.T., Ruddell, B.L., and Mayer, A. (2013). "The Relationship between Water Withdrawals and Freshwater Ecosystem Water Scarcity Quantified at Multiple Scales for a Great Lakes Watershed." *J. Water*

Resour. Plann. Manage., 10.1061/(ASCE)WR.1943-5452.0000374. Runner-up in editors' 2013 Paper of the Year Award voting.

Merwade, V. and Ruddell, B.L. (2012), Moving university hydrology education forward with geoinformatics, data and modeling approaches, *Hydrol. Earth Syst. Sci. Discuss.*, 9, 2601-2628, doi:10.5194/hessd-9-2601-2012.

Voepel, H., B.L. Ruddell, R. Schumer, P. A. Troch, P. D. Brooks, A. Neal, M. Durcik, and M. Sivapalan (2011), Quantifying the role of climate and landscape characteristics on hydrologic partitioning and vegetation response, *Water Resour. Res.*, 47, W00J09, doi:10.1029/2010WR009944. Most popular download from the WRR website in August 2011.

Kumar, P. and B.L. Ruddell (2010), Information Driven Ecohydrologic Self-Organization, *Entropy*, 12, 2085-2096.

Ruddell, B.L., and P. Kumar (2009a), Ecohydrologic process networks: 1. Identification, *Water Resour. Res.*, 45, W03419, doi:10.1029/2008WR007279.

Ruddell, B.L., and P. Kumar (2009b), Ecohydrologic process networks: 2. Analysis and characterization, *Water Resour. Res.*, 45, W03420, doi:10.1029/2008WR007280.

Hejazi, M.I., X. Cai, and B.L. Ruddell (2008), The role of hydrologic information in reservoir operation – Learning from historical releases, *Advances in Water Resources*, doi:10.1016/j.advwatres.2008.07.013.

MISC. PUBLICATIONS: ABSTRACTS, REPORTS, PATENTS, SOFTWARE, THESES, DATASETS

Ruddell, B.L. (2017), What's special about food, energy, and water? LinkedIn Article.

Ruddell, B.L. et al. (2017), Mobile Hydrology website, <https://cshci.cs.mtu.edu/water/>

Ruddell, B.L. et al. (2017), CoCoTemp website, <https://hci-dev.cs.mtu.edu:8103/cocotemp/>

Havely, J. et al. (2017), CoCo iTemp software. <https://github.com/MTUHIDE/CoCoTemp>

Ruddell, B.L. (2017), Three Business Cases for Water Use and Impact Accounting (WUIA). LinkedIn Article.

Leshyk, V., R.R. Rushforth, and B.L. Ruddell (2017), Hawaii's FEW System, graphical art.

Leshyk, V., R.R. Rushforth, and B.L. Ruddell (2017), New York City's FEW System, graphical art.

Ruddell, B.L. (2017), An Informatics Professor's Explanation of Big Data. LinkedIn Article.

Ruddell, B.L. et al. (2016), ProcessNetwork Software version 1.5, March 2016, *Github*, https://github.com/ProcessNetwork/ProcessNetwork_Software.

Sherbeck, J.A., and B.L. Ruddell, Rotary Actuator and Valve (2016), US Patent #9,581,265, filed 3/4/2013, dated February 28th, 2017.

Burillo, D., M. Chester, and B.L. Ruddell (2016), Electric Grid Vulnerabilities to Rising Air Temperatures in Arizona, *Procedia Engineering*, 145, 1346-1353.

(Bush, J. and B.L. Ruddell) Field Testing an Ice Storage Air Conditioner in Phoenix, Arizona. *EPRI*, Palo Alto, CA: 2015.

Johnson, N., B.L. Ruddell, J. Sherbeck, and J. Pezzi (2015), Residential Thermal Energy Control System with Storage, SRP/ASU-ATIC CREC Program Final Report.

Hab, K., A. Middel, B.L. Ruddell, and H. Hagen (2015), Spatial Aggregation of Mobile Transect Measurements for the Identification of Climatic Microenvironments, *17th Workshop on Visualization in Environmental Sciences* (EnvirVis 2015), Cagliari, Italy, 25-29 May 2015.

- Ruddell, B.L. et al. (2015), ProcessNetwork Software, version 1.4, January 2015, *Matlab Central File Exchange*, <http://www.mathworks.com/matlabcentral/fileexchange/41515-processnetwork-version-1-4-software>, downloaded roughly once per day by researchers around the world. V1.0 Originally published 2008.
- Mayer, A.M., B.L. Ruddell, and S.T. Mubako (2014), Introducing Virtual Water Accounting to the Great Lakes, <http://glpf.org/wp/wp-content/uploads/2011/03/VWA-Booklet-3-24-15.pdf>
- Dalrymple, M., R. Melnick, and M. Schwartz (2014), Energize Phoenix: Energy Efficiency on and Urban Scale, Year Three Report: Results, ASU Global Institute of Sustainability. Accessed 1 September 2014 at: <http://sustainability.asu.edu/docs/gios/energize/2013year3/Energize%20Phoenix-YR3-Report.pdf>
- Ruddell, B.L. and T.K. Marshall, Low-Cost Printed Mail-able Meteorological Radiation Shield, Copyright 2014.
- Contributor to: Seelbach, P.W., J.G. Read, K.A. Buckner, T.Eder, and C. Mannien (2014), Great Lakes Blue Accounting: Empowering Decisions to Realize Regional Water Values, Report to the Council of Great Lakes Governors.
- Ruddell, B.L. (2013), Indirect Management of cross-boundary water sustainability using Virtual Water, *Global Water Forum*. Accessed 17 December 2013 at: <http://www.globalwaterforum.org/2013/12/09/indirect-management-of-cross-boundary-water-sustainability-using-virtual-water/>, finalist for the Global Water Forum's 2013 Emerging Scholars Award.
- Ruddell, B.L., L. Olson, and C. Yan (2013), Project Report for the Mike Rock Company: Thermal, Energy, and IAQ Testing on a Small Prefabricated Structure.
- Ruddell, B.L., H. Bryan, P. Phelan, J.A. Sherbeck, and K. Ray (2013), Provisional Project Summary Report for ASU Lightworks Project: Residential Thermal Storage and Load Shifting Process.
- Sherbeck, J.A., and B.L. Ruddell, Simplified Small Scale Thermal Energy Storage Process, Patent Pending.
- Ruddell, B.L., Process Modifying Standard Logistical Transport Pallets to Create Modular Configurable Structures, Patent Application #61/758,612, filed 1/30/2013.
- Ruddell, B.L. and M. Pasqualetti (2013), Master Energy Plan Policy Brief: Water and Arizona's Electrical Energy Future, *for the Governor's Master Energy Plan*.
- National Research Council (2012), New Research Opportunities in the Earth Sciences, National Academies Press, ISBN:9780309219242. Contributor
- Martin, E.A. and BL Ruddell (2012), Value intensity of water used for electrical energy generation in the Western US; an application of embedded resource accounting, *IEEE International Symposium on Sustainable Systems and Technology*, Boston, MA, May 2012.
- Chow, W.T.L. and B.L. Ruddell (2012), Eddy covariance data measured at the CAP LTER flux tower located n the west Phoenix, AZ neighborhood of Maryvale from 2011-12-16 through 2012-12-31, <https://sustainability.asu.edu/caplter/data/data-catalog/view/knb-lter-cap.591.1/>. *In use in numerous published studies of land surface mass and energy fluxes in Phoenix.*
- Lande M., B.L. Ruddell, D. Morrell, R. Grondin, R. Anguamea Lara, R. Whitehouse, and K. Gary (2012), Work in Progress: Constructing a Multidisciplinary Design Project for First-Year Engineering and Computing Students, *2012 Frontiers in Education Conference*, Seattle, WA, USA, 3-6 October 2012.
- Ruddell, B.L. (2012), Applications of Embedded Resource Accounting to U.S. Water Resources, *USEPA Importance of Water Conference*, Washington, DC, USA, 19 Sep 2012.
- Gries C., M. Servilla, W. Sheldon, J. Porter, J. Walsh, and B.L. Ruddell (2012), Network Information System Best Practices for Metadata Workflows: TIGER team report to the LTER-NIS.
- Ruddell, B.L. (2012), Embedded Values Assessment of Water Value Intensities for Phoenix MSA Cities, City of Chandler, Arizona, September, 2012. Cited as one of the Water Department's 'key' accomplishments in 2012.

- USEPA (2012), Part 2: Expert Paper on Embedded Resource Accounting: Evaluating the Comparative Intensity of Water Use in Multiple Sectors of the U.S. Economy, In: *The Importance of Water to the U.S. Economy*, Office of Water, U.S. Environmental Protection Agency, September, 2012.
- Ruddell, B.L., N. Oberg, P. Kumar, and M. Garcia (2010), Using Information-Theoretic Statistics in MATLAB to Understand How Ecosystems Affect Regional Climates, MATLAB Digest Academic Edition, February 2010, www.mathworks.com/academia.
- Ruddell, B.L. (2009), *Reports are for Communication*. LinkedIn Article.
- Ruddell B.L. (2008), How to build a cyberinfrastructure for the long term. LinkedIn Article.
- Oberg, N. and B.L. Ruddell (2008), MATLAB Parallel Computing Toolbox Benchmark for an Embarrassingly Parallel Application, *Ven Te Chow Hydrosystems Laboratory Green Report*, University of Illinois.
- Ruddell, B.L., P. Kumar, and A. Schmidt (2008), Vista Data Vision Case Study: A Data Distribution System for Civil Engineering Research and Education at the University of Illinois of Urbana-Champaign, <http://vistadatavision.com/about-us/case-studies/>.
- Hejazi, M.I., X. Cai, and B.L. Ruddell (2008), How Reservoirs were Operated — Exploring the Role of Hydrologic Information, *ASCE Conf. Proc.* doi:10.1061/40976(316)593, Ahupua'a Proceedings of the World Environmental and Water Resources Congress 2008.
- Ruddell, B.L. (2008), Identification and Characterization of Ecohydrologic Process Networks, Ph.D. Thesis, *University of Illinois at Urbana-Champaign*, Urbana, IL., dissertation chair Praveen Kumar.
- Ruddell B.L. (2006), Scientific Metadata: Back to Basics. *Proceedings of the 7th International Conference on Hydroscience and Engineering (ICHE-2006)*, Sep. 10 – Sep. 13 2006, Philadelphia, USA.
- Ruddell B.L. (2006) *Virtual Water Trade for the Future of the Great Lakes*. LinkedIn Article.
- Merwade et al. (2005), Digital watershed for the Neuse basin, Chapter 8 in: Maidment, D. (ed.), *Hydrologic Information System Status Report*, September 15, 2005. Accessed 1 September 2014 at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.102.8565&rep=rep1&type=pdf#page=158>
- Ruddell, B.L. (2004), The Modelshed Geodata Model Framework and its Applications, Thesis, Graduate College of the University of Illinois at Urbana-Champaign.
- Qarabesah R., B.L. Ruddell, and Tan, L.A. (2003). *Environment and Pollution Sector Report of the Wadi el-Far'a Project Report: an Environmental Assessment of the Wadi el-Far'a Watershed*. The United States Agency for International Development.
- Boerman T., T. Brinks, S. Greiner, and B.L. Ruddell (2002). *Water Supply and Irrigation Design for an Orphanage near Guadalupe Bravos*. Senior Engineering Project Report, Calvin College, Grand Rapids, MI.

PROFESSIONAL SERVICE AND PUBLIC OUTREACH

Online Presence

Google Scholar	http://scholar.google.com/citations?user=W1fB5OcAAAAJ
LinkedIn	http://www.linkedin.com/in/benjaminruddell/
ResearchGate	http://www.researchgate.net/profile/Benjamin_Ruddell
ORCID	http://orcid.org/0000-0003-2967-9339
NAU Lab	http://nau.edu/SICCS/Labs/Complex-Systems-Informatics-Laboratory
Consulting	http://ruddellenvironmental.com/index.html

NWEP <http://www.nwep.org>
FEWSION <http://fewsion.us/>
VW in Great Lakes <http://glvirtualwater.net/>

Media Appearances (Select)

- Toth, Heidi., NAU looking for citizen scientists to help map Flagstaff's food, energy, water sources, *NAU News*, November 8th, 2017, <http://news.nau.edu/place4fews/>
- Brodie, M., Report: 5% Of U.S. Land Area Affects 60% OF Country's Rivers, Streams, *The Show*, September 14th, 2017, <http://kjzz.org/content/536443/report-5-us-land-area-affects-60-countrys-rivers-streams>
- Cowan, Emery, NAU mapping technology pinpoints Harvey's unexpected impacts, *Arizona Daily Sun*, September 7th, 2017, http://azdailysun.com/news/local/nau-mapping-technology-pinpoints-harvey-s-unexpected-impacts/article_5bcffee2-06d3-508b-b8d4-5d59abe838a7.html
- Sevigny, M., NAU Research Shows Ripple Effects of Hurricane Harvey on U.S. Economy, *KNAU*, September 1, 2017, <http://knau.org/post/nau-research-shows-ripple-effects-hurricane-harvey-us-economy#stream/0>
- NAU News, NAU researchers determine adverse effects of Houston flooding will be felt throughout the globe, August 30, 2017, <http://news.nau.edu/houston-flooding/>
- Toth, H., NAU researcher: City's infrastructure, not population, plays greater role in ecological impact, *NAU News*, August 22, 2017, <http://news.nau.edu/city-ecology/>
- Magahern, J., Saudi Arizona, *Phoenix Magazine*, September 2016. <http://www.phoenixmag.com/valley-news/saudi-arizona.html>
- Brodie, M., New Project to Map Food, Energy, and Water Systems Nationwide. *The Show*, September 16, 2016. <http://kjzz.org/node/365644>
- Morales, L., Mapping the Intersection of Food, Energy and Water. *Fronteras Desk*, September 8, 2016. <https://www.azpm.org/p/crawler-stories/2016/9/8/95436-nau-professor-to-map-the-intersection-of-food-energy-and-water/>
- NAU News, \$3 million grant to support first detailed map of the nation's food, energy, and water systems, September 2, 2016. <http://news.nau.edu/nau-researcher-awarded-3-million-grant-build-first-detailed-map-nations-food-energy-water-systems/>
- Ronda, C., Camels Don't Fly, Deserts Don't Bloom. <https://vimeo.com/164671735>
- Quraishi, A.-H., Virtual water transfers in the US producing a benefit to foreign nations, *Al Jazeera America*, 12 November 2015. <https://www.youtube.com/watch?v=EfOSu0JATU0>
- Watson, G., Dangerously Hot Playground Temperatures Explored by Texas Tech Researcher, *Texas Tech Today*, 11 November 2015. <http://today.ttu.edu/posts/2015/11/hot-playground-temperatures-explored-by-researcher>
- Seckel, S., Made in the shade: ASU team crunches data on how best to cool urban areas, *ASU NEWS [SCIENCE & TECH]*, 25 September 2015. <https://asunews.asu.edu/20150925-shade-research>
- Simons, T., Sustainability: City Water Interdependency. *Arizona Horizon*, 15 September, 2015. <http://www.azpbs.org/arizonahorizon/detail.php?id=2782#Sustainability: City Water Interdependency>
- Kullman, J., Arizona communities must cooperate to achieve water sustainability. *Full Circle*, 10 September 2015. <http://fullcircle.asu.edu/research/arizona-communities-must-cooperate-to-achieve-water-sustainability/>

- Goldstein, S., Should High Temperatures Restrict Valley Hiking Privileges? *KJZZ*, 17 July 2015. <http://kjzz.org/content/167543/should-high-temperatures-restrict-valley-hiking-privileges>
- Oleson, T., Virtual water: Tracking the unseen water in goods and resources, *Earth Magazine*, 21 September 2014. <http://www.earthmagazine.org/article/virtual-water-tracking-unseen-water-goods-and-resources>
- Goldstein, S., Valley Unlikely To Be Disrupted By A Natural Disaster, *KJZZ*, 5 September 2014. <http://kjzz.org/content/44304/valley-unlikely-be-disrupted-national-disaster>
- Brodie, M., Effects of Flooding in Rural Areas, *KJZZ*, 22 August 2014. <http://kjzz.org/content/42557/effects-flooding-rural-areas>
- Shadley, S., ASU Expert Praises Valley's Flood Control System, *KJZZ*, 19 August 2014. <http://kjzz.org/content/42145/asu-expert-praises-valleys-flood-control-system>
- Zroika, P., Changing climate in your own backyard, *ASU Research Matters*, 3 March 2014. <http://researchmatters.asu.edu/stories/changing-climate-your-own-backyard-3150>