

# Christa Brelsford

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## RESEARCH INTERESTS

In order to encourage the worlds rapidly growing urban population to develop in a secure and resilient manner, we need both a better empirical understanding of spatial patterns and evolution in cities, and also better theories about urban function. I use empirical methods, especially spatial analysis and remote sensing, to link individual choices to aggregate outcomes in order to build better theories about the function of cities and urban water systems.

## EDUCATION

Ph.D. Sustainability, Arizona State University, 2014  
Dissertation: Whiskey is for Drinking; Water is for Fighting Over: Population Growth, Infrastructure Change, and Conservation Policy as Drivers of Residential Water Demand

Advisors: Joshua Abbott and Abigail York  
GPA: 3.5/4.33

M.A. Climate and Society, Columbia University, 2008  
GPA: 3.75/4.33

B.S. Civil Engineering (cum laude), Columbia University, 2007  
GPA: 3.74/4.33

B.A. Liberal Studies, Bard College at Simons Rock, 2007  
GPA 3.5/4

## PROFESSIONAL APPOINTMENTS

2017-2020 Liane Russell Fellow, Oak Ridge National Laboratory  
Geographic Information Science and Technology Group

2014 – 2017 Postdoctoral Fellow, Santa Fe Institute  
Mentor: Luís Bettencourt

## PUBLICATIONS

### Peer Reviewed

- 2017      **Brelsford C.**, T. Martin and LMA. Bettencourt. Optimal Re-blocking as a Practical Tool for Neighborhood Development. *Environment and Planning B: Urban Analytics and City Science*, Jun. 2017.  
doi:10.1177/2399808317712715
- 2017      **Brelsford C.**, J. Lobo, J. Hand, LMA. Bettencourt. The Heterogeneity and Scale of Sustainable Development in Cities. *Proceedings of the National Academy of Science* May 2017 p. 201606033  
doi:10.1073/pnas.1606033114
- 2017      **Brelsford, C.**, and J. Abbott. “Growing into Water Conservation? Decomposing the Drivers of Reduced Water Consumption in Las Vegas, NV.” *Ecological Economics* 133 (March 2017): 99–110.  
doi:10.1016/j.ecolecon.2016.10.012.
- 2015      Bettencourt, LMA., and **C. Brelsford**. “Industrial Ecology: The View From Complex Systems: Industrial Ecology: The View From Complex Systems.” *Journal of Industrial Ecology* 19 (2): 195–97. 2015.  
doi:10.1111/jiec.12243.
- 2014      Lu, X., and **C. Brelsford**. Network Structure and Community Evolution on Twitter: Human Behavior Change in Response to the 2011 Japanese Earthquake and Tsunami. *Nature Scientific Reports*, 4. 2014 doi: 10.1038/srep06773
- 2014      **Brelsford, C.**, and D. Shepherd. “Using Mixture-Tuned Match Filtering to Measure Changes in Subpixel Vegetation Area in Las Vegas, Nevada.” *Journal of Applied Remote Sensing* 8 (1): 083660. 2014  
doi:10.1117/1.JRS.8.083660.

### Popular Press

- 2016      **Brelsford, C.**, Water management is a wicked problem, but not an unsolvable one. *Christian Science Monitor* July 13<sup>th</sup>, 2016  
<http://www.csmonitor.com/Science/Complexity/2016/0713/Water-management-is-a-wicked-problem-but-not-an-unsolvable-one>

### In Review

Berdahl, A., **C. Brelsford**, C. De Bacco, M. Dumas, V. Ferdinand, J. A. Grochow, L. Hébert-Dufresne, Y. Kallus, C. P. Kempes, A. Kolchinsky, D.B. Larremore, E. Libby, E. A. Power, C. Stern, B. D. Tracey. Dynamics of Beneficial Epidemics. [In Review. <http://arxiv.org/abs/1604.02096> ]

**Brelsford C.**, T. Martin, J. Hand and LMA. Bettencourt. Towards Cities Without Slums: Topology and the Spatial Evolution of Neighborhoods. [In Review. <http://www.santafe.edu/media/workingpapers/15-06-021.pdf>]

**Brelsford C.**, J. Abbott. How Smart are ‘Water Smart Landscapes?’. [In Review. [http://www.joshuakabbott.com/uploads/9/5/6/1/95618488/wsl\\_june17.pdf](http://www.joshuakabbott.com/uploads/9/5/6/1/95618488/wsl_june17.pdf)]

**Brelsford C.**, C. De Bacco. Are ‘Water Smart Landscapes Contagious’? An epidemic approach on networks to study peer effects. [In review. <https://arxiv.org/abs/1801.10516>]

## GRANTS, FELLOWSHIPS AND AWARDS

- 2017 Dumas, M., C. Brelsford. Socio-Hydrological Dynamics Workshop. NSF
- 2016 Bettencourt, LMA., C. Brelsford, J. Lobo. OpenIDEO Urban Resilience Challenge: How might urban slum communities become more resilient to the effects of climate change?
- 2013 Scholar Award, Dissertation Writing Fellowship, Philanthropic Educational Organization
- 2012 Earl A. and Lenore H. Tripke Professional Workshop Travel Award
- 2012 School of Sustainability Travel Grant
- 2010 Spirit of Service Award, Tempe Festival of the Arts
- 2008 School of Sustainability Graduate Fellowship, Arizona State University
- 2007 Environmental Protection Agency P3 Awards - Phase 1. Columbia University. Development Plan of a Sustainable Water Management Plan for a Rapidly Urbanizing Ghanaian Village (16 co-authors)
- 2007 N.G. Kaul Scholarship, New York Water Environment Association

## INVITED TALKS

- 2018 Are ‘Water Smart Landscapes’ Contagious? Invited Seminar, Civil

Engineering Department. Feb 15<sup>th</sup>. University of Tennessee Knoxville, Knoxville, TN.

- 2018 Are 'Water Smart Landscapes' Contagious? Invited Seminar, Global Urban Studies Brownbag Series. January 30<sup>th</sup>. Michigan State University, East Lansing, MI.
- 2016 The Topology of Cities. Invited Seminar. March 1<sup>st</sup>. Oak Ridge National Laboratory, Knoxville, TN.
- 2015 Keynote Address, Expanding Your Horizons Conference. Sept 19<sup>th</sup>. Santa Fe Community College, Santa Fe, NM.
- 2015 Growing into Water Conservation? Understanding the Drivers of Reduced Residential Water Consumption in Las Vegas NV. Invited Seminar. Sept 18<sup>th</sup>. Economics Department, University of New Mexico, Albuquerque, NM.
- 2012 Keynote Address, 23<sup>rd</sup> annual New Mexico Supercomputing Challenge. October 13<sup>th</sup>. New Mexico Institute of Mining and Technology. Socorro, NM
- 2011 Invited Talk. January 17<sup>th</sup>. Annual Meeting of the Southwest Orthopaedic Trauma Association. Phoenix, AZ.
- 2010 Commencement Address. May 15<sup>th</sup>. Bard College at Simons Rock, Great Barrington, MA.

## WORKSHOPS ORGANIZED

- 2017 Modeling and Measuring Socio-Hydrological Dynamics Across Scales. June 2018. Santa Fe Institute, Santa Fe, NM.  
<https://santafewaterworkshop.com>
- 2015 Human Cooperation: From Theory to Practice. Sept 28-29<sup>th</sup>. Santa Fe Institute, Santa Fe, NM.

## CONFERENCE PRESENTATIONS

- 2017 **Brelsford, C., M. Dumas.** Choices Matter, but How Do We Model Them? *American Geophysical Union Fall Meeting*. December 15<sup>th</sup>. New Orleans, Louisiana.

- 2017 **Brelsford, C.** Applications of Urban Scaling Theory. *Current Challenges in Global Security: The Impact of Human Behavior on Cyber Security, Climate Change, and Terrorism*. August 29<sup>th</sup>. Los Alamos, New Mexico.
- 2017 **Brelsford, C.**, De Bacco, C, and J Abbott. Is Cash for Grass Contagious? Maybe. *International Conference on Computational Social Systems*. July 12<sup>th</sup>. Cologne, Germany.
- 2016 **Brelsford, C.**, J. Lobo and LMA Bettencourt. Agglomeration and heterogeneity in cities. *Convening on Urban Data Science*. April 27<sup>th</sup>. Chicago Innovation Exchange. Chicago, IL.
- 2015 **Brelsford, C.** The topology of cities. *Reinventing the Grid: Designing Resilient, Adaptive and Creative Power Systems*. April 14. Santa Fe Institute, Santa Fe, NM.
- 2015 **Brelsford, C.** and J Abbott. Drivers of change in residential water consumption in Las Vegas, Nevada. *American Water Resources Association Spring Specialty Conference. Water for Urban Areas: Managing Risks and Building Resiliency*. March 30. Los Angeles, CA.
- 2015 **Brelsford, C.** Using counterfactual scenarios to estimate drivers of demand changes. *Urban Water Demand Roundtable*, Feb 10, 2015 Tempe, AZ.
- 2015 **Brelsford, C.**, J. Hand and LMA Bettencourt. The topology of cities. *Presentations to Slum and Shack Dwellers International board members and the Commissioner for Sanitation for the City of Mumbai*. January 15. Mumbai, India.
- 2014 **Brelsford, C.** Interactive tools for community development. *Acting Locally, Understanding Globally Workshop*. Nov. 20. Santa Fe Institute, Santa Fe, NM.
- 2014 **Brelsford, C.** Whiskey is for drinking; Water is for fighting over. Seminar, June 2. Santa Fe Institute, Santa Fe, NM.
- 2013 **Brelsford, C.** From conflict to cooperation: changes in water allocation institutions in Las Vegas, Nevada. *World Water Week*. September 5. Stockholm, Sweden.
- 2013 **Brelsford, C.**, D. Shepherd. Using mixture tuned match filtering to measure changes in subpixel vegetation area in Las Vegas, Nevada. *SPIE Optics + Photonics*. August 28. San Diego, CA.

- 2012 **Brelsford, C.**, D. Judi, T. McPherson, and M. Ewers. Water distribution system criticality assessment: Business-type impacts to economic consequence projections. *World Environmental & Water Resources Congress*, May 21. Albuquerque, NM.
- 2012 Judi, D., **C. Brelsford**, B. Edwards, T. McPherson, G. Wolde Gabriel, S. Larsen. Impacts of new infrastructure on the Nile River and its tributaries. *2012 World Environmental & Water Resources Congress*, May 20. Albuquerque, NM.
- 2011 **Brelsford C.** Understanding the likelihood of institutional adaptation to climate change. *Spring Specialty Conference of the American Water Resources Association. Managing Climate Change Impacts on Water Resources: Adaptation Issues, Options, and Strategies*, April 20. Baltimore, MD.
- 2011 **Brelsford C.**, O. Ahmad M. R. Delany E. Freeman, C. Kunzweiler, and Q. Wang. Measuring resilience after a catastrophic natural disaster: A case study of Fayette, Haiti after the 2010 earthquake. *Resilience 2011 Second International Science and Policy Conference*, March 16. Arizona State University, Tempe, AZ.

## TEACHING EXPERIENCE

### **Santa Fe Institute, Invited Lectures**

Global Sustainability Summer School (August 2016)

### **Arizona State University, Course Leader**

Graduate Workshop on Resilience in Haiti, (fall 2010)

### **Arizona State University, Teaching Assistantships**

Economics of Sustainability (fall 2012, fall 2013)

Decision Making and Collective Action for Sustainability (fall 2009)

## RESEARCH EXPERIENCE

- 2013 Summer Student, Center for Nonlinear Studies in T-division, Los Alamos National Laboratory
- 2009 - 2013 Graduate Research Assistant, Energy and Infrastructure group in D-Division, Los Alamos National Laboratory
- 2012 Complex Systems Summer School, Santa Fe Institute

2009 - 2010 Graduate Research Assistant, Decision Center for a Desert City, Tempe AZ  
2009 Global Sustainability Summer School, Santa Fe Institute

## **PROFESSIONAL SERVICE**

Reviewer for Journal of Applied Remote Sensing, Royal Society Interface, Royal Society Open Science, Entropy, Nature Sustainability, Proceedings of the National Academy of Sciences, National Academy of Sciences.

Postdoctoral Representative to the Science Board, Santa Fe Institute, 2015-2016

Omidyar Fellowship Selection Committee, Santa Fe Institute, 2014-2016

Postdoctoral Representative to the Faculty, Santa Fe Institute, 2014- 2016

## **COMMUNITY OUTREACH**

2014 - 2015 Mentor for high school students with Inspire Santa Fe

2010 - 2018 Public Speaking, Education, and Outreach about my experience in the Haiti earthquake in Phoenix, AZ; Anchorage, Aniak, & Dillingham, AK; Denver, CO; Los Angeles & San Francisco, CA; Vero Beach & Miami, FL; Los Alamos, Santa Fe & Socorro NM, Oak Ridge, TN. Appearances on Larry King Live, the Today Show, People Magazine, Women's Health, and numerous local TV, radio, and newspapers.

## **MEDIA COVERAGE**

MIT Technology Review. 2016. "Why Beneficial Epidemics Spread More Quickly than Harmful Ones." April 19<sup>th</sup>. <https://www.technologyreview.com/s/601298/why-beneficial-epidemics-spread-more-quickly-than-harmful-ones/>

Jennifer Ouellette. 2016. "When Things Go Viral and Everybody Wins." Gizmodo, April 12. <http://gizmodo.com/when-things-go-viral-and-everybody-wins-1769950969>

Matlock, Staci. 2014. "Sunday Spotlight: Young Scientist Who Lost Leg in Haitian Quake Perseveres as Climber." *Santa Fe New Mexican*, November 23.

Schwartz, Michelle. 2014. "ASU sustainability alum overcomes challenges to climb to the top." *ASU News*. September 15.

Faherty, John. 2010. "ASU Student repays Haitian who saved her." *The Arizona Republic*. December 5.