Katherine S. Nelson

Vanderbilt University • Department of Civil and Environmental Engineering
(405) 408 – 7041 • katherine.s.nelson@vanderbilt.edu • https://katesnelson.github.io/home

RESEARCH INTERESTS

Socio-environmental resilience; environmental justice; sustainable urban development; food and water security; policy analysis; hierarchical Bayesian modeling; spatial analysis and GIS

EDUCATION

2018 (anticipated)	Ph.D. in Environmental Engineering, Management and Policy, Vanderbilt University
2016	Certificate in College Teaching, Vanderbilt Center for Teaching, Vanderbilt University
2009	M.S. in Environmental Engineering, Washington University in St. Louis
2006	B.S. in Environmental Engineering, University of Oklahoma

PUBLICATIONS

Peer-Reviewed Journal Articles

2017 **Nelson, K. S.** & Burchfield, E.K. (2017). Effects of the Structure of Water Rights on Agricultural Production During Drought: A Spatiotemporal Analysis of California's Central Valley. *Water Resources* Research, 53. doi:10.1002/2017WR020666

2017 **Nelson, K. S.**, Camp, J. V., Philip, C. E., & Abkowitz, M. D. (2017). Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures. *Transportation Research Record: Journal of the Transportation Research Board*, (2611), 11-18.

2016 Dundon, L. A., **Nelson, K. S.**, Camp, J., Abkowitz, M., & Jones, A. (2016). Using Climate and Weather Data to Support Regional Vulnerability Screening Assessments of Transportation Infrastructure. *Risks*, 4(3), 28.

2015 **Nelson, K. S.**, Abkowitz, M. D., & Camp, J. V. (2015). A Method for Creating High Resolution Maps of Social Vulnerability in the Context of Environmental Hazards. *Applied Geography*, 63, 89-100.

2013 Wu, L., Luderer, M., Yang, X., Swain, C., Zhang, H., **Nelson, K. S.**, ... & Pan, D. (2013). Surface Passivation of Carbon Nanoparticles with Branched Macromolecules Influences Near Infrared Bioimaging. *Theranostics*, 3(9), 677.

2013 Wu, L., Cai, X., **Nelson, K. S.**, Xing, W., Xia, J., Zhang, R., ... & Shen, B. (2013). A Green Synthesis of Carbon Nanoparticles from Honey and their use in Real-Time Photoacoustic Imaging. *Nano Research*, 6(5), 312-325.

Peer-Reviewed Conference Proceedings

2015 **Nelson, K. S.**, Camp, J. V., Philip, C. E., & Abkowitz, M. D. (2015, September). *Navigable Inland Waterway Transportation Modeling: A Conceptual Framework and Modeling Approach for Consideration of Climate Change Induced Extreme Weather Events.* Paper presented at the World Association for Waterborne Transport Infrastructure (PIANC) Smart Rivers 2015 Conference, Buenos Aires, Argentina. Retrieved from http://www.pianc.org.ar/_stage/pdf/papers_sr2015/123_paper_Nelson_USA_7.pdf

Book Chapters and Reports

2014 **Nelson, K. S.**, Winter, P., Shokeen, M., Wang, S., & Berezin, M. Y. (2014). Nanoparticles for Bioimaging. *Nanotechnology for Biomedical Imaging and Diagnostics: From Nanoparticle Design to Clinical Applications*, 151-192.

2010 Giammar, D.E., **Nelson, K.S.**, Noel, J. D., & Xie, Y. (2010). *Water Chemistry Effects on Dissolution Rates of Lead Corrosion Products*. Water Research Foundation Report 4064. Retrieved from http://www.waterrf.org/PublicReportLibrary/4064.pdf

PAPERS UNDER REVIEW

Gillespie-Marthaler, L., **Nelson, K.S.**, Baroud, H., Kosson, D. S., & Abkowitz, M. D. Vulnerability, Resilience, and Sustainability: Multi-Scale, Dynamic Interactions within Complex Systems and the Need for Integrative Assessment Methods (Part 1 of 2). Revised and resubmitted, *Risk Analysis.*

Nelson, K. S., Gillespie-Marthaler, L., Baroud, H., Abkowitz, M. D., & Kosson, D. S. Vulnerability, Resilience, and Sustainability: An Integrated and Dynamic Resilience Assessment Framework for Complex Adaptive Systems (Part 2 of 2). Revised and resubmitted, *Risk Analysis.*

Gillespie-Marthaler, L., **Nelson, K.S.**, Baroud, H., & Abkowitz, M. D. Community Resilience Indicators: A Foundational Set of Indicators and Metrics for Implementation of Community Resilience Assessments.

WORKING PAPERS

Nelson, K. S., Johnson, P., & Dijoseph, P. Calibration and Validation of an Agent-based Model of Inland Waterway Tow Traffic. (In progress)

Nelson, K. S. Application of an Integrated and Dynamic Resilience Assessment Framework to Monitoring Trends and Projections in Community Resilience. (In progress)

Nelson, K. S. & Camp, J. V. Estimating the Effectiveness of a Home Buyout Program as an Urban Flood Adaptation Strategy. (In progress)

PRESENTATIONS

Paper Presentations

2017 Nelson, K. S., Dundon, L. A., & Abkowitz, M. D. (2017, June). *Quantifying Social Resilience and Evaluating Climate Change Adaptation Strategies*. Presented at the 3rd Climate Change Adaptation Conference (ECCA), Our Climate Ready Future, Glasgow, Scotland.

2017 Gillespie-Marthaler, L., Nelson, K. S., & Abkowitz, M. D. (2017, June). *Indicators for Assessing and Achieving Resilient and Sustainable Communities*. Presented at the 26th Annual Conference of the Society for Risk Analysis – Europe (SRA-E), Lisbon, Portugal.

2017 Nelson, K. S., Camp, J.V., Philip, C. E., & Abkowitz, M. D. (2017, January). *Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures*. Paper presented at the 96th Annual Meeting of the Transportation Research Board (TRB), Washington D.C.

2016 Nelson, K. S. & Burchfield, E. K. (2016, November). *Does the Structure of Water Rights Impact Agricultural Production During Droughts? A Spatiotemporal Analysis of California's Central Valley*. Paper presented at the Association for Public Policy Analysis & Management (APPAM) 38th Annual Fall Research Conference, Washington D.C.

2016 Nelson, K. S., Camp, J. V., Philip, C.E., & Abkowitz, M.D. (2016, June). *Navigable Inland Waterway Traffic Model for Evaluation of Tow Operation Procedures in the Context of Extreme Weather Events*. Paper presented in the Student Honor Panel of the 4th Biennial TRB-CMTS Research & Development Conference, Washington D.C.

2015 Nelson, K. S., Abkowitz, M. D., & Camp, J. V. (2015, April). *A Method for Creating High Resolution Maps of Social Vulnerability*. Paper presented at the Association of American Geographers (AAG) Annual Meeting, Chicago, IL.

2009 Giammar, D. E., Nelson, K. S., Noel, J. D., & Xie, Y. (2009, June). *Formation and Stability of Solid-Phase Lead Corrosion Products in Drinking Water Distribution Systems*. Paper presented at the AWWA Annual Conference and Exposition, San Diego, CA.

2009 Giammar, D. E., Nelson, K. S., Noel, J. D., & Xie, Y. (2009, March). *Influence of water chemistry on the stability of lead-containing phases present in drinking water distribution systems*. Paper presented at the 237th ACS National Meeting, Salt Lake City, UT. (March 22-26, 2009).

2008 Nelson, K. S. & Giammar, D. E. (2008, April). *The Influence of Water Chemistry on the Dissolution Rate of a Lead Phosphate Corrosion Product.* Paper presented at the Joint Meeting of the Missouri Water Environment Association and the Missouri Section of the American Water Works Association, Osage Beach, MO.

Poster Presentations

2016 Gillespie-Marthaler, L. & Nelson, K. S. (2016, December). *Resilience, Sustainability, and Vulnerability: Multi-Scale, Dynamic Interactions within Complex Systems and an Integrative Assessment Method*. Poster presented at the Society for Risk Analysis (SRA) Annual Meeting, San Diego, California.

2016 Gillespie-Marthaler, L. & Nelson, K. S. (2016, November). *Resilience, Sustainability, and Vulnerability: Multi-Scale, Dynamic Interactions within Complex Systems and an Integrative Assessment Method*. Poster presented at the Association for Public Policy Analysis & Management (APPAM) 38th Annual Fall Research Conference, Washington D.C.

2014 Nelson, K. S. (2014, February). *Environmental Justice Considerations Involving Rail Transport of Hazardous Materials*. Poster presented at the Logistics, Trade and Transportation (LTT) Symposium, Gulfport, Mississippi.

GRANTS

2017 Nashville Metro Water Services, "Converting Vulnerable Landscapes to Resilient and Sustainable Community Assets", March 2017 – December 2017, $62,500 (co-wrote)

2017 U.S. Coast Guard, "Elizabeth M Accident Evaluation Simulation", August 2017 – July 2018, $98,000 (co-wrote)

2017 U.S. Army Corps of Engineers, "BAA: Geospatial Investigation of Future Climate Conditions – The Impact on Supply Chains and USACE Water Resource Infrastructure Using Enhanced Simulation and Spatial Visualization Capabilities", July 2017 – June 2020, $1.25M (key participant)

2017 National Oceanic and Atmospheric Administration, "Sumner County Water Resilience: A Tennessee Model for Socio-Economic Analysis to Catalyze Adaptive Water Resource Management by Integrating Flood Mitigation and Land Use Management", July 2018 - June 2019 (pending), $175,000 (co-PI)

FELLOWSHIPS, AWARDS, & LICENSURE

2017 Funded Visiting Scholar, National Socio-Environmental Synthesis Center (SESYNC) Short Course "Teaching Socio-Environmental Synthesis with Case Studies"

2015 - 2016 Oak Ridge Institute for Science and Education (ORISE) Graduate Research Fellowship, U.S. Army Corps of Engineers Research Participation Program, May 2015 – October 2016, $60,000

2013 - 2018 Harold Stirling Vanderbilt Graduate Honor Fellowship, Vanderbilt University

2006 - 2008 National Science Foundation Graduate Teaching Fellow in K-12 Education, Washington University in St. Louis

2006 Outstanding Senior in Environmental Engineering, University of Oklahoma

2006 Licensed Engineer Intern (EI), Oklahoma State Board of Licensure for Professional Engineers and Land Surveyors, License Number 13480

RESEARCH & PROFFESIONAL EXPERIENCE

2014 - present	Graduate Research Assistant, Vanderbilt Center for Transportation and Operational Resilience, Vanderbilt University
2011 - 2013	Lab Manager and Senior Scientist, Nano Research Facility, Washington University in St. Louis
2010 - 2011	Research Scientist, Nano Research Facility, Washington University in St. Louis
2009 - 2010	Research and Lab Assistant, Aquatic Chemistry Lab, Washington University in St. Louis
2006 - 2009	Graduate Research Assistant, Aquatic Chemistry Lab, Washington University in St. Louis

TEACHING EXPERIENCE

2016	Guest Lecturer, Introduction to Environmental Engineering (undergraduate lecture course), Department of Civil & Environmental Engineering, Vanderbilt University
2016	Assistant Instructor, Geospatial Technologies (K-12 teacher professional development), Metropolitan Nashville Public Schools
2016	Guest Lecturer, Enterprise Risk Management (undergraduate/graduate seminar), Department of Civil & Environmental Engineering, Vanderbilt University
2015	Guest Lecturer, Introduction to Spatial Analysis and Modeling Using GIS in Research Applications (graduate seminar), College of Education and Human Development, Vanderbilt University
2013	Teaching Assistant, Introduction to Environmental Engineering (undergraduate lecture course), Department of Civil & Environmental Engineering, Vanderbilt University
2006 - 2008	National Science Foundation Graduate Teaching Fellow in K-12 Education (part-time co-teacher), Environmental Science, Gateway Middle School, St. Louis Public School District

SERVICE

Mentoring & Outreach

2016	Volunteer Instructor, Simplifying Complexity: The Wild World of Human-Environment Interactions, Tennessee Women in Science, Technology, Engineering & Research (TWISTER) STEM conference for girls in 9th to 12th grades
2012	Summer Focus Program Student Mentor, Effects of Gold Nanoparticles on *Danio rerio* (Zebrafish) Embryos, Washington University in St. Louis

2011 Research Experience for Teachers Program Mentor, Effects of Silver Nanoparticles on the Growth of *Arabidopsis thaliana*, Washington University in St. Louis

Professional Service

2015 Reviewer for Applied Geography

PROFESSIONAL AFFILIATIONS

Association for Public Policy Analysis and Management (APPAM)
Association of American Geographers (AAG)
American Geophysical Union (AGU)

TECHNICAL EXPERTISE

R (Statistical Programming Language)
Matlab
Python
SPSS
ArcGIS
QGIS
NetLogo
AnyLogic
LaTex

REFERENCES

Mark Abkowitz (Advisor)
Professor, Civil and Environmental Engineering
Vanderbilt University
mark.abkowitz@vanderbilt.edu
(615) 343-3436

Jonathan Gilligan
Associate Professor, Earth and Environmental Sciences
Vanderbilt University
jonathan.gilligan@vanderbilt.edu
(615) 322-2420

Hiba Baroud
Assistant Professor, Civil and Environmental Engineering
Vanderbilt University
hiba.baroud@vanderbilt.edu
(615) 322-0471

Janey Camp
Research Associate Professor, Civil and Environmental Engineering
Vanderbilt University
janey.camp@vanderbilt.edu
(615) 322-6013