Jonathan Mark Gilligan

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1 Contact Information

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2 Degrees Earned

Ph.D.: 1991, Yale University (Physics).

B.A.: 1982, Swarthmore College (Physics), with Honors.

3 Employment History

2016–present Associate Professor, Dept. of Civil & Environmental Engineering (secondary), Vanderbilt University.

2009–present Associate Professor, Dept. of Earth & Environmental Sciences, Vanderbilt University.

2003–2009 Senior Lecturer, Dept. of Earth & Environmental Sciences, Vanderbilt University.

2000–2003 The Robert T. Lagemann Assistant Professor of Living State Physics, Dept. of Physics & Astronomy, Vanderbilt University.

1996–1998 Associate Director, Center for Molecular and Atomic Studies at Surfaces, Vanderbilt University.

1995–2000 Research Assistant Professor, Dept. of Physics & Astronomy, Vanderbilt University.

1993–1994 Postdoctoral Research Associate, National Oceanic & Atmospheric Administration.

1991–1993 Nat'l. Research Council Postdoctoral Associate, Nat'l. Institute of Standards & Technology.

4 Honors and Awards

2022 The Alexander Heard Distinguished Service Professor Award, Vanderbilt University.

2018 The Chancellor's Award for Research, Vanderbilt University.

2017 The Morrison Prize for the highest impact paper of the year on sustainability law and policy.

1998 Outstanding Scientific Paper Award, NOAA Environmental Research Labs.

1995 NASA Group Achievement Award for outstanding accomplishments and contributions to the ASHOE/MAESA airborne research mission.

1991–1993 National Research Council Postdoctoral Associate

1985–1986 J.W. Gibbs Fellow, Yale University

5 Summary of Published Scholarship

One book, 77 journal papers, 3 book chapters, 20 substantive papers in conference proceedings, 2 patents, 7 open-source software packages.

5a. Citations and H-Index

As of Feb. 19, 2023, Google Scholar lists 6,998 citations, an h-index of 36, and 13 papers with 100+ citations, including 5 papers with 300+.

5b. Selected Recent Publications

1. K. Best, J. Gilligan, H. Baroud, A. Carrico, K. Donato, and B. Mallick. (2022). "Applying machine learning to social datasets: A study of migration in southwestern Bangladesh using random forests," *Regional Environmental Change*, **22**, 52. DOI: 10.1007/s10113-022-01915-1.

2. K.B. Best, A. Qu, and **J.M. Gilligan**. (2021). "Modeling multi-level patterns of environmental migration in Bangladesh: An agent-based approach." In: *Proceedings of the 2021 Winter Simulation Conference*. S. Kim, B. Feng, K. Smith, S. Masoud, Z. Zhang, C. Czabo, and M. Lopez, eds. Piscataway, NJ, USA: IEEE Press. DOI: 10.1109/WSC52266.2021.9715380.

3. F. Schenuit, **J. Gilligan**, and A. Viswamohanan. (2021). "A scenario of solar geoengineering governance: Vulnerable states demand, and act," *Futures*, **132**, 102809. DOI: 10.1016/j.futures.2021.102809.

4. **J.M. Gilligan**. (2021). "Expertise across disciplines: Establishing common ground in interdisciplinary disaster research teams," *Risk Analysis*, **41**, 1171–1177. DOI: 10.1111/risa.13407.

5. K.J. Ding, **J.M. Gilligan**, Y.E. Yang, P. Wolski, and G.M. Hornberger. (2021). "Assessing food-energy-water resources management strategies at city scale: An agent-based modeling approach for Cape Town, South Africa," *Resources, Conservation and Recycling*, **170**, 105573. DOI: 10.1016/j.resconrec.2021.105573.

6. J. Martinez, A. Mukhopadhyay, A. Ayman, M. Wilbur, P. Pugliese, D. Freudberg, **J. Gilligan**, A. Laszka, and A. Dubey. (2021). "Predicting public transportation load to estimate the probability of social distancing violations." In: *Proceedings of the Workshop on AI for Urban Mobility at the 35th AAAI Conference on Artificial Intelligence*.

7. K.B. Best, **J.M. Gilligan**, H. Baroud, A.R. Carrico, K.M. Donato, B.A. Ackerly, and B. Mallick. (2021). "Random forest analysis of two household surveys can identify important predictors of migration in Bangladesh," *Journal of Computational Social Science*, **14**, 77–100. DOI: 10.1007/s42001-020-00066-9.

8. **J.M. Gilligan** and M.P. Vandenbergh. (2020). "Beyond wickedness: Managing complex systems and climate change," *Vanderbilt Law Review*, **73**, 1177–1810.

9. A.R. Carrico, K.M. Donato, K. Best, and **J. Gilligan**. (2020). "Extreme weather and marriage among girls and women in Bangladesh," *Global Environmental Change*, **65**, 102160. DOI: 10.1016/j.gloenvcha.2020.102160.

10. K.S. Nielsen, P.C. Stern, T. Dietz, J.M. Gilligan, D.P. van Vuuren, M.J. Figueroa, C. Folke, W. Gwozdz, D. Ivanova, L.A. Reisch, M.P. Vandenbergh, K.S. Wolske, and R. Wood. (2020). "Improving climate change mitigation analysis: A framework for examining feasibility," *One Earth*, **3**, 325–336. DOI: 10.1016/j.oneear.2020.08.007.

11. S. Elsawah, T. Filatova, A.J. Jakeman, A.J. Kettner, M.L. Zellner, I.N. Athanasiadis, S.H. Hamilton, R.L. Axtell, D.G. Brown, **J.M. Gilligan**, M.A. Janssen, D.T. Robinson, J. Rozenberg, I.I.T. Ullah, and S.J. Lade. (2020). "Eight grand challenges in socio-environmental systems modeling," *Socio-Environmental Systems Modeling*, **2**, 16226. DOI: 10.18174/sesmo.2020a16226.

12. **J.M. Gilligan** and M.P. Vandenbergh. (2020). "A framework for assessing the impact of private climate governance," *Energy Research & Social Science*, **60**, 101400. DOI: 10.1016/j.erss.2019.101400.

13. **J.M. Gilligan**. (2019). "Modelling diet choices," *Nature Sustainability*, **2**, 661–662. DOI: 10.1038/s41893-019-0354-7.

14. J.B. Ruhl, J. Nay, and **J.M. Gilligan**. (2018). "Topic modeling the president: Conventional and computational methods," *George Washington Law Review*, **86**, 1243–1315.

15. **J.M. Gilligan**, C.A. Wold, S.C. Worland, J.J. Nay, D.J. Hess, and G.M. Hornberger. (2018). "Urban water conservation policies in the United States," *Earth's Future*, **6**, 955–967. DOI: 10.1029/2017EF000797.

16. **J.M. Gilligan**. (2018). "Climate modeling: accounting for the human factor," *Nature Climate Change*, **8**, 14–15. DOI: 10.1038/s41558-017-0038-0.

17. M.P. Vandenbergh and **J.M. Gilligan**. (2017). *Beyond Politics: The Private Governance Response to Climate Change*. New York, NY: Cambridge University Press. ISBN: 978-1107181229. 494 pp.

18. B.A. Ackerly, M. Anam, **J. Gilligan**, and S. Goodbred. (2017). "Climate and community: The human rights, livelihood, and migration impacts of climate change." In: *Climate Change, Migration, and Human Rights*. D. Manou, A. Baldwin, D. Cubie, A. Mijr, and T. Thorp, eds. New York: Routledge, pp. 189–202. ISBN: 9780367136161.

19. L. Benneyworth, **J. Gilligan**, J.C. Ayers, S. Goodbred, G. George, A. Carrico, M.R. Karim, F. Akter, D. Fry, K. Donato, and B. Piya. (2016). "Drinking water insecurity: water quality and access in coastal south-western Bangladesh," *International Journal of Environmental Health Research*, **26**, 508–524. DOI: 10.1080/09603123.2016.1194383.

20. E.K. Burchfield and **J. Gilligan**. (2016). "Agricultural adaptation to drought in the Sri Lankan dry zone," *Applied Geography*, 77, 92–100. DOI: 10.1016/j.apgeog.2016.10.003.

21. E.K. Burchfield and **J.M. Gilligan**. (2016). "Dynamics of individual and collective agricultural adaptation to water scarcity." In: *Proceedings of the 2016 Winter Simulation Conference*. T.M.K. Roeder, P.I. Frazier, R. Szechtman, E. Zhou, T. Huschka, and S.E. Chick, eds. Piscataway, NJ, USA: IEEE Press, pp. 1678–1689. DOI: 10.1109/WSC.2016.7822216.

22. **J.M. Gilligan**, C. Brady, J.V. Camp, J.J. Nay, and P. Sengupta. (2015). "Participatory simulations of urban flooding for learning and decision support." In: *Proceedings of the 2015 Winter Simulation Conference*. L. Yilmaz, W.K.V. Chan, I. Moon, T.M.K. Roeder, C. Macal, and M.D. Rossetti, eds. Piscataway, NJ, USA: IEEE Press, pp. 3174–3175. ISBN: 978-1-4673-9741-4. DOI: 10.1109/WSC.2015.7408456. 00000.

23. J.J. Nay and **J.M. Gilligan**. (2015). "Data-driven dynamic decision models." In: *Proceedings of the 2015 Winter Simulation Conference*. L. Yilmaz, W.K.V. Chan, I. Moon, T.M.K. Roeder, C. Macal, and M.D. Rossetti, eds. Piscataway, NJ, USA: IEEE Press, pp. 2752–2763. ISBN: 978-1-4673-9741-4. DOI: 10.1109/WSC.2015.7408381. 00000.

24. T. Dietz, G. Gardner, **J. Gilligan**, P. Stern, and M. Vandenbergh. (2009). "Household actions can provide a behavioral wedge to rapidly reduce U.S. carbon emissions," *PNAS*, **106**, 18452–18456. DOI: 10.1073/pnas.0908738106.

5c. Selected Recent Invited Presentations

45 invited presentations, including:

- "The Race Towards Climate Justice," 2023 Clinton Global Initiative University (CGI-U) conference. March 3–5, 2023.
- "Modeling Behavior Change in Socio-Environmental Systems." Invited talk, Second Coastlines and People Workshop on Identifying Interoperability and Data Needs of Interdisciplinary Models for Understanding Vulnerability of Coastal Systems. Florida International University (Sponsored by National Science Foundation). Oct. 4, 2022.

- "Incorporating Human Behavior into Coupled Socio-Environmental Systems Models." Keynote talk, National Socioenvironmental Synthesis Center webinar on Methods in Socio-Environmental Systems Modeling. June 20, 2022. A video of my talk and the panel discussion that followed, has been posted to the SESYNC YouTube channel at `https://www.youtube.com/watch?v=rI994KY7ftE`
- "Integrating Machine Learning with Agent-Based Modeling to Understand Human Impacts of Climate Change." Invited seminar, Florida International University. May 25, 2021.
- "Accounting for Human Behavior in Models of Coupled Natural & Human Systems," Invited presentation at Workshop on Coastal Observation and Modeling Systems, sponsored by NSF Coastlines and People program. Virtual conference hosted by Florida International University, Miami, FL, September 8, 2020. (98 attendees).
- "Managing Sediment for Sustainability," Invited virtual seminar, International Centre for Climate Change and Development, Dhaka, Bangladesh, July 20, 2020.
- "Beyond Wickedness: Managing Complex Systems and Climate Change," Invited presentation, co-delivered with Michael P. Vandenbergh. Vanderbilt University Law Review Symposium on Governing Wicked Problems. Nashville, TN, October 25, 2019.
- "The New Revolving Door," Invited presentation, co-delivered with Michael P. Vandenbergh. Case-Western Reserve Law School Symposium on Fifty Years of the Environmental Protection Agency. Cleveland, OH, October 18, 2019.
- "Agent-Based Modeling of Community Resilience and Environmental Non-Migration," Invited presentation, First International Conference on Environmental Non-Migration: Framework, Methods, and Cases, Technical University of Dresden, June 19-21 2019.
- "Sediment Management and Sea-Level Rise," invited presentation, Fifth Annual Gobeshona International Conference on Climate Knowledge, International Centre for Climate Change and Development, Dhaka, Bangladesh, January 9, 2019.
- Invited panelist, "What Can an Individual Do to Help Limit Climate Change," public panel discussion at Copenhagen Business School, Aug. 29, 2018.
- Invited participant, Workshop on Household Actions to Reduce Greenhouse Gas Emissions, Copenhagen Business School, Copenhagen Denmark, August 27–28 2018
- Invited panelist, "Re-envisioning 'Sustainable' Deltas through Critical Geography," American Association of Geographers Annual Conference, April 2018.
- "Carrot and Sticks in Private Climate Governance," invited presentation, Joint Conference on Environmental Regulation. The Hagler Institute for Advanced Study at the Texas A&M University School of Law and the Classical Liberal Institute at the New York University School of Law. March 9–10, 2018.
- "Energy and the Economy of Sri Lanka," invited presentation, Workshop on Assessing Stakeholder Preferences in Planning of Energy Sector in Sri Lanka, Colombo, Sri Lanka, August 11, 2017.
- "Understanding and Adapting to Water Scarcity at the Community Level," invited keynote presentation, Conference on Recognizing Climate Change Risk of Dry Zone Farmers, Ministry of Disaster Management, Colombo, Sri Lanka, August 10, 2017.
- "Planning for Environmental Stress and Disasters: The Importance of Interdisciplinary Approaches," invited presentation to the Institute of Town Planners of Sri Lanka and the Organization of Professional Associations of Sri Lanka. Colombo, Sri Lanka, August 9, 2017.

- "Quantifying the Potential for Greenhouse Gas Emissions Reductions through Private Governance," invited presentation to National Academies Board on Environmental Change and Society. National Academies, Washington, DC, July 11, 2017.
- "Connecting Human and Natural Systems: The Role of Agent-Based Simulations," invited keynote talk, CSDMS 2017 Annual Meeting on Modeling Coupled Earth and Human Systems. Boulder, CO. May 23–25 2017. My talk is online at `https://www.youtube.com/watch?v=v6i5_P_OOcU`.
- "Dynamics of Individual and Collective Agricultural Adaptation to Water Security," invited talk, Winter Simulation Conference 2016, Arlington, VA, December 12, 2016.

6 Selected Synergistic Activities

2021–present Principal Investigator, NSF Sustainable Regional Systems Planning Grant to work with state and local governments, businesses, and communities to improve resilient and equitable access to of electricity, transportation, and telecommunications in urban and rural communities in the Southeast.

2021–present Co-Principal Investigator, NSF Future of Work at the Human-Technology Frontier Planning Grant to work with water-treatment utilities to develop interactive computational tools for training the next generation of water treatment operators, and to facilitate human decision-making about maintaining water quality in the face of climate change.

2021–present Associate Editor for Climate Law and Policy, *Frontiers in Climate*.

2021–present Co-Chair Interdisciplinary Climate Studies Curriculum Committee, Vanderbilt University. Developed a novel interdisciplinary major in climate studies that incorporates humanities, social-science, and natural-science perspectives.

2020–present Director, Vanderbilt Climate and Society Grand Challenge Initiative. Leading a university initiative to bring scholars in humanities, social sciences and natural sciences together for collaborative scholarship and interdisciplinary teaching about climate change and its impacts on society.

2020–present Contributor to Nashville Mayor's Sustainability Advisory Committee.

2020–present Member, research partnership between Vanderbilt, cities of Chattanooga and Nashville, and University of Tennessee, Chattanooga to improve the efficiency of public transit service.

2016–2021 External Advisory Committee, Urban Water Innovation Network, an NSF-sponsored sustainability research network with $12.5 million in funding.

2019–2021 External Advisory Committee, Water Unaffordability in the United States, an interdisciplinary NSF-sponsored research project, Laura Senier, PI.

2019 Scientific Committee, First International Conference on Environmental Non-Migration. Dresden Germany, June 19–21, 2019.

2016–2019 Co-Principal Investigator, Vanderbilt Initiative for Smart-City Operations Research.

2018 Co-Chair, Environment and Sustainability Applications Track, Winter Simulation Conference. Goteborg, Sweden. Dec. 9–12, 2018.

2016–2022 Program Committee, Environmental and Sustainability Applications track, Winter Simulation Conference, co-sponsored by IEEE and INFORMS.

2018 Working Group on the Use of Socio-Environmental Systems Modeling in Actionable Science, National Socio-Environmental Synthesis Center.