

Patrick Bitterman

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EDUCATION

- 2017 Ph.D., Geography, Department of Geographical and Sustainability Sciences,
University of Iowa
- Graduate Certificate in College Teaching, Graduate Certificate in Geoinformatics
- 2011 B.S., Geography, University of Iowa

ACADEMIC POSITIONS

- 2019- **University of Nebraska-Lincoln**
Assistant Professor of Geography, School of Global Integrative Studies
- 2017-2019 **University of Vermont**
Postdoctoral Research Associate, Vermont EPSCoR: Basin Resilience to Extreme
Events (BREE)
- Postdoctoral Fellow, Gund Institute for Environment

PUBLICATIONS

Refereed Journal Articles

7. **Bitterman P.**, C. Koliba. 2020. Modeling Alternative Collaborative Governance Network Designs: An Agent-Based Model of Water Governance in the Lake Champlain Basin, Vermont. *Journal of Public Administration Research and Theory*. doi: 10.1093/jopart/muaa013.
6. **Bitterman P.**, D. A. Bennett, and S. Secchi. 2019. Constraints on Farmer Adaptability in the Iowa-Cedar River Basin. *Environmental Science & Policy*. doi: 10.1016/j.envsci.2018.11.004.
5. Carrel, Margaret, C. Zhao, D. Thapaliya, **P. Bitterman**, A. E. Kates, B. M. Hanson, T. C. Smith. 2017. Assessing the potential for raw meat to influence human colonization with *Staphylococcus aureus*. *Scientific Reports*. doi: 10.1038/s41598-017-11423-6.
4. van Riper, C. J., A. C. Landon, S. Kidd, **P. Bitterman**, L. A. Fitzgerald, E. F. Granek, S. Ibarra, D. Iwaniec, C. M. Raymond, and D. Toledo. 2017. Incorporating socio-cultural phenomena into ecosystem service valuation: The importance of critical pluralism. *BioScience*. doi: 10.1093/biosci/biw170.

3. **Bitterman, P.**, E. Tate, K. J. Van Meter, and N. B. Basu. 2016. Water security and rainwater harvesting: A conceptual framework and candidate indicators. *Applied Geography* 76: 75-84. doi: 10.1016/j.apgeog.2016.09.013.
2. **Bitterman, P.**, and D. A. Bennett. 2016. Constructing stability landscapes to identify alternative states in coupled social-ecological agent-based models. *Ecology and Society* 21(3): 21. doi: 10.5751/ES-08677-210321.
1. Carrel, M., and **P. Bitterman**. 2015. Personal Belief Exemptions to Vaccination in California: A Spatial Analysis. *Pediatrics* 136(1): 80-88. doi: 10.1542/peds.2015-0831.

Book Chapters

1. **Bitterman, P.**, and D. A. Bennett. 2018. Leveraging Coupled Agent-Based Models to Explore the Resilience of Tightly-Coupled Land Use Systems. In *Agent-Based Models and Complexity Science in the Age of Geospatial Big Data – Selected Papers from GIScience 2016*. Springer. doi: 10.1007/978-3-319-65993-0_2.

Manuscripts in Submission

4. **Bitterman P.**, C. Koliba, and A. Singer. Multiplex and multi-scale: A social-ecological perspective on water governance networks in the Lake Champlain Basin, Vermont. *In revision for Ecology & Society*.
3. Zia, A., A.W. Schroth, J.S. Hecht, P. Isles, P. Clemins, S. Turnbull, **P. Bitterman**, Y. Tsai, I. Mohammed, G. Bucini, E.M.B. Doran, C. Koliba, A. Bomblies, B. Beckage, J. Winter, C. Adair, D.M. Rizzo, B. Gibson, G. Pinder. Climate change-legacy phosphorus synergy hinders lake response to aggressive water policy targets. *In revision for Earth's Future*.
2. Greenleaf, H., S. Hurley, **P. Bitterman**, C. Koliba. Maintaining green stormwater infrastructure in urban and rural Vermont: Municipal maintenance practices and municipal officials' perceptions. *In review at Landscape and Urban Planning*.
1. **Bitterman P.**, and D. A. Bennett. Exploring alternative pathways towards more sustainable futures: A coupled agent-based model of agricultural land use under climate change scenarios. *In revision for Sustainability*

GRANTS AND FUNDING

External

2020-2024 *CNH2-L: Modelling the dynamics of human and estuarine systems with regulatory feedbacks*

Funded by US National Science Foundation

Award amount: \$1,436,438 (\$234,245 to UNL)

Investigator/s: Raleigh Hood (PI), co-PIs **Patrick Bitterman**, Victoria Coles, Sevgi Erdogan, and D.G. Webster

2017-2019 *SESYNC Pursuit: Risk Perception in Provision of Aquatic Ecosystem Services*
 Funded by National Socio-Environmental Synthesis Center (SESYNC)
 Investigator/s: D.G. Webster (PI), Semra Aytur (PI), and participants Mark Axelrod, Joseph Hamm, Robyn Wilson, Jade Mitchell, Louie Rivers, V. Kelly Turner, Asim Zia, Christopher Koliba, Andrew Schroth, Jeffrey Michael Reutter, **Patrick Bitterman**, Kevin P. Carlin, Elizabeth Doran, Donna Kashian, Craig Stow, Jiyoung Lee, Ramiro Berardo, Arika Ligmann-Zielinska.

2015-2017 *SESYNC Graduate Pursuit: Fire on the Fringe*
 Funded by: National Socio-Environmental Synthesis Center (SESYNC)
 Award amount: \$2000 awarded as fellowship
 Investigator/s: Kenneth Wallen (PI), Ellen Esch (PI), and team members **Patrick Bitterman**, Michael Levy, Katie Lyon, Michael V. Saha, and Alexandra Syphard

2011-2014, 2016-2017 *NSF IGERT Traineeship, University of Iowa*
 Funded by: US National Science Foundation
 Award amount: \$30,000 annually

Internal

2015-2016 *Graduate College Post-Comprehensive Research Award*
 Funded by: University of Iowa Strategic Fund Fellowship
 Award amount: \$10,379

2013-2015 *UI travel grants*
 Funded by: Executive Council of Graduate and Professional Students and Center for Global and Regional Environmental Research
 Award amounts: \$2150 total

Pending

DISES: Leveraging multi-scale models, immersive visualization, and stakeholder engagement for discovering windows of opportunity for adaptation in working landscapes

Applied to: National Science Foundation
 Amount sought: \$1,468,522
 Investigator/s: Patrick Bitterman (PI), co-PIs: Stephanie Hurley, Rachel Schattman

Not funded

Submitted 2021 *AccelNet Implementation: Safe and Sustainable Water for Agroecosystems Network-to-Networks (SSWAN2N)*
 Applied to: National Science Foundation
 Amount sought: \$1,999,894
 Investigator/s: Christopher Neale (PI), co-PIs: Steven R. Fassnacht, Sher Jan Ahmadzai, Norman A. Graham, Erin M. Haacker. Senior personnel: Dan

Snow, **Patrick Bitterman**, Shannon Bartelt-Hunt, Timothy Gates, Douglas Hartman, Timothy Martin, Lynn Paine, Julie Sinclair, Volodymyr Tarabara.

Submitted 2020 *A Social-Ecological Network Approach to Nebraska Water Governance*
Applied to: University of Nebraska-Lincoln Seed Grant
Amount sought: \$9,340
Investigator/s: Patrick Bitterman (joint PI), Erin Haacker (joint PI)

ACADEMIC PRESENTATIONS

Invited presentations

- 2021 **Bitterman, P.** A spatial perspective on water governance in the Lake Champlain Basin. Presentation to the Vermont EPSCoR Basin Resilience to Extreme Events All Hands Meeting 2021. August 9.
- 2020 **Bitterman, P.**, and C. Koliba. Modeling Alternative Collaborative Governance Network Designs: An Agent-Based Model of Water Governance in the Lake Champlain Basin, Vermont. Presentation to ESADE/Tillburg Network Webinar on Agent-Based Modeling. Dec 14.

Sessions Organized and Chaired

- 2017 Directions for computational modeling of complex systems with big data and big models. Sessions I and II. Co-organized with Eun-Kyeong Kim. Annual Meeting of the American Association of Geographers. April 5-9.

Conference Presentations

* indicates refereed submission

- 2021 **Bitterman, P.** A multi-spatial perspective on water governance in the Lake Champlain Basin. Great Plains Regional Meeting of the American Association of Geographers. Lincoln, NE. Oct 15-16.
- Bitterman, P.**, and C. Koliba. Multiplex and multi-scale: A social-ecological perspective on water governance networks in the Lake Champlain Basin, Vermont. Annual Meeting of The American Association of Geographers. Virtual (Seattle). April 7-11.
- 2020 Aytur, S., M. Doidge, E. Doran, R. Wilson, M. Axelrod, **P. Bitterman**, J. Bucci, J. Hamm, J. Lee, K. Carlin, H. Flaherty, A. Buzard, and DG Webster. Improving agricultural practices to prevent harmful algal blooms (HABs). APHA's 2020 Annual Meeting and Expo. Online. Oct 26-28.

- 2019 Aytur, S., E. Doran, M. Doidge, R. Wilson, M. Axelrod, **P. Bitterman**, J. Mitchell, J. Lee, K. Carlin, L. Rivers, J. Hamm, C. Gergen, A. Greig, M. Walawender, E. Jenkins, C. Koliba, J. Bucci, and DG Webster. Assessing correlates of farmer behavior to prevent Harmful Algal Blooms (HABs): A multi-level analysis. APHA's 2019 Annual Meeting and Expo. Philadelphia, PA. Nov 2-6.
- Bitterman, P.**, and C. Koliba. Modeling alternative water governance network designs for the Lake Champlain Basin: A multi-scale agent-based model of resource prioritization and collective action. 2019 Public Management Research Conference. Chapel Hill, NC. June 11-14.
- ***Bitterman, P.**, and C. Koliba. An agent-based framework of water governance in the Lake Champlain Basin: Interactions between policy alternatives and network structure. NetSci 2019. Burlington, VT. May 27-31.
- Koliba, C., and **P. Bitterman**. Crowdsourcing Climate Change Impacts and Policy Solutions Using Stakeholder Engagement and Online Platforms. International Research Society for Public Management (IRSPM). Wellington, New Zealand. April 16-18.
- Bitterman, P.**, and C. Koliba. Rules of the games: an agent-based framework for modeling multi-scale water governance actors in the Lake Champlain Basin. Annual Meeting of The American Association of Geographers. Washington DC. April 3-7.
- 2018 **Bitterman, P.**, and C. Koliba. An Adaptive Agent-Based Model of Water Governance Networks in the Lake Champlain Basin Social-Ecological System. Annual Meeting of The American Association of Geographers. New Orleans, LA. April 10-14.
- Koliba, C., and **P. Bitterman**. Overcoming Fragmented Governance in Complex Water Systems. Annual Conference of the American Society for Public Administration. Denver, CO. March 9-13.
- Bitterman, P.** Modeling Water Governance Networks in the Missisquoi River Watershed. Lake Champlain Basin Program Research Conference. Burlington, VT. January 8-9.
- 2017 **Bitterman, P.**, and D. A. Bennett. Locked in: modeling resilience, adaptability, and alternative futures in a tightly-coupled agro-social-ecological system. Annual Meeting of the American Association of Geographers. Boston, MA. April 5-9.
- Tate, E., **P. Bitterman**, K.J. Van Meter, and Nandita Basu. Water security and rainwater harvesting: A conceptual framework and candidate indicators. Annual Meeting of the American Association of Geographers. Boston, MA. April 5-9.

- 2016 ***Bitterman, P.**, and D. A. Bennett. *Leveraging Coupled Agent-Based Models to Explore the Resilience of Tightly-Coupled Land Use Systems*. 9th International Conference on Geographic Information Science. Montreal, QC, Canada. September 26-30.
- *Wallen, K., E. Esch, **P. Bitterman**, M. Levy, K. Lyon, M. Saha, A. Syphard, J. D. Absher, G. T. Kyle, and J. Vaske. *Fire on the fringe: Synthesis and coupling of human-wildfire dynamics*. 28th Annual Northeastern Recreation Research Symposium. Annapolis, MD. April 3-5.
- Bitterman, P.**, and D. A. Bennett. *Modeling Farmer Adaptability and Resilience in the Context of Climatic Perturbations*. Annual Meeting of the American Association of Geographers. San Francisco, CA. March 29-April 2.
- 2015 Lyon, K. M., M. A. Levy, K. E. Wallen, **P. Bitterman**, E. H. Esch, M. V. Saha, G. T. Kyle, and J. D. Absher. *Fire on the fringe: empirically parameterizing defensible space behavior in an agent-based model*. Annual meeting of the Association for Fire Ecology, the 6th International Fire Ecology and Management Congress. San Antonio, TX. November 16-20.
- ***Bitterman, P.**, D. A. Bennett, S. Xu, J. Schnoor, S. Secchi, L. Le, W. Gutowski and S. Kawazoe. *People, Water, and Climate: Adaptation and Resilience in Agricultural Watersheds*. Conference on Complex Systems. Tempe, AZ. Sept 28-Oct 2.
- Bitterman, P.**, E. Tate, N. Basu, and K. Van Meter. *Water Sustainability Indicators: Employing Causal Networks for Creative Deconstruction*. Annual meeting of the Association of American Geographers. Chicago, IL. April 21-25.
- Carrel, M., and **P. Bitterman**. *White and wealthy equals vaccines aren't healthy?: Ecologies of Personal Belief Exemptions for childhood immunizations among California kindergartners*. Annual meeting of the Association of American Geographers. Chicago, IL. April 21-25.
- 2014 **Bitterman, P.**, and D. A. Bennett. *Representing Resilience in Social-Ecological Systems: Trade-offs with Sustainability and the Effects of Changing Adaptive Capacity*. Annual meeting of the Association of American Geographers. Tampa, FL. April 8-12.
- 2013 **Bitterman, P.**, and D. A. Bennett. *Operationalizing Resilience Using a Coupled Agent-Based Model of a Generalized Social-Ecological System*. Annual meeting of the Association of American Geographers. Los Angeles, CA. April 9-13.
- Bennett, D. A., and **P. Bitterman**. 2013. *Measuring Sustainability and Identifying Windows of Opportunity*. Annual meeting of the Association of American Geographers, Los Angeles, CA. April 9-13.

TEACHING EXPERIENCE

University of Nebraska-Lincoln

Global Environmental Issues, Spring 2020, Spring 2021, Fall 2021
Programming, Scripting, and Automation for GIS, Spring 2021
Special topics: Spatial Analysis in R, Fall 2021
Principles of GIS, Fall 2019, 2020
Advanced GIS, Spring 2020

University of Vermont

Systems Dynamics and Strategic Planning for Community Resilience, Spring 2019

University of Iowa

Contemporary Environmental Issues, Summer 2014

SERVICE TO PROFESSION

Board member at-large, Human Dimensions of Global Change Specialty Group (AAG), 2021-

Manuscript review for: *Annals of the American Association of Geographers*, *Professional Geographer*, *Applied Geography*, *Ecology & Society*, *PLOS ONE*, *Ecological Complexity*, *Ecological Indicators*, *Land Degradation & Development*, *Sustainability*, *Land, Agricultural Systems*, *Water Resources Research*, *Environmental Management*, *Journal of Geographical Systems*

Ad hoc grant review, National Science Foundation GSS Program, 2018

SERVICE TO UNIVERSITY

Executive Committee, School of Global Integrative Studies, UNL, 2020-

Colloquium Committee, School of Global Integrative Studies, UNL, 2019-2020

Personnel Committee, School of Global Integrative Studies, UNL, 2019-2020

Awards Committee, School of Global Integrative Studies, UNL, 2019-2020

Colloquium Committee, UI, 2015-2016

Student Mentor, Critical MASS (Mentoring and Student Support System), UI, 2013-2014

Graduate Program Committee, UI, 2013-2014

Judge, Fall Undergraduate Research Festival, UI, 2013

Grant Reviewer, Executive Council of Graduate and Professional Students, UI, 2013

Graduate Student Representative, UI, 2012-2013

Faculty Search Committee: International Health, UI, 2012-2013

PROFESSIONAL MEMBERSHIPS

American Association for the Advancement of Science

American Association of Geographers

CoMSES Net (Network for Computational Modeling in Social and Ecological Sciences)

Complex Systems Society

CHANS-NET (International Network of Research on Coupled Human and Natural Systems)