Andrew L. Hamilton, PhD

Postdoctoral Associate
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Education

2017–2021	**PhD, Environmental Sciences and Engineering, University of North Carolina at Chapel Hill**. *Dissertation*: Multi-objective management of financial risks in coupled food-energy-water systems. *Supervisor*: Dr. Gregory W. Characklis.
2015–2017	**Masters in Environmental Management, Nicholas School of the Environment, Duke University**. Concentration in Water Resources Management, Certificate in Geospatial Analysis. *Master's project*: Minimization of third-party injury in multi-party water right transfers in Colorado. *Supervisor*: Dr. Mukesh Kumar.
2012–2014	**MS, Materials Science, University of California - Santa Barbara**. *Thesis*: Self-consistent field theory for the design of thermoplastic elastomers from miktoarm block copolymer-homopolymer blends. *Supervisor*: Dr. Glenn T. Fredrickson.
2008–2012	**BSE, Engineering Physics, Mathematics, Tulane University**. *Summa Cum Laude* with Departmental Honors.

Appointments

2022–Present	Postdoctoral associate, School of Civil & Environmental Engineering, Cornell University
2017–2021	Graduate research assistant, Department of Environmental Sciences & Engineering, University of North Carolina at Chapel Hill
2016	Intern, Water resources and environmental science, Tetra Tech, Inc.
2015–2016	Graduate research assistant, Center for Environmental Implications of Nanotechnology, Duke University
2015	Intern, River restoration, American Rivers
2012–2014	Graduate research assistant, Materials Department, University of California - Santa Barbara
2011	Intern, Engineering, Wyatt Technology Corp.
2010	NSF Research Experience for Undergraduates in Computational Science, Department of Chemistry, Louisiana State University
2009–2010	Undergraduate research assistant, Department of Chemistry, Tulane University

Awards and Honors

2022	Best Reviewer Award, Journal of Water Resources Planning and Management (ASCE)
2021	Department Nominee, Dean's Distinguished Dissertation Award (pending)
2021	3-Minute Thesis Competition Finalist, UNC Graduate School
2020	FAIR Cyber Training (FACT) Fellowship, Purdue University
2017	Presidential Management Fellows Program Finalist, U.S. Office of Personnel Management
2015-2017	Partial-Tuition Merit Scholarship, Nicholas School of the Environment, Duke University
2012	Tulane 34 Award, Tulane University

2012	Senior Scholar Award, Tulane University
2008–2012	Dean's Honor Full-Tuition Merit Scholarship, Tulane University

Publications

Peer-Reviewed Journal Articles

[8] **Hamilton, A. L.**, Characklis, G. W., & Reed, P. M. (2022). From stream flows to cash flows: Leveraging Evolutionary Multi-Objective Direct Policy Search to manage hydrologic financial risks. *Water Resources Research, 58*, e2021WR029747. DOI: 10.1029/2021WR029747.

[7] Malek, K., Reed, P., Zeff, H., **Hamilton, A.**, Wrzesien, M., Holtzman, N. Steinschneider, S. Herman, J., & Pavelsky, T. (2022). Bias correction of hydrologic projections strongly impacts inferred climate vulnerabilities in institutionally complex water systems. *Journal of Water Resources Planning and Management*, *148*(1), 04021095. DOI: 10.1061/(ASCE)WR.1943-5452.0001493.

[6] Zeff, H. B., **Hamilton, A. L.**, Malek, K., Herman, J. D., Cohen, J. S., Medellín-Azuara, J., Reed, P. M., & Characklis, G. W. (2021). California's Food-Energy-Water System: An open source simulation model of adaptive surface and groundwater management in the Central Valley. *Environmental Modelling & Software*, *141*, 105052. DOI: 10.1016/j.envsoft.2021.105052.

[5] Gupta, R. S., **Hamilton, A. L.**, Reed, P. M., & Characklis, G. W. (2020). Can modern multi-objective evolutionary algorithms discover high-dimensional financial risk portfolio tradeoffs for snow-dominated water-energy systems? *Advances in Water Resources*, *145*, 103718. DOI: 10.1016/j.advwatres.2020.103718.

[4] **Hamilton, A. L.**, Characklis, G. W., & Reed, P. M. (2020). Managing financial risk tradeoffs for hydropower generation using snowpack-based index contracts. *Water Resources Research*, *56*(10), e2020WR027212. DOI: 10.1029/2020WR027212.

[3] Cormier, S. M., Zheng, L., Leppo, E. W., & **Hamilton, A. L.** (2018). Step-by-step calculation and spreadsheet tools for predicting stressor levels that extirpate genera and species. *Integrated Environmental Assessment and Management*, *14*(2), 174-180. DOI: 10.1002/ieam.1993.

[2] Shi, W., **Hamilton, A. L.**, Delaney, K. T., Fredrickson, G. H., Kramer, E. J., Ntaras, C., Avgeropoulos, A., Lynd, N. A., Demassieux, Q., & Creton, C. (2015). Aperiodic "bricks and mortar" mesophase: a new equilibrium state of soft matter and application as a stiff thermoplastic elastomer. *Macromolecules*, *48*, 5378-5384. DOI: 10.1021/acs.macromol.5b01210.

[1] Shi, W., **Hamilton, A. L.**, Delaney, K. T., Fredrickson, G. H., Kramer, E. J., Ntaras, C., Avgeropoulos, A., & Lynd, N. A. (2015). Creating extremely asymmetric lamellar structures via fluctuation-assisted unbinding of miktoarm star block copolymer alloys. *Journal of the American Chemical Society*, *137*, 6160-6163. DOI: 10.1021/jacs.5b02881.

In Review

[1] **Hamilton, A. L.**, Zeff, H. B., Characklis, G. W., & Reed, P. M. Resilient California water portfolios require infrastructure investment partnerships that are viable for all partners. (In revision, pre-print available).

Media Coverage

[1] Hall, J., (2020). AGU Editor's Highlight: How to hedge the risk of reduced snowpack for hydropower. *EOS Magazine*. https://eos.org/editor-highlights/how-to-hedge-the-risk-of-reduced-snowpack-for-hydropower.

Presentations

[*] *Indicates presenter*, [†] *Indicates accepted future presentation*

Conference Oral Presentations

[9] **Hamilton, A. L.**[*†], Gupta, R. S., Zeff, H. B., Characklis, G. W., Reed, P. M., "Designing effective, fair, and robust water infrastructure investment partnerships under deep uncertainty." ASCE World Environmental and Water Resources Congress, Atlanta, GA, June 2022.

[8] **Hamilton, A. L.**[*], Zeff, H. B., Malek, K., Characklis, G. W., Reed, P. M., "Balancing heterogeneous impacts and preferences in the search for collective water supply infrastructure investments." ASCE World Environmental and Water Resources Congress, Online, June 2021.

[7] Zeff, H. B.[*], **Hamilton, A. L.**, Characklis, G. W., "Evaluating and managing drought-related financial risks in California's north-south water transfer system." American Geophysical Union, Online, December 2020.

[6] Malek, K.[*], Reed, P., Zeff, H., **Hamilton, A.**, Holtzman, N., Wrzesien, M., Steinschneider, S., Herman, J., Pavelsky, T., "Error or insight: Tracing how errors in dynamically downscaled hydrologic projections shape vulnerability inferences in complex water infrastructure systems." American Geophysical Union, Online, December 2020.

[5] Gupta, R. S.[*], **Hamilton, A. L.**, Reed, P. M., & Characklis, G. W., "How difficult is it to discover the tradeoffs in designing financial risk portfolios in snow-dominated water-energy systems?" American Geophysical Union, San Francisco, CA, December 2019.

[4] **Hamilton, A. L.**[*], Zeff, H. B., Characklis, G. W., Reed, P. M., Cohen, J. S., Herman, J. D. "Estimating and managing the financial risks of drought for agricultural water institutions." ASCE World Environmental and Water Resources Congress, Pittsburgh, PA, May 2019.

[3] Gupta, R. S.[*], **Hamilton, A. L.**, Reed, P. M., & Characklis, G. W., "Can modern multi-objective evolutionary algorithms address high-dimensional financial risk problems in coupled water and energy systems?" ASCE World Environmental and Water Resources Congress, Pittsburgh, PA, May 2019.

[2] **Hamilton, A. L.**[*], Characklis, G. W., Reed, P. M. "Direct policy search for multiobjective financial risk management in snow dominated hydropower systems." ASCE World Environmental and Water Resources Congress, Minneapolis, MN, May 2018.

[1] **Hamilton, A. L.**[*], Characklis, G. W., Reed, P. M. "Managing financial risk to hydropower in snow dominated systems: A Hetch Hetchy case study." American Geophysical Union, New Orleans, LA, December 2017.

Conference Poster Presentations

[2] **Hamilton, A. L.**[*], Zeff, H. B., Characklis, G. W., Reed, P. M., "Understanding the challenges posed in developing fair and effective investment partnerships to achieve California's Resilient Water Portfolio Goals." American Geophysical Union, New Orleans, LA, December 2021.

[1] **Hamilton, A. L.**[*], Characklis, G. W., Reed, P. M. "Dynamic management of hydrologic financial risk." Duke University Research Computing Symposium, Durham, NC, February 2020.

Other Presentations

[4] **Hamilton, A. L.**[*] "Using FAIR principles to improve the usability of a food-energy-water system simulation model." 2021 FAIR Cyber Training Workshop, Purdue University, Virtual, June 2021.

[3] **Hamilton, A. L.*** "A tale of two flows: Managing variable stream flows and cash flows in the water-energy-food nexus." Departmental Seminar, Department of Environmental Sciences and Engineering, University of North Carolina at Chapel Hill, Chapel Hill, NC, October 2020.

[2] **Hamilton, A. L.***, Characklis, G. W., Reed, P. M. "Managing financial risk to hydropower in snow dominated systems." San Francisco Public Utilities Commission, San Francisco, CA, November 2018.

[1] **Hamilton, A. L.***, Characklis, G. W., Reed, P. M. "Managing financial risk to hydropower in California." San Francisco Public Utilities Commission, San Francisco, CA, November 2017.

Workshops

[3] 2021 Alliance Graduate Summer School: Inequality and the Environment. Columbia University. Virtual, May 2021.

[2] 2020 FAIR Cyber Training Workshop. Purdue University as part of FACT Fellowship (see Awards). Virtual, Summer 2020.

[1] Managing financial risk in environmental systems: efficient and sustainable adaptation in the face of global change. Hoover Institution (Stanford University) and the Center on Financial Risk in Environmental Systems (UNC Chapel Hill). Stanford University, Palo Alto, CA, May 2019.

Open-Source Software

[3] **Hamilton, A. L.**, Cuppari, R. I. & Characklis, G. W. (2021), Python for Environmental Research. https://github.com/ahamilton144/Python-For-Environmental-Research. DOI: 10.5281/zenodo.4495708.

[2] **Hamilton, A. L.**, Zeff, H., Malek, K., Herman, J., Cohen, J., Medellin-Azuara, J., Reed, P. M., & Characklis, G. W. (2021), Graphical User Interface for the California Food-Energy-Water System (CALFEWS) simulation model. https://mygeohub.org/resources/guicalfews. DOI: 10.21981/8AJF-D461.

[1] Zeff, H., **Hamilton, A. L.**, Malek, K., Herman, J., Cohen, J., Medellin-Azuara, J., Reed, P. M., & Characklis, G. W. (2021), California Food-Energy-Water System (CALFEWS). https://github.com/hbz5000/CALFEWS. DOI: 10.5281/zenodo.4091708.

Teaching Experience

2020-2021	Instructor/Developer, Python for Environmental Research (ENVR 890), Department of Environmental Sciences and Engineering, UNC Chapel Hill
2018–2019	Guest Lecturer and Grader, Analysis of Water Resource Systems (ENVR 755), Department of Environmental Sciences and Engineering, UNC Chapel Hill

Service

2020	Co-organizer, Environmental Justice Reading Group, UNC Environmental Sciences and Engineering Student Organization
2020	Participant, Student Survey Taskforce, UNC Department of Environmental Sciences and Engineering
2020–Present	Reviewer, Water Resources Research
2020–Present	Reviewer, Journal of Hydrology
2019–Present	Reviewer, Journal of Water Resources Planning and Management