Sarah Marie Fletcher

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Last updated: November 2023

ACADEMIC APPOINTMENTS

Stanford University
Assistant Professor, Civil and Environmental Engineering — July 2020 - present
Center Fellow, Woods Institute for the Environment — July 2020 - present

Massachusetts Institute of Technology
Postdoctoral Associate, Civil and Environmental Engineering — August 2018 – June 2020

EDUCATION

Massachusetts Institute of Technology
PhD, Engineering Systems — September 2014 – May 2018
MS, Technology and Policy — September 2010 – May 2012

University of Pennsylvania
BA, Physics; Economics — September 2006 – May 2010

SELECTED HONORS AND AWARDS

- Caltech's Resnick Sustainability Institute, Young Investigator Lecture, April 2023
- Editor's Choice Paper, J. of Water Res. Planning and Management, July 2022
- 1st Place Doctoral Thesis, Academic Achievement Award, AWWA, 2019
  For dissertations related to public water supply from any university
- Fellow, Global Future Council on Food Systems Innovation, World Economic Forum, 2018
- Editor's Choice Paper, J. of Water Res. Planning and Management, October 2017
- Outstanding Student Paper Award, AGU Fall Meeting, 2017
- Outstanding Student Paper Award, AGU Fall Meeting, 2016
- Rasikbhai L. Meswani Fellowship for Water Solutions, MIT, 2017
- Best Presentation, Technology Management and Policy Consortium, Stony Brook, NY, 2017
- National Science Foundation Graduate Research Fellowship, 2015
- Best Thesis in Technology and Policy, MIT, 2012
- MIT Energy Fellowship, 2011

JOURNAL ARTICLES

Underlined names are advisees

Under Review

M. Zaniolo, **S. Fletcher***, M. Mauter.* Quantifying the value of technology and policy innovation in water resource portfolios, In review.

*Authors equally supervised

Giang, Edwards, **Fletcher**, Gardner-Frolick, Gryba, Mathias, Vernier-Cambron, Anderies, Berglund, Carley, Erickson, Grubert, Hadjimichael, Hill, Mayfield, Nock, Pikok, Saari, Samudio Lezcano, Siddiqi, Skerker, Tessum. Equity and modeling in sustainability science: examples and opportunities throughout the modeling process, In review.

K. Willebrand, M. Zaniolo, J. Skerker, **S. Fletcher**. Valuing combinations of flexible planning, design, and operations in water supply infrastructure, major revisions, In review.

B. Rachunok, A. Verma, **S. Fletcher**. Predicting and Understanding Residential Water Use with Interpretable Machine Learning, moderate revisions, In review.

M. Lickley and **S. Fletcher**. Early indicators improve confidence in precipitation change and emergence. minor revisions, In review.

M. Zaniolo, **S. Fletcher***, M. Mauter.* "FIND: A Synthetic weather generator to control drought Frequency, Intensity, and Duration," In review.

Published and Accepted

17. A. Nayak, B. Rachunok, B. Thompson, **S. Fletcher**, Socio-hydrological impacts of rate design on water affordability during drought. 2023. *Environmental Research Letters.* In press.

16. **S Fletcher**[1]**,** M Zaniolo[1], M Zhang[1], M Lickley, Climate oscillation impacts on water supply augmentation planning. 2023. *Proceedings of the National Academy of Sciences.* 120 (0).
    [1]*Authors contributed equally*

15. J Skerker, M Zaniolo, K Willebrand, M Lickley, **S Fletcher**. Evaluating rates of learning about climate uncertainty on flexible water infrastructure planning. 2023. *Water Resources Research*. 59 (6).

14. M Zaniolo, **S Fletcher**[1], M Mauter[1]. Robust technology and policy pathways for urban water security. 2023. *Environmental Research Letters.* 18 (5).
    [1]*Authors supervised equally*

13. B Rachunok and **S Fletcher**. Socio-hydrological drought impacts on household water affordability. 2023. *Nature Water.* 1 (83-94).

12. **S Fletcher,** A Hadjimichael, J Quinn, K Osman, M Giuliani, D Gold, A Jain Figueroa, B Gordon. 2022. Equity in water resources planning: a path forward for decision-support modelers*. Journal of Water Resources Planning and Management.* 148 (7).

11. D Birge*, **S Fletcher**, A Siddiqi, A Al-Sumaiti, and J Wescoat. 2022. Multi-Criteria, Multi-Resolution Modeling of Suburban Residential Landscape Alternatives: Water-Efficient Villas in the Arid Middle East. *Journal of Urban Planning and Development.* 148 (2).

10. J Shiu[1], **S Fletcher**[1]*, D Entekhabi. 2021. *Spatiotemporal monsoon characteristics and maize yields in West Africa.* Environmental Research Communications. 3 (125007).
    [1]*Authors contributed equally*

9. M Lickley, **S Fletcher**, M Rigby, S Solomon. 2021. Joint inference of CFC lifetimes and banks suggests previously unidentified emission*s*. *Nature Communications*. 12 (2920).

8. N Diffenbaugh, C Field, E Appel, I Azevedo, D Baldocchi, M Burke, J Burney, P Ciais, S Davis, A Fiore, **S Fletcher**, T Hertel, D Horton, S Hsiang, R Jackson, X Jin, M Levi, D Lobell, G McKinley, F Moore, A Montgomery, K Nadeau, D Pataki, J Randerson, M Reichstein, J Schnell, S Seneviratne, D

Singh, A Steiner, and G Wong-Parodi. 2020. The COVID-19 Lockdowns: A Window into the Earth System. *Nature Reviews Earth & Environment*. 1, p 470–481.

7. M Lickley, S Solomon, **S Fletcher**, G Velders, J Daniel, M Rigby, S Montzka, and L Kuijpers. 2020. Quantifying contributions of chlorofluorocarbon banks to emissions and impacts on the ozone layer and climate. *Nature Communications*. 11 (1380).

6. J Herman, J Quinn, S Steinschneider, M Giuliani, **S Fletcher**. 2020. Climate adaptation as a control problem: Review and perspectives on dynamic water resources planning under uncertainty. *Water Resources Research*. 56 (e24389).

5. **S Fletcher**, K Strzepek, A Alsaati, and O de Weck. 2019. Learning and flexibility for water supply infrastructure planning under groundwater resource uncertainty. *Environmental Research Letters*. 14 (11).

4. **S Fletcher**, M Lickley, and K Strzepek. 2019. Learning about climate change uncertainty enables flexible water infrastructure planning. *Nature Communications*. 10 (1782).

3. **S Fletcher**, M Miotti, J Swaminathan, M Klemun, K Strzepek and A Siddiqi. 2017. Water Supply Infrastructure Planning: A Decision-Making Framework to Classify Multiple Uncertainties and Evaluate Flexible Design. *Journal of Water Resources Planning and Management*. 143 (10).

2. Wescoat, **S Fletcher**, and M Novellino. 2016. National Rural Drinking Water Monitoring: Progress and Challenges With India's IMIS Database. *Water Policy* 18 (4).

1. A Siddiqi and **S Fletcher**. 2015. Energy Intensity of Water End-Uses. *Current Sustainable/ Renewable Energy Reports* 2 (1): 25-31

NON-REFEREED PUBLICATIONS

S Fletcher and J Jenkins. *As the Texas power crisis shows, our infrastructure is vulnerable to extreme weather*. MIT Technology Review. March 6, 2021.

E Moniz et al. 2011. *The Future of Natural Gas: An Interdisciplinary MIT Study*. MIT Energy Initiative.

INVITED SEMINARS

Climate-Informed Adaptive Water Supply Planning for an Uncertain Future. RAND Corporation. April 13, 2023.

Multi-scale modeling of drought impacts on urban water supply. Hydrosystems Seminar Series. Arizona State University. October 19, 2022.

Climate-Informed Adaptive Water Supply Planning for an Uncertain Future. Saint Anthony Falls Laboratory Seminar Series. University of Minnesota. February 22, 2022.

Climate-Informed Adaptive Water Supply Planning for an Uncertain Future. Bill Lane Center for the American West Seminar Series. Stanford University. January 19, 2022.

Adaptive water infrastructure planning for a changing world. Department of Civil and Environmental Engineering and Utah Water Research Laboratory, Utah State University. November 9, 2020

Adapting Water Resource Systems to a Changing World. Department of Civil and Environmental Engineering, Stanford University. September 15, 2020.

Addressing water and food security in sub-Saharan Africa using uncertainty quantification and systems models, School of Geography, Clark University. Scheduled for March 11, 2019; cancelled due to COVID-19.

Water infrastructure planning and policy: Learning and adapting for an uncertain future. Department of Urban Studies and Planning. Massachusetts Institute of Technology. February 13, 2019.

Water supply infrastructure planning: Learning and adapting for an uncertain future, Woods Institute for the Environment, Stanford University. January 29, 2019.

Water infrastructure planning and policy: Learning and adapting for an uncertain future, Goldman School of Public Policy, University of California, Berkeley. December 4, 2018.

Flexible water supply infrastructure planning: Learning and adapting for an uncertain future, Civil and Environmental Engineering, Tufts University. November 30, 2018.

Flexible water supply infrastructure planning under uncertainty: Learning and adapting for resilience, Civil and Environmental Engineering, University of Massachusetts Amherst. March 5, 2018.

Flexible water supply infrastructure planning under uncertainty: Learning and adapting for resilience, Department of Civil and Mechanical Engineering, California Institute of Technology. February 23, 2018.

Flexible Water Supply Infrastructure Planning Under Uncertainty: A Differentiated Approach, Center for Climate and Energy Decision Making, Carnegie Mellon University. February 20, 2018.

KEYNOTES AND INVITED CONFERENCE PRESENTATIONS

Adaptive water supply planning for urban drought resilience. Invited oral presentation. AGU Fall Meeting. San Francisco, CA. December 12, 2023.

Climate-Informed Adaptive Water Supply Planning. Invited talk. Caltech's Resnick Sustainability Institute Symposium. April 14, 2023.

*Urban Water Affordability & Drought Planning***.** Keynote presentation. Society for Decision-Making under Deep Uncertainty Annual Meeting. November 1, 2021

Adaptive and Equitable Water Supply Planning Under Uncertainty. Advancing Methods for Modeling Systems to inform Sustainability Science Workshop, as part of a Special Feature proposal for PNAS, Invited talk. June 7, 2021

Adaptive and Equitable Water Resources Planning Under Uncertainty. Invited talk. EWRI Systems Committee Meeting. June 3, 2021.

Adaptive water infrastructure planning for an uncertain future. Human-Water Systems Seminar Series. Invited oral presentation. Virginia Tech. January 22, 2021.

Building theory on the drivers of effective adaptive water supply planning using Bayesian learning and engineering options analysis, Invited oral presentation. AGU Fall Meeting. San Francisco, CA. December 20, 2019.

Learning about climate change uncertainty to enable flexible water infrastructure planning, Invited talk. AGU Fall Meeting. Washington, DC. December 11, 2018.

Flexible Water Supply Infrastructure Planning Under Uncertainty, Global Food+ Symposium, Invited talk, Tufts University. February 16, 2018.

Water supply infrastructure planning under multiple uncertainties: A differentiated approach, Invited talk. AGU Fall Meeting. New Orleans, LA. December 11, 2017.

CONFERENCE AND WORKSHOP PRESENTATIONS

Presentations

Socio-hydrological impacts of water scarcity on household water affordability. Oral presentation. AGU Fall Meeting. December 13, 2022.

Targeting Adaptive Infrastructure Management using Climate Variability and Information. Society for Decision-Making under Deep Uncertainty Annual Meeting. Oral presentation. November 10, 2022.

Spatial patterns in smallholder crop yield uncertainty identify priority intervention areas. AGU Fall Meeting. Oral presentation. Online due to COVID-19. December 2020.

Forecasting and climate adaptation: Water resources planning under uncertainty. Climate Change and Machine Learning Workshop, International Conference on Learning Representations. Oral presentation. Online due to COVID-19. April 30, 2020.

Characterizing farm-scale variability in maize yields in West Africa by integrating optical and passive microwave earth observation data with a process model. Oral presentation. AGU Fall Meeting. San Francisco, CA. December 2019.

Learning about groundwater resource uncertainty enables adaptive and reliable water supply infrastructure planning. Oral presentation. AGU Chapman Conference on the Quest for Sustainability of Heavily Stressed Aquifers at Regional to Global Scales. Valencia, Spain. October 2019.

Bayesian learning about climate uncertainty enables flexible infrastructure planning. Oral presentation. EWRI Congress. Pittsburgh, PA. May 2019.

Urban water supply infrastructure planning under predictive groundwater uncertainty: Bayesian updating and flexible design. Oral presentation. AGU Fall Meeting. New Orleans, LA. December 2017.

Flexible Water Supply Planning Under Multiple Uncertainties: A Differentiated Approach. Oral Presentation. Technology Management and Policy Consortium. Stony Brook, NY. June 2017.

Uncertainty Categorization, Modeling, and Management for Regional Water Supply Planning. Oral Presentation. AGU Fall Meeting. San Francisco, CA. December 2016.

Decisions Under Scarcity: Water Supply Infrastructure Investment Under Uncertainty in Melbourne. Oral Presentation. Sustainable Water Management 2016. American Water Works Association. Providence, RI. March 2016.

RESEARCH SUPPORT

1. Stanford UPS Endowment Fund, “Quantifying Urban Water Affordability,” $45,000. October 2023 – September 2024. Sole PI.
2. Stanford Environmental Ventures Project, “Adaptive drought management in a changing climate,” July 2023 – June 2025. $249,918 . Lead PI.
3. National Science Foundation, Civil Infrastructure Systems, “Adaptive Management of Water Supply Infrastructure for Persistent Anomalies versus Climate Trends” May 2023 – April 2026. $498,012. Lead PI.
4. Stanford Office of Community Engagement, “Water billing affordability in East Palo Alto,” January 2023 – February 2024. $49,894. Lead PI.
5. Stanford Sustainability Accelerator “Achieving the Human Right to Water in California,” May 2022 – December 2023. $100,000. Lead PI.
6. Stanford UPS Endowment Fund, “Assessing Drought Impacts on Urban Water Affordability and Access,” September 2022 – August 2023. $100,000. Sole PI.
7. US Department of Energy, National Alliance for Water Innovation, “Robust Technology and Policy Pathways for Urban Water Security,” October 2021 – September 2023. $500,000. Co-PI. Lead PI: M. Mauter, Stanford.
8. Stanford Impact Labs Faculty Design Fellowship, “Drought, Water Infrastructure, and Social Equity in California.” September 2020 – June 2021. $50,000. Sole PI.

TEACHING

CEE 266F, Stanford University, Stochastic Hydrology: Winter 2021, Winter 2022, Winter 2024
CEE 266G, Water Resources Systems Analysis: Fall 2021, Fall 2022
CEE 366A, Addressing Deep Uncertainty in Systems Models for Sustainability: Winter 2023
COLLEGE 102, Citizenship in the 21st Century: Winter 2024

RESEARCH ADVISING

PhD Student Advisees

1. Jennifer Skerker, CEE, Stanford University, Fall 2020 – present
2. Keani Willebrand, CEE, Stanford University, Fall 2020 – present
3. Mofan Zhang, CEE, Stanford University, Fall 2021 – present
4. Aniket Verma, CEE, Stanford University, Fall 2023 – present
5. Clara Medina, CEE, Stanford University, Fall 2023 – present, co-advised with K. Osman

MS Research Advisees

1. Aniket Verma, CEE, Stanford University, Winter 2022 – Winter 2023

Postdoctoral Advisees

1. Marta Zaniolo, CEE, Stanford University, Fall 2020 – October 2023, Co-advised with M. Mauter, Next role: Assistant Professor, Duke University
2. Benjamin Rachunok, CEE, Stanford University, Winter 2021 – Fall 2022
3. Next role: Assistant Professor, North Carolina State University

Undergraduate Research Advisees

1. Aliyah Hamilton, CEE, Howard University, SURF undergraduate researcher, Summer 2023

2. Bryana Gastelum CEE, Stanford University, Undergraduate research assistant, Spring 2023
3. Adam Nayak, CEE, Stanford University, Senior honors thesis advisor, Spring 2021 – Spring 2023
4. Janice Shiu, Earth Atmospheric and Planetary Sciences, Senior honors thesis advisor, MIT, Fall 2018 – Spring 2020, Co-advised with D. Entekhabi

AWARDS BY ADVISEES

1. C. Medina, Stanford Graduate Fellowship, 2023
2. J. Skerker, TomKat Fellowship for Translational Research, 2023
3. J. Skerker, Rising Environmental Leaders Program, 2023
4. A. Nayak, NSF Graduate Research Fellowship, 2022
5. A. Nayak, J. E. Wallace Sterling Award, 2022
6. J. Skerker, NSF Graduate Research Fellowship, Honorable Mention, 2023
7. M. Zaniolo, MIT CEE Rising Star, 2021
8. B. Rachunok, Rising Environmental Leaders Program, 2020
9. J. Skerker, Stanford Graduate Fellowship, 2020
10. K. Willebrand, NSF Graduate Research Fellowship, 2020

UNIVERSITY SERVICE

1. Ethics and Engineering Task Force, School of Engineering, Fall 2023 – present
2. Woods Institute Strategic Planning Committee, Winter 2023
3. Stanford Impact Labs, Faculty Advisory Board, Fall 2022 – present
4. CEE MS Curriculum Committee, Spring 2022 – Summer 2022
5. Climate Science Cluster Hire, Search Committee, Fall 2021 – Spring 2022
6. Stanford Impact Labs, Start-Up Fund investments, Review Committee, Fall 2021
7. Environmental Justice Working Group Coordinating Council, Fall 2021 – present
8. Stanford Interdisciplinary Graduate Fellowship (SIGF) Selection Committee, Spring 2021
9. Environmental Justice Graduate Research Fellowship, Selection Committee, Spring 2021
10. Woods Institute IDEAL Committee, Winter 2021
11. CEE Vision Committee, Fall 2020 – present

SCIENTIFIC COMMUNITY SERVICE

Reviewer

Journal Articles
PNAS, Nature Food, Environmental Research Letters, Earth's Future, Water Resources Research, Environmental Science and Technology, Climatic Change, Journal of Water Resources Planning and Management, Journal of Infrastructure Systems, International Journal of Climatology, Hydrological Processes, Health Affairs, Advances in Water Resources

External Grant Proposals
NSF Civil Infrastructure Systems, ad hoc, October 2023
NSF Environmental Sustainability, panel, March 2021
NSF Dynamics of Integrated Socio-Environmental Systems (DISES), panel, February 2021

Conference organizing

Conference Session Chair or co-Chair

- Equity breakout session, Multi-Sector Dynamics Workshop, October 2023
- "Cross-disciplinary systems modeling advances for sustainability science," AGU Fall Meeting 2022
- "Water and Society: Adaptive Management of Coupled Human-Natural Systems Confronting Global Change," AGU Fall Meeting 2022
- "Water and Society: Adaptive Management of Coupled Human-Natural Systems Confronting Global Change," AGU Fall Meeting 2021
- "Water and Society: Adaptive Management of Coupled Human-Natural Systems Confronting Global Change," AGU Fall Meeting 2020
- Bridging systems modeling advances across socio-ecological domains, American Geophysical Union Fall Meeting 2020, online, December 2020

Professional Societies

American Geophysical Union (AGU), American Society for Civil Engineers (ASCE), Society for Decision Making under Deep Uncertainty (DMDU), Multi-Sector Dynamics (MSD)

NON-ACADEMIC PROFESSIONAL EXPERIENCE

Sourcewater, Cambridge, MA
Director of Product Development — May 2014 – September 2014
Part-time Consultant — September 2014 – December 2015

IHS Cambridge Energy Research Associates (CERA), Cambridge, MA
Associate — June 2012 – May 2014

Bipartisan Policy Center, Washington, DC
Energy Intern — January 2010 – August 2010
Transportation Intern — May 2009 – August 2009