David F. Gold, Ph.D., E.I.T.

Postdoctoral Associate | Cornell University

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Appointments

2022- present	**Postdoctoral Associate**, Reed Group, School of Civil and Environmental Engineering, Cornell University
2020-2021	**Visiting Scholar**, Environmental Intelligence for Global Change Group, Politecnico di Milano

Education

Cornell University	**Ithaca, NY**
Ph.D. Environmental & Water Resources Systems Engineering	**Aug, 2022**

Thesis Title: *Advancing Regional Water Supply Planning To Develop Robust, Adaptive, Equitable, and Cooperatively Stable Infrastructure Investment and Management Pathways*

Cornell University	**Ithaca, NY**
Master of Engineering, Environmental and Water Resources Systems	**Dec, 2015**

Lafayette College	**Easton, PA**
Bachelor of Science in Civil and Environmental Engineering	**May, 2011**

Publications

JOURNAL ARTICLES

[12] Gorelick, D.E., **Gold, D.F.**, Asefa, T., Svrdlin, S., Wang, H., Wanakule, N., Reed, P.M., Characklis, G.W. (2022). Water supply infrastructure investment requires adaptive financial assessment: an enhanced exploratory modeling framework to evaluate coupled financial and water supply dynamics. Journal of Water Resources Planning and Management ,149(3)

[11] **Gold, D. F.**, Reed, P. M., Gorelick, D. E., & Characklis, G. W. (2022). Power and Pathways: Exploring Robustness, Cooperative Stability, and Power Relationships in Regional Infrastructure Investment and Water Supply Management Portfolio Pathways. *Earth's Future*, *10*(2), e2021EF002472.

[10] Reed, P. M., Hadjimichael, A., Moss, R. H., Brelsford, C., Burleyson, C. D., Cohen, **Gold, D.F.**, ... & Yoon, J. (2022). Multisector dynamics: Advancing the science of complex adaptive human-Earth systems. Earth's Future, 10(3), e2021EF002621.

[9] Gorelick, D. E., **Gold, D. F.**, Reed, P. M., & Characklis, G. W. (2022). Impact of Inter-Utility Agreements on Cooperative Regional Water Infrastructure Investment and Management Pathways. Water Resources Research, 58(3), e2021WR030700.

[8] Fletcher, S., Hadjimichael, A., Quinn, J., Osman, K., Giuliani, M., **Gold, D.F**, ... & Gordon, B. (2022). Equity in Water Resources Planning: A Path Forward for Decision Support Modelers. Journal of Water Resources Planning and Management, 148(7), 02522005.

[7] Kendler, S., Nebenzal, A., **Gold, D. F.**, Reed, P. M., & Fishbain, B. (2021). The effects of air pollution sources/sensor array configurations on the likelihood of obtaining accurate source term estimations. Atmospheric Environment, 246, 117754.

[6] Sunkara, S.V., Singh, R., **Gold, D. F.**, Reed, P., & Bhave, A. (2021). Improving Information-Based Coordinated Operations in Interbasin Water Transfer Megaprojects: Case Study in Southern India. Journal of Water Resources Planning and Management, (11), 04021075.

[5] Trindade, B. C., **Gold, D. F.**, Reed, P. M., Zeff, H. B., & Characklis, G. W. (2020). Water pathways: An open source stochastic simulation system for integrated water supply portfolio management and infrastructure investment planning. *Environmental Modelling & Software*, *132*, 104772.

[4] Hadjimichael, A., **Gold, D**. F., Hadka, D., & Reed, P. (2020). Rhodium: Python library for many-objective robust decision making and exploratory modeling. Journal of Open Research Software, 8.

[3] Gupta, A., Liu, M., **Gold, D. F.**, Reed, P., & Anderson, C. L. (2020). Exploring a direct policy search framework for multiobjective optimization of a microgrid energy management system.

[2] Truhlar, A. M., Marjerison, R. D., **Gold, D. F.**, Watkins, L., Archibald, J. A., Lung, M. E., ... & Walter, M. T. (2020). Rapid Remote Assessment of Culvert Flooding Risk. *Journal of Sustainable Water in the Built Environment*, 6(2), 06020001.

[1] **Gold, D. F.**, Reed, P. M., Trindade, B. C., & Characklis, G. W. (2019). Identifying Actionable Compromises: Navigating Multi-City Robustness Conflicts to Discover Cooperative Safe Operating Spaces for Regional Water Supply Portfolios. *Water Resources Research*, 55(11), 9024-9050.

IN REVIEW OR REVISION

Gold, D. F., Reed, P. M., Trindade, B. C., & Characklis, G. W. (In Revision). Advancing Regional Water Supply Management and Infrastructure Investment Pathways that are Equitable, Robust, Adaptive, and Cooperatively Stable. *Water Resources Research*

Sunkara, S.V., Singh, R., **Gold, D.F**, Reed, P.M., Bhave, A., (In Review). How should diverse stakeholder interests shape evaluations of complex water resources systems robustness when confronting deeply uncertain changes?. *Earth's Future*

Lau, L.B., Reed, P.M., Gold, D.F. (In Review). Discovering Safe Operating Spaces in Deeply Uncertain Pathways: Evaluating how Implementation Uncertainties Shape Cooperative Multi-City Water Supply Portfolio Management and Investment. *Water Resources Research*

IN PREP

Gold, D. F., Gupta, R.S., Reed, P. M., Vernon, C., Rice, J. (In Prep). A Multi-Basin Approach to Assessing Water Scarcities in the Upper Colorado River Basin.

Alves, C.A., Araujo, B. M., **Gold, D.F.**, Giacomazzo, A.P., Trindade, B. C., Reed, P.M., (In Prep). Exploring Adaptive Water Infrastructure Investment Pathways to Reduce Drought Vulnerabilities to Better Understand Equity Challenges for the Federal District of Brazil

BOOKS, REPORTS, AND OTHER PUBLICATIONS

[3] Reed, P.M., Hadjimichael, A., Malek, K., Karimi, T., Vernon, C.R., Srikrishnan, V., Gupta, R.S., **Gold, D.F.**, Lee, B., Keller, K., Thurber, T.B., & Rice, J.S. (2022). Addressing Uncertainty in Multisector Dynamics Research [e-Book]. Zenodo. https://doi.org/10.5281/zenodo.6110623

[2] Reed, P. M., Hadjimichael, A., Moss, R. H., Monier, E., Alba, S., Brelsford, C., Dyreson, A., **Gold, D.F.**, & et. al. (2022). MultiSector Dynamics: Scientific Challenges and a Research Vision for 2030, A Community of Practice Supported by the United States Department of Energy's Office of Science. *Zenodo*. http://doi.org/https://doi.org/10.5281/zenodo.5825890

[1] Hakanen, J., **Gold, D.F.**, Miettinen, K., Reed, P.M. (In press) Visualisation for decision support in many-objective optimisation: state-of-the-art, guidance and future directions. In Many Criteria Optimisation and Decision Analysis

Conference and Invited Presentations _____

INVITED TALKS

[6] September 2022. *Power and Pathways: Exploring Robustness, Cooperative Stability, and Power Relationships in Reginal Infrastructure Investment*. Environmental & Water Resources Engineering Seminar Series, Department of Civil and Environmental Engineering, UMASS Amherst.

[5] March 2022. *Power and Pathways: Exploring Robustness, Cooperative Stability, and Power Relationships in Regional Water Supply Planning*. Fletcher Research Group, Department of Civil and Environmental Engineering, Stanford University.

[4] November 2021. *Power and Pathways Exploring robustness, Cooperative Stability and Power Relationships in Regional Water Supply Planning*. Society for Decision Making Under Deep Uncertainty, Annual Meeting.

[3] October 2021. *Visual Analytics as a Tool for Decision Making Under Deep Uncertainty: An Exploration of Adaptation, Vulnerability, and Robustness*. Visualization in Deep Uncertainty, Application Spotlight, IEEE Vis 2021 Conference

[2] July 2021. *Water Supply Infrastructure Planning Decision Support*. Tampa Bay Water Board of Directors Meeting, Tampa Bay Water Authority, Clearwater, Florida.

[1] June 2021. *A Captivated Audience: How Professional Visualization Tools Can Make Your Data Shine*. eCornell Keynotes

CONFERENCE PRESENTATIONS

[15] **D.F. Gold**, P.M Reed, D.E. Gorelick, G.W. Characklis. Robust, Equitable and Stable Infrastructure Investment Pathways Require Cooperating Water Utilities to Understand Counterparty Risks, American Geophysical Union Fall Meeting, Chicago, IL, December 2022.

[14] **D.F. Gold**, P.M Reed, D.E. Gorelick, G.W. Characklis. Equitable, Robust, Adaptive and Stable Deeply Uncertain Pathways: a new framework for exploring cooperative stability and multi-actor vulnerabilities in regional water supply management and infrastructure investment pathways, Society for Decision Making under Deep Uncertainty Annual Meeting, Mexico City, MX, November 2022.

[13] **D.F. Gold**, P.M Reed, D.E. Gorelick, G.W. Characklis. Using reinforcement learning to discover state-aware rule systems for water supply portfolio management and infrastructure investment pathways, American Geophysical Union, Frontiers In Hydrology Conference, San Juan, PR, June 2022.

[12] **D.F. Gold**, D. E. Gorelick, G. W. Characklis, P.M. Reed. Power and Pathways: A multi-actor exploration of how cooperative stability and power dynamics impact the robustness of regional water supply planning compromises. American Geophysical Union Fall Meeting, Online, December 2021.

[11] **D.F. Gold**, A. Hadjimichael, V. Srikrishnan, R. Gupta, C. Vernon, J.S. Rice, K. Malek, T. Karmini, P.M. Reed. Addressing uncertainty in MultiSector Dynamics research: an eBook guide for novice and experienced modelers. American Geophysical Union Fall Meeting, Online, December 2021. (poster)

[10] **D.F. Gold**, D. E. Gorelick, P.M. Reed, G.W. Characklis. If not now, when? Designing state aware decision triggers to inform timing of infrastructure investments. EWRI World Environmental & Water Resources Congress, Online, June 2021.

[9] **D.F. Gold,** P.M Reed, D.E. Gorelick, G.W. Characklis. A multi-objective framework for understanding the stability and robustness of cooperative multi-city infrastructure investment pathways addressing changing drought and financial pressures. American Geophysical Union Fall Meeting, Online, December 2020. (poster)

[8] **D.F. Gold,** P.M Reed. What are the tradeoffs? Examining the cooperative stability of multi-city water infrastructure investment and management pathway. Society for Decision Making Under Deep Uncertainty Annual Meeting, Online, November 2020.

[7] **D.F. Gold,** P.M Reed, D.E. Gorelick, G.W. Characklis. The Consequences of Compromise: Exploring the Multi-Actor Implications of Robustness Compromises in Regional Water Supply Investment Pathways. American Geophysical Union Fall Meeting, San Francisco, USA, December 2019

[6] **D.F. Gold**, B.C Trindade, P.M. Reed, G.W. Characklis. Consequential Compromises: Exploring the Cooperative Stability of Multi-Actor Robustness Compromises in Regional Infrastructure Investment Pathways, Society for Decision Making under Deep Uncertainty Annual Meeting, Delft, NL, November 2019.

[5] **D.F Gold**, B.C Trindade, P.M. Reed and G.W. Characklis. Cooperative and Robust Water Pathways: Redefining robustness to include time evolving infrastructure investments and multi-actor stability. EWRI World Environmental & Water Resources Congress, Pittsburg, USA, May 2019.

[4] **D. F. Gold**, B.C. Trindade, P.M. Reed, G.W. Characklis. Conflicts in Coalitions: A Stability Analysis of Robust Multi-City Regional Water Supply Portfolios, Society for Decision Making under Deep Uncertainty Annual Meeting, November 2018

[3] **D. F. Gold**, B.C. Trindade, P.M. Reed, G.W. Characklis. Conflicts in Coalitions: A Stability Analysis of Robust Multi-City Regional Water Supply Portfolios. ASCE World Environmental & Water Resources Congress, Minneapolis, USA, June 2018

[2] **D. F. Gold**, B. C. Trindade, P.M. Reed, G.W. Characklis. Conflicts in Coalitions: A Stability Analysis of Robust Multi-City Regional Water Supply Portfolios. American Geophysical Union Fall Meeting, December 2017. (poster)

[1] **D. F. Gold**, M.T. Walter, L. Watkins, Z. Kaufman, A. Meyer, M. Mahaney. Modeling Road Culvert Vulnerability to Assist Prioritization of Local Infrastructure Investment. American Geophysical Union Fall Meeting, December 2016. (poster)

Media Coverage _____

"Cooperation Rewards Water Utilities". Texas Advanced Computing Center News, May 2022. https://www.tacc.utexas.edu/-/cooperation-rewards-water-utilities

"This study provides a new type of guidance to water managers in the real world". Smart Water Magazine, September 2022. https://smartwatermagazine.com/news/smart-water-magazine/study-provides-a-new-type-guidance-water-managers-real-world

Research Experience _____

DOE - IM3 – Cornell University   **Aug 2021-Present**
Developing flexible, open-source, integrated modeling capabilities that capture the structure, dynamic behavior, and emergent properties of the multiscale interactions within and between human and natural systems.

NSF-WSC – Cornell University   **Jan 2016-Jul 2021**
Investigating the stability of a regional coalition of water utilities in the Research Triangle of North Carolina who are interested in creating water supply portfolios that are robust to deeply uncertain future conditions.

Cornell Culvert Modeling Program – Cornell University   **May 2015-Dec 2015**
Improved and maintained an existing hydraulic/hydrologic model that used GIS and custom Python packages to evaluate road culvert risk in Tompkins County and the Hudson River valley, New York.

AguaClara Drinking Water Treatment Design Team – Cornell University   **Sept 2014-Dec 2015**
Worked on a team developing new drinking water treatment technology for resource-limited communities. Designed drinking water treatment plants for communities with populations of 1,000 – 50,000 people.

Teaching Experience _____

2021	**Introduction to Python (ENMGT 5080),** Instructor	*Cornell University*
2021	**Storytelling with Data (CEEM 5081),** Instructor	*Cornell University*
2020	**Introduction to Python (ENMGT 5080),** Instructor	*Cornell University*
2020	**Storytelling with Data (CEEM 5081),** Instructor	*Cornell University*
2021	**Decision Analysis (CEE 5980)**, Teaching Assistant	*Cornell University*
2020	**Uncertainty Analysis in Engineering (CEE 3040),** Teaching Assistant	*Cornell University*
2020	**Water Resources Systems Engineering (CEE 6200),** Teaching Assistant	*Cornell University*
2019	**Decision Analysis (CEE 5980)**, Teaching Assistant	*Cornell University*
2018	**Water Resources Systems Engineering (CEE 6200),** Teaching Assistant	*Cornell University*
2018	**Risk Analysis & Management (CEE 5970)**, Teaching Assistant	*Cornell University*
2018	**Fundamentals of Engineering** (**BEE 5300**), Teaching Assistant	*Cornell University*
2017	**Decision Analysis (CEE 5980)**, Teaching Assistant	*Cornell University*
2017	**Water Resources Systems Engineering (CEE 6200),** Teaching Assistant	*Cornell University*
2017	**Fundamentals of Engineering** (**BEE 5300**), Teaching Assistant	*Cornell University*
2016	**Uncertainty Analysis in Engineering (CEE 3040),** Teaching Assistant	*Cornell University*

2016	**Environmental Quality Engineering (CEE 3510),** Teaching Assistant	*Cornell University*
2015	**Uncertainty Analysis in Engineering (CEE 3040),** Teaching Assistant	*Cornell University*

Professional Experience _____

Civil Engineer – USDA Natural Resources Conservation Service – Warwick, RI   **2011 – 2014**
Design and oversight of soil and water conservation practices. Practices included irrigation pipelines, vegetated swales, animal waste storage facilities, and culvert stream crossings. Responsibilities included watershed delineation with ArcGIS, computation of peak runoff rates, sizing of swales and pipelines, utilizing AutoCAD Civil 3D to draw engineering plans, topographic surveying, construction inspection, and meeting with clients and contractors.

Mentoring _____

2020-2021 **Cornell Diversity Programs in Engineering CU EMPower Mentoring Program**, Mentor
2021-2022 **Civil and Environmental Engineering PhD Mentoring Program**, Mentor
2020-2021 **Civil and Environmental Engineering PhD Mentoring Program**, Mentor
2018-2019 **Civil and Environmental Engineering PhD Mentoring Program**, Mentor

Professional Service _____

LEADERSHIP
2020 – present   **MultiSector Dynamics Community of Practice Facilitation Team**, Member
2018 – 2020   **Cornell Engineering Student Association**, President
2010 – 2011   **American Society of Civil Engineers, Lafayette Student Chapter**, President

JOURNAL PEER REVIEW
Water Resources Research, Journal of Infrastructure Systems, Journal of Water Resources Planning and Management, Journal of Hydrology, Earth's Future, Hydrology and Earth System Sciences, Water Management, Journal of Open Source Software, Climate Change

CONFERENCE PEER REVIEW
ASCE World Environmental & Water Resources Congress (2020-2022)

CONFERENCE SESSIONS
Convener, Quo vadis adaptation pathways? – Recent advancements, experience and challenges in adaptation pathway research, Society for Decision Making Under Deep Uncertainty Annual Meeting (2022)

Convener, *Resilience, vulnerability and equity in multi-actor water resources systems*, World Environmental & Water Resources Congress (2021)

PROFESSIONAL MEMBERSHIP
2015 – present **American Society of Civil Engineers, Ithaca Chapter**, Member
2015 – present **American Geophysical Union**, Member
2018 – present **Society for Decision Making Under Deep Uncertainty**, Member

Skills _____

Certification: Civil Engineer In Training 5/21/2011, OSHA 10-hour Construction Training
Computing: Python; MATLAB; R; Linux; C/C++; HPC with SLURM; Microsoft Excel; AutoCAD Civil 3D; MathCAD; ArcGIS;

Fellowships _____

Class of 1949 Master of Engineering Fellowship (Cornell University, 2014-2015)

George Brewer '35 Master of Engineering Fellowship (Cornell University, 2014-2015)

Awards _____

Outstanding Dissertation Award in Natural Science & Engineering (Universities Council on Water Resources 2023)

John E. Perry Teaching Assistant Prize (Cornell University 2020-2021)

ASCE Outstanding Reviewer Award (ASCE Journal of Water Resources Planning and Management 2020)

John E. Perry Teaching Assistant Prize (Cornell University 2019-2020)

John E. Perry Teaching Assistant Prize (Cornell University 2017-2018)

John E. Perry Teaching Assistant Prize (Cornell University 2016-2017)

John E. Perry Teaching Assistant Prize (Cornell University 2015-2016)

USDA Employee Award for exceptional Service (NRCS 2010)