Drew Gower

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Education

Ph.D., Civil & Environmental Engineering, Princeton University, 2020
Dissertation: *Tradeoffs, inequalities, and asymmetries of cooperative smallholder irrigation in dryland environments*

M.S., Geology, University of Wisconsin - Madison, 2009
Thesis: *Reservoir seepage to groundwater in the Nariarlé watershed of Burkina Faso, West Africa*

B.A. with highest distinction, Environmental Sciences, Mathematics (minor), University of Virginia, 2003
Thesis: *Air bubble enhanced colloid mobilization in an unsaturated porous medium*

Academic Positions

Francis Marion University, Biology Department

Assistant Professor, August 2023–Present
Teaching Introduction to Environmental Science, Introduction to Sustainability, Water Resources Management, and Geographic Information Systems courses

University Of Maryland, Earth System Science Interdisciplinary Center

Postdoctoral Associate, 2020–2023
Managed a five million dollar USDA grant and assisting in the development of a suite of decision tools for farmers and water managers

St. Mary's College of Maryland

Adjunct Professor, 2019
Taught Dynamics of Coupled Human and Natural Systems and Field Methods in Hydrology courses

Princeton University, Department of Civil & Environmental Engineering

Graduate Research Assistant, 2017–2018
Developed a hydrologic model for the Nan province in northeastern Thailand as part of a project evaluating the impact of small reservoir construction on agricultural production

Graduate Research Assistant, 2016–2017
Contributed to the development of Mapping Africa, a project to map smallholder agriculture across Africa using crowd sourcing techniques

Graduate Research Assistant, 2012–2016
Designed and managed a program to monitor household water availability and assisted in the deployment of environmental sensors as part of a study of agricultural sustainability in the Laikipia Region of Kenya

Assistant in Instruction, 2013
Led three sections of Fundamentals of Environmental Studies precept

University of Wisconsin - Madison, Department of Geoscience

Teaching Assistant, 2007
Led three sections of Introduction to Geology course

Graduate Research Assistant, 2006–2008
Designed and conducted, in collaboration with researchers from the Institut de Recherche pour le Développement (IRD), a study of the potential for groundwater contamination by agricultural reservoirs in Burkina Faso

University of Virginia, Environmental Sciences Department

Undergraduate Research Assistant, 2001 & 2003
Assisted with laboratory and field experiments to characterize vadose zone colloidal mobilization in response to soil moisture fluctuations and transient wetting fronts

Undergraduate Research Assistant, 2002
Assisted with field research on the Eastern Shore of Virginia to measure the ecosystem service effect of fiddler crab burrows in regulating salt marsh chemistry

Nonacademic Experience

U.S. Forest Service Office of International Programs, Middle East Program Specialist, 2009–2012

Peace Corps, Small Business Development Volunteer (Burkina Faso), 2003–2005

Bunnell Lammons Engineering, Administrative Intern, 1999 & 2000

Journal Articles

Liang, X-Z.. **D. Gower** J.A. Kennedy, M. Kenney, M.C. Maddox, M. Gerst, G. Balboa, T. Becker, X. Cai, R. Elmore, W. Gao, Y. He, K. Liang, S. Lotton, L. Malayil, M.L. Matthews, A.M. Meadow, C.M.U. Neale, G. Newman, A.R. Sapkota, S. Shin, J. Straube, C. Sun, Y. Wu, Y. Yang, & X. Zhang (2024). DAWN: Dashboard for Agricultural Water Use and Nutrient Management—A Predictive Decision Support System to Improve Crop Production in a Changing Climate. *Bulletin of the American Meteorological Society, 105*(2): E432-E441. DOI: 10.1175/BAMS-D-22-0221.1

Krell, N.T., B.E. Morgan, **D. Gower**, & K.K. Caylor (2021). Consequences of dryland maize planting decisions under increased seasonal rainfall variability. *Water Resources Research, 57*(9): e2020WR029362. DOI: 10.1029/2020WR029362

Zeng, Z., D. Wang, L. Yang, J. Wu, A. Ziegler, M. Liu, P. Ciais, T. Searchinger, Z. Yang, D. Chen, A. Chen, L. Li, S. Piao, D. Taylor, X. Cai, M. Pan, L. Peng, P. Lin, **D. Gower**, Y. Feng , C. Zheng, K. Guan, X. Lian, T. Wang, L. Wang, S. Jeong, Z. Wei, J. Sheffield, K. Caylor, & E. Wood (2021). Deforestation-induced warming over tropical mountain regions regulated by elevation. *Nature Geoscience, 14*(1): 23-29. DOI: 10.1038/s41561-020-00666-0

Guido, Z., A. Zimmer, S. Lopus, C. Hannah, **D. Gower**, K. Waldman, N. Krell, J. Sheffield, K. Caylor, & T. Evans (2020). Farmer Forecasts: Impacts of Seasonal Rainfall Expectations on Agricultural Decision-Making in Sub-Saharan Africa. *Climate Risk Management, 30*: 100247. DOI: 10.1016/j.crm.2020.100247

Giroux, S.A., P. McCord, S. Lopus, **D. Gower**, J. Dell'Angelo, S. Dickinson, X. Chen, K.K. Caylor, & T.P. Evans (2020). Environmental heterogeneity and commodity sharing in smallholder agroecosystems. *PLoS ONE, 15*(1): e0228021. DOI: 10.1371/journal.pone.0228021

Waldman, K.B., S.Z. Attari, **D. Gower**, S.A. Giroux, K.K. Caylor, & T.P. Evans (2019). The salience of climate change in farmer decision-making within smallholder semi-arid agroecosystems. *Climatic Change, 156*, 527–543. DOI: 10.1007/s10584-019-02498-3

Zeng, Z., **D.B. Gower** & E.F. Wood (2018). Accelerating forest loss in Southeast Asian Massif in the 21st century: A case study in Nan Province, Thailand. *Global Change Biology, 24*(10), 4682-4695. DOI: 10.1111/gcb.14366

Lopus, S., P. McCord, **D. Gower**, & T. Evans (2017). Drivers of Farmer Satisfaction with Small-Scale Irrigation Systems. *Applied Geography, 89*, 77-86. DOI: 10.1016/j.apgeog.2017.10.004

McCord P., J. Dell'Angelo, **D.B. Gower**, K. Caylor, & T. Evans (2017). Household-level heterogeneity of water resources within common pool resource systems. *Ecology and Society, 22*(1): 48. DOI: 10.5751/ES-09156-220148

Gower, D. B., J. Dell'Angelo, P.F. McCord, K.K. Caylor, & T.P. Evans (2016). Modeling ecohydrological dynamics of smallholder strategies for food production in dryland agricultural systems. *Environmental Research Letters, 11*(11): 115005. DOI: 10.1088/1748-9326/11/11/115005

Dell'Angelo, J., P.F. McCord, **D. Gower**, S. Carpenter, K.K. Caylor, & T.P. Evans (2016). Community-based Water Governance on Mount Kenya: An Assessment Based on Ostrom's Design Principles of Natural Resource Management. *Mountain Research and Development, 36*(1), 102-116. DOI: 10.1659/MRD-JOURNAL-D-15-00040.1

Levy, M. C., M. Garcia, P. Blair, X. Chen, S.L. Gomes, **D.B. Gower**, J. Grames, L. Kuil, Y. Liu, L. Marston, P.F. McCord, M. Roobanannan, & R. Zeng (2016). Wicked but worth it: student perspectives on socio-hydrology. *Hydrological Processes, 30*(9), 1467-1472. DOI: 10.1002/hyp.10791

McCauley, D.J., T.E. Dawson, M.E. Power, J.C. Finlay, M. Ogada, **D.B. Gower**, K. Caylor, W.D. Nyingi, J.M. Githaiga, J. Nyunja, F.H. Joyce, R.L. Lewison, & J.S. Brashares (2015). Carbon stable isotopes suggest that hippopotamus-vectored nutrients subsidize aquatic consumers in an East African river. *Ecosphere, 6*(4): 52. DOI: 10.1890/ES14-00514.1

Saiers, J.E., G.M. Hornberger, **D.B. Gower**, & J.S. Herman (2003). The role of moving air-water interfaces in colloid mobilization within the vadose zone. *Geophysical Research Letters, 30*(21), 2083. DOI: 10.1029/2003GL018418

Book Chapters

Dell'Angelo, J., P. F. McCord, E. Baldwin, M.E. Cox, **D. Gower**, K. Caylor, & T.P. Evans (2014). Multilevel Governance of Irrigation Systems and Adaptation to Climate Change in Kenya. In *The Global Water System in the Anthropocene.* Eds. A. Bhaduri, J. Bogardi, J. Leentvaar, & S. Marx. Springer Water. Springer, Cham. DOI: 10.1007/978-3-319-07548-8_21

Conference Presentations

2017 American Geophysical Union Fall Meeting, New Orleans, LA. (December 15, 2017). Determinants of recent forest loss in northern Thailand. (with Z. Zeng, E. Wood, and K. Caylor)

7th annual Interdisciplinary Ph.D. Workshop in Sustainable Development, New York, NY. (April 22, 2017). Forecasting the impact of climate change on community water project growth and household food security in Laikipia, Kenya.

2016 American Geophysical Union Fall Meeting, San Francisco, CA. (December 14, 2016). An ecohydrologic framework for simulating catchment constraints on smallholder irrigation systems in drylands (poster). (with P.F. McCord, K. Caylor, J. Dell'Angelo, and T.P. Evans)

2016 Association of American Geographers Annual Meeting, San Francisco, CA. (March 30, 2016). An ecohydrological framework for modeling smallholder irrigation systems in drylands.

2015 American Geophysical Union Fall Meeting, San Francisco, CA. (December 14, 2015). Modeling the impacts of regulatory frameworks on self-organization in dryland agricultural systems (poster). (with K. Caylor)

2015 International Union of Geodesy and Geophysics Meeting, Prague, Czech Republic. (June 25, 2015). An ecohydrological framework for modeling stream-fed irrigation in dryland environments (poster). (with K. Caylor)

2008 Geological Society of America Annual Meeting, Houston, TX. (October 7, 2008). Reservoir contribution to groundwater flowpaths in the Nariarlé watershed of Burkina Faso.

2002 International Workshop on Colloids and Colloid-Facilitated Transport of Contaminants in Soils and Sediments, Viborg, Denmark. (September 2002). Air Bubble Enhanced Colloid Mobilization in an Unsaturated Porous Medium (poster). (with J.E. Saiers, J.J. Lenhart, and G.M. Hornberger)

Undergraduate Mentoring

University of Maryland

Jingyang Yu, Summer Internship Project: *Climate Impacts on China's Corn Yield*, (2022)

Princeton University

Miranda Bernard, Thesis: *An Irrigation and Precipitation Isotope Analysis of Crops in Central Kenya*, (2015)

Sally Goodman, Thesis: *An Investigation of Groundwater Potential in the Timau River Basin, Kenya*, (2014)

Academic Exchanges

Visiting student, Soil and Water Lab, Cornell University (Duration: August 2016 – May, 2017; Supervisor: Professor Todd Walter)

Visiting researcher, Stockholm Resilience Center, Stockholm University (Duration: October 26 – October 30, 2016; Collaborator: Professor Maja Schlüter)

Grants & Fellowships

Science to Achieve Results (STAR) Fellowship, Environmental Protection Agency (2014)

Francis Robbins Upton Fellowship in Engineering, Princeton University (2012)

Grant-in-Aid of Research, Sigma Xi (2007)

Graduate Student Research Grant, Geological Society of America (2007)

Weeks Research Assistantship, University of Wisconsin - Madison (2006)

Harrison Undergraduate Research Award, University of Virginia (2002)

Morris K. Udall Scholarship, Morris K. Udall and Stewart L. Udall Foundation (2002)

Awards

James J. and Dorothy T. Hanks Award in Geophysics, University of Wisconsin (2008)

Undergraduate Hydrology Award, University of Virginia (2003)

Undergraduate Interdisciplinary Award, University of Virginia (2003)

Joseph K. Roberts Award, University of Virginia (2003)

Academic Service

Conference Session Organizer

Coupled Climate-Agrohydrosystem Modeling to Support Sustainable Agricultural Production eLightning Summary Session, American Geophysical Union Fall Meeting, December 2021. (with X-L. Liang, Y. Wu, X. Cai, M. Matthews)

New insights, approaches and challenges in the field of socio-hydrology, Association of American Geographers Annual Meeting, March 2016. (with P.F. McCord)

New approaches to coupling human and water dynamics, Association of American Geographers Annual Meeting, April 2015. (with P.F. McCord)

Reviewer

Sustainable Water Resources Management, *Scientific Reports*, *PLOS One*, *Land Use Policy*, *International Journal of Disaster Risk Reduction*, *Mountain Research and Development*, and *African Geographical Review*.

Skills

Languages: Proficient French (oral and written)

Software: Amazon Web Services, ArcGIS/QGIS, Bash, C, LaTeX, Linux, MATLAB, MODFLOW, Microsoft Office, Python, R, SQL

Fieldwork: River gauging, Aquifer testing, Groundwater sampling, Community surveying, Machine learning