**Barbara S. Minsker**

Bobby B. Lyle Endowed Professor of Leadership & Global Entrepreneurship

Chair, Civil & Environmental Engineering Department

Senior Fellow, Hunt Institute for Engineering and Humanity

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**EDUCATION**

B.S. with Distinction, Cornell University, Operations Research and Industrial Engineering, 1986

Ph.D., Cornell University, Civil and Environmental Engineering, 1995

Post-doctoral research associate, University of Vermont, Research Center for Groundwater Remediation Design, 1995 – 1996

Future Thinking leadership development program, [Center for Authentic Leadership](http://www.authenticleadership.com), 2007-2010

[Committee on Institutional Cooperation (CIC) Academic Leadership Program](http://www.cic.net/Home/Projects/Leadership/ALP/Introduction.aspx), 2009-10

**HONORS AND AWARDS**

1998 National Science Foundation Faculty Early Career Development (CAREER) Award

1999-2000 National Center for Supercomputing Applications (NCSA) Faculty Fellow

2000 Army Young Investigator Award

2000 Presidential Early Career Award for Scientists & Engineers (PECASE)

2001-2002 Center for Advanced Study Fellow

2001-2016 Arthur and Virginia Nauman Faculty Scholar, University of Illinois

2003 Fellow, Japan Society for the Promotion of Science Invitation Fellowship Program

2003 American Society of Civil Engineers (ASCE) Walter L. Huber Civil Engineering Research Prize

2005 ASCE Environmental and Water Resources Institute (EWRI) Outstanding Achievement Award

2006 Xerox Award for Faculty Research

2008-2011 University Scholar

2012 EWRI Service to the Profession Award

2015 Leadership Illinois, Class of 2015

2017 Fellow, ASCE EWRI

**SCHOLARLY INTERESTS**

Developing innovative systems approaches to improve sustainability and resilience of coupled human and natural systems. Current research focuses on coupling machine learning and social computing with “Big Data” to address complex water resource problems such as green stormwater infrastructure design, integrated water cycle engineering, combined sewer overflows, hypoxia, and floods and droughts.

**PROFESSIONAL EXPERIENCE**

2016-Present **Professor,** Southern Methodist University

 *Primary Appointment*, Department of Civil and Environmental Engineering,

 *Courtesy Appointment*, Department of Computer Science and Engineering

 *Courtesy Appointment*, Department of Engineering Management, Information, and Systems

2016-Present **Department Chair**, Civil and Environmental Engineering, Southern Methodist University

2016-Present **Senior Fellow**, Institute for Engineering and Humanity, Southern Methodist University

2006-2016 **Professor,** Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign

1999-2016 **Faculty Affiliate**, National Center for Supercomputing Applications, University of Illinois Urbana-Champaign

2010-2015 **President**, Joyful U, Inc.

2008-2011 **Associate Provost Fellow**, Office of the Provost, University of Illinois Urbana-Champaign

2005-2007 **President**, Hazard Management Systems, Inc.

2002-2006 **Associate Professor,** Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign

1996-2002 **Assistant Professor,** Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign

1988-1990 **Environmental** **Policy Analyst and Work Assignment Manager**, Wade Miller Associates, Arlington, VA

1986-1988 **Environmental** **Policy Analyst**, ICF Incorporated, Fairfax, VA

**MAJOR LEADERSHIP AND SERVICE ACTIVITIES**

* *Southern Methodist University:*
	+ Chair, Department of Civil and Environmental Engineering (2016 – present): Developed and implementing a vision to advance learning and discovery in service to humanity, including new programs to promote excellence in research and education, faculty development and mentoring, and interdisciplinary and leadership education.
	+ Senior Fellow, Hunt Institute for Engineering and Humanity (2016 – present): Developing Resilient Cities Innovation Hub to advance leadership and “Big Data” approaches to improve urban resilience, collaborating with government and non-profit organizations.
* *University of Illinois:*
	+ Founding Co-Coordinator, Sustainable and Resilient Infrastructure Systems Program, Department of Civil and Environmental Engineering (2011-13): Created governance structure to serve as a model for cross-disciplinary programs, new MS and PhD programs, global leaders program, and new courses integrating sustainability and resilience into CEE planning, design, and management.
	+ Illinois Promise Scholars Mentor (2015-2016): Mentored low-income and first-generation college students to support their development and success at Illinois.
	+ Associate Provost Fellow: Led the creation of the University of Illinois Urbana-Champaign Sustainability Initiative vision, implementation plan, and curriculum development program, 2008-11. After completing the 3-year Fellow term, continued to advise on sustainability activities and lead initiatives on community sustainability partnerships for research, education, and public engagement, 2011-13.
* *National:*
	+ Principal Investigator (PI) and co-PI of the National Science Foundation (NSF)-funded WATERS Network Project Office (2005-10). Created a national water science plan that was evaluated by the National Research Council and led to a new $26 million/year NSF program on Water Sustainability and Climate.
	+ American Society of Civil Engineers:
* Founding Chair, Task Committee on Performance-Based Sustainable Design of Water Resources Infrastructure (2011-14)
* Secretary, Environmental Sensing and Cyber-infrastructure: Technologies and Applications (2011-12). Also control group member, 2010-11.
* Chair, Environmental and Water Resource Systems Committee (2005-6). Also secretary (2003-4), Vice-Chair (2004-5), Past-Chair (2006-7).
* Founding Chair, Task Committee on Long-Term Groundwater Monitoring (2000-2003). Awarded EWRI Outstanding Achievement Award.
* Control Group Member, Evolutionary Computation Task Committee (2003-6)
	+ Associate Editor, Water Resources Research (2002-4)
* *Entrepreneurism:*
	+ President, Hazard Management Systems Inc. (2005-7). Created automated genetic algorithm software for environmental management and design. Sold to Summit Envirosolutions Inc., who still use and advance the software.
	+ President, Joyful U Inc. (2010-2015). Founded non-profit organization dedicated to leadership development. Delivered programs in authentic leadership, purpose-driven workplace, collaboration, conflict resolution, mindfulness, and resilience. Now transitioned to consulting with organizations through [www.BarbaraMinsker.com](http://www.BarbaraMinsker.com).

**BOOKS AND BOOK CHAPTERS**

Minsker, Barbara S., “Genetic Algorithms,” in *Hydroinformatics: Data Integrative Approaches in Computation, Analysis, and Modeling*, ed. Praveen Kumar, CRC Press, ISBN 0849328942, 2005.

Minsker, Barbara, *The Joyful Professor: How to Shift From Surviving to Thriving in the Faculty Life*, Henschel Haus Publishing Inc., 2010.

Minsker, Barbara, *Joyful U: Discovering the Path of Success and Happiness; Mindful Living with Purpose and Resilience*, Henschel Haus Publishing Inc., 2014.

**PEER-REVIEWED PAPERS**

Zimmer, A., A. Schmidt, A. Ostfeld, and B. Minsker, “Reducing Combined Sewer Overflows (CSOs) Through Model Predictive Control and Capital Investment,” *Journal of Water Resources Planning and Management*, in press.

Zhao, Tingting, Barbara Minsker, Fernando Salas, David Maidment, Vesselin Diev, Jacob Spoelstra, and Prashant Dhingra, “Statistical and Hybrid Methods Implemented in a Web Application for Predicting Reservoir Inflows During Flood Events,” *Journal of the American Water Resources Association*, Article ID: JAWR12575 and DOI: 10.1111/1752-1688.12575, 2017.

Xu, Wenzhao, Collingsworth, Paris, Bailey, Barbara, and Minsker, Barbara, “Detecting Spatial Patterns of Rivermouth Processes Using a Geostatistical Framework for Near-Real-Time Analysis,” *Environmental Modeling and Software*, in press.

Du, Erhu, Ximing Cai, Nicholas Brozovic, and Barbara Minsker, “Evaluating the Impacts of Farmers’ Behaviors on a Hypothetical Agricultural Water Market Based on Double Auction,” *Water Resources Research*, in press.

Du, Erhu, Samuel Rivera, Ximing Cai, Laura Myers, Andrew Ernest, and Barbara Minsker, “Impacts of Human Behavioral Heterogeneity on the Benefits of Probabilistic Flood Warnings: An Agent-Based Modeling Framework,” *Journal of the American Water Resources Association*, (JAWRA), 1–17, DOI: [10.1111/1752-1688.12475](http://dx.doi.org/10.1111/1752-1688.12475), 2016.

Padhy, Smruti, Jay Alameda, Rob Kooper, Rui Liu, Sandeep Puthanveetil Satheesan, Inna Zharnitsky, Greg Jansen, Michael C. Dietze, Praveen Kumar, Jong Lee, Richard Marciano, Luigi Marini, Barbara Minsker, Chris Navarro, Marcus Slavenas, William Sullivan and Kenton McHenry, “An Architecture for Automatic Deployment of Brown Dog Services At Scale into Diverse Computing Infrastructures,” *XSEDE16 Conference Proceedings*, Association for Computing Machinery, 2016.

Zimmer, A., A. Schmidt, B. Ostfeld, and B. Minsker, “Evolutionary algorithm enhancement for model predictive control and real-time decision support,” *Environmental Modelling and Software, 69*, 2015.

Padhy, Smruty, Greg Jansen, Jay Alameda, Edgar Black, Liana Diesendruck, Mike Dietze, Praveen Kumar, Rob Kooper, Jong Lee, Riu Liu, Ricard Marciano, Luigi Marini, Dave Mattson, Barbara Minsker, Chris Navarro, Marcus Slavenas, William Sullivan, Jason Votava, and Kenton McHenry, “Brown Dog: Leveraging Everything Towards Autocuration,” 2015 IEEE International Conference on Big Data (IEEE BigData 2015), 2015.

Minsker, B., L. Baldwin, J. Crittenden, K. Kabbes, M. Karamouz, K. Lansey, T. Malinowski, E. Nzewi, A. Pandit, J. Parker, S. Rivera, C. Surbeck, B. Wallace, and J. Williams, “Progress and Recommendations for Advancing Performance-Based Sustainable and Resilient Infrastructure Design,” *Journal of Water Resources Planning & Management*, [http://dx.doi.org/10.1061/(ASCE)WR.1943-5452.0000521](http://dx.doi.org/10.1061/%28ASCE%29WR.1943-5452.0000521), 2015.

Rivera, S., B. Minsker, D. Work, and D. Roth, “A text mining framework for advancing sustainability indicators,” *Environmental Modelling and Software*, *62*, 128-138, 2014.

Maier, H.R., Z. Kapelan, J. Kasprzyk, J. Kollat, L.S. Matott, M.C. Cunha, G.C. Dandy, M.S. Gibbs, E. Keedwell, A. Marchi, A. Ostfeld, D. Savic, D.P. Solomatine, J.A. Vrugt, A.C. Zecchin, B.S. Minsker, E.J. Barbour, G. Kuczera, F. Pasha, A. Castelletti, M. Giuliani, *et al.*, [Evolutionary algorithms and other metaheuristics in water resources: Current status, research challenges and future directions](http://www.sciencedirect.com/science/article/pii/S1364815214002679), *Environmental Modelling & Software, Volume 62,*Pages 271-299, 2014*.*

Coopersmith, E., B. Minsker, C. Wenzel, and B. Gilmore, "Machine Learning Assessments of Soil Drying for Agricultural, Construction, and Recreational Planning," *Journal of Computers and Electronics in Agriculture*, *104*, 93-104, 2014.

Hill, David J., Branko Kerkez, Amin Rasekh, M. Katherine Banks, Barbara Minsker, Avi Ostfeld, "Sensing and Cyberinfrastructure for Smarter Water Management: The Challenge of Ubiquity," *Journal of Water Resources Planning and Management, Vol. 140*, No. 7, 2014.

Ahalt, S.; Band, L.; Christopherson, L.; Idaszak, R.; Lenhardt, C.; Minsker, B.; Palmer, M.; Shelley, M.; Tiemann, M.; Zimmerman, A., "Water Science Software Institute: Agile and Open Source Scientific Software Development," *Computing in Science & Engineering* , vol.16, no.3, pp.18-26, doi: 10.1109/MCSE.2014.5, 2014.

Coopersmith, E., B. Minsker, and M. Sivapalan, Using similarity of soil texture and hydroclimate to enhance soil moisture estimation, *Hydrol. Earth Syst. Sci.*, *18*, 3095-3107, doi:10.5194/hess-18-3095-2014, 2014.

Coopersmith, E., B. Minsker, and M. Sivapalan, "Patterns of Regional Climate Change: An Analysis of Shifting Hydrologic Regime Curves," Water Resources Research, 50(3), 1960–1983, DOI: 10.1002/2012WR013320, 2014.

Zimmer, A., A. Schmidt, A. Ostfeld, B. Minsker, “A New Method for the Offline Solution of Pressurized and Supercritical Flows,” *Journal of Hydraulic Engineering*, doi: 10.1061/(ASCE)HY.1943-7900.0000747, 2013.

Ahalt, S., Larry Band, Barbara Minsker, Margaret Palmer, Michael Tiemann, Ray Idaszak, Chris Lendhardt and Mary Whitton “Water Science Software Institute: An Open Source Engagement Process,” Proceedings of the 2013 International Workshop on Software Engineering for Computational Science and Engineering, 2013.

Wietsma, T., and B. Minsker, “Enabling scientific data sharing and re-use,” 2012 IEEE 8th International Conference on E-Science, Chicago, IL, <http://dx.doi.org/10.1109/eScience.2012.6404475>, 2012.

Gartial, M.R., B. Braunschweig, Te-Wei Chang, Parya Moinzadeh, Barbara S. Minsker, Gul Agha, Andrzej Wieckowski, Laura L. Keefer and Gang Logan Liu, "Micro Electronic Wireless Nitrate Sensor Network for Environmental Water Monitoring," *Environmental Science: Processes & Impacts* (formerly *J. Environ. Monit*.), DOI:10.1039/C2EM30380A, 2012

Hill, David J., Yong Liu, Luigi Marini, Rob Kooper, Alejandro Rodriguez, Barbara S. Minsker, James Myers, Terry McLaren, “Using A Virtual Sensor System to Create Real-Time Customized Environmental Data Products,” *Environmental Modelling and Software*, *26*, <http://dx.doi.org/10.1016/j.envsoft.2011.09.001>, 1710-1724, 2011.

Babbar-Sebens, Meghna, and B. S. Minsker, “Interactive Genetic Algorithm With Mixed Initiative Interaction For Multi-Criteria Ground Water Monitoring Design,” *Applied Soft Computing*, <http://dx.doi.org/10.1016/j.asoc.2011.08.054>, 2011.

Gopalakrishnan, G., B. Minsker, and A.Valocchi, “Monitoring Network Design for Phytoremediation Systems Using Primary and Secondary Data Sources,” *Environmental Science and Technology*, 45 (11), 4846–4853, 2011.

Yan, S., and B. Minsker, “Applying Dynamic Surrogate Models in Noisy Genetic Algorithms to Optimize Groundwater Remediation Designs,” *Journal of Water Resources Planning and Management*, 137(3), DOI: 10.1061/(ASCE)WR.1943-5452.0000106, 2011.

Coopersmith, E. J., B. Minsker, and P. Montagna, “Understanding and Forecasting Hypoxia Using Machine Learning Algorithms,” *Journal of Hydroinformatics*, 13(1), 64-80, doi:10.2166/hydro.2010.015, 2011.

Singh, A., D. D. Walker, B. S. Minsker, and A. J. Valocchi, “Incorporating Subjective and Stochastic Uncertainty in an Interactive Multi-Objective Groundwater Calibration Framework,” *Stochastic Environmental Research and Risk Assessment*, *24*(6), 881-898, 2010.

Babbar-Sebens, M., and B. S. Minsker, “Case-Based Micro Interactive Genetic Algorithm (CBMIGA) for Interactive Learning: Methodology and Application to Groundwater Monitoring Design,” *Environmental Modelling & Software*, *25* 1176e1187, doi:10.1016/j.envsoft.2010.03.027, 2010

Hill, D. J., and B. S. Minsker, “Anomaly detection in streaming environmental sensor data: A data-driven modeling approach,” *Environmental Modelling & Software*, [doi:10.1016/j.envsoft.2009.08.010](http://dx.doi.org/10.1016/j.envsoft.2009.08.010), 2009.

Hill, D. J., B. S. Minsker, and E. Amir, “Real-Time Bayesian Anomaly Detection in Streaming Environmental Data,” *Water Resources Research*, *45*, W00D28, doi:10.1029/2008WR006956, 2009.

Singh, A., B. S. Minsker, and P. Bajcsy, “Image-Based Machine Learning for Reduction of User-Fatigue in an Interactive Model Calibration System,” *Journal of Computing in Civil Engineering*, [http://dx.doi.org/10.1061/(ASCE)CP.1943-5487.0000026](http://dx.doi.org/10.1061/%28ASCE%29CP.1943-5487.0000026), 2009.

Demissie, Yonas K., Albert J. Valocchi, Barbara S. Minsker, Barbara A. Bailey, Integrating a calibrated groundwater flow model with error-correcting data-driven models to improve predictions, *Journal of Hydrology*, 364(3-4), 257-271, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2008.11.007, 2009.

Babbar-Sebens, M., and B. S. Minsker, “Standard Interactive Genetic Algorithm - A Comprehensive Optimization Framework for Groundwater Monitoring Design,” *J. of Water Resources Planning and Management*, 134(6), 2008.

Singh, A., B. S. Minsker, A. J. Valocchi, “An Interactive Multi-Objective Optimization Framework for Groundwater Inverse Modeling,” *Advances in Water Resources*, *31*(10), 1269-1283, 2008.

Singh, A., and B. S. Minsker, “Uncertainty-Based Multiobjective Optimization of Groundwater Remediation Design,” *Water Resources Research, 44*, W02404, doi:10.1029/2005WR004436, 2008.

Montgomery, J. Haas, C., Minsker, B. Schnoor, J., “The WATERS Network: Transforming our Scientific Understanding of the Nation's Waters,” *Water Env. Res.*, *79*(4), 339-340, 2007.

Montgomery, J., T. Harmon, W. Kaiser, A. Sanderson, C. Haas, R. Hooper, B. Minsker, J. Schnoor., N. Clesceri, W. Graham, P. Brezonik, “The WATERS Network: An Integrated Environmental Observatory Network for Water Research,” *Environmental Science and Technology*, 6642-6647, 2007.

Sinha, E., and B. Minsker, “Multiscale island injection genetic algorithms for groundwater remediation,” *Advances in Water Resources*, *30*(9), 1933-1942, 2007.

Hill, D., B. Minsker, A. Valocchi, V. Babovic, and M. Keijzer, “Upscaling Models of Solute Transport in Porous Media through Genetic Programming,” *Journal of Hydroinformatics*, *9*(4), 251­266, 2007.

Farrell, D. M., B. S. Minsker , D. Tcheng , D. Searsmith , J. Bohn , D. Beckman, “Data Mining To Improve Management And Reduce Costs Of Environmental Remediation, *J. of Hydroinformatics*, *9*(2), doi:10.2166/hydro.2007.004, 107–121, 2007.

Gopalakrishnan, G., M. C. Negri, B. S. Minsker, C. J. Werth, Monitoring subsurface contamination using tree branches, *Ground Water Monitoring and Remediation*, 27(1), 1-10, 2007.

Characklis, G. W., P. M. Reed, and B. S. Minsker, “The Role of the Systems Community in the National Science Foundation’s Environmental Observatories,” *Journal of Water Resources Planning and Management*, *133*(1), 1-3, 2007.

Espinoza, F., and B. S. Minsker, “Effects of local search algorithms on hybrid genetic algorithm performance for groundwater remediation design,” *Journal of Computing in Civil Engineering*, *20*(6), 420-430, 2006.

Becker, D., Minsker, B., Greenwald, R., Zhang, Y., Harre, K., Yager, K., Zheng, C., and Peralta, R., “Reducing Long-Term Remedial Costs by Transport Modeling Optimization,” *Ground Water*, *44*(6), 864-875, 2006.

Espinoza, F., and B. S. Minsker, “Development of the enhanced self-adaptive hybrid genetic algorithm (e-SAHGA),” *Water Resources Research*, 42, W08501, doi:10.1029/2005WR004221, 2006.

Dawsey, W., B. S. Minsker, and V. L. VanBlaricum, “Bayesian belief networks to integrate monitoring evidence of water distribution system contamination,” *Journal of Water Resources Planning and Management*, 132(4), 234-241, 2006.

Babbar, M., and B. S. Minsker, “Groundwater Remediation Design Using Multiscale Genetic Algorithms,” *J. of Water Resources Planning and Management*, 132(5), 341-350, 2006.

Yan, S., and B. S. Minsker, “Optimal Groundwater Remediation Design Using An Adaptive Neural Network Genetic Algorithm,” *Water Resources Research*, *42*, W05407, doi:10.1029/2005WR004303, 2006.

Ren, X., and B. S. Minsker, “Which Groundwater Remediation Objective is Better, a Realistic One or a Simple One?,” *J. of Water Resources Planning and Management*, *131*(5), 351-361, 2005.

Michael, W.J., B. S. Minsker, D. Tcheng, and A. J. Valocchi, "Integrating Data Sources to Improve Hydraulic Head Predictions: A Hierarchical Machine Learning Approach," *Water Resources Research*, 41(3), W03020 10.1029/2003WR002802, 2005.

Espinoza, F., B. S. Minsker, and D. E. Goldberg, “Adaptive hybrid genetic algorithm for groundwater remediation design,” *J. of Water Resources Planning and Management*, *131*(1), 14-24, 2005.

Minsker, B., “Long-Term Groundwater Monitoring Optimization: Improving Performance and Reducing Costs Associated with Natural Attenuation and Other In Situ Treatments," *Bioremediation Journal*, *8*(no 3-4), 87-88, 2004.

Reed, P., T.R. Ellsworth, and B.S. Minsker, "Spatial Interpolation Methods for Nonstationary Plume Data." *Ground Water*, 42(2), 190-202, 2004.

Reed, P. and B. S. Minsker, "Striking the Balance: Long Term Groundwater Monitoring Design for Multiple, Conflicting Objectives." *Journal of Water Resources and Planning Management*, 130(2), 140-149, 2004.

Liu, Y., and B. S. Minsker, “Full Multiscale Approach For Optimal Control Of In-Situ Bioremediation,” *J. of Water Resources Planning and Management*, 130(1), 26-32, 2004.

Reed, P., B. S. Minsker, and D. E. Goldberg, "Simplifying Multiobjective Optimization: An Automated Design Methodology for the Nondominated Sorted Genetic Algorithm-II." *Water Resources Research*, 39(7), 1196, doi:10.1029/2002WR001483, 2003.

Gopalakrishnan, G., B. S. Minsker, and D. Goldberg, Optimal sampling in a noisy genetic algorithm for risk-based remediation design, *Journal of Hydroinformatics*, *5*(1), 11-25, 2003.

Liu, Y., and B. S. Minsker, Efficient multiscale methods for optimal in situ bioremediation design, *J. of Water Resources Planning and Management*, *128*(3), 227-236, 2002.

Liu, Y., B. S. Minsker, and F. Saied, A one-way multiscale method for optimal in situ bioremediation design, *J. of Water Resources Planning and Management*, *127*(2), 130-139, 2001.

Reed, P., B. Minsker, and D. Goldberg, A multiobjective approach to cost effective long-term groundwater monitoring using an elitist nondominated sorted genetic algorithm with historical data, Invited paper, *Journal of Hydroinformatics*, *3*, 71-89, 2001.

Reed, P., B. Minsker, and A. J. Valocchi, Cost effective long-term monitoring design using a genetic algorithm and global mass interpolation, *Water Resources Research, 36*(12), 3731-3741, 2000.

Reed, P., B. S. Minsker, and D. E. Goldberg, Designing a competent simple genetic algorithm for search and optimization, *Water Resources Research*, *36*(12), 3757-3761, 2000.

Smalley, J. B., B. S. Minsker, and D. E. Goldberg, Risk-based in situ bioremediation design using a noisy genetic algorithm, *Water Resources Research*, *36*(20), 3043-3052, 2000.

Kosegi, J. M., B. S. Minsker, and D. E. Dougherty, A feasibility study of thermal in situ bioremediation of dense nonaqueous phase liquids, *Journal of Environmental Engineering*, *126*(7), 601-610, 2000.

Minsker, B. S., and C. A. Shoemaker, Quantifying the effects of uncertainty on optimal groundwater bioremediation policies, *Water Resources Research*, *124*(12), 3615-3625, 1998.

Minsker, B. S., and C. A. Shoemaker, Dynamic optimal control of in situ bioremediation, *Journal of Water Resources Planning and Management*, *124*(3), 149-161, 1998.

Minsker, B.S., and C.A. Shoemaker, Computational issues associated with optimal design of in situ bioremediation, *Journal of Water Resources Planning and Management*, *124*(1), 39-46, 1998.

Minsker, B.S., and C.A. Shoemaker, "Differentiating a finite element biodegradation model for optimal control," *Water Resources Research*, *32*(1), 187-192, 1996.

**COURSES DEVELOPED AND TAUGHT**

**CEE 201: Planning, Design, and Management of Civil Engineering Systems.** Introduction to the formulation and solution of civil engineering systems problems. Major topics are engineering economics, mathematical modeling, and optimization.

**CEE 434: Environmental Systems Analysis I.** Examination of principles of environmental engineering design: applications to mathematical methods, including single and multi-objective programming, to environmental systems; economic analysis, including benefit-cost; and policy and management strategies.

**CEE 498 BSM: Environmental Risk Assessment and Management.** (*New course development*) Risk assessment methods are introduced and issues associated with managing risk are discussed. The course is taught in a case study format, focusing on a variety of environmental case studies such as air pollution, climate change, drinking water, hazardous waste storage, transport and disposal, and Superfund remediation.

**CEE 535: Environmental Systems Analysis II, Risk and Uncertainty in Environmental and Water Resources Decision Making**. Exploration of the fundamental concepts of uncertainty, risk, and reliability as applied to environmental and water resources systems.

**CEE 598 OS: Optimization Methods for Engineering Design.** (*New course development*) Optimization models have been shown to be useful tools for aiding engineering design in many fields. This course focuses on methods for applying nonlinear optimization to engineering design, with a practical, applications-oriented perspective. The course is intended to serve students from all areas of engineering and does not assume prior knowledge in any particular application area. Students complete a project applying one of the methods to a problem in their own field.

**CEE 592/UP 576/NRES 592: Sustainable Urban Systems.** (*New course development*) This course explores fundamental concepts of sustainability and resilience as applied to urban infrastructure systems, including the complex interactions among human, engineered, and natural systems. The course is taught from a project-based format; focusing on problems proposed by external government and non-governmental organization partners.

**ENG 498 AL1: Authentic Leadership.** (*New course development*) Generate positive collective vision and movement to transform conflict, risk and uncertainty into progress and success. Learn mindfulness and resilience skills to improve creativity, productivity and reduce stress. Foster adaptive change to address risk and uncertainty. Case study through active participation in a university or non-university group activity.

**RESEARCH FUNDING: *Principal Investigator (PI) or co-PI on $23.7 million in funding.***

| **Years (Inclusive)** | **Brief Title or Description** | **Source of Funds** | **Total Funding** | **# of PI’s & Lead PI if not Minsker** |
| --- | --- | --- | --- | --- |
| 1997-1998 | Computationally-Efficient Management Tools for Groundwater Remediation Design | University of Illinois Campus Research Board | $13,973 | 1 |
| 1998-2004 | Research and Educational Advances in Optimal Groundwater Remediation Design | National Science Foundation CAREER Program | $246,868 | 1 |
| 1998-2000 | Cost-Effective Monitoring Design for Intrinsic Bioremediation | Illinois Water Resources Center and the United States Geological Survey | $52,152 | 2 |
| 1998-1999 | Survey of Models Relevant to Sediment Contamination in Water Bodies | E.I. DuPont de Nemours and Company | $15,000 | 5 |
| 1999-2002 | Cost-Effective Risk Based Corrective Action Design for Contaminated Groundwater | National Science Foundation | $212,977 | 1 |
| 1999-2000 | Efficient Parallelization of a Risk Management Model on the NT Supercluster | National Center for Supercomputing Applications UIUC Faculty Fellows Program | $25,805 | 1 |
| 2000-2001 | Cost-Effective Risk Management of Groundwater Contamination | U.S. Army Research Office Young Investigator Program | $50,000 | 1 |
| 2000-2003 | Cost-Effective Risk Management of Groundwater Contamination | State Matching Funds Program | $28,302 | 1 |
| 2000-2005 | Cost-Effect Risk Management of Groundwater Contamination  | Presidential Early Career Award for Scientists and Engineers (PECASE) | $500,000 | 1 |
| 2001-2002 | Knowledge Integration for Long-Term Monitoring, Operations, and Stewardship | Argonne National Laboratory | $27,639 | 2 |
| 2002-2007 | A New Framework for Adaptive Sampling and Analysis During Long-Term Monitoring and Remedial Action Management | U. S. Department of Energy | $540,000 | 3 |
| 2002-2003 | Upscaling of Flows in Heterogeneous Porous Media Using Machine Learning | University of Illinois Research Board | $8,597 | 3 |
| 2003-2004 | Technology Transfer of Evolutionary Multiobjective Optimization Software, with Demonstration for Optimizing Long-Term Groundwater Monitoring | Office of Naval Research through Technology, Research, Education, and Commercialization Center | $60,334 | 1 |
| 2003 | Gift | BP Group Environmental Management Company | $2,500 | 1 |
| 2004-2005 | A Collaborative Framework for Integrated Hazard Management | Office of Naval Research through Technology, Research, Education, and Commercialization Center | $173,802 | 1 |
| 2004-2007 | Cyberinfrastructure to Support Collaborative Knowledge Synthesis, with Environmental Test Beds | National Center for Supercomputing Applications | $555,171 | 1 |
| 2004-2006 | Cyberinfrastructure and Management System Development for a National CLEANER Network | National Science Foundation | $89,958 | 3, Wayland Eheart |
| 2005-2006 | A Collaborative Framework for Integrated Hazard Management | Office of Naval Research through Technology, Research, Education, and Commercialization Center | $135,643 | 1 |
| 2005-2010 | Coalition for Creation of CLEANER/WATERS Network Project Office | National Science Foundation | $3,000,000 | 5 |
| 2005-2006 | Computational Cluster for On-Demand and Interactive Environmental and Water Resources Engineering Computing | University of Illinois Campus Research Board | $25,000 | 5 |
| 2005-2010 | An Environmental Information System for Hypoxia in Corpus Christi Bay: A WATERS Network Testbed | National Science Foundation | $400,000 | 3 |
| 2006-2007 | Collaboration Support for Observation and Model-based Decisions | Office of Naval Research through Technology, Research, Education, and Commercialization Center | $122,285 | 1 |
| 2008-2010 | Science Plan of the WATer and Environmental Research Systems Network (WATERS Network) | National Science Foundation | $750,000 | 5, Jeff Dozier, UCSB |
| 2010-11 | NSF Workshop on Creating Scientific Software Innovation Institutes for Sustained Cyberinfrastructure Achievement and Excellence | National Science Foundation | $50,000 | 2, Stanley Ahalt, UNC |
| 2010-11 | Project Catfish | ADM Inc. | $374,911 | 3 |
| 2011-12 | EAGER: Launch of a Water Science Software Institute (WSSI) | National Science Foundation | $300,000 | 4, Stanley Ahalt, UNC |
| 2008-2014 | Virtual Observatory for Sustainability of Intensively Managed Environmental Systems | Institute for Advanced Computing Applications and Technologies | $734,546 | 3 |
| 2010-13 | Digital Urban Informatics: Computational Innovation for Sustainable and Optimal Urban Stormwater Management | Microsoft Research, Inc. | $400,000 | 2 |
| 2010-13 | Demonstrating the Feasibility of Agronomic Decision Support Using a Field Readiness Virtual Sensor | John Deere Inc. | $282,952 | 3 |
| 2011-14 | Data Mining and Informatics Applied to Great Lakes Environmental Indices | Illinois-Indiana Seagrant | $567,734 | 2 |
| 2012-13 | Conceptualization of a Water Science Software Institute | National Science Foundation | $729,686 | 4, Stanley Ahalt, UNC |
| 2013-17 | Animated Chicago Area Waterways Analysis System | Metropolitan Water Reclamation District of Greater Chicago | $606,851 | 4 |
| 2013-17 | Real-Time Water Modeling and Decision Support Framework | Microsoft Research, Inc. | $240,000 (gift) | 3 |
| 2013-17 | Collaborative Research: CyberSEES: Type 2: A New Framework for Crowd-Sourced Green Infrastructure Design | National Science Foundation | $1,144,600 | 8 |
| 2013-18 | CIF21 DIBBs – Brown Dog | National Science Foundation | $10,519,716 | 5 (McHenry) |
| 2017-2020 | SAFE-NET: An Integrated Connected Vehicle and Computing Platform for Public Safety Applications | US Department of Commerce National Institute of Standards and Technology | $484,802 | 4 (Abdelghany) |
| **Total Funding** |  |  | **$24,214,434** |  |

**STUDENTS**

| **PhD Thesis Students** | **Year Granted/Expected** | **Thesis Title** | **Source of Support** | **Current Employment** |
| --- | --- | --- | --- | --- |
| Zheng Li | 2020 | Informatics Approaches to Defining and Understanding Infrastructure Deserts | Southern Methodist University | Graduate research assistant |
| Ankit Rai | 2018 | Big Data Methods for Green Infrastructure Design | National Science Foundation | Graduate research assistant |
| Bardia Heidari Haratmeh | 2018 | Designing Green Infrastructure to Maximize Co-Benefits | National Science Foundation | Graduate research assistant |
| Samuel Rivera | 2018 | Socially Aware Green Infrastructure Design | NSF Graduate Research Fellow, NSF research grant | Graduate research assistant |
| Tingting Zhao | 2017 | A Service-Driven Approach to Assist Water Management During Extreme Events | Microsoft Research | Microsoft Inc. |
| Wenzhao Xu | 2017 | Data Analytics and Web Applications to Improve Monitoring and Understanding of Lake Processes | Illinois-Indiana Seagrant | Indeed, Inc. |
| Erhu Du | 2017 | Assessing the Role of Human Behaviors in the Management of Extreme Hydrological Events: An Agent-Based Modeling Approach | Fellowship, Microsoft Research, MWRD | Post-Doctoral Research Associate at Southern University of Science and Technology, China |
| Evan Coopersmith | 2013 | Data-Driven Modeling of Hydroclimatic Trends and Soil Moisture: Multi-Scale Data Integration and Decision Support | John Deere Inc. | Consultant |
| Andrea Zimmer | 2013 | Hydraulic Modeling and Evolutionary Optimization for Enhanced Real-Time Decision Support of Combined Sewer Overflows  | Fellowships and Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) | Consultant |
| Gayathri Gopalakrishnan | 2007 | Subsurface Monitoring With Trees | Department of Energy | Research Scientist, Space Science Institute |
| Abhishek Singh | 2007 | Inverse Groundwater Modeling Using Interactive Evolutionary Optimization | Department of Energy | Manager - California Operations and Senior Water Resources Engineer, INTERA Inc. |
| David Hill | 2007 | Machine Learning for Environmental Monitoring and Modeling | National Science Foundation, Office of Naval Research | Associate Professor, Thompson Rivers University |
| Meghna Babbar | 2006 | Interactive Genetic Algorithm: A Human-Computer Framework for Improving Groundwater Monitoring Designs | Department of Energy | Associate Professor, Oregon State University |
| Shenquan Yan | 2006 | An Adaptive Meta-Model Approach to Optimizing Groundwater Remediation Design with Genetic Algorithms | Army Research Office | Developer, Microsoft Inc. |
| Felipe Espinoza | 2003 | A Self-Adaptive Hybrid Genetic Algorithm For Optimal Groundwater Remediation Design | National Science Foundation, Army Research Office | Completed National Research Council post-doctoral fellow, US EPA, now consulting in Chile |
| Patrick Reed  | 2002 | Striking the Balance: Long-Term Groundwater Monitoring Design for Multiple Conflicting Objectives | US EPA STAR fellowship | Professor, Cornell University |
| Yong Liu | 2001 | Multiscale Approach to Optimal Control of In-Situ Bioremediation of Groundwater | National Science Foundation | Senior Software Development Engineer, Microsoft Inc. |

| **MS Thesis Students** | **Year Granted/Expected** | **Thesis Title** | **Source of Support** | **Current Employment** |
| --- | --- | --- | --- | --- |
| Jayant Ahalawat | 2016 | Data Driven Modeling of Corn Yield: A Machine Learning Approach | John Deere Inc. | Graduate research assistant |
| Tingting Zhao | 2014 | Enabling Real-Time Water Decision Support Services Using Model as a Service | Microsoft Research | Graduate research assistant |
| Ankit Rai | 2013 | Green Stormwater Infrastructure Design for Human and Ecosystem Wellbeing | National Science Foundation | Graduate research assistant |
| Samuel Rivera | 2013 | Tracking Sustainability Indicators through Text Mining | Fellowship and Illinois Research Board | Graduate research assistant |
| Tristan Wietsma | 2012 | Adaptive Sampling for Multiscale Environmental Sensing Networks | Institute for Advanced Computing Applications & Technologies | Financial analyst |
| Wesley Dawsey | 2011 | Bayesian Belief Networks for Water Security  | Office of Naval Research, EPA Midwestern Technical Assistance Center, Illinois State Water Survey | Consultant |
| Indu Chinta | 2010 | Model Fusion for Improving Hypoxia Forecasts: A Study of Boosting and Historical Scenario Modeling | National Science Foundation | Indian government |
| Brian Payne | 2011 | Assessing and Improving Watershed Sustainability: A Model-Based Approach | National Science Foundation, University of Illinois | Consultant |
| Andrew Collier | 2008 | Real-Time Environmental Visualization for Diverse User Communities | Office of Naval Research | Consultant |
| Evan Coopersmith | 2008 | Statistical and Machine Learning Approaches to Understanding Hypoxia in Corpus Christi Bay | National Science Foundation | Graduate research assistant |
| Aniruddha Bhagwat | 2005 | Preliminary Cyberinfrastructure Needs Assessment and Technology Review for CLEANER | National Science Foundation | Consultant, Corollo Engineers |
| Matthew Zavislak | 2005 | Constraint Handling in Groundwater Remediation Design with Genetic Algorithms | Army Research Office | Consultant |
| Marcia Hayes | 2005 | Evaluation of Advanced Genetic Algorithms Applied to Groundwater Remediation Design | Army Research Office | Consultant |
| Dara Farrell | 2004 | Data Mining to Improve Management and Reduce Costs Associated with Environmental Remediation | Fulbright Fellowship | Graduate student, University of Washington |
| Eva Sinha | 2004 | Multiscale Island Injection Genetic Algorithms for Groundwater Remediation | Army Research Office | Consultant, Black and Veatch |
| Xiaolin Ren | 2003 | Which Groundwater Remediation Objective Is Better, A Realistic One Or A Simple One? | Army Research Office | Unknown |
| Abhishek Singh | 2003 | Uncertainty Based Multi-Objective Optimization Of Groundwater Remediation Design | Army Research Office | INTERA, Inc. |
| Rachel Arst | 2002 | Which are Better, Probabalistic Model-Building Genetic Algorithms (PMBGAs) or Simple Genetic Algorithms (SGAs)? A Comparison for an Optimal Groundwater Remediation Design Problem | Army Research Office | Unknown |
| Meghna Babbar | 2002 | Multiscale Parallel Genetic Algorithms for Optimal Groundwater Remediation Design | National Science Foundation | Associate Professor, Oregon State University |
| William Michael | 2002 | Integrating Data Sources to Improve Long-Term Monitoring and Management: A Hierarchical Machine Learning Approach | Fellowships and Argonne National Lab | Caterpillar Inc. |
| Gayathri Gopalakrishnan | 2001 | Optimal Sampling in a Noisy Genetic Algorithm for Risk-Based Remediation Design | National Science Foundation | Research Scientist, Space Science Institute |
| Patrick Reed (co-advisor Albert Valocchi) | 1999 | Cost Effective Long-Term Groundwater Monitoring Design Using a Genetic Algorithm and Global Mass Interpolation | US EPA STAR Fellowship | Professor, Cornell University (Effective Fall 2013) |
| J. Bryan Smalley | 1998 | Risk-Based In Situ Bioremediation Design Using a Noisy Genetic Algorithm | UIUC Research Board | Unknown |
| Jeremy Kosegi | 1998 | A Feasibility Study of Thermal In Situ Bioremediation of Dense Nonaqueous Phase Liquids | UIUC Research Board | Consultant |