MARK STEPHAN BARTLETT, PH.D., PE

Data Science and ML Practice Lead

COMPANY ROLE

Data Science and ML Practice Lead

PROJECT ROLE / FOCUS AREAS

Machine learning

Data science

Applied mathematics

Digital transformation

Statistics

Hydrology

Ecohydrology

EDUCATION

Ph.D., Civil and Environmental Engineering, Duke University

MS, Environmental Engineering, University of Southern California

BS, Civil Engineering, Brown University

PROFESSIONAL MEMBERSHIP

American Society of Civil Engineers

American Geophysical Union

Mark Bartlett, Ph.D., P.E., Data Science and Machine Learning Practice Lead, brings years of experience in data science and machine learning to The Water Institute and the Analytics, Computing, Technology (ACT) Team. Mark's work spans from developing a rapid flood forecasting tool that can be replicated across landscape types and locations to creating data models for agricultural purposes.

Mark's expertise ranges from hydrology and hydraulics to stormwater management, ecohydrology, and water quality by bringing new techniques to engineering practices. His experience includes work with the National Oceanic and Atmospheric Administration (NOAA) on the Geophysical Fluid Dynamics Laboratory (GFDL) climate model and work with the United States Department of Agriculture (USDA) as a fellow in the National Institute of Food and Agriculture.

Prior to joining The Water Institute, Mark was the lead data scientist and machine learning engineer at Stantec, after working for several years as a fellow at the National Institute of Food and Agriculture where his research included creating a model that consistently represented all three types of photosynthesis.

Mark received his bachelor's degree in civil engineering from Brown University, his master's in environmental engineering from the University of Southern California, and his Ph.D. in civil and environmental engineering from Duke University.

PROFESSIONAL EXPERIENCE

2022–Present: Data Science and ML Practice Lead, The Water Institute

2019–2022: Lead Data Scientist and ML Engineer, Stantec, New York, NY

2017–2019: National Institute of Food and Agriculture (NIFA) Fellow, USDA

2017–2019: Visiting Postdoctoral Associate, Dept. of Civil and Env. Eng., Princeton University

2016–2019: Postdoctoral Associate, Dept. of Civil and Environmental Engineering, Duke University

2011–2016: Research Assistant, Dept. of Civil and Environmental Engineering, Duke University

2008–2011: Professional Civil Engineer, Carollo Engineers, Los Angeles, C.A.

2005–2008: Engineer/ Scientist, Carollo Engineers, Los Angeles, CA

SELECTED PROJECTS

Lower Mississippi River SmartPort & Resilience Center. *U.S. Department of Commerce Economic Development Administration. (Ongoing).* Technical Lead. With grants from The U.S. Department of Commerce's Economic Development Agency, the State of Louisiana and other partners, The Water Institute of the Gulf is developing a Lower Mississippi River SmartPort & Resilience Center (SmartPort). Through the development of a decision support tool to forecast shoaling at port facilities along the Mississippi River, SmartPort will improve port operations and benefit a variety of stakeholders who need to understand how sediment builds up in the Mississippi River. This Real-Time Shoaling Forecast Tool will be coupled with a suite of weather, river, and road traffic analytics to improve efficiency and help the region's ports become more resilient in the face of future natural disasters and economic shocks.

Louisiana Watershed Initiative (LWI). *Louisiana Coastal Protection and Restoration Authority. (Ongoing).* The Water Institute is providing programmatic and technical support across a range of LWI activities, including the data and modeling program. The Water Institute, partnered with researchers from Louisiana State University, the University of Iowa, and the University of North Florida, leads the LWI project to develop the modeling methodology and guidance for these "flood transition zones" than ultimately will enable such analyses in areas beyond Louisiana.

SELECTED PUBLICATIONS

1. Bartlett, M. S., Van Blitterswyk, J., Farella, M., Li, J., Smith, C., & Mrad, A. (2022). Pi theorem formulation of flood mapping. arXiv preprint arXiv:2211.00636.
2. Hartzell, S., Bartlett, M. S., Inglese, P., Consoli, S., Yin, J., & Porporato, A. (2021). Modeling nonlinear dynamics of CAM productivity and water use for global predictions. Plant, Cell & Environment,44.1: 34-48.
3. Bartlett, M. S., and A. Porporato (2019). Jump processes with deterministic and stochastic controls: application to irrigation and crop failure risk. Physical Review E,98 (5), 052132.
4. K. Yu, P. D'Odorico, S. Collins, D. Carr, A. Porporato, L. Wang, W. Gilhooly, A. Bhattachan, S. Hartzell, M. S. Bartlett, J. Yin, W. Anderegg, Y. He, W. Li, M. Tatlhego, and J. Fuentes. (2018) Plants with crassulacean acid metabolism outcompete grasses under carbon dioxide enrichment and drought. Under Review in Ecosphere.
5. Bartlett, M. S. and A. Porporato (2018). State dependent jump processes: Ito-Stratonovich interpretations, transient, and potential solutions. Physical Review E,98 (5), 052132.
6. Parolari, S. Pelrine, and M. S. Bartlett (2018). Stochastic water balance dynamics of passive and controlled stormwater basins. Advances in Water Resources, 122, 328-339.
7. Bartlett M. S. and A. Porporato (2018). A class of exact solutions of the Boussinesq equation for horizontal and sloping aquifers. Water Resources Research, 54(2), 767-778.
8. Hartzell S., M. S. Bartlett, and A. Porporato (2018). Unified representation of the C3, C4, and CAM photosynthetic pathways with the Photo3 model. Ecological Modeling, 384, 173-187.
9. Hartzell S., Bartlett, M.S., and A. Porporato (2018). Similarities in the evolution of plants and cars. PloS one.13(6), p.e0198044.
10. Hartzell S., M. S. Bartlett, and A. Porporato (2017). The role of plant water storage and hydraulic strategies in relation to soil moisture availability. Plant and Soil.1-19.
11. Bartlett, M. S., A. Parolari, J. McDonnell, and A. Porporato (2017). Reply to comment by Fred L. Ogden et al. on ''Beyond the SCS-CN method: A theoretical framework for spatially lumped rainfall-runoff response''. Water Resources Research, 53(7), 6351-6354.
12. Bartlett, M. S., A. Parolari, J. McDonnell, and A. Porporato (2016). Framework for event-based semidistributed modeling that unifies the SCS-CN method, VIC, PDM, and TOPMODEL. Water Resources Research, 52(9), 7036-7052.
13. Bartlett, M. S., A. Parolari, J. McDonnell, and A. Porporato (2016). Beyond the SCS-CN method: Theoretical framework for spatially lumped rainfall-runoff response. Water Resources Research52(6), 4608-4627.
14. Bartlett, M. S., A. Parolari, E. Daly, J. McDonnell, and A. Porporato (2015). Stochastic rainfall-runoff model with explicit soil moisture dynamics. Proceedings of the Royal Society A.471(2183), p.20150389.
15. Hartzell S., Bartlett, M.S., L. Virgin, and A. Porporato (2015). Nonlinear dynamics of the CAM circadian rhythm in response to environmental forcing. Journal of Theoretical Biology.368, 83-94.