

Nathan Geldner, Ph.D.
 Applied Mathematician
 The Water Institute
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EDUCATION

Purdue University	West Lafayette, IN	Industrial Engineering	Ph.D., 2023
Harvey Mudd College	Claremont, CA	Mathematics	BS, 2016

RESEARCH INTERESTS

Statistical analysis, environmental risk modeling, compound flood modeling, decision support under uncertainty.

PROFESSIONAL EXPERIENCE

The Water Institute	Applied Mathematician	2023–Present
Purdue University	Research Assistant	2018–2023
Centers for Disease Control and Prevention, Tobacco and Volatiles Branch	ORISE Statistics Fellow	2016–2018
Harvey Mudd College NOAA Clinic Team	Project Manager	2015–2016
UCLA Applied Mathematics REU 2015	Undergraduate Researcher	2015

PROFESSIONAL SOCIETY MEMBERSHIPS

- Society for Risk Analysis Member, 2021–Present
- Decision Making under Deep Uncertainty (DMDU) Society, 2018–Present
- Proceedings of the National Academy of Sciences, Risk Analysis, Peer Reviewer, 2021–Present

AWARDS AND HONORS

- Frederick N. Andrews Fellowship, Purdue University, 2018–2022
- Lee A. Chaden Fellowship, Purdue University, 2018
- NSF Graduate Research Fellowships Program, Honorable Mention, 2020
- Student Competition Award Winner, 2021 State of the Coast Conference

NOTABLE PROJECTS

Ph.D. Thesis/Advances in Coastal Flood Risk Analysis 2018–2023

Purdue University

The first chapter extends the JPM-OS statistical model of surge- and wave-driven coastal flooding to account for rainfall and riverine dynamics via Monte Carlo sampling of rainfall and riverine drivers and k-means clustering of hydrologic and surge features. The second chapter attempts to optimize the net present value of adaptive and static, structural, and nonstructural protection measures in the Larose to Golden Meadow protection system in a multiobjective sense across many sea level rise trajectories in order to quantify the value of adaptivity in protection planning. The third chapter investigations the extent to which traditional benefit-cost analysis harms socioeconomically disadvantaged communities and the extent to which an alternative risk measure may mitigate those harms, ultimately proposing the use of hybrid metrics with favorable tradeoffs.

Research Scientist/Coastal Compound Flood Hazard Modeling 2021–Present

Louisiana Watershed Initiative

Methods development for probabilistic modeling of coastal compound flood hazard.

Research Assistant/Model Improvements for the 2023 Louisiana Coastal Master Plan 2019–2021

Coastal Protection and Restoration Authority

Assisted a multiagency team in making various improvements to the risk modeling component of the Coastal Master Plan, including updates to accommodate an expanded suite of synthetic storms, development of a building-level coastwide structure inventory, and changes to levee fragility modeling.

PUBLISHED WORKS

Peer-Reviewed Publications

Johnson, D., Geldner, N., Liu, J., Baldos, U., & Hertel, T. (2023). Reducing US biofuels requirements mitigates short term impacts of global population and income growth on agricultural environmental outcomes. *Energy Policy*, 175.

Johnson, D., Wang, J., Geldner, N., & Zehr, A. (2022). Rapid, risk-based levee design framework for greater risk reduction at lower cost than standards-based design. *Journal of Flood Risk Management*, 15(2).

Johnson, D., & Geldner, N. (2019). Contemporary decision methods for agricultural, environmental, and resource management and policy. *Annual Review of Resource Economics*, 11, 19–41.

Capella, K., Roland, K., Geldner, N., deCastro, B., De Jesus, V., Bemmell, D., & Blount, B. (2019). Ethylbenzene and styrene exposure in the United States based on urinary mandelic acid and phenylglyoxylic acid: NHANES 2005-2006 and 2011-2012. *Environmental Research*, 171, 101–110.

Espenship, M., Silva, L., Smith, M., Capella, K., Reese, C., Rasio, J., Woodford, A., Geldner, N., deCastro, B., de Jesús, V., Blount, B. (2019). Nitromethane exposure from tobacco smoke and diet in the US population: NHANES, 2007-2012. *Environmental Science and Technology*, 53 (4), 2134-2140

Pan, C., Li, B., Zhang, Y., Geldner, N., Wang, C., Wang, L., Bertozzi, A. (2018). Crime modeling with Lévy flights for residential burglary models. *Mathematical Models and Methods in Applied Sciences*, 28 (09). 1857-1880

Technical Reports

Bartlett, M., Misra, S., Roberts, H., Geldner, N., McMan, B., Saharia, A., Zou, S., Johnson, D., Villarini, G., Kim, H., Yuill, B., Wang, Y., Georgiou, I., Fischbach, J. *Compound Flood Transition Zone Pilot Study for the Amite River Basin*. The Water Institute.

Johnson, D., Fischbach, J., Geldner, N., Wilson, M., & Stelzner, C. (2021). *Coastal Louisiana Risk Assessment (CLARA) Model Summary report*. Coastal Protection and Restoration Authority.

Fischbach, J., Johnson, D., Wilson, M., Geldner, N., & Stelzner, C. (2021). *2023 Coastal Master Plan: Model Improvement Report, Risk Assessment*. Louisiana Coastal Protection and Restoration Authority.

Johnson, D., & Geldner, N. (2021). *2023 Coastal Master Plan: Model Improvement Report, Storm Selection for the Integrated Compartment Model*. Louisiana Coastal Protection and Restoration Authority.

Conference Proceedings and Presentations

Geldner, N., Johnson, D., Doss-Gollin, J., Keller, K. (2023) *Efficient Nonstructural Flood Risk Mitigation and Intersectional Equity Implications*. State of the Coast Conference.

Geldner, N., Johnson, D., Misra, S., Bartlett, M. (2023) *Coastal Compound Flooding for the Louisiana Watershed Initiative – The Extended Joint Probability Method with Optimal Sampling*. State of the Coast Conference.

Geldner, N., Johnson, D., Villarini, G., Yuill, B., Saharia, A., Grimley, L., Young, N., McManus, M., Roberts, H., Misra, S., (2023) *Applied Joint Probabilistic Modeling of Compound Coastal Flood Hazard: An Extension of the Joint Probability Method with Optimal Sampling*. 14th International Conference on Applications of Statistics and Probability in Civil Engineering.

Geldner, N., Johnson, D., Fischbach, J., Wilson, M., & Stelzner, C. (2021). *2023 Coastal Master Plan—Risk assessment: Social vulnerability and other metrics*. State of the Coast Conference.

Geldner, N., Wang, J., Zehr, A., & Johnson, D. (2021). *Multi-objective optimization of tradeoffs and synergies between structural and nonstructural coastal protection projects*. Society for Risk Analysis Annual Meeting.

Geldner, N., Johnson, D., Doss-Gollin, J., & Keller, K. (2021). *Characterization of the equity-efficiency tradeoff in targeted residential coastal protection projects*. Society for Risk Analysis Annual Meeting.