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

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| 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**

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| 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**

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| **Ph.D. Thesis/Advances in Coastal Flood Risk Analysis**  *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. | 2018–2023 |
| **Research Scientist/Coastal Compound Flood Hazard Modeling**  *Louisiana Watershed Initiative*  Methods development for probabilistic modeling of coastal compound flood hazard. | 2021–Present |
| **Research Assistant/Model Improvements for the 2023 Louisiana Coastal Master Plan**  *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. | 2019–2021 |

**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., Bemmel, 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 Lvy 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., McMann, 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.