Emma C. House

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EDUCATION

Ph.D. in River Coastal Science and Engineering, Tulane University, Expected May 2025

Dissertation: Streamflow Estimation and Forecasting in Hysteretic Riverine Systems using Numerical Modeling and Machine Learning Approaches (*advisor:* Dr. Ehab Meselhe)

Relevant Coursework: River Mechanics, Open Channel Flow, Estuarine Processes, Methods in River Sampling, Numerical Modeling, Machine Learning.

MS in Civil Engineering, University of Delaware, August 2022

(Concentration: Water Resources Engineering)

Thesis: A Data Science Investigation of the Relationship between Urbanization and Groundwater Quality across the Continental U.S. (*advisor:* Dr. Jing Gao)

Relevant Coursework: Advanced GIS, Remote Sensing of Environment, Computing for Environmental Research, Data Science, Hydrogeology, Spatial Statistics, Water Quality Modeling.

BS in Environmental Engineering, University of Delaware, May 2020

(Concentration: Water Resources & Water Quality) (Minor: Environmental Sustainability)

Relevant Coursework: Environmental Engineering, Water Resources Engineering, Environmental Hydrology, Urban Hydrology, Watershed Management, Computer Science, Sustainability.

PROFESSIONAL EXPERIENCES

RESEARCH

Graduate Research Assistant (Ph.D.) August 2022 – Present

Department of River Coastal Science and Engineering, Tulane University New Orleans, LA

- Develop and analyze multi-dimensional process-based models of rivers to examine the physics of streamflow hysteresis dynamics under varying conditions to better understand and parameterize the process.
- Forecast streamflow using Machine Learning coupled with numerical models without relying on rating curve methods to capture the hysteresis in the system.
- Recommend a river monitoring setup that can capture the unsteady flow dynamics during hysteresis and provide data for more accurate streamflow estimation and forecasting.

Graduate Research Assistant (MS) September 2020 – August 2022

Department of Civil and Environmental Engineering, University of Delaware Newark, DE

- Analyzed national groundwater quality data using R and GIS to determine urbanization effects on groundwater quality through anthropogenic pollution, seawater intrusion, or other sources.
- Utilized machine learning techniques to differentiate groundwater quality relationships in selected city areas and coastal vs. inland study regions.
- Developed a spatial model for predicting future groundwater quality trends to identify areas of highest concern.

Summer Institute Scholar June 2020 – August 2020

National Water Center Innovators Program, NWC & CUAHSI Virtual

- Developed a Delft-3D model of the Lake Maurepas basin and coastal eastern Louisiana to study the flooding impacts of storm surges and precipitation on the coastal and hydrologic zones.
- Advised the National Water Model on a transition zone boundary to implement a coupled model for enhanced performance based on the physical characteristics of the system.
- Participated in group activities and networking events, gave research updates to the group throughout the program, and presented findings in the capstone meeting.

Environmental Scholar Student Researcher September 2019 – May 2020

Delaware Environmental Institute (DENIN) Newark, DE

- Performed an extensive literature and database search to detail the extent of urbanization-groundwater research in the field and identify any gaps.

- Used GIS and R to study local urbanization and correlations with groundwater levels in U.S. counties.
- Proposed a new research plan to extend the study to more groundwater variables and a larger spatial area with additional data sources.

Environmental Engineer – Sustainability and Design February 2019 – May 2020
Office of Economic Innovation & Partnership (OEIP) Newark, DE

- Collaborated with an interdisciplinary team of students and University faculty to assess the potential for an offshore wind deployment port on the Delaware Bay.
- Developed preliminary designs for the port and mechanisms using GIS and AutoCAD tools, focusing on coastal hydrological and hydrogeological analyses and environmental impact assessment.
- Presented the findings and relevant data to developers, government stakeholders, and relevant parties.

INDUSTRY

Hydraulic Engineering Intern June 2019 – August 2019
Carbon Ingeniería S.A. San José, CR

- Performed hydrological analyses of watersheds throughout the country using principles of rainfall characteristics and programs: HEC-HMS, AutoCAD, Civil 3D, QGIS, and HEC-RAS in synergy.
- Aided in the hydraulic design of new bridges using the calculated river and tributary parameters to support developing communities experiencing fluctuating hydrological conditions.
- Characterized areas of danger in a regional creeping landslide combining hydrological, geological, historical, and seismic characteristics in a QGIS map, and developed an early warning system for the small community.

LEADERSHIP

K-12 Education Volunteer October 2022 – Present
Tulane Center for K-12 STEM Education New Orleans, LA

- Taught two week-long summer classes to high school students from around the country: climate change and coastal engineering, with many hands-on activities, lessons, and collaborative group research projects.
- Lead middle and high-school workshops for GiST/BATS and other visiting students demonstrating river and coastal processes and travel to engage in educational outreach events.

Graduate Student Department Representative August 2023 – Present
Graduate Studies Student Association New Orleans, LA

- Attend monthly GSSA meetings to engage with the graduate student body, keep our department informed, and secure available funding for events.
- Act as a liaison between GSSA and our department graduate students and faculty, surveying interests and planning events (budgeting, logistics, execution, and reimbursements).

Mentor October 2020 – July 2022
Clean Water Science Network Virtual

- Directly advised two Latin American undergraduate students in applying to graduate school and pursuing careers relating to water resources.
- Participated in webinars and discussions on global water research, engineering, and policy, led discussion sessions and English language practice groups.

Graduate Student Advisor September 2020 – May 2022
Engineers Without Borders, University of Delaware Newark, DE

- Developed a Water Resources Management Plan for the Zomba region in Malawi, planned the creation of groundwater wells for drinking water, and worked with on-site contractors for implementation.
- Participated in weekly meetings to advise students on developing international engineering projects.

Green the Green Chair September 2019 – May 2020
Students for the Environment, University of Delaware Newark, DE

- Led the "Green the Green" movement on campus: collaborating with grounds management to implement natural pesticide techniques and native species on campus green spaces to benefit human and environmental health.
- Conducted biweekly meetings to teach members how to exercise sustainable practices in their lives individually, on campus, and in the community, and organized zero-waste crafts and activities.

WORKS

An Exploratory Data Analysis of the Relationship Between Groundwater Quality and Urbanization, August 2022 [Text]
The National Water Model and Compound Flooding in Coastal Transition Zones, August 2021

White Clay Creek Sports Complex Preliminary Design, Senior Design Project, April 2020
Urbanization Effects on U.S. Groundwater Resources: Data Core Study, May 2020 [Text]
Feasibility Assessment for an Offshore Wind Marshalling Port in the Delaware Bay, June 2020 [Text] [Media]

PRESENTATIONS

Numerical Modeling of Streamflow Hysteresis: A Budget of the Momentum Terms, AGU, December 2023 [Poster]
Real-Time Estimation and Forecasting of Streamflow Response to Cyclical Processes, SOC, May 2023 [Poster]
A Data-Driven Approach to Urbanization Effects on U.S. Groundwater Quality, HydroML, May 2022
Urbanization Effects on U.S. Groundwater Resources: Data Core, May 2020 [Poster]
Green the Green at The University of Delaware, Delaware Environmental Summit, October 2019