HEMAL DEY

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EDUCATION

2021-2025	**Ph.D.**	Department of Geography and the Environment The University of Alabama, Tuscaloosa, AL, USA **Dissertation Title**: *Towards a More Comprehensive Flood Risk Assessment Using Machine Learning Models: Four Case Studies Along the U.S. Gulf Coast.* **Committee**: Wanyun Shao (Chair), Sagy Cohen, Lisa Davis, Hongxing Liu, Hamid Moradkhani.
2018	**M.Sc.**	Geography and Environment Jagannath University, Dhaka, Bangladesh
2017	**B.Sc.**	Geography and Environment Jagannath University, Dhaka, Bangladesh

PROFESIONAL EXPERIENCE

May 2025 to Present	**Postdoctoral Fellow,** Risk Decision Making Lab, Department of Geography and the Environment, The University of Alabama. *Research project*: To Serve the Underserved: Identifying and Reaching Vulnerable Communities in Experimental FIM Areas. *[Funded by NOAA under Cooperative Institute for Research to Operations in Hydrology (CIROH)]*
Aug 2021 to May 2025	**Graduate Research Assistant**, Risk Decision Making Lab, Department of Geography and the Environment, The University of Alabama. *Research project 1*: Exploring Decision-Makers' and Public Risk Perception and Information Seeking Behaviors Related to Water Quantity in the Southeastern U.S. *[Funded by NOAA under CIROH project #NA22NWS4320003)]* *Research project 2:* Integrating multi-scale observations, machine learning and systems modeling for coastal Monitoring, Assessment, and Prediction (Coast-MAP) in the context of multiple stresses. *[Funded by Department of Treasury Project #22-SFWS-248612-UAT]* **Graduate Teaching Assistant**, GY 552 and GY 101, Department of

	Geography and the Environment, University of Alabama
July 2020 to Nov 2020	**GIS Assistant**, Geo-Planning for Advanced Development (GPAD), Dhaka, Bangladesh.

TECHNICAL SKILLS

- Processing and Analysis of Satellite Data: *Google Earth Engine, ERDAS Imagine*
- Analysis of Geospatial Data: *ArcMap, ArcGIS Pro, QGIS, Drone2Map*
- Statistical Packages: *SPSS, Microsoft Office*
- Programming Languages: *Python, JavaScript, R*
- Image Editing: *Adobe Photoshop CS, Adobe Lightroom*
- Web Designing: *Google Sites, HTML*
- Survey design: *Qualtrics, Google Forms*

RESEARCH EXPERIENCE

Research Interest

Natural Disaster Social Vulnerability GIS & Remote Sensing GeoAI

➢ Research Proposal

- Agency: Cooperative Institute for Research to Operations in Hydrology (CIROH), NOAA.
  Title: Identifying At-risk Communities in Experimental FIM Areas Using a Hybrid Modeling Approach
  Role: Co-PI
  Status: White Paper Submitted

➢ Publications (peer reviewed papers in academic journals)

8. Haque, M.M, Shao, W., & **Dey, H.** (2025). Integrating stakeholder perspectives in flood risk assessment: A case study in Mobile Bay, Alabama. *Natural Hazards*, 1-23. https://doi.org/10.1007/s11069-025-07725-y
7. **Dey, H.,** Haque, M. M., Shao, W., VanDyke, M., & Hao, F. (2024). Simulating flood risk in Tampa Bay using a machine learning driven approach. *npj Natural Hazards*, 1(1), 1-16. https://doi.org/10.1038/s44304-024-00045-4
6. **Dey, H.,** Shao, W., Haque, M. M., & VanDyke, M. (2024). Enhancing Flood Risk Analysis in Harris County: Integrating Flood Susceptibility and Social Vulnerability Mapping. *Journal of Geovisualization and Spatial Analysis*, *8*(1), 19. https://doi.org/10.1007/s41651-024-00181-5
5. **Dey, H.,** Shao, W., Moradkhani, H., Keim, B. D., & Peter, B. G. (2024). Urban flood susceptibility mapping using frequency ratio and multiple decision tree-based machine learning models. *Natural Hazards*, 1-29. https://doi.org/10.1007/s11069-024-06609-x

4. **Dey, H**., Shao, W., Pan, S., & Tian, H. (2023). The Spatiotemporal Patterns of Community Vulnerability in the US Mobile Bay from 2000–2020. *Applied Spatial Analysis and Policy*, 1-22. https://doi.org/10.1007/s12061-023-09549-4
3. Tabassum, A., Basak, R., Shao, W., Haque, M. M., Chowdhury, T. A., & **Dey, H**. (2023). Exploring the relationship between land use land cover and land surface temperature: a case study in Bangladesh and the policy implications for the Global South. *Journal of Geovisualization and Spatial Analysis*, *7*(2), 25. https://doi.org/10.1007/s41651-023-00155-z
2. Quader, M. A., **Dey, H.**, Malak, M.A., & Rahman, Z. (2023). A geospatial assessment of flood hazard in north-eastern depressed basin, Bangladesh. *Singapore Journal of Tropical Geography*. https://doi.org/10.1111/sjtg.12476
1. Quader, M. A., **Dey, H**., Malak, M.A., & Sajib, A. M. (2021). Rohingya refugee flooding and changes of the physical and social landscape in Ukhiya, Bangladesh. *Environment, Development and Sustainability*, *23*(3), 4634-4658. https://doi.org/10.1007/s10668-020-00792-0

➢ Journal manuscripts under review/ in preparation for

1. **Dey, H.,** Shao, W. "A Tale of Two Coasts: Unveiling U.S. Gulf and Atlantic Coastal Cities at High Flood Risk." (Under review in *Science Advances*)
2. Wang, C., Shao, W., **Dey, H.,** Shao, Y. "Multiscale Health Vulnerability Index and Urban-rural Differences in the U.S. South: Development and Implications." (Under review in *Applied Geography*)
3. Begum, S., Putul, U.A., Malak, M.A., **Dey, H.,** Shao, W. "Evaluating LULC Transformation and Its Socioeconomic Effects on Payra Seaport Development: A SWOT Perspective." (Under review in *Journal of Disaster Science and Management*)
4. Quader, M.A., Sakib, M., Mahmood, R., Jakaria, Md., **Dey, H.,** Rezvi, R.B. "Advancing Flood Susceptibility Mapping in South-Eastern Bangladesh Using Machine Learning Models." (Under review in Science of the Total Environment)
5. **Dey, H.,** Shao, W., Koliba, C., Dhawale, R., Wallace, C. S., Haque. M. "A Comparative Analysis of Data-Driven and Stakeholder Input Methods For Social Vulnerability Assessment in Miami-Dade County." (Under preparation)
6. Khan, K.M., Wang, B., **Dey, H.** "Earth Observation and Deep Learning for High-Resolution Flood Susceptibility in Koshi Basin: A Hybrid Model Comparison" (Under preparation)

➢ Conference Presentations

- **Dey, H**., Shao, W. "Unveiling Coastal Cities at High Risk of Flooding Along the U.S. Gulf and Atlantic Coast: A Machine Learning Driven Approach". This paper will be presented at *AGU 2025 Annual Meeting. New Orleans, LA.* December 15-19, **2025**.

- **Dey, H**., Shao, W. "To Serve the Underserved: Identifying and Reaching Vulnerable Communities in Experimental FIM Areas". This poster has been presented at *CIROH Science Meeting 2025. Tuscaloosa, AL.* September 15-18, **2025**.
- **Dey, H**., Haque. M., Shao, W., VanDyke., M, Hao., F. "Simulating Flood Risk in Tampa Bay Using a Machine Learning Driven Approach". This paper has been presented at *AAG Annual Meeting 2025. Detroit, MI.* March 24-28, **2025**.
- **Dey, H**., Haque. M., Shao, W., VanDyke., M, Hao., F. "Simulating Flood Risk in Tampa Bay Using a Machine Learning Driven Approach". This poster has been presented at *AGU 2024 Annual Meeting*. Washington, D.C. December 09-13, **2024**.
- **Dey, H**., Shao, W. "Crowded in High Flood Risk Zones: Assessing Flood Risk in Tampa Bay Using A Machine Learning Driven Approach". The paper was presented at *ALWRC Meeting 2024*. Orange Beach. September 04-06, **2024**.
- **Dey, H**., Shao, W. "Toward a more comprehensive assessment of flood risk: Mapping flood susceptibility and social vulnerability" presented in Lightning Talks in *2023 CIROH Training and Developers Conference*, Salt Lake, UT. May 16-18, **2023**.
- **Dey, H**., Shao, W. "Toward a more comprehensive assessment of flood risk: Mapping flood susceptibility and social vulnerability" Paper was presented at *AAG Annual Meeting 2023*. Denver, CO. March 23-27, **2023**.
- **Dey, H**., Shao, W. Moradkhani, H., Keim, B.D., Peter, B.G. "Comparing Flood Susceptible Zones with Public Perceived Flood Risk Areas in the City of New Orleans" Paper was presented at the *AWRA 2022 Spring Conference*. Tuscaloosa, AL. April 25-27, **2022**.

TEACHING EXPERINECE

Course: GY 552 - Environment Decision Making (**Fall 2025**)

- ✓ delivered two guest lectures on *Flood risk modelling by incorporating hazard, exposure and vulnerability*.

September 30, 2025

Workshop: CIROH DevCon 25- To serve the underserved - Identifying the underserved communities in FIM areas.

- ✓ Lead a hands-on practice session on *assessing social vulnerability for flood hazards*.

May 29, 2025

Course: GY 552 - Environment Decision Making (**Fall 2024**)

- ✓ Delivered a guest lecture on *How to measure flood susceptibility, social vulnerability, and flood risk*.

September 17, 2024

Course: Lab GY 101- Atmospheric Process & Pattern (**Fall 2023**)

- ✓ Served a Lab Instructor

August 2023 to December 2023

HONORS/AWARDS/FELLOWSHIP

- *Research Award/Fellowship*

2024 **Outstanding Graduate Research Award** (Ph.D. category) from the Dept. of Geography and the Environment, The University of Alabama **($200)**.
2024 **Dr. Bobby Wilson Award** from the Dept. of Geography and the Environment, The University of Alabama (**$250**).
2022 American Water Resources Association (**AWRA**) 2022 Spring Conference Paper Competition Award (**Second place**).
2021 **Graduate Council Fellowship** Award (2021-2022) from Graduate School at The University of Alabama **($52,326)**.
2021 **National Science and Technology Fellowship** Award (2020-2021) for MSc. thesis, Ministry of Science and Technology, Bangladesh **($700).**

- *Other Awards*

- Travel Grant Fellowship for CIROH DevCon 2025 conference from CIROH at the University of Alabama ($1700)
- Travel Grant Fellowship for AAG 2025 from CIROH at the University of Alabama ($2000)
- Travel Grant Fellowship for AGU 2024 from CIROH at the University of Alabama ($2000)
- Travel Grant Fellowship from the University of Alabama ($1200)
- CIROH Training and Developers Conference Travel Scholarship ($1500).
- Travel Grant Fellowship from the University of Alabama ($1000).
- Second place Award on "Photography contest" in the BAPA BEN 4th International Conference on Bangladesh Environment (ICBEN), December 2020.
- The Duke of Edinburgh's International Award, Bangladesh (Bronze Standard). September 2018.
- First place Award on "World Environment Day-2017 Photography Competition "organized by Geography and Environment department, Jagannath University, Bangladesh. June 2017.

MEMBERSHIPS

- American Geophysical Union (AGU). https://www.agu.org/annual-meeting
- Alabama Water Institute (AWI). http://ovpred.ua.edu/alabama-water-institute/
- American Association of Geographers (AAG). https://www.aag.org/

SCIENTIFIC REVIEWER

- Natural Hazard (Springer)
- Earth's Future (AGU)
- Environmental Monitoring and Assessment (Springer)

- Geo-spatial Information Science (Taylor & Francis)
- Earth Science Informatics (Springer)
- Scientific Reports
- Journal of Hydrology (Elsevier)
- npj Natural Hazard

REFERENCES

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