Lokendra Singh Rathore

Postdoctoral Researcher
Department of Environmental Sciences
Emory University, Atlanta

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PhD in Environmental Engineering, specializing in hydrology, food and water security, climate impact assessment, and sustainable food production.

Education

PhD, Civil and Environmental Engineering *July 2024*
University of Alabama, AL
• *Dissertation*: Climatic and anthropogenic influences on food and water security

BTech & MTech, Agricultural Engineering *July 2018*
Indian Institute of Technology Kharagpur, India
• *Master's research*: Optimal crop planning and water resources allocation in a canal command area

Research Experience

Postdoctoral Research Fellow, Emory University *August 2024 - Present*

• Developing a stakeholder-informed, community-engaged, geospatial data-driven, machine-learning-based modeling framework to project probable and desirable future cropping systems.
• Engaged farmers to integrate on-the-ground knowledge into data-driven predictive modeling.
• Performed scenario analyses to explore how changes in agricultural practices (e.g., irrigation, fertilizer, crop insurance) and federal policies influence regional cropping patterns.
• Coordinating and managing the project website in collaboration with Emory Center for Digital Scholarship (ECDS) to support research communication and stakeholder engagement.

Graduate Research Assistant, University of Alabama *January 2020 – July 2024*

• Investigated the effects of irrigation expansion on freshwater scarcity in urban areas across the US.
• Performed economic analysis of corn profitability and its influence on acreage decisions across the Southeastern and Midwestern US.
• Assessed long-term trends in drought-induced crop yield loss risk across the US using copula-based probabilistic model and spatio-temporal climate information.
• Improved the representation of reservoirs in the hydrologic modeling framework using machine learning.
• Evaluated the sustainability of virtual water flow among US counties due to grain trade.

Junior Research Fellow, National Institute of Hydrology *October 2018 – November 2019*

• Modeled water fluxes and storage in Himalayan basins using the VIC hydrological model.
• Evaluated impacts of climate variability on river discharge and water resource dynamics.

Publications

Papers published, accepted, or under review

• **LS Rathore**, M Kumar, H Moftakhari, P Ganguli (2024): Divergent changes in crop yield loss risk due to droughts over time in the US, *Environmental Research Letters*
• **LS Rathore**, M Kumar, RT McNider, N Magliocca, Ellenburg W (2024): Contrasting Corn Acreage Trends in the Midwest and Southeast: The Role of Yield, Climate, Economics, and Irrigation, *Journal of Agriculture and Food Research, 2024*
• **LS Rathore**, M Kumar, N Hanasaki, MM Mekonnen, Raghav P (2024): Water scarcity challenges across urban regions with expanding irrigation, *Environmental Research Letters, 2024*
• Pathak, R., Magliocca, N. R., Kumar, M., **Rathore, LS**, & Moradkhani, H. (2024). Does the Future Look Irrigated? Evaluating the Likelihood of Irrigation Adoption Within Alabama. *Southeastern Geographer.*
• Demeke B, **LS Rathore**, Mekonnen MM, Liu W (2024): Temporal Dynamics of the Water Footprint and Virtual Water Trade of Cotton, *Cleaner Production Letters, 7, 100074.*
• Malakar, P., Anshuman, A., Kumar, M., Boumis, G., Clement, T. P., Tashie, A., Thakur, H., Bhat, N., and **Rathore, LS** (2025)**:** A novel benchmark dataset of daily groundwater recharge: An in situ daily dataset for benchmarking temporal variability of groundwater recharge, *Earth Syst. Sci. Data*, 171515–1528
• **LS Rathore**, D Aziz, BW Demeke, MM Mekonnen (2023): Sustainability assessment of virtual water flows through cereal and milled grain trade among US counties, *Environmental Research: Infrastructure and Sustainability, 2023*
• **LS Rathore**, EB Burchfield: Quantifying influence of irrigation on crop likelihood in the central and eastern US [*Under review, Environmental Research Letters*]
• EB Burchfield, A Rissing, D Jackson-Smith, A Basche, K Desai, B McWherter, **LS Rathore**, K Kumar: Creating desirable agri-food futures through grounded predictive modeling [*Under review, Royal Society Open Science*]

Manuscripts in preparation

• **LS Rathore**, M Kumar: Improving water scarcity estimates through enhanced reservoir representation in hydrologic models [*Draft ready. In internal review*]
• **LS Rathore**, EB Burchfield: Key Drivers of Cultivation Geographies in the Central and Eastern United States [*In preparation*]

Conferences and Workshops

• **LS Rathore,** EB Burchfield: Quantifying Irrigation Contribution on Cultivation Patterns in the Central and Eastern US, *AGU 2025*
• Conducted a Session on “Integrative Future-Oriented Approaches for Transformative Change in Agricultural and Bioeconomy Systems”, BIOECO2, *University of Reims Champagne-Ardenne, 2025*
• **LS Rathore,** EB Burchfield: Quantifying Irrigation Influence on Cultivation Patterns using Explainable AI, *Conference on Applied Statistics in Agriculture and Natural Resources, 2025*
• **LS Rathore,** M Kumar: Temporal Changes in Crop Vulnerability to Drought in Key Agricultural Regions of the United States, *AGU 2023*
• **LS Rathore**, M Kumar, N Hanasaki, MM Mekonnen: Rain-fed to Irrigation-fed Transition of Cropped Agriculture may Enhance Urban-Rural Water Conflict, *AGU 2022*
• **LS Rathore,** M Kumar: Role of Climate Variability on Total Corn Production, *AGU 2022*

Skills and Expertise

• **Python**: Data analysis (*pandas, numpy, matplotlib, seaborn*), geospatial analysis (*geopandas, arcpy, shapely*), machine learning (*scikit-learn, keras*), statistical analysis (*scipy, statsmodels*)
• **Process-Based Models**: H08, CWatM, Variable Infiltration Capacity (VIC), DSSAT (crop model)
• **ArcGIS** • **R** • **MATLAB**

Academic Teaching Contributions

Guest lectures

• Water – Key to Food Security; *ENVS 224: Economy and the Environment*, Emory University
• Data Analysis in Environmental Studies; *ENVS 270: Environmental Data Science*, Emory University
• Food Security- A Global Challenge; *ENVS 323: Sustainable Food Systems*, Emory University
• Hydrological Modeling using VIC and Climate Change Impact Assessment: NIH Roorkee

Awards and Achievements

• Winner of WaPOR Hackathon, organized by IHE Delft (2023)
• Winner of the Tweet-your-research competition, organized by AGU Water and Society (2022)
• Secured an All India Rank of 78 in Graduate Aptitude Test in Engineering (GATE) held in 2017
• Secured an All India Rank of 5936 in IIT JEE with a percentile score of 97.72% (2013)

Scholarly and Professional Activities

Academic training/workshops

• Conducted "International workshop on: Towards research that transforms: Anticipating and shaping agricultural Futures", *University of Reims Champagne-Ardenne, 2025*
• Conducted 3-day training on "Hydrologic modelling using Variable Infiltration Capacity (VIC) model", National Institute of Hydrology, Roorkee, 2019

Journal reviewer

• Environmental Research Letters
• Water Resources Research