

# Shekhar Sharan Goyal

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## Professional Summary

I am an interdisciplinary researcher specializing in agricultural nutrient management, ecohydrology, and trade network analysis. My work addresses environmental impacts within the water-food-environment nexus, driving policies for sustainable agricultural development.

## Education

- Ph.D. Earth Sciences (Jan 2020 – Nov 2024, submitted)

Indian Institute of Technology Gandhinagar (IITGN), India

Advisor: Prof. Udit Bhatia

Dissertation: Quantifying Nutrient Pollution in Agricultural Systems, Restructuring Strategies for Management, and Assessing Implications on Trade Networks

- M.Sc. Geology (Hons) (July 2016 – June 2018)

Indian Institute of Technology Kharagpur (IIT KGP), India

Advisor: Prof. Abhijit Mukherjee

Thesis: Groundwater Evolution of Central Gangetic Aquifer System in the Vicinity of Varanasi

- B.Sc. Geology (Hons) (Aug 2013 – June 2016)

Banaras Hindu University (BHU), Varanasi, India

## Grants, Awards, and Honors

- IITGN Overseas Research Fellowship (2023)
- GATE Scholarship, Ministry of Human Resource, Govt. of India (2020)
- JAM Scholarship, Ministry of Human Resource, Govt. of India (2016)

## Research Experience

- Research Scientist (Jan 2024 – Present)  
Helmholtz Centre for Environmental Research (UFZ), Leipzig, Germany
  - Part of FluSeeQ project, focusing on stream-temperature modeling for Germany.
  - Conduct research on sustainable agricultural systems, focusing on nutrient management and trade networks.
  - Develop models to analyze the impacts of agricultural policies on ecohydrology and nutrient pollution.
- Visiting Researcher (Aug – Dec 2023)  
Helmholtz Centre for Environmental Research (UFZ), Leipzig, Germany  
Advisor: Dr. Rohini Kumar
  - Developed district-level nitrogen surplus datasets for India.
  - Analyzed nutrient pollution impacts, aiding sustainable agricultural policy formulation.
- Summer Research Intern (2017)  
Wadia Institute of Himalayan Geology, Dehradun, India
  - Analyzed tectonic activity and fault scarps in the lower Himalayan region.

## Publications

- Published:
  - Goyal, S.S., Dave, R., Kumar, R., Bhatia, U. (2024). Indian interstate trade exacerbates nutrient pollution in food production hubs. *Communications Earth & Environment*, 5(1), 9. (Nature portfolio.)
  - Goyal, S.S., Kumar, R. and Bhatia, U., 2024. Assessing temporal dynamics of nitrogen surplus in Indian agriculture: district scale data from 1966 to 2017. *Scientific Data*, 11(1), p.1191. (Nature portfolio.)
- Under Review:
  - Goyal, S.S., Kumar, R., Bhatia, U. Nutrient-Centric Restructuring Yields Greater Cross-benefits in Indian Agriculture. (Nature Communication)

## Conference Presentations

- (I) Goyal et al., 2024. Agricultural Pollution in Indian Interstate Trade Network, EGU24.
- (I) Bhatia, Goyal, Kumar, 2023. Restructuring the Indian Agricultural System towards Sustainability, EGU.
- (P) Goyal, Bhatia, 2023. Trade-driven Greenhouse Gas Emissions in India, EGU.

- (P) Goyal, Bhatia, 2021. Urbanization Impact on Urban River Water Quality, AGU.

## Teaching Experience

- Lab Teaching Assistant, IITGN:
  - Earth Surface Processes in the Anthropocene (2024)
  - River Morphology and Ecology (2023)
  - Modeling Earth System and Sustainability (2022)
  - Biodiversity Conservation and Sustainable Development (2020)

## Field Experience

- River Water Quality Sampling, Surat City (2022)
- Groundwater Quality Survey, Varanasi City (2017)

## Leadership & Professional Activities

- Organizer, Workshop on "Resilience of Power and Allied Lifeline Infrastructure Systems," IITGN (2022)
- Organizer, Workshop on "From Lab to Land: Technology Transfer for Farmers," IITGN (2024)
- Executive Member, Prithvi, IIT Kharagpur (2017)

## Skills

- Programming: Python, R, MATLAB, C, C++, LaTeX
- Climate Data Handling: NCL, CDO, NCO
- Software: ArcGIS, QGIS, SWAT, MIKE ECOLAB, QUAL2E, HEC-RAS
- Instrumentation: EPMA, Ion Chromatograph, ICP-OES, pH Meter
- Languages: Fluent in English and Hindi

## Research Interests

My research focuses on sustainable global agricultural trade networks, assessing climate variability impacts on nutrient pollution, and developing resilient agricultural systems through interdisciplinary collaboration and policy-driven solutions.