

P. KEDARNATH REDDY

PhD Research Scholar | Department of Hydrology, IIT Roorkee

Prime Minister Research Fellow (PMRF)

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RESEARCH PROFILE

PMRF-supported doctoral researcher specializing in groundwater-surface water interactions and hyporheic exchange in Himalayan headwater streams. Research integrates heat and solute tracers, high-resolution streambed temperature monitoring, field experimentation, hydrological data analysis, and development of low-cost environmental instrumentation to quantify exchange processes in data-scarce mountain environments.

RESEARCH FOCUS

GW-SW Interactions	Hyporheic Exchange	Tracer Hydrology	Heat as a Tracer
Transient Storage	Mountain Hydrology	Temperature Profiling	Low-Cost Sensing

EDUCATION

PRESENT PhD, Hydrology Indian Institute of Technology Roorkee CGPA 8.50	2020 M.Tech, Hydrology Indian Institute of Technology Roorkee CGPA 8.30	2015 B.Tech, Civil Engineering Yogananda Institute of Technology and Sciences (JNTU-Anantapur) 74.4%
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DOCTORAL RESEARCH & INSTRUMENTATION

TemPro | Designed - Fabricated - Field-deployed - Validated

Low-cost, multi-depth temperature profiling probe for groundwater-surface water interaction monitoring.

- Conduct field investigations in a Western Himalayan headwater stream using streambed temperature, salt-tracer breakthrough curves, discharge measurements and geomorphic observations to evaluate hyporheic exchange and transient storage.
- Apply temperature-based flux estimation and environmental time-series analysis to infer vertical exchange across the sediment-water interface, including amplitude/phase approaches implemented through VFLUX workflows.
- Present a nature-based restoration strategy/measure (geomorphic feature) to improve water quality through hyporheic exchange (an inherent riverine process).
- Experience in sensor calibration and validation, uncertainty assessment, field troubleshooting, piezometer-based measurements, vertical hydraulic gradients and water-sampling-oriented probe design.

SELECTED PUBLICATION & CONFERENCE CONTRIBUTIONS

PEER-REVIEWED PUBLICATION Reddy, P. K., et al. (2026). A cost-effective probe for monitoring groundwater-surface water interactions. Water Resources Research. https://doi.org/10.1029/2025WR041873
AGU 2024 Reddy, P. K. and Sen, S. Cost-Effective Temperature Probe for Hyporheic Flux Rates Quantification. <i>AGU Fall Meeting 2024</i> , Washington, D.C., USA, H06-119.
EGU 2024 Reddy, P. K. and Sen, S. Understanding Hyporheic Exchange Flows around a Meandering Section of Pristine Himalayan Headwaters. <i>EGU General Assembly 2024</i> , Vienna, Austria, EGU24-1154.
EGU 2023 Reddy, P. K., Bhattarai, N., and Sen, S. Understanding Evapotranspiration Variability between the Eastern and Western Himalayas. <i>EGU General Assembly 2023</i> , Vienna, Austria, EGU23-10850.

AWARDS, FELLOWSHIPS & ACADEMIC ACHIEVEMENTS

PMRF Prime Minister Research Fellowship National doctoral fellowship	MHRD GATE-M.Tech Scholarship Postgraduate scholarship	GATE Qualified GATE 2018 Civil Engineering
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TECHNICAL & RESEARCH SKILLS

FIELD HYDROLOGY Salt-tracer experiments; breakthrough-curve monitoring; discharge measurement; streambed temperature profiling; piezometer installation; vertical hydraulic gradient (VHG) measurements; water sampling; mountain-stream field deployment.	HYDROLOGICAL ANALYSIS Groundwater-surface water exchange; hyporheic flux estimation; transient storage; heat-as-a-tracer analysis; solute transport analysis; environmental time-series analysis.
INSTRUMENTATION Low-cost and modular environmental monitoring system design; integration of commercial off-the-shelf electronic modules (ESP32/NodeMCU, DS3231 RTC, microSD data logging, and power management); sensor packaging and waterproofing; Sensor calibration and validation; field deployment, validation, and troubleshooting.	PROGRAMMING & MODELLING Python; R; Arduino IDE; One-dimensional solute transport modelling (OTIS/OTIS-P); ArcGIS/QGIS; breakthrough-curve analysis;
Additional Engineering Software: AutoCAD; STAAD.Pro	

PROFESSIONAL EXPERIENCE

2015-2018 2021-2022	Assistant Civil Engineer VRK Associates, Bangalore Worked on civil-engineering assignments before returning to full-time academic research in hydrology.
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EARLIER RESEARCH PROJECTS

M.TECH DISSERTATION Evapotranspiration in the Himalayas Department of Hydrology, IIT Roorkee Compared evapotranspiration characteristics across the eastern and western Himalayas and evaluated methods suited to contrasting hydro-climatic conditions.	B.TECH PROJECT 100% Cement Replacement with Geopolymer Binder Yogananda Institute of Technology and Sciences Investigated geopolymer binder using alkaline activation (KOH + Na ₂ SiO ₃) as an alternative to conventional cement binder.
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LANGUAGES & ACADEMIC PRESENCE

LANGUAGES English - read, write, speak Hindi - read, write, speak Telugu - read, speak	ACADEMIC WEBSITE www.kedarnathsacademicinsights.com https://www.linkedin.com/in/p-kedarnath-reddy-663330260/
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