CURRICULUM VITAE

SUBASH POUDEL

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RESEARCH SUMMARY

Graduate researcher in civil and environmental engineering working on geohazard prediction with machine learning and geospatial analysis. Current work: post-wildfire debris flow prediction and volume estimation (WILDFLOW), and rockfall hazard monitoring for Montana transportation corridors (MDT). Earlier work: pixel- and shoreline-scale multi-hazard risk indices (MHRI) for U.S. coastal regions. ORISE Research Fellow at ERDC (USACE). Presented at AGU, EGU, GSA, ASCE EWRI, and ASBPA.

EDUCATION

PhD, Civil Engineering, Montana State University (MSU), Bozeman, MT, USAFall 2026 – present
Expected graduation: Spring 2030 | Advisor: Dr. Mohammad Khosravi

MS, Civil Engineering, Jackson State University (JSU), Jackson, MS, USA (Fall 2024 – Summer 2026)
GPA: 4.00 | Advisor: Dr. Rocky Talchabhadel
Thesis: Coastal Multi-Hazard Risk Assessment and Post-Wildfire Debris Flow Prediction (ProQuest Publication No. 32788396)

Bachelor's, Civil Engineering, Tribhuvan University, Nepal (2018-2022)
Score: 76.67% | Final-year thesis: Seismic Vulnerability Evaluation and Retrofitting of Existing RCC Structures

RESEARCH AND PROFESSIONAL EXPERIENCE

Graduate Research Assistant, Montana State University, Bozeman, MT (Fall 2026 – present)
Advisor: Dr. Mohammad Khosravi | Montana Department of Transportation (MDT) Modernizing Rockfall Assessment project

ORISE Research Fellow, ERDC-CHL, USACE, Vicksburg, MS (Oct 2025 – Jul 2026)
U.S. Department of Defense Research Participation Program | Mentor: Dr. Nawa Raj Pradhan

Summer Intern, ERDC-CHL, Vicksburg, MS(May – Jul 2025)

Graduate Research Assistant, Jackson State University, Jackson, MS (Aug 2024 – Sep 2025)
Advisor: Dr. Rocky Talchabhadel | HICORPS project with ERDC and Woolpert | Also Teaching Assistant, CIVL 330 Fluid Mechanics Lab

Civil Engineer, Civil Aviation Authority of Nepal (CAAN) (Feb – May 2023)

Geotechnical Engineer, Quartz Group Pvt. Ltd., Nepal (Jun – Oct 2022)
Conducted SPT, DCPT, and ERT soil investigations in mountainous terrain, laboratory analyses, and interpretive reports for infrastructure projects

RESEARCH PROJECTS

Post-Wildfire Debris Flow Volume Estimation (WILDFLOW)ERDC-CHL | JSU | MSU | Ongoing

1. Developing an ensemble machine learning framework (Random Forest, XGBoost, Logistic Regression) integrating 60+ geomorphological, hydrological, fire-related, and geological/soil parameters to predict post-wildfire debris flows.

2. Compiled data for 295+ California wildfires (2017–2024) at sub-basin scale (24,000+ sub-basins) from USGS Wildcat outputs, with temporal decay functions to model hazard evolution after a fire.
3. Outputs: P-LRT (Springer) paper, GSA Connects 2025 poster, AGU26 abstract (session EP003).

Web Dashboard for Post-Wildfire Debris Flow Risk AssessmentERDC-CHL | 2025 – 2026

4. Trained a 37-feature Random Forest classifier (terrain, burn severity, ERA5-Land soil moisture and rainfall, NOAA Atlas 14, SoilGrids) on the Dolan Fire (2020): AUC-ROC 0.983, 95% recall at an 8.4% false-alarm rate, benchmarked against the USGS Staley M1 baseline; independent transfer test on the CZU Lightning Complex Fire (2020).
5. Built an automated pipeline (Google Earth Engine, WhiteboxTools) and a Flutter/FastAPI web dashboard that delivers sub-basin debris flow probability maps to users without GIS expertise. Live dashboard.

Modernizing Rockfall Assessment (MDT)MSU | Fall 2026 – present

6. Contribute to Dr. Khosravi's Montana Department of Transportation (MDT) project on rockfall hazard monitoring for Montana transportation corridors, including the Highway 2 corridor.
7. Work covers LiDAR- and drone-based slope monitoring and ML-based geohazard prediction; currently preparing the MDT Task 1 report.

Shoreline-Scale Multi-Hazard Risk Index with Sea Level Rise, U.S. Pacific CoastJSU | ERDC | 2026

8. Extended the MHRI framework from county scale to 3,357 shoreline segments (about 7,066 km) in WA, OR, and CA using NOAA CUSP shorelines and 44 parameters; substituted NOAA 2022 sea level rise scenarios (26 tide gauges, 45 scenario–horizon combinations for 2030/2050/2100) into the hazard term.
9. Found segment MHRI values of about 30–71, with the northern Washington coast as the main hotspot; scenario differences emerge mainly by 2100.

High-Resolution Pixel-Level MHRI, U.S. West CoastJSU | ERDC | 2025

10. Built a pixel-level MHRI raster for 60 coastal counties in WA, OR, and CA from 41 hazard, exposure, susceptibility, and adaptive capacity parameters, revealing intra-county variation hidden by county- or tract-level aggregation used in federal assessments such as FEMA's.

Multi-Hazard Risk of U.S. Coastal Cities and CZMA AreasJSU | 2024 – 2025

11. Ranked 20 major U.S. coastal cities across the Pacific, Gulf, and Atlantic coasts using 42 indicators (published in IJDRR, 2026); extended the framework to Coastal Zone Management Act areas with future climate and socio-economic scenarios (EGU25).
12. Developed the Coastal City Flood Vulnerability Index (CCFVI), scoring flood vulnerability from 0 to 1 across exposure, susceptibility, and resilience components (JSU Research Engagement Week 2024).

Machine Learning-Enhanced Shoreline Extraction, Gulf CoastJSU | ERDC | 2025

13. Built an automated Google Earth Engine pipeline (MNDWI, Otsu thresholding, morphological cleaning, angle-based filtering, Landsat and Sentinel-2) extracting a 10-year shoreline series (2015–2024) across five Gulf Coast zones; 95.3% pixel accuracy against NLCD, 8.2 m RMSE, and over 95% of inland water features removed.

Discharge Prediction at HUC2 Outlets, Mississippi River BasinML course | Dec 2024

14. Trained an LSTM model to predict discharge at HUC2 outlets. Code on GitHub.

PUBLICATIONS

1. **Poudel, S.**, Bista, S., Bhattarai, S., Talchabhadel, R. (2026). Understanding multi-hazard risk for U.S. coastal cities. *International Journal of Disaster Risk Reduction*. doi.org/10.1016/j.ijdrr.2026.106023

2. **Poudel, S.**, Pradhan, N.R., Bhattarai, S., Talchabhadel, R. Satellite-Driven Machine Learning Pipeline for Post-Wildfire Debris Flow Prediction. *Progress in Landslide Research and Technology* (Springer), Vol. 6, Issue 1 (2027); 7th World Landslide Forum.
3. Talchabhadel, R., Panthi, J., Pandey, V.P., Rakhal, B., Ghimire, G.R., Bista, S., Bhattarai, S., **Poudel, S.**, Bhattarai, Y., Prajapati, R., Thapa, B.R., Nepal, B., Sharma, S. (2025). Yesterday's extremes, today's new normal: flood risk in the Kathmandu Valley, Nepal. *Natural Hazards*. doi.org/10.1007/s11069-025-07524-5

CONFERENCE PRESENTATIONS

1. **Poudel, S.**, et al. Post-wildfire debris flow volume prediction framework (WILDFLOW). *AGU Fall Meeting 2026*, San Francisco, CA, December 2026 [abstract #2076070, session EP003; upcoming].
2. **Poudel, S.**, Pradhan, N.R., Talchabhadel, R. Translating Sea Level Rise Projections into Shoreline-Scale Multi-Hazard Risk Assessment for U.S. Coastal Regions. *AGU Chapman Conference on Sea Level*, Montreal, Canada, June 8–11, 2026 [poster; travel grant].
3. **Poudel, S.**, Pradhan, N.R., Talchabhadel, R. Interactive Web Dashboard for Post-Wildfire Debris Flow Risk Assessment through a validated ML model. *EGU General Assembly 2026*, Vienna, Austria, May 3–8, 2026 [poster EGU26-735; OSPP contest].
4. **Poudel, S.**, Pradhan, N.R., Talchabhadel, R. Web-Based Dashboard for Post-Wildfire Debris Flow Prediction. *RD26*, ERDC, Vicksburg, MS, 2026 [poster].
5. **Poudel, S.**, Pradhan, N.R., Talchabhadel, R. Paving the way for a Machine Learning-Enhanced Shoreline Extraction through Satellite Imagery for Gulf Coastline Monitoring. *AGU25*, New Orleans, LA, December 15–19, 2025 [poster].
6. Bista, S., **Poudel, S.**, Talchabhadel, R. Rapid flood mapping using low complexity terrain-based techniques. *AGU25*, New Orleans, LA, December 16, 2025 [online poster].
7. **Poudel, S.**, Pradhan, N.R., Talchabhadel, R. Machine Learning Framework for Enhanced Post-Wildfire Debris Flow Prediction Across Recent California Fire Events: Integrating Temporal Dynamics and Advanced Geomorphological Parameters. *GSA Connects 2025*, San Antonio, TX, October 19–22, 2025 [poster; travel grant].
8. **Poudel, S.**, Pradhan, N.R., Talchabhadel, R. High-Resolution Multi-Hazard Risk Index Mapping for West Coast Communities: Bridging Science, Policy, and Local Resilience. *ASBPA National Coastal Conference 2025*, Long Beach, CA, October 7–10, 2025 [poster].
9. Talchabhadel, R., Bhattarai, S., **Poudel, S.**, Bista, S., Kafoury, R. Projecting Extreme Temperatures and Precipitation for the Gulf Coast Region of the United States. *EWRI World Environmental & Water Resources Congress 2025*, Anchorage, AK, May 18–21, 2025 [oral].
10. **Poudel, S.**, Bista, S., Talchabhadel, R. Mapping Multi-hazards in Coastal Cities Using Geospatial Techniques. *EWRI World Environmental & Water Resources Congress 2025*, Anchorage, AK, May 18–21, 2025 [oral].
11. **Poudel, S.**, Bista, S., Talchabhadel, R. Multi-Hazard Risk Assessment in CZMA Areas: A Geospatial Framework Integrating Future Climate Projections. *EGU General Assembly 2025*, April 27 – May 2, 2025 [virtual poster]. doi.org/10.5194/egusphere-egu25-14644
12. Talchabhadel, R., Bernard, D., Johnson, K., Bhattarai, S., Bista, S., **Poudel, S.**, Kafoury, R. Evaluation of Climate Change Projections Using Open-Source Software Infrastructure across the Gulf Coast of the United States. *AGU Fall Meeting 2024*, Washington, DC, December 9–13, 2024 [poster].

13. **Poudel, S.**, Bista, S., Talchabhadel, R. Flood Vulnerability Index of US Coastal Cities and Its use in assessing climate change impacts. *Research Engagement Week*, Jackson State University, October 2024 [poster].

AWARDS AND HONORS

15. 3rd place, JSU Research Symposium 2026, oral presentation competition.
16. Travel grants: AGU Chapman Conference on Sea Level, Montreal (June 2026); GSA Connects 2025, San Antonio (October 2025).
17. Participant, EGU 2026 Outstanding Student and PhD Candidate Presentation (OSPP) contest.
18. ORISE Fellow, U.S. Department of Defense Research Participation Program at ERDC, USACE (2025–2026).
19. Graduate Research Assistantship under Dr. Rocky Talchabhadel, funded by the Hydrological Impacts Computing, Outreach, and Resiliency Partnership (HICORPS) with ERDC and Woolpert.
20. Mahatma Gandhi Scholarship Scheme, Embassy of India, for study at Valmiki College (2016).
21. 2nd topper of Chitwan District, SLC examination, SLC Board (2015).

TECHNICAL SKILLS

Machine learning: Random Forest, XGBoost, Logistic Regression, LSTM
Programming: Python, MATLAB, Dart, C
Geospatial and remote sensing: ArcGIS Pro, QGIS, Google Earth Engine (Python), WhiteboxTools, USGS Wildcat
Web and apps: Flutter, FastAPI, Firebase
Field and design: Electrical Resistivity Tomography (ERT), SPT, DCPT, surveying instruments, AutoCAD, Civil 3D
Other: Microsoft Office, MS Project

PROFESSIONAL SERVICE AND MEMBERSHIPS

Peer reviewer: *Estuaries and Coasts*; *Scientific Reports*.
Memberships: American Society of Civil Engineers (ASCE); American Geophysical Union (AGU); European Geosciences Union (EGU); Geological Society of America (GSA); American Shore and Beach Preservation Association (ASBPA); Nepal Engineering Council (NEC).

REFERENCES

Dr. Rocky Talchabhadel, Department of Civil and Environmental Engineering, Jackson State University, Jackson, MS | rocky.talchabhadel@jsums.edu | +1-601-979-3927
Dr. Sanjib Sharma, Assistant Professor, Howard University | sanjib.sharma@howard.edu
Dr. Md Ishtiaque Hossain, Lecturer, Jackson State University | Ishtiaque.hossain@jsums.edu