BIPIN PAUDEL

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EDUCATION

- **Master of Science (MS) in Forestry - Remote Sensing and GIS** *(Aug 2024 – **Present**)*
  Mississippi State University (MSU), Starkville, MS - United States.
  Expected Graduation: 2026 Summer
- **Bachelor's Degree in Geomatics Engineering** *(Nov 2018 – July 2023)*
  Institute of Engineering (IOE), Tribhuvan University (TU), Nepal.

WORK EXPERIENCE

- **Graduate Research Assistant**
  Ecophysiology lab, Department of Forestry, Mississippi State University. *(Aug 2024 – **Present**)*
  - ➢ Process UAV-hyperspectral images using ArcGIS Pro, ENVI, and Python for ecological modeling.
  - ➢ Integrate UAV-based hyperspectral imaging system with statistical and machine learning models (LASSO, PLSR, Random Forest, XGBoost).
  - ➢ Develop predictive models for photosynthesis and nitrogen-related traits of *Populus deltoides* and its hybrids planted under different planting strategies and environmental conditions.
  - ➢ Investigate treatment-driven spectral variability using hyperspectral data and multivariate statistical methods.
- **Diploma Program Coordinator**
  Shree Redcross Secondary School, Dailekh, Nepal. *(Dec 2023 – April 2024)*
  - ➢ Managed academic administration of a three-year Geomatics Engineering Diploma program.
  - ➢ Supervised engineering field surveys and supported GIS-based terrain modeling and road alignment analysis.
- **Manager and Lead Trainer – Geospatial Training Unit**
  Shree Redcross Secondary School, Dailekh, Nepal. *(Dec 2023 – April 2024)*
  - ➢ Conducted applied GIS and remote sensing workshops on image preprocessing, digitization, and spatial interpolation.
  - ➢ Delivered training emphasizing spatial data management and land use land cover (LULC) classification in QGIS and ArcGIS workflows.
  - ➢ Applied GIS-based hydrological modeling to characterize drainage networks and watershed delineation.
- **Surveyor (Engineer)**
  Keladi - Shakharphant High Dam, Syangja, Nepal. *(May 2023 - June 2023)*
  - ➢ Conducted a detailed topographic survey using Total Station.
  - ➢ Completed terrain and catchment analysis for hydrological feasibility of dam site using HEC-RAS and Arc-Hydro.
- **GIS Trainer**
  Lamjung Agriculture Campus – Creative Thinkers, IAAS, TU (*Feb 2023*)
  - ➢ Designed and delivered a GIS workshop emphasizing spatial data preprocessing, georeferencing, spatial interpolation, and supervised LULC classification, and hydrological modeling for watershed characterization using Q-GIS.

TEACHING EXPERIENCE

- **Diploma Program Instructor.** *(Dec 2023 – April 2024)*

  Shree Redcross Secondary School, Dailekh, Nepal.

  A three-year Geomatics Engineering Diploma Program

  ➢ Designed and delivered relevant courses and labs.

  Courses taught *(with major contents):*

  GIS: Geo-referencing, Coordinate System, Overlay Analysis, Spatial Data Models, and Database Management System.

  Remote Sensing: Principles of Remote Sensing and Photogrammetry, Satellites and Sensors, Electromagnetic Radiation (EMR), and Ecological Analysis.

  Photogrammetry: Aerial (space and UAV-based) Photography Planning, Image Acquisition, Preprocessing and Analysis, Image Matching, Feature Extraction, and Field Applications.

  Topographical Surveying: Digital Elevation Model, Digital Surface Model, Digital Height Model, Electronic Distance Measurement (EDM), and Global Navigation Satellite System (GNSS).

  Surveying: Survey Instruments and Statistics, Measurement Errors, and Adjustments, and Global Positioning System (GPS).

PROJECTS

- **Predicting Gross Primary Productivity Through Landsat Imagery and Meteorological Variables Using Random Forest Regression.** *(November 2025)*
  - ➢ Preprocessed multi-source remote sensing data in Google Earth Engine, including resampling Landsat imagery to MODIS grid resolution, and developed a scalable GPP prediction workflow.
- **Estimating Water Use Efficiency and Related Traits in Populus deltoides and Its Hybrids Using UAV-based Hyperspectral Imaging.** *(October 2025)*
  - ➢ Conducted spectral preprocessing and computed 123 spectral indices.
  - ➢ Implemented LASSO regression to identify important spectral bands and indices that best capture sensitivity to key water-related physiological traits at the canopy level.
- **Predicting Leaf Area in Eastern Cottonwood and Poplar Hybrids Using Tree and Site Data Across Diverse Experimental Sites.** *(Sep 2024)*
  - ➢ Exploratory data analysis of allometric data acquired from six different sites in Mississippi State.
  - ➢ Applied Linear Fixed and Mixed Effect Model (LFEM & LMEM) to account for site-specific and genetic variability.
- **Denoising UAV-Borne Hyperspectral Imagery: A Deep Learning Approach.** *(May 2025)*
  - ➢ Implemented a denoising autoencoder to reduce noise in spectral signals.
  - ➢ Enhanced spectral response by improving signal-to-noise (SNR) ratio and identifying spectral intervals exhibiting dependable SNR improvements.
- **Habitat Suitability Mapping of White-Tailed Deer (Odocoileus virginianus) in Sunflower County - Mississippi.** *(Sep 2024)*
  - ➢ Developed habitat suitability maps by integrating deer occurrence data with the site variables.
  - ➢ Applied MaxENT modeling to identify potential conflict zones between deer habitats and human activities.
- **Spatial Analysis of Wildfire Incidents in the United States** *(Sep 2024)*
  - ➢ Conducted hotspot and heat map analysis to identify wildfire-prone counties with patterns.
  - ➢ Applied spatial clustering methods to characterize hotspots and support risk assessment.

- **Precipitation Forecasting Using Satellite Data: A Deep Learning Approach**. **Undergraduate Thesis** *(2023)*
  - ➢ Processed JAXA–EORC NetCDF satellite datasets and developed both univariate and multivariate LSTM models for short-term precipitation forecasting.
- **A Comparative Analysis of Total Station, Unmanned Aerial Vehicle (UAV), and DGPS in Road Alignment Survey.** *(May 2023)*
  - ➢ Evaluated the spatial accuracy and elevation models derived from ground (Total Station, GPS) and aerial (UAV photogrammetry) based topographic survey.
  - ➢ Optimize route alignment using Terrain Analysis and Orthophoto interpretation.
- **DEM Products Comparison– ASTER, ALOS PALSAR, SRTM, GTOPO30.** *(March 2023)*
  - ➢ Conducted a comparative analysis of DEM products to evaluate terrain representation accuracy using hill shade visualization, contour mapping, and raster-based calculations.
- **DEM Generation.** *(March 2023)*
  - ➢ Generated Digital Elevation Models (DEM) from Synthetic Aperture Radar (SAR) data using SNAP with interferometric processing workflows.
- **GPS Survey in Pokhara - Mapping Recreational Places.** *(Aug 2022)*
  - ➢ Mapped ~50 recreational and tourists sites using GPS and OSM tracker.
  - ➢ Prepared a detailed tourist map of Pokhara Metropolitan City, Nepal.
- **Hydrographic Survey for River Basin Development, Pame-Nepal.** *(Aug 2022)*
  - ➢ Conducted topographic survey using GPS and Total Station to characterize river basin terrain.
  - ➢ Identified the suitable site location for dam structures (Dam, Canal, Penstock Pipe, Powerhouse).
- **Drone Image Analysis for Infrastructure Mapping.** *(March 2022)*
  - ➢ Processed UAV imagery to create orthophotos and orthomosaics, DEM, DSM, and 3D models using Pix4D.
- **Flood Susceptibility Mapping of Western Development Region, Nepal.** *(June 2022)*
  - ➢ Assessed flood risk using Landsat imagery in ArcGIS to support flood management strategies.
- **Land Use Land Cover (LULC) Analysis of Western Development Region-Nepal.** *(April 2022)*
  - ➢ Performed major land cover classification using Sentinel-2 imagery.
- **LiDAR Point Cloud Processing.** *(Feb 2022)*
  - ➢ Processed LiDAR point cloud to generate a high-resolution Digital Elevation Model.
- **Burned and Unburned Area Identification in Nepal.** *(Feb 2022)*
  - ➢ Classified burned and unburned regions using Sentinel imagery to support post-fire monitoring.

CONFERENCE PRESENTATION AND PARTICIPATION

- **Paudel, B.**, Renninger, H. J., Bhattarai, R., Poudel, K. P., & Du, Q. A. D. (2025, December 15 –19). Estimating Photosynthetic Traits in *Populus deltoides* and Its Hybrids Using UAV-Based Hyperspectral Imaging and Machine Learning**. Oral presentation** at the **American Geophysical Union (AGU) 2025**, New Orleans, USA
- **Paudel, B.**, Renninger, H. J., Bhattarai, R., Poudel, K. P., & Du, Q. A. D. (2025, October 28 –30). Estimating Water Use Efficiency and Related Traits in *Populus deltoides* and Its Hybrids Using UAV-Based Hyperspectral Imaging**. Oral presentation** at the **Mississippi Water & Energy Conference 2025**, Mississippi, USA.
- **Paudel, B.**, Renninger, H. J., & Poudel, K. P. A. D. (2025, October 22–25). Predicting Leaf Area in Eastern Cottonwood and Poplar Hybrids Using Allometric and Site Data Across Diverse

Experimental Sites. **Poster presentation** at the **Society of American Foresters (SAF) National Convention**, Hartford, Connecticut, USA.

- **Paudel, B.**, Renninger, H. J., Bhattarai, R., Poudel, K. P., & Du, Q. A. D. (2025, October 18). Denoising UAV-Based Hyperspectral Imagery: A Deep Learning Approach. **Poster presentation** at the **Graduate Research Symposium**, Mississippi State University, Mississippi, USA.
- **Paudel, B.**, Renninger, H. J., Bhattarai, R., Poudel, K. P., & Du, Q. A. D. (2025, October 18). Quantifying Key Photosynthetic Traits in *Populus deltoides* and Its Hybrids Utilizing UAV-Based Hyperspectral Techniques. **Oral presentation** at the **Graduate Research Symposium**, Mississippi State University, Mississippi, USA.
- **Paudel, B.**, Renninger, H. J., & Poudel, K. P. A. D. (2025, February 15). Modeling Leaf Area in Eastern Cottonwood and Poplar Hybrids Using Allometric Relationships Across Diverse Experimental Sites. **Poster presentation** at the **Graduate Research Symposium**, Mississippi State University, Mississippi, USA.

HONORS AND AWARDS

- **Woody Crop Scholar** – 2026, 15th Short Rotation Woody Crops International Conference and The 9th International Poplar Symposium *(2026)*
- **Second Place (Poster Presentation),** *Society of American Foresters (SAF) National Convention***-** Hartford, Connecticut, USA. *(October 22nd -25th, 2025)*
- **Forestry Graduate Recruitment Travel Grant -** *Department of Forestry***,** *Mississippi State University.* *(2025)*
- **FGSA Travel Grant -** *Forestry Graduate Student Association, Department of Forestry, Mississippi State University.* *(2025)*
- **GRAGS Award (Graduate Recruitment Assistant Grant),** *Mississippi State University Graduate School and the Department of Forestry* **- Awarded $2500.** **(***2024)*
- **Bharati Bidhya Padak**, *Shree Bharati Bhawan Secondary School* – Pokhara, Nepal Recognized as **SLC (School Leaving Certificate) Batch Topper** *(2017)*

INTERNSHIP AND SCHOOL

- **Intern** - "**Remote Sensing Analysis for Disaster Management.**" Organized by GeoVigyan – India *(Virtual).* *(Dec 2022 – Jan 2023)*
  - ➢ Supported disaster and hazard mapping using bulk satellite data assimilation.
  - ➢ Assisted in neural network-based risk modeling and Weather and Research Forecasting (WRF) data exploration.
- **International Geoinformatics Summer School** *(Aug 2022)*
  Organized by the State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS), Wuhan University *(Virtual).*
  Major Highlights of School:
  - ➢ Remote Sensing in Natural Disaster Monitoring and Emergency Response, Night-light Detection.
  - ➢ Integration of Point Cloud and Photogrammetry in Smart City Applications.

PROFESSIONAL WORKSHOP AND CERTIFICATIONS

- **Graduate Teaching Assistant (GTA) Workshop – Level 2** (MSU) *(2025)*
- **Graduate Teaching Assistant (GTA) Workshop – Level 1** (MSU) *(2024)*
- **Training in Global Navigation Satellite System (GNSS)** *(2023)*

Organized by the Centre of Space Science and Geomatics Studies (CSSGS),
Centre for Spatial Information Science, The University of Tokyo (CSIS/UT),
and the International Committee on Global Navigation Satellite System (ICG).

➢ Hands-on training in static and kinematic positioning techniques.

- **Training on Differential GPS and Terrestrial LiDAR Scanner** *(2022)*
  Organized by the Centre of Space Science and Geomatics Studies (CSSGS), Nepal and supported by the University Grant Commission.
  ➢ Processed data using RTKLIB software using multiple methods- Static, RTK, and DGPS.
- **Basic Google Earth Engine Training** *(2022)*
  Organized by the Geomatics Engineering Students' Association of Nepal (GESAN), Nepal.
  ➢ Extracted different satellite imagery and conducted supervised classification for Land Use Land Cover mapping.
- **Certificate of Experience as a Remote Mapper** *(2022)*
  Organized by the Kathmandu Living Labs (KLL), Nepal.
  ➢ Contributed to Open Street Mapping (OSM) using JOSM for community mapping.
- **Residential Climate Training.** *(2021)*
  Organized by Nepalese Youths for Climate Action (NYCA) – Pokhara, Nepal.
  ➢ Participated in workshops addressing climate awareness and adaptation strategies.

PROFESSIONAL AFFILIATIONS

- **American Geophysical Union, USA**
  General Member (*2025 – **present)***
- **Forestry Graduate Student Association (FGSA),** Mississippi State University, US
  Secretory (*Dec 2024 – May 2025)*
- **Geomatics Engineering Students' Association of Nepal (GESAN),** TU, Nepal
  General Member (*2018 – 2023)*

PROFESSIONAL AND COMMUNITY SERVICES

- **Moderator - Mississippi Water & Energy Conference 2025**, *Mississippi, USA.* *(30th Oct 2025)*
- **University Representative, Society of American Foresters (SAF) National Convention,** Hartford, *Connecticut, USA.* *(October 22-25, 2025)*
- **Moderator - Welcome ceremony for the freshmen students** *(2019)*
  Institute of Engineering, Pashchimanchal Campus, Pokhara, Nepal.

TECHNICAL SKILLS

- **GIS Software**: ArcGIS Pro, ArcMap, QGIS, Global Mapper; Geoprocessing, spatial analysis, cartography.
- **Remote Sensing**: Google Earth Engine (Python API), ENVI, SNAP Toolbox, Panoply; UAV and satellite image processing.
- **Photogrammetry and LiDAR**: Pix4D, Agisoft Metashape; Orthomosaic generation, 3D surface modeling, LiDAR, and point-cloud classification.
- **Hydrology**: HEC-RAS, Arc-Hydro; Watershed delineation, flood modeling, and drainage network analysis.
- **Field & Data Collection**: DGPS, RTK-GNSS, KoboCollect, OSMTracker, Total Station, Drone; UAV flight planning, topographic, road, and ground-control survey.

- **Programming**: Python (TensorFlow, Pandas, NumPy, GDAL), R (caret, ggplot, dplyr, tidyr), HTML/CSS.
- **Others**: Microsoft Office (Excel, PowerPoint, Word).

I hereby declare that everything above is correct and true.

REFERENCES

- Dr. Heidi J. Renninger
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