

# Mukti Ram Subedi

POST DOCTORAL ASSOCIATE

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*I am a forester, geospatial and remote sensing data analyst.*

## Research Topics

- Land Use and Land Cover Mapping
- Time Series Image Analysis
- Image Acquisition, Processing, Analysis and Visualization
- Carbon Stock Assessment
- Forests and Trees Modeling
- Human Dimensions in Forestry

## Primary Research Methods

- Spatial Analysis and Mapping Using Geographic Object-Based Image Analysis (GEOBIA)
- Leveraging high-resolution Imagery, UAV, and LiDAR Data for Informed Decision-making
- (Non)Linear Mixed effect modelling, Multivariate Analysis
- Supervised and Unsupervised Machine and Deep learning

## Skills

### GIS Data Collection and Post Processing

Tremble Juno, Trimble GeoHX (6000), Spectra Precision ProMark 220, ArcPad (10.2x), TerraSync, GPS pathfinder office (> v5.2), Vertex Laser Geo

### GIS Mapping and Modeling

ArcGIS pro (3x), ArcGIS 10x (Model builder, Python for ArcGIS), Google Earth Pro, Google Earth Engine (GEE), QGIS 3x, FME 2019, ArcGIS Field Maps, ArcCollector

### Remote Sensing and Image Analysis

R, Jupyter Notebook, GEE, ERDAS Imagine, eCognition, ENVI

### Data Analysis and Econometrics

R(5 yrs), STATA (10 yrs), Python Scripting(3 yrs)

### Quantitative Research

t-test, ANOVAs, Regressions, Factor Analysis, Principal Component Analysis, Redundancy Analysis, (Un)supervised Machine Learning, Deep Learning (DL)

## Education

### Texas Tech University

Lubbock, TX

PH.D. IN WILDLIFE, AQUATIC, AND WILDLANDS SCIENCE AND MANAGEMENT

Jan. 2019 - Aug. 2022

- Dissertation Title: "Leveraging NAIP, LiDAR and Sentinel data for accurate multiclass mapping of heterogenous grassland landscapes in Texas."
- Committee members: Drs. Carlos Portillo Quintero (adviser; Dissertation chair), Samantha Kahl, Robert Cox, Nancy McIntyre, and Xiaopeng Song

### Texas A&M University

Kingsville, TX

M.Sc. IN BIOLOGY

Jan. 2014 - Aug. 2016

- Committee members: Drs. Weimin Xi (adviser; Thesis chair), Christopher Edgar, and Sandra Rideout-Hanzak

### Institute of Forestry, Tribhuvan University

Kritipur, Kathmandu

B.Sc. IN FORESTRY (GIS ELECTIVE)

Mar. 2005 - Jan. 2010

## Publications

### REFEREED JOURNAL PAPERS

1. Chaudhary, T., Xi, W., **Subedi, M.R.**, Rideout-Hanzak, S., Su, H., Dewez, N. P., & Clarke, S. (2023). East texas forests show strong resilience to exceptional drought. *Forestry*, 96(3), 326–339.
2. **Subedi, M.R.**, Portillo-Quintero, C., Kahl, S. S., McIntyre, N. E., Cox, R. D., & Perry, G. (2023). Leveraging NAIP imagery for accurate large-area land use/land cover mapping: A case study in central texas. *Photogrammetric Engineering & Remote Sensing*, 89(9), 547–560.

3. **Subedi, M.R.** R., Zhao, D., Dwivedi, P., Costanzo, B. E., & Martin, J. A. (2023). Site index models for loblolly pine forests in the southern united states developed with forest inventory and analysis data. *Forest Science*, fxad039.
4. Gautam, D., Gaire, N. P., **Subedi, M.R.**, Sharma, R. P., Tripathi, S., Sigdel, R., Basnet, S., Miya, M. S., Chhetri, P. K., & Tong, X. (2022). Moisture, not temperature, in the pre-monsoon influences pinus wallichiana growth along the altitudinal and aspect gradients in the lower himalayas of central nepal. *Forests*, 13(11), 1771.
5. Portillo-Quintero, C., Grisham, B., Haukos, D., Boal, C. W., Hagen, C., Wan, Z., **Subedi, M.R.**, & Menkiti, N. (2022). Trends in lesser prairie-chicken habitat extent and distribution on the southern high plains. *Remote Sensing*, 14(15), 3780.
6. Portillo-Quintero, C., Hernández-Stefanoni, J. L., Reyes-Palomeque, G., & **Subedi, M.R.** R. (2022). Novel approaches in tropical forests mapping and monitoring–time for operationalization. In *Remote Sensing* (20; Vol. 14, p. 5068). MDPI.
7. YAN, M., LIU, Z., SUBEDI, M. R., Linfeng, L., & Weimin, X. (2022). The complex impacts of unprecedented drought on forest tree mortality: A case study of dead trees in east texas, USA. *Chinese Journal of Ecology*, 42(3), 1034–1046.
8. Portillo-Quintero, C., Hernández-Stefanoni, J. L., Reyes-Palomeque, G., & **Subedi, M.R.** R. (2021). The road to operationalization of effective tropical forest monitoring systems. *Remote Sensing*, 13(7), 1370.
9. **Subedi, M.R.** R., Xi, W., Edgar, C. B., Rideout-Hanzak, S., & Yan, M. (2021). Tree mortality and biomass loss in drought-affected forests of east texas, USA. *Journal of Forestry Research*, 32, 67–80.
10. Jackson, M., Portillo-Quintero, C., Cox, R., Ritchie, G., Johnson, M., Humagain, K., & **Subedi, M.R.** R. (2020). Season, classifier, and spatial resolution impact honey mesquite and yellow bluestem detection using an unmanned aerial system. *Rangeland Ecology & Management*, 73(5), 658–672.
11. Kina, K., Bhumpakhpan, N., Trisurat, Y., Mainmit, N., Ghimire, K., & **Subedi, M.R.** (2020). Analysis of potential distribution of tiger habitat using MaxEnt in chitwan national park, nepal. *Journal of Remote Sensing and GIS Association of Thailand*, 21(3), 1–15.
12. **Subedi, M.R.** R., Oli, B. N., Shrestha, S., & Chhin, S. (2018). Height-diameter modeling of cinnamomum tamala grown in natural forest in mid-hill of nepal. *International Journal of Forestry Research*, 2018, 1–11.
13. **Subedi, M.R.** R., Xi, W., Edgar, C. B., Rideout-Hanzak, S., & Hedquist, B. C. (2018). Assessment of geostatistical methods for spatiotemporal analysis of drought patterns in east texas, USA. *Spatial Information Research*, 1–11.
14. **Subedi, M.R.** R. (2016). *Evaluating geospatial distribution of drought, drought-induced tree mortality, and biomass loss in east texas*, US. Texas A&M University-Kingsville.
15. **Subedi, M.R.**, & Timilsina, Y. (2016). Evidence of user participation in community forest management in the mid-hills of nepal: A case of rule making and implementation. *Small-Scale Forestry*, 15(2), 257–270.
16. Oli, B., & **Subedi, M.R.** (2015). Effects of management activities on vegetation diversity, dispersion pattern and stand structure of community-managed forest (shorea robusta) in nepal. *International Journal of Biodiversity Science, Ecosystem Services & Management*, 11(2), 96–105.
17. **Subedi, M.R.** R., & Timilsina, Y. P. (2014). Distribution pattern of cinnamomum tamala in annapurna conservation area, kaski, nepal. *Nepal Journal of Science and Technology*, 15(2), 29–36.
18. **Subedi, M.R.** R., & Sharma, R. P. (2012). Allometric biomass models for bark of cinnamomum tamala in mid-hill of nepal. *Biomass and Bioenergy*, 47, 44–49.
19. **Subedi, M.R.** (2009). Climate change and its potential effects on tree line position: An introduction and analysis. *Greenery–J. Environ. Biodiver*, 7, 17–21.

## Presentations

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### PEER-REVIEWED CONFERENCE PRESENTATIONS

**Subedi, M.R.** (February 2022). *Do LiDAR data offer a practical significance in LULC classification over NAIP data? comparing multiple machine learning algorithms using geographic object-based analysis coupled with target oriented validation.* Association of American Geographers (AAG), New York

**Subedi, M.R.** (December 2021). *Do LiDAR data provide practical significance to improve classification accuracy over NAIP Data? evidence from target-oriented validation strategies* North Central Texas Council of Governments [Virtual]

**Subedi, M.R.** (November 2021). *Large-area land use/land cover classification of very high-resolution imagery: accounting for spatial bias in sample data.* South Central Arc User Group (Grapevine, Texas).

Xi, W., **Subedi, M.R.** Liu. Z & Yan M. (August 2021). *Widespread increase of tree mortality triggered by an exceptional drought in east Texas, USA.* Ecological Society of America (ESA, Virtual Annual Meeting 2021).

Hedquest, Brent & **Subedi, M.R.** (April 2018). *Using Geospatial Tools for Documentation and Preservation of His-*

*torical Structures and in Undergraduate Experiential Learning at Rancho La Union, Zapata County, Texas.* American Association of Geographers.

**Subedi, M.R.** (April 2016). *Creating a Geographical Information System (GIS) Database for Documenting Historical Structures at Rancho La Union Ranch, Zapata County, Texas.* Poster presented at South Central Arc User Group Annual Meeting.

**Subedi, M.R.,** (November 2015). *Comparing interpolation techniques for Annual Standard Precipitation Evaporation Index (SPEI) mapping using multiple evaluation criteria: a case study of east Texas, USA.* Poster presented at Del Mar College on GIS Day.

**Subedi, M.R. & Xi, Weimin** (October, 2015). *Evaluating drought-induced tree mortality and biomass loss in east Texas forests.* Poster presented at Pathway symposium, at Texas A&M University-Corpus Christi.

**Subedi, M.R. & Xi, Weimin** (August, 2015). *Evaluating extreme drought-induced tree mortality and biomass loss in east Texas using Forest Inventory and Analysis (FIA) data.* Poster presented at 100th ESA meeting.

**Subedi, M.R. & Xi, Weimin** (April, 2014). *Spatiotemporal pattern and variability of drought in East Texas, USA.* Presented at Javelina research symposium, at Texas A&M University-Kingsville.

## Work Experience

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### Warnell School of Forestry

Athens, GA

POST-DOCTORAL ASSOCIATE

Jun.2022 - Present

- Designed and implemented a comprehensive Light Detection and Ranging (LiDAR) and Global Ecosystem Dynamics Investigation (GEDI) data processing workflow, ensuring seamless integration with Forest Inventory and Analysis (FIA) data for accurate and detailed forest assessments.
- Various quality control measures on processed LiDAR and GEDI data to ensure data accuracy and reliability in subsequent analyses.
- Developed a comprehensive methodology for identifying and mapping potential habitats for Northern Bobwhite, leveraging the combined power of LiDAR and FIA datasets.
- Conducted extensive spatial analyses to identify key habitat features, contributing valuable insights into the ecological requirements of Northern Bobwhite populations.

### Geospatial Research Technologies Lab

Lubbock, TX

GRADUATE RESEARCH ASSISTANT

Jan. 2019 - Aug.2022

- Developed a comprehensive methodology for high-resolution (NAIP orthoimagery) land use land cover (LULC) mapping over large extents (15 counties), utilizing advanced remote sensing techniques and spatial modeling.
- Integrated multi-sensor data sources, including satellite imagery, aerial photography, and ground truth data, to enhance the accuracy and detail of the LULC maps.
- Employed machine learning algorithms and classification techniques to automate the mapping process, resulting in time-efficient and consistently accurate land cover classifications.
- Oversaw the daily activities of undergraduate research assistants ( four in total), providing guidance on project tasks, data collection methods, and GIS analysis techniques.
- Conducted regular training sessions to enhance the technical skills of the research team, fostering a collaborative and learning-oriented environment.
- Collaborated with fellow lab members on diverse geospatial projects, offering expertise in data analysis, interpretation, and visualization.
- Provided support in the selection and application of appropriate geospatial analysis methods, ensuring the accuracy and reliability of research outcomes.
- Conducted quality assurance checks on geospatial datasets, identifying and rectifying inconsistencies to maintain data integrity.

### West Virginia University

Morgantown, WV

RESEARCH ASSISTANT

Aug. 2017 - Dec. 2018

- Collaborated with the project supervisor to analyze tree ring datasets, ensuring accuracy and reliability in the interpretation of research findings.
- Developed and executed a comprehensive forest inventory plan, including the establishment of sampling protocols and data collection methodologies.
- Applied advanced GIS techniques to integrate spatial data with forest inventory information, enhancing the precision of resource assessments.
- Implemented automated data logging systems using MayFly data loggers, improving efficiency in soil moisture and temperature collection.
- Conducted regular maintenance and calibration of data loggers to ensure the reliability of recorded soil variables and sap flow measurement.

## Geospatial Research Laboratory (GSRL)

Kingsville, TX

GIS ANALYST-INTERN

Aug. 2016 - May. 2017

- Offered expertise in troubleshooting ArcGIS suite-related issues, ensuring the seamless functioning of geospatial analysis tools within the GSRL.
- Contributed to lab upgrades, including software updates and hardware enhancements, optimizing the overall efficiency of GIS operations.
- Provided training sessions for the new lab manager, ensuring a smooth transition and continuity in the laboratory's operational processes.
- Established standardized procedures for lab management, including data organization, storage, and maintenance.
- Participated in fieldwork activities, assisting in GPS data collection and subsequent differential correction processes to enhance location accuracy.
- Ensured that laboratory assignments aligned with the latest features and functionalities of the upgraded ArcGIS suite, facilitating an up-to-date educational experience for students.

## Geospatial Research Laboratory (GSRL)

Kingsville, TX

LAB MANAGER

Jan. 2014 - Jul. 2016

- Provided guidance and support to students working on GIS projects, fostering a collaborative learning environment.
- Addressed questions and challenges, ensuring students' understanding and success in completing assignments.
- Analyzed Forest Inventory and Analysis (FIA) data databases and created biomass and volume distribution by County, forest ownership class, spatiotemporal variations of biomass and volume distribution in East Texas.
- Created student's labs, produced lab grading rubrics, designed and conducted training and workshops (Intro to ArcGIS, spatial and attribute query, Model builder, and ArcGIS Online).
- Managed, manipulated, and integrated GIS, LiDAR (ArcGIS platform), KMZ, GPS, and CAD data to produce maps.
- Provided mapping support and data analysis to civil engineers, environmental engineers, wildlife biologists, and geologists.
- Provided technical support for ArcGIS suite, troubleshoot and guided around 80 undergraduate students in their projects for two years.

## Community Based Forest and Tree Management in the Himalayas (ComForM)

Pokhara, Nepal

RESEARCHER

Sep. 2013 - Jan. 2014

- Worked mostly in ArcGIS 10.x (including desktop extensions) environment
- Developed comprehensive data collection templates, ensuring uniformity and efficiency in the gathering of essential information.
- Conducted interviews with community members, employing a participatory approach to gather firsthand knowledge and perspectives.
- Responded to inquiries and phone calls, providing accurate and timely information to enhance community engagement.
- Engaged local people to prepare participatory timber marketing route maps.

## Federation of Community Forests Users' Nepal (FECOFUN)

Kathmandu, Nepal

DOCUMENTATION OFFICER

Feb. 2012 - Sep. 2013

- Designed Geodatabase, database management, research, read and understand component drawings, geo-referencing, troubleshooting, create schematic procedures and specifications, and problem-solving.
- Trained local people on data collection using GPS (eTrex 20) devices, software programs (DNR Garmin, GPS utility, ArcView, and Google Earth).
- Acquired local conflict location data and prepared maps.
- Designed research, developed data collection tools and reporting tools and templates.
- Trained 18 staffs and 20 practitioners (Modular training participants): Data collection, Data entry in MS Access and excel spreadsheet, open-ended questions, and GPS handling
- Managed relational database (MS Access) of activities, conducted by central and district chapters of the program.
- Developed and improved training contents, delivered and facilitated workshops and training.

## Association for the Development of Environment and People in Transition (adaptnepal)

Kathmandu, Nepal

GIS DATA ANALYST-LAND USE CHANGE AND FORESTRY

Jun. 2011 - Feb. 2012

- Gathered, and analyzed meteorological data and performed geostatistical analysis.
- Prepared rainfall, and temperature distribution maps of Nepal.
- Extracted elevation data and classify vegetation types based on criteria defined by Intergovernmental Panel on Climate Change (IPCC).
- Analyzed the Land use change and forestry data in preparing second national communication report to United Nations Framework Convention on Climate Change (UNFCCC).
- Biomass loss/accumulation maps by vegetation over two decades (1990-2010) with different biomass growth factors.
- Discussed, and submitted progress reports as necessary to immediate supervisor and working team.

## ComForM

Pokhara, Nepal

RESEARCH ASSISTANT

Dec. 2009 - May 2011

- Assisted in developing comprehensive data collection templates, ensuring uniformity and efficiency in gathering essential information.
- Conducted GPS boundary survey of 10 community forests, assisted in image analysis (GeoEye) and collected ground control points.
- Collected forest inventory data from permanent sample plots.
- Conducted stakeholder and focus groups meetings, fostering collaboration and obtaining valuable insights for research purposes.
- Conducted interviews with community members, employing a participatory approach to gather firsthand knowledge and perspectives.
- Executed meticulous data entry and analysis, employing statistical and spatial techniques to derive meaningful patterns and trends.

## Teaching Experience

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### Aerial Photo Interpretation (5404)

Texas Tech University

INSTRUCTOR

July. 2020 - Aug. 2020

- Co-taught with Dr. Carlos Portillo as a part of teaching practicum

## GEOL 5312; GEOL 5313

TEACHING ASSISTANT

- Duing spring, summer and fall semester

TAMU-Kingsville

Aug. 2014 - Jul. 2016

## Math and Science in GIS

UPWARD BOUND MATH AND SCIENCE STUDENTS

TAMU-Kingsville

Jun. 2016 - Jul. 2016

## Awards and Honors

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### Department of Natural Resources Management

GRADUATE RESEARCH ASSISTANTSHIP

Lubbock, TX

Jan. 2019 - Present

### College of Graudate Studies

GRADUATE SCHOLARSHIP

- Amount: \$1000 USD.

Kingsville, TX

Jan. 2014

### Texas A&M University

HOUSING SCHOLARSHIP

Kingsville, TX

Jan. 2014 - Aug. 2014

### Institute of Forestry

MERIT SCHOLARSHIP

Pokhara, Nepal

2005 - 2009

## Grants

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### The Urbanovsky endowment

ELO AND URBANVOSKY FELLOWSHIP

- begin in Fall 2021 through 2024
- Funding Amount: \$15000/year

Texas Tech University, Lubbock

2021-2014

### Hallie I. and Ernest B. Fish Endowed Scholarship

FISH ENDOWED SCHOLARSHIP

- Begin Fall 2021 through Spring 2022
- Funding Amount: \$3000

Texas Tech University, Lubbock

2021-2022

### James A. "Buddy" Davidson Charitable Foundation

DAVIDSON ENDOWED SCHOLARSHIP

- Funding Amount: \$2000

Texas Tech University, Lubbock

2019

### Office of campus sustainability Texas A&M University-Kingsville

STUDENT SUSTAINABILITY COMPETITION AWARD

- Awarded to Green Hands Team : Mukti R. Subedi, Rohan Jayasuriya, and Nippun Bhadsavle
- Funding amount: \$3000 USD.

Texas A&M University, Kingsville

2015

### Nepal Federation of Indigenous Nationalities (NEFIN)

FOREST CARBON STOCK ASSESSMENT OF REDD+ PILOTING AREA (KHASUR VDC)

- Co-PI a project funded by NEFIN to estimate carobn stock assesement of indigeneous people managed forests.
- Funding amount: \$10,000 USD.

Kathmandu, Nepal

2012

### Community Based Forests and Trees Management in the Himalaya (ComForM)

POLITICAL ECONOMY OF RE-CENTRALIZING CF IN NEPAL

- Funding amount: \$5,500 USD.

Pokhara, Nepal

2012

### Annapurna Conservation Area Project (ACAP)

UNDERGRADUATE RESEARCH GRANT

- Competitive undergraduate Research Grant awared to conduct research on Biomass production and distribution pattern of Cinnamumum tamala in Mijuredanda VDC
- Funding amount: \$400 USD.

Pokhara, Nepal

2009

### ComForm

RESEARCH GRANT

- Co-PI a project to assess formulation and implementation status of community forest operation plan: a case study from Tanahun and Parbat districts
- Funding amount: \$3,000 USD.

Pokhara, Nepal

2009

## District Forest Office

EXPLORATORY RESEARCH GRANT

- Co-Pi a project funded to estimate diversity and distribution of Lichens and Orchids in Dhankuta district
- Funding amount: \$800 USD.

*Dhankuta, Nepal*

2009

## ACAP, Lwang Unit

RESOURCE ASSESSMENT GRANT

- Co-PI a project funded to execute forest resource assessment of Lwang Unit Conservation of ACAP
- Funding amount: \$3,000 USD.

*Pokhara, Nepal*

2008

## Satanchuli Community Forest User Group

WORKING PLAN

- A project awarded to prepare working plan of Satanchuli Community Forest User Group.
- Funding amount: \$850 USD.

*Chitwan, Nepal*

2008

## Service

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### Novel Approaches in Tropical Forests Mapping and Monitoring - Time for Operationalization

GUSEST EDITOR

- Ongoing

*Remote Sensing, MDPI*

2020- present

### Remote Sensing, Land, Forestry (MDPI)

REVIEWER

- Reviewed 17 manuscripts

*MDPI*

2022- Present

### Journal of Forestry Research (JFR)

REVIEWER

- Reviewed seven manuscripts

*Springer*

2016- Present

### Forestry Chronicles

REVIEWER

- Reviewed two manuscripts

*Canadian Institute of Forestry*

2020-Present

### Ecosystem Services

REVIEWER

- Reviewed one manuscript

*Elsevier*

2016

## Certificates

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### TAMUK

CERTIFICATE IN GIS

*Jun. 2016 - Present*

### FME Software

FME DESKTOP 2016 BASIC

*Jan. 2017 - Present*

### UC DAVIS

GEOGRAPHIC INFORMATION SYSTEMS (GIS) SPECIALIZATION

*Dec. 2016 - Present*

## Current Memberships

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- Mendeley-International Advisor, since 2012
- Society of American Foresters (SAF)
- South Central Arc User Group (SCAUG)
- American Association of Geographers(AAG)
- Ecological Society of America (ESA)