

PIs and Affiliations:

Dr. Krishna P. Poudel
Associate Professor of Forest Biometrics
Department of Forestry, Mississippi State University

Dr. Curtis VanderSchaaf
Assistant Extension Professor
Department of Forestry, Mississippi State University

Project Title:

Incorporating spatial dependence and measurement error when estimating county level forest biomass.

Period for Report:

July 1, 2024 – December 31, 2024

Progress:

The project is progressing as planned. Since January 16, 2024, a master's student, Mr. Pratyush Dhungana, has been developing area-level small area estimation (SAE) models for Mississippi, Minnesota, Oregon, and Colorado. These models incorporate measurement error in auxiliary remote sensing data and spatial dependence. Measurement error models have consistently outperformed direct measurements across all states. In Mississippi, where spatial dependence was significant for county-level forest biomass, the spatial Fay-Herriot model has shown superior performance. PI Poudel will be presented these results at the virtual PSAE on January 16, 2025. Currently, Mr. Dhungana is exploring the use of Mixed Effects Random Forests (MERF) models to predict pixel-level biomass. He presented preliminary findings at the Forest Inventory and Analysis (FIA) Science Symposium on November 19, 2024. While the MERF model, which uses Random Forest models with county as random effect, shows potential as an alternative to direct estimations, its effectiveness compared to conventional area-level models remains under investigation. Mr. Dhungana will present the findings at the 23rd Biennial Southern Silvicultural Research Conference, scheduled for March 18-20, 2025, at the Hyatt Regency Hotel in Greenville, SC and the PASE in-person meeting in Missoula in June.

Next Period Plans:

We are planning to finalize our flexible domain biomass estimates with the use of machine learning algorithms for all the proposed states by the next reporting period. We are using the data for same states (MS, MS, CO, and OR) for this analysis and compare our finding with the results from the area level models and present it in next PSAE meetings.

Problems or Delays:

No problems or delays encountered.