**PIs and Affiliations:**

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

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Assistant Extension Professor
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**Project Title:**

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

**Period for Report:**

January 1,2024 – July 31, 2024

**Progress:**

The project is on-going as planned. One master's level graduate student (Mr. Pratyush Dhungana) has been working on the project since January 16, 2024. During this period, we developed area level small area estimation (SAE) models with and without considering measurement error in the auxiliary remote sensing dataset and incorporating spatial dependence for the state of Mississippi. For the states of Minnesota, Oregon, and Colorado, however, we developed only the standard and measurement error area level SAE models, as we found no significant precision gains were observed with the spatial Fay-Herriot models in these states. Measurement error models have continued to perform better than the direct measurements in all the states considered. PI Poudel presented the preliminary results at the PSAE meeting in Tucson, AZ. Now, Mr. Dhungana is working on the use of Mixed Effects Random Forests (MERF) model to predict pixel level biomass and will present the preliminary findings to the Forest Inventory and Analysis (FIA) Science Symposium being held on November 19-21, 2024.

**Next Period Plans:**

We are planning to develop flexible domain biomass estimates with the use of machine learning algorithms for the next reporting period. We will use 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.