REVIEWER'S REPORT

Manuscript No.:   IJAR-52624   **Date: 05/07/2025**

Title: comprehensive Approach to Above-Ground Biomass Estimation using multi-source data integration and Advanced Learning Techniques

Recommendation:

Accept as it is ....

<mark>Accept after minor revision............</mark>

Accept after major revision ....

Do not accept (*Reasons below*) ....

Rating	Excel.	Good	Fair	Poor
Originality		-		
Techn. Quality		-		
Clarity		-		
Significance		-		

Reviewer Name: Dr Gulnawaz

Detailed Review Report

The manuscript presents a well-structured and methodologically sound study on above-ground biomass (AGB) estimation in Yellapur, Karnataka, using Sentinel-2 data combined with soil properties and various machine learning and deep learning models, including Random Forest, XGBoost, Progressive Neural Network (PNN), and Bayesian Neural Network (BNN). The integration of multisource data, such as vegetation indices, spectral bands, and soil characteristics, adds depth to the analysis, while the comparative modeling approach between Case 1 (excluding soil data) and Case 2 (including soil data) effectively demonstrates the value of data fusion. Notably, BNN outperformed other models in handling higher AGB values, mitigating saturation issues, and providing probabilistic predictions, thereby enhancing model robustness and generalizability. However, the manuscript requires minor revisions, including improvements in language and grammar, clearer figure/table formatting, and more transparency in hyperparameter tuning for deep learning models. The references are relevant and up-to-date, though a few entries need formatting corrections. The study's emphasis on open-access datasets and tools enhances reproducibility and accessibility for future researchers. Overall, this research makes a significant contribution to remote sensing-based biomass estimation and should be accepted for publication after minor revisions.