

ASSESSMENT OF LAND COVER CHANGES AND ITS IMPLICATIONS FOR CARBON STOCK OF A CONSERVATION AREA OF SOUTHWEST, NIGERIA

**Oluwole John Pelemo¹, C. F. Agbor², Maureen O. Ogoliegbune³,
T. Oshati⁴, and I. S. Adamu⁵**

^{1,2,3,5} Remote sensing and GIS Section, Forestry Research Institute, Nigeria.

⁴ National Productivity Centre, Ibadan, Nigeria.

¹ pelemo03@yahoo.com, ² chukwuka_friday@yahoo.com, ³ mogoliegbune@gmail.com,
⁴ oshatiti@yahoo.com, and ⁵ lollysbergtally15@gmail.com

This study presents the methodology applied for estimation of forest woody biomass and its carbon content according to main tree parameters on the forest stand scale, at the Old Oyo National Park, Nigeria. In 32 sample plots, tree species >20cm DBH and their respective heights were recorded. Ground-based and remote sensing measurements of tree attributes were converted into carbon estimates using allometric relationships and also remote sensing measurement using normalized-difference vegetation index (NDVI) and soil adjusted vegetation index (SAVI).

Four habitats were identified in the study area: dense forest, light forest, savanna/rock outcrop and water. Over a period of thirteen years, the land cover of dense forest decreased from 1,296.192 ha to 916.88 ha, *i.e.* from 51.6 to 36.5 %. Concurrently, savanna/rock outcrop increased from 364.994 ha to 699.592 ha, *i.e.* 14.53 - 27.9%. The probability/transition matrix that dense forest would change to light forest was 0.3226 and to savanna was 0.1913. The accuracy level and Cohen's Kappa estimate of Old Oyo National Park were 90% and $K = 85.08\%$, respectively. The above-ground biomass was 11,785.49 metric tons/ha, CO₂ emitted 30,949.94 metric tons/ha. Tree carbon was estimated at 2,193,699.51 metric tons/ha, and CO₂ sequestered was 22,253,949.58 tCO₂-e/ha. The regression analyses on CO₂ sequestered and CO₂ emitted showed R² was 0.6358, while the correlation coefficient ranged from 0.80 to 1. Also, NDVI and SAVI of each of the sample plots were determined. The regression analysis on NDVI and AGB showed that R² was 0.7342 while the correlation ranged from 0.11 to 1. Correlation between AGB and SAVI ranged between 0.08 and 1.00, showing a strong association.

This study considered the environmental, economic and political values of woody biomass estimation of the country's forest biomass resources. The estimation is important for strategic planning of the use of forest resources. It then becomes expedient to apply adaptation measures, substantial planting of trees, and urgent development of forest and game reserves to mitigate the environmental hazards.