Spatio-Temporal Analysis of Land Use Contribution to Greenhouse Gas Emissions in Kiambu County

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Abstract
This research project describes the possible relationship of greenhouse gas emission pattern with land use activities using a GIS approach. Ambient air quality measurements for nitrogen dioxide, carbon dioxide, and methane levels were obtained for Kiambu County using Google Earth Engine and NASA Giovanni for the years 2004, 2012 and 2022. Landsat 8 images and aerial photo derived maps used to map out the County's land use and land cover changes for the last two decades. Landsat data were classified using a classification tool in ArcMap to distinguish the different classes of interest which were; Urban and settlement, forest cover, agriculture, bare lands and road network. Greenhouse gas data from GoogleEarth engine and NASA Giovanni were interpolated using Inverse Distance Weighting (IDW) technique and the relationship between greenhouse gas emissions and land use was determined through map overlays and correlation analyses. The results show that an increase in anthropogenic activities e.g., urban development has led to a decrease in forest covers and vegetation which has led to increase in concentrations of greenhouse gases in the atmosphere. Furthermore, processing and classification enabled the computation of field total fluxes as the percentage of fluxes in different zones, considering the spatial variability of greenhouse gas fluxes within the region.
Key words: GIS, greenhouse fluxes, Kiambu