Wetlands mapping and AI-driven insights for enhanced Climate-Resilient Land Management in Rivers State, Nigeria (SDG 11 & 15)

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SUMMARY

Wetlands mapping for assessing wetland conversions and land use classification using satellite imagery and remote sensing techniques will pave the way for significant improvements in the management of wetlands in Rivers State, Nigeria. Rivers state is spatially located in the Niger Delta coastal region of Nigeria with a population of about 5,185,400 people and approximate size of 11,077km2. The area is changing rapidly due to urbanization where significant wetlands have been converted for other purposes posing consequences such as flooding, that are detrimental to the socio-economic well-being of the people and hinders the capacity of the state to have resilient cities. Therefore, efforts for conservation are being made to optimize the use of wetlands in the state. The aim of this work was to access the conversion of wetlands over 30years, from satellite derived spectral indices and Land Use classifications in parts of Rivers State from 1995-2025 and to determine the features existing on the lands. This was assessed linking the sustainable development goals and the available national wetland laws. Data acquisition from LandSat 4, 7 and 8 were acquired from the United State Geological Surveys (USGS) Earth explorer and data preprocessing was done on the imageries acquired using QGIS 3.34.9 to correct for atmospheric and radiometric issues in the datasets. Ground control spatial data were acquired for verification. LU/LC image supervised classification adopting the machine learning algorithm to provide enhanced results for the available wetlands area in 2025 was done using ArcGIS Pro, GeoAI tools. These provided the temporal changes over 30years. This change detection served as basis for informed decisions regarding this natural resource in line with national and international laws, having defined the specific drivers to be considered in the wise and optimal use of wetlands for environmental sustainability, enhanced Land Administration and Management.
