

Climate Change Induced Agro-Ecoclimatic Zonation (AEZ) for Resilience Rainfed Agriculture in the Savanna Ecological Zones of Nigeria

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Abstract

Global warming and climate change have continued to intensified, savanna and other vegetation zones are undergoing changes, while rainfall patterns and the general hydrologic regimes are not static; thus, the need to continuously monitor and update the agro and eco-climatic zones for enhanced resilience to climate change, agricultural productivity and sustainable livelihood. The research identified, collected and analysed location-specific field data on edaphic, vegetation, crop, and livestock across the savanna ecological zones of Nigeria using multi-stage sampling to select two-three states from each ecological zone; Guinea, Sudan and Sahel savanna. Similarly, observed 74 years daily rainfall, maximum and minimum temperature data from the archives of the Nigeria Meteorological Agency (NIMET) and Climate Prediction Centre (CPC) Merged Analysis of Precipitation were used to derive Onset ($\emptyset$), Cessation (C) of the rain, Hydrologic Growing Season (HGS), Aridity Index (AI) and Moisture Quality Index (MQI). These were analyzed, ranked, subjected to multi-temporal analysis, interpolated and used to determine temporal shifts in eco-climatic conditions within 1950-1984, 1985-2024 and 1950-2024. These variables were integrated to redefine the eco-climate zones, then integrated with vegetation, soil, crop cultivated and livestock variables to delineate the agro-climatic zones. The interpolated variables illustrates north-south dynamics of the eco-climatic conditions and climate change induced southward shift of the agro and eco-climatic zones across the study area. The identified climate change induced spatio-temporal transformation of the agro and eco-climatic zones are pertinent for effective adaptation, resilient rainfed agriculture and enhance climate change resilience across the fragile savanna agro ecological zones of Nigeria.