

Spatiotemporal Pattern of Vegetation Response to Rainfall Quality in the Sudano-Sahelian Ecological Zone, Nigeria

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ABSTRACT

The study examined the spatiotemporal patterns of vegetation response to rainfall quality in the Sudano-Sahelian Ecological Zone (SSEZ) of Nigeria. Rainfall data for 1981 to 2018 from the Climate Research Unit (CRU) and the United States Geological Survey (USGS) satellite imageries of the study area was used. The Monsoon Quality Index (MQI) and the Perpendicular Vegetation Index (PVI) methods were used for the analysis. The Monsoon Quality Index were used to determine the moisture quality (good or bad rainfall performance), while Perpendicular Vegetation Index was used to analyze the satellite images at the Infrared (IR) and Near Infrared (NIR) level. The result shows high variability in the amount of rainfall received across the ecological zone. The lowest average rainfall of 536mm was detected at Nguru while the highest was in Yelwa (1090.65mm). The analysis of rainfall quality shows that rainfall in the study area ranged from good at MQI value of <0.005 to extremely poor at MQI value of >0.02 . Yelwa station shows an MQI value <0.005 which indicates a good rainfall performance and in return has NDVI values between 0.440-0.874 and signifies healthy vegetation. The same pattern was observed in the Sokoto, station where MQI value is >0.02 , indicating extremely poor rainfall. This has implication for the vegetation vigour also because the NDVI falls between -2-0.09. The result shows that out of the eight (8) stations considered for this study, six (6) of the stations (Sokoto, Gusau, Katsina, Kano, Kaduna and Maiduguri) have NDVI values between -0.2-0.09 signifying poor vegetation vigour. However, Yelwa and Bauchi stations show NDVI values between 0.440-0.874 which signify healthy vegetation. The study shows a direct relationship between rainfall quality and vegetation vigour because the higher the rainfall quality, the healthier the vegetation and vice versa. The study recommends national green approach to restore the lost vegetation of the Sudano-Sahelian Ecological Zone to halt the loss of ecosystems and also mitigate the effect of climate change which has affected the quality of rainfall in the region.

Keywords: Rainfall, moisture quality Index, Normalised Difference in Vegetation Index.

1.0 INTRODUCTION

Rainfall and vegetation dynamics have been observed to be interconnected as the amount of rainfall received by vegetation is a major

factor determining its thickness or otherwise (Usman, 2000; Nayak *et al.*, 2005). For example, Studies reported that vegetation growth at high latitudes in some Northern