Climate Change and food insecurity implications on population of Guinea savanna part of Nigeria

By

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Extended Abstract

The recent impacts of rainfall variability on crop yield in Nigeria raise the question as to whether there will be enough food in Nigeria in the next century (IPCC, 2000). Various studies on the impacts of rainfall variability on crop yield have been carried out in different parts of the world and well established through decades of field experiments, statistical analyses of observed yields and monitoring of agricultural production by IPCC and other scholars. Prominent among these are the works by Rosenzweig and Hillel (1995), Tim (2000), FAO (2001), Chiew (2002), Haimson and Ennis (2004) and Adejuwon and Odekunle (2006). Some of these studies have shown significant impacts of climate variability on agricultural activities, especially during the last 40-year period. This study used GIS Kriging interpolation technique to examine and map the spatio-temporal impacts of rainfall variability on crop yields in the Guinea Savanna ecological zone of Nigeria. The specific objectives of the study were to develop a GIS database for inter-annual rainfall variability and crop yield in the study area between 1970 and 2000; map inter-annual changes in crop yield as a response to inter-annual rainfall variability in the study area; relate the spatio-temporal variability in rainfall with crop yields in the area; and asses the implications of climate change on population in the study area.

Materials and Methods

Both primary and secondary datasets were used for the study. The datasets on annual crop yield were obtained from the National Bureau of Statistics, Abuja while rainfall data were collected from the archives of the Nigerian Meteorological Services, Oshodi Lagos. Spatial datasets were developed using two phases of GIS database management; design phase and implementation phase. Three spatial interpolation methods; Inverse Distance Weighting (IDW) and the Spline and Ordinary Kriging were employed for the data analysis. Also, the dataset were analyzed using the coefficient of variation, correlation and regression analysis.

Results and discussions

The results yielded a model database that can be used to forecast trend in crop yield in relation to variability in rainfall. The maps produced revealed spatial relationships between crop yield and rainfall variability for various years. Also, the results of the correlation analysis revealed that rainfall variability was very high in most of Northern Guinea Savanna (e.g. Yola, Minna and Kaduna) with values of coefficient of variation between 26% and 49% while in Southern Guinea Savanna, the coefficient of variation is very low especially, in Enugu (9%) and Shaki (8%). The results confirmed the well known variabilities of rainfall in time and space. The spatial variability in rainfall reflected in crop yields as they also fluctuated from one year to the other, and varies from station to the other. For example, the proportion of variability in millet determined by total rainfall of the study area is 0.68, (at $p = 0.05$) while 0.62 for maize, 0.68 for cassava and the proportion for yam is 0.62 at $p = 0.05$. The results also showed

that April and May rainfall are the most determinants of maize and millet yield in most of the stations in the area. This implies that in Guinea Savanna, farmers could plant their maize and millet crops as from April.

In conclusion, the study examined rainfall variability impacts on crop yield and the findings are useful to determine approximately when farmers could plant maize, millet, cassava, and yam with the present variation in rainfall.

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