Detection and prediction of land use change impact on the streamflow regime in Sahelian river basin, Northwestern Nigeria

Detecting and predicting the impact of land use/land cover (LULC) changes on streamflow are crucial sources of information for the effective management and protection of land and water resources in Sahelian ecosystems such as the Hadejia river basin. In this study, LULC change detection was performed using ENVI, while the LULC modeling was conducted using the cellular automata (CA)–Markov in the IDRISI environment. However, the streamflow trend and variation were assessed using the Mann–Kendall (MK) trend test and the inverse distance weightage (IDW). Before the LULC modeling and projection (2030), the LULC was classified for 1990, 2000, and 2010 using supervised classification. Model output revealed a strong relationship between LULC and streamflow trend, thus, the decade 1990–2000 was the decade with high forest clearance and streamflow output, and consequently severe floods. However, the decade 2000–2010 witnessed land use expansion mainly via construction (3.4%). Meanwhile, the scenario will slightly change in the future as agriculture is projected to expand by about 9.3% from 2010 to 2030 due to the increased human population. Thus, food insecurity aggravated by climate change should be anticipated, and measures to avert/reduce their effects must be initiated.