KONKO, Yawo PhD/SPS/FT/2019/11130

ABSTRACT

Global warming is a worldwide phenomenon with disastrous implications ranging from ocean warming and glacier melting to sea level rise (SLR) and coastal damage. In recent decades, the majority of the world's coastal countries have seen tremendous population growth in their coastal districts. Coastal erosion is growing increasingly common as global temperatures rise, displacing coastal inhabitants and damaging towns and socioeconomic infrastructure, making sustainable management of coastal areas extremely difficult. One means for sustainable management and decision-making is to have information on the trend of climatic parameters at the local scale, the settlement pattern, the spatial distribution and dynamics of coastal peoples, the coastal erosion kinematics, the coastal erosion hotspots, the coastal vulnerability to SLR and inundation. This research contributes to the understanding of the range of climatic characteristics, spatial distribution and dynamics of coastal peoples, coastal erosion kinematics, and coastal sensitivity to SLR and inundation in Togo, West Africa. Images from satellites (Landsat and Sentinel-2), population data, field data, geographical data, and ground truth climatic data, specifically precipitation, temperature, wind speed, sunshine, and tidal gauge, were used from 1988 to 2020. The Mann-Kendall test and Sen's slope test were used to analyse the climate trends, while the Object-Based Image Analysis (OBIA) method was used to map settlement areas. The Support Vector Machine (SVM) method was used to extract the shoreline, and the kinematics were evaluated using the statistical linear regression method (LRR).The Integrated Valuation of Environmental Services and Tradeoffs (InVEST) for coastal vulnerability model was used to assess coastal vulnerability to SLR and inundation. Based on the findings, the temperature trend is significant at $\alpha = 0.001$, while the SLR exhibits a substantial annual trend at $\alpha = 0.05$.The temperature analysis showed an increase of trend of 0. 038 °C per year while the tidal gauge data analysis showed an increase of trend of 13.75 millimeters per year. The annual sunshine, annual wind speed and annual cumulative precipitation trend record variability which are not significant. However, the analysis of monthly sunshine identified significant trends at $\alpha = 0.1$ in April and September.According to statistical analysis of settlement dynamics, Togo's Maritime region, which had a population of 1,042,385 people in 1980, experienced population increase ranging from 2.06 per cent to 11.85 per cent between 1988 and 2020. The equivalent yearly expansion rate is 6.15 hectare per year from 1988 to 2000, 23.41 hectare per year from 2000 to 2015, and 40.16 hectare per year from 2015 to 2020. In 2022, the Maritime region has reached a population of 3,534,991 people. In addition, near the sea, the pattern of settlement areas is compacted with high density of peoples. In the inland this pattern is dispersed. In terms of shoreline kinematics, the Togolese coast has an average erosion rate ranging from 1.66 to 5.25 metre per year. Four high coastal erosion zones have been reported in the Alogavi, Devi-Kinme, Agbavi, and Baguida sectors. One high accretion zone was detected in the port region, near Adawlato sector. For coastal vulnerability model, high vulnerability is observed on the Baguida-Agbodrafo section, moderate vulnerability is observed in the Adawlato area and Agbodrafo-Aneho section, the low vulnerability is located in the port area. According to the findings, land in Togo's coastal zone is in great demand, the rate of settlement is increasing, and the

temperature and sea level are rising. Taking this information into account can help to determine the extent of climate change phenomena and draw up suitable coastal management and adaptation plans at the country scale.