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Impact of climate change on seasonal erosion and accretion patterns of sandy coast in Africa

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Abstract

The coast is very important providing habitat huge part of the world's population marine ecosystem, marine infrastructure and also essential for tourism. However, coastal erosion is one of challenging issue in coastal zone management because of its devastating impact on the economy and natural systems. The effect of climate change is expected to be critical in coastal areas which may result in change in erosion and sedimentation pattern. This study analyses the impact of climate change on the sediment budget of the coastline of Africa under the various Shared Socio-economic Pathways (SSP 2.6, 4.5 and 8.5) scenarios as prescribed by the Intergovernmental Panel on Climate Change (IPCC). For the purpose of analysis and visualisation, the coastline of Africa was demarcated into 7 regions; the Western Coast, the Gulf of Guinea, Southwest coast, southeast coast, Eastern, Red Sea coast, North coast and Madagascar. The sediment budget for each coastal section (~5 km long) was determined as the difference between the total amount of sediment transported in and out of that section. Basic inputs for the analysis were based on the First Institute of Oceanography-Earth System Model version 2.0 (FIO-ESM v2.0). Analysis showed significant change in the future for all the seasons compared to past. the change was more in the Autumn with a median value of -14.54%, -13.95% and -11.04% and Spring; 31.42%, 29.95% and 28.59% (for the SSP1 26, SSP245 and SSP585 respectively). Summer and Winter periods showed relatively low change in sediment budget. The rate of erosion in Autumn reduces whereas the rate of accretion in Spring increases towards the end of the century. In terms of spatial variation, the Southeast and the Madagascar coast is likely to experience higher rate of erosion whereas the Gulf of Guinea region is expected experience relatively high rate of accretion.

Keywords

climate change , erosion, sediment budget, Africa