MARINE AND COASTAL AREAS MANAGEMENT IN WESTERN AFRICA

GLOBAL MONITORING FOR ENVIRONMENT AND SECURITY (GMES),
& AFRICA PROGRAMME

COASTAL VULNERABILITY OF WEST AFRICA

APRIL, 2020
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INTRODUCTION

Shoreline monitoring is important for ensuring the protection of coastal areas and providing information on the dynamics of the coast. Shorelines change within short to long term periods and it is important that monitoring mechanisms are put in place to allow provision of timely information on the evolution of the coast. The coast provides an enabling environment for diverse economic activities, including tourism, fish landing, habitats for fauna and flora, among others. In light of the benefits derived from the coast, coupled with the threats of rapid erosion in the face of changing climate, an approach is required to address these challenges. It is in line with this objective that the GMES and Africa Programme at the University of Ghana is coordinating efforts in the twelve ECOWAS coastal countries to provide information to coastal managers and relevant decision making bodies. This effort makes use of suite of oceanographic datasets obtained from national institutions, international collaborators, and open source domains.

COASTAL DYNAMICS

The changes in the coastal zone areas are mostly caused by nearshore processes, beach morphology and anthropogenic activities. Regular engineering and development activities along coastal areas and naturally occurring phenomena near the coasts induce changes on coastal landforms. Urbanization, global warming, climate change and sea-level rise engender coastal hazards that lead to drastic changes along the coast (Joevivek et al., 2013). Globally, due to climate change the coast is constantly affected by flooding, accelerated sea-level rise with elevated tidal inundation, accelerated erosion, rising water tables and increased saltwater intrusion (Balica et al., 2012). According to the current Intergovernmental Panel on Climate Change (IPCC), globally averaged sea rise of over 30 cm is expected to occur within this century. Storms are expected to become intense with increased wind speeds. Over-washing and overtopping by waves will cause frequent flooding events which will impact severely on coastal communities. Computation of an index of coastal vulnerability which incorporates key parameters of geo-physical, economic, social factors provides an objective way for coastal managers to make appropriate interventions in the midst of limited resources and competing demands.
SHORELINE CHANGE OF WEST AFRICA

The area under consideration spans the coast of Senegal in the north west of Africa to down to Cameroon in the south. This region is very dynamic within the context of morphological processes influenced by human activities. Data for computation of shoreline rate of change was obtained from Copernicus Sentinel-1 data of May 2015 and December 2018. Pre-processing of the data was carried out using the SNAP toolbox and then with QGIS. Shoreline change analysis was conducted with the open source AMBUR software application which enabled calculation of shoreline End-Point-Rate (EPR) of change for designated transects. Sections of the shoreline was validated using high resolution images acquired with an unmanned aerial vehicle.

The results showed a general loss of land to the sea, with some areas experiencing high rates of erosion interspersed with moderate accretion of sediments in some areas. From the analysis, it was observed that the rate of erosion ranged between 1 m/year to about 30 m/year with an average rate of 10 m/year (± 0.5 m/year) (Figure 1). Notwithstanding this astronomical rate of loss of land to the sea, some areas also recorded accretion up to about 10 m/year. However, some local areas recorded about 50 m/year (Figure 1). The countries that recorded the highest rates of erosion were Guinea, Nigeria, Liberia, Senegal, Guinea Bissau and Ghana. The uncertainty in shoreline change obtained from sentinel-1 images using the adopted methods for shoreline extraction was approximately 20 meters.
The findings in this report is very alarming! In three and a half years, as much as seventy to one hundred meters (70 - 100 m) of beaches have been lost at some locations in West Africa. Other places also continue to lose their beaches, although at a relatively lower rate. This means that in the next three to four years many coastal communities will lose their dwellings to the sea. The impact of this would be enormous on local economies, requiring governments to allocate resources to settle retreating communities. In addition to losing taxes from the hospitality industry scattered along the beautiful beaches of West Africa, fishing activities would also be negatively impacted. In Ghana, for example, the fisheries sector employs about 2.4 million individuals or 10% of the population (NPOA, 2014). The artisanal fisheries is estimated to contribute about 3% to national GDP and generate revenue of $341 million annually (Belhabib, 2015). The story is similar in the other countries.
The situation requires urgent policy actions to be taken by governments in the hope of mitigating the impacts of shoreline recession – an action which must be tackled regionally. The following measures, though not new, are pertinent in addressing the challenges confronting the region:

i. Development of a framework to initiate, expand, and/or improve the management of coastal resources in safeguarding ecosystem health and human livelihoods;

ii. Strengthening existing legislations and policies to incorporate better marine spatial planning strategies unique to each location within the context of the Blue Economy Agenda;

iii. Resource programmes that contribute to raising awareness of the public about climate change and environmental threats, while building on existing indigenous knowledge and value systems;

iv. Investment in soft engineering shoreline protection strategies in locations considered to be of high value.

CONCLUSION

The Coastal Vulnerability Indices (CVI) service bulletin produced by the Regional Marine Centre provides information on vulnerability of shorelines to users of the marine environment, especially policy makers, coastal dwellers and Environment Managers for improved decision making on the use of coastal areas. This service forms part of the Global Monitoring for Environment and Security (GMES) & Africa programme. This issue focuses on shoreline change of the entire West African sub-region. It is targeted at stakeholders of the marine environment, specifically policy makers, environment officers, researchers, private entities as well as interested individuals for planning purposes.

ACKNOWLEDGEMENTS

The Coastal and Marine Resources Management of Western Africa project is part of the continent-wide Global Monitoring for Environment and Security, and Africa programme under the auspices of the African Union Commission (AUC), and supported by the European Commission (EC). Satellite data used for generating products in this bulletin were mainly obtained from the EU Copernicus programme. The University of Ghana Consortium implementing the project in the 12 ECOWAS countries duly acknowledges the kind support of the AUC and EC.
FURTHER READING


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