



KNOWLEDGE SHEET 6

The Effects of Climate Change on Coastal Erosion in West Africa

The effects of climate change—from changing precipitation patterns to rising seas—will exacerbate the coastal erosion already affecting West Africa, increasing the exposure and vulnerability of the people and assets located there. Given the importance of the coastal zone to the region as a whole, it is critical that policymakers consider the effects of future climate change in the decisions they make today.

Challenges

Many factors, both natural and human related, drive coastal erosion. The main causes are the depositing and removal of sediment, which occur via natural processes, such as coastal drift and river discharge.

Human activity can exacerbate erosion in multiple ways. It can affect the removal of sediment, through direct extraction or the creation of surfaces that disrupt the natural processes. Much more important is the disruptive effect on the supply of sediment, caused largely by dams, which interrupt the natural flow of rivers, preventing sediment from reaching coastal areas. The decline in coastal mangrove populations, which trap sediment where it is needed also contribute to coastal erosion, and climate change can affect natural resources such as these through changing temperatures, increasing salinity of groundwater and coastal estuaries, and alterations in river dynamics.

The combination of these factors has led to severe land and shoreline loss. The socioeconomic impacts are massive, because coastal areas are home to millions of people and billions of dollars of infrastructure. In addition, rising sea levels, intensifying storm surge, and extreme precipitation are likely to accentuate coastal erosion events.

By 2100 average sea levels are projected to rise 0.26–0.63 meters in low-emissions scenarios and 0.33–0.82 meters in high-emission scenarios (IPCC 2013). Sea-level rise

KEY CLIMATE IMPACTS ON COASTAL EROSION

- Rising sea levels, intensifying storm surge, and extreme precipitation are likely to accentuate coastal erosion events, with significant socio-economic impacts.
- Changing precipitation patterns could decrease the overall rainfall volumes in West Africa, which would further reduce the flow of rivers in the region, thus leading to a decrease in sedimentation deposits, in turn causing increased erosion rates.
- The combination of higher temperatures, increasing salinity of coastal estuaries and groundwater resources, and alterations in river dynamics from changes in rainfall may continue to exacerbate the loss of natural ecosystems and resources located along the coast.

will not be uniform across regions, however, because of factors such as land subsidence. Sea levels along the West African coast are expected to rise faster than the global average (UEMOA 2010). In addition, changing

precipitation patterns could decrease annual rainfall in the region, reducing river flows and the concomitant delivery of sediment to coastal areas.

Population growth, urbanization, and migration have led to the concentration of populations, infrastructure, and economic assets in the coastal areas of West Africa,

Solutions

In thinking about the resilience measures available to address the challenges facing West African coastal areas, it helps to use a conceptual framework. One intuitive method for doing so groups potential measures into five categories:

- policy development and planning
- hard measures (infrastructure)
- soft measures (including ecosystem and community-based adaptation)
- capacity building
- knowledge management and climate information services

Resilience measures can be integrated into programs and investments by modifying the intervention to account for climate change—by scaling up monitoring systems for climate events or changing the design of infrastructure to account for future floods, for example.

Local adaptation actions are important to the communities they serve, but they are a piece of a much bigger puzzle. Long-term resilience needs to be addressed at the national and regional levels, because activities in one part of the region can affect areas elsewhere.

increasing stress on natural resources. Climate change could exacerbate these trends, as droughts inland—which are expected to become more frequent and intense as a result of higher temperatures and changing precipitation patterns—drive rural populations from the hinterland toward the urban centers of the coast in search of economic opportunity.

Development of long-term land use plans that account for climate change and direct development away from areas with high exposure to climate-related hazards will be critical. Coupled with conservation efforts, particularly for mangrove forests, this will help reduce coastal erosion.

Regional cooperation is challenging, but it has been successful in many places, particularly where the issue addressed presented an existential challenge to the countries affected. Efforts to build trust and coordinate efforts will help policymakers protect the lives and livelihoods of the people in the region and allow their countries to build on the development gains made in recent years rather than see them rolled back as a result of climate change.

REFERENCES

- IPCC (Intergovernmental Panel on Climate Change). 2013. "Summary for Policymakers." In *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.
- UEMOA (West African Economic and Monetary Union). 2010. Regional Shoreline Monitoring Study and Drawing up of a Management Scheme for the West African Coastal Area. Regional Diagnostic.

The West Africa Coastal Areas Management Program (WACA) is a convening platform that aims to assist West African countries to sustainably manage their coastal areas and enhance socio-economic resilience to the effects of climate change. The program also seeks to facilitate access to technical expertise and financial resources for participating countries.



www.worldbank.org/waca