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RESEARCH OF THE IMPACT OF COASTAL POLLUTION AND DEGRADATION IN WEST AFRICA

According to; Vikas, M., & Dwarakish, G. S. (2015). Coastal pollution: a review. Aquatic Procedia, 4, 381-388.

There can be many causes of coastal pollution. Depending upon the position, the extent of pollution varies. The primary origin of pollution being the humans can be separated as the pollution by humans on the soil and off the ground.

The objective of this particular write-up is to gather information on the sources and causes of coastal pollution and degradation in West Africa, and to highlight the economic implications of coastal pollution and degradation.

This study estimates in monetary terms the Cost of Environmental Degradation (COED) in the coastal areas of Benin, Côte d'Ivoire, Senegal, and Togo. Specifically, it values the impacts of degradation that occur during one year, as a result of three major factors: flooding, erosion, and pollution.

Keywords: *Coastal pollution, marine environment, hazards, ecosystem, environmental degradation, flooding, water pollution.*

Introduction. *The definition of coastal pollution by the World Health Organization goes like this "The introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects such as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities" [1].*

The coasts of West Africa are home to large marine ecosystems (the Canary Islands, Guinea and Benguela currents), mangroves, wetlands and several hundred species of fish. With more than a third of the region's population living along the coast, these natural assets allow several million people to live off the resources of fishing, aquaculture and tourism. However, the West African marine and coastal environment is under pressure from a multitude of threats that seriously affect its health and the populations that depend on it: coastal erosion, the impacts of climate change and ocean acidification, but also of the development of offshore activities, overfishing, land-based pollution [2]. Coastal pollution as well affects the quality of groundwater as a result of runoffs. Groundwater is mostly believed to be clean since it is below the earth surface but most human activities and many natural processes affect the interaction of groundwater. It is known that surface water is hydraulically connected to groundwater even though the interactions are difficult to observe and measure [3].

Purpose and objectives of the research. *The purpose of this research is to identify the driving coastal pollutants and find appropriate mitigation strategies.*

The main objectives are: to review the impact of pollution and degradation in West Africa's coastal areas, to gather information on the sources and causes of coastal pollution and degradation in West Africa, to highlight the economic implications of coastal pollution and degradation in West Africa, to analyze the data on marine litter at the West African beaches, to suggest management strategies to mitigate coastal pollution, and again, to assess groundwater and heavy metal release into coastal water bodies as a result of some human activities.

Research materials and results

Water pollution, erosion and flooding are the latest lasting effects from natural disaster on the West African coast. Costs of the damages are some of the biggest concerns [4].

West Africa's coastal areas host about one third of the region's population and generate 56 percent of its GDP. They are home for valuable wetlands, fisheries, oil and gas reserves, and high tourism potential. However, these areas are affected by severe pressures: rapid urbanization along the coast has increased the demands on land, water, and other natural resources; man-made infrastructure and sand extraction have contributed to significant coastal retreat; moreover, climate change and disaster risks are exacerbating these threats. As a result, coastal areas are undergoing alarming environmental degradation leading to deaths (due to floods, air and water pollution), losses of assets (houses, infrastructure) and damages to critical ecosystems (mangroves, marine habitat) [5].

A study estimates in monetary terms the Cost of Environmental Degradation (COED) in the coastal areas of Benin, Côte d'Ivoire, Senegal, and Togo. Specifically, it values the impacts of degradation that occur during one year, as a result of three major factors: flooding, erosion, and pollution (from water, air and waste). The final results are expressed in 2017 prices. They are reflected in absolute (US$) and in relative terms, as percentage of the countries' [5].

Overall, the COED of the four countries is estimated at about US$3.8 billion, or 5.3 percent of the countries' GDP in 2017. Flooding and erosion are the main forms of degradation, accounting for more than 60 percent of the total cost (Fig. 2.5). Moreover, coastal degradation causes over 13,000 deaths a year, primarily due to air and water pollution, and to floods [5].

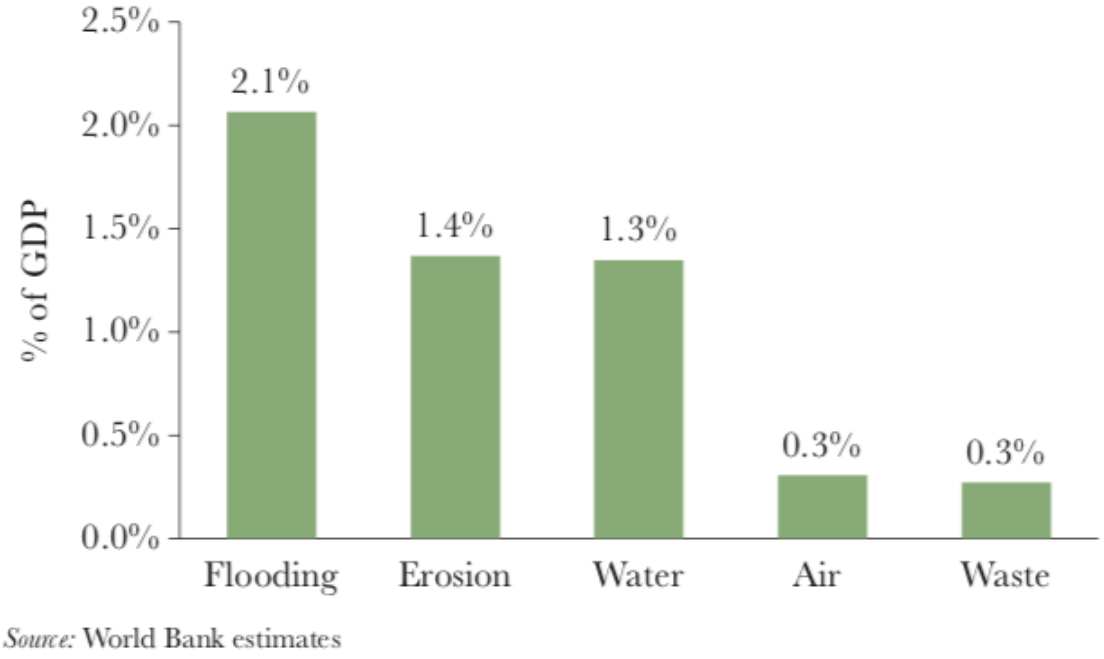

Figure 1 – Estimated COED by category, 2017

At the country level, coastal degradation imposes costs varying between 2.5 percent of GDP in Benin to 7.6 percent of GDP in Senegal in 2017.

These estimates are the result of three major factors affecting the coastal area [5]:

- **Flooding** due to high rainfalls (pluvial floods) and overflowing rivers (fluvial floods) causes deaths and leads to major damage to houses, infrastructure and critical ecosystems, such as beaches and mangroves. Floods are extremely damaging in Côte d'Ivoire, costing society US$1.2 billion per year, mainly due to large areas affected by pluvial floods. In the other countries, flooded areas and the associated water depths are smaller, leading to comparatively lower flooding costs.
- **Erosion** is a result of both natural and human factors. Some areas have no erosion at all, others have land losses (erosion), and others have land gains (accretion). About 56 percent of the coastline in Benin, Côte d'Ivoire, Senegal and Togo is subject to an average erosion of 1.8

meters per year. Erosion is the most damaging factor in Benin, Senegal, and Togo, primarily due to losses of high value urban land. The highest cost, estimated at US$0.5 billion per year, occurs in Senegal. In all countries, the cost of erosion is expected to increase considerably in the future, as the phenomenon is likely to affect larger urban areas.

- **Pollution** from air, water and waste mismanagement imposes an important toll on people's health and quality of life. It can reach as high as US$0.7 billion, in Côte d'Ivoire. In all countries, unsafe water, sanitation, and hygiene are particularly harmful, causing more than 10,000 deaths per year; they affect primarily Côte d'Ivoire and Senegal, with more than 4,000 deaths per country. Air pollution and waste mismanagement are also important forms of degradation, but are considerably under-estimated: the cost of air pollution (2,500 deaths) refers only to the impacts of fine particulate matter in the countries' capitals, while the cost of waste covers only the effects of insufficient collection and inappropriate disposal of municipal waste.

Conclusion. *Water pollution generally has been the most dominant type of pollution in the coastal areas of West Africa. Results from this specific study and analysis justifies the fact of water pollution dominance and how much cost that is imposed in some West African countries. From the study, flooding has the highest percentage of GDP (Gross Domestic Products) from the estimated Cost of Environmental Degradation (COED).*

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