

## OWARDS SUSTAINABLE COASTAL HAZARD MANAGEMENT IN NIGERI

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**Abstract:** In Nigeria, flooding, erosion and oil pollution have constituted most critical elements of coastal hazards. This paper highlights the dimensions, nature and characteristics of these phenomena. As such, it discusses their management and evolves sustainable preventive options. This paper further examines the problem, geographical, physical and human setting, land use planning, population growth and distribution, causes of pollution, impact of flooding and de-flooding programmes. It further submits strategies for future systems improvement in flood and pollution control, and advocates appropriate policy options such as socio-economic, technical, cultural, environmental, administrative and legislative. Other adaptive and institutional responses are suggested, for effective coastal shore protection and preservation. The possibility aspects of state and local institutional responses, role of education, funding and global partnerships and understanding are examined.

The paper discovered a large array of rules and regulation, as well as laws, but the implementation, monitoring, compliance, political will and attitude have been extremely weak, thereby exposing the coastal environment to dangers. A comprehensive and multidimensional coastal management is essential for hazard reduction in any maritime nation.

### 1. INTRODUCTION

This paper seeks to espouse the state of the art in coastal hazards as they relate to causes effects and management of pollution and flooding. One is confined to the coastal water around the shores and areas within thirty nautical points off the shores of Nigeria.

The management of pollution and flooding is discussed mainly because of the high frequency of their occurrence and the devastating consequences in human activities. These human activities include productive fishing practice, water transportation, tourism etc. urgent steps must be taken especially as strategies thus legal framework, proper monitoring of activities vulnerable flooding, planning of flood control strategies and evolving a range of responses.

The Federal Government of Nigeria has no doubt evolved management strategies for flood control but coastal hazards control needs thorough examination and detailed Action Plan.

### 2. ISSUES

With regards to flooding in the Nigerian situation, coastal flooding is the most peculiar and emphasized here. Flooding accounts for about 40% of fatalities from natural disasters.

A relationship has been found to exist between the facts of man's environment, sustainable development and flooding. Flooding arises from rainfall – most relationships such that when rainfall intensity exceeds the infiltration capacity of the soil, excess water is generated. One of the major factors, which, influences the infiltration capacity of the soil, is urbanization. Unplanned and haphazard economic, political and social development, which is in conflict with the environment, must be checked because humanity at present is confronting a self-generated environmental crisis, where he is the initiator and the oppressed.

An integrated approach to the management of flooding is rooted in the potential of humans to unite, preserve, understand their role in what afflicts them, and to take a common action.

Flooding, as coastal hazard is obvious in areas characterized by high precipitation, run-offs from rivers and urban chains tidal movement and winds. The shores of the Niger Delta and the Victoria Island coast are prone to these problems. It is becoming an annual problem.

The high amount of annual rainfall, which is above 2500mm in coastal Lagos and the Niger Delta, contributes to the high volume of water during wet seasons. Like the Mozambique, Mississippi, and southern Asian floods almost becoming annual events, flood as coastal hazard in Nigeria has contributed to displacement of coastal settlements, the people and farmlands, submerging of lands for tourism e.g. the Victoria Island Beach, wearing away of valuable soils etc.

A sustainable management strategy for flood control such as a socio-economic, technical, cultural, environmental, administrative and legislative are examined in this paper.

### **3. STUDY AREA**

The study area is Nigeria. It is one of the maritime countries in Africa. It lies within the tropics along the Gulf of Guinea, on the western coast of Africa. The Republic of Benin, bound it on the west on the east by Republic of Cameroon, on the south by the Atlantic Ocean. Its land coverage is 923.768 square kilometres and has an estimated population of 120 million people.

There are many rivers and rivulets along the coast. Prominent among them are the Ogun River in the west which flows into the Lagos Lagoon. The Escravos and Forcados whose terminals are renowned for hosting the crude oil Tankers; the Bonny River which provides Port Harcourt with an outlet to the sea and the Cross River System with the Imo and Qua-Iboe Rivers.

Nigeria is the sixth largest producer of crude petroleum oil in the world and the second in Africa. The production of crude petroleum oil, which was about 2 million barrels a day in 1980, has slumped as a result of the oil glut. Crude oil constitutes about 90 percent of the country's total export whereas the externalities from the oil sector are enormous, especially *oil spillage* and *pollution* on the oil producing regions.

The climate and the drainage pattern of the coastal parts of the country contribute to flooding as a coastal hazard. This is evident in the annual rainfall of more than 2500mm which is the high along the coast of West Africa. It is experienced in places like Lagos, Warri, Forcados, Calabar and Port Harcourt and some settlements in other West African countries e.g. Freetown. Similarly, the lowlands (plains) of the coastal parts of Nigeria especially the Niger Delta and Lagos State which is below sea level contribute immensely to annual flooding and movement of pollutants towards the shores.

### **4. TOWARDS SUSTAINABLE COASTAL HAZARD MANAGEMENT**

It is obvious that the Federal Government of Nigeria and her agencies such as the Nigeria Maritime Authority etc are aware of the various conventions and marine conservation efforts of the International Maritime Organisation and other organisations. Such conventions include the protocol of 1978 (or MARPOL 1973/1978). The bottlenecks remain implementation or enforcement of the various laws aimed at conserving and restoring the natural state of the seas.

#### **4.1 PREVENTING MARINE POLLUTION**

For over thirty-five years, the pollution of the world's oceans has become a matter of increasing international concern. Most of it comes from land –based sources and includes the by-products of industry, run-off from agricultural pesticides and herbicides and effluents discharged from urban areas.

Nevertheless, a very significant amount of pollution is caused by shipping and coastal activities generally.

#### **4.2 THE SHIPPING ACTIVITIES AND OIL POLLUTION CONTROL**

In tonnage terms, the most important pollutant resulting from shipping operations is oil. The National Academy of Science (NAS) of the United States estimated in 1980 that 3.54 million tons of oil entered the sea every year. Some 1.5 million tons of which resulted from the transport of oil by sea (the remainder came from land-based activities and included industrial wastes, urban run-off and natural seeps). A much greater quantity of oil enters the sea as a result of normal tanker operations, usually associated with the cleaning of cargo residues (clingage) which takes place when the ship is returning from the port of discharge to take on another cargo of oil.

During ballasting and cleaning, as much as half of this can be lost overboard unless slops are retained on board. In tonnage terms, this is still probably the biggest source of oil pollution from ships – about 700,000 tons a year.

### **5. NIGERIA CASE**

#### **5.1 GARBAGE AND SEWAGE**

Garbage and sewage from ships have traditionally been dumped into the sea as a matter of course, and in relation to the amount of similar wastes poured into the sea each year from the land. Today, there is excessive growth of substances such as plastics which are non-bio degradable: once thrown into the sea, they are extremely persistent and potentially harmful if ingested by sea and marine animals. The aesthetic quality of coastlines and beaches has also been devalued by the accumulation of such wastes. The amount of wastes generated by ships can be prodigious. Recent studies carried on Nigerian coastline showed that certain members of merchant ships screw dumped over board about 600 cardboards and paper boxes; 500 plastic beer-can holders, 190 plastic bags, ten plastic drums, metal drums, 300 bottles and certain quantities of toxic wastes.

#### **5.2 LAND GENERATED SOLID & LIQUID NOXIOUS WASTES**

In Nigeria, quantities of industrial, household and municipal wastes (mainly sewage and transport-related sedge) generated on shore are disposed of by dumping at sea. Most of these materials are such that the marine environment can assimilate them with harmful effects on sea animals and human beings as well as the physical environment.

Marine pollution no doubt is an international problem means that the maritime countries of the world combing their resources and acting together can only effectively tackle pollution. Therefore, the intensification and continued pursuance of *IMO* measures must be seriously considered such as:

- Preventing operational pollution
- Reducing accidents
- Reducing the consequences of accidents
- Providing compensations
- Helping implementation

This paper re-examine some conventions in order to put in place instruments for their implementation in Nigeria. The Nigerian Maritime Authority and the Federal Environmental Protection Agency should be more pragmatic and practical in implementing the following:

- a. The United Nations Convention on the Law of the Sea (UNCLOS) 1982.
- b. International Convention for the Prevention of Pollution from Ships 1973 as modified the protocol of 1978 (or MARPOL 73/78)
- c. The Convention for the Prevention of Marine Pollution by Dumping of Wastes and other

- matter 1972 or London Dumping Convention, LDC, controls incineration at sea.
- d. The 1992 Convention for the protection of the Marine Environment of the Northeast Atlantic which can be adapted by Nigeria and other nations.
  - e. The Paris Convention which came into force in 1978 and applies to Northeast Atlantic including the North Sea. The Paris Commission (PARCOM) administers it.
  - f. Convention for the prevention of Marine pollution by Dumping from ships and Aircraft 1972 or Osho Convention.
  - g. OIL Pol 1954 as amended in 1962 and 1969 came into force in 1958. Instead of explicitly discussing these convention one would advise that the Nigerian Government Environmental Agency should review those convention and implements them.
- In addition, the Government should:
- i. Reduce minimally the transshipment of chemicals and oil within her territorial waters. Although, the transport of oil and other hazardous substances cannot be eliminated in the short term, much can be done by National Maritime Authority (NMA), Federal Environmental Protection Agency (FEPA), Shipping companies, oil companies to minimize the risks of major and minor pollution incidents.
  - ii. Eliminate, as far as possible, the transshipment of water chemicals and oil, which should be recycled or dealt with as near to the point of production or use as possible.

### **5.3 FLOODS AND FLOOD CONTROL**

The high volume of water in the Atlantic Ocean resulting from high precipitation along the coast in southern Nigeria has always been given attention. In Nigeria, the federal government, through Federal Environmental Protection Agency and the World Bank had produced flood maps of areas affected by flood. The study actually recognized areas with normal and abnormal flooding. State Governments are not left out in solving flood problems, but their emphasis are on urban flooding and not of coastal hazard magnitude.

Dredging of coastal parts of the Atlantic Ocean in Nigeria has attracted huge financial involvement on the part of the federal government. The most recent is the billions of Naira spent with the view to solving coastal flood problems in southwestern Nigeria, Victoria Island, Lagos in particular.

The Federal government through the Federal Ministry of Works and Housing has arranged the dumping of massive rocks along the Victoria Island beach. This may act as wave breaks and embankment. The aim is to reduce the force and the velocity of backwash and swash action of waves.

Apart from this there are construction works in coastal and flood prone areas in Nigeria. The shores of the Atlantic Ocean in Victoria Island are covered using concrete in order for shores to withstand the influence of waves. The effort started in the 1990's.

Damming of streams, failures of dams, dredging and unplanned channelization of streams all lead to flooding especially in the Niger Delta of Nigeria. In order to solve the problem of man induced floods, which are becoming a feature of the Niger Delta area. Human interference with the courses of stream channels during various construction works must be monitored.

Durotoye B. (2000) claimed that in periods of extra-ordinary heavy rainfall, it might spill disaster (on the communities in the neighborhoods). Similarly tidal floods need a serious attention. The coastal areas and mangrove swamps of the Niger Delta areas naturally experience high tidal range causing the diurnal flooding of the areas by Ocean water and this creates the brackish water environment. Ocean surges similar to what has been mentioned in the case of coastal Lagos can be solved through dredging and building of embankments. Fresh water is becoming increasingly polluted.

Table 1 and 2 show the adopted PAR Model and its framework and towns with recent cases of floods respectively.

**Table 1** The Progression of safety

ADDRESS ROOT CAUSES	REDUCE PRESSURE	ACHIEVE SAFETY	REDUCE DISASTER RISK	REDUCE HAZARD RANGE OF MEASURES THAT CAN REDUCE FLOOD HAZARD
<ul style="list-style-type: none"> <li>▪ Increase Access to Policy Making on Flood/Pollution Reduction</li> <li>▪ Access to Viable Resources</li> <li>▪ A conducive and Democratic environment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ethical Standard Development</li> <li>▪ Enlightenment Programme</li> <li>▪ Provision of Basic Infrastructure</li> <li>▪ Population Growth and Migration figures factored into development policies</li> </ul>	<ul style="list-style-type: none"> <li>▪ Protected Environment</li> <li>▪ Preventive Strategies</li> <li>▪ Public Action</li> </ul>	<ul style="list-style-type: none"> <li>▪ Aim for a Controlled Situation/Reduction of Impacts</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adequate Policies made and implemented</li> <li>▪ Construction and Maintenance of Infrastructure</li> <li>▪ Controls</li> </ul>

PAR MODEL: The Release of “Pressures” to reduce flood disaster.

**Table 2** Towns with recent cases of flood

S/N	TOWN	STATE	SIZE	LOCATION
1	Victoria Island	Lagos	Large	Ocean Surge
2	Port Harcourt	Rivers	Large	Urban Flood Plain
3	Buguma	Rivers	Medium	Lower Flood Plain
4	Ahoada	Rivers	Medium	Upper Flood Plain
5	Bori	Rivers	Medium	Upper Flood Plain
6	Bonny Island	Rivers	Small	Beach Ridge Complex
7	Bokana	Rivers	Small	Lower Flood Plain
8	Yenegoa	Bayelsa	Medium	Upper Flood Plain
9	Brass	Bayelsa	Small	Beach Flood Plain
10	Nembe	Bayelsa	Medium	Lower Flood Plain
11	Akassa	Bayelsa	Small	Beach Ridge Complex
12	Sagbama	Bayelsa	Small	Upper Flood Plain
13	Kaiama	Bayelsa	Small	Lower Flood Plain
14	Warri	Delta	Small	Upper Flood Plain
15	Burutu	Delta	Medium	Lower Flood Plain
16	Koko	Delta	Small	Upper Flood Plain
17	Bomadi	Delta	Small	Upper Flood Plain
18	Forcados(New)	Delta	Small	Beach Ridge Complex
19	Patani	Delta	Small	Lower Flood Plain

Source: Durotoye B. (2000), Environment problems of the Niger Delta.

A strong political determination as adopted by the United Nations General Assembly is of strategic importance in solving pollution and flood related problems. The resolutions stress that “the need” for the international community to demonstrate the strong political determination required the mobilization and use of existing scientific and technical knowledge to mitigate natural disasters, bearing in mind in particular, the needs of the developing countries including Nigeria.

## 6. CONCLUSION

A thorough review of maritime activities and management points to some clear conclusion. It has been revealed that the open oceans although showing detectable signs of man's activities are not polluted. The margins of the seas on the other hand are under great pressure. Habitats are being lost to coastal encroachment, eutrophication is degrading sheltered coastal regions, and synthetic organic compounds are building up in the tropics. Some of the mechanism for precaution and control of marine pollution are in place but not fully operated, while others remain to be developed. If international actions can be taken at once, an improvement in coastal hazard management could be seen in the near future.

## REFERENCES

- Durotoye, B. (2000): Geo-Environmental Constraint in the Development of the Niger Delta Area of Nigeria (Akinjide Oshuntokun Eds. – Environmental Problems of the Niger Delta). Fredrick Ebert Foundation, Lagos.
- Guardian (1979): In Segun Ogunleye's Pollution – An Environmental Malediction in the Niger Delta (Oshuntokun A. Eds. - Environmental Problems of the Niger Delta, 2000). Fredrick Ebert Foundation, Lagos.
- National Concord (1992): In Segun Ogunleye's Pollution – An Environmental Malediction in the Niger Delta (Oshuntokun A. Eds. - Environmental Problems of the Niger Delta, 2000). Fredrick Ebert Foundation, Lagos.
- Olukoju, Ayodeji (1997): Nigeria Coastal Zone: Environmental Problems, Responses and Suggested Remedies (Oshuntokun A. Eds. – Dimensions of Environmental Problems in Nigeria) Davidson Press, University of Ibadan, Nigeria.
- Onyehialam, A.I (1999): Making our Environment Safer before Disaster Strikes – A case study of Flooding in Ikorodu Local Government with special reference to Majidun-Owutu Environs, Lagos (Unpublished dissertation submitted to the Department of Geography, University of Lagos, Nigeria).
- Osservatoria, Yesuviano (1992): "Stop Disaster – International Decade for National Disaster Reduction" – IDNDR Secretariat.
- Singh, R. B. Ed. (1994): Disasters Environment and Development. Oxford and IBH.
- W.W.WUK(1993): "Briefing on Pollution from Merchant Shipping (Fighting to save our National Word)". Waste Management International Plc.