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Monographic issue

Risk, response and resilience to flood of Southern Nigeria

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Letter from the Editor

The Emergency and Disaster Reports is a journal edited by the Unit for Research in Emergency and Disaster of the Department of Medicine of the University of Oviedo aimed to introduce research papers, monographic reviews, and technical reports related to the fields of Medicine and Public Health in the contexts of emergency and disaster. Both situations are events that can deeply affect the health, the economy, the environment, and the development of the affected populations.

The topics covered by the journal include a wide range of issues related to the different dimensions of the phenomena of emergency and disaster, ranging from the study of the risk factors, patterns of frequency and distribution, characteristics, impacts, prevention, preparedness, mitigation, response, humanitarian aid, standards of intervention, operative research, recovery, rehabilitation, resilience and policies, strategies, and actions to address these phenomena from a risk reduction approach. In the last thirty years has been substantial progress in the above-mentioned areas in part thanks to a better scientific knowledge of the subject. The journal aims to contribute to this progress by facilitating the dissemination of the results of research in this field.

The present monographic issue is centered on the flood risk profile of the southern region of Nigeria. Nigeria, situated in the West African region, currently boasts a population of approximately 219 million individuals as of 2022. It is widely recognized as the most populous African country and ranks as the seventh most populous country worldwide. Southern Nigeria is made up of 17 of the 36 states in the country. The region has 45% of the nation's population.

The monograph provides an in-depth analysis of the various factors contributing to the heightened frequency and severity of flood hazards in the region. These factors include proximity to the Atlantic Ocean, heavy rainfalls, unregulated urban expansion, insufficient maintenance of dams, deforestation, improper waste management, and insufficient governmental support for environmental monitoring and planning. This attributed to the significant developmental disparity seen across the nation.

This monographic issue provides an analysis of the financial and non-financial consequences of floods in southern Nigeria, while also examining the response strategies implemented by governmental bodies at the federal, state, and local levels.

Furthermore, the text underscores the infrastructure implemented by both the authorities and the community to alleviate the risks associated with flooding. The monograph proposes that the Nigerian government, across all tiers, prioritize the execution of action plans outlined in the Sendai Framework. The objective is to mitigate flood risks, minimize vulnerability, and foster resilience.

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Table of Contents

List of Figures

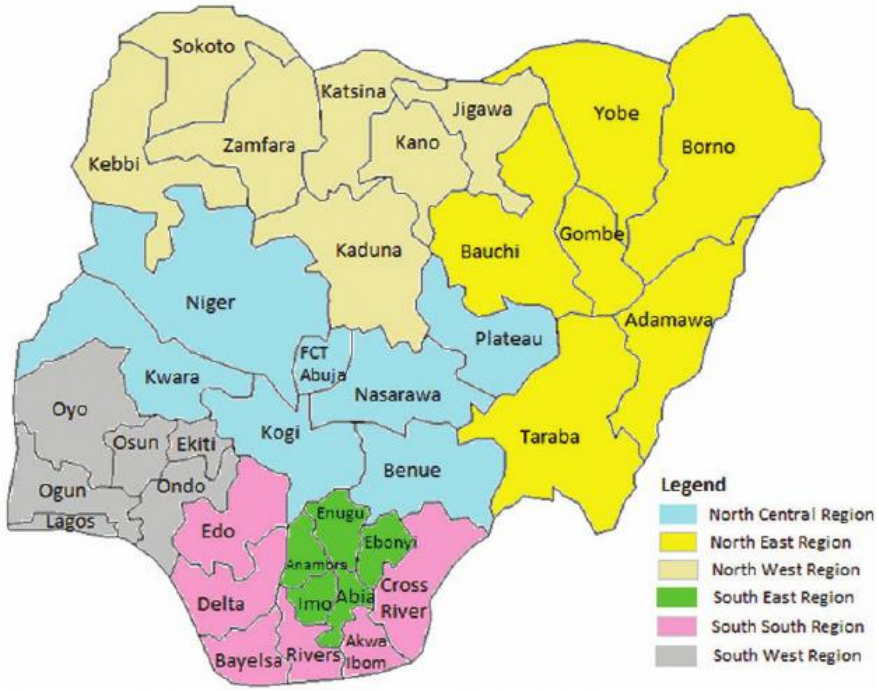
List of Tables

1.0 Chapter One: Introduction

1.1. Geography of Nigeria

Nigeria is a country in West Africa. It is 923,768 square kilometres in size. It is 40 and 140 degrees north of the equator and 30 and 140 degrees east of the Greenwich meridian in terms of longitude. Nigeria is in the tropical zone the whole way through. Nigeria's borders are on the west with the Republic of Benin, north with the Republic of Niger, and east with the Federal Republic of Cameroon. Lake Chad is on the northeast border and goes into the Republics of Niger, Chad, and the northernmost part of the Republic of Cameroon. In the south, the coast of Nigeria is washed by the Atlantic Ocean. The Niger River and the Benue River mostly cross Nigeria. There are tributaries and outlets to these rivers.(1) Nigeria has a population of approximately 219 million people, (2) With a population growth rate of 2.54%, approximately 50.3% of Nigerians live in urban areas. Nigeria, regarded as the most populous country in Africa, comprises more than 250 different ethnic groups. The following political figures are the most numerous and substantial: Igbo (Ibo) account for 18%, Ijaw for 10%, Kanuri for 4%, Ibibio for 3.5%, Tiv for 2.5%, Hausa and Fulani for 29%, and Yoruba for roughly 21%.(3) Abuja, the capital of Nigeria, is in the Federal Capital Territory, which was set up by a decree in 1976. Even though Lagos state used to be the capital, it is still the commercial and industrial centre of the country.(4)

Fig. 1. Map of Nigeria showing the 36 states and Federal Capital Territory (FCT), Abuja.



Source: (5)

1.2. Climate

Even though all of Nigeria is in the tropics, the weather changes from tropical near the coast to subtropical farther inland. Every year in Nigeria, there are two seasons: the rainy season and the dry season. Every year, it rains from April to October and doesn't rain from November to March. In the southern coastal areas of Nigeria, the highest temperature is 37°C, and the lowest temperature is 10°C. Further north, the climate is drier, and extreme temperatures can reach 45°C.(1)

1.3. Relief (Lowlands and Highlands)

In terms of relief, which is defined as "the ground or surface characteristics of the land above sea level," Nigeria is primarily classified into two types: lowlands and highlands.

1.3.1. Lowlands

Wherever the elevation is less than 300 metres above sea level is considered part of the Lowlands. (6) The following are some examples of lowland locations in Nigeria and their elevations or heights above sea level:

- The Northwestern Sokoto plain (200-300m)
- Chad Basin or Borno plain (100-300m)
- The Niger Delta relief (0-100m)
- The Cross River Valley (120-180m)
- The valley or trough of Niger-Benue (100–300 metres)
- Coastal lowlands in Western Nigeria's inland (100-300m)
- Coastal plain (0-100m)

1.3.2. Highlands

Areas 300 m or more above sea level are called the Highlands. Examples of Nigerian Highlands may be found in the following four categories:

- **The Western Highlands:** The Western highland or upland encompasses the states of Oyo, Ondo, Kwara, and Osun in Nigeria's western area. Several notable hills can be found in the area, including the highest point (Idanre Hill, 950m) and the 400-700m hills of Apata and Epeme (350-600m). These mountains are the watersheds for the Ogun, Osun, and Osse rivers.
- **The North-Central Highlands:** These mountains may be found in Northern Nigeria, smack dab in the heart of Kano, Kaduna, Bauchi, Jigawa, and Plateau. The Jos plateau, located here, is a hydrological centre or watershed with a radial drainage pattern and the

headwaters of major rivers, including the Hadeija, Kaduna, and Sokoto (200–1500 m). The Jos plateau rises to its highest point at the Shere Hills (1650m)

- **The Eastern Scarp-land:** Southeastern Nigeria, including the Enugu and Nsukka regions, is home to the Eastern Scarp Land. The central mountain range in the region is the Udi-Nsukka plateau (300-600m). The headwaters of the Omanbala, Imo, and Cross rivers are in this scarp area.
- **The Eastern Highlands:** These may be found along the borders of Nigeria and Cameroon. They represent Nigeria's most elevated area. Alantika and Shebshi hills (1600-2000 m), Obudu and Oban hills, Mandara mountain (1200-1500 m), Biu plateau (800-1000 m), Adamawa peak (1800-2400 m), and Mandara mountain (1200-1500 m) are among these (1200m). These territories contain the Gana, Ngoda, and Yedssar rivers, which flow into Lake Chad.(6)

1.4. River Drainage

Drainage includes bodies of water such as rivers and lakes. Nigeria's drainage may be categorised as either rivers or lakes. The Rivers Niger and Benue are the two most important rivers in Nigeria. The River Niger, the largest river in Nigeria, originates in the highlands of Guinea. From Nigeria, it passes into Mali and the Niger Republic (6). The eastern highlands are the source of the Benue River, which enters the Niger in Lokoja. As a result, Lokoja is referred regarded as a confluence town.

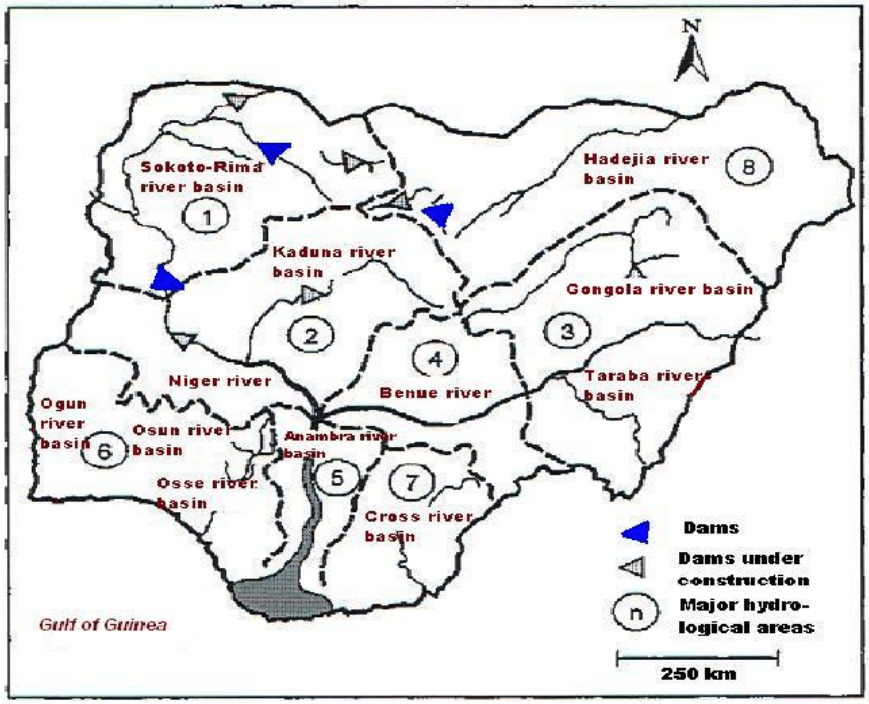
1.4.1. River Basins: A basin is usually drained by a river and its tributaries. In other words, they are naturally low-lying places. A river basin is also known as a catchment region. There are five major river basins in Nigeria: (i) the Niger Basin, (ii) the Benue Basin, (iii) the Chad Basin, (iv) the Cross River Basin, and (v) the South Atlantic Basin.

1.4.2 Lakes in Nigeria: A lake is a body of water surrounded by land. Nigerian lakes are classified into two categories.

Artificial or Man-Made lakes: These are lakes that humans have built. Lake Kainji on the River Niger and Shiroro Lake on the River Kaduna are examples.

Natural Lake: These lakes are found naturally. Lack Chad is one example. Because Lake Chad draws water from several rivers, including the Hadeija, Gana, Yobe, and Yedseram, it is sometimes referred to as an inland drainage.

Fig. 2. Map of Nigeria showing major rivers and hydrological basins: 1 Niger North, 2 Niger Central, 3 Upper Benue, 4 Lower Benue, 5 Niger South, 6 Western Littoral, 7 Eastern Littoral, 8 Lake Chad

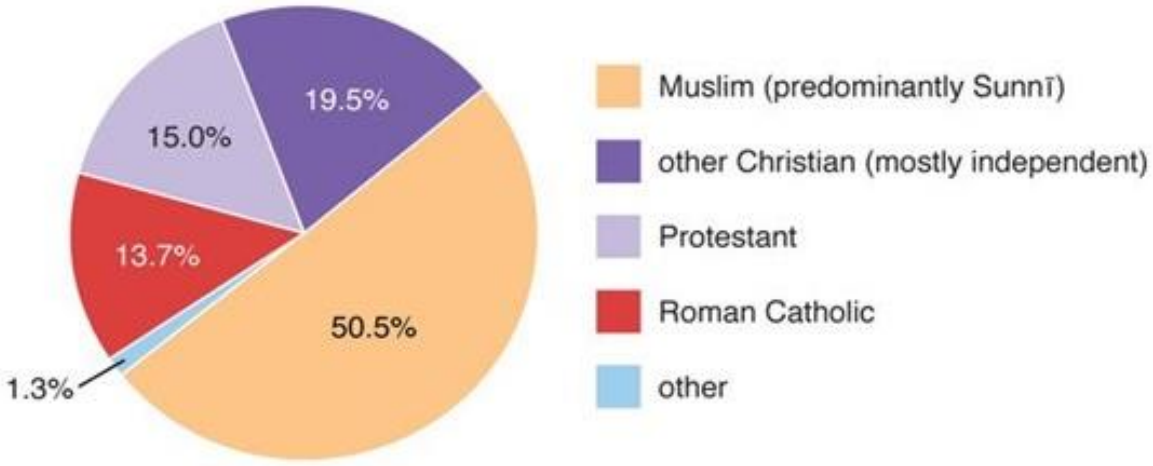


Source: (7)

1.5. Religious Affiliations in Nigeria

Before the start of the twentieth century, most Nigerians practised traditional religions. Still, British colonial rules discouraged this to such an extent that, by the time of independence in 1960, the majority of the population was classified as Muslim or Christian. A tiny minority of the population claimed to practise traditional religions around the turn of the century. Northern states have the most significant Muslim population density. Three-quarters of the population follows Islam, the predominant religion in a few southern republics. In the eastern states, more than three-quarters of the population is Christian.(8)

Fig. 3. Chart showing the religious affiliations in Nigeria

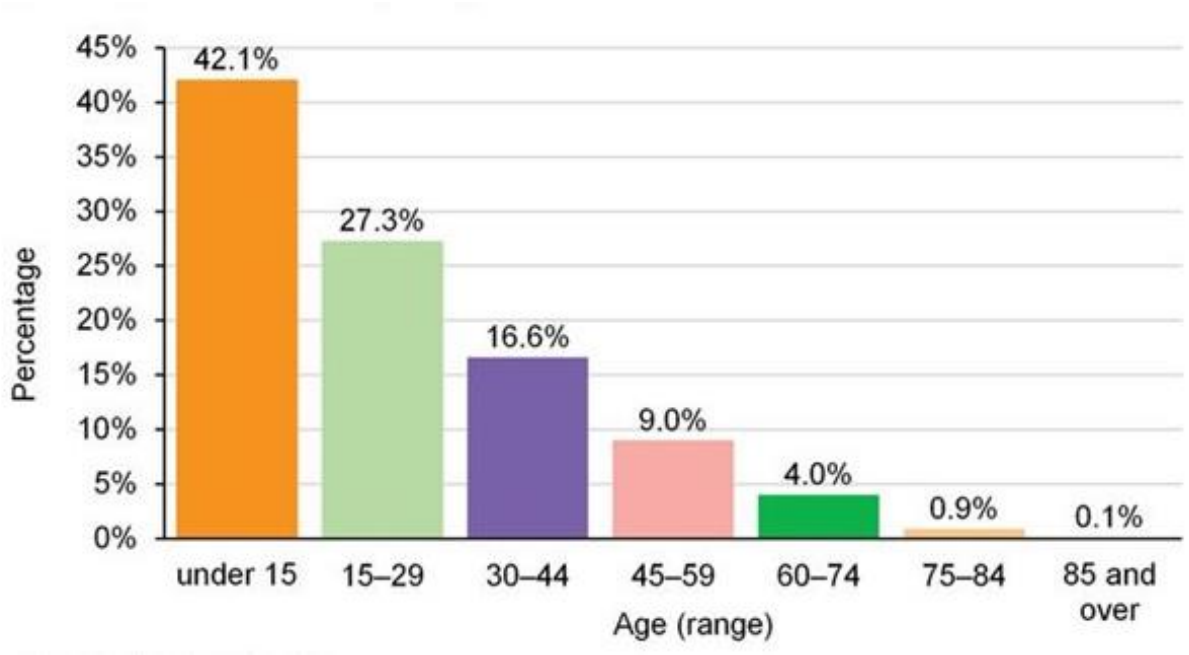


Source: (8)

1.6. Demographic Trends in Nigeria

Like other developing nations, Nigeria has higher birth and death rates than the global average. However, since the mid-twentieth century, infant mortality has decreased dramatically, and life expectancy has soared; as a result, population growth has been fast. Almost three-quarters of the population is under the age of 30.(9)

Fig. 4. Age distribution in Nigeria



Source: (9)

There is a lot of migration in Nigeria, especially between the north and south. Many people from the south moved to the northern towns of Kano, Sokoto, Kaduna, and Jos. Seasonal migrants also moved from the northern districts of Sokoto and Kano to the southern cacao-growing areas. More people have moved from the southeast to the more industrialised and urbanised western states of Lagos, Oyo, and Ogun or the western agricultural states of Ondo and Edo. (9)

1.7. Socioeconomic Situation of Nigeria

Nigeria's economy is a mixed-income, growing market with rising manufacturing, finance, service, communications, technology, and entertainment industries. It is the world's 27th-biggest economy by nominal GDP, the 24th-largest by purchasing power parity, and the largest Sub-Saharan African economy (10). The country's inflation rate is over 13.9%, and more than 70% of the population lives below the poverty line (11).

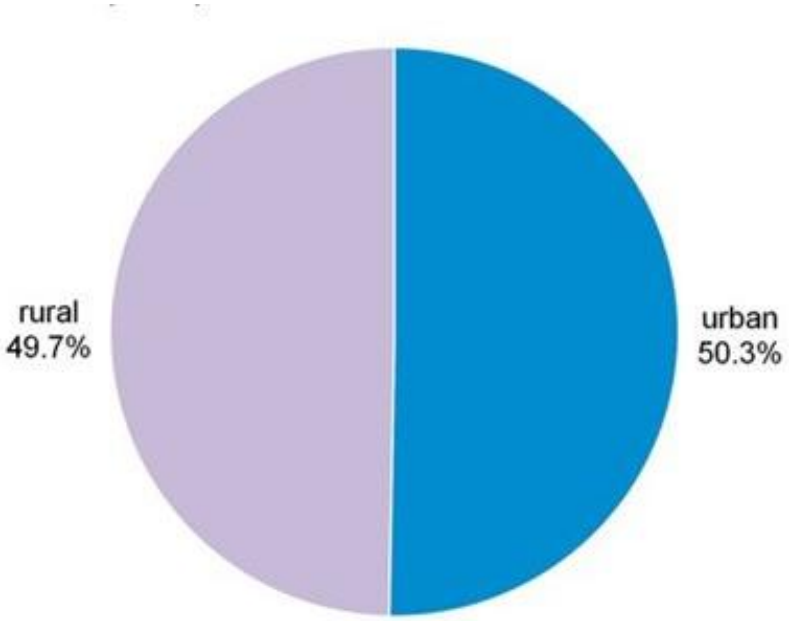
1.8. Settlement Patterns

1.8.1. Urban and Rural Settlements in Nigeria

About half of the country's population lives in rural areas. You may find populated areas along the shore in the southwest Yoruba region and the far north Hausa and Kanuri regions. Compounds, or scattered homesteads, are the primary form of housing in several southeast Igbo and Anang-Ibibio regions and some central Tiv regions. A man, his immediate family, and a few extended families

live in each compound. Each compound in the village is home to relatives or descendants of a common ancestor, often the settlement's founder.(9)

Fig. 5. Pie chart showing the urban-rural settlements in Nigeria



Source: (9)

In the eastern states, each village has a chief or headman who is one of the most respected and successful men in the area and has the support of the people. In places where Yoruba and Edo's people live, as well as in most northern states, the chief is chosen by or with the approval of the area's traditional ruler. A big part of village life is the age-grade system, in which people are put in groups with other people their age. This system, which put men into three-year groups for work and initiation, was more critical in the past, but it isn't used as much today. (8)

1.9. Geographic Regions

Nigeria's north and south are very different in terms of landscape, climate, vegetation, social structure, religious preferences, literacy level, and farming methods. Nigeria is split into three areas based on these differences: the south (Guinea coastlands), the middle area, and the north, also called Nigerian Sudan. (8)

Fig. 6. Map showing the Northern and Southern regions of Nigeria

Source: (12)

1.10. Southern Nigeria

Fig. 7. Map Showing the States in Southern Nigeria

Source: (13)

Northern Nigeria has 19 states and the Federal Capital Territory (FCT), a more extensive area than the 17 states in the south. Based on the 2006 population census, the National Population Commission's projections for 2016 show that 54% of Nigeria's people live in the north and 45% live in the south. The most developed economy is in the south of Nigeria. Tree crops are grown here on peasant farms and commercial plantations, which use the forest plants well. Most of Nigeria's oil, seaports, and industrial hubs are in the southern part of the country. There are also critical cultural hubs in the south, such as the Igbo in the east, the Yoruba in the west, and the Edo in the middle. They are an excellent way to get around in this swampy area in southern Nigeria and the Delta, where rivers split into a network of creeks and canals.

Before crude oil came along, oil palm was the primary way for this southern region to get money from other countries. The soil in the southwestern part of Nigeria is excellent for growing cocoa on a large scale. To the north of the tropical forest is a savannah with thick woods in the river basins. Most of the plants are grasslands, and there aren't many trees. Most of the meat eaten in the country comes from the savannah zone, which has good grazing land for raising animals. (1)

The Igbo and Yoruba people live in the southern part of the country, which is the most crowded part of sub-Saharan Africa. People from the crowded Igbo and Ibibio regions like to move to the densely populated Yoruba regions where cocoa is grown. The eastern Cross River area is sparsely inhabited due to poor soil and climate. (8)

1.11. Methodology

This research report utilises a range of secondary sources of information to investigate the flood risk profile in southern Nigeria as well as the response and resilience efforts made. These sources include historical reviews of disasters, primarily utilising data from the Emergency Database (EM-DAT) of the Centre for Research on the Epidemiology of Disasters (CRED); reports from Reliefweb and Preventionweb online databases; comprehensive reviews of non-governmental organisation reports; key national documents such as policies and plans; and previous assessments and reports. It also includes internet searches for information from reputable news outlets, disaster briefs from the Nigerian government, and reports from international organisations such as the International Organisation for Migration (IOM), the International Federation of the Red Cross and Red Crescent Society of Nigeria, the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), and the WHO Regional Office for Africa. Secondary information was gathered from academic publications as well. The disaster terms included in this research were derived from the standardised vocabulary established by the United Nations Office for Disaster Risk Reduction (UNDRR).

2.0 Chapter Two: Hazards and Disaster Risks in Nigeria

2.1. What are Disasters

Disasters are a significant disruption of a community's functioning at various scales caused by hazardous occurrences interacting with conditions of exposure, susceptibility, and capacity, resulting in human, material, economic, and environmental losses. The disaster's impact might be rapid and confined, but it is typically extensive and can persist for a long time. The effect frequently surpasses a community's or society's ability to deal with its resources, necessitating aid from other sources, which might include neighbouring jurisdictions or those at the national or worldwide levels.(14)

2.2. What are Disaster Risks

This is a possible loss of life, injury, or lost or damaged assets which might occur to a system, society or community in a certain period, assessed stochastically as a function of hazard, exposure, vulnerability and capacity. Disaster risk expresses the notion of hazardous occurrences and catastrophes as the consequence of continually existing risk circumstances. Disaster risk involves several sorts of possible losses, which are frequently difficult to evaluate. Nevertheless, with knowledge of the prevalent dangers and population and socioeconomic growth patterns, disaster risks may be quantified and mapped in basic terms.(15)

2.3. What is a Hazard

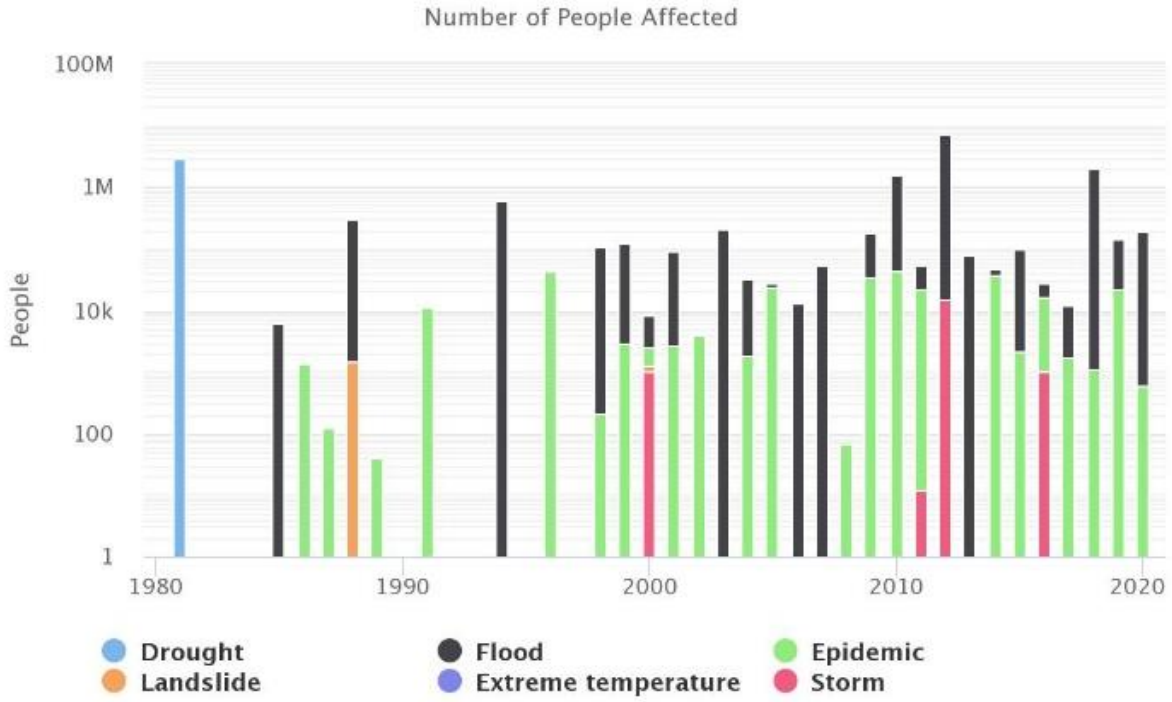
A hazard is a process, phenomenon or human action that may cause loss of life, injury or other health repercussions, property damage, social and economic upheaval or environmental degradation. Hazards might be natural, anthropogenic or socio-cultural. Natural risks are primarily related to natural processes and events. Anthropogenic risks, or human-generated hazards, are produced solely or mainly by human actions and decisions. Several hazards are socio-natural in that they are related to a combination of natural and artificial variables, including environmental deterioration and climate change. Hazards may be solitary, sequential or compounded in their origin and impact. Each danger is described by its location, intensity or degree, frequency and likelihood. Biological risks are also characterised by their infectiousness, toxicity, or other pathogen features such as dose-response, incubation period, case fatality rate, and pathogen transmission estimate.(16)

2.4 Significant Hazard Risks and Disasters in Nigeria

Nigeria continues to face substantial developmental problems, including diversifying the economy and reducing reliance on oil, solving insufficient infrastructure, constructing solid and functional institutions, and addressing governance concerns and public finance management systems. Inequality in income and opportunity has been increasing significantly, hampering poverty reduction efforts.

Nigeria is deeply split between North and South. This division has grown in recent years due to the Boko Haram insurgency, farmer-herder conflict, banditry, and a lack of economic growth in the country's north. In southern Nigeria, violent crimes such as insurgency, piracy, abduction, and oil and gas infrastructure damage are rising, with significant economic consequences for Nigeria. The root cause of the nation's high poverty rates, regional inequality, and social and political turmoil is a lack of employment opportunities. In Nigeria, high levels of poverty, low levels of development, and reliance on rainfed agriculture limit impoverished households' and communities' capacity to manage climate risks, making them more vulnerable to climate-related crises and disasters.(17)

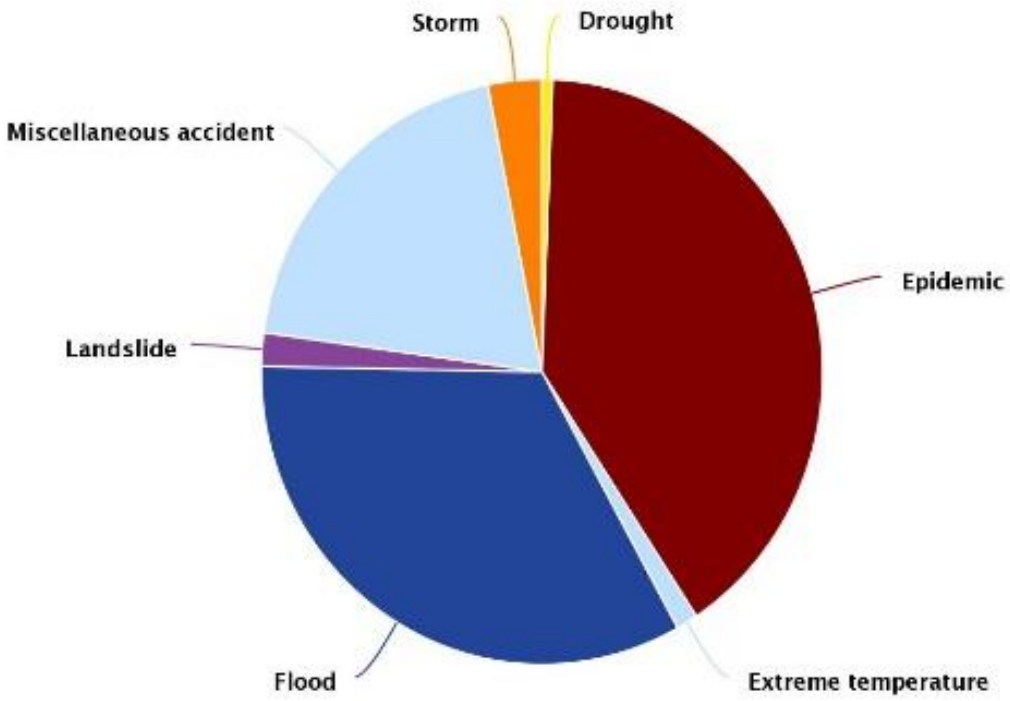
Fig. 8. Statistics on major natural disasters in Nigeria from 1980 to 2020



Source: (18)

There are numerous hazards in Nigeria, many of which have become disasters with increasing intensity and frequency over the last two decades for various reasons. Some reasons include rapid population growth, urbanisation, and social-political issues compounded by ethnic plurality, which may have resulted in fierce competition for scarce resources, deteriorating livelihoods, social marginalisation, and increasing insecurity.

Fig. 9. The average yearly incidence of natural disasters in Nigeria from 1980 to 2020



Source: (18)

The following are some of the severe hazards in Nigeria that may have turned into disasters: (19)

- Frequent oil spills on lands and water bodies within the Niger Delta region
- Increasing levels of industrial pollution and waste
- Riverine, coastal, and urban floods,
- Desertification due to the uncontrolled use of wood for fuel,
- Pest infestations
- Epidemics such as the dreaded avian influenza H5N1 (bird flu), Ebola virus disease, monkey pox, and cholera
- Droughts and general land use degradation
- Gully erosions
- Windstorms in the northern parts of the country
- Technological disasters such as the 1992 C-130 plane crash, the EAS crash of 2002, and the Bellview and Sosoliso air crash of 2005
- embarrassing cases of collapsed buildings in major cities in Lagos and Port Harcourt
- Urban fire outbreaks from multiple sources

- Explosions from rampant cases of oil pipeline vandalism in southern Nigeria, such as the oil spillage and fire in Enugu East, LGA, in Enugu State between February and March 2004, and the oil pipeline explosion in Nkanu-West, LGA, in Enugu State on July 28, 2004
- Ethno-religious conflicts in northern Nigeria and reprisal attacks in southeastern Nigeria
- Armed banditry by different terror groups across the country
- Plateau State experienced a hailstorm on April 6, 2004.
- Windstorms in the communities of Inaukpa Odukpani, Osun-Esuk Boki, and Biase in Cross River state
- Pest infestation in Yobe State in 2004
- Land slide in Nsukka, Enugu East, Awgu, and Orji River local government areas in Enugu state in 2005.

2.5. Flood Disasters in Southern Nigeria

2.5.1. What is Flood

Flooding is the rapid accumulation or release of surface waters from any source, resulting in widespread and temporary inundation of normally dry land areas. There might be positive and negative results from flooding. However, although they have the potential to save the lives of people and ecosystems that a prolonged drought has impacted, they are also expected to be the costliest natural disaster in history. Severe rains are the most common cause of flooding because they overwhelm natural watercourses. However, torrential downpours are not always the cause of flooding. In coastal areas, for example, a storm surge from a tropical cyclone, a tsunami, or a high tide coinciding with higher-than-typical river levels may all cause flooding. Any location downstream of a damaged dam may get inundated even if the weather is dry. (20) There is no question that Nigeria is vulnerable to all forms of hazards, both natural and man-made. Floods displace more people in Nigeria than any other hazard, resulting in widespread devastation. Flooding is a recurring issue in Nigeria, causing fatalities and community evacuation. (21)

2.5.2. Types of Flood Disasters in Nigeria

Fluvial Floods (River floods):

When the water level of a river, lake, or stream rises to its maximum capacity and overflows onto the land next to the body of water, this phenomenon is known as a fluvial flood, another name for a river flood. A considerable amount of rain or snowmelt might be the culprit for the increase in the river's water level. The overflow of a river may create significant destruction because it influences smaller rivers downstream, which can lead to the failure of dams and dikes and the flooding of neighbouring areas.(22)

Urban Flooding:

Urban flooding is the term used to describe the phenomenon of heavy rainstorms resulting in flooding that is not brought on by an overflowing body of water. Urban flooding is possible in any region, whether in an urban or rural setting or even in areas that are geographically far from any bodies of water. When the capacity of the urban drainage system is exceeded, water overflows onto the streets and other buildings in the immediate area. Or when urbanisation and ground cementing have rendered the floor resistant to the absorption of water, which may also cause flooding.(22).

Coastal Flood (Storm Surge):

Coastal flooding refers to the overflow of saltwater into land areas close to the coast. The tide and the wind may combine to cause devastating flooding along the shore, as shown in the form of a storm surge, which a tsunami can also drive. The storm surge caused by a hurricane or typhoon is the primary cause of flooding along the shore. Storm winds blow water inland, creating this phenomenon. As the tide rises, the damage increases; severe winds at high tide may lead to devastating storm surges. When water levels rise to the point that they overrun low-lying areas, this kind of flood may be devastating. Other factors, such as the strength, volume, speed, and direction of a windstorm, also impact the intensity of a coastal flood. Onshore and offshore locations are also important geologically. Coastal flood models use this data in conjunction with historical storm data to estimate the potential for and magnitude of a storm surge. (22)

2.6. Exposure, Vulnerabilities, and Risks Associated with Flooding in Southern Nigeria

Vulnerabilities are situations caused by physical, social, economic, and environmental processes or variables that make people, communities, assets, or systems more susceptible to the effects of hazards. (23) Flood vulnerability is determined by exposure, susceptibility, and a lack of resilience. Flooding is one of the most severe challenges in many regions of Nigeria, particularly in the south, due to various detrimental social, ecological, climatological, topographic, and economic risk factors. The enormous population and socioeconomic vulnerability of the bulk of the people and the degree of economic activity in southern Nigerian states such as Lagos and Port Harcourt have increased flood hazards. However, the pattern of flood occurrence has altered dramatically throughout the decades. Flooding in the city has been more common in recent years. With many areas of the city suffering floods during the rainy season, the geographical extent of flooding has also grown. The flood risk profile in southern Nigeria has been significantly exacerbated by changes in the frequency and intensity of rainstorms, land use, and subsequent changes in the hydrological fluxes of the urban watershed linked to urban growth. These factors have also been exacerbated by inadequate or nonexistent drainage infrastructure, poor waste management, poor urban planning, and poor development control.(24) Nigeria, which is placed 160th out of 181 nations according to the 2020 ND-GAIN Index, is acknowledged as being particularly vulnerable to the effects of climate change due to a mix of political, geographic, and societal variables.(17)

With over 800 million people living in flood-prone areas and 70 million people worldwide exposed to flooding every year, the frequency of floods in recent years has increased at an unprecedented rate. According to estimates, 14.7 billion people, or 19% of the world's population, are directly exposed to significant dangers during flood events that occur once every 100 years.(25) The total number of disastrous occurrences worldwide in 2021 was 432, significantly more than the average of 357 each year between 2001 and 2020. These events were dominated by floods, which occurred 223 times, up from the average yearly frequency of 163 floods between 2001 and 2020.(26)

2.7. Climate-related Flood Risks in Southern Nigeria

Nigeria is vulnerable to various water-related natural disasters, including floods, storms, ocean surges, and droughts. Nigeria is one of the ten most vulnerable countries to the effects of climate change and natural disasters. Storm surges throughout the whole coast, inland floods in the Niger Delta area, and negative rainfall anomalies in the southeast pose significant hazards to Nigeria's coastal states. In 2012, Nigeria was hit twice by a severe drought in the northeast and massive flooding that devastated almost the whole nation.

Southern Nigeria has a tropical wet climate, the central and northern parts have a low savannah environment, and the northernmost parts have a Sahelian hot and semi-arid climate. The outcome is a gradient of decreasing precipitation from the south to the north. The southern regions often see heavy downpours throughout the rainy season (March–October). In much of Africa, the annual rainfall is above 2,000 mm, and in the Niger Delta, it may reach over 4,000 mm. The central areas have one transparent rainy season (April to September) and one clear dry season (December to March).(17) A projected 0.5-metre rise in sea level for Nigeria by the end of the century may necessitate the relocation of 27 to 53 million people.(17)

It is anticipated that by the end of the twenty-first century, the world's oceans' average level will rise by more than 6 feet (or 2 metres). A significant stretch of Nigeria's coastline is low-lying, placing Lagos in a precarious situation. Some estimates say Lagos is less than two metres above sea level.(27) Southern Nigeria, particularly Lagos state, is anticipated to rank sixth in terms of vulnerability to climate change hazards by 2070.(24)

Fig. 10. This picture was taken in April 2016 above Lagos Island, which is located in Lagos, the commercial hub of Nigeria.

Source: (27)

According to residents, the people of the Okun Alfa costal hamlet in Lagos, southern Nigeria, have had to relocate several times owing to the advancing seas of the Atlantic Ocean, but land and time are running short.(28)

2.8. Unrestrained Urbanisation as a Flood Risk Factor in Southern Nigeria

Most private urban developers in Nigeria start building houses even in flood-prone regions, endangering both the development's physical integrity and the lives of its inhabitants. Urban poverty and fast urbanisation growth both raise the danger of flooding. About 41 million people, or 24% of Nigeria's total population, are thought to reside in climate-vulnerable regions. With substantial population densities in Lagos, Warri, and Port Harcourt, where lower-income families and slum areas are vulnerable to floods and storm surges, the coastal states with some of the highest total vulnerability are located there. Lagos state's high population density and development pace have put considerable strain on the environment and infrastructure, exacerbated by inadequate urban planning. Lagos has a largely impoverished population, mostly in slums and outlying city districts. From 42 slum communities in 1981, the city has generated around 100 slum communities, accounting for over 70% of the city's population. (24) According to data from Kogi state and other regions of Nigeria, 85.6% of the population earns NGN 50,000 (equal to USD 112) or less each month. 62.8% of this fraction earn less than the national minimum salary of 30,000 nairas. With such a low monthly income, the residents of this region may be unable to assemble resources to

plan for, respond to, and recover from flood disasters. Many families' lack of evacuation plans and flood management strategies, poor flood education levels, high flood experience rates, low literacy rates, restricted access to flood warning infrastructure, and inadequate household economic capability are some of the leading causes of increased vulnerability and low resilience.(29)

2.8.1. Factors Contributing to Southern Nigeria's Fast Urbanisation and Population Explosion

Nigeria's most important economic and commercial centres, including Lagos, the de facto capital, are located in the south. More than 55 million people live in the southwest region, or almost a quarter of the total population. The area is densely inhabited, with an average of 100-500 people per square kilometre, due to the restricted land space, particularly in comparison to the northern areas of the nation. However, most of the region's population is concentrated in large metropolitan centres such as Lagos, Ibadan, Benin City, Akure, and Warri. Despite this, there are still sizeable populations living in suburban and rural areas of the region. (30) Lagos state is a coastal metropolis on the Atlantic Ocean's shore. Lagos, West Africa's most important port city and Nigeria's economic centre, is Africa's second-largest megacity after Cairo. Lagos state's population is expected to reach 15.8 million by 2025. (31) Even before Nigeria's independence in 1960, Lagos had years of fast urbanisation. Its population density is 20,000 people per square kilometre, significantly above the global average population density of 112 people for coastal zones. (24) Lagos state's overpopulation is a significant risk factor for flood disasters. Most structures in the state of Lagos do not have enough distance from river banks and channels. This problem usually results from neglecting to seek building plan permission from the proper state regulating body.(32)

2.9. Effects of Human Activities on Flood Risk in Southern Nigeria

Additionally, the mangrove forest in the Delta, which serves as a significant barrier against storm surges from the sea, is being destroyed by increasing coastal erosion, rising seas, and oil pollution.(33) Climate change, deforestation, watershed degradation, land use, urbanisation, and extensive occupancy in flood-prone regions have aggravated floods and drought challenges and increased the risk of wildfires. In Nigeria, wildfires are typically caused by human activity and are used for land clearing, garbage disposal, pasture management, animal tracking, and hunting. The bulk of severe fires is noticed from January onwards, owing to high temperatures (over 35°C) and the hot and dry harmattan winds that blow from north to south between December and March.(34) In the southern Nigerian hills, significant bushfires in the dry season may increase the risk of riverine and flash floods during the wet season. It can also trigger landslides, mudslides, and gully erosion in sedimentary terrains.(17)

2.10. Drainage System Inadequacy and Poor Waste Management are Common in Southern Nigeria

Inadequate drainage systems and improper human drainage practise are vulnerability factors contributing to the danger of flooding in southern Nigeria. Both natural and man-made factors

cause floods. Heavy and intense rains, coastal storm surges, estuarine interactions, dam collapse and other control works, excessive discharge from drains and control works. Obstruction of drainage and river channels was the primary cause of flooding witnessed in Ogunpa, Ibadan, Oyo state and Onitsha, Anambra state. Flooding will likely worsen after more intense rainfall because basin, network, and channel characteristics stay steady, and the variable component cannot handle the increased water flow.(35) Due to inadequate waste management caused by overcrowding and ineffective waste regulation enforcement and management, trash and other wastes frequently clog water drainage channels. (32) According to research, one of the main factors increasing the risk of urban floods in the Akwa Ibom south of Nigeria is the obstruction of drainage systems by reckless garbage dumps.(36)

2.11. Improper Land-Use Practises

In the southern region of Nigeria, where economic activity is robust, an extraordinary influx of urban migrants has led to the inappropriate construction of buildings for commercial and private use, sometimes even in flood plains, to house the region's expanding population. The river catchment areas have almost no trees left. It is sound knowledge that forests have an exceptional ability for penetration and transmission. While surface runoff may be as low as a tenth of that of open fields, forests have an infiltration capacity that is two to three times higher. There is almost little cover along the riverbanks of Niger and Benue. It is common to practise growing crops right up to the banks of rivers, sometimes even on the tops of hills. Therefore, in many Southern regions, vulnerabilities result from a confluence of factors, including a lack of forest cover, improper agricultural methods, and land allocation for residential development. Due to widespread deforestation, residents and nearby businesses in the Akpaka Forest Reserve in Onitsha, Anambra state, southern Nigeria, are in greater danger of being impacted by frequent and severe floods. (35) Additionally, developers build homes in wet places where flooding is almost always unavoidable owing to the rapid and unrestrained population increase, particularly in metropolitan areas.

2.12. Poor Dam Management and Poor Response from the Government and the People

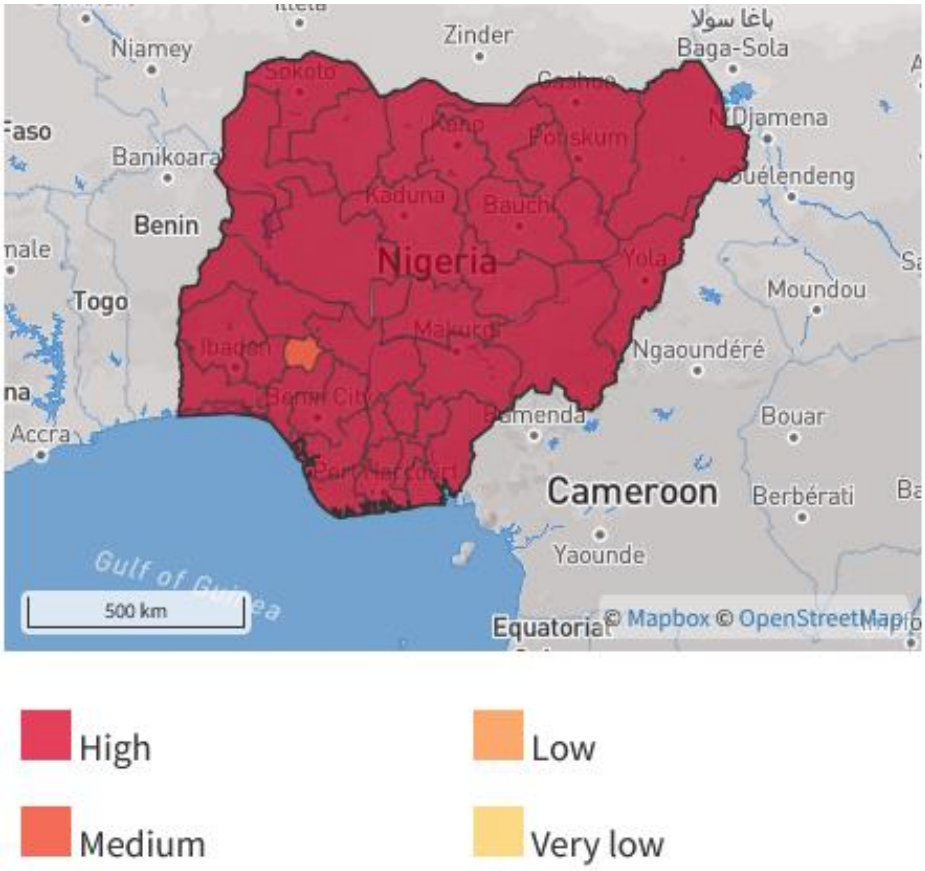
Even though ineffective management of dams is intrinsically connected to inadequate governance, this is still a risk factor for floods in Nigeria. Dams may hold back water to avoid floods, provide relatively clean electricity, and store water for crops during the dry season. Since dams collect silt, the water they release is cleaner, but it also flows farther downstream and into the river bed. This cut enlarges the river's passageway, enabling it to carry more water without overflowing its banks during floods. Dams are constructed in many parts of the globe for flood control, hydroelectric power production, and water diversion. While the first two duties are well acknowledged, dams' role in flood control in Nigeria has been largely disregarded. The country's six political regions do not have a sufficient number of dams, and more are required along the Benue and Niger rivers.(37)

The Lagdo Dam in neighbouring Cameroon discharges water annually, causing the river to overflow and causing annual flooding in Nigeria. Water from the Lagdo dam was blamed for 30 deaths in Nigeria in 2012 and the deadliest disastrous flood in 2022.(37) The regular and planned

releases of extra water from Oyan Dam in neighbouring Ogun State during the rainy seasons are mostly to blame for flooding in various areas of Lagos State in southern Nigeria. Despite increased rainfall brought on by climate change, Nigerian government institutions responsible for managing environmental dynamics have weak ecological planning. The Nigerian government's failure to establish and implement regulations at all levels and inadequate ecological planning has been blamed for increasing Nigerian susceptibility to flooding hazards.(38)

2.13. Fluvial or River Flood Risks in Nigeria: All states in Nigeria are at high risk of river flood risks, except Osun state in the southwest, which is classed as medium risk based on modelled flood data presently available. Models use historical and forecasted precipitation, current river levels, and soil and terrain parameters to predict the possibility of river flooding. The results from these models are used to identify river floods with the potential to cause harm to both people and property, and it is anticipated that at least one such flood will occur within the next ten years. (39)

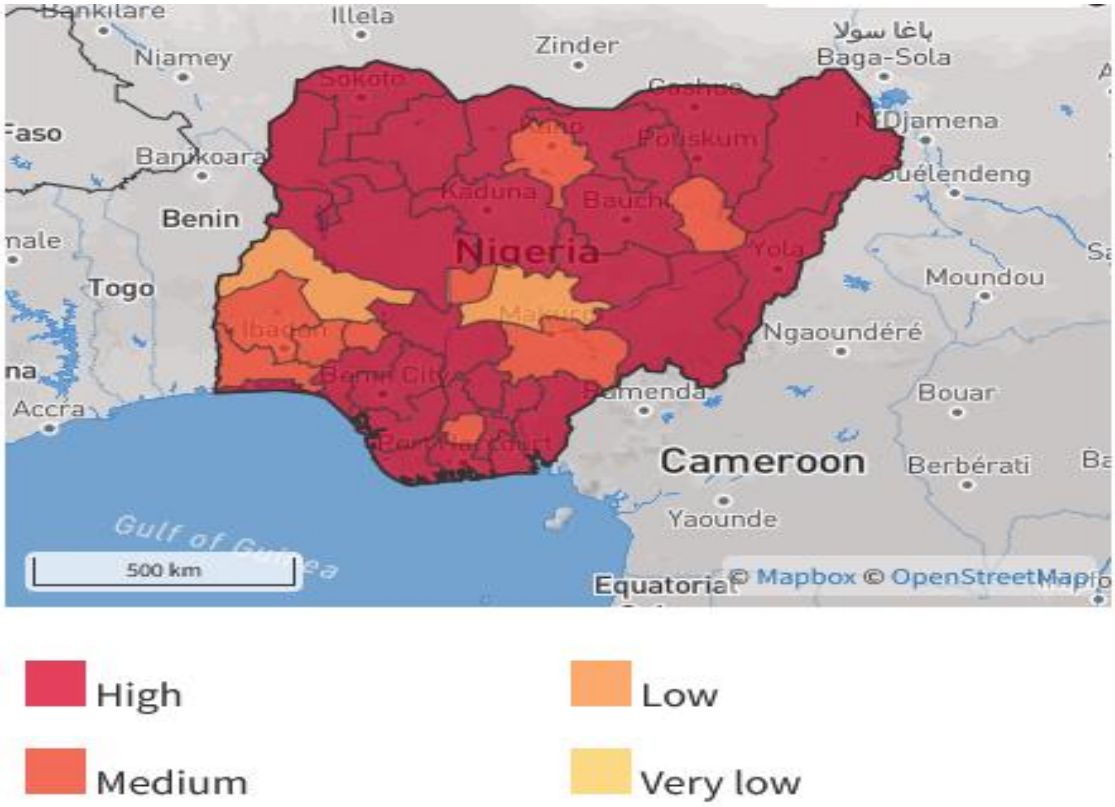
Fig. 11. Map showing the potential risks of river flooding in Nigeria.



Source: (39)

2.14. Urban Flood Risks in Nigeria: All of the states in northern Nigeria have a high risk of urban flooding, except Kano and Gombe states, which have a medium risk due to their geography. From Kogi to the Niger Delta in southern Nigeria, the danger of urban flooding is severe. In contrast, it is moderate in Benue, Oyo, Ekiti, Imo, and Ogun States and low in Kwara State. (40)

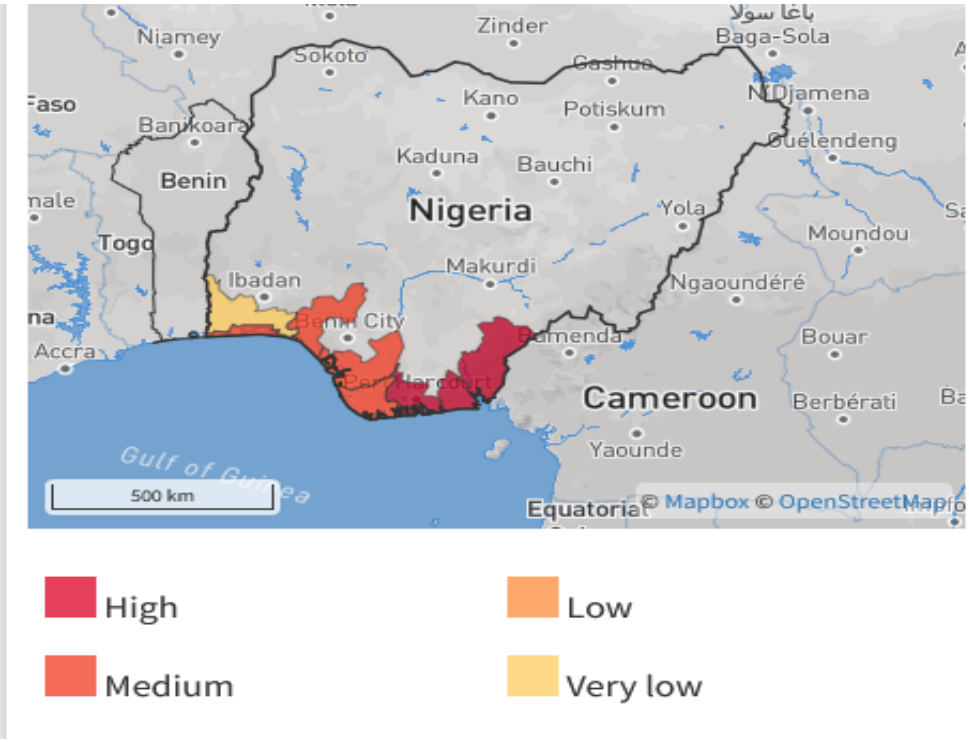
Fig. 12. Map Showing the potential risks of Urban flooding in Nigeria.



Source: (40)

2.15. Coastal Flooding Risks in Nigeria: Coastal flooding is a problem in the following states in southern Nigeria. The Nigerian states most in danger of coastal flooding are Rivers, Cross River, and Akwa Ibom, with Bayelsa, the Delta, Ojo, and Lagos having a medium risk and Ogun having a very low risk. (41)

Fig. 13. Map showing the potential risks of Coastal flooding in Nigeria.

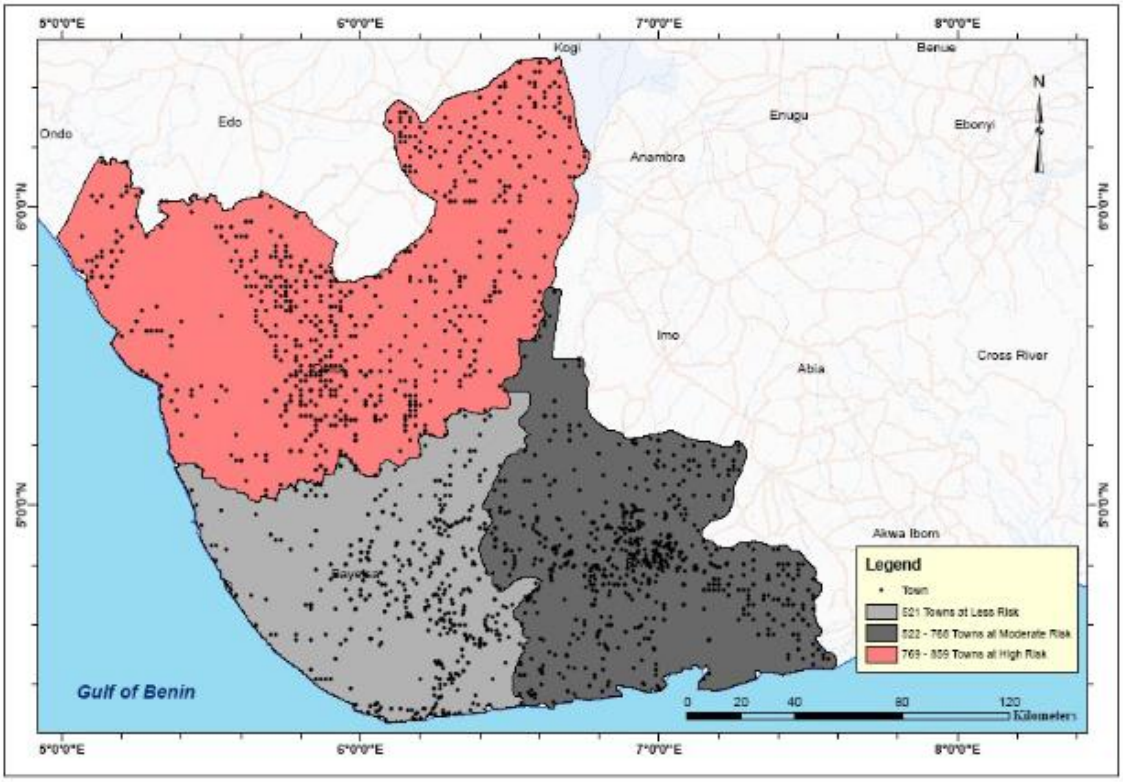


Source: (41)

2.15. Flood Risk in Niger Delta Regions

The Niger Delta in southern Nigeria is a large coastal flood plain where the Niger-Benue River system empties into the Atlantic Ocean. Bayelsa State, located in southern Nigeria in the Niger Delta region, serves as a conduit for the numerous distributaries of the Niger-Benue River system to discharge into the sea. The state has a very high vulnerability index, not only to flood hazards caused by the Niger-Benue River system but also to rising sea levels caused by climate change.(42) If sea levels were to increase by only 1 meter, it is predicted that 75% of the Niger Delta in southern Nigeria would be submerged.(18)

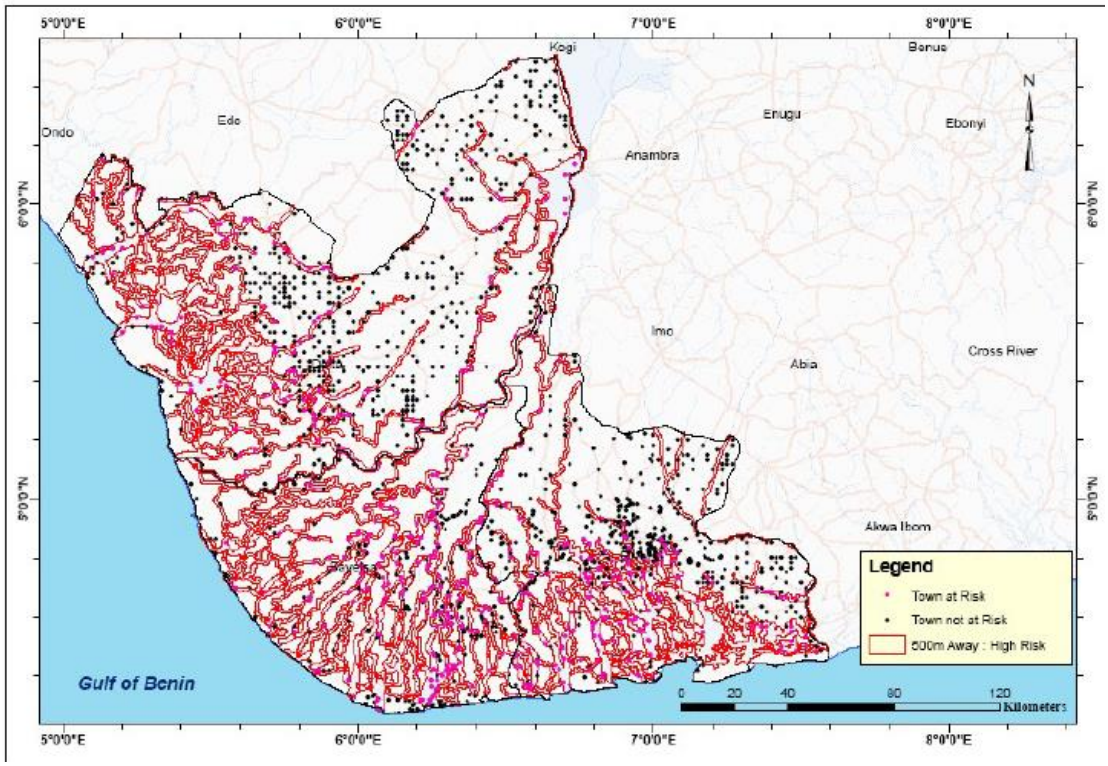
Fig. 14. Flood-Vulnerable Communities in the Niger Delta region of southern Nigeria.



Source: (43)

The Niger Delta region receives nearly 90% of all water from the Niger-Benue River systems and 100% from all the streams in the Niger Delta Region. The Atlantic Ocean also borders it, the landscape is flat, and communities are located along river systems, making the region vulnerable to flooding. About 580 rivers in the Niger Delta region are prone to overflow and flooding, potentially affecting 2,148 settlements. Projection models predict that 1,110 communities 1.5 kilometres from the water could be swamped. About 794 homes will be flooded at 1000m, while 244 communities may be overwhelmed at 500m.(44)

Fig. 15. Map showing towns that can be flooded within 500m of the water bodies in Bayelsa state



source:(43)

2.16. Changes in the Frequency and Severity of Flood Disasters in Southern Nigeria from 2000 To 2022

The number of big disasters that occurred worldwide in 2021 was 432, a considerable increase from the average of 357 significant disasters that occurred annually from 2001 to 2020. More than 223 flood incidents were reported, above the worldwide average of 163 flood occurrences from 2001 to 2020.(26) Between 2000 and 2022, more than 104 natural disasters were recorded in Nigeria, with floods making up more than 52% of all such events. Some others are viral and bacterial infections, insect infestations, high temperatures, and landslides.(45)

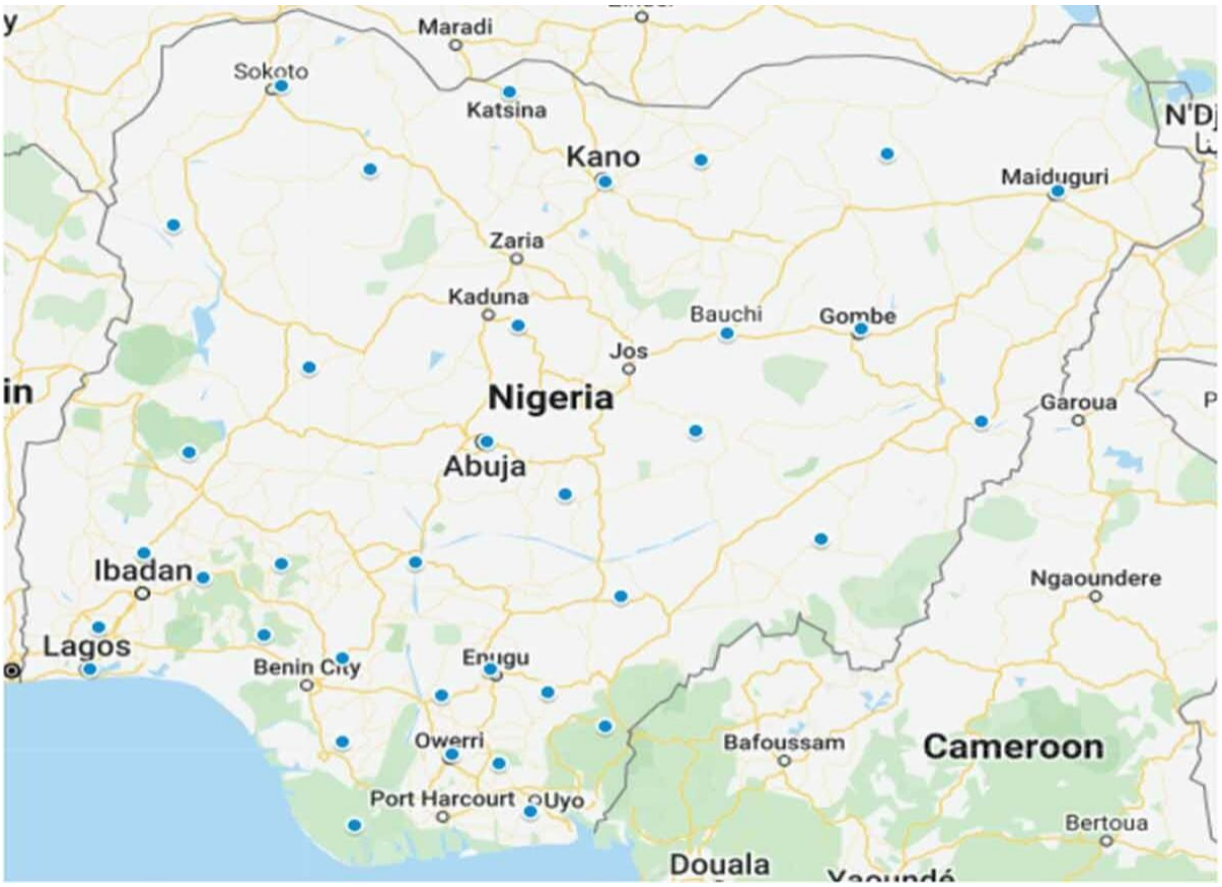
2.17. The Trend of Flood Disasters from EM-DAT 2000 – 2022 in Southern Nigeria:

Although no fatalities or serious injuries were recorded, some 500 individuals were affected by a flood in Lagos, Nigeria, in the year 2000, and losses totalled $7,561. Benin City, Edo State, and Cross River State had flooding in the year 2000, affecting over a thousand people. In 2001, a flood in Ondo State, southwest Nigeria, affected over 2,000 people. (45)

- In 2002, over 2,000 people in the Shomolu neighbourhood of Lagos state, Nigeria, were forced to evacuate their homes due to flooding.
- No fatalities were recorded; however heavy rains in the Lagos province in 2004 displaced over a thousand people and submerged nearly 340 kilometres of land. Flooding due to heavy rains displaced around 15,000 people in Ugheli North LGA, Delta State, in 2004.
- In 2005, torrential rains in Lagos, Nigeria, displaced one thousand persons.
- Around 2000 people in Edo State were impacted by flooding that year (2006).
- Ogun State had severe flooding in 2007, affecting many residents and ultimately taking the lives of 17 of them.
- Over 5,000 people were forced from homes in Ikorodu, Lagos, and six lost their lives due to urban flooding in 2007.
- In Lagos, Nigeria, 31 persons lost their lives to flood-related causes in 2009. Additionally, many residents were homeless and left without a house.
- In 2010, floods killed 1,555 people and displaced over 258,000 people across the country. (21)
- In 2011, severe rains triggered urban flooding in the Ibadan North Local Government Area (LGA), which resulted in 120 deaths and displaced 3000 people. In the same year, flooding in the states of Imo and Lagos resulted in the deaths of ten people when they drowned.
- One of the most significant and disastrous flooding catastrophes occurred in Nigeria in 2012, impacting seven million people and creating losses to the economy of five hundred million dollars. (17)
- According to the National Emergency Management Agency (NEMA), 2012 in Nigeria resulted in 363 persons losing their lives, more than 2.1 million people being evacuated, and roughly N2.6 trillion in economic damages. (46).
- In 2013, flooding in Abia, Ebonyi, and Edo forced 8,100 people from their homes, and 19 drowned as a result. Also, The Ibadan North Local Government Area (LGA) in Oyo State, southwest Nigeria, experienced floods in 2013 due to torrential rainfall, resulting in at least 100 fatalities and 10,000 displaced residents.
- When a storm deluge struck the states of Cross Rivers, Rivers, Benue, and Delta in 2016, it forced more than a thousand people to seek refuge elsewhere, and it claimed the lives o f more than 28 others.
- In Osun, Ekiti, Akwa Ibom, and Enugu in 2017, twenty people lost their lives, and an ad ditional five thousand people were forced to flee their homes due to the flood. The cost of the repair was expected to be $5111,000.
- In 2017, flooding had an impact on the lives of more than 10,000 persons in the state of B enue
- In 2018, severe riverine flooding in Kogi, Delta, and Anambra resulted in 199 fatalities, 1306 injuries, the displacement of over 193000 persons, and damage of more than $275,000,000.

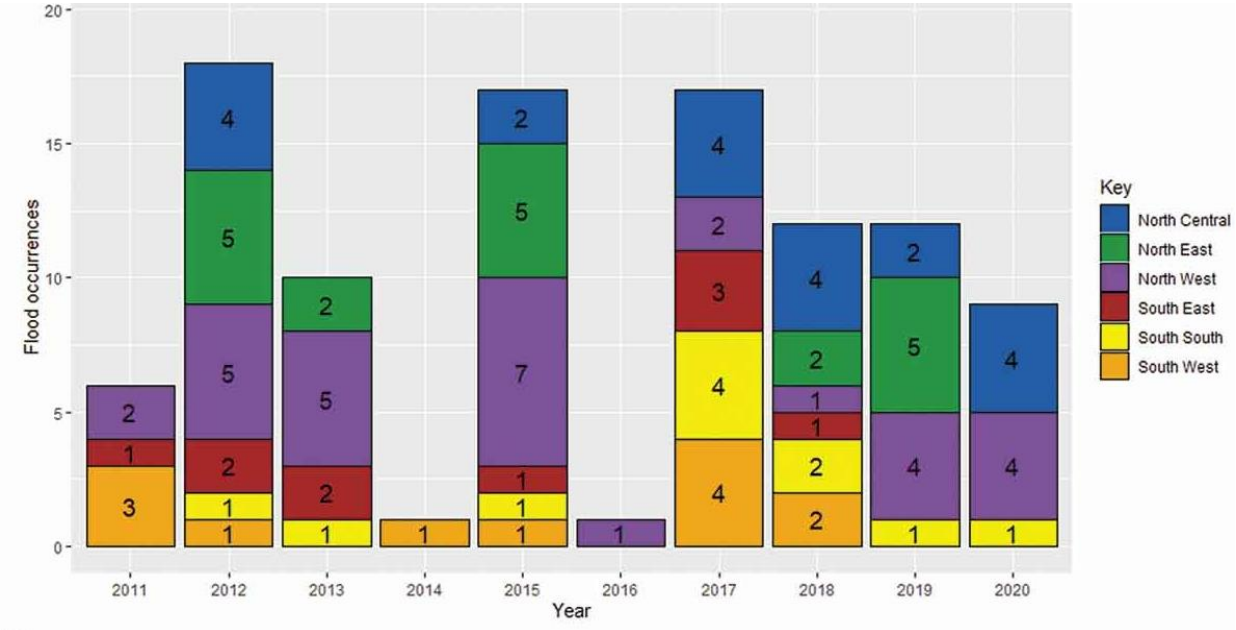
- In the southern Nigerian state of Akwa Ibom, heavy rains in 2020 caused urban floods and riverine flooding, leading to 4 deaths and over 3,000 displaced people. (45)

Fig. 16. This map displays all 35 states and the Federal Capital Territory (FCT) that have been impacted by floods in Nigeria between 2011 and 2020.



Source: (25)

Fig. 17. Stacking bar chart depicting the incidence of significant floods in Nigeria by geopolitical zone between 2011 and 2020.



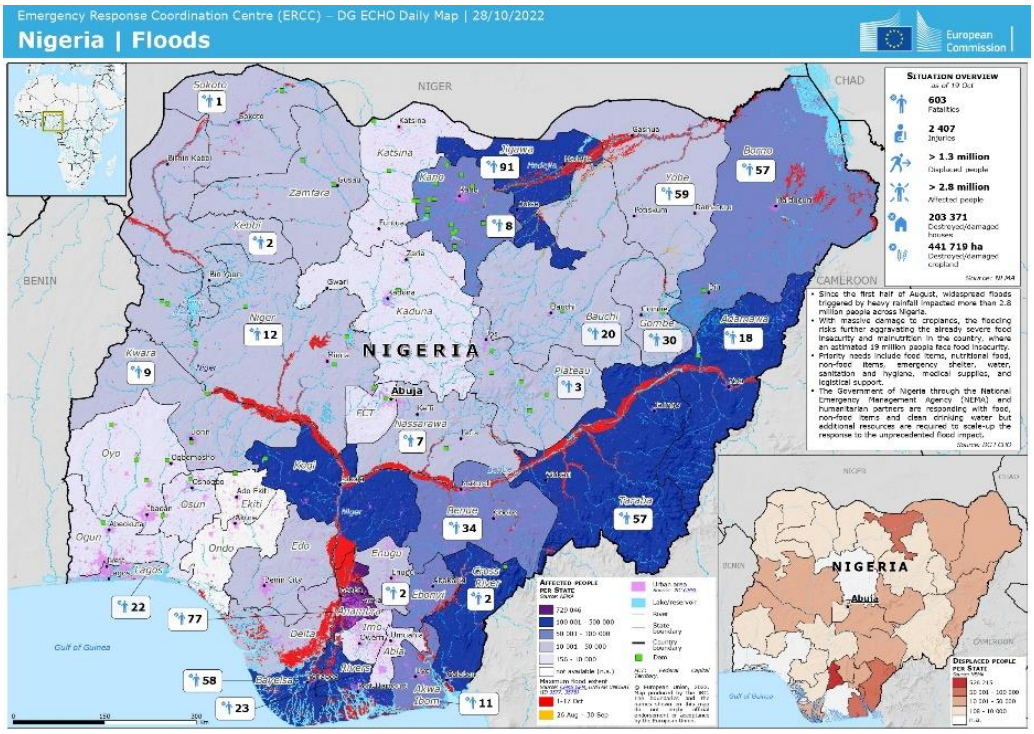
Source: (25)

Based on this data, it is clear that the Northwest region of Nigeria saw the most flooding (31 occurrences), followed by the North Central region (20 events) and the Northeast region (19 occurrences). There were fewer floods in the Southeast region, which was also true of the Southsouth and Southwest regions. Between 2011 and 2020, northern areas had more significant floods than southern regions. At least 18 floods occurred in the nation in 2012, 17 in 2015 and 2017, and 12 in 2018 and 2019. There was one flood each in the Southwest and Northwest in 2014 and 2016, making them the two years with the fewest floods.(25).

3.0. Chapter Three: Southern Nigerian Flood Disaster Incidents in 2022

In 2022, floods in Nigeria caused a lot of damage in the states of Anambra, Delta, Bayelsa, Cross River, Benue, Kogi, Enugu, Imo, Ebonyi, Rivers, Nasarawa, and Lagos. More than 3.2 million people were affected, including 1.9 million children. As of November 2022, 1.4 million people were homeless in 34 of the 36 states, and 612 people had died. (47). More than 200,000 homes were destroyed completely or partially by the floods in 2022. Many people in flood-prone areas of Nigeria do not have the means to migrate, so they wait until the water levels have returned to normal before returning to their houses.(48) As of October 19, 2022, 204 individuals had died in southern Nigeria as a result of flood-related causes, accounting for 33.8% of all deaths. Anambra state had the most deaths of 77 as a consequence of a boat tragedy while attempting to flee the flood. (49)

Fig. 18. Map depicting the number of people impacted and killed by floods in Nigeria in 2022



Source: (49)

3.1. Flood Disasters in Bayelsa State

About 219,400 individuals were forced from their homes in Bayelsa state, located in the south of Nigeria, and there were about 257,900 people in urgent need of humanitarian aid. (50). As of October 2022, there has been 58 fatalities. (49) The National Inland Waterways Authority of Nigeria reports that the crest of the 2012 flood was 12.84 meters, and the crest of the 2022 flood was 13.22 meters.(47)

Fig. 19. Floods bring bodies to the surface in Bayelsa State

Source: (51)

In the Azikoro district of the Bayelsa state, bodies from drowned cemeteries surrounding the area appeared on floating waters on streets in the state capital, triggering worries of an outbreak. In October 2022, the roads were entirely underwater, making it impossible to go to the impacted morgues at Bomadi General Hospital and Olodiama. Former President Goodluck Jonathan's country house, Otuoke, in the Ogbia local government area, was also inundated in the storm. In October's broadcast to the state, Bayelsa's governor said that over 300 towns had approximately one million displaced residents. Several state citizens have claimed that this event caused a gasoline shortage and skyrocketed food costs.(51)

As the rains peaked in September and October 2022, many highways and bridges linking Bayelsa with other states were washed away. The flood damaged the East-West Road, which connects Delta State and Rivers State to Bayelsa State.(51) The floods were so severe that trucks and cars transporting food like garri, tomatoes, onions, beans, rice, chicken goods, and petrol could not enter Bayelsa state.

Fig. 20. In Bayelsa State, floods destroyed an access road in October 2022

Source: (52)

Fig. 21. (a). Damaged access road in Bayelsa state

Fig. 22. (b) Flooded Homes in Odi, Bayelsa State, southern Nigeria

Source: (51)

3.2. Flood Disasters in Rivers State

In 2022 alone, the disastrous flood in Rivers washed out around 200 communities in the local councils of Ogba/Egbema/Ndoni (ONELGA), Ahoada West, Ahoada East, and Abual Odual. Six people were killed at the Ihuike hamlet on the East-West route's Ahaoda axis as they sought to cross the surging waters to the road. According to an eyewitness, a woman and her little boy were swept away by the water. The baby's corpse was finally retrieved, but the mother was not found. After being swept away by a flood on a boat, eight individuals perished, while the other four managed to escape. The Orashi region of the state, which encompasses the three councils, was hit by devastating floods in 2012, resulting in the deaths of a large number of people. In addition, Rivers State was hit hard by floods in 2016, 2017, 2018, and 2020, but not much was done to fix the problem until recently. Many individuals in the state were affected by the flood before recovering from the previous flood disaster. In ONELGA, for instance, flooding has reached bridges, roads, farms, and schools, wiping out nearly 20 settlements. Since the floods began, many people have lost their homes, farms, and ways of living due to the rising waters. Food security is another area where the disruption could have negative consequences.(53) There have been 58 deaths attributed to floods as of October 2022. (49)

Fig. 23. Graphic depiction of flood Homes in Rivers State

Source:(54)

Because several roads throughout Rivers State were flooded, truckers and delivery services were forced to use other routes, which were more prolonged and more costly, which drove up the cost of transportation for everyone. The cost of living has risen, and the price of gasoline has been artificially inflated, making life even more difficult for many people in southern Nigeria.(55)

3.3. Flood Disasters in Cross Rivers State

According to the National Emergency Management Agency (NEMA), the findings of their risk assessment in April 2022 revealed that 254 villages in 14 local government areas in Cross River State are flood-prone.(56) At least 15 persons perished, and 217 homes were flooded in 21 towns across 12 LGAs in Cross River State in July and August of 2017. Crops worth millions of naira were destroyed, including cassava, yams, groundnuts, okra, vegetables, and other cash crops.(57)

Fig. 24. Several homes have been submerged by the floodwaters that have ravaged Cross Rivers State

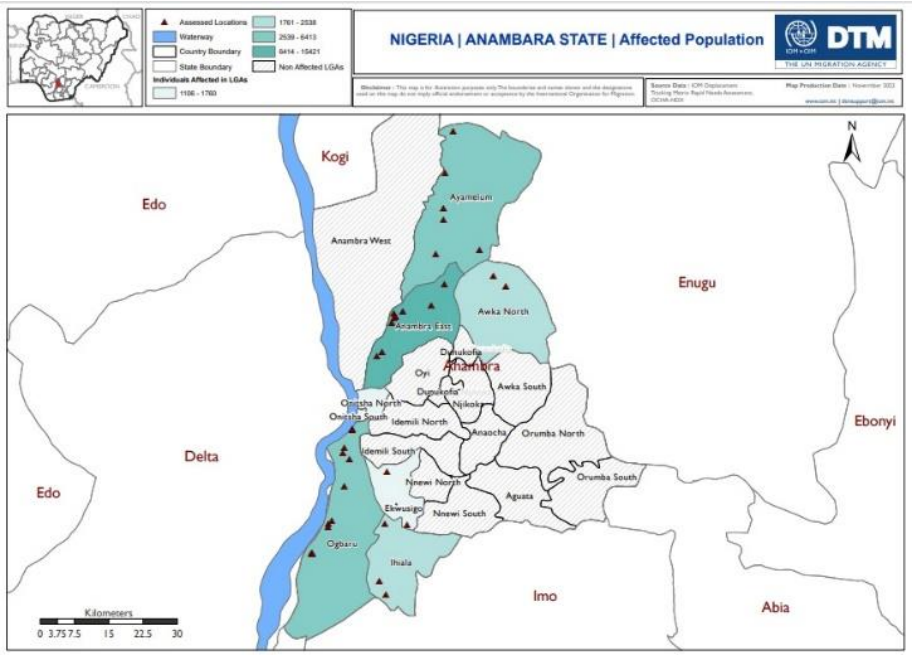
Source:(58)

In the year 2022, flood waters in the state of Cross River were responsible for the deaths of six individuals, the destruction of 400 homes, and the loss of 700 acres of agricultural land. In addition, the flood waters caused $400,000.00 in property damage. It is anticipated that flood-affected regions of the state will increase criminal behaviour and commercial sex peddling due to the disaster. These are a few unintended effects of flood disasters in the state.(59) The flooding, which occurred after it had rained for about five days in a row, affected fifteen riverine towns in the Obubra Local Government Area of Cross River State and caused hundreds of residents to be displaced from their homes. In addition, the flood was responsible for the loss of rice, yam, and cassava crops and economic trees, household items, and schools, which were estimated to be worth millions of Naira.(60)

3.4. Flood Disasters in Anambra State

In 2018, more than 375,142 people were devastated by flooding throughout ten local government areas in the southern Nigerian state of Anambra. With 131,175 individuals impacted, Ogbaru council has the most significant number, followed by Anambra west with 100,775 and Onitsha south with 1,005.(61) The most tragic consequence of the flood occurred at Ogbaru when a boating accident caused at least 76 people to go missing. This boat mishap was the worst single event in the 2022 flood disasters in Nigeria. DTM (Displacement Tracking Matrix) found 35,074 people in 6,980 households were affected by the floods in the seven (7) LGAs in Anambra state that were evaluated. These people comprised IDPs living in camp-like settings and citizens impacted by the floods but stayed in their villages. At 44.0% of the total affected population in the State, Anambra East LGA had the most significant number of victims, with 15,421. Ogbaru LGA, which borders Anambra East, had the second-highest number of victims, 6,413 (18% of the total population), behind Anambra East. By contrast, Onitsha North LGA had the fewest number of casualties. All 1,106 affected residents of Onitsha North came from the neighbouring local government area (LGA) of Anambra West. Most (73%) of impacted residents' homes had some damage, while 19% were wrecked. The recent floods destroyed or badly damaged 92% of Anambra's schools, 58% of its other educational institutions, and 64% of its hospitals. The percentage of flood victims who did not have access to medical treatment was around 44%. Some damage has been done to 2,807 toilets, while 58 water stations have been affected in some way.(62) At the end of October 2022, 77 persons in Anambra state have lost their lives due to the effects of the flooding. (49)

Fig. 25. Map of flooding in the state of Anambra, 2022, based on information from the IOM of Nigeria



***Source*:** (62)

Fig. 26. A heartbroken woman sobs on a flooded street in the state of Anambra, one of the most hit.

Source: (63)

The Government and the People did not Adequately Respond Nigerian Flood Threat Warnings

Every year, the Nigerian Meteorological Agency (NiMET) and the Nigeria Hydrological Services Agency (NIHSA) stress that the danger and severity of flooding are rising to alert everyone to the need for better-coordinated efforts to lessen the impact of flooding. A forecast that NiMET provided in August 2022 indicated that there would be an increase in the amount of rainfall that occurred in 19 states during August and October. Nevertheless, despite these warnings, the measures made by the Nigerian government at all levels to lessen the risk, deal with the danger, or establish resilience were utterly unsuccessful. Many flood victims in Anambra state, which is located in southeast Nigeria and has a high risk of riverine floods, have acknowledged that this early warning did not reach them. Even though the extent and intensity of the flood were predicted, and Nigerian meteorological organisations provided warnings, this early warning did not come to them. This lack of awareness was because the mode of communication used to disseminate this warning was inappropriate for reaching individuals in high-risk communities. Despite repeated warnings from the media, the most vulnerable citizens in many high-risk locales continued to be unaware of the situation. Consequently, the inefficiency of the communication channels available to these people has exacerbated their susceptibility.(64) About 729,000 people in Anambra state were affected by the floods, and 526,000 were displaced persons in the 13 local government areas.(50)

Fig. 27. Floods damage homes in Anam Community, Anambra West LGA in Anambra State

Source: (65)

Fig. 28. A section of the state of Anambra in Nigeria that was flooded on October 28, 2022

Source: (66)

3.5. Flood Disasters in Edo State

The floods in Edo State resulted in over 41 deaths, with more than 73,000 individuals affected. The floods also damaged at least 670 homes entirely. Additionally, the floods damaged or destroyed close to 1,400 homes. There were about 1,328 families who were made homeless as a result of the damage or destruction of their dwellings. More than fifty elementary schools, twelve colleges, and eleven health centres were shut down due to the flooding. There were substantial losses of livestock, as well as the destruction of about 18,769 hectares of crops and farmlands.(67) Due to the heavy downpour and subsequent river overflow, flood waters inundated no less than twelve villages in the Edo North Senatorial district.(68)

Fig. 29. Edo State, October 2022, with numerous submerged homes

Source:(68)

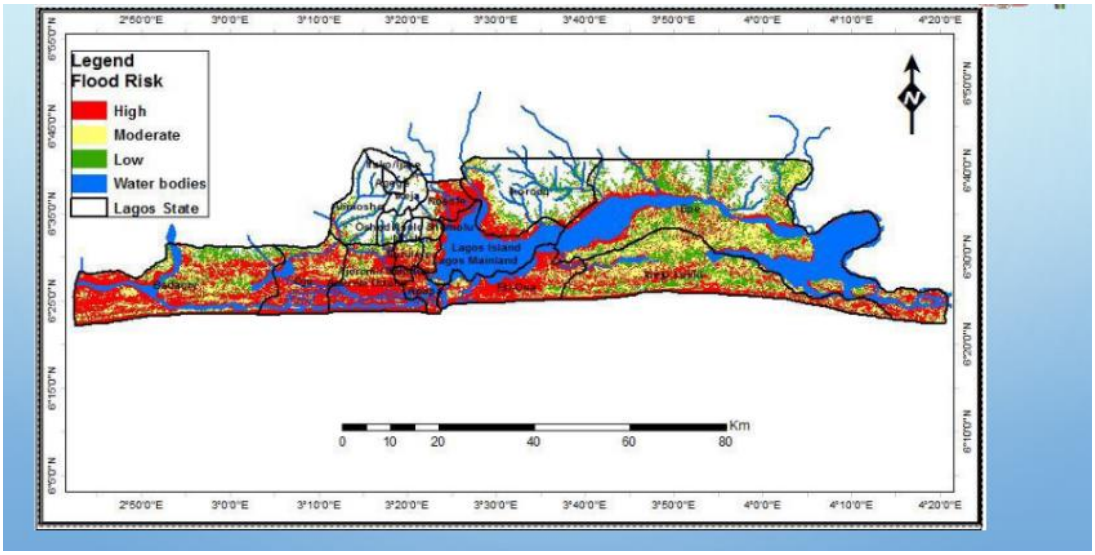
3.6. Flood Disasters in Lagos State

Lagos State, situated in southern Nigeria, was severely impacted by floods in 2022 and had the 15th-highest population exposure to coastal flooding anywhere in the globe. Lagos recorded about 22 deaths from flood-related causes as of October 2022.(49) Due to overcrowding, insufficient sanitation, and a lack of good medical and public health services, Lagos state and the rest of sub-Saharan Africa are susceptible to floods and the waterborne diseases accompanying them.

It is estimated that Lagos loses almost $4 billion annually due to losses in property, income, and lives. As sea levels rise and storm surges exacerbate floods, the coastline of low-lying Lagos is degrading. The coastline of Lagos, Nigeria, has receded by an average of 2.64 metres each year during the past 50 years. Rapid urbanisation and the sand mining trade that feeds it contribute to this erosion, putting coastal ecosystems and the communities that rely on them in jeopardy. Habitability of the city may be threatened by the end of the century if the current pattern of rising seas, flooding, and coastal erosion continues. The average annual rainfall in Lagos is expected to reach 1,750 mm by 2022, up from 1,627 mm in 2021. Many rivers and streams of fresh water, as well as a lagoon and the Atlantic Ocean, surround the city of Lagos. This megacity is particularly vulnerable to coastal flooding due to its position, relatively flat topography, and average height of barely 1.5 m above sea level; rising sea levels will only make this problem worse. Sand, gravel,

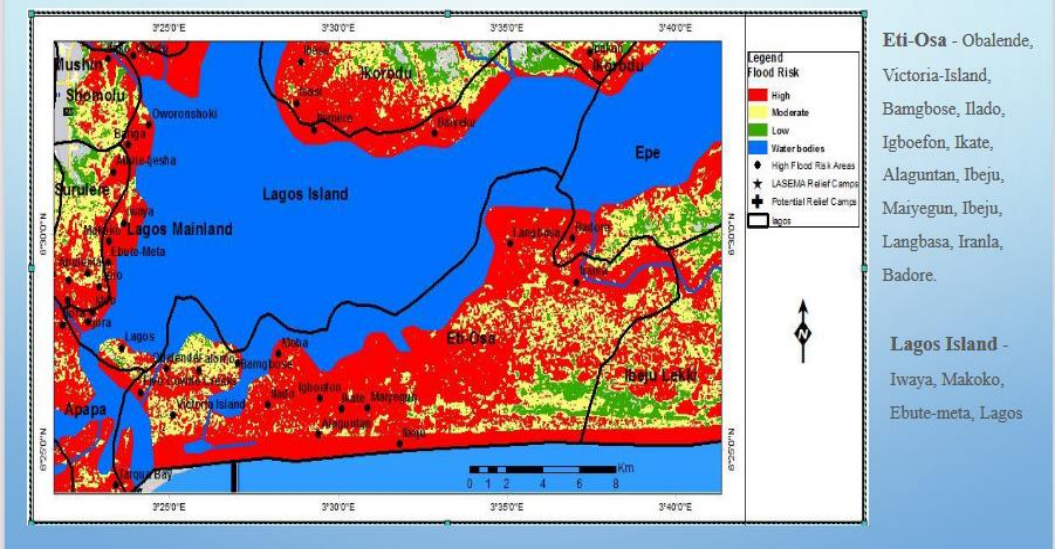
crushed stone, and aggregates are mined along the Lagos coast for road and building development, contributing to coastal erosion. To maintain its position as Nigeria's and Africa's economic and political hub, Lagos requires annual sand consumption of over 40 million m3, mostly for use in construction projects that provide the structures and other infrastructure needed to run these institutions. (69)

Fig. 30. A map displaying Lagos state in southern Nigeria and all of its LGA, with a total land mass of 3339.94 km2, of which about 961.13 km2 (28.78%) is at high risk of flooding.



Source: (70)

Fig. 31. Flood risk map of Eti-Osa LGA and Lagos Island



Source: (70)

This map shows that 79.38% of the total area of the Eti-Osa LGA in Lagos State, southern Nigeria, is in a high-risk flood zone, and it is the area with the most land in a high-risk flood zone. The next area is Ajeromi/Ifelodun LGA, which has a high risk of flooding on 66% of its land area.

This is the case even though Lagos is not as densely populated as the rest of sub-Saharan Africa. The concentration of a large number of people in a relatively small region with a high risk of flooding contributes to the emergence of waterborne disease outbreaks. Flooding makes a much more challenging situation since overcrowding, and shoddy municipal architecture has made it impossible to secure clean water and sewer connections. The vast majority of infectious diseases are transmitted via the use of water. The water supply contamination and the lack of sufficient sanitary facilities are critical contributors to illness in the communities around the relief camps for flood victims. Vibrio species, which may cause cholera, are among those that are shown to be the most widespread waterborne pathogens in the aftermath of floods. Other common waterborne infections include cryptosporidiosis, non-specific diarrhoea, rotavirus, typhoid, and paratyphoid. This contamination results from the introduction pathogens from sewage into the drinking water supply. This contamination is especially obvious in areas with a high population density and a consistently poor level of life due to insufficient sanitation, insufficient medical care, extreme poverty, and an abundance of rats and animals that serve as their food sources. It's possible that flooding could temporarily reduce the number of rodents in an area. Still, as the water goes down, the same areas will become prime breeding grounds for the vectors and diseases that rodents bring. During the floods in Lagos, Nigeria, in September of 2012, there was a significant issue with waterborne diseases due to polluted drinking water and a lack of sanitation. It was also said that many people had skin issues since they needed to wade through water to get to their homes. The floods brought with them a significant amount of garbage, as well as illnesses that are spread by excrement and pollutant residues. According to one study, the flooding in Lagos, Nigeria, in 2012 caused an outbreak of cholera and dysentery that affected more than half of the city's population. And research has revealed that the Vibrio species, which is responsible for cholera and causes watery diarrhoea, is the waterborne infection found most often after floods. When floods struck the region, around 21.7% of the population was afflicted by typhoid fever caused by ingesting contaminated food or water polluted with faeces from broken sewage systems. Floodwaters might have caused the contaminated food or water. About 17.5% of people tested positive for malaria, which was attributed to the high density of mosquito breeding sites, such as standing water in potholes in the road, blocked drainage systems, obstructed rivers, and lagoons overrun with garbage and other debris and not drain properly. In addition, 4.3% of people reported skin rashes due to prolonged and repeated contact with contaminated water. Additionally, it was shown that the prevalence of hepatitis A and E was 3.6% and 1.1%, respectively. 1.8% of people got leptospirosis because rats and other rodents polluted the water supply with their urine. Schistosomiasis accounted for just 0.4% of cases, whereas other water-related illnesses accounted for 2.5%.(71)

Fig. 32. Flood Disaster in Lagos State, Southern Nigeria, 2022

Source: (72)

3.7. Flood Disasters in Kogi State

Over 108 people died from the flood disaster in Kogi state, central Nigeria, in 2022; over 20,000 people were affected; over 13,000 people were internally displaced, and 277 people with disabilities were among the IDPs. The floods destroyed approximately 600 hectares of farmlands and property, including houses, worth billions of naira. As of the first week of November 2022, almost 15,000 homes had been damaged, with 3,209 entirely ruined. About eighty-four per cent of the homes hit were either wholly or partially destroyed. The 2022 flood in Kogi State disrupted 76 per cent of the state's academic endeavours and 40 percent of its healthcare infrastructure. The flooding was blamed on the opening of the Ladgo dam in Cameroon, which let out surplus water. (73) Within the two IDP camps, there is no access to fundamental amenities like running water, restrooms, or a comfortable place to lay their heads. Flood victims and their families choose to sleep outside without mosquito nets, and this puts them at risk for diseases like cholera, typhoid, and malaria, as well as attacks from wild animals like snakes and scorpions.(74)

Fig. 33. In Kogi State, canoes are used to get trapped people out of their homes

Source: (75)

Flood victims in Lokoja, Kogi state, who were living in Internally Displaced Camps, endured the most terrible moments of their life as they were forced to eat whatever they could find. At the same time, relief supplies reportedly meant for them were diverted. These victims lived hand to mouth.(74)

Fig. 34. Flooding destroys homes and halts the movement of goods and people in Lokaja, Kogi state.

Source: (76)

4.0. Chapter Four: Economic Losses Caused by Flood Disasters in Southern Nigeria

It is estimated that the 12 worst-hit states lost close to $17 billion due to flooding in 2012. Those living on a limited income are more at risk during severe weather events. Eighty per cent of those who live in rural areas rely on agriculture as their primary source of income. However, this industry is particularly vulnerable to natural disasters such as floods and droughts.(17) Between 2011 and 2020, Nigeria experienced around 1,187 deaths related to floods. Floods represented approximately 15% of all African deaths caused by flooding during this same period. The cost of damage to homes was $904.5 million, representing 21% of the total property damage caused by floods throughout Africa. More than seven million people were impacted by the floods that occurred in 2012 during July and October. During the 2012 floods, over 5,900 homes were wiped out, over 5,000 people were wounded, and over 2 million people were forced to relocate.(25)

In 2015, one million individuals were impacted by severe floods, costing an estimated $25 million in losses. Nigeria loses between 2-11% of its GDP if adaptation measures are not done. As estimated by the Post Disaster Need Assessment (PDNA) Report after the 2012 flood, the overall damage was $16.9 billion, or 1.4% of real GDP growth that year.(17)

The victims of floods have always been forced to live with the repercussions of the flood disaster for a significant length of time, either until the occurrence of the subsequent flood disaster or for the rest of their life. A flood can't happen without leaving some impression on the people who experience it. It is especially worrying that disasters might lead to a rise in food insecurity because of the deterioration of land and infrastructure caused by erosion, direct crop failure because of floods and severe rains, potential nutrient leaching, and fungal growth because of increased humidity. Possible drought conditions will have an impact on the water supply. Inaction on climate change might cost Nigeria between 6% and 30% of its GDP by 2050, or US$100-460 billion, due to the reliance of the country's economy on climate-sensitive sectors such as agriculture, forestry, oil, and gas production. (17)

The Consumer Price Index (CPI) report for Bayelsa state showed that inflation rose by 20.8% in September 2022, which was the highest rate since 2005. In August 2022, inflation was at 20.52%, a jump from that. The index went up by 1.36% from one month to the next, less than the 1.77% increase seen the month before. The annual food inflation rate was 23.34%, higher than the previous month's rate of 23.12%. The National Bureau of Statistics (NBS) said that the rise in the food index was caused by higher prices for staple foods and their products, which were indirectly affected by the flood.(51)

Changes in rainfall will impact food security and water availability due to rising temperatures and increases in the frequency of floods and droughts. An increase in the frequency of heavy rains may also cause soil erosion and waterlogging of crops, leading to a reduction in agricultural yields and an increase in the likelihood of food insecurity. As a result of the predicted effects of climate change, Nigeria and the rest of the West African area are anticipated to be a centre of high levels of food insecurity in the not-too-distant future. Because of this, there is a potential for enormous

economic losses, damage to agricultural areas and infrastructure, and perhaps mortality among humans. The deterioration of land and soil, which is made worse by frequent flooding, has a negative influence on agricultural productivity, which in turn has a disproportionately negative impact on the lives of poor rural people. There will be repercussions for food security due to the susceptibility of some crops to the effects of rising temperatures and water stress.(17)

It is anticipated that the floods will have a significant adverse effect on food security. Over 569,000 hectares of agriculture in Nigeria have been destroyed or damaged by floods, putting over 19.5 million people in danger of acute food shortages before the October 2022 harvest season. In addition, floods have forced about 569,000 people to lose their homes. Because of the harm done to essential crops like cassava, rice, and plantain, among other crops, crucial food supplies and necessary means of livelihood have been eliminated.(77)

It is estimated that 110,000 hectares of agriculture have been destroyed due to the 2022 floods. As a direct consequence of the floods, there has been an interruption in the fuel supply, and food prices have increased by 23%. It has been reported by the Food and Agriculture Organization of the United Nations (FAO) and the World Food Programme of the United Nations (WFP) that Nigeria is at risk of suffering catastrophic levels of hunger. Matthias Schmale, the UN Humanitarian Coordinator for Nigeria, estimates that there are 19 million people in Nigeria who do not have consistent access to food, and 14.7 million children are at risk of being malnourished. (48)

4.1. The Impact of Floods on Children and The Education System in Southern Nigeria

In 2012, flooding disrupted educational programmes, Children in several southern states felt the effects of the school closures, which lasted for at least two months. Due to the severe danger of kids drowning in the flooded school area, state ministries of education formally closed schools. Schools were inundated, floodwaters obstructed access routes to the schools, and state ministries of education issued official closures. A total of 2167 elementary schools and 788 secondary schools were either wholly or partly destroyed in the states of Anambra, Delta, Bayelsa, Edo, Kogi, and Rivers in Southern Nigeria.(78)

Table 1. The Number of Primary Schools Damaged by Floods in Southern Nigeria in 2012.

Affected States in Southern Nigeria	Partially Damaged Primary Schools	Completely Damaged Primary Schools	Total
Anambra	1050	256	1306
Delta	238	20	250
Bayelsa	234	12	254
Edo	10	8	18
Kogi	105	118	223
Rivers	116	0	116
Total	1753	414	2167

Source : (78)

Table 2. The Number of Secondary Schools Damaged by Floods in Southern Nigeria in 2012.

Affected States in Southern Nigeria	Partially Damaged Secondary Schools	Completely Damaged Secondary Schools	Total
Anambra	323	93	416
Delta	75	3	78
Bayelsa	163	1	164
Edo	3	0	3
Kogi	13	33	46
Rivers	81	0	81
Total	658	130	788

Source: (78)

The quality of teaching was impacted by operating in a leased structure or erecting a temporary tent, both of which are not ideal learning environments. Furthermore, children who have their sessions held outside are more likely to get respiratory illnesses like the common cold or pneumonia. Many reopened schools were left without furniture or instructional resources, making it difficult for teachers and students to return to their regular routines. Demand for elementary and secondary education in these states was also impacted because some students whose schools remained open temporarily stopped attending because they or their parents were unwilling to risk crossing the flood waters to get there. Even though classes resumed, several families have reported that their children cannot attend school due to poor road conditions. In addition, many kids have lost their school uniforms and supplies, such as notebooks and pencils, in the water. Schools had to charge returning students and their families compensating fees since many public institutions had to replace damaged or destroyed classroom supplies. This problem further discouraged students from going, especially those from low-income families residing in rural regions, and led to their staying at home to assist their parents instead. Some schools served as makeshift shelters for families whose homes were swept away or damaged by floods. Over 200 schools were damaged from being utilised as internally displaced persons (IDP) camps, and IDPs used classroom seats as firewood in some of those schools. Anambra State had the most losses ($4.9 million), while Edo State suffered the least ($720,000).(78)

Table 3. The Financial Cost of Education-Related Damages Done by Flood in 2012 in Southern Nigeria

Affected States in Southern Nigeria	Financial Cost of the Damaged Schools (Million Dollars)
Anambra	4.9
Delta	9.6
Bayelsa	2.02
Edo	0.720
Kogi	9.6
Rivers	2.4
Total	29.24

Source: (78)

The flooding in Nigeria in 2022 was the worst in a decade, placing millions of people at risk of contracting diseases that are spread by water, drowning, and going hungry. Over 2.5 million people, approximately 60% of whom are children, will require humanitarian assistance in 2022, according to projections provided by UNICEF. According to the Children's Climate Risk Index (CCRI) compiled by UNICEF, Nigeria has a "very high risk" of being adversely impacted by climate change. It ranks second among the 163 countries that are included in the index. Children in countries deemed at "very high risk" are subject to the devastating effects of exposure to various climatic and environmental shocks. These effects are compounded by the high levels of underlying child vulnerability caused by inadequate critical services such as water and sanitation, healthcare, and education.(79)

4.2. The Impact of Floods on Health and Health Care Systems

As of November 15, 2012, NEMA (2012) reported that the floods have resulted in 363 fatalities, 5,851 injuries, 3,891,314 people being impacted, and 3,871,53 people being relocated. The floods damaged or destroyed 11.4% of primary healthcare institutions, 24.8% of secondary healthcare facilities, and 8.3% of healthcare facilities in the impacted regions, disrupting direct preventative and curative health services and restricting access to proper health care.(78)

Table 4. Damage and losses to health systems caused by floods in southern Niger in 2012.

Affected States in Southern Nigeria	The cost of fixing the damaged health care systems (Million Dollars)
Anambra	3.4
Delta	5.8
Bayelsa	11.4
Edo	1.94
Kogi	9
Rivers	17
Total	48.54

Source : (78)

4.3. Effects of Flood on Agriculture

Most farming and raising of animals happen in the low-lying areas of the significant river flood plains, where they can take advantage of being close to water. During the floods, many household and commercial livestock were lost to drowning.

Table 5. Estimated Crop, Livestock, and Fishery Production Losses from the 2012 flood

Affected States in Southern Nigeria	Cost on Agriculture (Million Dollars)
Anambra	77.15
Delta	97.7
Bayelsa	26.5
Edo	7.85
Imo	6.5
Kogi	115.3
Kwara	77.2
Total	408.2

Source: (78)

4.4. Flood Effects on Water and Sanitation

The flood damaged many water infrastructures, including open wells, dams, and boreholes. Around 8022 water facilities have been damaged since September 2012, including dams, open wells, tube wells, boreholes, hand pumps, solar panels, generators, generator homes, high- and low-lift pumps, and so on. 109787 sanitary facilities, including latrines and trash cans, were also destroyed.(78)

Table 6. Floods' effects on water and sanitation

Affected States in Southern Nigeria	Number of Water facilities damaged	Number of Toilet facilities damaged	The Financial damage on Water and Sanitation (Million Dollars)
Anambra	191	25	0.246
Bayelsa	4290	106307	5.69
Edo	3369	3455	0.635
Rivers	172	0	0.158
Total	8022	109787	6.73

Source: (78)

4.5. Effects of the Flood on the Production, Transmission, and Distribution of Electricity

The floods destroyed or damaged no power plants or transmission lines; therefore, energy generation and transmission capacity were not impacted. However, numerous ground-level transformers were flooded, and electrical poles and cables were broken, disrupting power distribution to certain customers. No one should be surprised if this has a detrimental effect on the bottom lines of power distributors over the same time frame. The results of the flooding disaster on energy generation and distribution in southern Nigeria cost the region a total of $593,800. Damage to the sector's physical assets was valued at what it would cost to replace the components washed away in the floods using stockpiles of equipment and spare parts held by power providers. There were monetary losses of $138,600 in Anambra State, $42,800 in Bayelsa State, $244,800 in Cross River State, $96,800 in Kogi State, and $70,800 in Rivers State.(78)

5.0. Chapter Five: Response to Flood Disaster and National Resiliency

5.1. Analysis of Nigeria's Institutional Preparedness for Flood Disasters

5.1.1. The National Emergency Management Agency (NEMA) oversees Flood Response and Recovery

The ability to respond to floods in Nigeria and the country's infrastructure has significantly increased since the founding of the National Emergency Management Agency (NEMA) in 1999. NEMA was established to lead and support disaster management stakeholders in a comprehensive risk-based emergency management programme of mitigation, preparedness, response, and recovery to coordinate and facilitate disaster management efforts to reduce the loss of lives and property and protect lives from hazards. Even though the national response capacity has improved over the last several years, there is still room for more improvement in risk reduction and mitigation ability. The Nigeria Emergency Management Agency is in charge of helping people recover from the effects of catastrophes such as floods, droughts, erosion, wind/rain storms, and the subsequent spread of disease and destruction of infrastructure (NEMA). NEMA's objective includes educating the public to raise awareness and preparation levels and recognise and respond quickly to disasters. It is an independent organisation that answers to the President. MDA delegates make up the Governing Council, which oversees the Agency's operations. NEMA encompasses technical and non-technical sections, including training, search and rescue, relief and rehabilitation, disaster planning, research, forecasting, and funding and administration. The six-zone offices that makeup NEMA have been strengthened.(80)

5.2. NEMA Zonal Officers

However, most zonal offices also struggle to react effectively to crises, adding to the burdens already carried by SEMAs. These include insufficiently featured machinery and a shortage of finances caused by a delay in allocation from Headquarters. Some regional offices, for instance, may not have enough drivers or cars to carry out their duties. Contractors have been slow to acquire and distribute relief items to zonal warehouses, slowing logistics operations. Furthermore, distribution to disaster victims is very unclear due to the lack of direct distribution of disaster relief items to local governments. Flooding, fires, and severe rain and wind have been the primary focus of rescue operations. The primary function of the zonal offices is to examine crises that have already occurred and then provide suggestions for humanitarian aid to the people who need it through organising seminars on disaster management for government employees in relevant state MDAs.(80)

5.3. State Emergency Management Agencies (SEMA)

NEMA's inability to react rapidly to disasters is attributable primarily to its reliance on the cooperation and coordination of state and local governments to carry out its mission. NEMA functions at the federal level and is only requested to engage in disaster management activities

beyond SEMAs' capability. The NEMA Act mandates that state governments form independent State Emergency Management Agencies (SEMAs) to oversee disaster management in the states. The 36 federal states were urged to create State Emergency Management Agencies (SEMAs). In all, 22 of the country's 36 states have made their state emergency management agencies (SEMAs) the primary authorities responsible for disaster management. Unfortunately, many state emergency management agencies (SEMAs) have not received enough preparation from their respective governments. As a result, NEMA now operates primarily independently.(81)

5.4. The Hyogo Framework for Action (HFA): Initiatives and Gaps

5.4.1. DRR as a Development Priority

The federal government of Nigeria is a signatory to the HFA and is responsible for reporting on the progress that has been achieved toward implementing the five HFA goals. The Nigerian government focuses on disaster risk management, as shown by the nation's membership in the Consultative Group of the World Bank's Global Facility for Disaster Risk Reduction and Recovery Board (GFDRR). The National Emergency Management Agency Act No. 12 of 1999, as revised by Act 50, which formed the National Emergency Management Agency, continues to be the enabling law for disaster management in Nigeria. Act 50 also established the National Emergency Management Agency (NEMA). Before this legislation, there existed an organisation known as the National Emergency Relief Agency, which had its beginnings in the year 1990.

On the other hand, the Enabling Act No. 12 of 1999 redesigned and refocused the Agency; instead of being a relief agency, it was transformed into a body that coordinates the management of disasters in all ramifications. The National Disaster Management Framework (NDMF) is a system that acts as a regulatory guideline for effective and efficient disaster management in Nigeria. NEMA's purpose is to enable prevention and preparation and coordinate response at the federal level. The NDMF offers a mechanism that serves as a regulatory guideline. Currently, one of the primary responsibilities of the federal government is to provide funding for programmes that handle disaster management. The yearly allotments from the Ecological Fund, established specifically to address environmental crises and disasters, are the principal contributor to NEMA's financial resources. NEMA is to receive 20% of the yearly allotment of ecological funds from the federal government in accordance with Section 13 of the NEMA Act of 1999, which mandated this provision.(81) Even now, seven years after Nigeria signed the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR), natural disasters of varying degrees continue to wreak havoc in the country, driving survivors from their homes and destroying private property. Despite this, the numerous operations of the ministry have not shown any trace of an integrated and inclusive approach to DRR, strategic disaster mitigation, and preparation, as was promised in its mission.(82)

5.4.2. National Development Strategies

In 2010, the Nigerian government adopted the Nigeria Vision 20:2020, which lays out the country's long-term goals for national development and the steps that would be taken to bring them to fruition by 2020. It outlines a strategy to propel the country's economy into the league of the top 20 economies in the world by the year 2020. The accomplishment of this objective would make it feasible for the country to provide a satisfactory standard of living to its citizens and inhabitants. NV20:2020 places a focus on several environmental preservation practices, including the avoidance of the loss of biological diversity, the restoration of degraded areas, the protection of ecologically sensitive sites, and the repair of degraded regions. (80) There is no denying that Nigeria could not realise its ambitious objective. After realising it would be impossible to achieve the objectives outlined in Vision 20:2020, Nigeria established the National Steering Committee to manage and implement Nigeria Agenda 2050.(83)

5.4.3. Early Warning Systems

There is currently no defined, automated method for generating and transmitting early warning information in Nigeria. Several organisations strive to put together early warning systems, but each is doing it uniquely. Nigeria's National Institute of Meteorology (NIMET) produces weather predictions and seasonal rainfall estimates. Soil moisture and historical data predict climate-related catastrophes throughout the country. National disaster risk and emergency management stakeholders are not getting proactive information management of existing dangers and data for monitoring and early warning. Users are required to submit information requests, which hinders the transmission of potentially lifesaving data to those in need. For example, NIMET's rain forecasts may aid in mitigating the effects of periodic floods in the South-West region. On the other hand, state ministries are responsible for independently obtaining early warning information from NIMET's public website or the media; the federal agency does not send such notifications to them directly.

While NEMA has attempted to establish an early warning system for epidemics, there is no federal, state, or local/community-level flood early warning system. Most rivers in the country lack operational water level gauges, and those that do often lack coordinated stage and discharge stations. Most of Nigeria's river basins have inadequate hydrometeorology data collection and monitoring for flood warnings. Consequently, the national flood early warning system lacks consistency and standard operating procedures for sending alerts to those who need them. State and local governments have generally been slow or reluctant to join in early warning operations due to a lack of expertise, political will, and funding.(81)

5.4.4. Central Database on Past Disasters

There isn't yet a centralised database that gathers data on past disasters. However, records of prior disasters are not yet being kept systematically by a government institution. Historical information on disaster occurrences and losses is recorded in a decentralised fashion.(81)

5.5. National Key Interventions to Reduce Underlying Flood Risks

5.5.1. Structural Context: There are substantial policies in Nigeria to manage DRR dangers, such as the National Erosion and Flood Control Policy, Climate Change Adaptation, and so on, but enforcement and implementation have been weak. The present policies of Nigeria might be reshaped into early adaptation and disaster prevention methods in response to climate change and natural disasters. However, the government has been unable to produce a thorough implementation strategy that would transform these objectives into significant cross-sectoral initiatives for disaster risk reduction and environmental management. This chasm is a substantial obstacle to its execution.

5.5.2. Water Management: Floods are often caused in Nigeria by poor management of the country's water resources. There are 323 dams in Nigeria, most of which were constructed in response to the 1972-1973 drought. Because of a lack of finances and political will, these dams are often neglected, resulting in a massive sedimentation issue. Currently, the usage of these dams is limited, and the water behind them is released during the rainy season to avoid dam collapse. When the dam is opened, the previously obstructed downstream drainages overflow. (81)

5.5.3. Infrastructure and Investment Deficiencies: It is essential for flood defence structures to be constructed, restored, enlarged, and supplemented by ecological infrastructure in Nigeria. These projects must be prioritised.

5.6. Federal Government Response to Flood Disasters

There have been flooding responses from the government, government employees, and Action Aid. Some examples of these responses include the distribution of emergency food assistance, the distribution of dignity kits, and the provision of temporary housing (amongst others). Among the many groups responding to the flood are:

National Emergency Management Agency (NEMA) and State Emergency Management Agency (SEMA)

Between June and September of 2021, NEMA worked with local chapters of the Nigerian Red Cross Society (NRCS) to educate residents of villages located along the banks of the Niger and Benue rivers on flood preparedness. Also, in areas prone to flooding, NEMA works with state emergency management agencies (SEMAs) to map out neighbourhoods and raise awareness.

Ministry of Humanitarian Affairs Disaster Management and Social Development (MHADMSD)

The MHADMSD use NEMA to identify high-risk local governments in each state that need prompt involvement across various areas, from preparation and response to resilience-building. The Ministry of Humanitarian Affairs, Disaster Management, and Social Development help provide needy families with food, medicine, sugar, canoes, and temporary shelters.

Nigerian Meteorological Agency (NiMet): The National Society is working in tandem with NiMet to monitor weather reports and risk assessments and to disseminate this information to concerned local chapters.(84)

5.7. International Humanitarian Organizations Assistance in Nigeria

The Nigerian Red Cross Society (NRCS) has been monitoring weather data via its branches to identify potential hazards and avoid floods throughout the nation. The NRCS collaborates with organisations such as the National Emergency Management Agency (NEMA), the State Emergency Management Agency (SEMA), the Nigeria Meteorological Agency (NiMet), the Nigeria Hydrological Services Agency (NIHSA), the Federal Fire Service (FFS), the Federal Road Safety Commission (FRCS), the Nigeria Security Civil Defence Corps (NSCDC), the Nigeria Police Force (NPF), the National Orientation Agencies (NOA), the Nigerian Army (NA), and the Ministry of Environment. The National Society includes 37 chapters and over 800,000 volunteers who are skilled and experienced in many fields. These volunteers are dispersed around the nation, particularly in flood-prone regions and villages. The NRCS also has National Disaster Response Teams (NDRTs) on standby to assist with response activities when required. These teams are trained in various areas and assigned to Branches.(81)

Through the British Red Cross, the International Federation of Red Cross and Red Crescent Societies (IFRC) has obtained funding for preparation operations in six Nigerian states in 2021: Anambra, Delta, Lagos, Gombe, Kogi, and Keba. Nonetheless, several states are vulnerable to flooding during the rainy season. Thus these measures are inadequate. Therefore, more funding is required to finance preparation work in the remaining states.(81)

The British Red Cross remains committed to the nation via its funding of training, refresher courses, and the Youth Exchange Program for disaster preparedness. Together with NRCS, the Partner National Society is working to improve community flood preparation in Lagos FCT and Imo state via the incorporation of GBV and resource mobilisation.(84)

In reaction to the 2022 flood disaster, the World Health Organization (WHO) supplied emergency medical supplies to the government and people of Anambra State. As part of WHO's emergency response to Anambra state, the organisation assisted the state administration in establishing health clinics and other emergency services to address the disaster's health impacts as soon as possible.(85) The International Organization for Migration (IOM) Displacement Tracking and Monitoring (DTM) teams in Kogi and Anambra assisted the State Emergency Management Agency (SEMA) by distributing 400 non-food items (NFI) kits to Anambra's internally Displaced Persons (IDPs).(80)

Many people in Kogi State have been affected by the floods, and they are all going through a lot of stress on many different levels. To alleviate the situation, the WHO sent emergency health kits, mobile medical teams, and emergency health specialists to enable a multisector response to flood disasters in the affected states of Nigeria. The World Health Organization (WHO) has provided

non-food items like hygiene kits, mosquito nets, and 90 International Emergence Health Kits (IEHK-2017) to flood-affected areas in Kogi State. Together, these supplies will treat an estimated 900,000 people over three months (300,000 per month) for infectious diseases.(86)

In October 2022, The United Nations Children's Fund, Known Abbreviated as UNICEF, donated to the victims of the recent flood that struck seven local government areas in Anambra. The value of the donation was in the millions of naira. The products contain one hundred barrels of chlorine that may be used to cleanse various water sources. 40 cartons of Aquatabs, which are used for the purification of water in homes, and 320 cartons of Ready to Use therapeutic food (RUTF).(87)

5.8. Local Reaction to Flood Disasters

Many inhabitants in flood-prone areas only responded after the flood because of poor flood preparedness, which might have been averted with more significant coordinated efforts between the government and other stakeholders, including individuals. People in wealthy areas contributed funds to clean up drains and streams and repair old bridges. Some community leaders also used public forums and religious organisations to educate residents about the need to be flood ready.

In low- and middle-income communities, sandbags were used to prevent some flooding. As a precaution against potential flooding, several residents temporarily evacuated their homes. They requested housing and living costs assistance from government and non-governmental organisations. Regardless of socioeconomic class, the effectiveness of most locally targeted resilience projects is limited and only lasts a short time. Attempts to assist communities in coping with the numerous aspects of floods were futile.(88) Many of these people wait for the flood waters to subside so that they may return to their houses until the next flood season, which is often worse than the one before it as a result of the impacts of climate change.

5.9. Flood Disaster Resilience

The Department of Erosion, Flood, and Coastal Zone Management (EFCZM) of the Federal Ministry of the Environment (FMENV) focuses on flood resilience. The FMENV is the regulating organisation for flood resilience activities due to its responsibility to regulate all environmental programmes in Nigeria. (a) defining the policy, legal, and regulatory framework for environmental management, including collaboration with sectorial ministries and stakeholders; (b) environmental monitoring, data collection, and analysis; (c) EIA review, training, and clearances, including environmental education and public awareness; (d) ecosystem management and promoting sustainable use of natural resources; and (e) establishing and enforcing environmental standards. The Ministry comprises five technical departments founded by combining ecologically relevant divisions from numerous sector ministries, such as Water Resources, Agriculture, and Works. (i) Forestry, (ii) Drought and Desertification Management, (iii) Erosion, Flood, and Coastal Zone Management, (iv) Environment Assessment, and (v) Pollution Control and Environmental Health are among them. The federal government, the Ecological Fund, and international donors provide financial assistance to the EFCZM Department. The federal budget allocations for environmental

management have often been insufficient since what is authorised and disbursed does not always align.(81)

5.10. Conclusion and Way Forward

Clearly, Southern Nigeria faces a significant risk from floods, and the widespread flooding that affected several states in 2022 proves that these catastrophes are becoming more intense and have more far-reaching consequences. Several factors have contributed to this precarious situation, including a lack of environmental planning and monitoring, the construction of buildings in flood plains due to unchecked urbanisation, widespread deforestation, inadequate dam maintenance, negligence of urban planning, improper waste disposal that leads to clogged drains, and a lack of attention from government at all levels to these problems. All of these factors amplify the devastation caused when floods strike Nigeria.

"Investing in disaster risk reduction for resilience" is one of the four pillars of the Sendai Framework. Still, the government's efforts at all levels are insufficient, leaving residents to find ways to deal with the floods independently. Nigeria's federal, state and local municipalities must work with citizens and other interested parties to find and implement effective, long-term solutions. The first step is to increase awareness among those living in high-risk communities. They need to be prepared for floods and know what to do to lessen the damage. All parties involved need to know their duties before, during, and after a flood event, and they should be linked to relevant government authorities. As an added measure, the federal government should work with the states to ensure that all applicable environmental and development control regulations are adhered to. This will prohibit new development from occurring on wetlands and floodplains and guarantee flood-resistant building requirements are complied with when new structures are built.(88)

Nigeria must make constructing and maintaining additional dams in key locations around the country a top priority to reduce the risk of flooding. The legislation, implementation, and enforcement of flood risk management must be ensured, and this must be done in conjunction with land use, spatial, and urban planning. Enforcing proper drainage system use to prevent blockage of waterways is another crucial strategy. Use suitable early warning systems that can reach communities at risk in a language and way that they can understand and accept. Lastly, the government of Nigeria needs to strengthen its diplomatic ties and work more closely with its neighbours, such as the Republic of Cameroon, in disaster risk reduction and prevention to have a more harmonious control of the shared water bodies and dams they have.

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