

ENVIRONMENTAL LAW AND FLOOD DISASTER IN NIGERIA: THE IMPERATIVE OF LEGAL CONTROL

**BY
W. A. ADEBAYO ***

ABSTRACT.

"Nigeria will continue to labour under the pains of flood disaster unless there is a radical approach to avert the disaster.

Though, flood is a natural hazard, the people and the government can, through a concerted effort prevent the hazard from graduating into a natural disaster. The rainy season which is supposed to be a period of blessing has annually become a catastrophe. Nigeria in year 2012 alone lost about N2.6 Trillion to flood disaster.** Government effort is geared towards recovery and not prevention or reduction of the disaster.

Flooding may arise from global warming, but the fact is undisputed that flood disaster is induced more by the activities of people and lack of adequate environmental policy by the government.

To meet the challenges of flooding, and the consequence, there is a need for government to promote environmentally friendly planning policies and inculcate into people habits that are supportive and protective of the environment. Legal provision can be used to entrench the policies and habits.

This paper to examine the nature, types and causes of law: the impact of flooding in the environment and the measure to control flooding. This paper also is advocating legal response, both at the national and international levels.

*W. A. Adebayo is a lecturer at the Department of Private Law, Faculty of Law, Ekiti State University, Ado Ekiti, Nigeria.

** NAN features /w.71 No 242/2013 (July 2) The Director General of the National Emergency Management Agency (NEMA) released the figure at a forum on Disaster Risk Reduction in Geneva, Switzerland.

1. INTRODUCTION

Floods are probably the most widely experienced catastrophic geological hazards¹. It is usually a disastrous overflow of water from a lake or other body of water due to excessive rainfall or other input of water. Flood does not discriminate between the developed and the developing or under developed countries. Floods are usually caused by river or lakes overflowing their banks or by surges of ocean water during periods of heavy rainfall². Flooding is seasonal and it is one of the challenges facing the planet earth. Flood, whenever it occurs, usually brings untold hardship to the people and the environment. Flood in severe cases leads to loss of lives, damage to property, destruction of plant and animals, erosion of the earth surface and the pollution of the environment among other effects. On the average, in the United States alone, floods annually take nearly 100 lives and cause well over one billion dollar in property damage³.

The Holy Bible⁴ has an account of a devastating flood which wiped away, the generation of humanity, plants and animals of the era. The only survivor of the flood was the man Noah and his family and the pairs of species of animals that took refuge in the ark that was built by Noah in obedience to the instruction of God.

Flood is a threat to the environment and the habitat. The carnage associated with flood can be prevented or minimized through proper planning policy by the government. Understanding flood risk is an essential steps in managing the associated impacts of flooding and in making informed decision in addressing such impacts. Flood is an environmental problem, hence the need to expose students both at undergraduate and post graduate levels, scholars, researcher, policy maker and the society to the problem with a view of carrying out research; making proposal that will benefit the society; regulating the conducts of the members of the society and to enable the government formulate policies necessary to minimize the losses associated with flooding.

2.0 NATURE, TYPES AND CAUSES OF FLOOD

2.1 NATURE

Some floods are the result of unusual event such as the collapse of dam, but the vast majority are a perfectly normal, and to some extent predictable part of the

¹ Montgomery, C. W. (2006) Environmental Geology Mc Graw Hill Higher Education. New York (8th ed) P. 126.

² Time for kids Almanac 2012. Time for kids books New York P. 237 see also timeforkids .com

³ Montgomery C. W. Ibid P. 126

⁴ Genesis Chapters 7 & 8

natural functioning of streams⁵. Floods can also occur in rivers, when flow exceeds the capacity of the river channel, particularly at bends or meanders⁶. Flood will also occur during the period of heavy and intense rainfall. Whether a flood will occur or not depends on the quantity of water involved and the rate at which it enters the stream system. When the water input exceeds the capacity of the stream to carry that water away downstream within its channels, the water overflow the banks. Other variables that will influence the occurrence of flood are the rate of surface run off of the soil, the topography, vegetation etc. The rate of surface runoff is influenced by the extent of infiltration, which in turn is controlled by the soil type and how much soil is exposed. Soils, like rocks vary in porosity and permeability. A very porous and permeable soil allows a great deal of water to sink in relatively fast. If the soil is less permeable or is covered by artificial structures, the proportion of water that runs off over the surface increases. Once even permeable soil is saturated with water, any additional moisture is necessarily forced to become part of the surface run off⁷.

The topography of the soil will also influence the extent or rate of surface run off. The steeper the terrain, the more readily water runs off over the surface and the less it tends to sink into the soil. Water that infiltrates the soil, like surface run off, tends to flow down gradient, and may in time, also reach the stream. However, the subsurface runoff water, flowing through the soil or rock, generally moves much more slowly than the surface run off. The more gradually the water reaches the stream, the better the chances that the stream discharge will be adequate to carry the water away without flooding⁸.

Vegetation may reduce flood hazards in several ways. The plants may supply a physical barrier to surface runoff, decreasing its velocity and thus slowing the rate at which water reaches a stream⁹. The Government in Nigeria has realized the importance of plants in checkmating the scourge of flood and erosion, hence tree planting is an annual official event in Nigeria. Plant roots working into the soil loosen it, which tends to maintain or increase the soils permeability, and hence infiltration, thus reducing the proportion of surface run off. Plants also absorb water, using some of it to grow and releasing some slowly by evapotranspiration

⁵ Montgomery, C. W. Op. Cit P. 126.

⁶ Bariweni, P. A. Tawari, C. C. and Abowei, J. F.N (2012) "Some Environmental Effects of Flooding in the Niger Delta Region of Nigeria "International Journal of Fisheries and Acquatic Sciences, Maxwell Scientific Organization P. 36

⁷ Montgomery, C. W. Ibid P. 133

⁸ Ibid.

⁹ Ibid.

from foliage¹⁰. During a flood, the water level of a stream is higher than usual and its velocity and discharge also increase as the greater mass of water is pulled downstream by gravity¹¹.

Flooding is considered a bane or disaster whenever it affects humanity and the environment. It has been discovered by scholars that "nature benefits more from natural floods than from not having them at all. The thing that makes natural floods a disaster is when flood waters occur in area populated by human and in area of significant human development"¹². Floods are known to renew wetland areas which in turn host a wide range of flora and fauna. Preventing flood waters from entering such wetland areas will create imbalance to the natural state of things resulting to destruction of natural habitats and even extinction of various species of animals and plants¹³. The benefit ascribed to flood is infinitesimal and of a long term effect compared with the monumental damage that one event of flood will cause. Flood becomes a phenomenon and it is meaningful because of the adverse effects on the environment and the habitats. Measures to prevent flood disaster therefore are advocated than concerted effort to induce it.

2.2 TYPES OF FLOOD

- a) **Upstream flood**:- These are floods that affect only small localized areas. These are most often caused by sudden, locally intense rain storms and by event like dam failure. Even if the total amount of water involved is moderate, the rapidity with which it enters the stream can cause it temporarily to exceed the stream channel capacity.
- b) **Flash floods** – These are a variety of upstream flood characterized by especially rapid rise of stream stage¹⁴. Flash flood will occur anywhere that surface runoff is rapid, large in volume and fuelled into a relatively restricted area. It occurs in the urban city on the highway or road as a temporary stream. It can also occur in a desert after a cloud burst but the water level quickly subsides as it sinks into parched ground. Flash floods occur primarily in hilly or mountainous area due to prevailing connective rainfall mechanisms, thin soils and high runoff velocities. The warning time for such events is short. In general, the duration of this flood event is also short, but this flood type is

¹⁰ Ibid

¹¹ Ibid.

¹² Bariweni, P. A. et al. Op. cit. p.36

¹³ Ibid

¹⁴ Montgomery, C. W. op cit. P. 134

also frequently connected with severe damage, mainly because it is narrow, fast flowing and deep¹⁵.

- c) **Downstream floods:** These are the floods that result from prolonged heavy rains over a broad area or from extensive regional snowmelt. It usually lasts longer than the upstream flood because of excess water.

This type of flood is also known as inland flooding. The flooding may take the following forms.

- (i) **Overland flow:** This occurs where the amount of rainfall exceeds the infiltration capacity of the ground to absorb it. This excess water flows overland, ponding in natural hollows and low lying area or behind obstructions.
 - (ii) **River Flooding:** This occurs when the capacity of a water course is exceeded or the channels is blocked or restricted, and excess water spills out from the channel onto adjacent low-lying areas.
 - (iii) **Ground water flooding:** This occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it i.e. when the capacity of this underground reservoir is exceeded. The water level, though rises slowly may be in place for extended period of time resulting in significant damage to property.
- d) **Coastal flooding:** This is caused by higher sea levels than normal, largely as a result of storm surges. Coastal flooding may be caused by the combination of high tide level, storm surges and wave action.
- e) **Fluvial flooding:** This occurs in the flood plains of rivers when the capacity of water course is exceeded as a result of rainfall or snow and ice melts within catchment areas further upstream. Blockages of water courses and flood channels or tide locking may also lead to ponding and rising water levels¹⁶.
- f) **Pluvial flooding:** This is surface water flooding caused by rainwater run-off from urban and rural land with low absorbency. Increased intensity of development in urban areas has given rise to land with a larger proportion of non-permeable surfaces, a problem often exacerbated by overloaded and outdated drainage infrastructure. These circumstance combined with intense rainfall, can give rise to localized flooding.

¹⁵ Baker, M. H. N (2009) Trans boundary river floods; examining countries, international river basis and continents water policy, IWA publishing pp 271 -272.

¹⁶ Bariweni, P. A. et al. Op cit P. 39

2.3

CAUSES OF FLOOD

Flooding may occur depending on the type. However, flood has generally occurred during the period of heavy rainfall or snowfall. Water from rainfall or snow is distributed in many ways. Some of the water is retained by the soil, some is absorbed by vegetation while some evaporates. The water which remains and which reaches stream channels is called runoff. Floods occur when soil and vegetation cannot absorb all the water. Whenever this happens, the water then runs off the land in quantities that cannot be carried in stream channels or retained in natural ponds and constructed reservoirs. Periodic floods occur naturally on many rivers, forming an area known as the flood plain. These river floods often result from heavy rain, sometimes combined with melting snow, which causes the river to overflow their banks. Flood plain includes a major portion of land around a major river. The flood plain is usually an ideal place for farming. Farmers have settled in flood plain since ancient times because flooding streams deposit fine sediment over the lands flooded, replenishing nutrients in the soil and thus making the soil especially fertile. In the riverine areas where rivers are used for transportation, cities may have been built deliberately as close to the water as possible. Many streams are scenic features to live near. Obviously the more people settle and build in flood plains, the more damage flooding will do. It must be emphasized that the development of flood plain is one of the factors that can actually increase the severity of flooding. Building in a flood plain can lead to increase in flood heights. In Nigeria, the coastal states such as Lagos, Ondo, Rivers, Bayelsa, Delta and Akwa Ibom etc are example of where floodplain development has taken place. In Lagos State of Nigeria, places like Lekki, Victoria Island, Ikoyi, Ajegunle, Apapa etc have witnessed tremendous construction of buildings. The buildings occupy land space reclaimed from river and oceans. Sand filling of flood plain land for construction similarly decrease the volume available to stream water and this further aggravate the situation.

Nigeria has a rainy season and suffers from seasonal flash floods. These flash floods are sometimes lethal, especially in the rural areas or overcrowded slums where drainages is poor or does not exist at all. On 2 July, 2012 many Nigeria coastal and inland cities experienced heavy rain and residents of Lagos were gasping for breath due to the flooding. In addition, there was a gridlock on major roads, causing people to cancel or postpone appointments they may have heard. In mid July 2012, flooding, in the Ibadan metropolis of Oyo State, Nigeria caused some residents at Challenge Area, Oke Ayo, Eleyele to flee from their residences and save their lives. In late July 2012, at least 39 people were killed due to flooding in

Lamingo dam near Jos, Plateau State. In Ado Ekiti, Ekiti State, Nigeria, flooding has become a recurring event annually from 2010 to date and it has devastated and caused untold hardship on the residents of Basiri, Ajilosun, Olorunda, Afao Road by rendering some homeless and paralyzing economic activities.

Flooding may arise from building process. The materials extensively used to cover the ground when cities are built, such as asphalt and concrete are relatively impermeable and greatly reduced groundwater replenishment. Therefore, when considerable area is covered by these materials, surface runoff tends to be much more concentrated and rapid than before, increasing the risk of flooding.

Heavy and unusual rainfall as witnessed in Nigeria in year 2010 and 2012 inevitably led to rise in water level. For instance the water level was very high in the Lagos lagoon resulting in tidal lock which made it difficult for the water to discharge into the lagoon. A flood that rises and falls rapidly with little or no advance warning is called a flash flood. Flash floods usually result from intense rainfall over a relatively small area. Coastal areas are occasionally flooded by usually high tides induced by severe winds over ocean surfaces, or by tsunamis caused by under sea earthquakes. Continuous rains over six weeks, exacerbated by the passage of tropical storm Noel, resulted in severe flooding in Southwestern and Western department of Haiti as well as in Artibonite Department. The rains and associated flooding killed thousands of people and destroyed many houses and properties. Pakistan in 2010 experienced what the United Nations described as the greatest humanitarian crisis in the recent history with more people affected than the South East Asian Tsunami¹⁷ and the recent earthquakes in Kashmir and Haiti combined. A million homes were destroyed or damaged. It is pertinent to note that out of the 50 million acres of cultivable land, more than 10 million acres of standing crops, mainly cotton and sugarcane, were destroyed or severally damaged.

Flooding can also result from poor farming. Some farming practices can damage the vegetation cover. Vegetation can decrease flood hazards somewhat by providing a physical barrier to surface run off, by soaking up some of the water and through plants root action which keeps the soil looser and more permeable. Vegetation can also be critical to preventing soil erosion. When vegetation is removed and erosion increased, much more soil can be washed into streams. There it can fill in or "silt up" the channel, decreasing the channel's volume and thus reducing the streams capacity to carry water away quickly Overgrazing of the land can also lead to flooding. Grazing of too many animals will cause the pasture to be

¹⁷ Tsunamis are high, large waves, typically caused by undersea earthquakes, volcanic eruptions or massive explosions.

eaten away quickly. The soil is thus left without any cover and it is easily washed into the river. Over cultivation of the land will also make the land to be infertile. When the land is cultivated over a long period of time, it will become infertile to the extent that no vegetation can grow on it.

Flooding can also be caused by poorly constructed or mismanaged dam. The size of a dam is a function of the quantity of the water to be retained and the usage. There is, however, a maximum height that the water in a dam should safely reach and dams are built with adjusted gate valves, which allow for the safe, gradual release of water. Flooding will occur whenever a dam is no longer safe and when the maximum water level has been reached and the opening of the gate valves becomes necessary. Where the opening of the gate is not done in a controlled and gradual manner, it can lead to even more devastating consequence. This is what happened many years ago in the case of Ogunpa River in Ibadan, Oyo State of Nigeria. Several properties were completely flooded when a strike embarked upon by the workers at Eleyele dam made it difficult to release water gradually from the dam. The properties downstream of the dam were affected by the overflowing of the river.

Deforestation of the forest belt near the rivers can cause flooding. People who live in the riverine areas and the banks of rivers cut many trees in order to build houses and to make farm. As a result of deforestation, there will be no tree to soak up water. This will cause more water to flow into the river. There will also be no tree to hold the soil together and when this happens, there will be soil erosion. Because of silting, the river bed becomes shallow while the water volume increases to the extent that the river cannot hold all the water and it will eventually overflow the bank.

Flooding may be caused by climate change. This is so because when the climate is warmer, it may lead to heavy rains, relative sea level will continue to rise around most shoreline while extreme sea levels will be experienced more frequently. Human activities such as bush burning, felling of trees, gas flaring, etc have direct effects and over time progressively resulted into climate change.

Flooding may also result from snowmelt. Because of the global warming, there is a rise in temperature. The rise in temperature will result in ice cap melting in spring with the consequence of more water flowing into the sea. The sea level will invariably rise and lead to flooding.

Flooding always occur in coastal areas because they have high tides or storms. The sea level will rise and when the sea level is higher than the level of the coastal low level, flooding will occur.

Flooding can also be caused by storms. On 29 August 2005 the deadliest storm, Hurricane Katrina hit the United States and caused flooding that destroyed much of New Orleans, Louisiana, and the coastal cities of Mississippi and Alabama. The storm killed about 1,300 people, making it the third deadliest hurricane in the history of the United States of America. The deadliest in U. S. history was the hurricane that struck Galveston, Texas in 1900, killing an estimated 8,000 people. The second deadliest hurricane to hit the United States was the great Okeechobee hurricane of 1928 which struck Florida and killed between 2500 and 3,000 people. Flood waters affected more than 80% of New Orleans, one of American most fabled cities. Most of the New Orleans sit below sea level¹⁸. An extensive system of earthen levees and concrete wall had been built to keep the water out. Still a tidal surge of 6 to 8m (20 to 25ft) rolled in from the gulf and obliterated earthen levees that stretched 187 kilometers in length and affected neighbouring St. Bernard Parish. The tide also surge into the city's industrial canal, topping the concrete floodwalls and eventually creating huge breaches that buried one of the poorest neighbourhoods.

3.0 FLOODING AND IMPACTS ON THE WORLD ENVIRONMENTS

Man and its environment are usually the victim of flood disasters. Flooding whenever its happens, as it is annually, has adversely affected man more than any other natural disasters. The floods in Pakistan in 2010 caused horrific damage to 25% of the country homes, business, crops and lives were lost. An estimated 1,600 people were killed while more than 20 million people (nearly 12 percent of the population) suffered. More than 160,000 square kilometers or 20 percent of Pakistan land mass were inundated. A million homes were destroyed or damaged. Also, about 10 million acres of the 50 million acres of cultivated land withstanding crops mainly cotton and sugarcane were destroyed or severely damaged. Ten million men, women and children lacked the food and water they needed to stay alive. Pakistan in the last 30 years have witnessed more than fifty floods. In each of these calamities, those whose lives were devastated never recovered to the state where they were before the disaster. Those who suffer were always the same people. The overwhelming majority of the victims are the poor and oppressed working masses of Pakistan. Flooding in Pakistan like other developing countries is

¹⁸ Montgomery, C. W. Op. Cit P. 110.

not the wrath of God but the inability of a degenerate social system to deal with the real problems faced by the people. The 2011 flood disaster in Pakistan is another source of concern as it affected children more than any group¹⁹.

The floods in South Western Haiti in 2010 caused great devastation so great in fact that the authorities stopped counting the dead. Bodies were piled up in common graves 10 feet wide, 10 feet long and 20 feet deep. The estimate shows more than 3,000 deaths in Haiti²⁰. Asian countries like India, China, Japan, Philippines, Thailand, Korea, Indonesia, Sri-Lanka, Pakistan, Afghanistan, Uzbekistan, Mongolia, Nepal, Kazakhstan, Bangladesh etc were hit by deadly flood disaster. The CNN reported that the flood disaster across South East Asia in 2011 led to the death of more than 139,580 people. Flooding in Asia is a result of the combination of growing risk of global warming and climate changes together with rapid and massive urbanization without proper infrastructure. Floods in Asia have been a regular and integral component in the life of the people.

In America, flooding is an annual event but with little or no human casualties as witnessed in other countries of the world. A major rainfall that lasted from 28-30 March, 2010 led to the worst flooding in the history of Rhode Islands or of Rhode Island counties - Warwick, Cranston, Johnston and Massachusetts were declared emergency disaster zones. The floods in middle Tennessee, West Tennessee, South Central and Western Kentucky and northern Mississippi between 1-2 May affected the areas for several days and resulted in a number of deaths²¹. The Mississippi in 2011 swell and caused flood in Missouri, Illinois, Tennessee, Arkansas, Mississippi and Louisiana states in America. Heavy rainfall, severe thunderstorms and flash flooding affected several Midwest states of America in 2013. The state of Colorado experienced floods in September 2013. According to the office of Emergency Management, there were 172 people unaccounted for and at least 3 dead in flood area of Boulder county.²²

The flood in Sri Lanka on Monday 27 December 2010 affected more than 200,000 people²³. The flood was caused by heavy rainfall that lasted from noon on Sunday December 26 to noon on Monday December 27, 2010.

Nigeria in 2010 experienced heavy flood that devastated the people and destroyed their property. The Northern states of Sokoto, Kebbi, Jigawa, Zamfara,

¹⁹ UN Office for the coordination of Humanitarian affairs says five million people are affected. The UNICEF says children are the most vulnerable. Up to 2.5m children have been affected.

²⁰ www.haitisupport.gn.apc.org

²¹ Jump up ▲ "Flood a 1000 year event" *knoxville News sentinel* Retrieved 2010 -05-06; Jump up " May 2010 flood: by the numbers" *the Tennessean* May 1, 2011. Retrieved 2011

²² Jump up "172 people unaccounted for in Boulder county" *CBS news Denver*. Retrieved 14 September 2013

²³ *The Nation Newspaper*, Tuesday December 28, 2010. P. 61

Nassarawa and Kwara States and the South West States of Lagos, Oyo, Ogun, Ondo, Ekiti experienced devastating flash floods from heavy rainfall.

Apart from causing the loss of lives, flood disaster has the effect of destabilizing and displacing the people. People are naturally destabilized when their property such as houses and crops are destroyed by flood. The May 2010 flooding in Tennessee, U.S.A. resulted in a number of deaths and widespread property damages. The flash floods of September 2010 in Minnesota and Wisconsin, USA put towns under water and forced the evacuation of people. The year 2010 flood disaster in Lagos State, Nigeria rendered thousand of people homeless and displaced. Flash flooding destroys crops thereby causing hunger to those engaged in subsistence farming and great loss to those engaged at a commercial scale farming. Hunger can lead to psychological / emotional disorder in people.

In Jigawa State of Nigeria, more than two million people were displaced while about 90,000 hectares of farmland were destroyed²⁴. In Rini town in Bakura Local Government of Zamfara State of Nigeria, flood washed away more than 2,000 hectares of farmland. The flood rendered 50 families homeless and created pools of water on the road in nearby villages. The flood was caused by the overflow of a river near the town as a result of many days of rainfall in the area²⁵. The flood in year 2010 in Nigeria swept through parts of the Northwest, ravaging communities in Sokoto and Kebbi States. Farmlands were washed away, home were submerged and their owners sent to emergency shelter. Devastating floods ravaged communities in Ogun and Osun States in Nigeria in year 2010. The flood was caused by the release of water from Oyan Dam by the Ogun/ Osun River Basin Development Authority. Thousands of residents were rendered homeless, lives endangered, property destroyed and socio –economic life disrupted by the resultant flood that sacked several communities in Ikosi- Ketu, Mile 12, Agiliti, Owode, Elede, Owode Onirin, Agboyi, Odogun, Isheri, Ojodu Berger, Majashin, Maidan and Thomas Laniyan Estates among others in the two states²⁶. Because of the flood in Ajegunle area of Lagos State, the government relocated 681 flood victims from 70 families to relief camp at Agbowo in Lagos State. The flood in Sokoto State submerged about 20 villages out of the over 50 affected across 11 local government councils²⁷. Flooding devastated the residents of Doma in Doma Local Government of Nassarawa State. Buildings caved in under the impact of heavy floods. The fence of the Local Government Secretariat was also brought down. The flood affected about 200

²⁴ The Nation Wednesday 29 September 2010. P. 41

²⁵ Ibid.

²⁶ The Nation Wednesday 20 October, 2010 P. 17

²⁷ The Nation Wednesday 13 October, 2010 P. 23

people, a large number of who gathered under the tree and premises of the local government secretariat waiting to get relief materials brought by the National Emergency Management Agency. In communities of Kara and Warewa, along the Lagos /Ibadan expressway, children were trapped in school and parents were heard wailing until they were rescued. At River view estate, Isheri several houses were submerged.

Another effect of flood is the damage to roads, bridges and culverts with the consequence of disrupting free flow of traffic. The floods in Sokoto State washed away several kilometers of the access road and a bridge to the University of Sokoto connecting Seven Local Government areas to Sokoto town²⁸. Flood destroyed the bridge that linked Kebbi States of Nigeria with Niger Republic. The bridge was a major link between Bagudo, Kamba, Argungu Local Government²⁹ Area and Niger Republic³⁰. Physical interaction between the people of Ozolla community in Nkanu West Local Government Area of Enugu State, Nigeria were seriously disrupted following the collapse of a bridge along the Old Enugu – Port Harcourt Federal Highway³¹. The bridge was washed away by heavy floods, cutting the strategic inter local government road into two as a result of the collapse of an earth dam built by the University of Nigeria Teaching Hospital, Ituku Ozalla. The bridge gave way after a heavy downpour which caused the Iyoro and ufam streams in the area to overflow their banks. At the Tin Can port in Lagos, Nigeria, the roads at the first and second gate were rendered impassable by flood. The failed parts of the road continued to increase in size as the flood washes off most parts of the road³².

Flooding has the negative impact of rendering people jobless. People engaged in the agricultural sector are usually rendered jobless during the period of severe flood. The loss of job in the agricultural sector will invariably lead to shortage of food in the society. For example in Jigawa State of Nigeria, about 90,000 hectares of farmland were destroyed by flood as at September 2010. Farm produce such as rice, guinea corn, millet, beans, sesame, maize were washed away by the flood. In Bakura Local Government area of Zamfara, State, Flood submerged about 2,000 hectares of farmland³³. People engaged in the agricultural sector usually find it difficult to practice their occupation as it happened in Haiti in 2008 after the flood. There was terrible landslides, vast quantities of earth were washed into the

²⁸ The Nation Wednesday 13 October, 2010, P. 24

²⁹ Ibid

³⁰ The Nation Wednesday 13 October, 2010, p. 24

³¹ The Nation Wednesday 22 October, 2010, p. 24

³² The Nation Tuesday 11 May, 2010 P. 35

³³ The Nation September 29, 2010 Pp 41-42

sea, huge numbers of trees uprooted, many fields and gardens were washed away and countless numbers of livestock were drowned.

The effect of flooding on the economy of nations is catastrophic. Financial losses due to flood run into million of dollars every year. The amount of money spent on emergency every year can be diverted for the development of the vital sector of the economy³⁴. The government is confronted every year with the need to repair damaged infrastructures such as roads, bridges and culverts. The various governments make provision every year for the resettlement of displaced people. The Lagos State Government in Nigeria relocated about 681 people at the resettlement camp at Agbowa at the expense of the government providing them three square meals daily. In Jigawa State, about 1,000 people were in camp in central primary school in Sentrimawa in Ringim Council alone with 562 children, 194 males and 233 female victims. The Federal Government of Nigeria donated One Billion Naira each to Sokoto and Lagos States among other from the ecological fund apart from what each of the affected state governments spent on rehabilitating the victims of the flood.

Flooding in most cases is accompanied with the outbreak of diseases such as typhoid, cholera, dysentery, skin diseases and other food and water borne diseases. In the developing countries of the world, majority of the people do not have access to safe drinking and portable water. The people source of water are the rivers, streams and lake which are normally polluted whenever there is a flood disaster. This hopeless situation has usually exposed the people to various diseases.

4.0 MEASURE TO CONTROL FLOODING

The general consensus among environmental scientists is that flooding being a natural phenomenon can only be managed and not totally stopped. "A first step is to identify as accurately as possible the area at risk. Careful mapping with accurate stream discharge data should allow identification of those areas threatened by floods of different recurrence intervals. Land that could be inundated often-by Twenty five year floods, perhaps might best be restricted to land uses not involving much building. The land could be used for example for livestock grazing pasture or for parks or other recreational purposes³⁵.

³⁴ The Federal Government of Nigeria was alleged to have released N17.6 Billion as a bail out for flood victims in Nigeria following the year 2012 flood disaster. The money was taken from the Ecological Funds Office established through Decree 36 of 1984. The fund was modified by Allocation of Revenue, Federation Account order of 8th July 2002.

³⁵ Montgomery C. W. Op cit Pg 141-142

The use of retention ponds can also help to control or minimize the effect of flooding. Retention ponds are suitable where there is open land to reduce flood hazard along a stream. These ponds are large basins that trap some of the surface runoff, keeping it from flowing immediately into the stream. They may be elaborate artificial measures, old, abandoned quarries or in the simplest cases, fields dammed by dikes or piled up soil. Diversion channel can also be used as stream stage rises. The diversion channel can be used to redirect some of the water flow into areas adjacent to the stream where flooding will cause minimal damage. The diversion of water might be into farmland or recreational land and away from built up areas, to reduce losses of life and property damage.

One major cause of flooding is poor maintenance of dam. The size of a dam is a function of the quantity of the water to be retained and the usage. There is however, a maximum height that the water in a dam should safely reach and dams are built with adjusted gate valves, which allow for the safe gradual release of water. Flooding occurs whenever a dam is no longer safe, when the maximum water level has been reached and the opening of the gate valves becomes necessary. Where this is not done in a controlled and gradual manner, it could lead to even more devastating consequences³⁶. It is pertinent to point out that "several of the country's dams (Nigeria) are in states of disrepair, many are silled up, have non-functioning machinery and are under perfunctory supervision. When these dams overflow, the consequences are usually devastating³⁷. There is no doubt that proper control of dam water involving periodic release of the water is a sure way of preventing the dams from collapsing. An effective method of controlling floodwater is to construct coordinated groups of dams and reservoirs on the headwaters of the streams that lead into the main rivers, so that water can be stored during periods of heavy run off and released gradually during dry seasons. To control the water that is released from the dam, a well designed earth channel, preferably trapezoidal in shape should be constructed to guide the water from the dam to the nearest water body or outfall. There should also be a minimum setback of 50 metres to serve as a buffer zone on either side of this channel with no development contemplated in the zone³⁸. It is also suggested that a retention basin be constructed behind the dam outlet gate. The basin will give suitable room for the gradual release of water, and hence prevent sudden flooding of the downstream areas. Routine de-silting and maintenance of the main water body or

³⁶ Mr. Kunle Adebayo, a former President of the Nigeria Institution of Structural Engineer and Former Chairman Ikeja branch of Nigeria society of Engineer quoted by "the Nation" on Tuesday October 19, 2010 P. 30 while commenting on Oyan Dam overflow.

³⁷ The Nation Friday September 2010 P. 21

³⁸ The Nation October 19, Op cit.

outfall where the channel discharges will prevent future back up and over flooding³⁹.

Those who live near rivers especially in the riverine areas bear some responsibility for flood disaster. In Nigeria, the people in the Niger Delta area apart from those living on water build house on flood plains which ought to be free of all construction. Such citizen worsen the tendency for rivers to silt up by throwing domestic waste and other rubbish into them. The Ogunpa flood disaster in Ibadan, Oyo State of Nigeria in 1981 was caused mainly by the blockage of the channel which caused the river bank to over flow.

Channelization is a general term for various modifications of the stream channel itself that are usually intended to increase the velocity of water flow, the volume of the channel, or both. These modifications thus increase the discharge of the stream and hence the rate at which surplus water is carried away⁴⁰. The channel can be widened or deepened, especially where soil erosion and subsequent sediment deposition in the stream have partially filled in the channel. Care must be taken, however that channelization does not alter the stream dynamics too greatly elsewhere. Alternatively, a stream channel might be enrouted for example by deliberately cutting off meanders to provide a more direct path for the water flow. Such measure do tend to decrease the flood hazard upstream from where they are carved out. Channelization is not a one time effort. Constant maintenance is required to limit erosion in the straightened channel sections and to keep the river in the cut offs. Channelization has ecological impacts as well. Wetlands may be drained as water is shifted more efficiently downstream. Stream bank habitat is reduced as channels are straightened and shortened, and fish may adapt poorly to new stream flow patterns and streambed configuration. Also by causing more water to flow downstream faster, channelization often increases the likelihood of flooding downstream from the alterations⁴¹.

The heavy and sustained rainfall witnessed in many countries of the world has been attributed to the rise in the ocean level caused by climate change. One of the ways of protecting the environment is by planting trees to reduce the effect of climate change. Through the centuries people have created and contributed to flood problem by cutting down trees and digging up the vegetable cover of the soil,

³⁹ Ibid

The Government of Ekiti State has embarked on the chanellisation of waterways around Fayose market, Offin River from Basiri Area to Opopogbooro through Olorunda area in Ado Ekiti from 2006 to date in order to curb flood disaster.

⁴⁰ Montgomery C. W. Op. Cit P. 143

⁴¹ Ibid

thus increasing the soil erosion. Cultivation decreases the ability of the soil to retain water and increase runoff. Vast land areas along the headwaters of rivers throughout the world have been laid waste by intense cultivation and subsequent erosion. Flood control in these areas has been directed to restoring vegetation and instituting efficient methods of soil management such as crop rotation and contour flowing. In the developing countries of the world, the consumption of wood increases day by day. Trees are felled for construction purposes in the building industry. The peasants rely on wood as a source of energy for cooking, bakeries and dry cleaners rely on charcoal from wood. All these put pressure on the environment. In Nigeria, the Federal Government over the years introduced a programme for afforestation.

Proper urban planning is lacking in many of the developing countries. The government should step up effort to ensure that illegal structures are not allowed to exist in the flood plains. Comprehensive Environmental Impact Assessments should be carried out. Hazards are exogenous but disasters are endogenous. While flooding is a hazard, our inability to cope with the consequences of floods contribute to a major disaster. Development planning in every nation particularly the developing countries of the world must be holistic. Land use, urban development, industrial activities and water management must be coordinated. Geographers and town planners are equipped with sufficient knowledge of the terrain that is best suited for certain activities. Land use plan must be properly prepared and strictly enforced. It should be noted that flood plains are ideal and suitable for agriculture whereas industrial complexes should not be constructed in flood plains.

Floods of unprecedented magnitude have taken place in all the states of the Federation of Nigeria in the recent past. For each of these floods, billions of naira damages to infrastructure are recorded and subsequently such amounts are needed for rehabilitation. The Federal Ministry of Environment in Nigeria has adopted the following strategies for flood management.

- (1) Regulation on the use of flood plains
- (2) Flood plain management through good practices that will reduce flood run offs.
- (3) Flood plain mapping / flood risk study
- (4) Engineering design /solutions
- (5) Introduction of water harvesting and management through impoundment of excess water by small scale dams and other storage structures

The Federal Ministry of Environment in Nigeria has developed the following strategies in order to arrest or at least ameliorate the escalating problems of flooding.

- (a) Monitoring assessment, mapping, inventorisation and generation of baseline environment data for the prevention, mitigation and control hydro - metrological related disasters in Nigeria.
- (b) Land reclamation
- (c) Development of soil conservation policy and master plan towards efficient land use practice in Nigeria.
- (d) Processing and management of satellite data for management of hydro - meteorological related disasters in Nigeria flood, erosion, water harvest and coastal erosion.
- (e) Monitoring the impact of global change and associated impacts of flood, inland and coastal erosion.
- (f) Inter-basin water transfer from regions of surplus to region of deficits for water harvesting for fresh flood prevention.
- (g) Formulation of resettlement strategies, emergency preparedness plans, and sociological aspects of coping with flood in affected areas in the country in cooperation with other related agencies.
- (h) Development and operation of flood, early warning systems.
- (i) Studies and designs for control of soil erosion, flood, coastal zones management, water harvesting and management.
- (j) Public enlightenment on prevention, mitigation and control of flood erosion and coastal zone degradation.
- (k) Operation and maintenance of installed physical structures for control of flood and erosion, to ensure optimum efficiency and achievement of designed life spans of such structures.
- (l) Protection and management of coastal shoreline against coastal erosion and coastal degradation.
- (m) Establishing linkages with agencies with similar mandates

5.0 NATIONAL AND INTERNATIONAL LEGAL RESPONSE TO THE PROBLEM OF FLOOD DISASTER

Flood is a function of water from the various sources. The climate is another important factor that will determine the rise in the level of water and rainfall. National and international legal responses to the problem of flooding are not

adequate. It is pertinent to point out that apart from the developed countries, only few of the developing countries have evolved legal measures to control or mitigate the hardship arising from flooding.

The United State of America took a bold step in 1973 by enacting the Federal Flood Disaster Protection Act (1973). The measure provides for federally subsidized insurance for property owner in identified flood – hazard areas, whether in stream flood plains or in flood prone coastal regions. Those most at risk, then, pay for insurance against their possible flood losses. The idea is that in time the flood prone areas insurance will replace after the fact disaster in flood – prone areas.

The 1973 Act has its negative effects. The idea of subsidized flood insurance has been to encourage people to rebuild, sometimes severely times, in severally flooded prone areas and in a sense the insurance has encouraged continued development in such areas. The Act is not a preventive legislation but rather it is to provide succour for flood victims.

In Nigeria, there is no principal legislation whether at the national or state levels dealing primarily with flood disaster. The Federal Government of Nigeria reacted to the problem of flood disaster which is an annual problem by enacting into law the National Emergency Management Agency (Establishment etc) Act⁴². The Act defines natural or other disasters to include any disaster arising from any crisis, epidemic, drought, flood, earthquake, storm, train, roads, aircraft, oil spillage or other accidents and mass deportation or repatriation of Nigerian from any other country.

The Act generally deals with natural disaster without any special provision to tackle the menace of flooding. The agency is to perform some functions⁴³ among which the relevant one to flooding are:

- (a) educate and inform the public on disaster prevention and control measures
- (b) distribute emergency relief materials to victims of natural or other disaster and assist in the rehabilitation of the victims where necessary.
- (c) liase with the United Nations Disaster Reduction Organisation or such other international bodies for the reduction of natural and other disasters.

The River Basin Development Authorities Act⁴⁴ is another legislation that deals with the problem of flooding in Nigeria.

⁴² National Emergency Management Agency (Establishment etc Act cap No LFN 2004)

⁴³ S. 6 (1) of the Act.

The authority is to coordinate the activities of the River Basin Development authorities in Nigeria.

The authority is saddled with numerous responsibilities but the one that is relevant to flooding is reproduced below:

“to undertake comprehensive development of both surface and underground water resources for multipurpose use with particular emphasis on the provision of irrigation infrastructures and the controls of floods and erosion and for watershed management⁴⁵”

Flooding occurs frequently in the cities and rural settlement in the developing countries of the world because of poor town planning. For instance in Nigeria there is no drainage system in most part of the country. Roads and houses are flooded in some areas even when it has not rained heavily because of the absence of a drainage system or because gutter have been blocked with refuse. Some houses are built close to streams and this impedes the flow of water. The National Assembly of the Federal Republic of Nigeria repealed the Federal Environmental Protection Agency Act and in 2007 enacted the National Environmental Standards and Regulations Enforcement Agency (Establishment) Act 2007. The Agency is charged with the responsibility for the protection and development of environment in Nigeria.

The Act is not a law designed primarily to address the problem of flood disaster in Nigeria. However, the Act tersely refers to the issue of flood in sections 8 and 26 respectively. Section 8 (k) deals with the power of the agency. As follows:

⁴⁴ CAP R9 LFN 2004

⁴⁵ S. 4 (1) Act

The agency shall have power to

- (i) Submit for the approval of the minister, proposals for the evaluation, and review of existing guidelines, regulation and standards on environment other than in the oil and gas sector including**
- (ii) ...**
- (iii) ...**
- (iv) Erosion and flood control**

Section 26 of the Act provides:

- (i) The agency may make regulation, guidelines and standards for the protection and enhancement of the quality of land resources, natural watershed, coastal zones, dam and reservoirs including prevention of flood and erosion, to serve the purpose of the Act.**
- (ii) In drawing proposal for such regulations, guidelines or standards, the agency shall take into consideration the Zonings Acts, Municipal Development guidelines and Building codes to prevent siting of essential facilities on flood plain"**

The act is a principal legislation for the protection of the environment but it is noteworthy and pathetic that the Act does not give adequate consideration to one of the menacing problems that poses a threat to humanity and the environment. This shows the disposition of Nigeria and Africa countries to the issue of flood disaster.

Legal norms over the years, no doubt have served as a veritable instrument of social control. Flooding as observed with the occasional consequent disaster has been attributed partly to anti-social habits and failure of government. The governments of countries all over the world have employed legal instruments to order the pattern of social behaviours in a way to prohibited behaviour and practices that are inimical to the welfare of the society. Legal regulations is a specific legal action, which is accomplished by law as a normative mandatory regulator. Its peculiarity lies in the fact that it is one form of special regulation, which has arms, organizational, and result oriented character⁴⁶. Law has been realised. In the protection of the enviroment both at domestic and international level. When in a society, its members behave and functions according to law, it is being realised and the aim of legal regulation is achieved... This realisation of law in its social character means conduct in consonance with the norms of law. The

⁴⁶ Gasiokwu, M. O. U. (1999) Sociology of Law. Mono Expressions Limited, Enugu Nigeria . P. 57.

pollution of the environment has largely been checkmated through legal norms. Treaties, conventions and related protocols have been used to control human behaviour with a view of protecting the environment from human activities that pose a danger to the environment. The international community through the United Nations and other continental bodies can take the lead through policies and legal instruments directed at overcoming disaster associated with flooding. There is a need for concerted effort by the international community in view of the transboundary nature of flooding. Nations should evolve legal framework to nip at the bud lawful practices like dumping of wastes in river channels or engaging in construction activities that may hamper free flow of water along river channels. It is also advocated that the Climate Change convention and the conventions relating to ozone layer depletion should be reviewed to accommodate measures that will have direct bearing to the issue of flooding.

CONCLUSION

Flood is an annual event all over the world. Flood becomes a disaster whenever it affects man and his property. The flood recorded in the Holy Bible⁴⁷ swept off the whole generation of humanity except the man Noah and his household. On Monday 27 December 2010, more than 200,000 people were affected by flooding which resulted from heavy rains in Sri Lanka⁴⁸. In Indonesia⁴⁹ torrential rains that began on Saturday 22nd February 2014 caused three rivers to over flood and resulted in flooding and slides that killed at least eleven people in Indonesia eastern most province of papua. Rains and rivers are essential to human existence. Flood has no respect to nations except those that are conscious of it. Flooding can be controlled through conscious and decisive efforts of government and the people. Law as an instrument of social engineering can be used to order human behaviours that aid flooding.

⁴⁷ Genesis chapter 7 & 8

⁴⁸ The Nation Newspaper, Tuesday December 28,2010 P.61

⁴⁹ The Nation Newspaper, Tuesday February 25, 2014 P.60

The Nation Newspaper is a daily Newspaper produced in Nigeria and read all over the world and it is available on the internet www.thenationaonlineng.net.