FLOODING IN DEVELOPING COUNTRIES: THE REMOTE AND IMMEDIATE CAUSES. A NON-EXPERT VIEW

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Abstract

Flood simply means a large volume of water which has overflowed from a source into a previously dry area and the process of this event is referred to as flooding. However, the two words (Flood and Flooding) could to an extent be used interchangeably. Flood most often is generated by heavy rainfall and/or overflow from a water reservoir such as dam or river. All creatures need water to survive but when the water comes in large volumes in excess of available evacuation and drainage system within a short period of time, it portends danger to living things such as man, other animals and plants and non-living things such as buildings, vehicles and business. The history and story of flood have survived all ages and various accounts of flooding abound in various religious and spiritual literatures, scripts and writings. There are notions in some schools of thought that associate flood with some kind of cosmic punishment. Despite the reasons for and sources of flood, it is still possible that man, being represented by the state and its citizens could alter some practices and activities which are known to exacerbate the incidence of flooding. Such practices and activities vary from clime to clime, culture to culture and race to race. This will be discussed in details below. The aim of this article is to raise our individual and collective consciousness to the remote and immediate causes of flooding in developing countries. Why the developing countries? In developing countries, both the citizens and the states exhibit some characteristic tendencies which tend to aggravate the incidences of flood. Therefore, the objectives of this article are to expose the various activities and characteristic tendencies that could worsen flooding incidences, to understudy the effect of flooding to man and finally to make a recommendation on how to curtail the incidences of flooding. It shall be understood that this article was not copied or read from any other source, and without any reference to any professional constructs or experts in that field but simply a mere representation of my personal knowledge, opinion and experience of the subject matter, in a bid to contribute my own quota in finding solutions to the menace of flood especially in developing countries, like Nigeria.
1] CAUSES OF FLOODING

There are various causes of flooding. I prefer to classify them into two, viz: Natural and Artificial causes.

1.1) NATURAL CAUSES

As the name implies, natural causes are those causes that were not triggered by man or its agencies. These causes may include the following: Soil type, excess rain, excess water volume and frequency, unfavorable topography, water source overflow, global warming and bush fire.

**The soil type:** The soil type may affect the flood behavior positively or adversely. Loose soil may easily allow more volume of water to percolate through it before becoming saturated. On the other hand, muddy soil or soil with stone bases may not allow much volume of water to percolate freely or fast enough thereby leading to quicker water saturation. Each soil type has its own rate of water absorption and therefore when the rate of water influx exceeds the rate of water absorption, the soil is assumed to have reached its saturation point for that time frame. The result will be water overflow. Therefore, the soil characteristics which includes absorbing power and water-saturation capacity could determine the behavior of flood over it.

**Volume and frequency of rainfall:** The water absorbed by the soil takes time to percolate down through other various soil layers. Large volume of water generated by heavy rainfall will saturate the soil faster. A frequent rainfall may achieve similar effect considering the total volume of water generated within a given time frame. Therefore, if for a particular season, much rainfall is expected, then it implies that much flood will be expected at those regions that are liable to flooding. This is where it is important to pay attention to weather forecasts for each geographical regions.

**Topography:** The topography of a landscape could affect the rate of water flow. For instance, a sloppy landscape will behave like “send-down-the-rain roofing structure”, which implies that water moves over the soil at a faster rate such that the soil could only absorb a smaller volume of water at a given time. This slope practically pushes the water further down as the speed and force (momentum) of the water increases for every meter further away from the source. Consequently, the flooding effect may be felt more at the base of the slope or hill. On the other hand, a flatter
landscape does not have enough angulation (slope) for pushing water away, hence waterlogging may be the result. Therefore, those that reside at the base of the mountain or closer to sea (river) level should be more alert whenever high rainfall is forecasted for a particular season.

**Water Overflow:** Flooding could be caused by water overflow from a water reservoir. Here reservoir could be ocean, sea, river, lake and avalanche. For oceans, seas and rivers, tidal wave changes may push the water level up thereby forcing the water reservoirs to practically spill over water onto the adjoining banks. Such water level rise is noted during tsunamis, storms and typhoons. During an avalanche, large volume of water melts and flows down the hill into the base water source. This sudden increase in water volume of the river will also result to water overflow as discussed earlier.

**Atmospheric Temperature:** Global warning due to increased atmospheric temperature could lead to melting of the glaciers (mobile ice packs) in the Polar Regions. Consequently, the large volume of water released will finally find its way down to the oceans, seas and rivers, thereby increasing the water level and causing flooding as discussed earlier.

**Bush fire:** Some types of bush fire are caused by natural static electricity. Fire could lead to destruction of trees, grasses and vegetation. This kind of deforestation exposes the soil to direct solar radiation, thereby striping the soil of its natural protection against flood.

### 1.2) ARTIFICIAL (MAN-MADE) CAUSES

Flooding may be due to artificial causes originating from activities associated with man and its agencies. Here, I prefer to classify artificial causes into three vitz: Causes by both the state and the citizens, causes by the citizens only and causes by the state only.

#### 1.2.1) CAUSES BY BOTH THE STATES AND CITIZENS.

Listed below are some of the factors or traits exhibited by both the government and the citizens that could cause flooding.

**Poor Evacuation of Refuse:** One of the worrisome causes of flood is the issue of poor evacuation of refuse. Here both the government and the citizens are the culprits. In a civilized society, it is the responsibility of the government to plan and map out refuse disposal dumps/sites. The site should
be reasonably close to the inhabitants of the area otherwise the inhabitants may be tempted to dump their refuse along the route or nearby gutter especially during night. It is also the responsibility of the government to clean and evacuate the public refuse dumps regularly and consistently. The frequency of waste disposal will depend on the rate of generation of refuse by each neighborhood. On the other hand, it is the responsibility of the citizens to make adequate use of the dump as designated. Every home shall have a mini domestic dump usually in the form of refuse bag(s) or bucket which shall be evacuated at the nearest or most convenient public dump when filled. Unfortunately, these ideal settings do not function as expected in most cities in the developing countries. Hence, we find situations where there is no public dump, the dumps where available are overfilled and not evacuated regularly. When there is no dump or where the dump is over-filled and littered with smelly wastes, the individuals may throw their refuse from a distance thereby littering the site the more. During rainfall, most of the littered refuse will be swept into the gutter by the rain. This marks the failure of the government or its corresponding agencies for executing their statutory functions. However, we also find a situation where some individuals dump their refuse in a nearby gutter during rainfall or at night. The net effect of improper evacuation of waste by the government and its citizens is the blocking of the gutter system. When the gutters are blocked, flooding becomes inevitable.

**Blockage or Inappropriate Diversion of Natural Water Ways.** Water, it is said always finds its ways and levels. During construction of buildings or roads, it may happen that the natural waterways are either blocked or diverted improperly. When this happens, flooding becomes inevitable.

**Building and compound design:** In constructing a building, the design of the roof section is very critical to how the building will manage rainfall. A less-inclined roof will delay the speed of water that runs over it while steeper roof will fasten the water speed. Builders will argue that flatter roofs waterlog and therefor are prone to roof decays and leakages and as such, steeper roofing design has become the modern trend. The implication of steeper roof design is that large volume of rain water is sent down the drainage pipe at higher speed and in heavy rain, water may overflow the roof gutter from the roof top. In addition, some of the houses are built without appropriate compound design. A good compound design shall take appropriate consideration of the drainage of water that comes from the roof and from other parts of the compound. To worsen the already
compromised situation, most compound floors are covered with tiles instead of grass lawn. The implication is that the tiles give water-proofing effect such that little or no water is absorbed by the soil under the tiles. One of the functions of underground well or water reservoir system in the compound is to collect most of the water that emanate from the compound. In most rural communities, most compounds have local underground wells that collect most of the water from the compound during rainfall. Sadly, most modern buildings especially in the urban cities do not factor underground well into the compound design. Therefore, poor roof design, improper landscaping, absence of green areas and absence of domestic water reservoir are some of the factors that could increase the amount of water that leaves the compound to join the public water drainage system and gutter. This may seem small but imagine the impact when rain water from hundreds of compounds in a locality are pushed into the public gutter at great speed during rainfall! So in essence, control of flood begins from each home. When every home contains its own water, the issue of flooding will be checkmated.

**Poor road Construction and Drainage Network:** It is no longer news that a newly-constructed road you may have passed the previous month may have started showing signs of failure the next month you take the same route. Such roads may have been constructed by non-professionals for reasons best known to the sponsor(s). Worst still you find situations where roads were constructed without any gutter or where the gutter is not wide and/or deep enough to control the volume of water expected. At times the roads are constructed in a haste in order to score some political, religious and traditional points or for other reasons best known to the sponsor(s). Such a scenario is often rampant in a year preceding elections where an incumbent or a new political aspirant who is hunting for votes from a catchment area will hastily construct or reconstruct road(s) to appease the region of interest. In religious circles, the story is the same, as a member of the congregation who is hunting for one religious title or recognition may hastily construct the road(s) leading to the worship center. Also, in local settings, a person seeking for one traditional title or another may hastily construct road(s) for the community. The list of such intentions are numerous but they all have one thing in common: A gift of road for a hidden agenda and motive! The roads constructed in such a manner are easily plagued with potholes, none or ill-constructed gutters. Such roads never last as they lack professional supervision, do not meet basic requirements and therefore constitute a possible cause of flooding.
**Deforestation**: The trees and other vegetations serve as water speed breaker. For instance if you take a cover under a foliage tree during rainfall, you will notice that it will take some time from the start of the rain before the rain droplets will touch you. Were the tree not there, the rain will beat you mercilessly. Therefore, by collecting the rain droplets and releasing them gradually to the ground via the trunks and branches, the soil is given adequate time to absorb the rain water. The grasses act as rain water trap which reduce the speed of water over them thereby increasing the chances of the water absorption by the soil. Trees and other vegetation may be destroyed by construction of houses and roads, artificially-caused wild fire, over-grazing of the fields, etc. These activities directly or indirectly expose the soil and since there is less impedance to its motion, the water will flow over the soil surface faster than if grasses were in place. This again could lead to flooding.

1.2.2) **CAUSES BY PERSONS**

Flooding could be caused by some practices which are exhibited by some individuals. Some of the causes are discussed below:

**Non-use of domestic waste and Compost system**: In a compound where there is no domestic dump or compost system, refuse may litter the compound unnecessarily. In such compounds, the occupants are often found disposing their domestic wastes across the fence especially if the adjoining plot is vacant or at any available space outside the compound. At times the waste may be dumped inside a nearby public gutter especially at night, early in the morning or during rainfall. The net effect of all these unwholesome practices are that during rainfall, domestic wastes will be carried into the public gutter thereby blocking the gutter and causing flood. This problem is partially solved in the villages and rural communities using local method known as compost system. In the rural settings, a portion of the compound is excavated at or near where animals such as goats and cows are kept. The non-degradable refuse such as rubbers and metals are separated from the degradable ones such as foods and agricultural wastes. The degradable wastes are dumped into the excavated site while the non-degradable are burnt or sent to iron-dealers. During farming season, compost dump is excavated and the contents are used as natural fertilizer. Since composting is ideal in rural settings, urban dwellers must consider using domestic refuse
containers to control the wastes generated from their compound. Therefore, non-use of compost system by rural dwellers or domestic dump by urban dwellers are one of the causes of flooding.

Building on top of drainage system: Often houses and other structures are built on top of drainage system. The builders of such structures often do not get appropriate building permit from the relevant authority. Building on top of drainage system may block the system, damage it with time or render servicing the channel impossible. This negative practice is mostly perpetuated by greedy land owners who are always zealous to secure every inch of their land’s perimeter especially where the drainage system has encroached on their property. A damaged or blocked water drainage system will enhance flooding.

Over-grazing: Over-grazing a field or landscape by domestic animals exposes the soil unnecessarily and thus reduces the natural protection the vegetable have on the soil. An over-exposed soil is prone to flooding as discussed earlier.

1.2.3) CAUSES BY GOVERNMENT’S NEGLIGENCE OR ACTIVITIES

There are causes of flooding which are due to neglect or activities by the government or its agencies. Government in this context means the following: Federal, State, Local and Town/Community governing bodies.

Improper design of public water drainage system: It is the duty of the government to plan, design, implement and manage public utility services. A well planned and designed water drainage system drains water from the region fast enough to prevent waterlogging.

Ideally, smaller gutters join and empty into larger gutters in the course of water evacuation by the drainage system. However, when this configuration is reversed, water surge will result from the increased pressure and pumping effect. Surprisingly, this is the kind of drainage configuration you may find in some water drainage systems. Such faulty drainage designs are likely done by non-professionals, perhaps in government’s/contractor’s effort to cut cost. Most rural communities have devised local ways of controlling flood. For instance, in some communities, each compound has at least one water reservoir in the form of underground well and each major road has one or many roadside water reservoirs. The communities that implement this model of rain water evacuation do not easily fall victims of flooding. Since, this kind of local drainage system could
not be implemented in urban cities, it behooves on the government to ensure that water drainage system in the cities are properly designed and implemented.

Busted or discharged dam: Artificial dam is constructed by the government for many reasons. Water is pooled and conserved in the dams for the following reasons: Hydro-electricity generation, irrigation, consumption and flood control. Occasionally, the dam will be filled beyond its safe capacity. In order to reduce the chances of the dam from bursting, a large quantity of water may be discharged through a dedicated overflow channel. Over-filled dam has danger of bursting. Unfortunately, when the dam is on a country’s border, such as Lago dam in Cameroun, discharge of such a dam may affect some regions in the neighboring country (like Adamawa state, Nigeria). Discharged or busted dam releases a large volume of water into the environment with its attendant risk of causing flooding in neighboring downstream regions.

2) EFFECT OF FLOODING

Flooding can have the following effects on society and the environment: Loss of life, Destruction of houses and properties, Destruction of agricultural entities and products, Displacement of persons, Disruption of echo system, Colossal financial cost to individuals and states, Loss of job and un-employment, Disruption of educational activities, Eruption of diseases and epidemics, Erosion, Endangerment of the environment.

3) RECOMMENDATION ON FLOOD CONTROL

In this article, we have looked at various causes of flooding, some of which cannot be prevented but could be managed. We also looked at some practices and activities perpetrated by both government and the citizens which directly and indirectly could foster flooding. The following recommendations are therefore proposed for the control and check-mating of flooding:

1) The Government to give regular weather reports and forecast through its agencies
2) The citizens to listen and adhere to weather forecast advice
3) Engagement of appropriate and qualified professionals for construction of roads, gutters, buildings and compounds.
4) To ensure that every compound contains the water that emanates from the compound
5) Construction of quality roads and gutters that meet global standards
6) Politicizing road construction projects should be discouraged
7) Construction of dams and flood speed breakers should be done
8) Encourage forestation, afforestation and reforestation
9) Incorporation of flood control system in both private and public building designs
10) Stop practices that could block or damage private and public water drainage system
11) Evacuate waste as and when due
12) To have as much green areas in a compound as possible than tiles