How Can The Introduction Of Flood Re Mitigate Flood Hazard

Floods in Ghana

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Flooding in Ghana is a recurring natural disaster affecting multiple regions of the country, driven by heavy rainfall, poor urban planning, environmental degradation, and sometimes controlled dam spillage. These floods have significant social, economic, and environmental impacts, leading to property damage, displacement of communities, and challenges for local and national authorities.

Floods in Ghana refer to a series of flood incidents that have caused property damage and loss of life. Floods are caused by excessive rainfall and dam spillages. Flooding is a recurring natural disaster that has become a defining challenge for the country's environmental, economic, and political discourse. Ghana's tropical climate typically has two main seasons: a dry season and a rainy season. There is the major rainy season and the minor rainy season. In southern Ghana, the major rainy season occurs from April to mid-June, while the minor rainy season typically runs from September to November. The dry season generally extends from December to March, although these patterns have varied slightly in recent years due to climate change. Ghana's ecology, characterized by distinct rainy seasons, predisposes both coastal and inland regions to heavy rainfall and subsequent flooding. The intense major rainy season and climate change have contributed to the growing severity and frequency of flood events across the nation.

The impact of flooding is a complex dynamic. In urban centres such as Accra, chronic flooding disrupts transportation network, displaces communities, claims lives, and strains the states limited emergency response systems like the National Disaster Management Organization (NADMO). Rural and urban communities are equally affected during floods as these events lead to immediate material and human losses but also impose long-term economic burdens by diverting public resources towards recovery. The cost of repeated flood damage affects national development and compromises efforts to address other socio-economic challenges. Politically, flooding has emerged as a contentious issue linked with government, policymaking, urban planning, public accountability, and, to some extent, corruption. Historical and contemporary floods have revealed significant gaps in urban planning and disaster management strategies and influencing electoral politics.

Flooding in Ghana can be traced back to as early as the 1930s, with the significant flood recorded in 1955, 1960, 1963, 1973, 1986, 1991, 1995, 1999, 2001, 2002, 2009, 2010, 2011, 2015, 2020, 2022, and most recently 2023. Sometime in 2023, following a recent flood, a photograph of the front page of the Daily Graphic from 1960 was widely circulated on social media. On Monday, April 18, 1960, that very front page carried the headline "When the Rains Came to Accra" and featured two images depicting flooding in the city. In pre-colonial Ghana, local communities adapted to the natural patterns of the environment and developed traditional knowledge and coping strategies to cope with seasonal floods. However, colonial rule brought changes with the introduction of land use practices and urban planning in coastal towns, altering the natural drainage patterns that curbed flooding. Following Ghana's independence in 1957, there was accelerated urbanisation in Accra that made it vulnerable to flood. Post-independence, there were significant demographic shifts, with informal settlements often established in waterways and flood-prone areas due to rapid rural-urban migration. More recently, climate change and expanding urban areas have intensified flood risks.

Causes of floods in Ghana.

Over the years, Ghana has experienced floods across different regions notably caused by several factors such as:

Continuous heavy downpours

Ghana’s major rainy season from April to mid-June can bring intense downpours that overwhelm inadequate or poorly maintained drainage systems, especially in expanding urban areas like Accra and Kumasi. Improved stormwater infrastructure, regular desilting of gutters, and broader climate resilience measures are needed to mitigate flood impacts.

Corruption

Corruption in various facets of governance has significantly hindered Ghana’s ability to address flooding. Allegations of misappropriated public funds towards sanitation projects and the issuance of unauthorised building permits weaken essential infrastructure upgrades such as drainage projects and allow development in flood-prone areas. A prominent example is the 2023 resignation of Cecilia Dapaah, then Minister for Sanitation and Water Resources, following revelations that large sums of cash were stored at her residence.Although investigations into the source of the funds are ongoing, the scandal has raised public concerns about the misuse of government resources intended for essential services, including those aimed at flood mitigation. Such controversies undermine confidence in public institutions, hinder effective policy implementation, and heighten the vulnerability of communities facing increasing flood risks.

Poor Urban Planning

Rapid urban expansion in Ghana, particularly in cities like Accra and Kumasi, has often proceeded without comprehensive planning or strict adherence to zoning regulations. This has led to the construction of roads, homes, and commercial structures in areas with inadequate drainage systems or naturally flood-prone terrain. In many urban neighbourhoods, storm drains were either never constructed or have not been expanded to accommodate growing populations, resulting in frequent overflows during heavy rainfall. Moreover, unregulated housing developments reduce open green spaces that could otherwise absorb excess water, increasing the volume of runoff. The failure to integrate urban planning with climate-positive strategies increases flood risk and places additional strain on already overburdened infrastructure.

Choked gutters

Poor waste management and inadequate maintenance of drainage systems have led to gutters becoming clogged with debris, plastic waste, and silt. In urban centres like Accra, many drainage channels overflow during heavy rains, because accumulated, refuse obstructs the free flow of water. This problem is compounded by rapid population growth and limited capacity for solid waste disposal, resulting in more rubbish entering stormwater systems. When gutters are choked, even moderate rainfall can cause localised flooding that damages property and disrupts transportation. Addressing this issue requires regular desilting, public education on responsible waste disposal, and stricter enforcement of sanitation bylaws.

Improper settlements

Rapid urbanisation and limited affordable housing options in Ghana have led to the emergence of informal or unauthorised settlements in low?lying, flood-prone areas. In cities like Accra, neighbourhoods commonly known as “Sodom and Gomorrah” have been built alongside the Odaw River, where the lack of proper drainage, waste management, and regulated construction significantly increases flood risks. Many of these informal settlements do not adhere to zoning regulations or building codes, resulting in structures that block natural waterways and increased runoff during heavy rainfall. Consequently, residents face recurrent flooding, property damage, and health hazards, prompting calls for more stringent enforcement of urban development policies and the provision of safer, regulated housing.

Low-lying and flat lands

Certain regions of Ghana, particularly along the coast and in the southern plains, are characterised by low-lying, flat topography. Areas such as Accra sit near sea level, causing rainwater and coastal tides to accumulate more readily during heavy downpours or storm surges. Without sufficient natural or artificial drainage, water can linger for prolonged periods, leading to recurrent floods that disrupt transportation, damage infrastructure, and threaten agriculture. This topographical challenge often intensifies when combined with urban development on reclaimed lands or in areas that were historically wetlands, undermining the need for flood-resilient land-use policies and infrastructure planning.

Rare cases of dam spillageFor instance, on June 3rd, 2015, Accra, heavy rainfall in Ghana's capital led to flooding. The main contributing factors were choked gutters that blocked drainage systems and improper settlements. Over 200 people lost their lives due to a petrol station explosion during the flood. In 2021, heavy rainfall caused floods in the Kumasi Metropolis, resulting in the loss of lives 4 people and displacement of 200 others. This flood was caused by heavy rainfall. In the Volta Region and the Eastern Region of Ghana, severe floods occurred after the Akosombo Dam was spilled, displacing 26,000 people from their homes in 2023.

Reports from the BBC attributed the flood to heavy rainfall which caused the Volta River Authority to spill the dam. Below is a list of floods.

Severe weather terminology (United States)

storm surge, tornadoes and flooding rain. Non-precipitation hazards – Weather hazards not directly associated with any of the above including extreme heat

This article describes severe weather terminology used by the National Weather Service (NWS) in the United States, a government agency operating within the Department of Commerce as an arm of the National Oceanic and Atmospheric Administration (NOAA).

The NWS provides weather forecasts, hazardous weather alerts, and other weather-related products for the general public and special interests through a collection of national and regional guidance centers (including the Storm Prediction Center, the National Hurricane Center and the Aviation Weather Center), and 122 local Weather Forecast Offices (WFO). Each Weather Forecast Office is assigned a designated geographic area of responsibility—also known as a county warning area—that are split into numerous forecast zones (encompassing part or all of one county or equivalent thereof) for issuing forecasts and hazardous weather products.

The article primarily defines precise meanings and associated criteria for nearly all weather warnings, watches, advisories, statements, and other products not associated with hazardous weather issued by the NWS and its sub-organizations (some of which may be specific to certain cities or regions). Related weather scales and general weather terms used by the agency are also addressed.

Federal Emergency Management Agency

FEMA Is Slow To Act On Program That Buys Flooded Houses Planet Money – Episode 797: Flood Money Hazard Mitigation Grant Program (HMGP) Annual data: "Billion-Dollar

The Federal Emergency Management Agency (FEMA) is an agency of the United States Department of Homeland Security (DHS), initially created under President Jimmy Carter by Presidential Reorganization Plan No. 3 of 1978 and implemented by two Executive Orders on April 1, 1979. The agency's primary purpose is to coordinate the response to a disaster that has occurred in the United States and that overwhelms the resources of local and state authorities. The governor of the state in which the disaster occurs must declare a state of emergency and formally request from the president that FEMA and the federal government

respond to the disaster. The only exception to the state's gubernatorial declaration requirement occurs when an emergency or disaster takes place on federal property or to a federal asset—for example, the 1995 bombing of the Alfred P. Murrah Federal Building in Oklahoma City, Oklahoma, or the Space Shuttle Columbia in the 2003 return-flight disaster.

While on-the-ground support of disaster recovery efforts is a major part of FEMA's charter, the agency provides state and local governments with experts in specialized fields, funding for rebuilding efforts, and relief funds for infrastructure development by directing individuals to access low-interest loans, in conjunction with the Small Business Administration. In addition to this, FEMA provides funds for response personnel training throughout the United States and funds for non-federal entities to provide housing and services for migrants released from Department of Homeland Security custody.

Risk management

labeling can no longer be used to mitigate risk). Typical risk analysis and evaluation techniques adopted by the medical device industry include hazard analysis

Risk management is the identification, evaluation, and prioritization of risks, followed by the minimization, monitoring, and control of the impact or probability of those risks occurring. Risks can come from various sources (i.e, threats) including uncertainty in international markets, political instability, dangers of project failures (at any phase in design, development, production, or sustaining of life-cycles), legal liabilities, credit risk, accidents, natural causes and disasters, deliberate attack from an adversary, or events of uncertain or unpredictable root-cause. Retail traders also apply risk management by using fixed percentage position sizing and risk-to-reward frameworks to avoid large drawdowns and support consistent decision-making under pressure.

There are two types of events viz. Risks and Opportunities. Negative events can be classified as risks while positive events are classified as opportunities. Risk management standards have been developed by various institutions, including the Project Management Institute, the National Institute of Standards and Technology, actuarial societies, and International Organization for Standardization. Methods, definitions and goals vary widely according to whether the risk management method is in the context of project management, security, engineering, industrial processes, financial portfolios, actuarial assessments, or public health and safety. Certain risk management standards have been criticized for having no measurable improvement on risk, whereas the confidence in estimates and decisions seems to increase.

Strategies to manage threats (uncertainties with negative consequences) typically include avoiding the threat, reducing the negative effect or probability of the threat, transferring all or part of the threat to another party, and even retaining some or all of the potential or actual consequences of a particular threat. The opposite of these strategies can be used to respond to opportunities (uncertain future states with benefits).

As a professional role, a risk manager will "oversee the organization's comprehensive insurance and risk management program, assessing and identifying risks that could impede the reputation, safety, security, or financial success of the organization", and then develop plans to minimize and / or mitigate any negative (financial) outcomes. Risk Analysts support the technical side of the organization's risk management approach: once risk data has been compiled and evaluated, analysts share their findings with their managers, who use those insights to decide among possible solutions.

See also Chief Risk Officer, internal audit, and Financial risk management § Corporate finance.

Emergency management

offers advice on how to mitigate disasters. The Agency gives instructions on how to retrofit a home to minimize hazards from a flood, to include installing

Emergency management (also Disaster management) is a science and a system charged with creating the framework within which communities reduce vulnerability to hazards and cope with disasters. Emergency management, despite its name, does not actually focus on the management of emergencies; emergencies can be understood as minor events with limited impacts and are managed through the day-to-day functions of a community. Instead, emergency management focuses on the management of disasters, which are events that produce more impacts than a community can handle on its own. The management of disasters tends to require some combination of activity from individuals and households, organizations, local, and/or higher levels of government. Although many different terminologies exist globally, the activities of emergency management can be generally categorized into preparedness, response, mitigation, and recovery, although other terms such as disaster risk reduction and prevention are also common. The outcome of emergency management is to prevent disasters and where this is not possible, to reduce their harmful impacts.

Mold and human health

an assessment of the location and extent of the mold hazard in a structure. Various practices of remediation can be followed to mitigate mold issues in

Mold health issues refer to the harmful health effects of molds ("moulds" in British English) and their mycotoxins.

Molds are ubiquitous in the biosphere, and mold spores are a common component of household and workplace dust. The vast majority of molds are not hazardous to humans, and reaction to molds can vary between individuals, with relatively minor allergic reactions being the most common. The United States Centers for Disease Control and Prevention (CDC) reported in its June 2006 report, 'Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods,' that "excessive exposure to mold-contaminated materials can cause adverse health effects in susceptible persons regardless of the type of mold or the extent of contamination." When mold spores are present in abnormally high quantities, they can present especially hazardous health risks to humans after prolonged exposure, including allergic reactions or poisoning by mycotoxins, or causing fungal infection (mycosis).

Risk assessment

which can mitigate these effects. The output from such a process may also be called a risk assessment. Hazard analysis forms the first stage of a risk

Risk assessment is a process for identifying hazards, potential (future) events which may negatively impact on individuals, assets, and/or the environment because of those hazards, their likelihood and consequences, and actions which can mitigate these effects. The output from such a process may also be called a risk assessment. Hazard analysis forms the first stage of a risk assessment process. Judgments "on the tolerability of the risk on the basis of a risk analysis" (i.e. risk evaluation) also form part of the process. The results of a risk assessment process may be expressed in a quantitative or qualitative fashion.

Risk assessment forms a key part of a broader risk management strategy to help reduce any potential risk-related consequences.

Tsunami

Understanding and Mitigation of Tsunami Hazards". U.S. Geological Survey. Archived from the original on 16 March 2025. Thucydides: “A History of the Peloponnesian

A tsunami ((t)soo-NAH-mee, (t)suu-; from Japanese: ??, lit. 'harbour wave', pronounced [ts?nami]) is a series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean or a large lake. Earthquakes, volcanic eruptions and underwater explosions (including detonations, landslides, glacier calvings, meteorite impacts and other disturbances) above or below water all have the potential to

generate a tsunami. Unlike normal ocean waves, which are generated by wind, or tides, which are in turn generated by the gravitational pull of the Moon and the Sun, a tsunami is generated by the displacement of water from a large event.

Tsunami waves do not resemble normal undersea currents or sea waves because their wavelength is far longer. Rather than appearing as a breaking wave, a tsunami may instead initially resemble a rapidly rising tide. For this reason, it is often referred to as a tidal wave, although this usage is not favoured by the scientific community because it might give the false impression of a causal relationship between tides and tsunamis. Tsunamis generally consist of a series of waves, with periods ranging from minutes to hours, arriving in a so-called "wave train". Wave heights of tens of metres can be generated by large events. Although the impact of tsunamis is limited to coastal areas, their destructive power can be enormous, and they can affect entire ocean basins. The 2004 Indian Ocean tsunami was among the deadliest natural disasters in human history, with at least 230,000 people killed or missing in 14 countries bordering the Indian Ocean.

The Ancient Greek historian Thucydides suggested in his 5th century BC History of the Peloponnesian War that tsunamis were related to submarine earthquakes, but the understanding of tsunamis remained slim until the 20th century, and much remains unknown. Major areas of current research include determining why some large earthquakes do not generate tsunamis while other smaller ones do. This ongoing research is designed to help accurately forecast the passage of tsunamis across oceans as well as how tsunami waves interact with shorelines.

Climate resilience

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Climate resilience is a concept to describe how well people or ecosystems are prepared to bounce back from certain climate hazard events. The formal definition of the term is the "capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance". For example, climate resilience can be the ability to recover from climate-related shocks such as floods and droughts. Different actions can increase climate resilience of communities and ecosystems to help them cope. They can help to keep systems working in the face of external forces. For example, building a seawall to protect a coastal community from flooding might help maintain existing ways of life there.

To increase climate resilience means one has to reduce the climate vulnerability of people, communities and countries. This can be done in many different ways. They can be technological and infrastructural changes (including buildings and roads) or policy (e.g. laws and regulation). There are also social and community approaches, as well as nature-based ones, for example by restoring ecosystems like forests to act as natural barriers against climate impacts. These types of approaches are also known as climate change adaptation. Climate resilience is a broader concept that includes adaptation but also emphasizes a system-wide approach to managing risks. The changes have to be implemented at all scales of society, from local community action all the way to global treaties. It also emphasizes the need to transform systems and societies and to better cope with a changed climate.

To make societies more resilient, climate policies and plans should be shaped by choices that support sustainability. This kind of development has come to be known as climate resilient development. It has become a new paradigm for sustainable development. It influences theory and practice across all sectors globally. Two approaches that fall under this kind of development are climate resilient infrastructure and climate-smart agriculture. Another example are climate-resilient water services. These are services that provide access to high quality drinking water during all seasons and even during extreme weather events. On every continent, governments are now adopting policies for climate resilient economies. International frameworks such as the Paris Agreement and the Sustainable Development Goals are drivers for such initiatives.

Tools exist to measure climate resilience. They allow for comparisons of different groups of people through standardized metrics. Objective tools use fixed and transparent definitions of resilience. Two examples for objective tools are the Resilience Index Measurement and Analysis (RIMA) and the Livelihoods Change Over Time (LCOT). Subjective approaches on the other hand use people's feelings of what constitutes resilience. People then make their own assessment of their resilience.

Social vulnerability

understand the social conditions that transform a natural hazard (e.g. flood, earthquake, mass movements etc.) into a social disaster. The concept emphasizes

In its broadest sense, social vulnerability is one dimension of vulnerability to multiple stressors and shocks, including abuse, social exclusion and natural hazards. Social vulnerability refers to the inability of people, organizations, and societies to withstand adverse impacts from multiple stressors to which they are exposed. These impacts are due in part to characteristics inherent in social interactions, institutions, and systems of cultural values.

Social vulnerability is an interdisciplinary topic that connects social, health, and environmental fields of study. As it captures the susceptibility of a system or an individual to respond to external stressors like pandemics or natural disasters, many studies of social vulnerability are found in risk management literature.