

**CENTRE FOR CLIMATE CHANGE AND SUSTAINABILITY STUDIES  
UNIVERSITY OF GHANA**



***Re-Energize Governance of Disaster Risk Reduction and Resilience  
for Sustainable Development***

**[Re-Energize DR3 Project]**

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**OVERVIEW OF GOVERNANCE APPROACHES FOR PRE- AND  
POST-DISASTERS IN GHANA**

**DRAFT REPORT**

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## TABLE OF CONTENTS

1. Introduction.....	2
1.1 Background .....	2
1.2 Disaster risk profile and institutional framework .....	3
2. Legislation, Governance and Funding Mechanisms .....	5
2.2 Institutional framework for decentralized implementation of disaster risk reduction and resilience .....	9
3. Case Study: Accra as a flood vulnerable city .....	10
3.1 Profile of Accra.....	10
3.2 Examining the causes of floods in Accra.....	15
4. Priorities and Investments By Decision Makers to Reduce Risks of Future Disasters ....	16
4.1 Budget Allocations to DR3 .....	16
4.2 Financing of disaster risk reduction and resilience.....	18
4.3 Dedicated funding mechanisms for local governance .....	20
4.4 Evidence based on the effectiveness of different interventions.....	21
4.5 The role of private and civil society sector in disaster risk reduction and resilience in Ghana .....	24
4.7 Resource allocation to vulnerable communities for DR3 .....	27
4.8 Cross-sector coordination in disaster risk reduction and resilience in Ghana .....	29
4.9 Data and information for disaster risk reduction and resilience in Ghana.....	29
4.10 Monitoring and Evaluation of disaster risk reduction and resilience in Ghana.....	30
5.Mapping disasters vulnerability in Ghana .....	31
REFERENCES .....	34
APPENDICES .....	38
Appendix 1: Drought Indicators .....	38
Appendix 2. NADMO Indicator Performance 2018.....	40
Appendix 3: National Disaster Summary- January-December 2016.....	41
Appendix 4: National Disaster Summary- January-December 2017.....	42

## **Abstract**

*Over the past fifty years, there have been more than 8,000 major disasters recorded throughout the world with an estimated cost of \$5 trillion in damages, and killing about 2.5 million people. The level of risk experienced concerning disasters vary considerably from one geographical region to the other. In Africa, Ghana is rated highly in terms of exposure to risks emanating from seismic and multiple weather-related hazards. Situated in one of the world's most complex climatic regions, the country is affected by the climatic forces of the Sahel and two oceans. In Ghana, the management of disaster risks in Ghana has seen a considerable paradigm shift from a reactive approach to a prevention and risk reduction approach in more recent times there have been deliberate efforts by the government to retool and strengthen disaster management and make it both a national and local priority by involving all relevant stakeholders. Funding and intervention projects by development partners and civil society organisations have been aligned with the paradigm shift and priority actions of the government in line with the Sendai Framework for Disaster Risk Reduction (2015–2030). Disaster Risk Reduction (DRR) projects and programmes such as flood forecasting and early warning systems, advocacy and capacity building, disaster plan, and disaster preparedness for the effective response have all been undertaken to effectively mainstream DRR in local level planning and enhance community preparedness and resilience. In Ghana, the main institution mandated by the government and with the responsibility to work in DRR and Disaster Risk Management (DRM) is the National Disaster Management Organisation (NADMO). Existing laws and legislative instruments guiding disaster risk reduction, management and resilience in Ghana include National Disaster Management Organisation Act 1996 (Act 517); and the reviewed national Disaster Management Organisation Act 2016 (Act 927), Environmental Protection Agency Act 1994 (Act 490), The Ghana National Fire Service Act 1997 (Act 537) and Land Use and Spatial Planning Act 2016 (Act 925). Like most developing African cities, Accra is exposed to natural disasters and hazards, particularly floods, which disproportionately affects the urban poor in terms of loss of lives, disruption of livelihoods and damages to infrastructure and property. Accra's susceptibility to flooding is not only driven by human-induced factors such as rapid urbanization and growth of informal settlements, poor waste management and drainage system, and urban governance challenges, but also climate variability and climate change. Across the city, the disaster vulnerable areas are usually dominated by low-income households which have limited adaptive capacity. Areas such as Adabraka-Odawna, Nima, Fadama and Darkuman, as a result of their low topography coupled*

*with limited infrastructure makes flooding an annual experience. Particularly in densely populated areas where poor housing conditions further amplify the negative impacts on lives and properties the city has been impacted by major floods in the last three decades. According to UNDRR (2020), Ghana annually invests 2% of its annual budget towards disaster risk reduction, out of which 0.9% is earmarked for direct disaster risk reduction investments. The purpose of this review is to examine and discuss Ghana's preparedness for disasters by looking at the governance approaches and the priorities for decision-makers in Ghana to reduce risks of future disasters. Accra, Ghana's capital and most urbanized city is used as the case study.*

## **1. Introduction**

### *1.1 Background*

Disasters normally result from a combination of three main factors such as exposure to a hazard; the presence of vulnerability conditions; and the insufficient capacity to cope or reduce potential negative consequences (Mahar et al. nd.). Disasters often impact several aspects of life including loss of life, injury, disease and other negative effects on human physical, mental and social wellbeing, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation. Aside from these effects disaster disrupts the normal pattern of life, causing both physical and emotional suffering and an overwhelming sense of helplessness and hopelessness (Mahar, et al., N.D.).

Available data indicates that the frequency of natural disasters around the world has increased exponentially since the 1970s. In terms of social and economic impacts, an estimated 1 million people have died and a damage of US\$1.7 trillion reported from natural disasters since 2000 (Guha-Sapir et al. 2015). Climate change has influenced the prevalence of natural disasters. Climate change can raise the risk of extreme weather and can result in an increased risk of droughts and the increased strength of storms, such as tropical cyclones. Areas that are usually unaffected by the sea are becoming more vulnerable due to rising sea levels as waves and currents become stronger (Tiseo, 2020).

The level of risk experienced concerning disasters vary considerably from one geographical region to the other. The IPCC (2012) reported that an overwhelming percentage (95%) of natural disasters take place in developing nations. As of 2019, the disaster risk hotspot regions

included Oceania, Southeast Asia, Central America and West and Central Africa. Looking at continents, Africa has the highest societal vulnerability, followed by Asia and America. Europe is the continent with the lowest disaster risk worldwide with an index value of 2.43 (Day et al., 2019). Research findings reflect a world in which people of low socioeconomic status (SES) are more vulnerable in the event of disasters and are more likely to suffer dire consequences, including property damage, homelessness, and physical and financial impacts. Disasters aggravate the adversity of people with low SES than those with high SES. As rightly noted by the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR), the huge financial burden associated with natural disasters perpetuates the poverty conditions of the poor (see Hallegatte et al., 2017). The causes and consequences of risk are transmitted across geographic regions and income classes, between the present and future generations and between social and economic sectors (UNDRR, 2019). Also, in recognition of the fact that disaster risks will further be magnified by climate change and result in more localized disasters which will negatively impact lives and property, several initiatives have been advanced over the years both at the international and national levels for disaster risk reduction. For instance, the adoption of the Sendai Framework for Disaster Risk Reduction 2015–2030 (Sendai Framework)<sup>1</sup> at the third United Nations World Conference on Disaster Reduction (WCDR) – and its subsequent endorsement by the General Assembly of the United Nations (Resolution A/RES/69/283) in June 2015 – marked the culmination of a process that formally began in the 1970s.

### *1.2 Disaster risk profile and institutional framework*

Generally, Ghana ranks high in exposure to disaster risks resulting from seismic and weather-related hazards such as earthquakes, floods, coastal erosion, droughts, tropical storms, disease epidemics and wildfires (**Table 1**). The country is however noted for its high vulnerability to flood and drought. In the last two decades, flooding events (urban and rural) are increasing in terms of frequency, intensity and complexity, resulting in loss of lives, and damage to infrastructure, property and livelihoods (NADMO, 2018). The geographic positioning of Ghana in one of the world's most complex climatic regions; the climatic forces of the Sahel and two oceans play a major role in the country's high exposure to climate-related disaster risks (UNDP, 2017). Interestingly, floods are usually preceded by a period of drought, damaging food crops and human health. This is indicative of the high variability in climate and hydrological flows and shows how climate change exacerbates the country's vulnerability to

extreme weather conditions. Floods have exposed weaknesses in the disaster preparedness and response system and worsened vulnerabilities of people, infrastructure and livelihoods (Gough et al., 2019).

Table 1: Disasters classification in Ghana

No	Types of disasters	Examples
1	Insect and Pest Infestation	Blackfly, armyworm, anthrax, locust, etc.
2	Diseases and Epidemics	Yellow fever, pandemic influenza, cerebro-spinal meningitis (CSM), cholera
3	Geological/Nuclear Radiological	Landslide, gas emission, earthquakes, tsunamis
4	Human-induced/Man-made	Marine and railway emergencies, vehicular and aviation accidents, building collapse
5	Hydro-meteorological	Floods, windstorm, droughts, rainstorm, tidal waves
6	Fire and lightning	Lightning, domestic and industrial fires, bush/wildfires

NADMO (2019)

The management of disaster risks in Ghana has seen a considerable paradigm shift from a responsible approach to a prevention and risk reduction approach in more recent times (GFDRR, 2016). This has been orchestrated largely by challenges in terms of the required capacity at all levels and budgetary support in Disaster Risk Reduction (UNDP, 2017). Consequently, there have been deliberate efforts by the government to retool and strengthen disaster management and make it both a national and local priority by involving all relevant stakeholders. Funding and intervention projects by development partners and civil society organisations have been aligned with this paradigm shift and priority actions of governments per the Sendai Framework for Disaster Risk Reduction (2015–2030). Disaster Risk Reduction (DRR) projects and programmes such as flood forecasting and early warning systems, advocacy and capacity building, disaster plan, and disaster preparedness for an effective response have all been undertaken to effectively mainstream DRR in local level planning and enhance community preparedness and resilience.

Furthermore, in the past decade, governance and institutional mechanisms and initiatives including the Ghana Plan of Action on DRR and Climate Change Adaptation (CCA), Platforms for DRR, Review of the National Policy on DRR, National Contingency Plan, District Disaster Management Plans, Flood scenarios, Preparation of Building Guides and Review of the National Building Regulations and the Building Code have also been undertaken to ensure that DRR is a national and local priority as part of efforts to achieve the aims of the Sendai

Framework for Disaster Risk Reduction (2015–2030) and the UN Sustainable Development Goals.

## **2. Legislation, Governance and Funding Mechanisms**

### *2.1 Disaster risk governance and management in Ghana*

In Ghana, some laws and legislative instruments help in explaining and guiding Disaster Risk Reduction and Management. They include

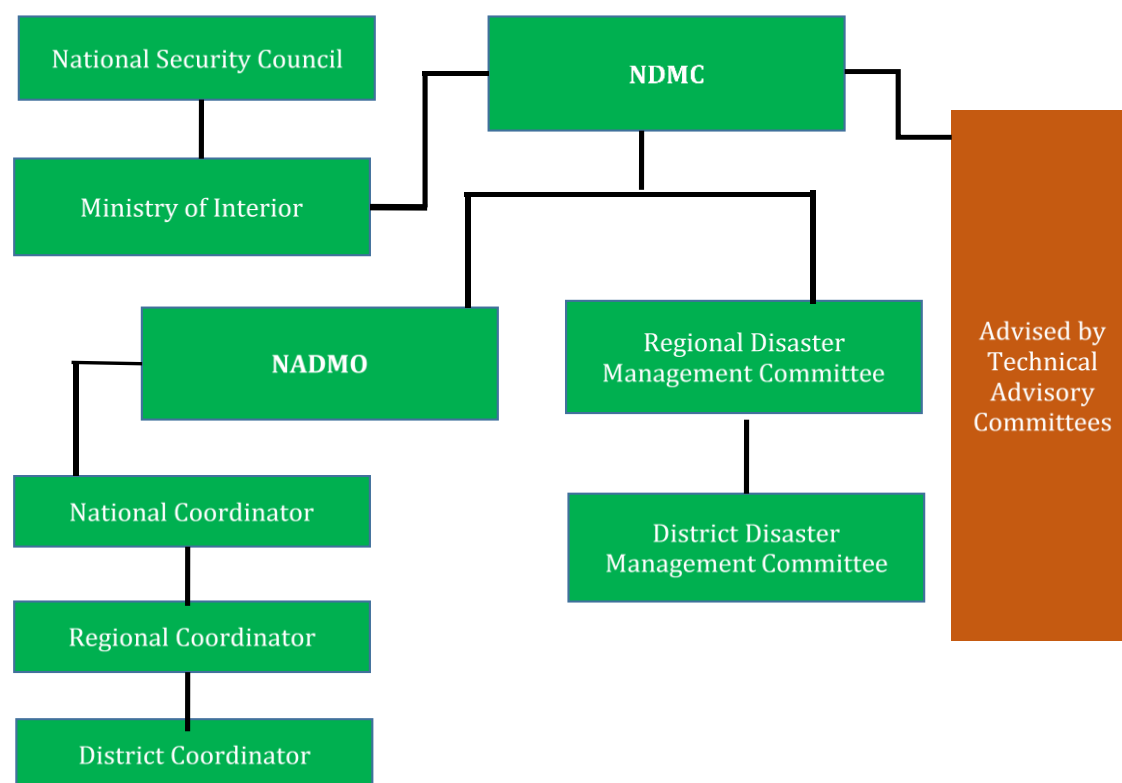
- National Disaster Management Organisation Act 1996 (Act 517); and the reviewed National Disaster Management Organisation Act 2016 (Act 927)
- Environmental Protection Agency Act 1994 (Act 490)
- The Ghana National Fire Service Act 1997 (Act 537) and
- Land Use and Spatial Planning Act 2016 (Act 925)

Underpinned by the shift to disaster prevention and preparedness towards reduce disaster losses and build resilience, there have been conscious efforts by the government to integrate DRM into poverty reduction and sustainable development agendas. Ghana has developed strategies to strengthen institutional capacity in disaster risk management across key sector ministries. The NADMO committees at national, regional and district levels implement disaster policies with support from the technical advisory committees. In recent times, Disaster Risk Management (DRM) has attracted more substantive attention and forms an integral part of development planning. The Sendai Framework for Disaster Risk Reduction has offered stakeholders and development partners a unique opportunity to mobilize resources and expertise for the implementation of interventions per the framework's priorities for action.

The main institution mandated by the government and with the responsibility to work in DRR and DRM) is the National Disaster Management Organisation (NADMO) that operates under the Ministry of Interior. The NADMO was established through an Act of Parliament (Act 517 of 1996) to oversee and coordinate disaster management activities among governmental and non-governmental actors and build the capacity of communities for disaster response and preparedness through social mobilization, employment generation and poverty reduction projects. The resolve to establish NADMO was a sequel to the United Nation's declaration between 1990-1999 as the International Decade for Natural Disaster Reduction (UN/IDNDR).

The goals were to intensify global consciousness, promote disaster prevention and lessen the risk of natural disasters through the extensive use of science and technology. Currently, NADMO operates in ten regional secretariats out of the sixteen regions, two hundred and fifty-four (254) metropolitan, municipal, and district secretariat, and over nine hundred (900) zonal offices throughout the country (NADMO, 2018).

In addition to governmental policy, NADMO is required to implement international, national, regional and district disaster management plans. Its mandate includes activities such as identifying, monitoring and mapping out hazards, collaborating with relevant institutions and communities by spreading information that educates the public on disaster awareness, preparedness and prevention. Further, the organisation is mandated to advise the Ghanaian government on matters bothering disaster risks and emergency prevention and regulation. NADMO is also expected to collate data on disasters in the country as well as ensure the effective flow of disaster communication (**Figure 1**).



*Figure 1: Disaster management organisation structure in Ghana*

Source: NADMO, 2019



In terms of management structure, NADMO is governed by the National Security Council, which determines the policies for NADMO and is chaired by the President. The National Disaster Management Committee (NDMC) is the advocating body for NADMO and is chaired by the Ministry of Interior. The NDMC is composed of national coordinator representatives from the following ministries: Finance and Economic Planning; Health; Employment and Labour Relations; Information; Local Government and Rural Development; Defence; Environment, Science, Technology and Innovation; Transport; Communications; and the National Development Planning Commission (see **Figure 1**).

Ghana has put in place governance arrangements that contribute to coherence in DRM across different ministries, departments and agencies as well as metropolitan, municipal and district assemblies. The coordination between EPA and NADMO is an example of governance arrangements supporting coherence between climate change adaptation (CCA) and DRM. The outcome of this co-ordination led to the development of the Ghana Plan of Action on Disaster Risk Reduction and Climate Change Adaptation (NADMO, 2011) and the National Climate Change Policy (NCCP) (Korah and Cobbinah, 2019). NADMO has a Climate Change/Disaster Risk Reduction (CC/DRR) Department that focuses on reducing climate change and disaster-related vulnerabilities as well as other economic, social and environmental challenges that are associated with disasters (NADMO, 2019). More specific functions of the CC/DRR Department include:

- Formulation, implementation and evaluation of CCA and DRR programmes at all levels within NADMO;
- Collection and sharing of information on CCA and DRR within NADMO and other stakeholders;
- Liaison with relevant actors to mainstream CCA and DRR into plans, programmes and policies, as well as assistance with the implementation of UN protocols that relate to CCA and DRR;
- Education and enhancement of capacity for the implementation of CCA and DRR actions at national, regional and district levels.

Under Ghana's National Climate Change Policy (NCCP), NADMO holds the main responsibility for implementing several programme areas, which are particularly relevant to disaster risk management. These include the climate-proofing of key existing infrastructure, the protection of coastal resources and communities, rapid response and disaster management

and promotion of early warning systems (MESTI, 2015).

In 2010, Ghana adopted the National Disaster Management Plan, which refers to climate change as an integral part of the disaster management model for Ghana (NADMO, 2010). The Plan was developed to support NADMO to achieve its mandate of ensuring that disasters in whatever form are properly managed. The plan consists of seven key components, some of which are relevant to climate change adaptation (see **Table 2**).

*Table 2. Policy framework on DRM in Ghana*

	<b>Disaster Risk Management</b>
<b>National legislation</b>	Coordinated Programme of Economic and Social Development Policies (2017-2024)
<b>Enacted by</b>	NDPC
<b>Objective</b>	To provide the President's comprehensive vision for the mid-term economic and social development of Ghana, including the following policy areas related to CCA and DRM:
<b>Key elements</b>	<ul style="list-style-type: none"> <li>• climate variability and change</li> <li>• disaster management</li> <li>• water for development</li> <li>• drainage and flood control</li> <li>• water and sanitation</li> <li>• land administration and management</li> <li>• human settlements and housing</li> </ul>
<b>National frameworks</b>	National Disaster Management Plan ( <i>published in 2010</i> )
<b>Lead institution</b>	NADMO
<b>Objective</b>	To guide NADMO in achieving its mandate of ensuring that disasters in whatever form are properly managed
<b>Key elements</b>	<ul style="list-style-type: none"> <li>• disaster hazard mapping</li> <li>• education, training and research</li> <li>• emergency response and relief management</li> <li>• rehabilitation, resettlement and reconstruction</li> <li>• monitoring and evaluation</li> <li>• financing</li> <li>• disaster risk management system</li> </ul>

Source: Authors' own

## *2.2 Institutional framework for decentralized implementation of disaster risk reduction and resilience*

The decentralised governance system in Ghana implies that MMDAs play an essential role in implementing DRM policies and strategies. The National Development Planning Commission (NDPC) and Ministry of Local Government and Rural Development (MLGRD) support MMDAs in formulating their Medium-term Development Plans (MTDPs). This includes a review of the extent to which issues such as climate risk and DRM are considered. While MLGRD plays a key role in translating national-level policies to local level planning, NDPC provides MMDAs with guidance and technical support to ensure that plans: i) conform to the national development framework and key thematic areas, ii) support the participation and representation of concerned actors and iii) create uniformity in the planning process across all districts in Ghana.

The guidelines provide a checklist that specifies that climate change mitigation and adaptation must be addressed in an integrated manner through MMDAs policy planning and implementation (Government of Ghana, 2017a). On adaptation, it identifies priority actions across six sectors: i) agriculture and food security, ii) sustainable forest resource management, iii) resilient infrastructure and built environment, iv) climate change health, v) water resources and vi) gender and the vulnerable. Across these sectors, the overarching objective is to “increase climate resilience and decrease vulnerability for enhanced sustainable development” (Government of Ghana, 2017a, p. 14).

Informed by the guidance provided by NDPC, MTDPs outline the programmes, projects, activities and budgets for each MMDA. This puts NDPC in an important strategic position since MMDA’s budgets do not get released until their MTDPs have been verified by NDPC to be compliant with domestic objectives, including indicators that have implicit consideration for DRM, and signed off. Greater consideration of DRM commitments should be included in the Nationally Determined Contributions (NDC) checklist.

As earlier indicated, in terms of policy coherence and co-ordination in DRM, NADMO has established the CC/DRR Department to advance activities that address climate change and disaster risk reduction. Yet, NADMO still faces challenges in implementation. According to the draft implementation plan of Ghana’s NDC, NADMO is expected to fully incorporate climate change activities into its structure by setting up climate change desks in all its regional and district offices and building staff capacity in these units. It further stipulates that the

CC/DRR Department should establish a technical committee to support and guide its activities related to CCA and DRM (MESTI, 2019). Ministries and commissions such as the Ministry of Finance and Economic Planning, Energy Commission, Ministry of Food and Agriculture, and Forestry Commission have established similar climate units and desks.

Local capacity is key for ensuring that policies get implemented. Important progress has been made in enhancing capacity at the national level to collect and use climate and DRR data to inform national planning and reporting processes. There is, however, the need for further capacity- building at the district level, where policy implementation takes place. This includes greater awareness of disaster policies and programmes, what is required of the MMDAs and the associated resource needs (Asante et al., 2015).

### **3. Case Study: Accra as a flood vulnerable city**

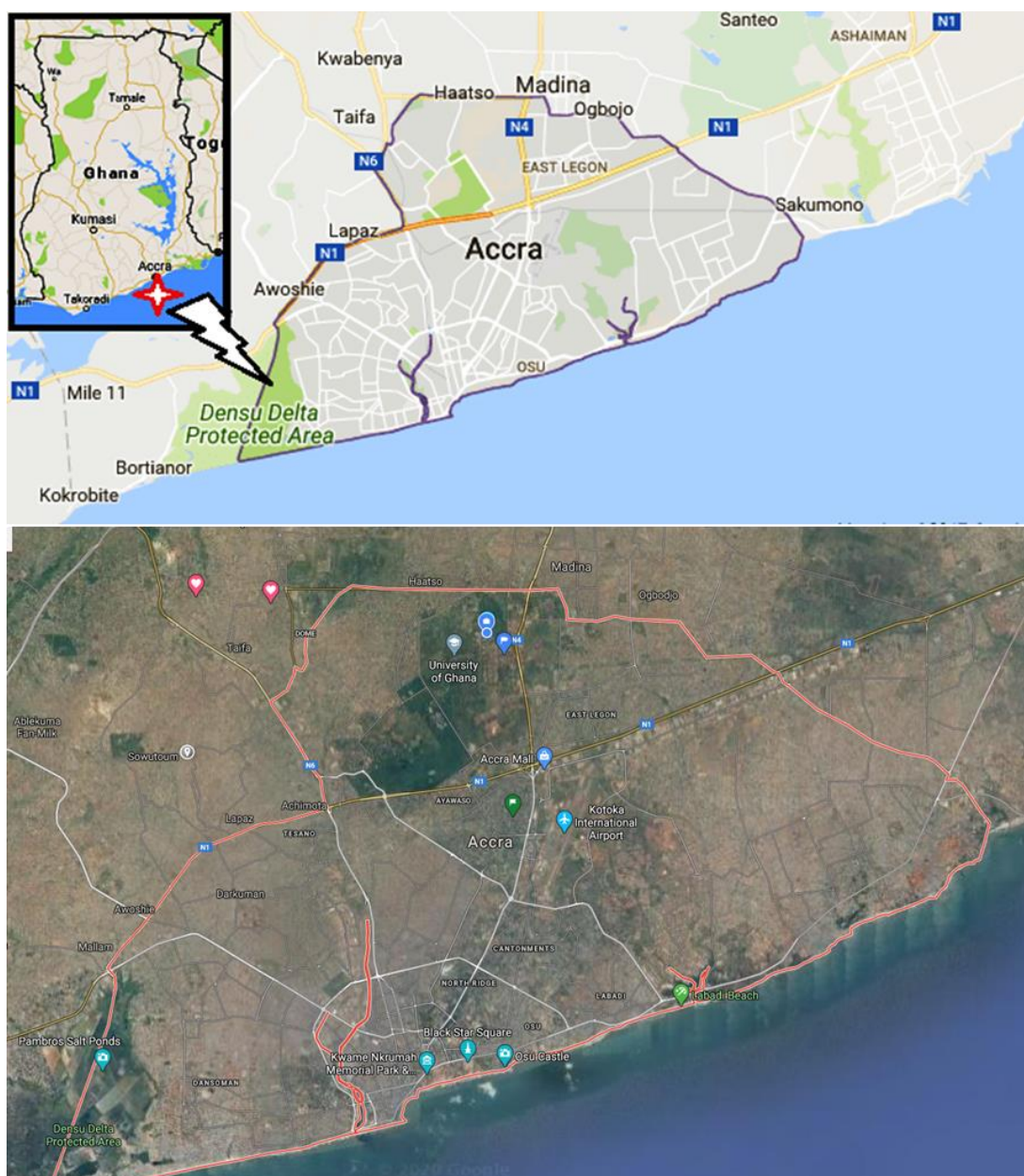
#### *3.1 Profile of Accra*

Accra Metropolitan Area (AMA) is the focus of this case study. Accra is the capital and largest city of Ghana and covers an area of 60 km<sup>2</sup>. With an estimated urban population of 2,052,341 (Ghana Statistical Service, 2019), it is the most urbanized metropolitan area in the Greater Accra Region of Ghana and one of the fastest urbanizing areas in the West African sub-region (World Bank 2015; UNDESA, 2018). The AMA comprises several sub-metropolitan areas which include: Ayawaso West, Okaikoi South, Osu Klotey, Ayawaso Central, Ayawaso East, Ashiedu Keteke, Okaikoi North, Ablekuma South and Ablekuma North, Ablekuma West and Ablekuma Central (**Figure 2**)

Like most developing African cities, Accra is exposed to natural disasters and hazards, particularly floods, which disproportionately affects the urban poor in terms of loss of lives, disruption of livelihoods and damages to infrastructure and property. Accra presents a quintessential example of a fast developing city in sub-Saharan Africa in need of effective, innovative and place-based disaster risk reduction investments to build capacity and enhance resilience.

In recent years, haphazard planning and development within the metropolis have exacerbated the city's vulnerability to disasters such as flooding and fires. Accra's susceptibility to flooding is however not only driven by human-induced factors such as rapid urbanization and growth

of informal settlements, and associated challenges such as poor waste management and drainage system, and urban governance but also climate variability and climate change. The wanton destruction of Accra's green and blue spaces contributes significantly to the present perennial flooding. Across the city, the disaster vulnerable areas are usually dominated by low-income households which have limited adaptive capacity. Areas such as Adabraka-Odawna, Nima, Fadama and Darkuman by virtue of their low topography coupled with limited infrastructure makes flooding an annual experience. Particularly in densely populated areas where poor housing conditions further amplify the negative impacts on lives and properties the city has been impacted by major floods in the last three decades (**Table 3**).



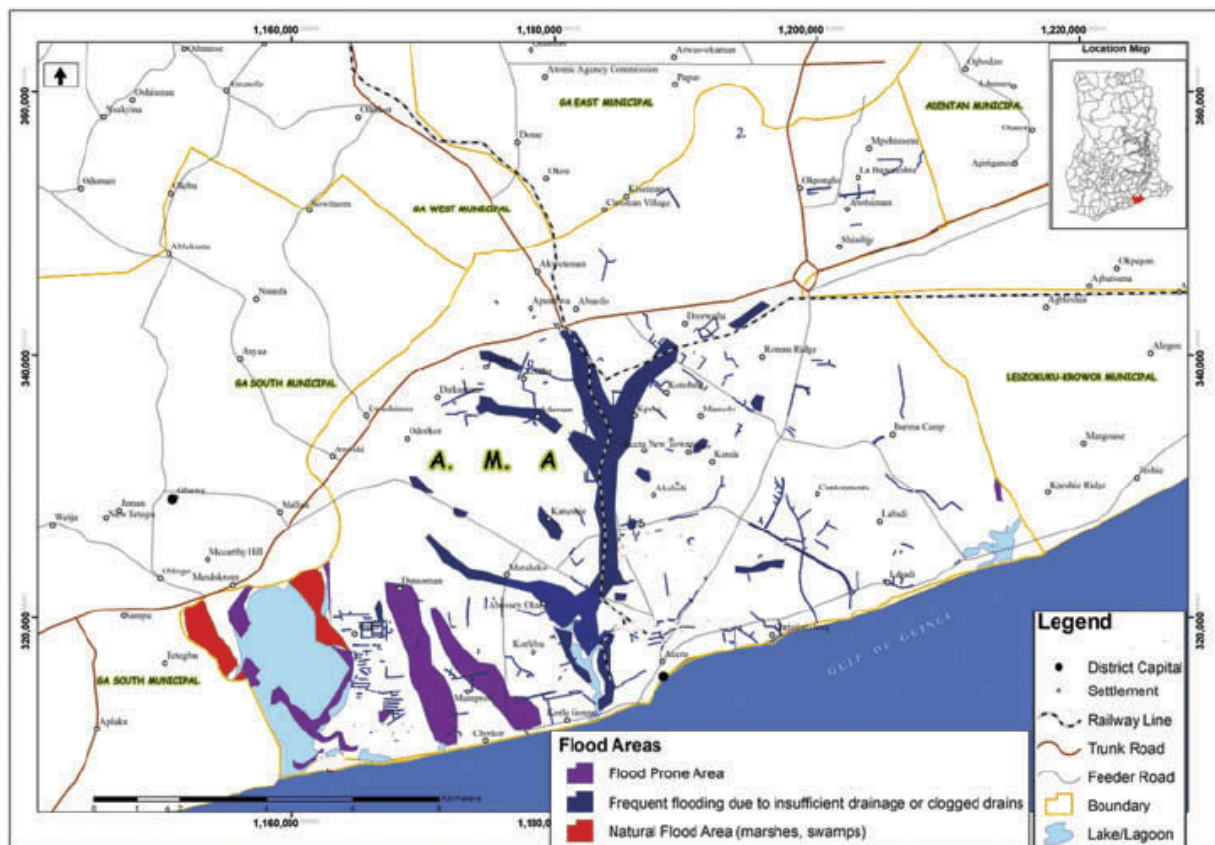
*Figure 2: Location and geographical boundary of Accra*

Table 3: Incidence of flooding events in Accra (1968 – 2020)

Event Date	Impacts		
	<i>Affected areas</i>	<i>Damages in buildings and infrastructures</i>	<i>Estimated Injuries and Deaths</i>
July 4, 1968	Central Accra	No details recorded	-
July 5, 1991	Central Accra	Power installation damaged	-
July 5, 1995	Achimota	Achimota VRA substation	-
June 28, 2001	Madina, Achimota, Dzorwulu, Avenor, Santa Maria and Adabraka Official Town	No details recorded	-
May 5, 2010	Central Accra, Ofankor	Infrastructure and properties destroyed	-
June 22, 2010	Nation's worst flood disaster	Infrastructure and properties destroyed	35 deaths
February 24, 2011	Adabraka, Kisseman, Alajo Junction, A-Lang at Santa Maria, Oyarifa, Haatso, Adenta and the Tema Timber Market	Infrastructure and properties submerged or washed away	-
November 1, 2011	Central Accra	Infrastructure and properties submerged or washed away	14 deaths and 43,087 people affected
May 31, 2013	Kwame Nkrumah Circle, Darkuman Kokompe, Obetsebi Lamptey Circle and portions of the Graphic Road, Santa Maria and Dansoman Roundabout	Infrastructure and properties destroyed	-
June 6, 2014	Adabraka, Awoshie, Kwame Nkrumah Circle, Mallam, North Kaneshie, Abeka, Dansoman and Odorkor	Houses submerged and damaged	-
July 4, 2014	Anyaa, Taifa, Dome, Nii Boi Town, Dansoman, some parts of Kaneshie, Adabraka, Awoshie, Kwame Nkrumah Circle, Mallam, Abeka, and Odorkor	Infrastructure and properties destroyed	-
June 3, 2015	Adabraka, Kwame Nkrumah Circle	Fuel stations burnt, 77,000 buildings affected, infrastructure and properties submerged	152 deaths, several injuries
June 9-15, 2016	Central Accra	Infrastructure and properties destroyed	10 deaths
30 May 2019	Central Accra	Infrastructure and properties submerged or washed away	3 deaths
28 October 2019	Central Accra	Infrastructure and properties submerged or washed away	<b>28 October, 2019</b>
June 8, 2020	Adabraka, Awoshie, Kwame Nkrumah Circle, Mallam, North Kaneshie, and Abeka	Accra-Tema Motorway flooded	<b>June 8, 2020</b>

**Source:** Review of the literature (gray and peer-reviewed materials)

Between 1955 and 1997, it is estimated that GH¢300 billion worth of properties have been destroyed and several lives have been lost as a result of flooding while thousands of people have been displaced from their homes and workplaces (Sarkodie et al., 2015). The recent 2015 flood and fire disaster resulted in over 152 lives loss, caused damage to infrastructure and livelihoods in excess of \$55 million with 77,000 buildings fully or partially destroyed, and directly affected more than 53,000 people, with several others requiring assistance in various forms to cope, restore their livelihoods and heal mentally. Considering that the flood hotspots in Accra are mostly found in low-lying areas and places with poor structural and environmental conditions, proper city planning, enforcement of building regulations and investment in flood resilient infrastructures could minimize the annual floods in the metropolis (**Figure 3**).



*Figure 1: Flood-prone areas and types of floods in Accra*

Source: (Kagblor, 2010)

Ghana has been a signatory to the Hyogo Framework for Action (HFA) 2005-2015 and Sendai Framework for Action (SFA) 2015-2030 which are designed to help countries reduce casualties



as well as socio-economic and environmental losses due to disasters. Nonetheless, the low preparedness of national, regional and local governments to disaster risks remain a big challenge for building capacity and resilience in Accra and other urban locations. NADMO coordinates disaster management issues in the country and works closely with several institutions such as the Ghana Police Service, Ghana National Fire Service, and Ghana Red Cross Society. In Accra, emergency response teams have continually sensitized communities in flood-prone areas to engage in proper waste disposal practices and develop and implement evacuation plans. Attempts to solve the perennial flooding have always been a knee-jerk approach and have often lacked a holistic assessment and proactive disaster management.

### *3.2 Examining the causes of floods in Accra*

The perceived and actual causes of flood hazards in cities of sub-Saharan African countries have come under tremendous debate. In Accra, flooding has been the key source of human vulnerability (Karley, 2009). Many studies have discussed flood vulnerability in the city and have given varied attributions to their frequent occurrences (Amoako et al., 2018; Gough et al., 2019). For example, Amoako & Boamah (2015) have categorized the causes of floods in Accra in a three-dimensional and interrelated manner:

- 1) meteorological (intense rains and storm surges);
- 2) hydrological (impervious urban surfaces); and
- 3) the management of surface running water.

Typically, floods occur when intense rains over longer periods lead to overland run-offs due to raised water tables and high urban creeps (increased paved area) and low permeability of alluvial soils.

Several factors have accounted for the frequency and complexity of floods in Accra. Disaster risk and urban poverty are strongly linked and intertwined with the reality of climate change. Climate change continues to expose communities and people to higher rainfall variability, water stress, and depletion of resource-based livelihoods. Disaster risks will further be magnified by climate change and result in more localized disasters which will negatively impact lives, infrastructure and property. Accra is experiencing increasing slum and informal settlement conditions as well as improper siting of settlements on or along drainage channels and waterways which increases the vulnerability of the settlements to flooding. Such

settlements include *Sakaman, Kamara Down, Portions of East Legon and Dzorwulu, Bawaleshie, Abelenkpe, Dansoman, Circle and Adabraka-Odawna.*

Development of residential buildings and paved roads have contributed to the impermeability of the catchment areas resulting in increased runoff. Disregard for building regulations has led to buildings in the protected and green belt zones of the city causing depletion of vegetation and making these areas more prone to erosion, sedimentation and flooding. The outcome is the reduced capacity of ecosystems to provide critical functions and services, including regulation of floods in key watersheds and resilience to climate variability. Linked to this is the issue of improper waste management practices. The current waste management system is overwhelmed by the volume and types of waste generated in the city. Also, most settlements in low-income areas lack waste disposal facilities. This contributes to the dumping of the solid waste directly into watercourses, drains, and culverts which result in reduced flow capacity. The capacities of most rivers and drains have been greatly reduced by the deposition of silt, garbage, and weed-growth in and along the riverbanks and catchment of river channels. The key challenge is how to reinforce and mainstream new developmental approaches into an integrated national policy and governance system for disaster risk reduction which prioritises poverty reduction and climate change adaptation through a coordinated approach.

#### **4. Priorities and Investments By Decision Makers to Reduce Risks of Future Disasters**

##### *4.1 Budget Allocations to DR3*

In recent times, disaster management in Ghana has taken on a new outlook, characterized by a shift from the traditional response approach to a prevention and risk reduction approach (UNDP, 2017). The Global Facility for Disaster Reduction and Recovery (GFDRR) in undertaking the disaster risk reduction profile of Ghana identified risk reduction approaches, land use planning, local and national DRM policies and legislative framework to enforce DRM strategies, as the key priority areas in disaster risk reduction in Ghana. For instance, a disaster risk reduction workshop held in Accra in November 2018, revealed that Ghana is committed to implementing the priority areas of the Sendai Framework for disaster reduction (2015-2030). These areas of priority include;

- comprehending the dynamics of disaster risks and hazards,
- strengthening disaster risk governance to facilitate the management of disaster risk,

- building resilience by investing in disaster reduction and capacity building,
- augmenting disaster preparedness for effective response, recovery, rehabilitation and reconstruction.

According to UNDRR (2020), Ghana annually invests 2% of its annual budget towards disaster risk reduction, out of which 0.9% is earmarked for direct disaster risk reduction investments. Dedicated funding mechanisms that include incentives for incorporating CCA and DRM into budget processes are in theory available to local governments. However, in practical terms, with the help of decentralization, metropolitan, municipal and district assemblies (MMDAs) are responsible for providing funds for developmental priorities in the local assemblies, but this responsibility is not matched by the capacities required for the generation of revenues (Musah-Surugu et al., 2019). For instance, according to the Accra Metropolitan Assembly (2019), the majority of the MMDAs as well as certain urban localities experience budget deficits. This is resulting in the sourcing of funds for CCA and DRM activities from local government transfers and development partners.

In the 2019 Budget Statement and Economic Policy, the government of Ghana's target for the infrastructural sector, which seeks to promote a resilient built environment emphasized the promotion of proactive planning for disaster risk reduction as a major driver to achieving the stated target (MoFEP, 2019). For example, the Accra Drainage and Sewerage Project Construction project by the Ministry of Sanitation and Water Resources has been approved for construction work to begin. However, according to UNSDR (2014), disaster risk reduction is not considered as a priority at all levels of government in Ghana as many institutions engaged in the execution of developmental projects do not ascertain the immediate gains associated with disaster risk reduction, while others are not all set to bear the costs associated with DRR.

The Ministry of Interior budget allocation for the period 2016-2019 was seen to increase over the years by an average of 25%. It was noted that over 80% of the money each year was allocated to the compensation of the employees and the remainder was for other expenses (**Table 4**).

Table 4. The Ministry of Interior budget allocation for the period 2016-2019

Category of expenditure	Year			
	2016	2017	2018	2019
Compensation of employees	86,455,585	73,043,885	88,871,525	105,816,912
Use of goods and services	2,890,000	14,990,870	9,938,250	11,600,000
Social benefits	50,000	4,197	32,500	
Other expenses	60,000	4,933	29,250	
Non – financial assets			500,000	7,300.000
<b>Total</b>	<b>89,455,585</b>	<b>88,043,885</b>	<b>99,371,525</b>	<b>124,716,912</b>

(Source: Ministry of Interior Appropriation bill)

#### 4.2 Financing of disaster risk reduction and resilience

While a range of financial mechanisms exists for DRM in Ghana, funding remains a major barrier to implementation. The Ministry of Finance oversees Ghana's budgeting system called Programme Based Budgeting, a system considered effective in encouraging sector ministries and MMDAs to mainstream CCA and DRM into their budget planning processes. The ministries, departments and agencies (MDAs), as well as the metropolitan, municipal and district assemblies (MMDAs), prepare their Budget Estimates annually. The Budget estimates contain programmes and projects for which MDAs and MMDAs seek funding, and must be aligned with the national policy direction of the government (Ministry of Finance, n.d.).

The Programme Based Budgeting can facilitate consideration for DRM through its budget planning processes, especially for cross-cutting issues. Both CCA and DRM have dedicated budget codes, which MDAs and MMDAs are requested to report for related activities in their Budget Estimates. As illustrated in **Table 5**, Climate Change Finance Tracking Tools, developed by the Ministry of Finance to support the preparation of the Budget Estimates, outline climate-relevant budget codes and the policy objectives associated with them. The tools also provide criteria on the degrees of relevance to climate and disaster objectives (high, medium or low) and their target (mitigation, adaptation or multifocal) (Ministry of Finance, 2016).

While the Climate Finance Tracking Tools currently highlight only climate-related budget codes, they could also bring in DRM-related codes to identify areas where public funding can be allocated to enhance synergies between CCA and DRM. Based on the guidance in the Tools.

*Table 5. Climate and disaster-relevant budget codes and policy objectives*

<b>Budget codes</b>	<b>Policy objectives</b>	<b>Potential links with climate-related disaster risk management</b>
<b>030103</b>	Promote seeds and planting material	Directly linked through enhancing the resilience of the agriculture sector to climate risks
<b>030403</b>	Promote sustainable environment, land and water management	Directly linked through better land-use and water management measures
<b>030802</b>	Ensure sustainable management of natural resources	Indirectly linked through better natural resource
<b>030901</b>	Reduce the loss of biodiversity	Indirectly linked through enhanced resilience of ecosystems that could help improve the livelihoods of people living nearby
<b>031101</b>	Reverse forest and land degradation	Directly linked through prevention of e.g. mudslides
<b>031301</b>	Ensure sustainable use of wetlands and water resources	Directly linked through prevention of e.g. flooding
<b>031601</b>	Enhance capacity to adapt to climate change impacts	Directly linked through enhanced capacity of citizens to manage the negative impacts of climate change
<b>031701</b>	Enhance capacity to mitigate and reduce natural disasters and reduce risks and vulnerability	The objective targets both DRM and CCA in itself.
<b>050102</b>	Create an efficient and effective transport system that meets user needs	Directly linked through enhanced resilience of transport systems to climate change and natural disasters
<b>051101</b>	Promote proactive planning to prevent and mitigate disasters	The objective targets both DRM and CCA in itself.
<b>051301</b>	Improve the management of water resources	Directly linked through e.g. the management of damages from droughts

<b>060105</b>	Ensure continued provision of life skills training and management for personal hygiene, fire safety, environment, sanitation and climate change	Directly linked through enhanced capacity of citizens to manage the negative impacts of climate change and natural disasters
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Note: These indicators are specified in the Climate Change Finance Tracking Tools (Ministry of Finance, 2016).

Source: (Ministry of Finance, 2016)

#### *4.3 Dedicated funding mechanisms for local governance*

The District Assemblies' Common Fund (DACF) offers a mechanism for distributing financial resources from the central government to the sub-national level. At least 5% of the national revenue is to be shared among all District Assemblies in Ghana with a formula approved by the Parliament of Ghana. Of the budget allocated from DACF, all districts are mandated to set aside a certain amount for emergency response, although the percentage varies across districts, based on the available internal funds for a particular year and on the district assembly's priority areas (NADMO, 2012). MLGRD, the Ministry of Finance as well as other MDAs are involved in the management of the DACF. The DACF is considered by the local assemblies to be a main source of finance for CCA and DRM, complementing scarce MMDAs funding to conduct capacity building, awareness-creation and sensitisation (Korah and Cobbinah, 2019). DACF has introduced an incentive mechanism for incorporating, among other policy domains, CCA and DRM into the budgeting at the sub-national level.

The District Assemblies Performance Assessment Tool (DPAT) from 2018 is used to evaluate the efficiency and accountability of the services provided by MMDAs so that those with satisfactory performance can be financially rewarded in accessing DACF (MLGRD, 2016). The Performance Measures, which include a measure on "Environment and Climate Change", determine each assembly's share of the Performance Grant of the DACF, supported by donors (Switzerland and Germany). The Environment and Climate Change measure include multiple indicators, for instance, whether more than 5% of the programmes and projects of the MMDA's annual action plan focus specifically on climate change and disaster risk reduction measures (MLGRD, 2016).

Despite efforts to mainstream DRM into budget allocation, financing remains an important barrier for implementation. The budgetary constraints are largely as a result of multiple factors such as competing development priorities and a low level of awareness of climate and disaster risks by sector ministries and agencies as well as by the MMDAs. Funding for DRM measures therefore tends to be largely driven by development co-operation partners and is often project-based. With Ghana's status as a middle-income country, this support from development partners will likely be limited. Also, budget allocations to disaster risk prevention and preparedness are more limited than those for response measures (OECD, 2020).

#### *4.4 Evidence based on the effectiveness of different interventions*

In Ghana, the management of natural disasters such as floods and drought has gained heightened attention in recent times by national institutions such as the Water Resources Commission (WRC), Hydrological Services Department (HSD), National Disaster Management Organization (NADMO), Ghana Meteorological Agency (GMet), and the Environmental Protection Agency (EPA). These institutions have received support, in terms of financial and technical expertise, from international organizations such as the World Bank, United Nations Development Programme (UNDP) and the World Meteorological Organization (WMO) to develop intervention projects and roll-out programmes and activities aimed at protecting Ghanaians from the adverse impacts of climatic and non-climatic shocks (VBA-WMO-GWP Initiative Volta IFM, 2016) (see **Table 6**).

*Table 6: Project interventions and evidence of impacts*

Project/Intervention	Objectives	Impacts or Evidence Achieved /Expected Outcomes
Integrating flood and drought management and early warning for climate change adaptation in the Volta Basin  Duration: 2019-2023 Geographical coverage: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo.	<ol style="list-style-type: none"> <li>1. Develop capacity and establish frameworks at the local, regional and national levels to ensure risk-informed decision-making;</li> <li>2. Develop concrete adaptation and environmentally friendly actions using an integrated approach;</li> <li>3. Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels.</li> </ol>	Not yet assessed.

<p>Advocacy and capacity building for disaster risk reduction and preparedness in Ghana - The GFDRR project</p> <p>Duration: 2015-2016 Geographical coverage: Nationwide</p>	<ol style="list-style-type: none"> <li>1. Advocate for disaster preparedness and risk reduction at national and regional levels through high-level advocacy and operationalization of the regional platforms for disaster risk reduction.</li> <li>2. Strengthen capacities in disaster preparedness and risk reduction of government cadres, particularly those in professional functions at NADMO, other national agencies, regional and local administration, through the design and implementation of a core training curriculum for their staff.</li> <li>3. Foster disaster preparedness at the national level through national simulation exercises and enhanced coordination with the international community through the United Nations Inter-Agency Standing Committee.</li> </ol>	<ul style="list-style-type: none"> <li>• Eighty government practitioners benefited from a disaster risk management course designed and implemented in consultation with the University of Cape Coast to build the capacity of government practitioners.</li> <li>• A comprehensive module on disaster risk management was produced through the collaboration between NADMO and the University of Cape Coast to serve as reference material to help upgrade the knowledge of practitioners and in turn, facilitate the incorporation of disaster risk reduction in local development and policy planning.</li> <li>• Through the carrying out of simulation exercises, vulnerable communities to disaster risks have been equipped with the knowledge on what to do to lessen the impact of disasters on their lives and livelihoods.</li> <li>• 1,500 copies of each of the fliers on household safety tips were produced and distributed in the bid to raise awareness among vulnerable households in urban communities.</li> </ul>
<p>The National Action Programme to Combat Drought and Desertification.</p> <p>Duration: 2002-2027 Geographical coverage: Nationwide</p>	<p>To sustain maximum agricultural production and ensure food security and enhanced livelihoods whilst combating desertification to maintain the integrity of the ecosystem and to properly manage and conserve natural resources.</p>	<ul style="list-style-type: none"> <li>• Strengthening research institutions in the development of drought-tolerant crop varieties.</li> <li>• Promoting the dissemination of drought-tolerant varieties.</li> <li>• Strengthening the extension services to effectively promote drought-tolerant crop varieties, etc.</li> </ul>
<p>The Greater Accra Resilient and Integrated Development (GARID) project.</p> <p>Duration: 10-12 years Geographical Coverage: Greater Accra Region.</p>	<ol style="list-style-type: none"> <li>(1) Strengthen flood and solid waste management</li> <li>(2) Improve the living conditions of people living within the confines of the Odaw Basin.</li> </ol>	<p>Under implementation. Not yet assessed.</p>



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Cost = USD200million

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The National Drought Plan	To enable Ghana as a country, build her capacity as far as drought resilience is concerned through tangible or solid actions for drought preparedness.	Not yet assessed
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#### *4.5 The role of private and civil society sector in disaster risk reduction and resilience in Ghana*

According to Rosier (2018), the private sector excels in the marketing of goods and services as well as adapting messages to capture people's attention. Therefore, with their support, this important quality of theirs can be deployed to raise awareness on issues such as climate and disaster risks. In terms of the role played by the private sector in DRR in Ghana, Vodafone Ghana, being one of the telecommunication giants, have been playing a crucial role in the area of supporting the response to emergencies, as there is an ongoing partnership to provide additional connectivity for the flood monitoring system which is managed by the Hydrological Services Department under the Ministry of Sanitation and Water Resources. Also, in the manufacturing space, Unilever Company Limited, the parent company of Unilever Ghana Limited has committed to contributing its quota towards meeting the targets of SDGs 3, 6, and 17. Consequently, they are actively involved in advocating for NGOs and businesses to work together on disaster planning and preparedness. In the event of disaster strikes, they provide communities with support in the form of business expertise, product donations, and financial support among others. And their disaster and emergency strategy has a three-part approach which is resilience (building preparedness before an emergency strikes), relief (assistance during the crisis), and rehabilitation (helping to recover and rebuild communities, economies and value chains).

With regards to the role of civil societies in disaster risk reduction, Adly (2016) posits that civil society organizations primarily contribute to policy analysis, policy-making and strategy formulation at international, national and sub-national levels as well as gathering and advocating for the preferences and interests of people affected by disasters (see **Table 7**).

*Table 7: Civil Society Organisations (CSOs) and their role in DRR*

Name of CSO		Aims in relation to DRR	Role in DRR
World Vision Ghana	Vision	<ul style="list-style-type: none"> <li>• Integrate disaster risk reduction into the programmes of World Vision.</li> <li>• Designing of DRR oriented programmes and projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Reviewing how project design will impact disaster risk or vulnerability.</li> <li>• Engages with vulnerable communities to address disaster management needs for improved community quality of life.</li> <li>• Collaborates with other partners to rightly respond to emergencies as and when they occur in the country.</li> <li>• Advocacy on disaster management.</li> </ul>
World Programme	Food	<ul style="list-style-type: none"> <li>• Working to avert, mitigate and help vulnerable communities to prepare for disasters.</li> </ul>	<ul style="list-style-type: none"> <li>• Preventing acute hunger and investing in disaster preparedness and mitigation measures.</li> <li>• Works hand in hand with the government to augment its capacity to prepare for, assess and respond to hunger caused by disasters, as well as develop national policies and plans which effectively address the effects of disasters on nutrition.</li> </ul>

### **Box 1: The Bagré Dam spillage and role of media in DRR**

The Bagré Dam spillage which began on August 10, 2020 on the White Volta located near Bagré Village in Burkina Faso led to the destruction of several farms and food crops of smallholder farmers who consistently face perennial flooding. Subsequently, heavy downpours of rain on September 7, 2020, culminated in flooding in several communities in the North East Region along the White Volta. The flood resulted in 10 fatalities, about 7,561 persons being affected, 1,596 homes and critical infrastructure being damaged or destroyed, about 500 farmers and pastoralists and a total of 2,500 hectares of farmlands being affected, and immense loss of crops and livestock. Destruction of crops and animals has implications for food security given that agriculture is the mainstay of the populations in the affected communities. Four regions were affected: Northern, North East, Upper East, and Upper West. For example, Chereponi, Kpasinkpe, and some other communities in the Mamprugu and Moaduru Districts could not be accessed except through Bolgatanga in the Upper East Region. The Adali Bridge in the Chereponi District was also damaged, affecting economic and social activities. Mobility within and between the affected areas and access to healthcare and shelter for the displaced persons were severely impacted.

The National Disaster Management Organization (NADMO) activated its 'Operation Thunder Bolt' mission to be able to access the affected areas, dispatch personnel and provide relief assistance to the flood victims. Furthermore, the displacement and movements of affected people in search of humanitarian assistance made adherence to COVID-19 prevention protocol largely impossible. This also had the potential to heighten the risk of infection of the pandemic.

The disaster stimulated improvements in disaster management with greater emphasis on DRR. It fostered cooperation between the government, civil society, private groups and individuals. The government rolled out plans to avert the perennial flooding including desilting the White Volta, regulating the flow of the Bagré Dam spillage, and constructing the Pwalugu dam, to serve as a receptacle to contain spillage from the Bagre dam, for irrigation purposes and electricity generation. Private media houses such as the Multimedia Group spearheaded by JoyNews initiated the #UpToUs Movement to rally help for the affected people in northern Ghana. Ecobank Ghana donated GH¢50,000 to support the campaign and several CSOs and individuals provided donations in cash and kind to support the affected communities and displaced persons. JoyNews collaborated with Ghana Red Cross to distribute the donated items, and appealed to other corporate institutions and individuals to support the initiative. The disaster made the government and NADMO realise the limitations of its disaster management capacity, in particular the need to invest more in DRR.

#### 4.7 Resource allocation to vulnerable communities for DR3

Inadequate infrastructure and services, and the growth of informal settlements and slums are increasingly exposing the urban population to shocks and stresses. According to NADMO an average of 165,000 individuals are displaced yearly by emergencies and disasters due to unpreparedness (NADMO, 2017). Accra's recent major flood and gas explosion twin-disaster on June 3rd 2015 which claimed over 152 lives and destroyed private and commercial properties is clear evidence of disaster unpreparedness and lack of an early warning system. **Table 8** identifies some selected agencies and the types of response and intervention they provide to support disaster events and vulnerable communities.

As part of efforts to make cities resilient, there is the need to raise more awareness on the social and economic impacts of common disaster events on vulnerable groups and locations in Accra and strengthen resource mobilisation coordination among stakeholders. DRR & CCA for vulnerable groups and locations are increasingly manifest in new donor programmes and policies and have also become more firmly reflected in government sector programmes. However, the fact remains that resource allocation to vulnerable communities for addressing DRR is woefully inadequate. This challenges efforts toward disaster response and preparedness especially in terms of the required capacity at all levels to champion a clear focus on disaster risk reduction and implements appropriate relief assistance.

*Table 8: Nature and types of response provided by selected agencies*

Stakeholder	Nature and Types of Response
<i>Government support</i>	
National Disaster Management Organization (NADMO)	<ul style="list-style-type: none"><li>- Through NADMO, the government has provided some relief items, including foodstuff, to the affected populations as mitigation measures.</li><li>- An amount of about GHc4,000,000.00 worth of emergency relief was distributed by NADMO in 2015 as flood relief in affected communities in Accra.</li><li>- Some households were also relocated short-term.</li><li>- NADMO to leverage the opportunity provided by the emergency to adopt a disaster risk-responsive approach for sustainable growth with the assistance of the UN.</li></ul>
National Disaster Management Organization (NADMO)	The Ghana Government promised GHC 50 million for emergency response during the June 2015 floods. This was allocated to desilting gutters, construction of storm drains and culverts and other relief efforts. However, additional resources were required to fix

	infrastructure to restore life to the commercially active population in the Accra – Tema area which is the hub of major economic activities.
Land Use and Spatial Planning Authority (formerly Town and Country Planning Department)	<p>-There are plans by the government to construct one hundred and twenty kilometres (120 km) of storm drains along the major river basins in the city.</p> <p>-To construct water retention reservoirs.</p> <p>-Additionally, the Government is clearing all structures in waterways to minimize flooding in the city</p>
Ghana Meteorological Agency (GMet)	- GMet projects rains will continue in the southern part and middle belt of Ghana up till the end of July of almost every year as that is the rainy season in Ghana.
Department of Urban Roads, Accra Metro Office	<p>-Metropolitan, Municipal and District Assemblies (MMDAs) accelerated programs to desilt drains especially at the onset of the rainy season.</p> <p>-Also, relevant bye-laws to control development in their areas, since they have a hand in planning in these local areas.</p>
<i>Donor support</i>	
World Food Programme	In 2010, victims of floods in Accra started receiving relief aid, including food for 25,000 people, the Ghana News Agency reported, citing a statement from the United Nations' World Food Programme.
Catholic Relief Services	<p>-The Catholic Relief Services (CRS) in collaboration with the Ghana Catholic Bishops' Conference (GCBC) and the Catholic Archdiocese of Accra have provided support for the victims of the June 3 flood disaster.</p> <p>-The CRS presented an amount of GHC240.00 to each of the 667 victims to provide them relief and comfort.</p> <p>-Also, vouchers valued at GHC70.00 was distributed in 2010 to beneficiaries, including those who are 65 years and above, nursing mothers, pregnant women, female and male single-headed households, children under three years and the physically challenged.</p>
Ghana Red Cross Society	<p>-The Ghana Red Cross Society provides assistance with regards to registration of the displaced, food distribution and education on the dangers of waterborne diseases during times of floods and related disasters.</p> <p>-In 2007, the Ghana Red Cross Society also built temporary houses for some victims of floods in affected communities in Accra.</p>

#### *4.8 Cross-sector coordination in disaster risk reduction and resilience in Ghana*

Ghana has taken a mainstreamed approach to DRM which is backed by key policy frameworks (NADMO, 2011) to ensure that DRM policies are embedded in the country's sustainable development goals. For example, DRM is featured in Ghana's Co-ordinated Programme of Economic and Social Development Policies (2017-2024) and the President's mid-term development vision. The Programme highlights numerous policy areas that directly or indirectly link to DRM including water management, drainage and flood control, and human settlements and housing (Government of Ghana, 2017b).

The National Climate Change Policy (NCCP) is the main policy document for climate change and related issues in Ghana. The 10 policy areas of the NCCP are critical given the synergies and measures that are directly linked to disaster risk reduction and management. For instance, the focus on climate-resilient infrastructure aims to ensure that design standards, relevant building codes and spatial planning include parameters related to climate change and variability, and DRR. NADMO is identified as the lead in developing hazard monitoring and early warning systems with a sound scientific and technological basis to increase the resilience of vulnerable communities to climate-related risks (MESTI, 2015).

While coherence in the governance arrangement and policy frameworks for DRM has improved, the implementation of necessary policy actions remains a challenge, especially for local stakeholders in MMDAs, given the gaps in data and information, awareness, funding, and institutional and personal capacities.

#### *4.9 Data and information for disaster risk reduction and resilience in Ghana*

The Ghana Meteorological Agency (GMet) plays a critical role in providing climate and meteorological data and information. The Climate Research Unit is responsible for providing analytical data and information on climate variability and change, seasonal forecasting, climate services, climate information, drought and floods alerts (GMet, n.d.). With technical and financial support from the Global Facility for Disaster Reduction and Recovery (GFDRR), the Water Resources Commission, NADMO, GMet, EPA among others, collaborated with the World Bank to establish a flood forecasting system for the White Volta River. This system uses extensive river gauge and meteorological data, along with historical data to identify flood-

prone areas and hotspots. The hazard assessment component of the project led to the launch of a flood forecasting system in 2012 (World Bank, 2013).

While the quality and coverage of data and information have steadily improved, much improvement is needed to further support evidence-based decision-making. Currently, the lack of near real-time information and insufficient quality of climate forecasts still prevents the development and reliability of effective early warning systems (DHI, 2018). Historical information on losses and damages caused by natural hazards and different types of weather data is not readily available and scattered among different sources (GIZ and MCII, 2019). Fees charged for accessing climate-related information and data remains a big disincentive to institutions and entities from using such information.

The Climate Change Data Hub has been established at EPA to provide a data portal to disseminate information on Ghana's actions to tackle climate change (e.g. actions under the NDC, GHG inventories). The Hub aims to collect and disseminate information on DRM related issues and potentially metamorphose into a consolidated portal that stores and provides accessible primary and secondary climate and meteorological information.

#### *4.10 Monitoring and Evaluation of disaster risk reduction and resilience in Ghana*

The National Development Planning Commission administers the national monitoring and evaluation system in Ghana. Regulatory measures in place mandate every government implementing agency to monitor and evaluate their respective policies, programmes and projects, guided by national indicators, baselines and targets identified in the National Medium-Term Policy Framework and the Sector and District Planning Guidelines. Reporting across all sectors and levels of government informs the National Annual Progress Report.

The National Disaster Management Plan specifies that NDPC will oversee the monitoring progress at the national level and the Regional Disaster Management Committee at the Regional and District levels. The plan specifies that there will be periodic monitoring and evaluation to ensure consistency with national initiatives and government priorities. Key indicators identified primarily focus on activities or processes and include:

- Measure the expected outcomes of the Plan.
- Set benchmarks.



- Measure the effectiveness of policies, strategies and programmes and inform policy development.
- Identify Agencies and Departments accountable and responsible for each performance indicator.
- Identify opportunities for improvement that lead to the enhancement of the Disaster Management System.

In parallel, the Ministry of Finance publishes the consolidated Annual Budget Performance Report, an assessment of the implementation of the budget within a fiscal year (Government of Ghana, 2019). These budget reports aim to ensure transparency and accountability in the management of public resources. They provide valuable insights into the status of the implementation of DRM initiatives.

## 5.Mapping disaster vulnerability in Ghana

Table 9. below shows the vulnerability index for disaster risk reduction and resilience in Ghana. These indices are extracted from different national document and sources.

*Table 9. Flood Vulnerability indicators*

Indicator	Social/Economic/ Ecological/Technical /Physical	SDGs directly influenced
Minimal human vulnerability (basic needs)	Social	1,2,3
Diverse livelihoods and employment (savings, skills training, and social welfare)	Economic	3,8
Adequate safeguards to human life and health (integrated health services, and responsive emergency services)	Social	3,16
Collective identity and mutual support (community engagement, networks and social integration)	Social	10,11,16
Social stability and security (crime prevention, justice and emergency management)	Social	11,16

Availability of financial resources and contingency funds	Economic	9,16
Reduced physical exposure and vulnerability (environmental stewardship, land use planning)	Ecological	9,11,13,16
Continuity of critical services (ecosystems and infrastructure)	Ecological	9,16
Reliable communications and mobility	Social	11
Effective leadership and management (government, businesses and civil society)	Social/Technical	16,17
Empowered stakeholders (education, information and knowledge programmes)	Social/Technical	4,5,16
Integrated development planning (city resilience, integrated development plans)	Social/Technical	6,7,11,13,16
Dwelling type and house environment	Social	11
Household socioeconomic characteristics	Social/Economic	1,3,4,8,10
Budget allocation and mobilization	Social/Economic	1,2, 5
Insurance coverage	Social/Economic/ Ecological/Technical /Physical	1,2, 11
Availability and channels to disseminate early warning systems	Social/Economic/Technical	10, 5
Traditional/local/indigenous knowledge	Social/Economic/Ecological	3

Experience and perception of flood risk	Social	6,10,11,13
Household and community flood adaptation strategies	Social	1,4,5,8,11
Evacuation preparedness	Social	1, 2
Rainfall and groundwater level	Physical	13,14,15
Age	Demographic	10, 1
Gender	Demographic	10
Educational level	Demographic	1,4,5,8,11
Income level	Demographic	2, 4, 11
Ethnicity	Demographic/Social	1,3,
Occupation	Demographic/Social	2, 11, 13
Marital status	Demographic/Social	4, 5,
Number of children	Demographic/Social	1,4,5,8,11
Topography	Physical	9,11
Ability to swim	Social	3
Ghana's institutional framework	Economic	8,16

Population density	Demographic/Social	3,6,12
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## APPENDICES

### Appendix 1: Drought Indicators

Category	Vulnerability indicators (factors)	SDGs
Social	Education (e.g. illiteracy; indigenous and local knowledge)	4
	Gender (e.g. gender inequality)	5
	Social capital (e.g. social networks)	3,4
	Health status (e.g. alcohol and substance use; restricted mobility/disability; malnutrition; mental health; disease prevalence)	1,3
	Health services (e.g. health insurance)	3,6
	Remoteness (e.g. rural/remote populations)	10
	Awareness and information (e.g. drought awareness; early warning, access to information; underestimation of drought risk)	4,13
	Water demand	1,6
Economic	Poverty and income (e.g. income diversification; poverty; unemployment; problematic debt; dependency ratio)	1,2,8,10
	Inequality	1,10
	Savings, credits and loans (access to)	1,3
	Markets (e.g. access to markets; market fragility)	1,3
	Insurance (e.g. agricultural/animal/crop/drought insurance)	3,10



Physical	Availability and quality of infrastructure (e.g. transportation; water and sanitation; energy; water tanks; reservoirs; wells; water quality)	6,7,9,
Crime and conflict	Stability (e.g., crime; war and conflict)	16
Governance	Plans and strategies (e.g., drought planning and investment in disaster prevention and preparedness; water management planning)	6,13,15,16
	Corruption and law enforcement (e.g., lack of trust in institutions)	16
	Participation (e.g., public participation in governance; political representation)	16
	Assistance (e.g., availability of food aid; development/aid projects (ODA)	1,2,16
Environmental	Soil condition and quality (e.g., degradation/desertification)	13,15
	Protection and conservation (e.g., protected areas; livestock health condition; soil and water conservation practices)	13,14,15
Farming practices	Technology (e.g., access to technology; irrigation; use of agricultural inputs (fertilizer); fodder)	1,15,16
	Pesticide use	1,2,16
	Crop type (e.g. resistance; diversification)	1,2,15,16

## Appendix 2. NADMO Indicator Performance 2018

Main Output	Output Indicator	Baseline 2017	Target 2018	Actual 2018
Public Education Campaigns on CC&DRR	Number of Public Education Campaign carried out	1,497	3,000	2,965
Field Trips & Assessment Undertaken	Number of Field Trip & Assessment undertaken	565	2,000	2,078
Capacity of staff and other stakeholders built	Number of Simulation Exercise conducted	38	64	23
Staff trained	Number of staff trained in DRR	1,700	1,517	1,485
Committee Trained	Number of Stakeholders trained	98	47	15
Flood mitigation measure undertaken	Number of major drains dredged	276	300	194
Emergency response and rescue	Number of emergency response and rescue missions carried out	1,134	2,000	2,009
Disaster Management Committee Meeting	Number of National, Regional & District Disaster Management Committee meetings held	30	150	121
National Platform Advisory Committee Meeting	Number of Platform Advisory Committee Meetings held	30	50	2
Relief Administered to Disaster Victims	Number of Victims supported with relief items	191,175	30,000	88,358

Source: NADMO, 2019

### Appendix 3: National Disaster Summary- January-December 2016

Region	Disaster Type	Communities Affected	Persons Affected	Economic Cost of Disaster (GHC)
Northern	Flood, Drought, Rainstorm and Fire	243	19,005	Nil
Upper West	Flood, Drought, Rainstorm, Fire, Collapsed Building, Land disputes	No data reported	7,818	Nil
Upper East	Flood, Drought, Rainstorm and Fire	Nil	2,561	534,276.00
Brong Ahafo	Flood, Drought, Rainstorm, Fire, Boat Accident, Bush fire	Nil	10,872	Nil
Ashanti	Flood, Man-Made, Rainstorm and Fire	Nil	20,754	Nil
Volta	Flood, Drought, Rainstorm, Fire, Others	Nil	17,198	1996,849
Western	Hydromet, Epidemic, Fire	Nil	29,034	Nil
Greater Accra	Flood, Drought, Rainstorm and Fire	Nil	209	Nil
Eastern	Flood, Galamsey, Rainstorm, Fire, Cholera	Nil	11,823	953,125.00

**Source: NADMO, 2016**

#### Appendix 4: National Disaster Summary- January-December 2017

Region	Disaster Type	Communities Affected	Persons Affected	Economic Cost of Disaster (GHC)
<b>Northern</b>	Flood, Drought, Rainstorm and Fire	105	40, 510	Nil
<b>Upper West</b>	Flood, Drought, Rainstorm, Fire, Collapsed Building, Land disputes, CSM	28	8,571	3,967,409.00
<b>Upper East</b>	Flood, Drought, Rainstorm and Fire	Nil	Nil	Nil
<b>Brong Ahafo</b>	Flood, Drought, Rainstorm, Fire, Boat Accident, Bush fire	171	7,555	3,692,490.00
<b>Ashanti</b>	Flood, Man-Made, Rainstorm and Fire	Nil	19,297	18,062,173.00
<b>Volta</b>	Flood, Drought, Rainstorm, Fire, Others	4	12,446	2,413,856.00
<b>Western</b>	Hydromet, Epidemic, Tidal Waves, Fire	9	7,176	1,596,356.00
<b>Central</b>	Flood, Drought, Rainstorm, Fire	14	Nil	Nil
<b>Greater Accra</b>	Flood, Drought, Rainstorm, Tidal Waves, Fire	122	Nil	Nil
<b>Eastern</b>	Flood, Galamsey, Rainstorm, Fire, Cholera	33	11,557	618,664.00

Source: NADMO, 2017