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Ministry of Environment, Science and Technology
Ministry of Local Government and Rural Development

City STRENGTH
RESILIENT CITIES PROGRAM

Strengthening Urban Resilience in Accra

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Foreword

Ghana is making important strides toward fostering resilient cities that ensure the safety of citizens and create thriving and vibrant communities. It is estimated that 65 percent of the Ghanaian population will live in urban areas by 2030. Cities are places where people, assets, economic activities and connections to other countries and cities come together. The process of urbanization in Ghana is an opportunity to create engines of economic growth that lift many out of poverty and establish Ghana as the gateway to West Africa.

The Greater Accra Metropolitan Area (GAMA), along with Kumasi, continues to be a dominant urban center. Hosting 4.4 million people (17.7 percent of Ghana's population), GAMA is also acknowledged as one of the fastest-growing city regions in West Africa, with a large concentration of people, investments and economic activities. Nonetheless, GAMA is exposed to recurrent shocks and stresses on top of numerous developmental challenges and climate change issues that threaten development gains. The deadly floods of June 2015 are a reminder that creating a resilient city is a priority at all government levels. As a first step, the Ministry of Environment, Science, Technology and Innovation (MESTI) and the Ministry of Local Government and Rural Development (MLGRD) approached the World Bank to implement the CityStrength Diagnostic. The objective was to engage a wide range of stakeholders across Metropolitan, Municipal and District Assemblies (MMDAs) in GAMA and other government agencies to jointly identify the root causes of the many shocks and stresses confronting the GAMA region and identify priority actions and investment to address them.

This report summarizes the outcomes of the process and outlines the recommendations that were identified jointly by local stakeholders in Ghana and World Bank specialists. Furthermore, the report provides evidence that can be leveraged by the Government to request further support from the World Bank and other development partners to implement follow-up actions. As the country continues reaping the benefits of an urban transformation, having a resilient GAMA is a priority, and as such, the Government is fully committed to turning it into a reality.

Minister/Chief Director of MESTI
Minister/Chief Director of MLGRD

Abbreviations

ACARP	Accra Compost and Recycling Plant
AdMA	Adentan Municipal Assembly
AEDA	Ada East District Assembly
AFD	Agence Française de Développement
AfDB	African Development Bank
AMA	Accra Metropolitan Assembly
AshMA	Ashaiman Municipal Assembly
ATMA	Ashaiman-Tema Municipal Area
AWDA	Ada West District Assembly
BRR	Building Regulation for Resilience
BRT	Bus Rapid Transit
CCA	Climate Change Adaptation
CERSGIS	Center for Remote Sensing and Geographic Information Systems
CMU	Country Management Unit
CREW	Community Resilience through Early Warning Systems
CSAU	Client Services and Access Unit
CSR	Centre for Scientific Research
CWSA	Community Water and Sanitation Agency
DACF	District Assemblies Common Fund
DDF	District Development Facility
DEM	Digital Elevation Model
DESSAP	District Environmental Sanitation Strategy and Action Plan
DFR	Department of Feeder Roads
DRM	Disaster Risk Management
DRMMP	Disaster Risk Management Master Plan
DRR	Disaster Risk Reduction
DUR	Department of Urban Roads
ECG	Electricity Company of Ghana
EDAIF	Export Development and Agricultural Investment Fund
EHSD	Environmental Health and Sanitation Directorate
ESP	Environmental Sanitation Policy
E-SWMIP	Emergency Solid Waste Management Improvement Program
EWS	Early Warning Systems
FOAT	Functional Organizational Assessment Tool
GAMA	Greater Accra Metropolitan Area
GAPTE	Greater Accra Passenger Transport Executive
GCMA	Ga Central Municipal Assembly
GDP	Gross Domestic Product
GELIS	Ghana Enterprise Land Information System
GEMA	Ga East Municipal Assembly
GFDRR	Global Facility for Disaster Reduction and Recovery
GHA	Ghana Highways Authority
GHS	Ghanaian Cedi
GIS	Geographical Information System
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit (German Agency for

	International Cooperation)
GLSS	Ghana Living Standards Survey
GMet	Ghana Meterological Agency
GoG	Government of Ghana
GRDA	Ghana Railway Development Authority
GSGDA	Ghana Shared Growth and Development Agenda
GSMA	Ga South Municipal Assembly
GSS	Ghana Statistical Service
GUTP	Ghana Urban Transport Project
GWCL	Ghana Water Company Limited
GWMA	Ga West Municipal Assembly
HSD	Hydrological Service Department
IDA	International Development Association
IFRC	International Federation of Red Cross and Red Crescent Societies
IGF	Internally Generated Fund
IUESMP	Integrated Urban Environmental Sanitation Master Plan
IWRMP	Integrated Water Resources Management Plan
JDPA	Joint Development Planning Area
JDBP	Joint Development Planning Board
KfW	KfW Development Bank
KKDA	Kpone-Katamanso District Assembly
KVIP	Kumasi Ventilated Improved Pit
LaDMA	La Dade-Kotopon Municipal Assembly
LaNMMA	La Nkwantanang-Madina Municipal Assembly
LAP	Land Administration Project
LC	Land Commission
LEAP	Livelihood Empowerment Against Poverty
LED	Light Emitting Diodes
LED	Local Economic Development
LeKMA	Ledzokuku-Krowor Municipal Assembly
LUPMIS	Land Use Planning and Management Information System
MCEs	Metropolitan/Municipal Chief Executives
MDAs	Ministries, Departments and Agencies
MDGs	Millennium Development Goals
MESSAP	Metropolitan/Municipal Environmental Sanitation Strategy and Action Plan
MESTI	Ministry of Environment, Science, Technology and Innovation
MGD	Million Gallons per Day
MLGRD	Ministry of Local Government and Rural Development
MLNR	Ministry of Lands and Natural Resources
MMA	Metropolitan and Municipal Assemblies
MMDAs	Metropolitan, Municipal and District Assemblies
MoF	Ministry of Finance
MoFEP	Ministry of Finance and Economic Planning
MGCSP	Ministry of Gender, Children and Social Protection
MoH	Ministry of Health
MoI	Ministry of Interior
MoT	Ministry of Transport
MRH	Ministry of Roads and Highways

MTDEF	Medium Term Development Expenditure Framework
MWRWH	Ministry of Water Resources, Works and Housing
NADMO	National Disaster Management Organization
NCCP	National Climate Change Policy
NDMC	National Disaster Management Committee
NDPC	National Development Planning Commission
NESSAP	National Environmental Sanitation Strategy and Action Plan
NGOs	Non-Governmental Organizations
NHIA	National Health Insurance Authority
NIP	National Infrastructure Plan
NiPDA	Ningo-Prampram District Assembly
NMT	Non-Motorized Transport
NPRA	National Pension Regulatory Authority
NSDF	National Spatial Development Framework
OBA	Output-Based Aid
OCHA	Office for the Coordination of Humanitarian Affairs
PCU	Planning Coordinating Unit
PPP	Public-Private Partnership
RCC	Regional Coordinating Council
SECO	Stasstssekretariat fur Wirtschaft (State Secretariat for Economic Affairs)
SESIP	Strategic Environmental Sanitation Investment Plan
SfDR	Support for Decentralization Reforms
SODA	Shai-Osudoku District Assembly
SWM	Solid Waste Management
SWP	Sanitation and Water Project
TA	Technical Assistance
TCPD	Town and Country Planning Department
TMA	Tema Metropolitan Assembly
UNCT	United Nations Country Team
UNDP	United Nations Development Programme
UPTU	Urban Passenger Transport Units
VIPs	Ventilated Improved Pit-Latrines
VRA	Volta River Authority
WASH	Water Sanitation and Hygiene
WCs	Water Closets
WSSDP	Water Sector Strategic Development Plan
WTP	Water Treatment Plant

Executive Summary

A. A SHIFT IN STRATEGY: INVESTING IN URBAN RESILIENCE

Greater Accra Metropolitan Area (GAMA) is one of the fastest-growing city regions in West Africa, and is facing new opportunities and challenges. GAMA is home to 4.6 million Ghanaians, accounting for 16.3 percent of Ghana's 2016 total population.[1] As of 2010, 90 percent of the population in GAMA resided in urban areas,[2] growing at an annual rate of four percent with a large concentration of people, investments and economic activities. The GAMA region accounts for about 25 percent of the national GDP and dominates formal (32 percent) and informal (28 percent) urban employment[3], with lower poverty rate of 5.6 percent thatn the national average of 24.2 percent[4]. However, given the mostly unplanned expansion, the city has not managed to keep up with the growth, contributing to a number of challenges such as lack of housing, limited access to basic services, and long commute hours with traffic congestion. These challenges make the city susceptible to a number of natural and man-made disasters including floods, sea-level rise, fire outbreaks and building collapse. Furthermore, the effects of climate change will exacerbate GAMA's vulnerabilities, increasing the frequency and intensity of floods and increasing rural-urban migration as a result of droughts in the northern parts of the country.

The floods of June 2015 are a reminder that creating a resilient city is a priority. Continuous rainfall led to one of the worst flooding events in GAMA's history, reported as one of the 10 deadliest disasters of 2015 worldwide.[5] The floods affected 52,622 people and also caused leakage at a filling station, resulting in an explosion that left 150 casualties.[6] Beyond the toll on human life, damages across the housing, transport, water and sanitation sectors amounted to US$55 million, while the needs for reconstruction are estimated at US$105 million.[7] As a result, the Ministry of Environment, Science and Technology (MESTI) and the Ministry of Local Governments and Rural Development (MLGRD) requested support from the World Bank to better understand the risks facing GAMA and to develop a strategic action plan fostering resilience in the metropolitan area.

The World Bank and the Ghanaian Government jointly implemented the CityStrength methodology to understand GAMA's exposure to risks, level of resilience, and the performance of urban systems. The process included strong dialogue among key stakeholders—such as different levels of government, civil society, residents, and the private sector—to evaluate the level of resilience of GAMA. The methodology first identifies the main shocks and stresses, including their spatial distribution patterns, and evaluates their impact to key sectors. Then, taking a holistic approach, it brings the findings together and determines cross-sectoral linkages and the resilience of the city. The end result of the process is a prioritized list of structural and non-structural actions to enhance the overall resilience of the city as well as to increase the resilience-building potential of planned and aspirational projects.[8]

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[1] Data Production Unit, Ghana Statistical Service, 16th September, 2016.
[2] Ghana Statistical Service: Population and Housing Census, 2010
[3] Fred please add
[4] Ghana Statistical Service: Ghana Living Standards Survey Round 6 (GLSS - 6), 2014
[5] Munich Re, 2016
[6] N MESTI, 2016. June 3 2015 Floods in Accra: Assessment Summary (Draft Report)
[7] Ministry of Environment, Science, Technology and Innovation (2015); June 3,2015 Floods in Accra, Assessment Summary
[8] "World Bank Group. 2015. City Strength Diagnostic: Methodological Guidebook. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/22470 License: CC BY 3.0 IGO."

Rather than only focusing on the Accra Metropolitan Assembly, which is the national capital and comprises most of the concentration of people and economic activities, the government expanded the scope of the exercise to the 16 Metropolitan, Municipal and District Assemblies (MMDAs) that form the Greater Accra Region. This was done in recognition of the close connections between the different local government entities, known as MMDAs, which contribute to the overall resilience of the city. The final list of participating local government entities included: Accra Metropolitan Assembly (AMA); Tema Metropolitan Assembly (TMA); Ga West Municipal (GaWMA); Ga East Municipal Assembly (GaEMA); Ga Central Municipal Assembly (GaCMA); Ga South Municipal Assembly (GaSMA); Ledzokuku-Krowor Municipal Assembly (LeKMA); Adentan Municipal Assembly (AdMA); Ashiaman Municipal Assembly (AshMA); La Nkwantanang-Madina Municipal Assembly (LaNMA); La Dade-Kotopon Municipal Assembly (LaDMA); Ada West District Assembly (AWDA); Ada East District Assembly (AEDA); Kpone Katamanso District Assembly (KKDA); Ningo-Prampram District Assembly (NiPDA); and Shai-Osudoku District Assembly (SODA).

The Government formed a steering committee of different agencies of the GAMA region to guide the exercise according to priority sectors of the city. These include: Urban Development and Housing; Disaster Risk Management and Climate Change; Social and Community Development; Solid Waste and Basic Sanitation; Transport, Water and Sewerage; Urban/Municipal Risk Finance; Drainage and Coastal Zone Management. The different phases of the process consisted of: data collection; consultation workshops with representatives from key Ministries, the 16 MMDAs, and development partners; and field visits and hazard mapping. Facilitated by the World Bank, city stakeholders identified the key shocks and stresses that most affect GAMA as well as key actions to address them.

B. DIAGNOSTIC: SHOCKS and STRESSES

GAMA is exposed to various shocks and stresses, often coupled with limited performance of urban systems, which together threaten development gains made thus far. Main shocks identified by the local stakeholders during the CityStrength consultations included flooding, fire, cholera outbreaks and coastal erosion, with tidal surge, building collapse, windstorm, drought and earthquake considered to be secondary shocks. Flooding is a dominant shock in all MMDAs due to its frequent recurrence and heavy impact on lives and property. The spatial distribution of shocks vary. The mostly urban MMDAs have been affected by fire, and the stresses of high-density and informal settlements across the city, combined with the lack of basic services and infrastructure, lead to public health issues such as outbreaks of cholera. Alternatively, coastal MMDAs have a high vulnerability to coastal erosion and tidal surge, coupled with sea level rise as a consequence of climate change. A few mostly-rural MMDAs that are part of GAMA reported water scarcity, land degredation, fire outbreaks, and lack of connectivity to markets as their main concerns. The list of shocks include predictable and unpredictable events, which reinforces the need for resilient and robust urban systems, enabling a city to withstand and respond to a range of risks.

The impact of shocks are inextricably linked to stresses. Participants in the CityStrength exercise determined that GAMA is under strain due to poor sanitation, rapid urbanization, proliferation of informal settlements, excessive unemployment, and land and chieftaincy conflicts. Secondary stresses include water scarcity, land and environmental degradation, as well as weaknesses in governance and institutional coordination. The pressure of rapid urban expansion on land, housing, the environment and infrastructure and basic services makes GAMA more vulnerable to various shocks as it is not prepared to withstand the

impacts. For instance, lagging and inadequately built infrastructure, insufficient drainage capacity and clogged drains, silted lagoon outlets, inadequate waste collection and disposal, and settlement encroachment along the water-courses are all related and increase the risk of flooding. Similarly, given the lack of integrated land use planning, an informal land market and a backlog of housing, informal settlements constitute 40 percent of the built up area in GAMA. Embedded fragmentation of jurisdictions and lack of coordination among MMDAs and MDAs undermine equitable basic services delivery and coherent land use planning. Stresses occur unevenly across all MMDAs, and they affect the poor and vulnerable in a disproportionate manner. Urban areas have relatively better access to services and infrastructure than peri-urban and rural areas. High-income households can afford access to formal services while low-income households end up using informal private vendors, often at a high cost.

C. KEY FINDINGS

GAMA has good policies and institutions in place but implementation remains a challenge. Ghana's National Urban Policy (2012–2017) guides urban development at the national level and includes climate change adaptation and mitigation mechanisms. Other policies give more authority to MMDAs and require the integration of disaster risk reduction and climate change adaptation considerations in the medium-term development plans of MMDAs. However, inadequate metropolitan governance is an obstacle to creating resilience. Many policies enacted at the national level require MMDAs to implement them but without associated funding and despite a lack of MMDA technical capacity. Coordination among the 16 MMDAs that comprise GAMA also could be improved upon. There are currently no agencies that allow for urban planning with proper funding at the GAMA level, despite the interjurisdictional implications of service delivery and drainage management. For example, within GAMA, the latter is spread across the Hydrological Services Department (HSD) (for primary drains), the 16 MMDAs (for secondary drains), and the road sector agencies (GHA, DUR, and DFR) (for tertiary or roadside drains), resulting in weak coordination, planning, and enforcement. Furthermore, flood events call for actions to increase upstream retention capacity, which should be done by an agency at the GAMA-wide level. A Regional Coordinating Council (RCC) is in place but it does not have the necessary capacity and power to convene leadership and influence strategies. A GAMA-wide agency could also foster a long-term vision for the city region with a lens toward resilience as well as help MMDAs implement their mandates.

Housing provision and land-use planning cannot keep up with the rate of urbanization. As GAMA continues to urbanize, the metropolitan region needs to have plans in place to accommodate the growing population, including housing and infrastructure plans. MMDAs within GAMA do have planning processes in place, but as mentioned, implementation remains a challenge. As a result, planning continually lags behind urban growth and plans need to be constantly updated to reflect the reality on the ground. Housing demand far exceeds supply, in turn exacerbating the proliferation of informal areas. There is no comprehensive cadaster, which leads to informal land transactions causing many disputes, and urban planning does not account for risks, leaving many people exposed to shocks and stresses. Furthermore, land use plans are outdated and there is weak enforcement of building codes and regulations, thus, many residents in GAMA settle in precarious areas and have poor quality housing, in adiditon to being exposed to urban fire. The latter is the result of improper electrical wiring and unsafe cooking practices. The density and crowdesness features of informal settlements worsens the impact of fire outbreak. Many informal markets are also at risk of urban fire also due to inadequate construction materials and faulty electrical wiring. Fire outbreaks in markets affect the poor disproportionately since many depend on commercial activity for their livelihood.

Basic services and infrastructure are inadequate and highly susceptible to shocks and stresses. The large influx of people into the Greater Accra Metropolitan Area is putting pressure on basic services and infrastructure that has been strained for some time now. The coverage of services varies across sectors but is largely inadequate. About half the residents have adequate access to improved toilet facilities (a flush toilet or the KVIP toilet), yet sewerage only covers 10 percent of the GAMA geographic region. This lack of sanitation intensifies outbreaks of cholera[9]. 75 percent of solid waste generated in GAMA is collected, while the rest is discarded in open areas and drainage channels which further exacerbates floods. Mobility and access to transportation face significant problems due to inadequate infrastructure such as flood-resistant roads, coupled with poor road conditions, traffic congestion, and limited public transport. And yet, GAMA has made progress in other sectors. Access to potable water is over 95 percent while access to electricity stands at 92.7 percent. Nonetheless, challenges in services provision persist as the city continues to grow and people without access to services are primarily in high-density, low-income communities.

GAMA's response to acute shocks has been primarily reactive. Whenever there is a shock, different agencies, such as the National Disaster Management Organization (NADMO), and individual MMDAs respond with emergency and relief services. However, there are no proactive efforts on prevention and early warning, which makes the GAMA region constantly susceptible to a wide range of shocks and stresses. This includes a lack of contingency funding and risk insurance to deal with disasters, causing the MMDAs divert funding from other sectors into the response. This is detrimental in the long term because the diverted funds would otherwise be used for maintenance of city infrastructure. The results are that roads remain damaged, drainage that is not cleaned up on a regular basis, and efforts to properly discard of solid and liquid waste are unsuccessful. The poor condition of infrastructure continues, leaving the city vulnerable, and thus creating a vicious circle. The response approach is reflected in NADMO's mandate to manage disasters and develop community response capacity, a mandate that still focuses strongly on responding to disasters rather than fostering resilience. A systematic collection of data on multi-hazards at the MMDA or GAMA level is lacking, which further limits the capacity to promote a strategy that includes preparedness to shocks and stresses. This includes consideration of climate change effects. For example, sea-level rise has led to increased erosion and inundation of vulnerable areas in Accra. About 80 percent of the GAMA's 225 kilometer shoreline is threatened by erosion. Significant numbers of houses have vanished due to coastal erosion and the trend continues in some coastal areas.

D. RECOMMENDATIONS TO ADDRESS SHOCKS AND STRESSES AND ENHANCE RESILIENCE

The CityStrength process concluded with a list of cross-sectoral recommendations to enhance resilience in GAMA. The recommendations came from the findings at the different stages of the CityStrength diagnostic that helped city stakeholders to prioritize follow-up actions. The Ministry of Environment, Technology, and Science (MESTI) which commissioned the exercise confirmed the final list and it was also endorsed by the Ministry of Local Governments and Rural Development (MLGRD). The recommendations cut across infrastructure needs as well as institutional interventions and behavioral change:

1. **Improve Metropolitan Planning and Coordination:** Effective metropolitan (GAMA-wide) governance will engender a long term vision for the development of GAMA as a region which can be accompanied by effective urban and land-use planning that takes risk management into account. Emphasis should be given to key factors for urban resilience such as land management,

[9] https://www.cdc.gov/cholera/general/

information systems, and provision of infrastructure. Based on the findings of Metropolitan Management in Greater Accra Technical Assistance, , the National Development Planning (System) Act, 1994 (Act 480) endorses the establishment of a designated contiguous area as a Joint Development Planning Area (JDPA) and a Joint Development Planning Board (JDPB), for the purposes of formulating and supervising the implementation of development plans for that area. Therefore, the designation of a JDPA, encompassing the GAMA, and the establishment of JDPB are urgent preconditions to enhance planning and coordination as well as to develop a Joint Development Plan. The Government should also expedite implementation of the new Land Use and Spatial Planning Act, 2016 (Act 925) and new three-tier Planning Model. The Model provides a framework and process for preparation of comprehensive spatial development and structural plans for all MMDAs, sub-regions and regions in Ghana. The Act also requires upgrading of existing communities and can leverage current efforts, such as the preparation of a Greater Accra Regional Spatial Development Framework and an integrated sanitation and drainage master plan. Increased coordination will be key, as will capacity building efforts of staff in charge of the design and implementation of strategic plans.

2. **Integrate Urban Flood and Coastal Zone Management:** GAMA needs urban systems in place that are prepared to handle floods and sea level rise in the context of climate change, reducing the risk of exposure to these shocks. Quick wins include finalizing the GAMA-wide drainage and flood control master plan and updating existing plans for incorporation into current spatial development strategies and land use plans. Drainage and flood control infrastructure and management systems should also be improved. This can be done by: (1) mapping and demarcating floodplains and buffer zones of all drainage ways and enforcing existing regulations; (2) improving coordination between responsible agencies (HSD, Ghana Highway Authority, Department of Urban Roads, and Department of Feeder Roads) and the 16 MMDAs in GAMA for drainage works, operation and maintenance; and (3) a substantial increase in the daily operation and maintenance budget for the drainage system and hydraulic infrastructure at MMDA level, and not just on an emergency basis. Also on the preparedness side, GAMA should identify and secure areas to increase retention capacity and reduce runoff as well as develop green areas on floodplains. Adequate collection and disposal of solid waste, especially in critical areas, will prevent clogged drains that exacerbate flooding. This includes closer coordination between the private and informal sector to reach all areas of the city and awareness-raising on proper solid waste disposal. Moreover, at present, there is a significant shortfall in the availability of engineered and appropriately operated waste transfer and disposal capacity, which calls for investment in appropriate infrastructure.

3. **Enhance Resilience in Vulnerable Communities:** Vulnerable communities are the most affected during disasters and generally lack access to urban services and infrastructure. Nonetheless, impacts on vulnerable communities have repercussions for the city region's overall resilience due to geographic and systemic linkages. Many vulnerable communities are often located in low-lying areas particularly susceptible to floods, or elsewhere more exposed to cholera and malaria, or crime and violence. GAMA needs to prioritize the identification of vulnerable settlements across the 16 MMDAs to focus investment in the most exposed places. This key information can feed into a comprehensive slum upgrading and redevelopment strategy which needs to be integrated with local economic development initiatives and any existing development plans. Close coordination with the Regional Coordinating Council as well as with agencies in charge of social protection will enable the collection of important information about conditions on the ground.

4. **Improve Disaster Preparedness and Response to multi-hazards in GAMA:** It is essential to have a good understanding of the risks facing the GAMA region, including future climate change impacts such as sea level rise, in order to fulfill MMDAs' mandate to plan, mainstream and implement evidence-based disaster and climate risk management actions. Thus, a comprehensive and detailed risk assessment should be prioritized to create a risk profile for the region. Data needs to be collected regularly by the MMDAs to make sure that strategies are up to date. For example, the current sea defense wall intended to remediate tidal surges is negatively impacting some MMDAs. The information gathered can guide initiatives on preparedness, including strengthened early warning systems, especially for the most poor and vulnerable. A disaster risk management and climate change adaptation coordinating entity at the metropolitan (GAMA-wide) level can work jointly with NADMO to help implement policies and mandates at the MMDA level. Dedicated budget and adequate staff and equipment will be key to fulfill preparedness and response recommendations. For example, there is a lack of fire equipment necessary to respond to fire or take fire safety measures, especially in tall buildings and informal markets.

E. MOVING FORWARD

GAMA is well positioned to undertake the challenge of enhancing resilience at the metropolitan level. There is strong commitment from leading Ministries and the constituent MMDAs to address the many hazards that GAMA faces that can set back development gains. The rapid urbanization that GAMA is experiencing should be seen as an opportunity rather than challenge. It highlights the pull of the region as an engine of economic growth and an important gateway into West Africa. The findings and recommendations of this report will help GAMA address urban challenges, but most importantly, they highlight the need for a long term vision for the region that includes projected population increase and climate change adaptation. The city region already has ongoing efforts that will support implementation of the different recommendations. Such efforts include the Ghana Plan of Action on Disaster Risk Reduction being undertaken by NADMO as well as the Community Resilience through Early Warning (CREW) project and the Flood Early Warning Systems (FEWs). Adopting a business-as-usual approach going forward will leave GAMA dangerously exposed to the same hazards that are experienced every year. But a forward-looking strategy for resilience will lead to a thriving, competitive and inclusive city region.

I. THE CASE FOR INVESTING IN URBAN RESILIENCE IN GHANA

I. THE CASE FOR INVESTING IN URBAN RESILIENCE IN GHANA

Ghana has been undergoing a significant structural transformation since the mid-1980s. Population more than doubled between 1984 and 2013, and at the same time, Ghana's urban population more than tripled from under 4 million to nearly 14 million people.[10] Urbanization has yielded many positive outcomes associated with increased productivity and economies of scale. This has helped to create jobs, increase human capital, decrease poverty, and expand opportunities and improve living conditions for millions of Ghanaians. However, Ghana now faces key challenges of ensuring that urbanization continues to complement growth through strengthening resilience, rather than loosing development gains to natural and man-made disasters. Many rising problems are related to urbanization, disasters, and climate change, especially in the context of urban areas. In this context, Ghana finds itself in need to enhance its urban resilience.

1. What is Urban Resilience

Resilience[11] is the capacity of individuals, communities, institutions, businesses, and systems to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience. A resilient city is capable of adapting to a variety of shocks and stresses while still providing essential services to its residents, especially the poor and vulnerable. Resilience works toward long-term sustainability objectives—meeting the needs of the present without compromising the ability of future generations to meet their own needs.[12] Resilience is also about learning to live with the spectrum of risks that exist at the interface between people, the economy, and the environment. Where sustainability aims to put the world back into balance, resilience looks for ways to manage in an imbalanced world.[13]

Cities can drive national economic growth and innovation and act as cultural and creative centers. However, urbanization, especially when rapid and unplanned, also brings challenges. The concentration of people, assets, and infrastructure in urban areas means that an increasingly complex range of shocks and stresses can jeopardize the well-being of large numbers of people and hard-won development gains. In addition to exposure to natural hazards like storms, droughts, and earthquakes, cities are also vulnerable to economic downturns, crime and violence, public health epidemics, and infrastructure failure. These shocks and stresses can have devastating effects, bringing some or all of an urban system to a halt, and possibly causing asset damage and loss of life. Disaster losses are often linked with, or exacerbated by, poverty and vulnerability of the poor that stem from socio-economic and environmental imbalances.

In essence, the resilience of a city depends on the overall performance and capacity of its systems, not solely on its ability to cope with specific natural hazards or to adapt targeted areas to the impacts of climate change.[14] Cities are complex systems, and, like all systems, a city depends on the smooth functioning of its constituent elements and the larger organization in which it is nested. Disruptions to the basic services they provide can have cascading impacts well beyond the city itself. The complexity of cities also makes resilience building especially challenging. Focusing on one policy goal, such as climate protection, without considering others can lead to undesirable outcomes. These decisions may come as

[10] World Bank.2015. Ghana Urbanization Review.
[11] World Bank, *City Strength Diagnostic,* http://documents.worldbank.org/curated/en/2015/07/24812294/city-strength-diagnostic-methodological-guidebook.
[12] Brundtland Commission, 1987
[13] Zolli, 2012
[14] Brugmann, 2012

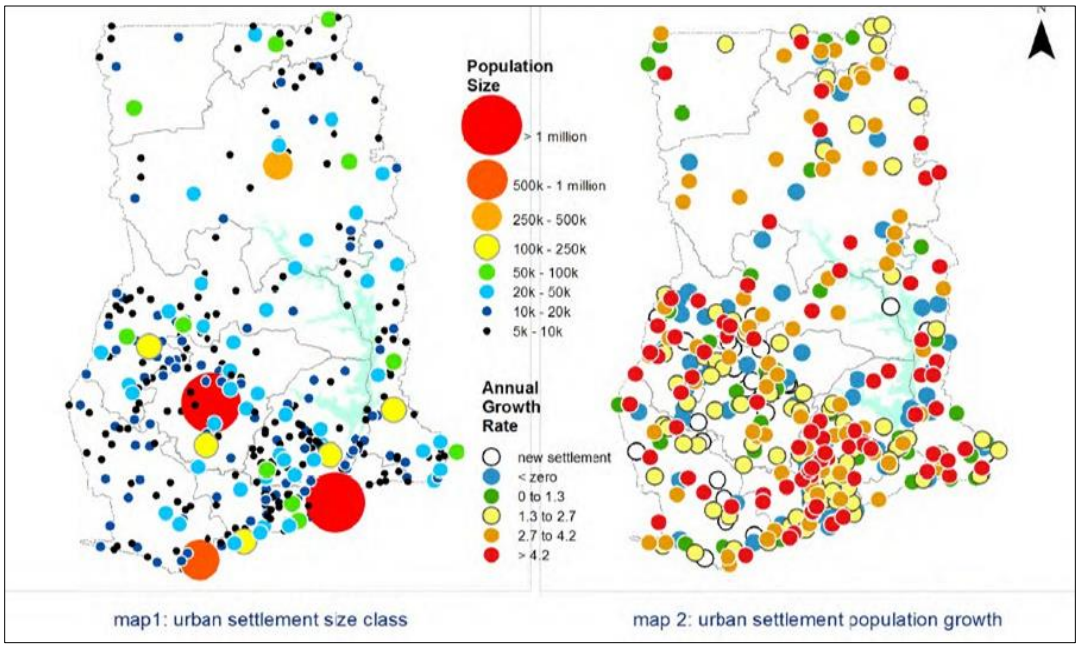
explicit trade-offs, unintended consequences, or some combination of the two. Building a resilient city therefore requires urban development to be informed by the identification and deep understanding of shocks and stresses, to be addressed in a holistic, multisectoral, and flexible approach.

2. Urban Resilience in Ghana and Investment Needs

2.1 Urbanization Trend in Ghana

Ghana's total population more than doubled from 1984 to 2013. Over this period, urban population growth outpaced rural population growth rising from under 4 million to nearly 14 million and leading to a change in the urbanization proportion from 31 percent of the population dwelling in urban areas to 51 percent. Moreover, the urban population is projected to grow further by an average of 2.8 percent per annum over the next 20 years, leading to an expected urban population of 22.6 million people (representing 65 percent of the national population) by 2030.[15]

Figure 1: Urbanization in Ghana



Source: National Spatial Development Framework 2015–35, Town & Country Planning Department

Accra, the capital city, has traditionally dominated the urban landscape. Nonetheless, since 2000, all regions of Ghana have experienced steady urbanization. The number of medium (20,000–50,000 people) and medium-large (50,000–100,000) sized towns has quadrupled and tripled, respectively. In the process, while Accra also continues to grow, its urban primacy has diminished. Accra's 24.4 percent share of the total urban population in 1984 declined to 16.6 percent by 2010, representing a more balanced urban

[15] Ghana Statistical Service, 2012: 2010 Population and Housing Census: Summary Report of Final Result; MLGRD, 2012; National Urban Policy Framework and Action Plan; UN-Habitat 2012: State of the World's Cities 2012/2013: Prosperity of Cities.

growth that includes Kumasi, Tema, Sekondi-Takoradi, Tamale and many smaller cities (World Bank, 2015).[16]

Rapid urbanization has coincided with stable and rapid economic growth. From 1961 to 1983, GDP annual growth averaged 0.9 percent, 5.7 percent from 1984 to 2013, and 7.8 percent from 2005 to 2013.[17] This rapid growth has resulted in a reduction in poverty in both rural and urban areas, with the total poverty incidence dropping below 25 percent in 2013 and below 11 percent in urban areas.[18] However, urbanization does not always have positive effects and also brings about some challenges.

Ghana's rapid urbanization can be characterized by an over-concentration of population, investments, economic activities and services around a few large urban settlements, especially in and around Greater Accra (4.4 million), Greater Kumasi (2.3 million) and the twin settlements of Sekondi-Takoradi (1 million). The three metropolitan areas constitute more than 50 percent of the total urban population. They have physically surpassed their administrative boundaries and spilled into adjacent areas that include other Metropolitan, Municipal and District assemblies (MMDAs) engulfing smaller cities and towns and absorbing semi-urban and rural hinterlands. These metropolitan areas have dense urban cores and a sizable number of other urban settlements. Challenges associated with this urbanization phenomena include: rapid, low-density expansion at peripheries reaching towns and villages that are up to 100 kilometers from the center; ribbon development along feeder and trunk roads, and in cluster patterns that lack basic services and social amenities; as well as lack of affordable housing. These challenges call for proactive measures to improve the resilience of Ghana's major urban centers.[19]

The Government has a number of policies that already require MMDAs to incorporate disaster risk management and climate change adaptation into land-use and structural planning. This includes Ghana's National Urban Policy (2012–2017) which aims to guide the country's urban development. However, it lacks a strategic action plan which has led to disjointed project-based interventions that have been unsuccessful in tackling the challenges in Ghana's urban sector.[20] The new Housing Policy (2015) also includes similar requirements of risk considerations, but implementation remained an issue.

2.2 Disasters in Ghana

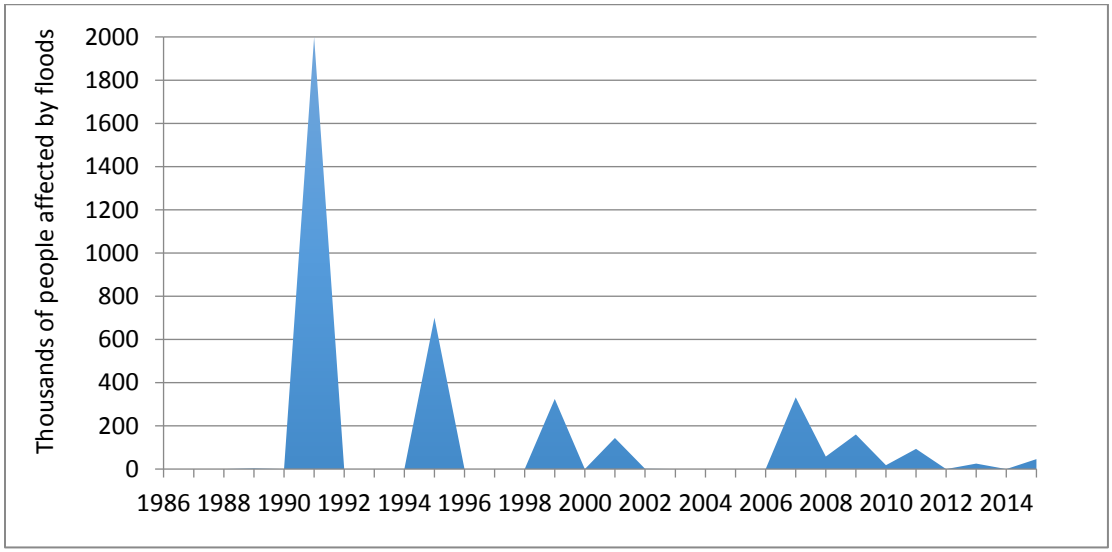
Ghana has witnessed a number of major disasters in the past 40 years. The tables below provide an overview of the deadliest disasters and those which affected the most people in the country. In terms of number of people affected, the 1983 drought is the most severe disaster in Ghana's recent history. The floods of 1991, 1995, 1999, 2001, 2007, and 2009 all affected more than 100,000 people. Furthermore, floods have affected nearly four million people in Ghana over the last 40 years, mostly related to river floods (mainly in the Volta River System) and in urban areas, notably Accra. In terms of casualties, epidemics have impacted Ghana the most with more than 1,100 deaths since 1975.

[16] World Bank, 2015: Rising through Cities in Ghana: Ghana Urbanization Review Overview Report.
[17] World Bank. 2015. Ghana Urbanization Review
[18] Ibid.
[19] Town and Country Planning Department, 2015: National Spatial Development Framework 2015–2035.
[20] Ibid.

Table 1: Top Ten Most Devastating Disasters since 1983 (EMDAT, 2016)[21]

10 disasters in Ghana affected the greatest number of people			10 deadliest disasters in Ghana caused the greatest number of casualties		
Type	Year	Total affected	Type	Year	Totals deaths
Drought	1983	12,500,000	Epidemic	1984	103
Flood	1991	2,000,000	Flood	1995	145
Flood	1995	700,000	Epidemic	1996	411
Flood	1999	324,602	Epidemic	1998	67
Flood	2001	144,025	Flood	1999	52
Flood	2007	332,600	Flood	2007	56
Flood	2008	58,000	Flood	2010	45
Flood	2009	139,790	Epidemic	2011	101
Flood	2011	81,473	Epidemic	2014	249
Epidemic	2014	56,469	Epidemic	2015	85

Figure 2: Number of People Affected by Floods in Ghana since 1986 (EMDAT, 2016)

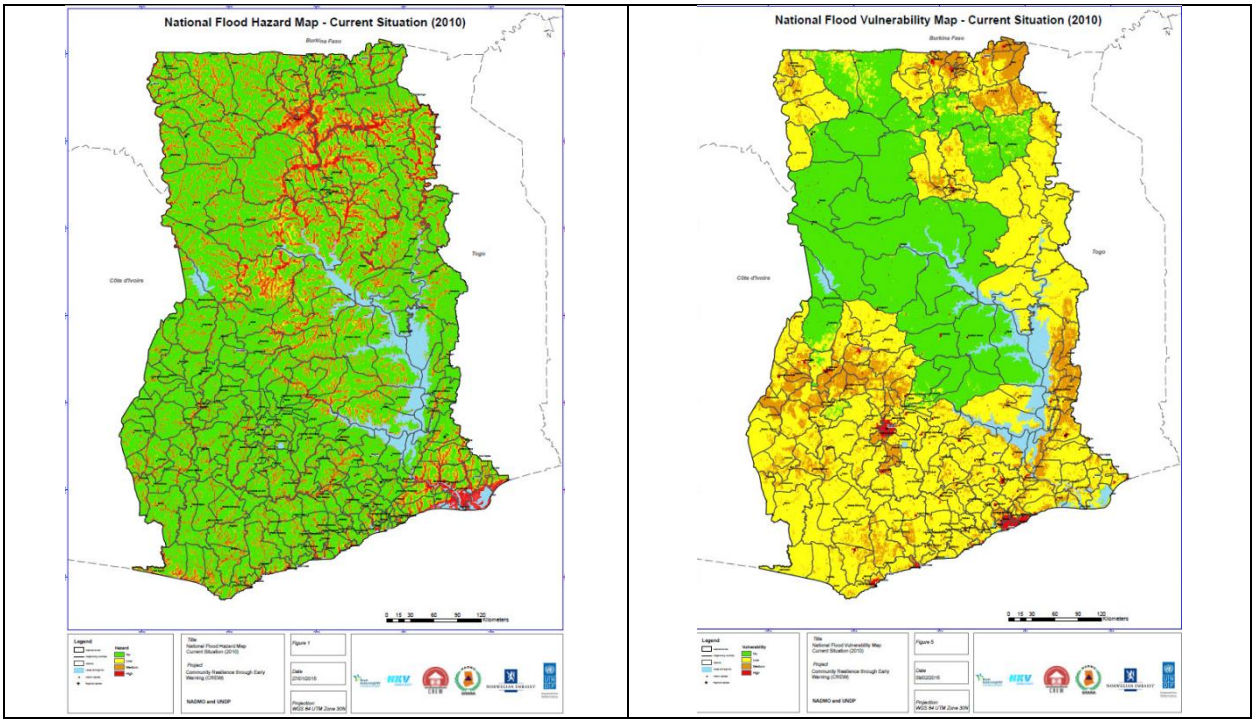


In recent years, the 2007 floods affected more than 300,000 people mainly in the three northern regions of Upper East, Upper West and Northern Region due to extensive flooding of the Volta River, making it the most severe flood in the country (Figure 2). Similarly, in 2010, more than 160,000 people were affected by floods,[22] both in the Volta basin as well as in Accra. There are however some discrepancies related to the way data is reported by different entities and international organizations. If the 150 people who died in a petrol station fire during the floods of June 3, 2015 were included in the number of flood related casualties, that flood would be the deadliest flood disaster in Ghana since 1975.

[21] EM-DAT: The CRED/OFDA International Disaster Database—www.emdat.be—Université Catholique de Louvain—Brussels—Belgium, 2016

[22] OCHA, 2010.

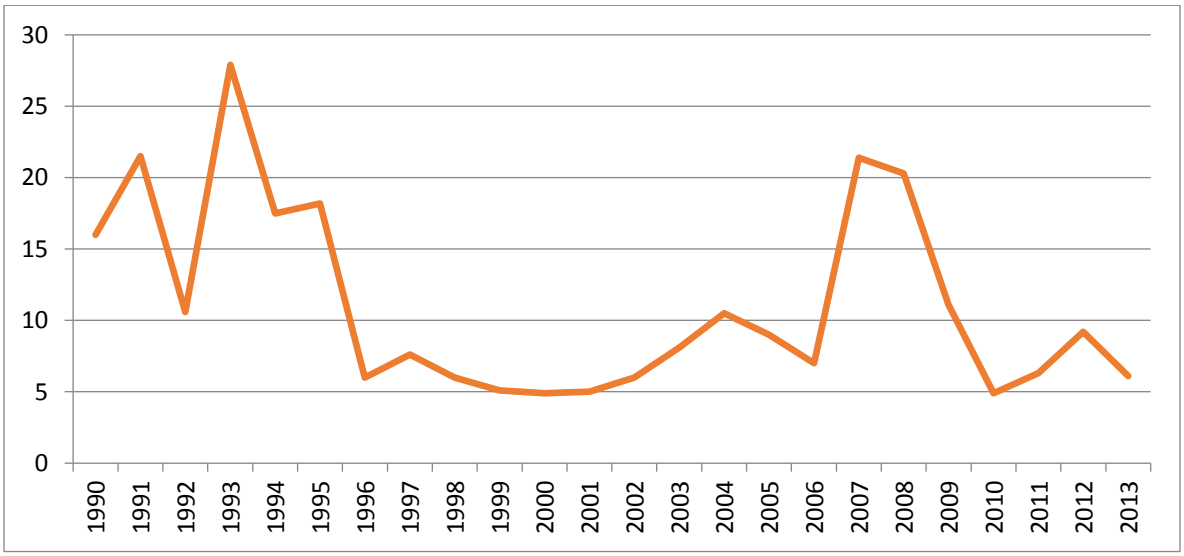
Figure 3: (Left) Flood Hazard Map, (Right) Flood Vulnerability Map



Source: UNDP, 2015

Major disasters, like the floods from 1991, 1995 and 2007 have resulted in increased humanitarian assistance provided to Ghana. Figure 4, below, indicates the humanitarian assistance provided since 1990 (Global Humanitarian Assistance, 2016), highlighting the years of major floods, where Ghana received in US$ 21.5 million in 1991, US$ 18.2 million in 1995 and US$ 21.4 million in 2007.

Figure 4: Humanitarian Assistance provided to Ghana since 1990



Source: (International Humanitarian Response Database, 2016)

With regard to the June 3, 2015 floods, reports from the Ministry of Environment, Science, Technology & Innovation (MESTI) indicate that about 52,622 people were affected in Greater Accra Region.[23] Munich Re also reported the floods of 2015 in Accra among the ten deadliest disasters of that year worldwide.[24] The table below provides a breakdown of the number of people affected by the floods in each of the MMDAs in Greater Accra. There are limited statistics on the floods in Greater Accra itself, but a publication in the *Daily Graphic* newspaper in June 2015 and records available from NADMO illustrate the main flood events in Accra in the past decades (Annex A).

Table 2: Populations affected by June 3, 2015 Flood (MESTI, 2016)

MMDA	Number of People Affected
Ga South	4,808
Ga Central	12,032
Ga West	920
Ga East	1,355
La Madina	532
AMA	15,000
LADMA	500
Adenta	1,718
LEKMA	8,234
Ashaima	757
Tema	6,593
Kpone	490
Shai Osu	75
Ningo	1,237
Ada East	490
Ada West	125
Total	52,622

2.3 Climate Change Impacts

Climate change further exacerbates Ghana's vulnerability to shocks and stresses. Effects of climate change are reflected in sea level rise,[25] cyclonic storms, storm surges, and droughts. The latter, especially, is an important contributor to increased migration flows to Ghana's rapidly expanding cities, where already about half of the population live in slums. Factors that make Accra vulnerable to climate change include a mixture of biophysical factors related to the geographic location of the city, underlying infrastructure issues, as well as socio-demographic factors.[26]

Ghana's economy largely relies on climate-sensitive sectors, in particular agriculture, energy and forestry. Agriculture is currently the second biggest contributor to Ghana's Gross Domestic Product (GDP), with approximately 70 percent of the population depending directly or indirectly on agriculture. Any climate-related disaster is, therefore, likely to affect the economy of Ghana, especially the more vulnerable rural communities who depend largely on rain-fed agriculture and comprise the majority of the population.

[23] MESTI, 2016. June 3 2015 Floods in Accra: Assessment Summary (Draft Report)

[24] Munich Re, 2016

[25] A World Bank report from 2009 (Dasgupta, et al.) estimated that about 400 square kilometers and 137,000 people in Ghana will be at direct risk of sea level rise. These numbers seem low compared to other regions of the world partially because of the geology of the continent. Africa lies on a plateau of Precambrian rocks without extensive mechanical weathering consequences. As a result, the coasts of Africa present few natural harbors and relatively straight coastlines with substantial coastal populations living several meters or more above sea level.

[26] (Ministry of Environment, Science, Technology and Innovation, 2015; Baxter, 2015)

Climate change effects on temperature and rainfall patterns will exacerbate the intensity and frequency of floods and droughts, increasing the number of catastrophic events and drought-induced migration. Furthermore, the concentration of economic activities and assets, and complex interrelatedness of people and services in cities makes shocks particularly damaging with significant detrimental economic and social impacts. This will put more pressure on a population that is expected to double by 2040 and already struggling with poverty, unemployment, precarious housing and weak governance.

Climate impacts are likely to further accelerate ongoing rural-to-urban migration beyond the absorptive capacities of major municipalities such as Accra and Kumasi in the Southern regions of Ghana (Yankson & Bertrand, 2012). Projected socio-economic and climate-related factors in rural and agrarian areas are likely to exacerbate this trend. However, Middle Belt and Southern regions, such as Kumasi and Accra, whose economies primarily rely on services and industry, could also be affected by extreme heat, dry and wet events, potentially reducing their ability to absorb this growing population and workforce and to generate economic opportunities in urban areas. As consequences, the growth of informal settlements could accelerate, for example, and lead to adverse impacts on health and poverty.

2.4 The need for investing in Strengthening Urban Resilience in Ghana

Given the aforementioned challenges in the context of Ghana and its urban development, Ghana's sustainable development turns on strengthening its urban resilience. Associated with uncontrolled lateral expansion of urban centers, Ghana's cities cannot meet the growing urban demand for services and infrastructure. They face challenges like underservice and infrastructure-deficient communities, traffic congestion, high levels of pollution, limited employment accessibility and development of slums.[27] Moreover, these deficits make people more vulnerable to both natural and man-made disasters. Natural disasters will also be adversely affected by climate change. Increases in the frequency and intensity of rainfall, floods and landslides, along with the occurrence of extended periods of drought and intense heat will bring about devastating consequences for Ghana's urban development, worsening the socio-economic situations for the people who live and work there.

There are pressing needs to address these urban development and resilience challenges. Proactive investment in urban resilience will reduce risks from recurrent disasters such as annual flooding, climate change impacts and other socio-economic deficits. This will help not only mitigate future risks of disasters but also reduce poverty, protect existing infrastructure and housing, and promote investments and shared prosperity. Based on the clear need for enhanced resilience, the Ministry of Environment, Science, Technology and Innovation (MESTI) and the Ministry of Local Governments and Rural Development (MLGRD) are currently spearheading a holistic initiative to look at resilience in the Greater Accra Metropolitan Area (GAMA), which includes Accra the capital of the country. Assessing the challenges and opportunities across a spectrum of sectors will better prepare the city to face a wide range of shocks and stresses. To this end, the two ministries requested the implementation of the CityStrength Diagnostic, and given the interrelatedness of the different municipalities around Accra City, it was decided to include all 16 MMDAs of GAMA.

[27] Ghana Urbanization Review. World Bank, 2015

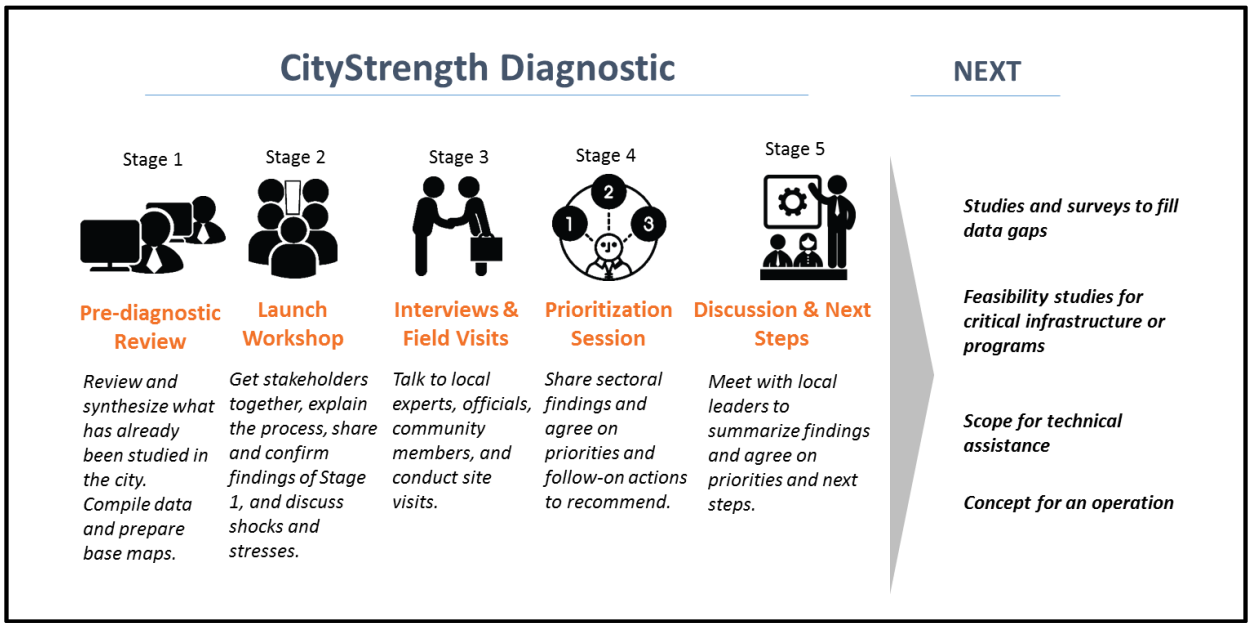
3. CityStrength Participatory Methodology and Process in Ghana

3.1 CityStrength Participatory Methodology

Given the importance of urban resilience in the development agenda, the CityStrength Diagnostic was developed by the World Bank to help facilitate a dialogue among stakeholders (e.g. government, civil society, residents, and the private sector) about risks, resilience, and the performance of urban systems. It is important to note that CityStrength is an engagement process, not an analytical study. The CityStrength Diagnostic results in the identification of priority actions and investments that will enhance the city's resilience as well as increase the resilience-building potential of planned or aspirational projects. It promotes a holistic and integrated approach that encourages cross-sectoral collaborations to more efficiently tackle existing issues and to unlock opportunities within the city.

The CityStrength Diagnostic consists of five stages, book-ended by leadership commitment for resilience on the front-end and a longer-term engagement with development partners through financing or technical assistance at the back-end.[28]

Figure 3: Stages of the CityStrength Diagnostic



3.2 CityStrength Process in Greater Accra Metropolitan Area

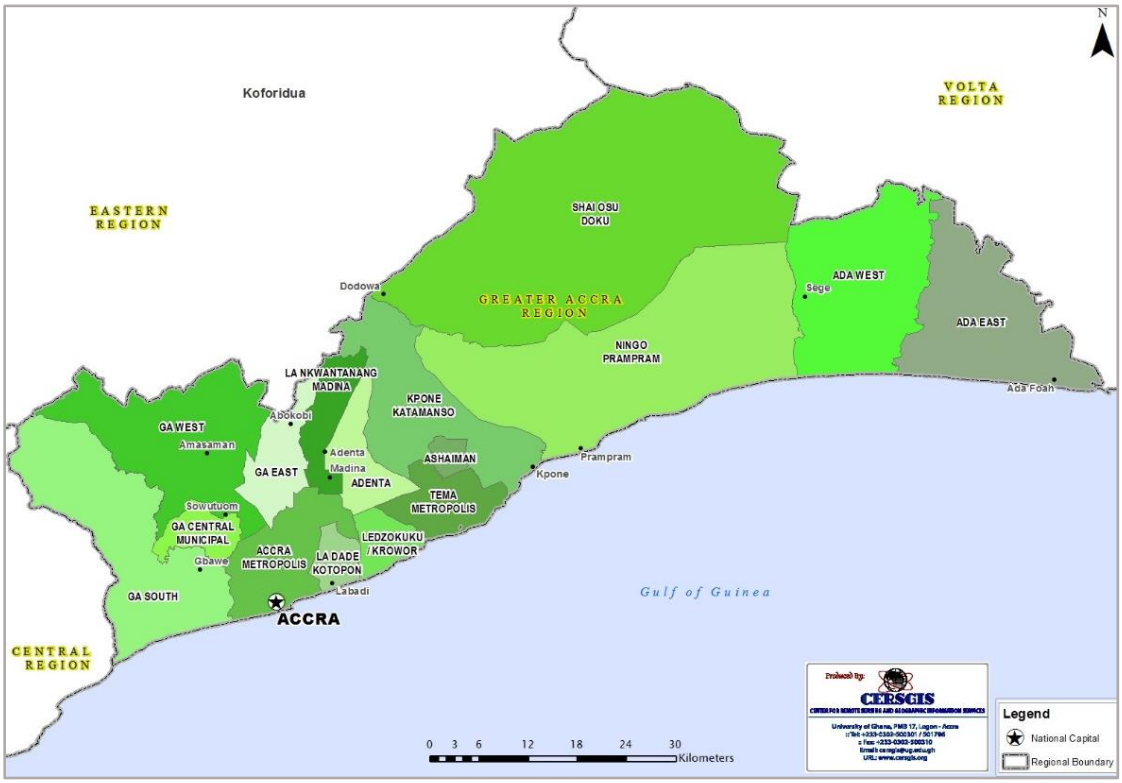
After the Government's request for CityStrength**, t**he methodology was adapted[29] to meet the client's specific needs. Nine sectors were identified as key for the assessment, based on national and regional priorities: Urban Development and Housing, Disaster Risk Management and Climate Change, Social and Community Development, Solid Waste and Basic Sanitation, Transport, Water and Sewerage, Urban/Municipal Risk Finance, Drainage and Coastal Zone Management, and Food Security and

[28] City Strength Diagnostic: Methodological Guidebook. World Bank Group, 2015

[29] The standard methodology can be found here: City Strength Diagnostic: Methodological Guidebook. World Bank Group, 2015, Washington, DC. https://openknowledge.worldbank.org/handle/10986/22470

Agriculture. Furthermore, 16 MMDAs were identified as participants: Accra Metropolitan Assembly (AMA); Tema Metropolitan Assembly (TMA); Ga West Municipal (GaWMA); Ga East Municipal Assembly (GaEMA); Ga Central Municipal Assembly (GaCMA); Ga South Municipal Assembly (GaSMA); Ledzokuku-Krowor Municipal Assembly (LeKMA); Adentan Municipal Assembly (AdMA); Ashiaman Municipal Assembly (AshMA); La Nkwantanang-Madina Municipal Assembly (LaNMA); La Dade-Kotopon Municipal Assembly (LaDMA); Ada West District Assembly (AWDA); Ada East District Assembly (AEDA); Kpone Katamanso District Assembly (KKDA); Ningo-Prampram District Assembly (NiPDA); and Shai-Osudoku District Assembly (SODA) (Figure 4). In addition, the exercise made a conscious effort to reach out to and engage other Development Partners and Academia, e.g. UN-Habitat, 100 Resilient Cities, Cities Alliance, and University of Ghana.

Figure 4: Map of GAMA Showing MMDA Boundaries



CityStrength featured to following tailored steps in Accra:

1. **Prediagnostic phase and data collection—January 2016–August 2016:** In an effort to understand the current situation in the GAMA region, an extensive data collection exercise was carried out with the ongoing support of different government agencies. This consisted of a combination of primary and secondary data. The information was used to prepare a pre-diagnostic report outlining the initial findings.

2. **Inception workshop—February 2016:** Different representatives from the national, regional, and local governments, as well as representatives from across a wide variety of sectors, were invited to attend an inception workshop. The purpose was to introduce the concept of urban resilience to the participants as well as present the CityStrength methodology and the proposed process. After a round of discussions, the stakeholders decided to cover the aforementioned sectors. It's important to note that modules for Drainage and Coastal Zone Management had to be developed

for Accra as they were not included in the original methodology.

3. **Consultation workshops—May 2016:** To further assess resilience in the different MMDAs and each of the sectors, a two-day workshop was organized in Accra in May 2016. The objectives of the workshops were to engage with a wide range of stakeholders (government officials, academic institutions, Non-Governmental Organizations (NGOs), and development partners) to find out more about the shocks and stresses in GAMA; present the findings of the pre-diagnostic phase and obtain validation from local stakeholders; fill in information gaps; and prioritize the vulnerabilities in the sectors and MMDAs; and brainstorm about the required actions to address them.

   Due to the large number of MMDAs participating in the exercise, the discussions, facilitated by World Bank specialists, were grouped in four clusters of MMDAs based on locational proximity, spatial-economic characteristics, historical administrative relationships, and common drainage shed. Concrete outputs from the workshop included hot spot maps developed by the MMDAs with guidance from World Bank staff; and presentations from each of the sectors and clusters of MMDAs with the identified shocks and stresses, current level of resilience, and priority actions and potential implementing bodies. The assessment of resilience was done against the five characteristics of resilience in the methodology: coordination, inclusiveness, reflectiveness, redundancy, and robustness (Annex B).

4. **Prioritization session—May 2016:** Recommendations made by the sectors and clusters of MMDAs were brought together in a preliminary list of priorities for the Greater Accra Metropolitan Area. Representatives from the MESTI and the MLGRD were present during the session. In addition, a separate meeting was held with senior level officials from MESTI during which the recommendations were also presented. In both cases, there were no objections to the list of priorities for GAMA.

5. **Dissemination workshop—June 2017:** The findings from the exercise are captured in this report, highlighting the most pressing needs at the national, regional, and city level, and listing recommended actions to enhance resilience in GAMA and the different sectors. The report was prepared with input collected at the different phases of the CityStrength diagnostic and the outcomes were validated by the appropriate agencies. Moreover, a dissemination workshop was organized to convene key high-level stakeholders to share the findings and gauge interest in implementing the identified recommendations. This findings report is not meant to be the end of the engagement with the Government. Instead, it is meant to be a starting point for the Government to build on the findings and enhance resilience across GAMA. The report can also be used to approach internal and external partners to request further technical and financial support.

4. Report Structure

Section I presents an introduction to the concept of urban resilience, its relevance in the context of Ghana in general, and its investment needs. Moreover, it includes a description of the methodology used.

Section II provides an overview of GAMA, covering its geography, demographics, urbanization trends and climate change impacts. The section also discusses the shocks, stresses and challenges of resilience, and demonstrates the hotspots that were identified by participants of the workshop under four geographical clusters.

Section III focuses on the resilience of urban systems, based on assessments of nine sectors across GAMA.

A summary of the priority actions and investments required at both the GAMA and respective MMDA levels are presented in Section IV. These have been grouped under four thematic areas namely (1) Improved Metropolitan Planning and Coordination; (2) Adopt an Integrated Urban Flood and Coastal Zone Management Plan; (3) Enhance Resilience in Vulnerable Communities; and (4) Improve Disaster Preparedness and Response.

II. RESILIENCE CHALLENGES IN GAMA

II. RESILIENCE CHALLENGES IN GAMA

GAMA continues to be a dominant urban center due to the concentration of assets, economic activities, and government. GAMA is a destination for rural migration linked to economic opportunities and a better quality of life. However, urbanization has been occurring in a very rapid manner and has outpaced planning, with implications for the inclusion and living conditions of the residents. Low income communities, in particular, find themselves living in informal and overcrowded housing with limited or no access to urban services. This haphazard urban development represents a challenge for the city. Furthermore, GAMA faces a number of shocks and stresses that impact the city due to its lack of capacity to withstand them. Flooding events, fire outbreaks and diseases continue to bring GAMA to an economic and social halt. These issues are predicted to exacerbate as a result of the effects of climate change.

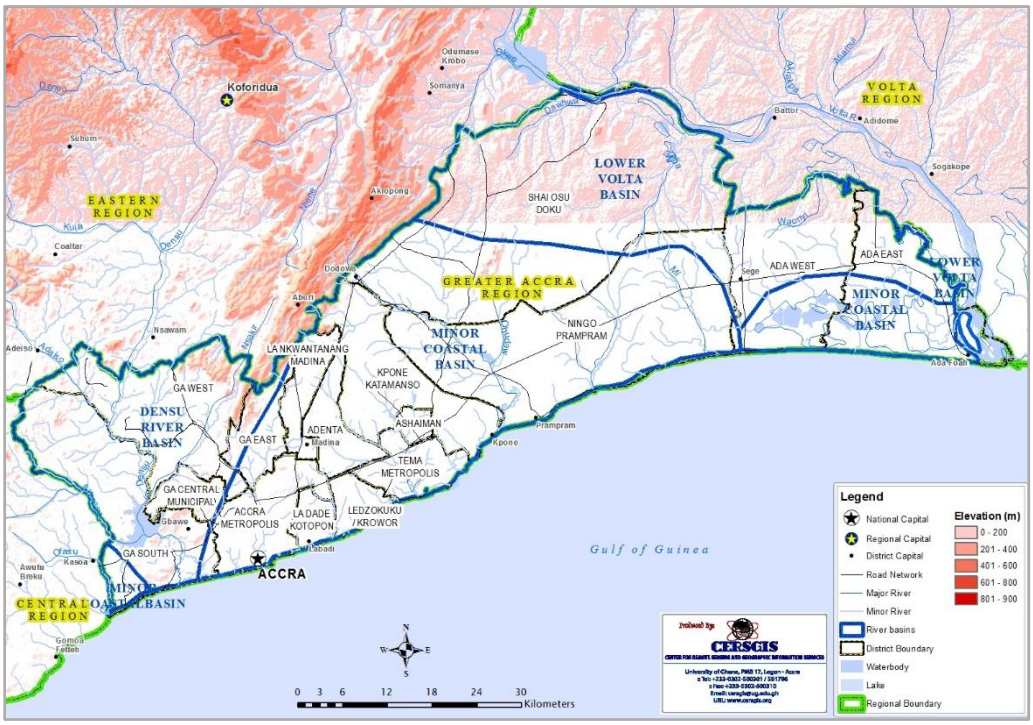
Figure 5: GAMA in Ghana

1. Overview of GAMA

1.1 Geography, Topography and Climate

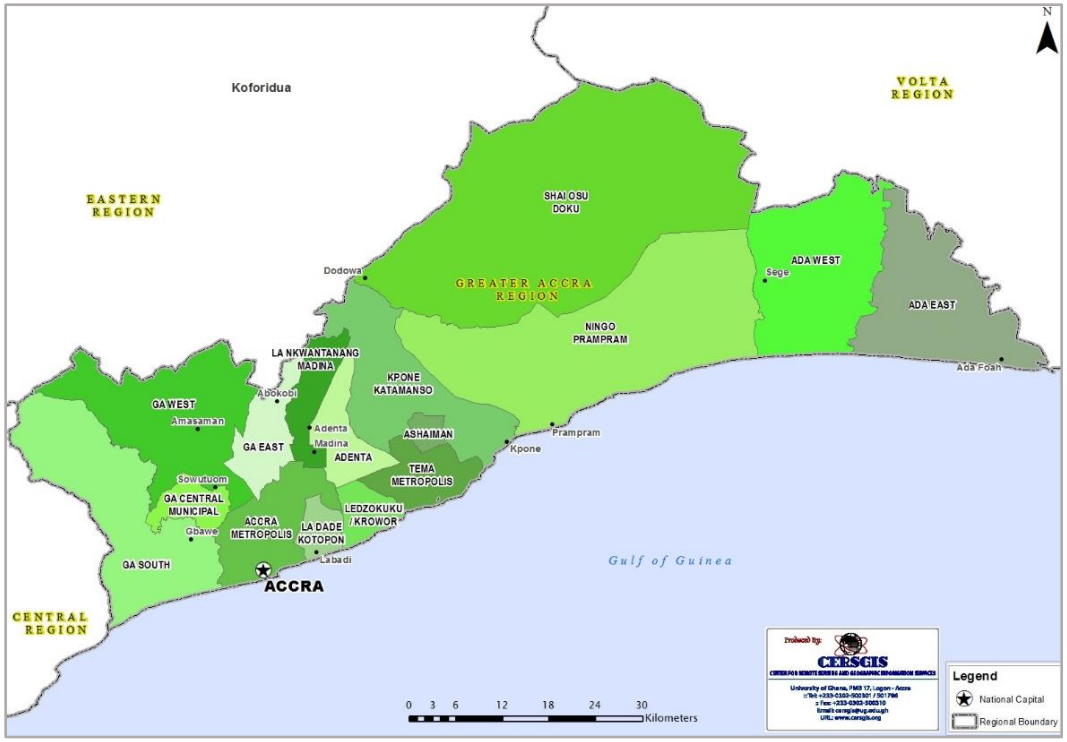
GAMA is located in the southern part of Ghana along the Atlantic coast of West Africa, occupies a total area of 3,245 square kilometers, and includes the capital city, Accra. It has a coastline of approximately 225 kilometers, stretching from Kokrobite in the west to Ada in the east. GAMA falls within the dry coastal equatorial climatic zone with temperatures ranging between 20° and 30° Celsius and annual rainfall ranging from 635 mm along the coast to 1,300 mm in the northern parts.

Figure 6: Hydrology Map of GAMA



Source: CERSGIS

Figure 7: Map of GAMA Showing MMDA Boundaries



Source: CERSGIS

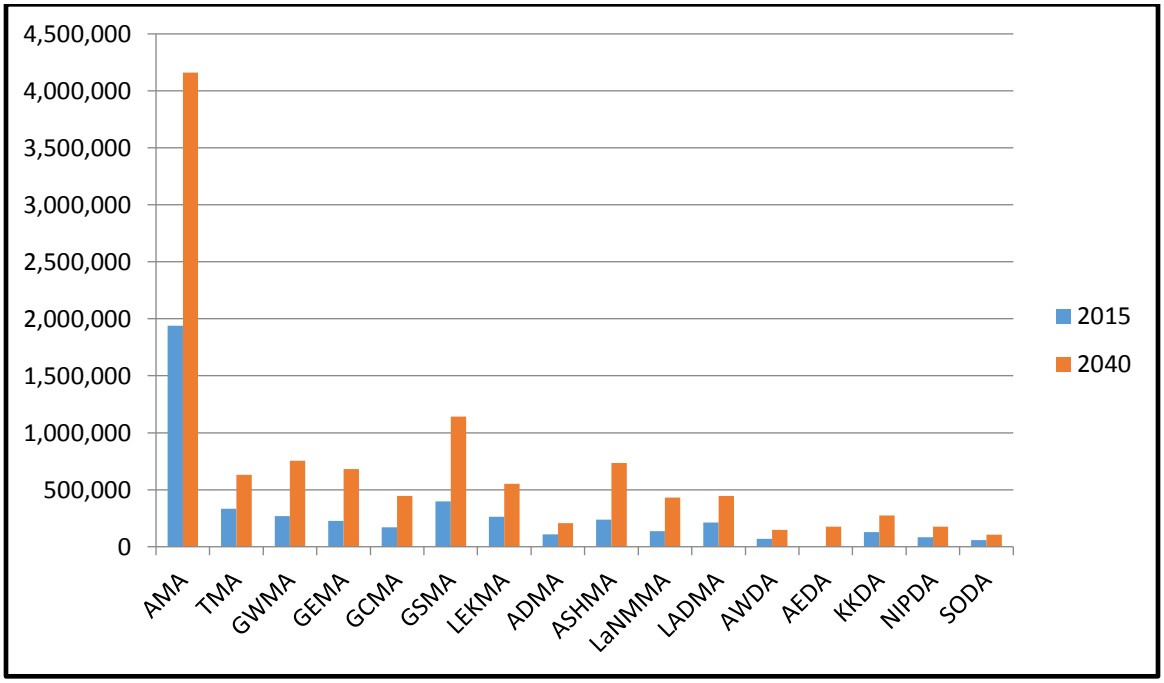
There are two distinct rainy seasons in GAMA: from April to July and from September to November, with two rainfall peaks notably in June and October. The first rainfall season is associated with the major

cropping season in the region. The relief is generally gentle and undulating low plains with heights not exceeding 60 meters in the Accra Plains area and raising to about 430 metres as it approaches the Akwapim Ridge. The Volta and Densu rivers flow through GAMA as well as some small streams (including the Odaw, Lafa, Chemu, Nima, Dakobi, Ponpon, Nsaki, Onyansia and Doblo) flowing mostly from the Akwapim Ridge into the sea through numerous lagoons (including Korle, Chemu, Sakumo, Songor). Because GAMA is bordered on the south by the Gulf of Guinea, there are ecologically important but highly polluted lagoons and wetlands within its landscape.

1.2 Demographics and Socio-economic Quick Facts

Based on projections from the 2010 population and housing census results, GAMA has a 2016 population of 4.6 million inhabitants [30] with an average annual growth rate of 2.4 percent. This represents a 15 percent increase over the total population in the year 2010. The distribution of population across the 16 MMDAs within the GAMA region is uneven (See Figure 8).

Figure 8: Population Distribution by MMDA



Source: Projected based on 2010 Population and Housing Census (Ghana Statistical Service, 2010)

The GAMA region accounts for about 25 percent of the national GDP and dominates formal (32 percent) and informal (28 percent) urban employment[31]. As the governmental and commercial capital of the nation, GAMA acts as a magnet for investment into the country and as a gateway for international trade attracting a foreign direct investment of 83 percent. [32] It is roughly at the center of a West African regional economic corridor—and interconnected by air, sea, and highway links—between Abidjan (Cote d'Ivoire) and Lagos (Nigeria).

[30] Data Production Unit, Ghana Statistical Service, 16th September, 2016.

[31]

[32]

Based on analysis of the 2010 PHC results, GAMA has the highest GDP per capita (GH¢5,250) of all regions in Ghana though it varies across the MMDAs in the region. GAMA GDP is also higher than the national average of GH¢4,022.[33] According to the 2010 PHC, among the 15^{+} population in GAMA, 65.4 percent were employed while 5.9 percent were unemployed and 28.7 percent were not economically active. The unemployment rate of 5.9 percent was higher than the national average of 4.2 percent.[34] Results of the Ghana Living Standards Survey 6 (GLSS-6) indicates that for urban areas in Ghana, more than 40 percent are self-employed and about 35 percent are employees. Moreover, about 38 percent of the economically active are engaged in sales and services occupations, while professional, technical and related workers comprise 10.9 percent.[35]

Mean annual incomes for GAMA are lower than those in other urban areas in Ghana. The mean annual household income and mean annual per capita income for GAMA were GH¢17,024 and GH¢5,603 respectively in 2012/2013, compared to GH¢22,727 and GH¢7,671, respectively, for other urban areas in Ghana.[36] However, GAMA has the highest proportion of households (56.6 percent) falling in the upper 20 percent or highest quintile and a smaller proportion of households in the lowest quintile (2.9 percent) of the income ladder compared to all the other regions. On the other hand, average annual expenditures are higher in the GAMA region than in other urban areas in Ghana. The average annual household expenditure and the average annual per capita expenditure are GH¢13,677 and GH¢4,875, respectively, as compared to GH¢9,841 and GH¢3,407, respectively, for other urban areas in Ghana.

GAMA is the least poor region in the country, with the incidence of poverty (5.6 percent) lower than the national average of 24.2 percent in 2012/2013.[37] The incidence of extreme poverty is virtually non-existent in urban localities, with GAMA representing only 0.9 percent, with rates of income inequality falling from 41.9 percent in 2005/06 to 37.0 percent in 2012/13.

Access to services is determined both by their availability and affordability. Availability of services is largely determined by their location because infrastructure is available within proximity. Urban areas normally have much more service availability than rural areas. On the other hand, affordability is largely determined by households' ability to pay for available services as a result of cost and income. According to the Ghana Living Standards Survey 6 (GLSS 6), GAMA's access to potable water (defined to include pipe, bottle/sachet, protected well/spring, and borehole) is over 95 percent. About 50 percent have adequate access to an improved toilet facility (a flush toilet or the KVIP toilet) and 92.7 percent have access to electricity. Access to health facilities stands at 76.9 percent, which is relatively high compared to other urban areas, despite the spatial inequity or disparities in the distribution of health facilities across localities in GAMA.

2. Urbanization Trends and Climate Change Impacts in GAMA

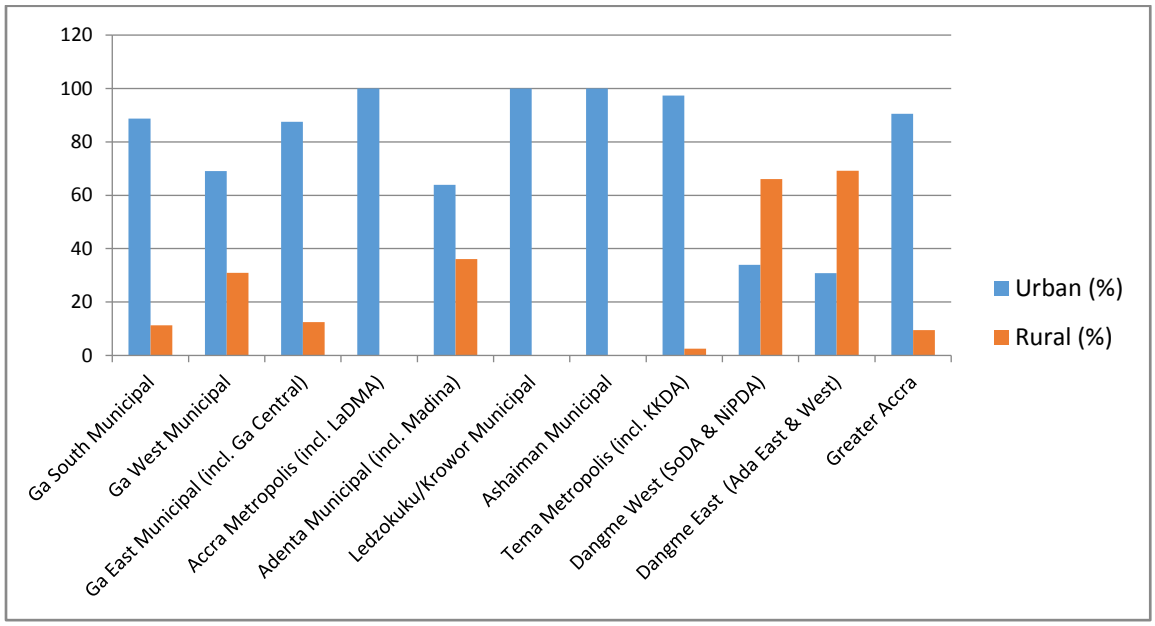
2.1 Urbanization in GAMA

GAMA accommodates 16.3 percent of Ghana's 2016 total population and is acknowledged as one of the fastest-growing city regions in West Africa. Of the 6 million people living within the metropolitan area, as defined by the 16 MMDAs, about 4.15 million reside in urban areas and 450,000 in rural; an urbanization level of 90 percent (Figure 9). Contiguous MMDAs (AMA, LADMA, LEKMA, TMA, ASHMA, LANMMA, GCMA

[33] Town & Country Planning Department: National Spatial Development Framework: Understanding the Space Economy—Unequal Spatio-economic Landscape (2014 PowerPoint presentation)
[34] Ghana Statistical Service, 2010 Population and Housing Census Report (2012)
[35] Ghana Statistical Service: Ghana Living Standards Survey Round 6 (GLSS - 6), 2014
[36] Ibid.
[37] Ibid.

and GEMA) are currently almost completely urbanized while four MMDAs are predominantly rural—SODA, AEDA, AWDA, NiPDA.

Figure 9: Rural-Urban Population Distribution in GAMA

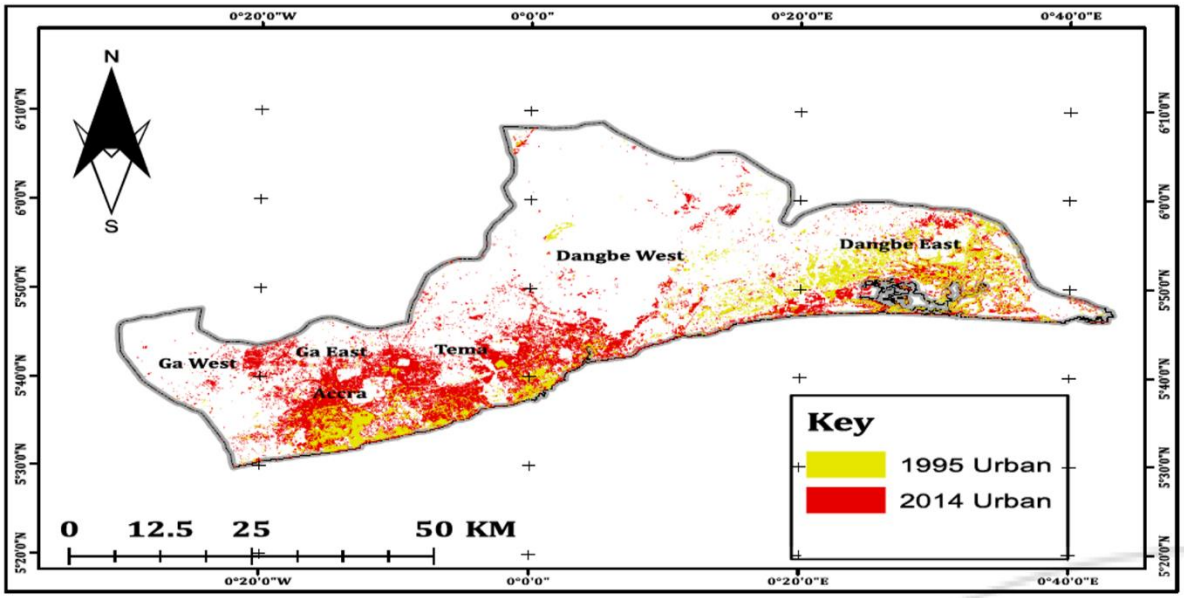


Source: Ghana Statistical Service, 2010 Population and Housing Census

GAMA's total population and urban population grew at 3.5 and 3.9 percent annually, respectively, between 2000 and 2010. Furthermore, GAMA's population is anticipated to more than double, to 10.5 million, by 2040 with the whole region almost totally urbanized (99.6 percent). In addition to a rapid urbanization, most of the 16 MMDAs are experiencing outward expansion and proliferation of informality; a situation that calls for a more pragmatic and holistic development approach. The challenges and stresses that this rapid expansion and development brought about without advance planning are characterized by a proliferation of under-serviced and infrastructure-deficient communities, with increasing congestion, high levels of pollution, and limited employment opportunities. The challenges will be further discussed in Section 3 below.

Urban sprawl has changed over the past decades. Figure 10 shows that there has been a considerable change in urban form between 1995 and 2014. The significant change of expansion and density is concentrated primarily in Western GAMA. The central and western districts of the region (AMA, LEKMA, LaDMA, TMA, GEMA and ASHMA) have much higher densities compared to the eastern districts. Additionally, built-up densities have been increasing faster in the western districts. In essence, the GAMA exhibits a relatively compact development in the west and central, with sparse and fragmented development in the east.

Figure 10: Built-up Density Characteristics



Source: Modified image from Frimpong, Bolarinwa, and Afrifa, 2015[38]

2.2 Climate Change Impacts

Several studies have been undertaken to reveal climate trends in Ghana. Findings suggest that overall Ghana is projected to become hotter, with overall annual temperatures expected to increase between 1°C and 3°C by 2060. It is also projected to get wetter during the wet season and drier during the dry season, with greater rainfall variability and intensity. Annual rainfall is expected to decrease by 20.5 percent by 2080, further exacerbating drought. In addition, sea level is expected to rise by up to 34.5 cm by 2080, with accompanying storm surges. Geographical distribution of climate change indicates that the North of Ghana is likely to encounter a hotter and possibly drier climate, while the south, which houses the Accra GAMA region, is likely to face a hotter future with higher rainfall variability and intensity.[39] Downscaled models applied to the river basins on which urban Accra and rural areas upstream depend predict major changes. Results indicate that the Accra region will see an increase in average temperatures between 0.5 to 0.8°C, more extreme rainfall events, erratic rainfall during the rainy season, a tripling of extreme drought conditions, and an 8 percent rise in evapotranspiration.[40]

3. Challenges in GAMA: Hazard Exposure, Shocks and Stresses

Challenges of unplanned urban expansion and climate change impacts are inextricably linked to shocks and stresses to which GAMA is exposed. Shocks refer to sudden events that impact the performance of the city's sectors, structure, infrastructure and institutions. Stresses refer to longer-term trends that undermine the performance of the city's systems and increase the vulnerability of actors within it. Managing these risks and increasing overall resilience requires adequate information on predicted and unpredicted events. Many shocks and stresses that GAMA faces are largely predictable; nonetheless, they

[38] Frimpong Emmanuel Osei, Bolarinwa Olutayo Balogun, Comfort Gyasiwaa Afrifa (2015). Identifying and Quantifying Urban Sprawl in the Greater Accra Region of Ghana from 1985 to 2014. International Journal of Science and Research (IJSR), vol 4, issue 1, pages 2319-7064.

[39] (Arndt, 2015; GFDRR, 2011)

[40] (Baxter, 2015)

have been left unaddressed. Major shocks identified by the local stakeholders during the CityStrength workshop include: flooding, urban fire, cholera outbreak and coastal erosion, coupled with the following secondary shocks: tidal surge, building collapse, windstorm, drought and earthquake (Table 3). Major stresses identified include: poor sanitation, rapid urbanization, proliferation of informal settlements, excessive unemployment, as well as land and chieftaincy conflicts; while secondary stresses include water scarcity, land and environmental degradation, as well as weak governance (accountability and transparency).

Table 3: Key Hazards in GAMA

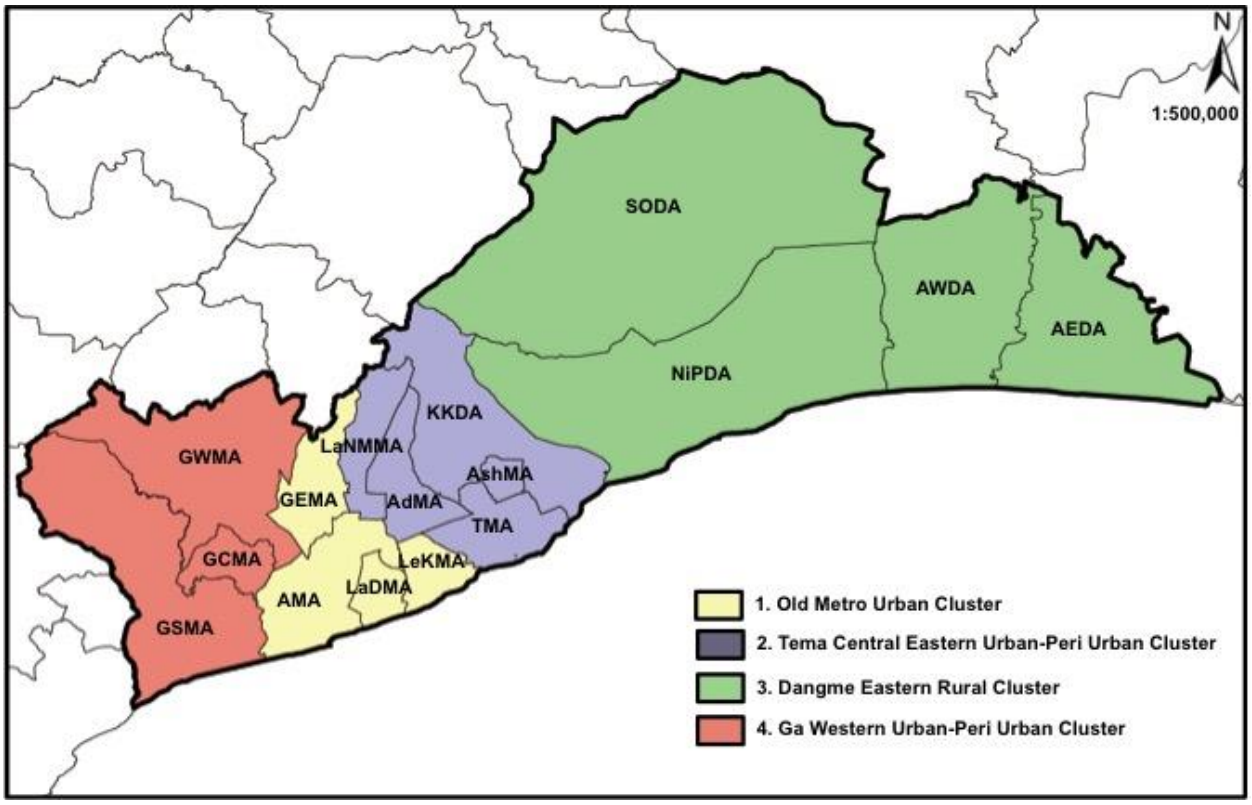
Hazard	Comment
Flooding	Although flooding events and their impacts are not systematically documented by the MMDAs, it is estimated that flooding occurs during all rainy seasons, from March to June or July. The most recent flooding event on June 3rd, 2015 was the deadliest, leaving 150 casualties and affecting 52,000 people.
Cholera	Cholera outbreaks were reported by many MMDAs as happening every year. Between June 2014 and February 2015, 20,500 cholera cases were recorded in the Greater Accra region with 121 fatalities. Open defecation, lack of access to adequate sanitation solutions, and limited drainage network have contributed to cholera outbreaks.
Fire	All MMDAs noted rising exposure to fire. On average, three big fires are reported in a year. Major causes are electrical and gas faults, illegal connections and/or unsafe cooking practices.
Coastal Erosion and Sea level rise	Sea-level rise has led to increased erosion and inundation of vulnerable areas in Accra,[41] with 80 percent of the shoreline threatened by erosion.[42] Significant numbers of houses have vanished due to coastal erosion in the past and the trend continues in some coastal areas.[43]
Building Collapse	Collapse of buildings, both completed and incompleted, have been witnessed with some regularity in the past few years. The challenge is due to outdated building regulatory frameworks and limited or no technical supervision during construction implementation.
Earthquake	GAMA is exposed to earthquakes. Since 1615, records show that the metropolitan area has experienced earthquakes of varying intensity with the last quake occurring in 1939 at a magnitude of 6.5 (a similar intensity earthquake in Philippines killed 12,000 people).[44]

Note: The severity of hazard as perceived by workshop participants. Flooding was identified as the most severe (shown in red), followed by other hazards (shown in orange).

For the purposes of identifying spatial disaggregation of these shocks and stresses, the 16 MMDAs were grouped into four clusters (Figure 11): 1. Accra Old Metro Urban Cluster; 2. Tema Central Eastern Urban-Peri Urban Cluster; 3. Dangme Eastern Rural Cluster; and 4. Ga Western Urban-Peri Urban Cluster. The designation of clusters was based on locational proximity, spatial-economic characteristics, historical administrative relationships, and common drainage shed.

[41] Amoani et al., 2012
[42] Appeaning Addo et al, 2008
[43] Boateng, 2012
[44] Kutu, 2013

Figure 11: Four Clusters in GAMA



Cluster 1, Accra Old Metro Urban cluster is composed of AMA, LaDMA, LeKMA, and GEMA, as the core contiguous areas of metro GAMA that are almost 100 percent urbanized and include the city center of Accra. Cluster 2, Tema Central Eastern Urban-Peri Urban Cluster encompasses TMA, AshMA, KKDA, LaNMMA, and AdMA; Cluster 3, Dangme Eastern Rural Cluster, encompasses SODA, NiPDA, AWDA, AEDA, each of which are predominantly rural in nature and largely sparsely populated (except in the areas around their respective capitals). Cluster 4, Ga Western Urban-Peri Urban Cluster, delineates the western part of GAMA and encompasses GWMA, GCMA, and GSMA.

The following Table 4 and Table 5 summarize the spatial distribution of shocks and stresses.

Table 4: Spatial Distribution of Shocks in GAMA MMDAs

Cluster	MMDA	Flooding	Fire	Tidal/Coastal Erosion	Cholera Outbreak	Wind Storms	Building Collapse	Earth Quake
1	AMA	✓	✓	✓	✓		✓	✓
	GEMA	✓	✓				✓	
	LADMA	✓	✓	✓	✓		✓	
	LEKMA	✓		✓				
2	TMA	✓	✓	✓				
	LANMMA	✓	✓					
	ADMA	✓	✓					
	ASHMA	✓	✓		✓			
	KKDA	✓	✓	✓				
3	SODA	✓	✓					
	NIPDA	✓		✓				
	AWDA	✓	✓	✓				
	AEDA	✓		✓				
4	GCMA	✓	✓			✓		✓
	GSMA	✓	✓		✓	✓		
	GWMA	✓	✓		✓	✓		

Note: Find Annex C for detailed information

Table 5: Spatial Distribution of Stresses in GAMA MMDAs

Cluster	MMDA	Poor Sanitation	Rapid Urbanization	Traffic Congestion	Land/ Boundary Disputes	Jobs	Proliferation of Informality	Water Scarcity	Land Degradation
1	AMA	✓	✓	✓		✓	✓	✓	
	LADMA	✓	✓	✓		✓	✓	✓	
	LEKMA	✓	✓	✓		✓	✓	✓	
	GEMA	✓	✓	✓	✓	✓	✓	✓	
2	TMA	✓	✓	✓	✓	✓	✓		
	LANMMA	✓	✓	✓		✓	✓		
	ADMA	✓	✓	✓	✓	✓	✓		
	ASHMA	✓	✓	✓	✓	✓	✓		
	KKDA	✓	✓	✓	✓	✓	✓		
3	SODA	✓			✓			✓	✓
	NIPDA	✓			✓			✓	✓
	AWDA	✓						✓	✓
	AEDA	✓						✓	✓
4	GCMA	✓	✓	✓	✓	✓			
	GSMA	✓	✓	✓	✓				
	GWMA	✓	✓	✓	✓				

Note: Find Annex C for detailed information

3.1 Shocks

1) Flooding

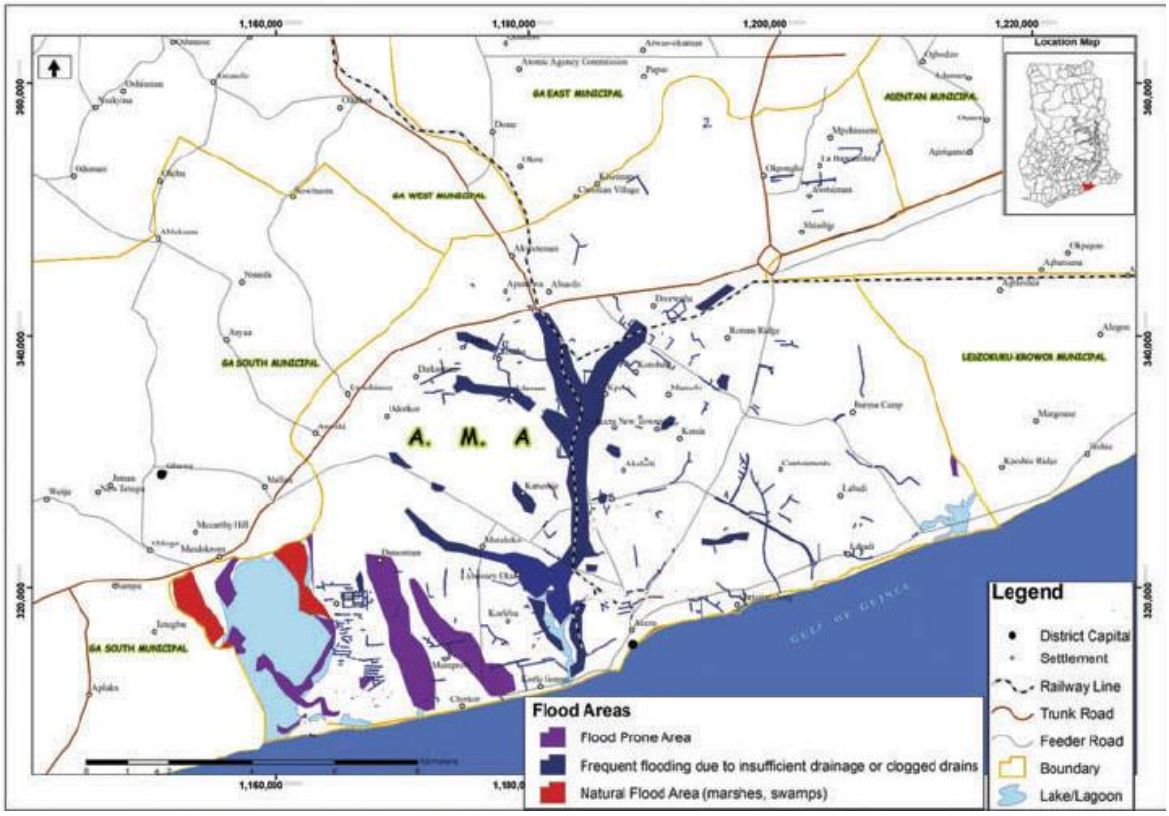
GAMA, which is enclosed by Nyanyanu basin in the west and the Volta Delta estuary east of Ada, is drained by the following basins from West to East: Densu, Lafa, Chemu I, and Odaw River, draining the city center to Korle Lagoon, Osu, Kpeshie, Songo Mokwe, Sakumo II, Chemu II and Ada-Songhor (See: Geography, Topography and Climate). In these basins and drains, flash and riverine floods have become a frequent phenomenon in all MMDAs, leading to loss of lives and property. Significant flood events have been recorded in 1973, 1986, 1995, 1999, 2001, 2002 and the recent devastating June 2015 event (Figure 12). Although flooding events and their impacts are not systematically documented by the MMDAs, it is estimated that flooding occurs during all rainy seasons, from March to June or July.

Figure 12: 2015 June Flooding Flooding in Accra

Source: http://citifmonline.com/2014/06/05/heavy-downpour-floods-accra-photos/ (Accessed September 2016)

Multiple responsible entities at national, regional, and municipal levels have looked into the underlying structural and institutional causes of flooding and ways to address them. In addition to the low lying nature of GAMA, the area's rapid expansion and urbanization has increased the risk of flooding. Figure 13 shows flood prone areas in AMA and other areas affected by floods for specific reasons such as insufficient drainage and clogged drains or natural flood plain such as swamps.

Figure 13: Flood Prone Zones in AMA



Source: Amaoko, 2016

With urbanization, the infiltration capacity of the natural drainage basin system has drastically reduced in recent years. In the absence of adequate wastewater and solid waste collection, the inadequately maintained drains are commonly used as sewers and garbage collectors in all Clusters, which, combined with siltation, chokes the channels further reducing the discharge capacity. The blockage of free-flow streams and drains render low-lying neighborhoods vulnerable to flooding anytime it rains in Clusters 1, 3, and 4. Moreover, most of the lagoon outlets to the sea are significantly silted, causing flooding to become a perennial phenomenon in large parts of the GAMA region. Weak enforcement of planning standards and building codes has resulted in incompatible land uses (including buildings) dangerously encroaching the banks of streams and drains in Clusters 2 and 4.

Design flaws in transport infrastructure further contribute to the overall failure of hydraulic infrastructure. Concrete cover slabs on roadside drains often break and block water flow. These covers are also often installed incorrectly by being placed inside the drain, at water depth, reducing flow capacity and causing spillover. Additionally, runoff patterns and flow regimes are not properly assessed during the design of road infrastructure, causing the associated drainage works to be built to suboptimal capacities.

Table 6 shows the flood prone areas of each MMDA and Cluster.

Table 6: Areas Exposed to Frequent Flooding in GAMA

MMDA	Flood Prone Areas	Cluster
AMA	- Pambros Salt Ponds, Dansoman-Mpoase-South Odorkor corridor, Dansoman-Sukura-Chorkor corridor, Mataheko-Abossey Okai-Korle Lagoon corridor, Odaw-Dzorwulu-Awudome Industrial Area System and Darkuman-North Kaneshie-Tesano corridor	1. Accra Old Metro Urban Cluster
LekMA	- Coco Beach, Kasapreko, Mukwedjor, Nkomefa and Rasta/Otabil	
LaDMA	- Adiembra, Adobertor, Burma camp, Cantonments, Ako Adjei, New La Kpanaa, Labone, New Kaajano Abafum/Kowe/Abese and Tse-Addo/Mantiase	
GEMA	- Kwabenya, Agbogba, Ashongman, Taifa, Dome, Okoe, and Christian Village	
TMA	- Communities 3, 5, 11, 12, 16, 18, 19 & 20, Sakumono, Tema Newtown, Lashibi/Klagon and Adjei Kojo	2. Tema Central Eastern Urban-Peri Urban Cluster
AdMA	- Adenta Commando Area, Ashiyie, Ashale- Botwe, Japan Motors, New Legon, Nanakrom, Abenwoha and Nsuonano	
AshMA	- Middle east, Damsite, Roman Down, Lebanon zone 5, Community 22, Jericho, Asensuba, Valco Flat, TDC old quarters and Ashaiman New town	
LaNMMA	- Aboman, Adenta West, Redco, Madina West, Labone, Firestone, Hanna, Agbogboshie, Arapa jay	
KKDA	- Golf City, Zenu Dam site, Community 25, Kpone Shalom Estate, Kpone-Kokompe and Gbetsile Dam site	
NiPDA	- Afienya, Tsopoli, Annewe Olowe, Ayetepa, Kpongunor, parts of Dawhenya, Old and New Ningo, and Prampram	3. Dangme Eastern Rural Cluster
AWDA	- Akplabanya, Anyamam, Wokumagbe, Goi, Lolonya, Luhuor, Agbedrafor, Matsekope and Addokope	
SODA	- Dodowa, Odumase, Alikope, Ayikuma, Luom, Doryumu, Natriku, Asutsuare and Labuse	
AEDA	- Ada Foah, Azizanya	
GWMA	- Kotoku, Medie, South Ofankor, Fish Pond, Nsakina	4. Ga Western Urban-Peri Urban Cluster
GSMA	- New Weija, Old Weija, Tetegu, Oblogo	
GCMA	- almost the whole area	

Note: Find Annex C for detailed information

2) Fire Outbreak

In recent years, fire outbreak has become a common feature in most of the GAMA region, and all the MMDAs noted rising exposure to its hazards. Fire outbreaks can be categorized according to a variety of contexts, such as industrial, market, residential and bush fires, with several losses to property and sometimes casualties counted during these incidents. Clusters 3 and 4 are both susceptible to residential fire, while rural Cluster 3 is the only one susceptible to bush fire. Industrial fires are mostly recorded in industrial areas of AMA, TMA, KKDA and are largely attributed to lack of safety precautions and electrical faults. Similarly, dilapidated electrical wiring, illegal electricity connections and unsafe cooking practices in formal and informal market places have contributed to fires in AMA, GaEMA, TMA and AshMA. Fire outbreaks in the slums or informal communities are also common in AMA, LaDMA, TMA, AshMA, and LaNMMA. Residential fires are largely due to over-crowding, illegal connections, improper wiring by unqualified electricians and unsafe cooking habits. The most recent fire incident was in AdWDA and SoDA.

Moreover, wildfires or bushfires occur in rural areas of GaEMA, LaNMMA, KKDA, AdMA, and MMDAs in Cluster 3, especially from November to March when the dry, hot season is at its peak. Fire outbreak hotspots are shown below in Table 7.

Table 7: Fire Outbreak Hotspots

Fire	Hotspots
Industrial Fire	- AMA: industrial area - TMA: industrial area - KKDA: industrial area
Market Fire	- AMA: Agbogboloshie, Kaneshie, Katamanto, Makola - GaEMA: Dome - TMA: Community 1 Market - AshMA: Ashaiman Main Market
Residential Fire	- AMA: Old Fadama, Nima - LaDMA: La - AshMA: Old Tulaku, Adakordz - TMA: Tema Newtown, Communities 1, 2, and 5 - LaNMMA: Madina Zongo
Bush Fire	- GaEMA: Adenkrebi, Ayi Mensa, Sesemi, Dedekrom, Bodomase, Ogoha - LaNMMA: Danfa, Addo Teiman and Otinibi - KKDA: Appolonia, Oyibi, Gonten and Nanoman - AdMA: Marlejor and Amrahia - AWDA: Addokope, Dorgobom, Kablevu, Sege and Akplabanya - SODA: Dawa, Gbogbodziri, Agomeda; Asenema, Sanfo Dawu, Kpeyibo, Kentenkyiren, and Dzogbedi

The impacts of fire outbreaks are further exacerbated by lack of adequate access roads, traffic congestion, and increasing neighborhood density and informality, making it difficult for emergency services to reach the affected areas and fire can spread quickly due to overcrowdedness. As a result, fires are usually out of control by the time the Fire Service responds and gets to the fire scene.

3) Cholera Outbreak

There is an observed frequency of epidemics of diseases such as cholera, common primarily during or immediately after the rainy seasons within Clusters 1 and 4. The vulnerability to cholera is linked to poor sanitation and hygiene, and poor drainage and solid waste management associated with densely populated and informal developments within the GAMA area. Open defecation in coastal areas continues to be common practice, especially in the eastern, more rural MMDAs. The weak enforcement of sanitation bye-laws by the respective MMDAs also contributes to the problem.

Between June 2014 and February 2015, 20,500 cholera cases were recorded in the Greater Accra region with 121 fatalities.[45] The main hotspots during the last incidence of cholera included Old Fadama, Chorkor, Mensah Guinea, James Town, Gbegbeise in AMA and La Kpanaa, Abafum, Kowe, Abese, New La Kpanaa, Adienbra and Adobertor in LaDMA. GaSMA and GaWMA have also recorded the highest incidence in the Clusters, including Weija, Tetegu, Mallam, Gbawe, Oblogo, Amanfro, Bortianor, Kokrobite and South Ofankor, where open defecation, inadequate household toilet facilities, and improper solid and liquid waste disposal are acute.

[45] (IFRC, 2015)

4) Coastal Erosion and Sea Level Rise

Sea-level rise has led to increased erosion and inundation of vulnerable areas in Accra.[46] About 80 percent of the GAMA's 225 kilometer shoreline is threatened by erosion.[47] Significant numbers of houses have vanished due to coastal erosion and the trend continues in some coastal areas.[48] Property loss is expected to rise to 926 buildings submerged[49] and the potential economic losses will include the fish landing sites and the salt mining industry.[50] By 2100, the coastline is expected to have retreated by 189 meters to 202 meters.[51] Additionally, 8 hectares of vegetation will also be lost to inundation by 2100. It is estimated that the coastline is eroding at a rate of four meters annually in the east (around Ada) and two meters annually in the west (around Kokrobite).[52]

The high erosion rates are adversely affecting coastal infrastructure and valuable cultural resources, as well as the environment and communities. In addition to sea level rise, coastal erosion has been exacerbated by sand and gravel mining for construction in the past,[53] poor management of the coast over the years, inadequate construction of sea-defense walls,[54] and excessive and indiscriminate encroachment of buildings along the coast. Coastal erosion is a chronic issue along the coastline of Clusters 1 and 2, with the most severe cases occurring at Nungua and Teshie in LeKMA, La in LaDMA, Mensah Guinea in AMA, as well as the coastline of TMA and KKDA.[55]

5) Secondary Shocks

The risks of tidal surge or building collapse are not prevalent across all MMDAs but does effect some of them. Drought and earthquakes have not been identified as main shocks by the MMDA clusters but there is a need of frequent monitoring as either would have a significant destructive impact.

a. Tidal Surge

Tidal surge is one of the biggest problems that affect the socio-economic life of the people living and working in the coastal areas of Cluster 3. Heavy and strong tidal waves from the sea have eroded the sandy coastline, leading to occasional flooding in some communities. During high tide, houses are inundated and submerged, leaving hundreds of people homeless and destroying the economic livelihood of the affected population. In late April/early May of 2016, more than 300 people were displaced within Ada West alone. Representatives of AWDA mentioned that the retention wall being built in the neighboring region is exacerbating tidal surges for them. The situation exposes the inhabitants to the threat of environmental sanitation, communicable diseases and squalor. In an attempt to address the erosion of the coastline and inundation associated with the surge, a couple of sea defense initiatives were implemented at Ada and

[46] Amoani et al., 2012
[47] Appeaning Addo et al 2008
[48] Boateng, I. (2012). An application of GIS and coastal geomorphology for large scale assessment of coastal erosion and management: a case study of Ghana. J Coast Conserv. DOI 10.1007/s11852-012-0209-0.
[49] Appeaning Addo et al., 2011
[50] ibidIbid.
[51] Ibid.
[52] Appeaning Addo, 2013
[53] Although recently banned, the construction sector relied heavily on the use of coastal sand and pebbles of the coastal areas of GAMA when constructing buildings, houses, bridges and roads. Despite the ban, this practice continues as a form of sand theft, directly causing erosion.
[54] Representatives of TMA and KKDA at the pre-diagnostic workshop also indicated they believed the construction of sea-defense walls in nearby coastal communities has transferred the tidal pressure of the sea to their coastlines, resulting in the increasing rate of coastal erosion being recorded within their jurisdictions.
[55]Coastal erosion hotspots are identified by the Department of Oceanography and Fisheries of the University of Ghana and officials of the affected MMAs

Blekusu. Discussion and coordination between neighboring regions are also critical given the case of AWDA.

The main tidal surge and coastal erosion hotspots include the following areas: Kewunor, Lolonyakope, Pute, Otrokpe, Anyakpor, Elavanyo and Totope in AEDA; Akplabanya, Anyamam, Wokumagbe, Goi, Lolonya, and Kablevu in AWDA; and Kpongunor, Minya, Abia, Akokokrom and Prampram in NiPDA.

b. Building Collapse

Structural defects, lack of adherence to building codes and the use of unqualified artisans to develop high-rise buildings have resulted in building collapses lately in Clusters 1 and 2. Collapse of buildings, both completed and incomplete, has been witnessed with some regularity in the past few years. There has been series of the incidents in AMA, LaDMA, LaNMMA and AshMA, where most middle-rise building development has taken place. A six-story Melcom shopping mall in November 2012, a four-story building under construction at Cantonments in July 2015, a ten-story building under construction for Export Development and Agricultural Investment Fund (EDAIF) in November 2015, and the incomplete five-story Airport City building in February 2016, all collapsed, resulting in the loss of lives and properties. The city authorities vehemently denounced the owners of the buildings for failing to acquire the necessary permits before putting up the structures and the building inspectors for their negligence and wanton disregard for the structural integrity of the buildings. A common excuse among most developers is that they build without the necessary permit due to the long waiting time for approval. Strict supervision and enforcement of building codes is critical to this effect.

c. Windstorms

Windstorms are seemingly a secondary shock affecting only Cluster 4, such as Lomnava and Israel in GCMA, Amanfro and Obom in GSMA, and Manchie and Kotoku in GWMA. However, they are becoming a worsening phenomenon in recent times due to climate change. Buildings and livestock have been mostly affected and some injuries have also been recorded. Between 2011 and 2016, over 200 houses and 30 people have been reported to have suffered from damages and injuries respectively due to windstorms in GWMA.

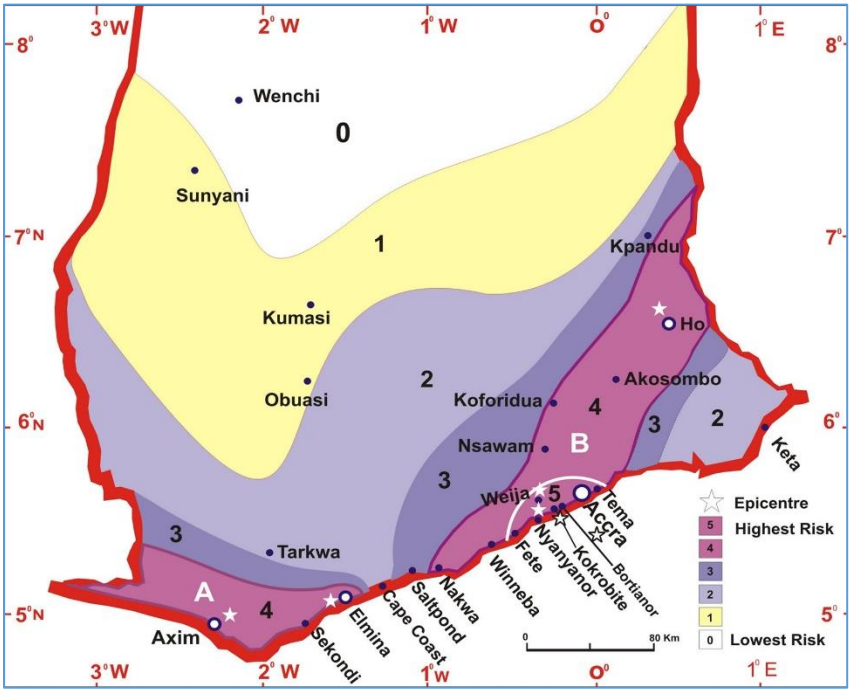
d. Drought

High temperatures, acute dry weather conditions and reduced rainfall are leading to the drying up of most of the rivers that supply water to the western part of GAMA during the dry seasons. Most affected are areas in the GWMA, GCMA and GSMA that rely on water from the Densu River. Drought in the northern areas in Ghana also effects GAMA, pushing people who lost their agricultural sector livelihoods into the city, thus putting pressure on basic services and increasing informality.

e. Seismic Movements and Earthquake Hazards

GAMA is situated in an active seismic location—a fault line from the Akwapim ridges runs through SODA, GWMA, GCMA and GSMA—with the underlying terrain being highly fractured and yet bearing a lot of buildings that are susceptible to earthquake disaster (Figure 14). Records show that, since 1615, the metropolitan area has experienced earth movements of varying intensity, with the last earthquake occurring in 1939 with a 6.5 magnitude on the Richter scale. In the 1990's an earth tremor was experienced in the region and there is a likelihood of reoccurrence (Katu, 2013). Public information on earthquake predictions and appropriate responses is virtually nonexistent. Poor building construction design, and weak enforcement of building and seismic codes and regulations contribute to vulnerability to earthquakes, worsened by a lack of preparedness to deal with such disasters. Disaster risk management by respective districts has been mostly focused on recurrent shocks such as epidemics and floods.

Figure 14: Major Earthquake Epicenters, and the General Earthquake Risk-Level Zones of Southern Ghana



Source: Kutu, 2013[56]

3.2 Stresses

1) Rapid urban expansion

GAMA's urban population is growing at an annual rate of four percent. Rapid urbanization in and of itself can yield many positive outcomes, but it is categorized as a stress for GAMA because the city cannot keep pace with the need for planning and provision of basic services, and as a result, the growth has been haphazard. In the eastern half of the region (AEDA, AWDA, SODA, NIPDA) and the peri-urban portions of the western half (GASMA, GAWMA, GAEMA, ADMA, KKDA), rapid urban expansion has placed pressure on land, housing, infrastructure and basic services as well as the environment. These MMDAs are the current frontiers of the urban expansion of the GAMA region with land development occurring at an alarmingly rapid rate. In the case of newly developed areas in pre-urban Cluster 4, service provision and infrastructure has been particularly difficult because it features sparsely populated settlements.

2) Proliferation of informality

Rapid urban expansion has been accompanied by a proliferation of informality, particularly in the western half of the GAMA region. Informal settlements in GAMA, constitute over 40 percent of the built-up area, with the largest portion recorded in AMA, LaDMA, AshMA, and LaNMMA (Table 8). The lack of a properly functioning housing and land market and the increased cost of land in the center of Accra, have contributed to further expansion of informal settlements and slums. In the absence of formal provision of infrastructure and services, the majority of informal settlers resort to informal channels for obtaining services, usually at inefficient and relatively high cost. In the case of land, informal transactions can sometimes lead to conflict, with land being sold to multiple buyers. This poses further stress on their already precarious living conditions and the city's management capacity.

[56] Kutu, 2013

Table 8: Areas of Urban Expansion with Informality

MMDA	Areas	Cluster
AMA	- Sukura, Russia, Sempe, Sabon Zongo, James Town, Korle Dudor, Adedenkpo, Chorkor, Old Fadama, Mpoase, Gbegbeyise, Mamponse, Darkuman, New Fadama, Abeka, Akweteyman, Achimota, Maamobi, Kotobabi, Niiman, Mempeasem, Old Tesano/Adaman, Avenor and Alajo, Ayidiki, Babylon and Abuja	1. Accra Old Metro Urban Cluster
LekMA	- Teshie and Nungua old towns	
LaDMA	- La	
GEMA	- Dome, Taifa, Kwabenya and Haatso	
TMA	- Tema Manhean, Klagon, Sakumono Village, Adjei Kojo	2. Tema Central Eastern Urban-Peri Urban Cluster
AdMA	- Approtech, Ashiyie, Nsamanpom, Adentan Mamomo, Old Ashaley Botwe, Ogbojo, Adjiriganor and Otano Villages, Amanfro and Amrahia	
AshMA	- Ashaiman	
LaNMMA	- Madina, Agbogba, Danfa, Otinibi, and West Adentan	
KKDA	- Kakasunanka, Zenu, Appolonia, Kpone Bawaleshie, Gbetsile, Kpone and the area just south of the Free Zone Enclave and north of Bankuman	

Note: Find Annex C for detailed information

3) Lack of Infrastructure and Service Delivery

a. Poor Sanitation and Waste Management

GAMA faces serious challenges throughout the environmental sanitation chain, beginning with the limited access to toilet facilities associated with inadequate waste management. Though there is access to some type of sanitation facilities throughout the region, coverage is still below standard. In Ga West, for instance, total sanitation coverage is estimated at 47 percent for domestic entities and 65 percent for international institutions. Some residents in Cluster 4 use unapproved toilet facilities like pit and pan latrines and still practice open defecation.

Sanitation challenges are often associated with a variety of potential bottlenecks: (i) limited wastewater and septic sludge collection and transportation, (ii) lack of operational wastewater and sludge treatment facilities, (iii) inadequate solid waste collection from low-income areas, and (vi) absence of adequate solid waste disposal facilities. More than half of the population in Cluster 3 have no access to organized means of waste disposal; therefore, waste continues to be dumped and burned. In case of Cluster 4, there are systems in place to ensure door-to-door collection; still, it is inadequate and unaffordable to some households. Some municipalities (e.g. GSMA and GCMA) have no engineered landfill final disposal sites for both liquid and solid waste, and depend on other municipalities, ending up increasing the cost of waste disposal due to transportation cost.

There are existing Municipal Environmental and Sanitation Strategy and Action Plans (MESSAPs) for each of the municipalities but implementation suffers an inadequacy of funds and lack of commitment from relevant institutions. While these problems are common to all MMDAs in the GAMA, and waste flows across political boundaries, solutions are usually sought individually by each MMDA.

b. Lack of Connectivity and Congestion

Deficiencies in transportation infrastructure are pervasive throughout the 16 MMDAs. Road transport is used most widely and by the overwhelming majority of people, as other modes of transport are poorly developed. In core urban areas, however, accessibility and mobility are problematic, with inadequate road infrastructure, poor surface conditions of roads including major collectors and most local roads, and improper traffic management systems. There is over-concentration of activities in certain areas (especially in the central business district of AMA) and the circulation system has not been properly designed to take land use into account, leading to persistent traffic congestion (Table 9). Roads in the peri-urban and rural portions are also poorly developed with most lacking side drains, making them inaccessible during the rainy season and adversely affecting agribusiness in markets.

Table 9: Congestion Hotspots

MMDA	Areas	Cluster
AMA	- Central business district, Kwame Nkrumah Circle, Obetsebi Lamptey Circle, Dansoman-Asoredanho, Dansoman-Sakaman and Kaneshie Market	1. Accra Old Metro Urban Cluster
LekMA	- Teshie-Nungua Beach Road, Nungua Barrier, Spintex Road, Adogon Railway crossing—Baatsonaa road	
LaDMA	- Osu-La Beach Road, Labone, Switchback Road, Cantoments and Airport	
GEMA	- Achimota Golf Course-Dome Pillar 2, Dome old town, and Kwabenya-Ashongman corridor	
TMA	- Ashaiman Interchange—Motorway Roundabout; Valco Roundabout—Motorway Roundabout, General Hospital Roundabout	2. Tema Central Eastern Urban-Peri Urban Cluster
AdMA	- Madina Road and Ashale Botwe—Nmai Dzorn Road	
AshMA	- Ashaiman Interchange—Ashaiman Market, and Municipal Assembly—Bus Terminal	
LaNMMA	- Atomic Junction Roundabout, Madina Market—Ritz Junction, and Ritz Junction—Ashale Botwe Road	
KKDA	- Motorway Roundabout—Dawhwenya Road, Motorway Roundabout—Afienya Road, and Kpone Township roads	
GWMA	- Pokuase U-Turn to Ofankor Roundabout, Sarpeiman, and Faase	4. Ga Western Urban-Peri Urban Cluster
GSMA	- Toll booth to Kasoa first light	

c. Water Scarcity

Availability of water resources and accessibility to piped water are the main concerns in Clusters 1 and 3. Both clusters suffer from water scarcity because current demand on potable water has exceeded its capacity. In AMA, for instance, Weija and Kpong Waterworks supply 401,800 m^3 of the 532,570 m^3 daily demand, which accounts only for 75 percent of demand. Water scarcity affects rural areas and low-income populations disproportionately. In urban areas of Cluster 1, there is marked variation in access to water with respect to income classes. Some wealthy areas in AMA, LEKMA, and LADMA are connected to the water network most of the days and they pay official rates. While, the areas where middle- and low-income earners live, the supply of water is poor and irregular even if they have piped-water connections. In case of GEMA, areas such as Dome, Taifa, Agbogba and Ashongman Musuko, with limited or no access to water connections, ended up purchasing water from private vendors at high cost.

Unlike urban areas, rural areas in Cluster 3 have far more limited to access to water. Except for bigger and suburban communities connected to Ghana Water Company Ltd. lines from Kpong and Osudoku Water Project, the smaller communities depend on dams, streams, rivers and dug-outs for drinking water and other domestic uses. Even for those communities connected to pipe lines, the flow of water is irregular in most communities. The main water scarcity hotspots in Cluster 3 include the following: Otsebleku, Abbeypanya, Ajumador, Kpotsum, Nyigbenya to Dawa areas in NiPDA; Asasekorkor to Lanor areas in SoDA; Wonyi Ada to Medovunu areas in AWDA; and Asigbekope areas in AEDA.

4) Excessive unemployment

The unemployment rate of 13.4 percent in GAMA is higher than Ghana's national average of 10.4 percent, and can be attributed to the mismatch of rapid urbanization and availability of adequate jobs in the city. Services constitute the major sector of GAMA's economy, with agriculture limited to the rural parts of the region (GEMA, AEDA, AWDA, SODA, and NiPDA). The regional economy continually fails to generate enough industrial development and growth, with most jobs concentrated in low value-added informal services. The large informal sector has limited access to finances and therefore typically remains composed of relatively small household enterprises. Inadequate employment opportunities, significantly affecting the large cohort of youth with limited skills and training, combined with low informal sector wages and salaries, pose a serious threat to GAMA's security. It was reported during consultations that the lack of employment opportunities might be leading to social vices such as drug dealing and crime and violence. Moreover, current social protection programs that provide support to poor and vulnerable households are not always effectively targeted. They often focus on rural areas, have relative low coverage, are fragmented, and largely focus on specific categories of vulnerable groups, such as the elderly and disabled. In addition to the daily stress that unemployment presents for individuals, the cumulative impact among segments of society could undermine the inclusive growth agenda and may contribute to social unrest.

5) Land, boundary and chieftaincy disputes

In the effort to create more Local Government Authorities, the delineation and re-demarcation of land, without clear agreed-upon boundaries, has contributed to boundary disputes and tension among some MMDAs, and is affecting planning and development of communities around contested boundary areas. The land acquisition and ownership structures and processes in the country are not conducive to effective city development. Almost 80 percent of land ownership in Ghana is customary and such lands are vested in traditional authorities, families and clans who lease out the lands or sell them. Bureaucracies in processing land property documents have resulted in multiple sale of lands and the associated conflicts in the city. The peri-urban areas of GEMA, GSMA, GWMA, LaNMMA and AdMA are the most effected. Guards have been positioned on lands to secure them many times and conflicts over the ownership of these lands have resulted in damages and in some cases even deaths; posing a threat to security and law and order within the GAMA region.

6) Weak urban governance and institutional coordination

A general lack of regulatory enforcement and institutional coordination presents another cross-cutting stress in the region. The resilience challenge confronting GAMA is compounded by the array of stakeholders with planning, management and operational responsibilities within its jurisdiction. These stakeholders include the Regional Coordinating Council, the 16 MMDAs (planning and rating authorities), parastatals, customary landowners, the private sector, individuals and NGOs. Their number and diversity, combined with an environment of inadequate institutional and coordination capacity in the Ministries, Departments, and Agencies (MDAs) and MMDAs, an unresponsive legislative framework, human resource shortages, and inadequate financial resources, together pose a steep challenge to joint decision-making and coordination as well as enforcement of plans and regulations. Building governance and stakeholder

institutional capacity and coordination will be key to maintaining a functional system and enabling the resilience envisaged for the GAMA region.

4. Summary of findings across MMDAs

The Greater Accra Metropolitan Area is facing new opportunities and challenges. GAMA is home to 4.6 million Ghanaians, accounting for 16.3 percent of Ghana's total 2016 population. The great majority (90%) of the GAMA population resides in urban areas,[57] with large concentrations of people, investments and economic activities, and growing at an annual rate of four percent. However, city services and infrastructure have not kept pace, contributing to a number of stresses such as a lack of affordable housing, limited access to basic services, and long commute hours with traffic congestion. The stresses faced by GAMA are exacerbated by the region's exposure to flooding, fire, earthquakes, and other impacts from climate change.

Main shocks identified by local stakeholders in the course of the CityStrength consultations included flooding, fire, cholera outbreaks and coastal erosion; secondary shocks included tidal surges, building collapse, windstorms, drought and earthquakes. Flooding is a dominant shock across all MMDAs, given its frequency and impact on people's lives and property, but it is not the only recurrent threat facing the region. The largely urban MMDAs have been affected by fire, high-density and informal settlements across the city, as well as lack of basic services and infrastructure leading to public health issues. In the coastal MMDAs, communities have a high vulnerability to coastal erosion and tidal surges, coupled with sea level rise as a consequence of climate change. A few mostly rural MMDAs that are part of GAMA reported water scarcity, land degradation, bushfire outbreaks, and lack of connectivity to markets as their main concerns.

These urban stresses have placed pressure on GAMA's built and natural environment. The region is under strain due to poor sanitation, rapid urbanization, proliferation of informal settlements, excessive unemployment, and land and chieftaincy conflicts. Secondary stresses identified include water scarcity, land and environmental degradation, as well as weak governance and institutional coordination. The pressure of rapid urban expansion on land, housing, the environment, infrastructure and basic services makes GAMA more vulnerable to various shocks as it is unprepared to withstand their impact. Embedded fragmentation of jurisdictions and lack of coordination among MMDAs undermine equitable basic service delivery and coherent land use planning. Stresses occur unevenly across the MMDAs, but affect the poor and vulnerable in a disproportionate manner. Urban areas have relatively better access to service and infrastructure than peri-urban rural areas. High-income households can afford access to formal services, while low-income households end up using private vendors, often at a high cost.

The combination of shocks and stresses put pressure on urban system, and this will be further discussed in the next chapter.

[57] Ghana Statistical Service: Population and Housing Census, 2010.

III. ASSESSMENT OF RESILIENCE OF URBAN SYSTEMS

III. ASSESSMENT OF RESILIENCE OF URBAN SYSTEMS

Introduction and Overview

In this chapter, the findings of the sectoral assessments of resilience are presented. The sectoral specialists and local stakeholders conducted the assessments jointly, based on information collected as part of the pre-diagnostic phase and discussed collectively during the consultation workshops. The performance of each sector was measured against the five characteristics of resilience. The process at the sectoral level was intended to provide participants with a better understanding of strengths and weaknesses in each of the sectors and their linkages with other systems. These insights served as input into the overall prioritization process.

The following sectors, organized under three categories, were part of the exercise:

1. Urban Development, Housing and Disaster Risk Management
    1.1. Urban Development, Land Management and Housing
    1.2. Disaster Risk Management
    1.3. Urban Finance

2. Urban Services and Infrastructure
    2.1. Transport and Roads
    2.2. Water Supply and Sanitation
    2.3. Solid Waste Management
    2.4. Drainage and Coastal Zone Management

3. Community Development and Social Protection

Qualities of Urban Resilience

Quality	Description
Robust	Robust systems include well-conceived, constructed and managed physical assets, so that they can withstand the impacts of shocks without significant damage or loss of function. Robust design anticipates potential failures in systems, making provision to ensure failure is predictable, safe, and not disproportionate to the cause. Overreliance on a single asset, cascading failure and design thresholds that might lead to catastrophic collapse if exceeded are actively avoided. An important aspect of robustness is proper operations and maintenance to ensure that systems are functioning properly. (E.g. A building is designed to accommodate a seismic event without collapse or excessive damage.)
Redundant	A redundant network or system has a belt and braces approach which includes spare capacity or back-up to accommodate disruption, extreme pressures or surges in demand. Providing diverse ways of achieving a given need or fulfilling a particular function is a means to achieving a redundant system. If one service channel gets disrupted, another can be used. (E.g. A power distribution network is able to rebalance to respond to a surge in demand in a particular area.)
Reflective	Resilient urban systems examine, learn, and evolve based on their past experiences and new information, modifying standards or norms based on emerging evidence rather than seeking permanent solutions based on the status quo. As a result, people and institutions examine and systematically learn from their past experiences, and leverage this learning to inform future decision-making. (E.g. A financial management system might make use of information on past shocks and stresses to improve budget reserving policies.)
Coordinated	Coordination between city systems and agencies means that knowledge is shared, planning is collaborative and strategic, and decision-making is based on investments that are mutually supportive towards a common outcome. Exchange of information between systems enables them to function collectively and respond rapidly through feedback loops occurring throughout the city. (E.g. A coordinated transport systems is not only aligned with urban growth dynamics and land use but also has open communication with other agencies so that it can divert user traffic to different modes of transport based on changing conditions.)
Inclusive	Being inclusive recognizes that risk is perceived differently by different stakeholders and that shocks and stresses affect the most vulnerable the most. An inclusive approach contributes to a sense of shared ownership or joint vision to build a resilient city. This can be achieved through consultation and engagement with a wide range of stakeholders, including the most vulnerable groups, to ensure that systems are more resilient by considering a wider range of vulnerabilities, risk management capacities, and localized information. Equity in access to infrastructure and services underpins social cohesion and opportunity. (E.g. An inclusive budgeting process could help ensure that the allocation of city resources reflects community priorities.)

1. Urban Development, Disaster Risk Management and Urban Finance

1.1 Urban Development, Land Management and Housing

In a resilient city, physical and socio-economic planning processes are well-coordinated, legally enforced, inclusive, and cross-sectoral. Key stakeholders are involved to align plans with sector priorities and to ensure that the interests of all societal groups are taken into consideration (coordinated and inclusive). Coordination between departments and other agencies enables the use of existing knowledge and data across the city to better understand current and future vulnerabilities (reflective). Urban planning and development ensures a holistic and long-term approach to urban growth, factoring in potential shocks and stresses and encouraging proactive mitigation measures (robust). Multiple strategies are in place to ensure that primary urban development goals can be achieved in the face of changing demographics, urbanization rates, or economic shifts (redundant).

Sectoral Overview

As evidenced in other sections of this report, GAMA is urbanizing at an alarming rate. The growth has been sprawled, haphazard, and with various densities in different MMDAs. GAMA's outward expansion coupled with a lack of a formal and efficient land market, as well as timely land-use planning, has led to the proliferation of informal settlements which make up a large area of the city. Informal housing has generally featured low-quality construction materials, crowdedness and limited services provision (e.g. water supply, transport, sanitation and solid waste management). Moreover, many people have settled in dangerous areas such as river canals. Lack of funding and weak technical capacity have made it challenging for the city to provide the appropriate infrastructure and maintain existing assets. GAMA therefore experiences recurrent stresses and is not able to withstand the various shocks that impact the city and disproportionately affect the urban poor. There is no existing body that coordinates land use planning and risk mitigation efforts at the metropolitan level, thus resulting in disjointed individual initiatives in the different MMDAs and worsening haphazard urban development. While good urban and housing policies are in place, the challenge remains implementation.

Institutional Set-up

MMDAs are responsible for overall urban development as informed by the Local Government Act, 1993 (Act 462) and the national decentralization policy framework, 2015–2019. However, this responsibility is subject to policy directives/guidance, planning evaluation and monitoring responsibilities of national level urban sector Ministries, Departments and Agencies (MDAs). This oversight is by extension also exercised by the Regional Coordinating Councils (RCCs) as political institutions and the regional-level Ministries, Departments, and Agencies (Regional MDAs) as bureaucratic and technical institutions.

Operating within the framework of national policy, the MMDA is the urban policy-making body for its jurisdiction. It has legislative power and it has taxation power. The deliberative and legislative functions of MMDAs are performed by the General Assembly under the leadership of the Presiding Member (Speaker of the House). Each MMDA is under the control of a Chief Executive representing central government but deriving his/her authority from the Assembly. Each MMDA has an Executive Committee headed by the Chief Executive, which superintends the implementation of the decisions of the General Assembly. Departments of the MMDAs and district-level departments of other MDAs carry out implementation of urban development initiatives within the districts.

Policy Context

The main policies that drive urban development, land management and housing are implemented by various ministries at the national level, and by MMDAs and MDAs at the local level:

- National Urban Policy (2012–2017): Guides urban development at the national level and includes climate change adaptation and mitigation mechanisms.
- National Housing Policy (2015): Promotes access to adequate housing, inclusion in decision making, and sustainable funding to meet housing demand.
- National Land Policy (1999): Aims to harmonize laws and policies to facilitate access to land and security of tenure, away from dangerous areas. Furthermore, promotes capacity building for government officials.
- National Spatial Development Framework (2015–2035): Long term spatial development strategy. A framework is being prepared for the Greater Accra Region.

Box 1: Goals of National Land Policy

The goals of the National Land Policy are to: (i) harmonize statutory laws and customary practices to facilitate equitable access to land and enhance security of tenure through registering systematically all interests in land; (ii) minimize and eliminate, where possible, the sources of protracted land boundary disputes and litigation in order to bring their associated economic costs and socio-political upheavals under control; (iii) ensure payment within a reasonable timeframe of fair compensation for land acquired by the state from customary or private landowners; (iv) instill order and discipline in the land market to curb the incidence of land encroachment, unapproved development schemes, multiple or illegal land sales, land speculation and other forms of land racketeering; (v) create and maintain effective institutional capacity and capability at the national, regional, district, and where appropriate, community levels for land services delivery; (vi) promote community and participatory land management and land use planning within a decentralized planning system; and (vii) formalize land markets where appropriate to promote business-like and professional property management principles with the aim of maximizing economic, financial and social returns while working towards a self-financed land administration system.

Table 10: Projects and Programs—Urban Management and Housing

Type/ Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA(s)
Land Administration Project (LAP) 1 and 2	Lay a policy and institutional foundation and pilot initiatives in land administration. Land Commissions (LC) were created and business processes were computerized for faster delivery of services. The registration of deeds was decentralized to all nine regional capitals and land use planning was modelled at three levels, including preparation of spatial development frameworks, structure plans and local plans.	World Bank	MLNR, MESTI, TCPD, LC	US $50m	2004–2017	Nation-wide

Type/ Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA(s)
Greater Accra Spatial Development Framework	Preparation of regional spatial development framework for Greater Accra	World Bank	TCPD, MESTI, RCC	US$25m	2016–2017	GAMA
GAMA Sanitation and Water Project	Sanitation and water supply improvements	World Bank	MLGRD, G ARCC	US$150m	2013–2018	GAMA
Local Government Capacity Support Project	Urban infrastructure and services improvement, Municipal finance	World Bank	MLGRD	US$175m	2011—2018	MMAs
Support for Decentralization Reforms (SfDR) Project	Urban management, urban services, capacity building	GIZ	MLGRD; LGS			MMDAs
District Development Facility (DDF) 2	Performance-based earmarked revenue granted to MMDAs to support implementation of items within the Medium Term Development Plan (MTDP).	Canada, Danida, AFD, KfW, and SECO	MLGRD	US$230.2m	2014-2018	All MMDAs
Accra's Planned City Extension Project	Spatial/land use planning	UN-Habitat	MLGRD, TCPD			NiPDA

Qualities of Resilience

Robustness

The robustness of the urban development, land management and housing sector in relation to shocks and stresses is very limited. National building regulations are not enforced and haven't been updated since 1996. Regardless, building standards, building permit and plot size standards do not incentivize housing options for informal communities.

Most MMDAs have either no land use or sector plans, or existing plans are outdated. MMDAs also have incomplete land registration and cadastral systems, which lead to informal land transactions. Land use plans that take shocks and stresses into account are either non-existent or unenforced.

Both the national urban policy and the new housing policy have provisions for resilience and climate change actions and make specific reference to the 'use of sustainability principles to guide shelter and human settlement development' (Ghana Housing Policy, 2015). The challenge will be the successful implementation of the policy and related initiatives. MMDAs are facing challenges in managing the uncontrolled and unpermitted expansion of buildup areas (formal and informal), which leads to an increase of settlements in high risk zones. Following the June 2015 flood disaster, ad hoc efforts were undertaken along the hot spots in some of the river basins to remove settlers from high risk zones, but the efforts do not appear to be informed by a comprehensive long-term analysis and providing viable alternatives for settlers.

Coordination

The roles and mandates of actors in urban development, land management and housing are clearly described across existing laws and policies, but effective coordination is weak. To some extent, the coordination of some core urban services has improved between the MMDAs and the Region, especially through sector specific initiatives such as collaboration on urban transport in GAPTE, collaboration on solid waste initiatives in the water sector, and on sanitation. In terms of land use planning, coordination of housing provision with spatial development is still limited. There is weak coordination between key land agencies, e.g. Lands Commission, Town and Country Planning Departments (TCPDs), MMDAs, and the utility companies. There is lack of provision of land and sites and services schemes for expansion and housing. Severe gaps remain with regard to consolidation of land information systems, regular update of the land tenure, and the lack of coordination between urban service providers and local authorities. There is also limited collaboration between public and private stakeholders, although the initiatives under the Land Administration Project (LAP), the urban policy and the new housing policy provide some opportunities in this area if implemented. Efforts to coordinate the sector at the national level have not been sustained over time (There is still no sector working group established for urban development).
Urban management at the metropolitan level is complex due to the existence of 16 MMDAs, which makes land use planning challenging. It becomes more complex as advanced planning initiatives aim to address climate change amplifications as well as reduction of risks in key areas. Furthermore, there are unclear district boundary demarcations, leading to risk of land conflicts and duplication in planning efforts.

Inclusiveness

While informed by comprehensive national policies and the existence of a framework for local planning, local level land use planning leaves a lot to be desired. Many stakeholders, including low income communities, are seldom engaged in the planning and implementation process. Many MMDAs do not have local sector plans for land use and a legal framework is lacking, e.g. there is often no land registry. There is very limited consultation with land owners, MMDAs, and national utilities. In some cases, there is a parallel land market system for the processing of land transactions, outside the official system. GAMA does have a consultative process in place for planning purposes, but it is unclear how this gets transferred to the implementation phase.

The Ghana Living Standards Survey (GLSS) Round 6 reports that access to basic services in GAMA varies. GAMA's access to potable water is over 95 percent, about 50 percent have adequate access to an improved toilet facility (a flush toilet or the KVIP toilet) and 92.7 percent have access to electricity. Furthermore, a survey conducted by the People's Dialogue indicate that informal settlements in GAMA constitute over 40 percent of the built-up area.[58] Less than 50 percent of the waste generated in GAMA is collected and properly disposed. Transportation accessibility and mobility problems are significant due to lack of adequate infrastructure such as flood-resistant roads, coupled with poor road conditions, traffic congestion, weak public transport availability, and poor consideration of non-motorized users. Moreover, the city struggles with unemployment.

Redundancy

The government does not have different ways to provide urban services in case of disruptions and the services are already stressed on a daily basis due to the extensive demand across the GAMA area. The rapid growth of the city and the lag in urban planning limits the ability of the city to think about

[58]A recent survey conducted by People's Dialogue (under the Land Services and Citizenship Project funded by Cities Alliance) identified 263 slum communities and pockets within the AMA alone.

redundancy. In the case of housing provision, the building codes are strict which creates an incentive to build informal housing. This means that there are no alternative options to ensure safe housing for people of different incomes.

Reflectiveness

There is limited overview of the location and quality of the current housing stock and other infrastructure in the MMDAs; it is only done at the national level but it is not comprehensive. There is no deliberate use of existing Ghana Statistical Services (GSS) data nor is it spatially mapped. This reduces the ability of decision makers to identify in a systematic way the overall quality of assets in the city beyond what can be noted from field visits and observations. Reflection on past and future disasters at the MMDA level planning is limited, especially in contingency planning.

Urban planning, as emphasized throughout the report, is challenging due to the current urban growth rates. As a result, the city reacts to the situation on the ground with limited ability to reflect on past trends.

1.2 Disaster Risk Management

In a resilient city, the disaster risk management system combines a well-functioning and inclusive disaster preparedness and emergency response mechanism with effective disaster prevention infrastructure (robust, redundant and inclusive). Such a mechanism and infrastructure is based on an integrated citywide risk assessment and is developed to prepare for, limit, and recover from expected shocks (reflective). In a resilient city, risk information is a necessary foundational element for institutional decision making across sectors (coordinated) and in particular for budget and strategic decisions for territorial planning and management of the built environment (reflective).

Sectoral Overview

The Greater Accra Region is highly exposed to flooding in addition to cholera outbreak, fire, building collapse, and coastal erosion. The perception of seismic risk and sea-level rise is not as prevalent but there is a level of exposure which can seriously impact the functioning of Accra. The region is not prepared to effectively ascertain and mitigate disaster and climate risks. The approach to disaster risk management is responsive; whenever there is a shock, different agencies and affected MMDAs come together to address the situation. The National Disaster Management Organization (NADMO) is the main agency tasked with managing disasters. NADMO has different committees to coordinate efforts at the national, regional and district level. Nonetheless, implementation of policies has been a challenge including because the focus is still on response and there is lack of technical capacity. An example of weak long term planning is the relocation of people who live near waterways to other areas in the city—in an effort to protect against future flooding—given that people tend to return due to proximity to their livelihoods. There is, however, improvement in the sector. MMDAs are now mandated to include disaster risk management and climate change adaptation considerations into their medium-term development plans. It's going to be important for MMDAs to have the necessary funding and support to fulfill their mandate.

Institutional Set-up

The National Disaster Management Organization (NADMO) under the Ministry of the Interior is mandated to (i) manage disasters by coordinating the resources of governmental institutions and non-governmental agencies, and (ii) develop the capacity of communities to respond effectively to disasters and improve their livelihood through social mobilization, employment generation and poverty reduction projects. NADMO is made up of the National Disaster Management Committee (NDMC) at the national level, and Regional and District Disaster Management Committees at the regional and district levels, respectively.

Responsibilities of the NDMC include implementing national policies on disasters, coordination of regional and district disaster management plans and activities, and the coordination of post-disaster activities. At the district level, each district is required to formulate a disaster management plan as part of its planning process. NADMO also has technical committees for various hazards that serve an advisory role. NADMO has not been able to develop a comprehensive national Disaster Risk Management Master Plan (DRMMP) with clearly defined action plans to mitigate natural disasters. The new NADMO bill would empower NADMO to focus more on prevention, early warning and preparedness, and building codes, and would establish a National Disaster Management Fund. Ghana Meteorological Service (GMet), on the other hand, is responsible for monitoring hydro-meteorological and climate events, and issuing forecasts.

Policy Context

- National Development Policy Framework 2014–2017 (GSGDA II): Implemented by the National Disaster Management Committee under NADMO.
- National Climate Change Policy: Implemented by MESTI
- Medium Term Development Plans (2014–2017) of the MMDAs: To mainstream Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) into MMDA development planning, disaster-related issues, programs and plans risks, disaster preparedness and disaster reduction issues, programs, plans and strategies are now integrated into the Medium Term Development Plans of the MMDAs. DRR and Disaster Risk Management (DRM) forms part of the Functional Organizational Assessment Tool (FOAT) of MMDAs undertaken by the MLGRD.
- National Disaster Management Plan (2010): Guides NADMO in achieving its main mandate of ensuring that disasters are properly managed. The NDMP identifies appropriate measures to manage disasters at the different phases, namely: the Pre-Disaster Phase (Mitigation and Preparedness), the Disaster or Emergency Phase (Response and Relief), and the Post Disaster Phase (Rehabilitation, Resettlement and Reconstruction).
- Standard Operating Procedures and Contingency Plan by NADMO
- Ghana Plan of Action on Disaster Risk Reduction (DRR): Shift the national agenda from a disaster response approach to a disaster prevention and risk reduction approach, and mainstream disaster risk reduction and climate change adaptation into MMDA development planning and programs.

Relevant programs and projects—Disaster Risk Management

Table 11: Projects and Programs—Disaster Risk Management

Type/Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA(s)
Advocacy and capacity building for disaster risk reduction and preparedness in Ghana	Capacity building and advocacy for disaster preparedness and risk reduction at national and regional level	GFDRR, UNDP	NADMO	US $0.5m	Nov. 2014–Dec. 2016	Nationwide
Community Resilience through Early Warning (CREW) Project	Aims to build capacities within the country to reduce	Norwegian Govt.; UNDP	NADMO, Ghana Meteorological Service	US $5.2m	2012–2015	Nationwide

	disaster risk by putting in place an integrated early warning system that is both scientific and people-centered. This includes hazard maps, enhanced systems and coordination capacities for early warning, and disaster risk reduction projects in 10 pilot sites.					
Disaster Risk Management Country Plan	Flood protection	GFDRR	Water Resources Commission	US$0.8m	2014–2016	
Ghana Climate Innovation Center		WB		US$17.2m		
Ghana Multisectoral Plan for Climate and Disaster Risk Management including Accra Climate Strategy		WB		NA		

Qualities of Resilience

Robustness

The lack of enforcement of land use planning and outdated building regulations make it difficult to effectively mitigate disaster risks. Lax spatial planning and sprawl of the city, along with limited or inadequate drainage network, has increased the exposure of citizens to flooding. While some MMDAs receive early flood warnings, these are not adequate. The most popular preventive activity for flooding is to relocate at-risk populations (e.g., people settled in buffer zones or floodplains) to safer areas. Nonetheless, in almost all cases, the affected population returns to risk areas as their livelihoods remain close by. The robustness of the DRM system is also highly impacted by the inadequacy of equipment. Fire outbreak is one of the main shocks reported, however, there aren't enough fire trucks and fire fighters are unable to reach fires on the upper stories of tall buildings. Sprinkler systems are also not available in most buildings in the city. Furthermore, the poor conditions of roads and ongoing problems associated with traffic congestions make it challenging for emergency vehicles to access all areas in the city, particularly informal communities.

A good step forward that can lead to more robust infrastructure is requiring MMDAs to incorporate disaster risk management and climate change adaptation measures in structural plans. Nonetheless, there is a trend in GAMA to rely only on structural solutions, such as improving drainage system, which will not provide comprehensive solutions. Dedicated actions and investments which comprehensively address structural and non-structural mitigation measures, incentives for positive behavioral changes, and innovative ways of financing and maintaining mitigation options will be needed to develop a robust DRM system in GAMA.

Coordination

MMDAs do not have emergency plans and post-recovery plans and they also lack shelters for an affected population in case of a disaster. While some coordination between MMDAs and NADMO exists, such as in the dredging of flooded areas (Ga South Municipal Assembly (GSMA)), there is continuous need to integrate disaster preparedness and awareness within the existing structures of the local governments. The weak metropolitan management across GAMA and levels of government mentioned earlier hampers effective development and implementation of DRM actions. DRM is a cross sectoral issue that needs coordinated planning and actions, vertically from different levels of government and the ministries and horizontally across different MMDAs. A lack of metropolitan planning structure in GAMA causes a negative impact during and after disasters. In the event of a shock, the most popular approach for flood or other emergency response is to set up a steering committee under the Mayor to coordinate post disaster relief and recovery.

NADMO undertakes awareness raising and has a contingency plan in case of disasters. MMDAs, however, do not have plans that take the shocks and stresses into account. There is also limited cross-sectoral collaboration. In the case of flooding, there is room for improvement in the coordination between the agencies in charge of solid waste management and drainage.

Inclusiveness

The DRM system is inclusive. Post-disaster response targets poor and vulnerable populations. The most vulnerable groups adequately participate in the planning activities for emergency response.

Redundancy

There is no adequate redundancy in the DRM system in GAMA. In terms of fire outbreaks, water hydrants are scarce, and fire fighters are unable to respond to multiple fire outbreaks because there aren't enough fire trucks. There is also not enough medicine to treat people with Malaria and Cholera during seasons of high incidences.

Reflectiveness

There is no systematic study undertaken by the MMDAs to establish a disaster and climate risk profile, which can provide information on location and extent of exposure to hazards. Such an assessment is critical for developing effective land use plans, designing disaster risk reduction and mitigation solutions, and preparing for different scenarios of potential disasters. There is no detailed seismic, flooding, coastal erosion and sea-level rise map for Greater Accra Region. However, flood prone areas are considered in urban planning processes.

The Accra Metropolitan Assembly (AMA) learned from the recent flooding and has improved preparedness and budget for post-disaster response. NADMO has also improved DRM strategies and MMDAs are taking actions to clean drains before the rainy season. However, more actions are needed at the overall GAMA level to improve disaster risk mitigation planning and implementation.

Risk insurance is not available to businesses and many MMDAs do not have contingency plans or budgets. Inadequate funding for operations and perennial delays in the release of funds to support planned and emergency programs for disaster risk management are widespread. The MMDAs have no contingency plans for natural and man-made potential disasters and related environmental and technological hazards and risk. The MMDAs divert budget from other sectors to support relief and in some cases to provide recovery support.

Once more, a good initiative would require individual MMDAs to consider disaster risk management and climate change adaption when preparing land-use and structural plans as part of their medium term development strategies.

1.3 Urban Finance

In a resilient city, the municipal finance system is able to withstand large-scale shocks to revenues or unforeseen needed expenditures through reserves and flexible budget reallocation mechanisms (robust and redundant). Budget planning, management, and policymaking are based on actual performance data, including information on damage and loss from previous shocks or stresses (reflective). A resilient city has a municipal finance system that has sufficient autonomy to manage its resources and coordinates across departments to ensure spending leads to results towards the city's priorities (coordinated). It creates a stable and informed investment environment that allows for the involvement of diverse actors and supports an inclusive approach to budgeting, ensuring that the allocation of city resources reflects community priorities (inclusive).

Sectoral Overview

The urban finance sector at GAMA level is challenged by structural, administrative and systemic inefficiencies. Important sources of funding include the District Assemblies' Common Fund (DACF) (a minimum of 7.5 percent of the national revenue set aside to be shared among all District Assemblies in Ghana), transfers from the central government, and internally generated funds (IGF). The most significant source of funding remains the central government. Given that the national government does not take disaster preparedness and response into their financial planning, this leaves the MMDA of GAMA financially susceptible to shocks and stresses. Whenever there is a disaster at the GAMA level, individual MMDAs are the first responders and they have to divert funding from other purposes, such as maintenance of infrastructure, to respond. Transfers from the government are not always timely, which hinders financial planning at local levels. Furthermore, a weak land use plan and significant levels of informality create obstacles in collecting fees, taxes, and other sources of funding that fall under internally generated funds. Limited borrowing rights for the MMDAs and weak capacity to collect internally generated revenue were mentioned as additional challenges by the participants of the CityStrength consultations.

Institutional Set-up

Multiple institutions participate in municipal finance management at all levels of government. Policy guidance, oversight and technical support is provided by the central level agencies, while the Regional Coordinating Councils (RCCs) monitor and provide support to MMDAs which are the ones in charge of implementation. Key among the institutions are the Ministry of Finance (MOF), Ministry of Local Government and Rural Development (MLGRD), Controller and Accountant General Department (CAGD), Audit Service, National Development Planning Commission (NDPC), civil society organizations, development partners, private sector institutions, 34 line MDAs, and the Bank of Ghana.

In addition to the District Assemblies' Common Fund, other sources of financing for MMDAs include grants, land rates, mineral royalties, government transfers, ceded revenues and external credits. MMDAs are also expected to generate funds internally through mechanisms such as fees, fines, rates, rents, trading services and licensing, for administrative and other related expenses.

Policy Context

National Decentralization Policy (2010): Seeks to ensure that there is equilibrium between MMDA mandates and the decentralized fiscal resources. Funding provided to MMDAs comes from sources that

include the District Assemblies Common Fund, District Development Facility (DDF), and other miscellaneous transfers.

Intergovernmental Fiscal Framework (IGFF): Articulates the fiscal decentralization vision of Ghana and sets out policy measures, including revenue assignment and internally generated funds.

All sources of the MMDAs' revenues are for mandated use. In the case of funds from the DACF and IGF, 11 percent is linked to compliance performance while the remaining 89 percent is up to the discretion of MMDAs. Funds from the District Development Facility are entirely linked to compliance performance.

Programs and Projects

A number of reforms have been initiated to enhance the revenue mobilization performance of MMDAs over the years and empower them to manage IGF effectively. National level initiatives include:

1. The introduction of IGF-related indicators in the Functional Organizational Assessment Tool (FOAT) annual performance assessment of MMDAs by MLGRD
2. Target setting for MMDAs through the composite budgeting process
3. Development of guidelines for rate-fixing
4. Properly naming streets and property addresses to facilitate internally generated revenues
5. IGF training modules undertaken by the Institute of Local Government Services (ILGS)

At the local level, MMDAs have also undertaken interventions such as:

1. Recruiting revenue collectors who are compensated on the basis of commission
2. Implementation of street naming and designation of addresses to improve the identification of properties and businesses and thus facilitate revenue collection from rates and licenses
3. Regularization of physical development and valuation of properties
4. Creation of commercial and market centers
5. Outsourcing of the revenue collection operations to the private sector in various forms
6. Awareness creation and targeted service delivery to encourage voluntary compliance of rate payers
7. Sanctioning of defaulters

Table 12 below provides a summary of projects and programs within the sector.

Table 12: Projects and Programs—Urban Finance

Type/ Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA(s)
Local Government Capacity Support Project	Providing support for development of policies, manual guidelines, Staff salary	World Bank	MLGRD	US$175m	2011—2017	All MMDAs
Public Financial Management Reform Project		World Bank	MOF	US$45m	-2015	All MMDAs
Support for Decentralization	Providing capacity building support to	GIZ	MLGRD			All MMDAs

Reforms (SfDR) Project	improve the performance of MMDAs					
District Development Facility (DDF) 2	A performance based earmarked revenue granted to MMDAs to support implementation of items within the MTDEF.	Canada, Danida, AFD, KfW, and SECO	MLGRD	US$230.2m	2014-2018	All MMDAs
Local Government Financing Bill						
Local Government Capacity to Borrow Study						

Assessment of Sectoral Resilience

Robustness

In general, MMDA budgets are robust. They are separated into Capital Budget (spent on infrastructure—clinics, classroom blocks, roads, water) and Operational Budget (spent on administrative expenses and staff training and other support services). MMDAs plans and budgets are seamlessly linked together. However, the over-reliance of MMDAs on few funding sources including external funding, results in a lack of freedom, and also limits the ability of MMDAs to plan for unforeseen events.

Furthermore, there appears to be little planning for disaster-related expenditures at the national level, leaving the economy very susceptible to sudden shocks. Naturally, this extends to the financial planning of municipalities, given that they rely heavily on the national government for financial support. This issue is compounded by poor revenue collection and management within the MMDAs. If a disaster occurs and the municipal level government is unable to finance the required response, then the national government must support the municipality. This creates an incentive for both national and municipal governments to improve financial planning for disaster events.

Other challenges identified during the CityStrength diagnostics consultations include the following:

1. Inadequate budgetary allocations from the central government
2. Delays in the release of constitutionally-mandated DACF payments to MMDAs
3. Excessive deductions from DACF at the central level
4. Deficiencies in basic revenue management systems, including inadequate registers(records?),
5. Low capacity for revenue collection, including absence of billing and collection systems, and inappropriate accountability and management of collected funds
6. Incomplete transfer of functions to local governments
7. Limited borrowing rights of MMDAs
8. Inadequate local political will
9. Out-dated property valuation rolls
10. High costs associated with compliance of federal mandates at the MMDA level
11. Lack of incentives to collect revenue
12. Political interference

13. Poor coordination of multiple stakeholders with divergent interests
14. Low civilian understanding of financial obligations to their respective MMDAs

Coordination

The MMDA municipal financing system offers limited coordination or leadership in financing adequate responses to shocks and their aftermath. And there is no predefined financing arrangement between municipalities and the national government to finance emergency disaster relief, reconstruction, or disaster risk reduction initiatives. This leaves municipalities to reallocate funds from other projects within their own budgets, or reliant on a transfer of funds from the national government, which can be slow and unpredictable. The establishment of clear roles and responsibilities between national and local governments is an important first step in arranging appropriate financing for disaster preparedness, prevention and mitigation. The absence of clear and enforced mandates, which give rise to financial obligations for MMDAs and the national government, inhibits proper coordination of efforts and cost-effective financing.

Inclusiveness

MMDA budgets are developed through transparent and participatory planning (town halls, public hearings), involving all stakeholders and citizens of MMDAs.

Redundancy

At present, MMDAs rely heavily on a relatively few sources of finance, drawing about half of their funding from external sources. MMDAs do not utilize insurance mechanisms to provide resources for emergency relief and reconstruction in the aftermath of a shock. Increasing the use of insurance for both individuals and the municipal government can diversify municipal emergency funding resources and build the financial resilience of the MMDAs to shock events.

Reflectiveness

As mentioned earlier, the national government does not anticipate the impact of shocks in their financial planning process, despite long experience with recurrent shocks and stresses and their costs. Due to the close connection between financial planning at the national level and mandates and funding at the local level, reflection at the GAMA level remains significantly weak. The financing of response to shocks has changed little after past events. However, there are ongoing activities to promote discussion of recurrent issues and identify priorities, which will potentially lead to progress.

2. Urban Services and Infrastructure

2.1 Transport and Roads

In a resilient city, the transport system offers multiple modes of transport to its users to ensure the continuity of mobility in the event of disruptions, and to ensure access to transportation for all population groups. It takes a flexible approach and proactive coordination with other agencies to be able to divert user traffic to different modes of transport based on changing conditions. In a resilient city, the planning for and investments in the transport sector are based on an assessment of past shocks and stresses and are closely aligned with other departmental plans and overall key priorities of the city.

Sectoral Overview

The transport and road system across the 16 MMDAs is not resilient to growing hazard exposure and climate impacts. Challenges in the transport sector center on road traffic, mainly regarding congestion and adequate infrastructure. All the MMDAs face poor traffic management, which results in congestion and a high rate of traffic accidents. Furthermore, different and viable modes of transport (as an alternative to the dominance of private road transport—"trotro" [private mini-bus] and taxi operators) are not available for basic intracity mobility. Limited storm water drainage, uncontrolled street-hawking and growing informal settlements also exacerbate traffic congestion that can lead to accidents. A number of MMDAs, such as AMA, LaNMMA, AshMA, and TMA, have historic centers or market areas with street patterns that do not facilitate access, especially during fire or flooding for emergency vehicles. Generally, planning for the transport and roads sector is currently not based on risk assessments and is not effectively aligned with the land-use plans (where these exist). All MMDAs are in need of improved traffic management, public transport provision, oversight of public transport services within the city region, an improved and comprehensive approach to drainage, and improved urban planning and development control.

Institutional Set-up

The road and transport sectors are overseen at the national level by the Ministry of Roads and Highways (MRH) and the Ministry of Transport (MoT), respectively. MRH's responsibilities include policy formulation, coordination and oversight, infrastructure development and maintenance, and financing. Similarly, the MoT has overall responsibility for the transport sector including provision of modes of transport and traffic management. Within GAMA, the Department of Urban Roads (DUR) plays a major role in the administration, planning, control, development, and maintenance of urban roads and associated infrastructure. MMDAs share these responsibilities with DUR, and are also responsible for the enforcement of road and transport regulations, alongside the Motor and Transport Traffic Unit of the Ghana Police Service (which resides under the Ministry of the Interior). Private sector operators play a significant role in the road transport sector as they account for nearly all bus and taxi transit options. There is currently no national body mandated to develop regulations for transport operations and services.

International development partners play a significant role in the transport sector. Over the last decade, they have provided over US$2 billion in grants and loans for policy and infrastructure development in the sector.

Following a disaster in GAMA, road repair and reconstruction falls mainly to the DUR and the MMDAs. Given that both bodies are underfunded, funds necessary for the further development of the sector are regularly diverted for the repair and reconstruction of flood-damaged roads.

Policy Context

Transport Sector Medium-Term Development Plan, 2014—2017: Aims to develop and integrate land use, transport planning, and service provision; create an environment for private sector participation; develop and implement a comprehensive and integrated policy, governance and institutional framework; and develop adequate human resources and apply new technology.

Urban transport policy (2007): Outlines GoG's commitment to: Invest into mass transport systems with the aim of contributing up to 80 percent of all person trips; Concentrate on providing urban transport infrastructure and regulations, creating the environment that will empower the private sector to invest into transport service provision; Develop and implement a decentralized institutional and regulatory framework for urban transportation; and integrate urban transportation within a strategic urban development framework.

Ongoing/Planned Projects and Programs

There are recent and/or currently ongoing activities that provide significant opportunity for urban transport improvement. These include:

i. Passage of by-laws by 11 MMDAs and establish Urban Passenger Transport Units (UPTU) to provide the framework for planning and regulating urban passenger transportation;

ii. The recent collaboration of the MMDAs in GAMA in setting up of a Greater Accra Passenger Transport Executive (GAPTE) to plan and regulate cross jurisdictional travel (more than 70 percent of total trips) in the Accra area;

iii. A proposed project to modernize and improve the coordination of traffic lights in Accra and Kumasi.

Other relevant ongoing/planned projects and programs in the sector are presented in the table below.

Table 13: Projects and Programs—Transport and Road Sector

Type/ Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA(s)
Transport Sector Project	Support to Road Sector and Educational Entities, Improvement of Trunk Roads, Improvement of Urban Roads and Infrastructure, Improvement of Feeder Roads and Support to MoT.	WB	MRH	US$225m		All MMDAs
Urban Transport Project	Mobility improvements in participating MMDAs—traffic engineering measures, implementation of a Bus Rapid Transit (BRT) system.	WB	DUR	US$83m	2007–2015	
Awoshie-Pokuase Road	Rehabilitation of Awoshie-Pokuase road project; improvement of schools, hospitals, and water supply along the project corridor	AfDB (co-financing with AFD)	MRH, MoT	US$62.4		GaEMA, GaCMA
Kwame Nkrumah Circle Interchange	Construction of multi-level interchange	Brazil Govt	DUR	Eur74m		AMA
Kotoka International Airport Expansion Project	Construction of Terminal 3 and other expansion works	AfDB	GACL	US$400m		LaDMA
Transport Master Plan Project in Great Accra Region	20-year transportation master plan for GAMA region	KoICA	MoT, GARCC	US$1.5m		GAMA MMDAs
Corridor Development for West Africa Growth Ring		JICA				

Type/ Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA(s)
Master Plan Project						
Preparatory Survey on Project for the Improvement of the Tema Motorway Roundabout		JICA				
Project for Developing Labor Based Bituminous Surfacing Technology		JICA				
Ghana Urban Mobility and Accessibility Project		SECO	MLGRD		2016–2020	GAMA MMDAs

Assessment of Sector Resilience

Robustness

The transport system is not designed to withstand shocks and there is a lack of engineers to properly design shock-resistant infrastructure. In the case of flooding, road design seldom takes runoff into account, nor the larger drainage infrastructure scheme, resulting in road damage. In addition, there is an inadequate road maintenance and road expansion due to the diversion of funding to respond to shocks. Poor road surface conditions and flooding are also compounded by the use of roadsides as rubbish collectors by residents.

Accra's fast-growing urban population will lead to more congested roadways as car use is expected to increase five-fold every 15 to 20 years, especially as alternatives for mobility such as adequate mass-transit remain unavailable. The congestion problem is exacerbated by the constant flooding, but also by illegal or inappropriate use of roads, such as hawking at intersections and toll collection points, and the seldom used pedestrian bridges. The construction of illegal accesses and illegal parking which goes unenforced, also contribute to traffic congestion.

Coordination

While some MMDAs feel that there is a lack of coordination with the national government with no clear division of responsibilities in the case of a disaster, others consider that integrated transport planning does exist to some extent at the national level with agencies responsible for agriculture, health, and education. Works Departments responsible for road and roadside drainage design in the different MMDAs do not coordinate with one another and there is limited coordination with the Hydrological Services Department. This lack of coordination makes it challenging to have an area-wide traffic management system.

In addition to the Works Departments, there are a number of agencies responsible for the road transport sector. However, while some regulations for road transport exist, they are rarely enforced. There is no national or GAMA-wide regulatory authority (similar to the maritime sector) that can develop and enforce uniform regulations across MMDAs. Some enforcement is carried out by the Ministry of Interior's Motor and Transport Traffic Unit, but it does not extend to issues such as illegal parking in areas of high traffic, transport access points, lorry sites, illegal hawking, or public transport. MMDAs are well-placed to carry out enforcement for these issues, but they lack the financial resources or the capacity to do so.

Transportation in GAMA also suffers due to improper land use planning, which includes challenges in coordination among agencies and actors. For instance, land set aside for specific purposes is often sold and made unavailable for the implementation of land use plans. In some cases in GAMA, this has led to sprawling and poorly sited lorry stations, contributing to traffic congestion.

In the case of flooding, improved collaboration with the solid waste management sector can minimize the level of flooding by addressing the dumping of waste in ditches and drain canals.

Inclusiveness

While there are consultative processes involved in transport-related planning, they are not as robust or comprehensive as needed. Local communities are often consulted, but the needs of vulnerable groups, including the poorest communities or those with disabilities, are not included in sector development planning.

There are also challenges for the non-motorized transport (NMT) users. This includes lack of adequate infrastructure such as pedestrian bridges, which makes NMT users vulnerable to accidents. NMT users also transport wheelbarrows and hand-pulled trolleys along with motorized traffic, further increasing conditions for accidents. There is no appropriate legislation to protect NMT users. It is important to note that there have been investments such as bicycle lanes in important urban centers such as Accra and Tamale; however, there is an apparent lack of commitment to continue these types of initiatives which benefit NMT users.

Redundancy

There is a severe over-reliance on road transport and more specifically, private vehicles. Mass transport options such as trains and buses are limited and unreliable. In the case of buses, they are largely operated by private operators, however, the service is unregulated, there is limited coverage of routes, and vehicles are in poor condition. Private operators must also procure and own the buses. Since these operators have no guarantee as to what routes will be available to them, the risk lies almost entirely on the operator. While the Government has tried to expand public transport by implementing a bus rapid transit (BRT) system, the current scheme has been unsuccessful. Additionally, while there is a significant number of alternative routes available in case of congestion or flooding, there is a lack of information available in the aftermath of floods as to what routes are open or unaffected.

Reflectiveness

Planning is conducted according to past experiences. For example, reconstruction efforts for roads damaged by floods and improvement of drainage design take past failures into account. However, technical capacity to implement the lessons learned and revised plans is limited at the MMDA level.

While there is a transport-specific integrated plan, a national transport policy, and a section on transport in the GSGDA II, land use planning is not aligned with these policy documents. Lack of coordination among

agencies and actors also exacerbate the problems related to lack of implementation capacity as per guiding strategies.

2.2 Water Supply and Sanitation

A resilient water supply and sanitation system takes a holistic planning approach that considers current and future shocks and stresses in line with the key priorities for the various jurisdictions that constitute the city region. It provides inclusive access to the water supply and sanitation services for all segments of its population. The planning for and investment in the sector is driven by demand and supply data and is based on cross-sectoral and cross-jurisdictional collaborations that align with urban development plans and priorities. It has sufficient technical and financial capacity to undertake sustainable and long-term operation, maintenance, and planning for the water supply and sanitation infrastructure and services.

Sectoral Overview

GAMA's water sector is performing significantly better than sanitation. The country met the Millennium Development Goal (MDG) target for increase access to water from 56 percent to 89 percent, which was above the expected target of 76 percent. Over the period however, there was a decrease in access to water on premises in urban areas from 41 percent to 32 percent. MMDAs are responsible for the delivery of sanitation services to residents within their areas of jurisdiction. The MDG sanitation target for the country was 54 percent, but the level achieved in December 2015 was only 15 percent. The vast majority of excreta produced in Accra is disposed of inappropriately (Nikiema, et al., 2015) which creates public health concerns for a city region that already struggles with cholera. Plans are currently being designed for the improvement of the sanitation sector but there is not an accompanying implementation plan which has been a shortfall of previous plans. There is a need for greater clarity around mandates related to sanitation, for example in the management of toilets, which impacts the functioning of the sector. GAMA does have wide availability of vacuum trucks for collection, transport, and discharge of fecal matter to disposal sites, which alleviates pressure from the lack of sewage infrastructure. Meanwhile, while water supply is still falling short of meeting the increasing demand as GAMA continues to grow, supply has nonetheless doubled in the last 18 months. There is a master plan in place for the water sector but lack of funding and resulting delays make the plan outdated as the city continues to expand. Overall, the water and sanitation sector struggles with a shortage of technical experts such as engineers, as well as inadequate equipment and tools to deal with challenges of major infrastructure endeavors in a city region that is constantly changing.

Institutional Set-up

The institutional arrangements for water and sanitation in Ghana are well structured. The Ministry of Local Government and Rural Development (MLGRD) provides policy direction through the Environmental Health and Sanitation Directorate (EHSD) and leads the various MMDAs in the delivery of sanitation services. The Ministry of Water Resources, Works and Housing (MWRWH) through the Water Directorate is responsible for the water sub-sector. There are three main water agencies under the ministry, namely, (1) the Ghana Water Company, Ltd. (GWCL), responsible for the supply of water to residents in the urban portions of GAMA; the Urban Water Utility; (2) the Community Water and Sanitation Agency, responsible for facilitating water supply for rural and small towns; and (3) the Water Resources Commission, responsible for managing the water resources of the country. The Public Utilities Regulation Commission is an independent entity responsible for regulation of urban water supply.

Policy Context

The National Water Policy (2007): The National Water Policy (NWP) provides the overall framework for the sustainable development of Ghana's water resources. The ultimate goal of the NWP is to "achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations". It is to be achieved by addressing relevant issues under water resources management, urban water supply, and community water and sanitation. For each broad area, a number of focus areas for policy considerations are identified.

The NWP considers water resources management within the context of the following two main areas:

- Conservation of the water resources stock in all its occurrences to sustain availability and maintain acceptable quality for the betterment of human health and the environment; and
- Regulation and control of demands of water use and waste disposal to stay within the natural capacity of the water resources base, which must necessarily maintain its regeneration and self-purification characteristics.

The NWP elaborates key policy issues related to the basic principles and challenges confronting water resources management development and use in the three subsectors—water resources management, urban water supply, and community water and sanitation. It further outlines proposals and guidelines for implementing the policy including institutional roles and responsibilities, standards, regulations, definitions, and references.

- Water Sector Strategic Development Plan (WSSDP): The Plan has the goal of "providing sustainable water and basic sanitation for all by 2025" and includes a detailed plan for implementing key actions.
- Integrated Water Resources Management Plan (IWRMP): A comprehensive planning and implementation framework for managing the water resources in the country.
- Updated Environmental Sanitation Policy (ESP) (2010): Develop a clear and nationally accepted vision of environmental sanitation as an essential social service and a major determinant of improved health and quality of life in Ghana. The vision is accompanied by a strategy and action plan as well as a financing framework.

A summary of physical investments planned in urban water supply over the planning horizon (2012–2025) is provided in Table 14.

Table 14: Sector Investments—Urban Water: (2012–2025)

Planning Horizon	Interventions	Estimated Cost (US$ mill.)	Remarks
2012–2015	Rehabilitation, upgrading and expansion of existing systems	317.00	Interventions in all 10 regions.
2016–2020	Rehabilitation, upgrading and expansion of existing systems	372.50	Interventions in all 10 regions
2021–2025	Rehabilitation, upgrading and expansion of existing systems	372.50	Interventions in all 10 regions
Total		**1,062.00**	**Averaging US$75.9m/yr**

Source: MWRWH

Currently, a good number of the projects of the Ghana Water Company Limited (GWCL) are tackling system capacity issues to increase production and availability of water. However, investment in distribution infrastructure is limited.

Other relevant projects include the following:

Table 15: Projects and Programs—Water and Sanitation

Type/ Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA
OBA Urban Sanitation Facility for the GAMA Project	Sanitation and waste treatment and disposal for low-income communities in GAMA	World Bank	MLGRD; Planning Coordinating Unit (PCU)	US$8.76m	2014–2018	11 MMDAs in GAMA
Kpong Water Supply Expansion Project	Construction of 40MGD Water Treatment Plant (WTP) to serve GAMA supply area	CHINA EXIM BANK, GOG	MWRWH/GWCL	US $273m	2015	Parts of GAMA
Greater Accra Metropolitan Area (GAMA) Sanitation and Water Project	Update of the Urban Water Supply Master Plan. Transmission and Distribution Improvement Works (about 150km), construction of storage reservoirs and stand pipes	WORLD BANK	MWRWH/GWCL	US$ 1.5b	2014-2018	GAMA
Tema Sewarage Improvement Project	Rehabilitate the sewerage system in the Tema Metropolis and improve environmental conditions	AFD—FRENCH GOV'T	TMA	US$ 7m	Submitted proposal to AFD	TMA

Qualities of Resilience

Robustness

The robustness of sanitation services is very limited. Sewerage network services cover less than 10 percent of the geographic footprint of GAMA. The majority of residents in the city region are located in the high-density, low-income communities and do not have access to household toilets (only about 30 percent of households in GAMA have access to a household toilet). Instead, there are many public toilets which serve as the primary toilet for many residents. These toilets are mostly overused and do not meet basic hygienic requirements for ensuring good health. The households with toilet facilities use onsite sanitation systems including mostly Water Closets (WCs) and Ventilated Improved Pit Latrines (VIPs). These have to be emptied periodically.

There is also very limited treatment and disposal capacity for the sewage/septage/fecal sludge produced in the metro area and its surrounding municipalities. The major disposal point in the city is at “lavender hill” on the beach in the Accra Metropolitan Assembly where between 150 and 200 trucks dump raw untreated human waste into the sea. Approximately 79 percent of the human waste produced in Accra is inappropriately disposed of (Nikiema, et al., 2015).[59] There is a treatment plant at the Nungua Farms off

[59] Sanitation and Hygiene for Development, 2013. 4 (3) 371-383

the Accra-Tema motorway but it is only partially functional. A new treatment plant at the University of Ghana serves the University and four other educational institutions nearby. It is expected that in the medium term, households and other entities within the catchment area will also be connected to the sewerage network.

The strength of the sanitation sector is the availability of several (up to a hundred) vacuum trucks in the city for the collection, transport, and discharge of fecal matter to disposal sites. This service is paid by the households and it is a potential source of revenue for new treatment plants that are in the pipeline, to ensure the sustainability of the facilities. The private sector plays a key role in the provision of vacuum trucks for the needed services.

Several plans for the sanitation sector have been developed in the past and have not been implemented. There is an integrated urban environmental sanitation master plan (IUESMP) under development for solid waste, liquid waste and drainage funded by the International Development Association (IDA), but there is no implementation plan. There are current efforts to facilitate the implementation of the master plan to stop the haphazard growth of the city region without essential municipal services in place. The same IDA-funded project is developing a water supply master plan. In some cases, the agreements governing the management of the toilets are contentious, thereby making it difficult for the assemblies to ensure that public toilets are managed and operated efficiently.

The robustness of water supply services in GAMA is relatively better. Water supply has not kept pace with the growth of the city region, but nonetheless, supply has almost doubled in the last 18 months. The GWCL had a master plan in place but not the funding necessary to keep pace with the expansion of the metropolis. The main challenges are the delay in providing distribution mains to unserved areas and the frequent pipe bursts due to old water distribution infrastructure.

Overall, MMDA spending on basic sanitation and water supply is very limited. A portion of the budget is for solid waste collection which, together with basic sanitation, is termed “environmental sanitation”. Because water supply in the GAMA assemblies is seen as the responsibility of GWCL and CWSA, the assemblies spend virtually no resources when it comes to water supply. In the areas where there were severe water shortages recently, the assemblies sometimes facilitated the services of water tanker operators to provide water at a cost to the residents. Solid waste is prioritized in the distribution of resources, partly because it’s more tangible when waste remains uncollected. Basic sanitation is seen as a household responsibility.

The human resources capacity in most of the assemblies is a major challenge. The adequate number of personnel with the right qualifications and expertise is lacking, especially engineers. Where public health engineers have been engaged in the last two years, there are still challenges since an appropriate scheme of work was not developed prior to their engagement. This has led to a high attrition rate. Additionally, some of the engineers are unable to provide the services required since they do not have the necessary tools and resources to do so.

Coordination

The roles and responsibilities in the sector are clearly defined with several policies, guidelines and implementation strategies in place. The presence of the Water and Sanitation Sector Working Group also enhances the coordination among the various stakeholders in the sector. Further, there is collaboration among assemblies that have disposal sites and those that do not. There are no extra charges for vacuum trucks crossing municipal boundaries. The assemblies are also in contact with GWCL for the provision of water supply services. Reports of pipe bursts are sometimes channeled through assemblies.

There are several projects and programs ongoing in the water and sanitation sector. However, residents in low-income communities, in particular, complain about the varied and seemingly uncoordinated interventions taking place. In some instances, different NGOs and other organizations have consultations with the residents and the subsequent interventions never happen. When the interventions do take place, there have been instances of duplication of work. However, there are efforts by the Water and Sanitation Sector Working Group which meets regularly to oversee that there is no duplication and that the various interventions are undertaken using similar approaches. In addition, the working group facilitates communications between assemblies and the residents to avoid confusion from any differing approaches. Despite these efforts, there is clearly room for improvement. Lack of coordination with different implementation and financing arrangements poses a challenge to assembly officials and residents.

Overall, coordination efforts have not led to an improvement in the quantity and quality of delivery of water and sanitation services in the city region.

Inclusiveness

Access to water and sanitation is poor across GAMA. Sewerage network services cover less than 10 percent of the geographical spread of GAMA and only about 30 percent of households in GAMA have access to a household toilet. The majority of residents in the city region are located in the high-density, low-income communities, which is where the majority of water and sanitation interventions are located. A major challenge for sanitation is a national norm requiring households to pay the full amount for accessing household toilets with no financial support. By law, all households are supposed to be constructed with toilet facilities. However, in most of the low-income communities, the majority of households live in compound houses which are made up of single rooms. It is estimated that between 60 percent and 90 percent of households in some of the low-income urban communities do not have toilets. Providing a single toilet for a typical compound house which usually has more than one household and more than twenty inhabitants, is considered a shared facility and was not counted in meeting the target for the MDGs.

For water supply, efforts have been made by the GWCL and CWSA to provide water via standpipes to households in the low-income communities. The regulations require that households submit site plans and building permits for houses, but this is impossible in most cases since the houses do not meet the required standards to obtain a building permit.

Redundancy

The water supply system is very vulnerable to shocks. In the past two years, there have been substantial improvements in the provision of additional water supply from two sources. There is a new desalination plant at Teshie-Nungua, with water supply of 60,000 m^3 per day, serving the Ledzokuku-Krowor Municipality and its immediate surroundings. A new treatment plant with a water supply of 360,000 m^3 per day, is located at Kpong serving the northern part of GAMA. There are, however, still areas where water is rationed. This means there is no redundancy in the system in case of an emergency shutdown.

The sanitation system does not meet the needs of the city region and hence there is no redundancy.

Reflectiveness

There are social norms which impact sanitation delivery negatively. The belief that toilets are dirty and should therefore be far away from households needs to be changed. Lack of maintenance contributes to the unsanitary conditions of toilets. Thus, it is necessary to provide positive examples of clean household toilets to encourage residents to move away from public toilets. Greater public awareness and education about the public health dangers of open defecation, including the spread of Cholera, is also essential to changing residents' behavior.

Where sanctions are to be applied to people who don't comply with sanitation laws, there is usually interference from traditional and political leaders who plead for their constituents, and therefore, policies remain powerless.

2.3 Solid Waste Management

A resilient solid waste management (SWM) system takes a holistic planning approach that provides inclusive access to SWM services and sustainable disposal of waste in the city. It provides for safe collection and disposal as well as recycling of waste. It ensures that there is sufficient technical and financial capacity to undertake sustainable and long-term operations, maintenance, and planning for SWM infrastructure and services. The planning for and investment in the sector is driven by demand and supply data and is based on cross-jurisdictional and cross-departmental collaborations that support coordination with urban development plans and priorities.

Sectoral Overview

Accra's rapid growth has steadily increased the quantities of municipal solid waste generated by the city (see Box 2), placing increasing strain on the city's solid waste management services. This strain is likely to continue to increase as quantities of waste generated by the city continue to grow.

In the face of this challenge, a number of SWM policy interventions and investments have been made over the past two decades. This has included privatization of MMDA waste collection operations and significant investment in waste transfer, waste treatment and landfill facilities. The city's waste collection operations now serve much of the city and several modern, well-engineered waste facilities have been built and commissioned over the past five years (Kpone landfill, Zoompak waste transfer facility and Accra Compost and Recycling Plant (ACARP)) with more planned for the future.

Despite these actions, however, Accra's SWM system still encounters challenges. Current solid waste collection services do not provide for all communities across the city, particularly low-income and informal areas. GAMA generates over 2,500 tons of municipal solid waste (MSW) per day, of which an estimated 75 percent is collected from households. Collection coverage varies significantly between MMDAs, ranging from a low of 35 percent in Ga South to a high of 93 percent in Dade Kotopon (see Table 16). Significant quantities of waste are still dumped in open areas and drainage channels across the city, creating public health problems and exacerbating flooding. Only one of the city's allocated disposal sites (Kpone) is engineered to provide adequate environmental protection. The remaining two dump sites (Nsumia and Abloraadjei) pose significant health and environmental risks to nearby residents and to the wastepickers that collect recyclables on these sites. The level of data collection to create baselines for planning varies across MMDAs which have different levels of implementation planning.

Box 2: Solid Waste Management in GAMA—Key Data

Total estimated population (2015): 4.25 million
Total estimated waste generated (2015): 2,500 tons per day
Estimated waste generation rate per person: 0.6kg per person per day
Proportion of organic material in the waste stream: 60 percent
Average collection coverage: 75 percent
Remaining life of existing engineered disposal capacity: less than 4 years

Source: Ministry of Local Government and Rural Development. 2015. "GAMA Emergency Solid Waste Management Improvement Program (E-SWMIP)"

Institutional Set-up

The Solid Waste Management (SWM) sector involves a wide range of actors with different levels of responsibility. The Ministry of Local Government and Rural Development (MLGRD) is the lead sector agency. Its functions include:

- Coordination and formulation of environmental sanitation policy including technical guidelines, monitoring and evaluation
- Promulgation of national legislation and model by-laws
- Direction and supervision of the National Environmental Sanitation Policy Coordination Council
- Facilitating the mobilization of funds for sector plans and programs

Within MLGRD, the Environmental Health and Sanitation Directorate (EHSD) and the Regional Environmental Health Offices (REHOs) play the leading role in supporting environmental sanitation. The functions of the EHSD include:

- Provision of guidance to MLGRD on environmental sanitation sector planning, policy and legislation
- Provision of technical assistance to District Assemblies and service providers
- Coordinating and disseminating the results of research in the environmental sanitation field
- Regulation of all service providers both public and private

The MMDAs are responsible for SWM in their respective jurisdictions and carry out the following distinct functions:

- Waste management
- Public health management

Provision of works related to Solid Waste Facilities at the District Assembly level is the responsibility of the District Works Department (DWD). The District Environmental Health and Management Departments (DEHSDs) typically liaise with DWDs in preparing plans and costs for sanitation facilities.

Policy Context

National Environmental Sanitation Policy of 2010, under the MLGRD: Overarching policy document guiding operations of the SWM sector. All MMDAs are required to prepare their own sanitation strategy and action plan, known as MESSAP or DESSAP depending on metro, municipal or district status.

Table 16: Waste Collection Coverage, by MMDA

MMDA	Population (2015)	Waste generated[1] (t/d)	Waste collected (%)	Waste collected (t/d)
Accra Metropolitan	1,883,892	1,130	91%	1,024
Adentan	88,493	53	57%	30
Ashaiman	216,067	130	91%	118
Ga Central	132,624	80	44%	35
Ga East	167,157	100	68%	68
Ga South	465,435	279	35%	99
Ga West	248,670	149	38%	57
Kpone Katamanso	124,301	75	61%	46
La Dade Kotopon	207,706	125	93%	116
La Nkwantanang-Madina	126,634	76	68%	52
Ledzokuku Krowor	257,884	155	77%	119
Tema Metropolitan	331,246	199	78%	155
TOTAL	4,250,109	2,550	75%	1,918

Source: Ministry of Local Government and Rural Development. 2015. "GAMA Emergency Solid Waste Management Improvement Program (E-SWMIP)".

Note 1: Based on estimated waste generation rate of 0.6kg per person per day.

Qualities of Resilience

Robustness

Greater Accra's SWM services have a moderate level of robustness. The city has waste collection services which serve much of the city and significant investments have been made in waste transfer, treatment and disposal capacity over recent years (e.g. Kpone landfill, Zoompak waste transfer facility and Accra Compost and Recycling Plant (ACARP)). However, the lack of treatment and disposal capacity in Accra has reached a critical state and affects the robustness of the solid waste management sector. There is only one engineered landfill, which is nearing capacity, and one residual waste treatment facility for the entire city. Significant quantities of waste are not collected and transferred for treatment and disposal. Dumping of wastes, particularly in drainage channels, is still widespread, causing flooding and public health risks. This practice is particularly common in lower income areas where households either do not have access to, or choose not to pay for, waste collection operations.

Box 3: Current Negative Environmental Impacts of GAMA SWM System

- Dump sites in the City of Accra are sources of considerable environmental impact. The Abloraadjei dump site is one example, in particular. Wastes are burned on site, causing local air quality impacts, and with no engineered lining at the site, it is possible that leachate is polluting the Ga East groundwater, though no studies have assessed this issue. The site is also likely generating methane gas, a potential asphyxiation/explosion risk for nearby residents and also a powerful greenhouse gas. Any impacts of the site will become more acute as housing is built increasingly close to the dump site's boundaries.
- Approximately 100 wastepickers scour the dump site daily, collecting recyclable materials. The conditions for these activities are dangerous, with wastepickers exposed to pathogens from decomposing organic and medical wastes, hazardous substances in the waste, dangerous fumes from burning materials, and potential waste slides due to the steep piles of waste.

Coordination

National and local legislative frameworks provide clear responsibilities and mandates for SWM, though coordination among different agencies remains challenging where interests and agendas overlap (e.g. MLGRD and MESTI). Further, coordination among MMDAs needs improvement, particularly on the issue of providing adequate residual waste treatment and disposal capacity.

There is also room for improved collaboration between the formal and informal sectors in SWM operations. The formal sector features private companies competing for government waste treatment and disposal contracts. The informal sector provides waste collection services and recycles materials such as metals, cardboard and plastics serving low-income communities that are not reached by the formal sector. There is some level of public-private sector coordination but it could be strengthened. Experience in other cities shows that the informal sector can be very effective at providing wastes collection services at a local level where they are properly integrated with the formal sector.

Inclusiveness

Over the past 20 years, the city has successfully engaged the private sector in delivering SWM services and infrastructure. Progress has also been made in engaging non-governmental and community-based organizations on SWM issues. However, public awareness of SWM issues remains poor, especially about the negative consequences of practicing open dumping. As noted in Box 3, informal wastepickers work the dump sites daily, collecting and removing recyclable materials, though at significant risk to their health from waste, fumes, pathogens, and waste slides.

The city's waste collection operations now serve much of the city , with a n estimated 75 percent of GAMA's daily generated municipal solid waste (MSW) collected from households. Solid waste collection services do not provide for all communities, particularly low-income and informal areas, and collection coverage varies significantly between MMDAs, ranging from a low of 35 percent in Ga South to a high of 93 percent in Dade Kotopon (see Table 16).

At present, the majority of waste collection services are provided by formal (private sector) waste management companies with some services also being provided by informal waste collectors, known as 'kaya bola'. Waste is collected directly from households and also from centralized collection containers (typically 7-8 m^3 skips) placed around the city to which informal collectors and residents bring their waste.

The formal waste companies that operate on behalf of the MMDAs under concession-type contracts, collect fees directly from residents in accordance with fee rates set by the MMDAs. Different rates are set for low-, middle- and high-income households. The side-effect of this approach is that private collectors focus on high- and middle-income areas where fee rate collection rates are higher. This results in low-income areas not receiving collection services. Informal collectors also charge households directly, typically on a weekly or per collection basis. These informal collectors do not have contracts with the MMDA so they operate in competition with the formal companies. However, there are some instances where private companies subcontract collection operations to informal collectors, particularly in low income areas of the city where it is more difficult to operate with large vehicles.

Redundancy

Currently, there is very limited additional capacity in Accra's SWM systems. Collected wastes are transferred, either directly or via the Zoompak waste transfer facility, to one of three disposal sites in Accra. One of these is an engineered landfill (Kpone Landfill in TEMA) and the other two are dump sites with no engineered containment or effective operational practices to prevent pollution (Nsumia dump site in Akwapim South and Abloraadjei dump site in Ga East). There are also a number of smaller dump sites across the city used by households, and informal collectors, and possibly also by formal companies. The Kpone landfill was constructed in 2013 with a design life of 8-10 years but by 2016, it has received over four times its anticipated input. It is expected that the site will be full before the end of 2016.

In addition, approximately 500 tons of waste per day are delivered to the Accra Compost and Recycling Plant (ACARP). At this plant, recyclables are removed and organic waste treated to produce a compost which is sold for use in landscaping. The remaining 'residual' waste (about 20 percent of the input volume) is disposed of at a landfill site located at the ACARP site.

In the event of a shock that affects the SWM system, there is very limited contingency available to keep services operating and ensure that wastes are collected and transferred for appropriate disposal and treatment. This has the potential to significantly increase public health risks as the quantities of dumped waste around the city and in drainage channels increases. This is also likely to increase the risk of flooding.

Reflectiveness

The level of data collection and analysis on SWM factors varies considerably among MMDAs. For example, AMA has an integrated SWM strategy which sets out, in detail, the baseline situation and a detailed implementation plan for improving SWM. Other MMDAs provide plans for improving SWM in their MESSAP and DESSAP documents, with varying levels of evidence-based analysis and degree of detailed implementation planning that has been conducted.

There is also a significant gap between the plans that are developed and the actual implementation of these plans. The system is reflective on paper, but in reality, past experience does not appear to inform implementation on the ground.

Recognizing the challenges that GAMA's SWM system faces and the very real hazard that this poses in terms of environmental health and flood risk, the MLGRD developed an Emergency Solid Waste Management and Improvement Program (E-SWMIP) in August 2015. This proposed the urgent development of additional landfill capacity at the Kpone landfill, a new landfill at Ashaladja in Ga East, and four new transfer stations at Achimota, Kaneshie, Mallam and Agbobloshie. The total cost of these investments was estimated at US$35 million. It is understood that the MLGRD is currently seeking funding to implement this program.

2.4 Drainage and Coastal Zone Management

In a resilient city, drainage and coastal zone management is intrinsically linked to the larger management of water resources in all of its dimensions. This stretches from the management of storm runoff, management of natural drainage systems and their riparian zones, and management of coastal wetlands and coastal zones in general. The drainage and coastal zone management system is integrated in all city planning processes, including construction, land use, socio-economic issues, and sectoral plans. A resilient city bases its decisions for budget allocation and investment prioritization on information that includes experienced and expected damages and losses from drainage and coastal zone-related disaster events.

Sectoral Overview

The coastal zone of Ghana is primarily a high-energy environment and has some lowlands, which are prone to flooding. The coastal zone is defined as the area below the 30-meter contour representing about 7 percent of the country's land area. It is home to 20 million people, about 25 percent of the nation's total population, and host to about 70 percent of Ghana's industries and businesses.

Underlying infrastructure issues largely drive Greater Accra's vulnerability to frequent flooding. Of particular importance are hydraulic infrastructure, solid waste management infrastructure, and transport-related infrastructure. The drainage and coastal zone management system in Greater Accra is not only highly vulnerable, but also a key entry point for sustainably managing floods from an infrastructure perspective. Due to rapid expansion of the city, the infiltration capacities of the basin surfaces have changed drastically in recent decades.

The *CityStrength* diagnostic consultations confirmed and highlighted the following stresses affecting the drainage and coastal zone management systems:

- Accra is rapidly growing, but only providing limited access to affordable housing and in all types of land with substantial impacts on the urban hydrology. The rapid expansion of informal settlements also impacts the drainage patters of the city. (See: Housing)
- Spatial planning and building guidelines are seldom enforced, putting additional pressure on the vulnerable areas to be made available for construction. (see: Land Management)
- A weak solid waste management infrastructure with only one designed and operational land fill in GAMA, combined with detrimental solid waste management practices by the majority of residents puts additional pressure on the drainage system and exacerbates flooding. (see: Solid Waste Management)
- The division of responsibilities for drainage management, including operation and maintenance, is spread across the Hydrological Services Department (HSD), the MMDAs, and the Department of Urban Roads, resulting in weak coordination, planning and enforcement.
- Only a fraction of the required funding for operation and maintenance of the drainage system is regularly provided, resulting in the delay of needed maintenance work, such as desilting and regular dredging and cleaning of channels.
- Artisanal sand mining along Accra's beaches threatens major parts of the coast and its protective function.

Institutional Set-up

With regards to protection, management and development of drainage and coastal zones, the following are the current arrangements:

- The coastal zones and drainage systems are planned and managed by the respective MMDAs through the Medium Term Development Plans. The Hydrological Services Department of the Ministry of Water

Resources, Works and Housing (MWRWH) is responsible for the physical protection of the coastline and the construction of storm drains. Sometimes, however, the MMDAs, MLGRD and the MWRWH also handle storm drains through consultancy.

- The responsibility for drainage management, including operation and maintenance, is spread across HSD (for primary drains), the 16 MMDAs of greater Accra (for secondary drains), and the Department of Urban Roads (for tertiary or road side drains). The coordinating roles are carried out by the Ministries depending on what program needs to be implemented. However, challenges associated with the number of agencies involved has resulted in weak coordination, planning and enforcement.

Policy Context

Key policies in the sector fall under three major areas: Integrated coastal zone management and sustainable development; marine environmental protection, both from land-based activities and from sea-based activities; and sustainable use and conservation of marine living resources (both of the high seas and under national jurisdiction). Important plans under the areas include:

Coastal Zone Management Indicative Plan, 1990; National Environmental Action Plan, 1994; Integrated Coastal Zone Plan, 1998; Coastal Zone Profile of Ghana, 1998; National Oil Spill Contingency Plan with specific reference to the marine environment, 2002; and Environmental sensitivity map of the coastal areas of Ghana, 1999 and 2004.

Ongoing/planned projects and programs in the GAMA region include the Mensah Guinea Coastal Protection Project and the Ningo-Prampram Coastal Protection Project.

The MWRWH has prioritized and costed a total of 40 storm drains for GAMA alone, amounting to about US$345 million. The details of these storm drain projects are presented in Table 17, below.

Table 17: Details of 40 Prioritized Drains in GAMA

Ranking Order of Priority	Drain	Basin	Total Drain Length	Unlined Length	Cost/M(US$) Including Cover
1	LAFA STREAM	LAFA	14,260.00	8,000.00	7,500.00
2	GBAWE	BARLEY	300.00	300.00	5,500.00
3	SOUTH ODORKOR		1,148.00	1,148.00	4,400.00
4	DANSOMAN A		1,430.00	1,430.00	2,200.00
5	DANSOMAN B		1,138.00	1,138.00	2,200.00
6	ODAW UPSTREAM	ODAW	12,165.00	2,000.00	11,250.00
7	MATEHEKO		3,469.00	1,669.00	2,100.00
8	SOUTH KANASHIE		1,730.00	1,730.00	14,062.50
9	WEST KANASHIE		1,400.00	1,400.00	4,500.00
10	SOUTH AWUDOME		2,000.00	2,000.00	3,300.00
11	ONYASIA DZORWULU		7,146.00	5,746.00	11,250.00
12	ONYASIA DZORWULU		4,000.00	4,000.00	2,200.00
13	NIMA	NIMA	7,050.00	2,000.00	5,500.00
14	NIMA	NIMA	1,881.00	1,881.00	3,300.00
15	CHEMU		4,190.00	627.00	2,000.00
16	MAMPON	MAMPON	2,140.00	2,140.00	2,750.00
17	DANSOMAN		1,000.00	1,000.00	1,650.00
18	MUKOSE	ODAW	3,250.00	500.00	2,200.00
19	WEST RIDGE		1,495.00	1,495.00	1,650.00

Ranking Order of Priority	Drain	Basin	Total Drain Length	Unlined Length	Cost/M(US$) Including Cover
20	ADABRAKA		1,500.00	1,500.00	1,650.00
21	AKWETEMAN	APENKWA	655.00	655.00	2,200.00
22	APENKWA	APENKWA	760.00	760.00	4,000.00
23	OSU KLOTTEY	OSU KLOTTEY	4,460.00	914.00	3,300.00
24	OSU-CAMONITE	OSU KLOTTEY	973.00	973.00	4,500.00
25	OSU-BAFAROCK		1,500.00	1,500.00	3,300.00
26	CONFERENCE-CASTLE		1,700.00	1,700.00	2,750.00
27	AWUDOME	ODAW	1,000.00	1,000.00	2,200.00
28	FEO EYEO		1,518.00	1,518.00	2,200.00
29	ST. THERESA-DADEBAN		2,000.00	2,000.00	2,200.00
30	CIRCLE		1,000.00	1,000.00	3,300.00
31	KORLE GONNO		1,793.00	1,793.00	350.00
32	SOUTH LABADI	LABADI	1,550.00	149.00	2,300.00
33	CENTRAL LABADI		500.00	500.00	1,650.00
34	LA CENTRAL		400.00	400.00	600.00
35	LA KOLIKO		1,000.00	1,000.00	2,200.00
36	KPESHIE	KPESHIE	5,486.00	3,046.00	5,500.00
37	EAST LEGON		4,000.00	4,000.00	2,200.00
38	BURMA CAMP		3,000.00	1,105.00	1,650.00
39	KORDJOR		13,043.00	5,000.00	7,500.00
40	ONYASIA/DZORWULU	ODAW		70,717.00	7,500.00

Qualities of Resilience

Robustness

The drainage system of greater Accra is inadequately designed to accommodate the rapid expansion and population growth of the city, which has caused a drastic change of the infiltration capacity of its drainage basin surfaces in recent years. This, together with hydraulic infrastructure's substantially reduced retention capacity, leads to overwhelmed basins as a result of rainfalls with high peak flows. Only a small part of the main drainage channels are lined, while secondary and primary drainage systems are not well integrated or connected. Furthermore, the drains are commonly used as garbage collectors, which, combined with siltation, chokes the channels, further reducing the discharge capacity as maintenance is often limited. Most of the lagoon outlets to the sea are significantly silted. The situation was aggravated during the June 3, 2015 floods through the malfunctioning of the flapgate weir regulating the flow of the Odaw River into the Korle Lagoon. The actual storage and drainage capacity is therefore likely insufficient to adequately drain the storm waters, causing flooding to become a perennial phenomenon in large parts of the city over the past decades. Design flaws in transport infrastructure further contribute to the overall failure of hydraulic infrastructure. Concrete cover slabs on roadside drains often break and block water flow. These covers are also often installed incorrectly by being placed inside the drain at water depth, reducing flow capacity and causing spillover. Additionally, runoff patterns and flow regimes are not properly assessed during the design of road infrastructure, causing the associated drainage works to be built to suboptimal capacities.

Adequate management of solid waste is a key concern. With the urgent need for dredging the main canals and interceptors (near the Nkrumah circle area), the main concern is how to adequately dispose of the silted material so that no additional problems are created at other parts of the hydraulic infrastructure due to the emergency desilting and dredging activities (as is the case of the weir at the entrance of the Korle Lagoon, currently used as a "transfer station"). It is also important to address the limited capacity at disposal sites to accommodate the management of debris and dredging of some critical segments of the drainage system.

Coordination

Greater Accra's drainage system scores moderately to poor with regard to its coordination quality. The institutional landscape responsible for drainage management in greater Accra is divided among many agencies with no coordination oversight managing the entire drainage network in greater Accra. Coordination between agencies is only done on ad-hoc basis and related to specific interventions or projects. Upstream coordination in the planning process is missing. The institutional mandates, roles, and responsibilities regarding drainage networks must be clarified in order to ensure proper operation and maintenance moving forward.

While MWRWH is responsible for the planning and development of main drainage infrastructure, MMDAs are responsible for the operation and maintenance. However, the MMDAs face significant budgetary restraints which do not allow for adequate maintenance. Additionally, the design and implementation of drainage infrastructure associated with transport infrastructure is the responsibility of the Ministry of Roads and Highways (MRH), leading to suboptimal coordination with other stakeholders to ensure designs are made to necessary specifications.

Inclusiveness

Greater Accra is known for its community based, inclusive approach to planning. As such, the drainage management system in greater Accra has good collaboration with the communities in the different MMDAs. Although limited in its depth and width, communities have good knowledge on the flood risk.

Redundancy

Greater Accra's drainage system is not redundant at all vis-à-vis shocks. Even short and limited rainfall events immediately turn into (localized) flooding. While the drainage system is under-designed and not fully operational, it also lacks buffer capacity to store or buffer peak flows. Retention basins in the upstream areas are absent and in-situ retention capacity of the drains is non-existent, making the system extremely vulnerable to shocks.

Reflectiveness

The decision makers and practitioners responsible for flood and drainage management in greater Accra are well aware of the challenges of the local drainage system, but have so far taken little action on mitigating the flood impacts. According to the Hydrological Service Department, no water level and discharge information has been recorded in any of the main rivers of Greater Accra (notably Odaw River and Korle Lagoon) since the early 1990s. Thus, many of the decisions that should be taken to sustainably address flooding (for example, the identification of areas at risk) lack a thorough understanding of the hydrology of Greater Accra.

For example, following the June 2015 floods, many of the existing plans were reviewed and mitigation measures, such as drainage cleaning, were quickly put in place. However, this has not yet been reflected in the long term planning, operation and maintenance of the drainage system in Greater Accra.

3. Community and Social Protection

A resilient city provides all of its inhabitants, including vulnerable and marginalized people, with equal and fair access to basic services and engagement in the formal economy. The vulnerable and marginalized groups have sufficient capacity and resources to bounce back from shocks and stresses, such as timely alerts and information to make informed decisions and increased awareness of their risk. A resilient city creates opportunities for a thriving civil society that supports the fair representation of society. Support structures such as safety nets and emergency response target all vulnerable sections of the society and effectively deliver their services even in adverse situations.

Sectoral Overview

The Government of Ghana is moving forward in the area of community and social protection. However, even though the poverty rates in GAMA are the lowest when compared to other regions in the country, there are still vulnerable groups—including youth, disabled, elderly—that need assistance and the current support system is not adequate. Poverty remains a concern despite its overall decline, particularly in terms of spatial inequality; two districts in the region, Shai Osudoku (55.1 percent) and Ningo Prampram (31.2 percent), have poverty rates more than four times the regional average. [60] There are many social programs that target vulnerable groups and provide different types of services. The main poverty alleviation program is Livelihood Empowerment Against Poverty (LEAP) which consists of cash transfers. There are other programs which aim to increase school attendance, address malnutrition, and provide healthcare, among other objectives. There are good policies at the national level that have to be implemented by individual MMDAs. Overall, however, there is a lack of appropriate funding transferred from the national government for the different social programs. There are good coordination efforts across MMDAs and sectors for the provision of social services, especially for the LEAP program, but coordination is not as strong at the national level. There are efforts to protect vulnerable groups from malaria and cholera outbreaks, as well as initiatives to prevent impacts from floods and address any damages that do occur. However, there is a need for more proactivity as some actions just take place before flooding season, rather than having regular maintenance and monitoring. Prevention and relief efforts for the community have a short-term focus without consideration of how shocks impact individuals in the long term, such as the death of a household's breadwinner and loss of livelihoods. Basic services provision varies depending on the service, but low-income communities are generally affected the most by lack of coverage. Unemployment is also a significant stresse as a result of inadequate skill-building. Based on the abovementioned information, the community and social protection sector is not ready to withstand significant impacts and provide for affected residents.

Institutional Set-up

In 2013, the Government established the Ministry of Gender, Children and Social Protection to oversee activities related to community and social protection, especially targeting vulnerable groups such as the disabled, the elderly, children, women, and the urban poor.

There are other institutions that are also involved in the provision of social services. The Ministry of Employment and Labour Relations is responsible for promoting job creation, vocational training, and overall economic growth. The National Disaster Management Organization (NADMO) is responsible for providing relief support to communities affected by shocks. There are also other agencies such as the National Health Insurance Authority (NHIA), the National Pension Regulatory Authority (NPRA), and the

[60] Molini, Vasco, and Pierella Paci. 2015. "Poverty Reduction in Ghana 2015: Progress and Challenges." World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO

Ghana Education Service that provide other social services to residents. Most of the agencies have national level programs that are administered by the different MMDAs at the local level and overseen by the Regional Coordinating Council. At the MMDA level, the Social Welfare Agency administers the different social programs and provides services and resources to the vulnerable groups in the MMDA. Furthermore, there are different NGOs and Community-Based Organizations (CBOs) operating in the MMDAs, but there is weak coordination with the government agencies and any joint work is ad hoc.

Policy Context

National Social Protection Strategy (NSPS)—2007: Supports the vision of promoting an all-inclusive and socially empowered society and creating mechanisms for the protection of persons living in extreme poverty and related vulnerability and exclusion.

The policy's specific objectives are: (1) To increase the ability of the extreme poor to meet basic needs through improving access to livelihood opportunities and social protection; (2) To reduce extreme poverty and related vulnerability and exclusion through provision of LEAP Social Grants Programme; and (3) To strengthen the capacity of MMDAs to deliver, monitor and evaluate effective social protection programs

National Employment Policy—2014: Aims to achieve the inclusion of vulnerable groups to increase their productivity and employability through different mechanisms, including a comprehensive database and labor market information to facilitate policy planning and programming; and protection of children against child labor, provision of alternative income-earning activities for children and their families, and the creation of a database on children at work to facilitate planning and decision-making.

Other relevant policy frameworks that support social protection include the following:

- Child and Family Welfare Policy, 2014
- National Health Insurance Act, 2012 (Act 865)
- National Pensions (Amendment) Act, 2014 (Act 883)
- National Pensions Act, 2008 (Act 766)
- The Children's Act, 1998 (Act 560)
- Juvenile Justice Act, 2003 (Act 653)
- Domestic Violence Act, 2007 (Act 732)
- Human Trafficking Act, 2005 (Act 694); and
- Disability Act 715

Ongoing/Planned Projects and Programs

- Social Security and National Insurance Trust (SSNIT): Social Security Scheme established in 1965 to provide three basic benefits: (1) old age pension, (2) invalidity pension and (3) death-survivors payment.
- The National Health Insurance Scheme (NHIS): Established the National Health Insurance Scheme (NHIS) in 2003 to provide basic healthcare services to persons residing in the country, through mutual and private health insurance schemes.
- The Ghana School Feeding Programme (GSFP): Launched in 2005 to achieve the Millennium Development Goal concerning reduction of hunger.
- The Livelihood Empowerment Against Poverty (LEAP) Social Grant Scheme, under the Ministry of Gender, Children and Social Protection (MoGCSP), is meant to decrease poverty in Ghana. It started as a 5-year-pilot program from 2008 to 2012 but has continued since then. It contains financial support for Orphan/Vulnerable Children, people over 65 years and people with disabilities. It involves conditional and unconditional monthly cash transfers. The cash transfers

are funded from GoG budget and support from Development Partners like the World Bank, UNICEF, ILO and the Government of Brazil.

Other programs include:

(1) Capitation Grant (Primary and Secondary Education); (2) Social Welfare Programs; (3) Supplementary Feeding Programs; (4) Youth Employment Program; (5) Free antenatal care services; (6) Scholarships for brilliant but needy children; (7) Integrated Agricultural Support Program; (7) Microfinance Schemes; and (8) Emergency Management Schemes

Table 18: Ongoing/Planned Projects and Programs—Social Protection Sector

Type/Name of Project	Details or Program Components	Sponsor	Primary Government Counterpart	Budget	Time Period	Beneficiary MMDA/ Beneficiary MMDA
Ghana Social Opportunities Project	Social protection; cash transfers	World Bank	MoF, MGCSP	US$88.6m	2010–2017	All MMDAs
Ghana Social Opportunities Project	Social protection; cash transfers	World Bank	MoF, MGCSP	US$50m	2014–2017	All MMDAs
Ghana—Maternal, Child Health and Nutrition Project	Community-based health and nutrition services for women of reproductive age, especially pregnant women, and children under 2 years old.	World Bank	MoF, MoH	US$73m	2014–2020	All MMDAs

Qualities of Resilience

Robustness

Flood prevention and response, as it relates to impacts on the community, is still inadequate, especially for vulnerable groups such as the poor. There is a need to be more proactive. The assessment of structures in risky areas is critical but it only gets done before the rainy season. Given the complexity of moving people to a safe area, the assessments should be done on a more regular basis. Whenever a house is located in a risky area, NADMO requests the occupants to move to a different area, without compensation. If they do not comply with the request to move, the structure eventually gets demolished and the owner/occupier get charged with the cost of demolition. Moreover, people nonetheless return to be close to their livelihoods in the vulnerable areas. The response initiatives whenever there are shocks are also solely focused on relief support in the short term. NADMO works with MMDAs to provide shelter and other key items to affected citizens, but there is no thinking about how to alleviate long term disruptions such as the loss of livelihoods.

GAMA has a system in place to deal with outbreaks of malaria and cholera to assist residents. On the preventive side, there is quarterly fumigation before the rainy season. Citizens can also report concerns and issues to their designated representative in the Assembly, who then goes to the MMDA for follow-up.

Coordination

The different agencies involved in the provision of social services at the MMDA level are somewhat coordinated but this could be improved. There are meetings across sectors for information sharing that take place on a monthly and quarterly basis, depending on the subjects discussed and the participating agencies. The different social agencies do try to share information on the social program beneficiaries to prevent people from taking advantage of welfare programs. Social welfare officers from different MMDAs get together on a quarterly basis, especially to discuss the LEAP Program. Coordination appears to be weaker at the national level.

The Government does not effectively coordinate the provision of services with informal structures, such as family and community networks, and other non-government organizations, despite the fact that they operate widely in GAMA and are a strong support system for many.

Inclusiveness

At the district level, there is strong community consultation on issues of urban planning as instituted by the Ministry of Local Governments and Rural Development. There are boards for dissemination of important information and a radio station that communicates issues of concern. Nonetheless, the extent and level of engagement beyond the urban planning stage is unclear and whether there is accountability in the implementation of projects. The TMA has a website with information on all their social programs, which is something that is worth replicating in other MMDAs.

Social services have ineffective targeting mechanisms and not everyone is getting the same quality of services across the MMDAs. While formal residents registered in each MMDA in GAMA are targeted for the provision of social services, there are no resources for those living in informality, such as unregistered migrants. Provision of social services in GAMA is more about equality than equity. In terms of access to basic services, there are different rates of coverage depending on the service. For example, amount of water supplied has increased although coverage is still lagging behind urban growth. Sanitation services as mentioned earlier are weak. Low-income and informal communities are the most affected by lack of provision of basic services and they also often experience overcrowding.

As Accra continues to be an engine of economic growth, the housing prices will progressively increase, especially in the middle of the city. As a result, many people are settling on the outskirts of the cities, including elderly people who have lived in Accra for a long time but who cannot afford the prices in the city with the pension they receive. This also encourages informal settlements, including in dangerous areas, of people who want to remain close to their livelihoods. The horizontal expansion of the city requires more people to commute to the city for work, which in turn creates traffic congestion, another stress that was reported by representatives from the sector.

Redundancy

There are multiple programs for the vulnerable as described above: LEAP, Disability Fund, Education and Uniforms for all children, among others. Ghana also has a strong informal network of families and community members that support the vulnerable when the government cannot provide for them. However, the redundant capacity is already strained; the sector is too reliant on the national government and whenever the transfers to the local government are delayed, the MMDAs are unable to provide social services to their citizens. The level of funding that the local government gets from the central government for social programs is two percent of the common fund; the actual amount is difficult to predict. Furthermore, the funding that is transferred is usually earmarked for specific programs, meaning that there is no flexibility for MMDAs to move funding from one program to another whenever there is a mismatch between demand and supply. MMDAs also depend solely on the national government for

census related data which feeds into their social programs. There are no proactive data-gathering initiatives at the local level.

Outbreaks of diseases are a challenge because when people get sick, they are unable to go to work which affects their income. The death of a household's breadwinner was reported as a stress by the community and social protection sector. GAMA has funding allocated to provide free essential medicine and vaccines to people such as for Malaria, but funding is too dependent on the national government and the initiatives get disrupted whenever funding does not come through.

Reflectiveness

The MMDAs do try to gather data on past disasters to use it for future planning, however, it is unclear how effectively the lessons are actually incorporated. Additionally, the MMDAs inform people about the hazards that affect them and coping mechanisms but this is done on an ad-hoc basis.

The different social programs carry out background checks to determine eligibility. However, there is no ongoing monitoring of the recipients and no exit strategy to make sure that people are not perpetually benefitting from the system.

The educational system is not preparing students for jobs. Participants of the consultations reported that the material that is taught at academic institutions is too theoretical so when graduates enter the labor force, they need to develop skills that should be learned at school. This discourages employers from hiring recent graduates, which exacerbates the problem of youth unemployment. The lack of employment among youth is presumed to be leading to an increase in social vices such as armed robbery, prostitution, substance abuse, and cybercrimes. There is an employment agency called 'National Labor Services', however, its efficiency and effectiveness is questionable.

There are some good practices to try to prevent flooding and any impacts on communities. For example, assemblies have ongoing weekly sensitization programs about preparing for the rainy season and potential flooding. As the rainy season approaches, the programs are intensified, particularly in flood prone areas. MMDAs also check in on new settlements to make sure they are complying with basic safety features.

4. Conclusion

The different sectors of GAMA have taken significant steps towards enabling the city to reach its development objectives. There are good systems in place in urban planning processes, coordination issues (mandates) as well as implementation issues. Urban services still has room for improvement in solid waste management, as well as greater coordination given the clear interlinkages between the three sectors. The city can also benefit from improved drainage infrastructure.

There have been many improvements in the individual sectors analyzed as part of the CityStrength exercise, and GAMA is taking the necessary steps to harness urbanization and create opportunities to lift many out of poverty and boost shared prosperity. Despite the many improvements made thus far, GAMA still has the opportunity to improve individual sectors' performance and contribute to enhanced resilience at the city level. Several issues identified as priority areas were found to be challenges common to multiple sectors and crossing jurisdictional lines of the 16 MMDA. But coordination remains a challenge as there is no institution in charge of metropolitan management. For instance, addressing constant flooding will require MMDAs to work together on cross-sectoral collaboration (i.e. transport, solid waste, and drainage). GAMA can leverage current efforts by the government to create Joint Development Planning Areas and position the GAMA area as a candidate for it.

There are existing mandates at the national level that respond to the call for increased resilience. For example, MMDAs have been tasked with incorporating disaster risk management and climate change adaptation into their medium term development plans, which has implications for land-use and structural plans. Nonetheless, there remains an overall lack of financial and technical capacity (e.g. engineers) to turn it into a reality.

GAMA will also benefit from a long term vision for the development of the sectors that takes shocks and stresses into account as well as the future effects of climate change. As of now, the approach to shocks and stresses has been reactive, focusing on relief and emergency response, rather than taking a proactive approach of prevention and mitigation.

Urbanization has remained ahead of planning as a result of weak implementation capacity whenever plans are prepared. This has resulted in high levels of informality and location of settlements in dangerous areas. Furthermore, planning doesn't effectively integrate risk considerations because there is no systematic data collection which can establish a robust and comprehensive risk profile for GAMA. Contingency finance is also needed to prevent the diversion of funding from maintenance functions to shock response.

Basic services provision varies depending on the service and MMDA but it is generally inadequate, especially sanitation services, and it has implications on the resilience of the city. For example, inadequate transport options and collection and disposal of waste exacerbates traffic congestion, public health concerns, and flooding as a result of clogged drains. Improved sectoral performance is also going to require behavioral change of residents who are unaware of vulnerabilities or how their behavior puts others at risk and compromises the resilience of the city. This also relates to the inadequate disposal of solid waste which exacerbates flooding. GAMA is addressing many of the abovementioned challenges already, through investment in infrastructure, revisions of land-use and structural plans, and capacity building. The Government is committed to the resilience agenda and will undoubtedly strive for high performance of the sectors.

IV. PRIORITY ACTIONS AND INVESTMENTS IN GAMA

IV. PRIORITY ACTIONS AND INVESTMENTS IN GAMA

Priority actions and investment highlights the most pressing needs at the national, regional, and city level; and it lists recommended actions to enhance resilience in GAMA and the different sectors. Recommendations were first made by the sectors and clusters of MMDAs, discussed with stakeholders and then validated by the appropriate agencies, MESTI and MLGRD. The following list of identified priorities is not meant to be the end of the engagement with the Government and GAMA stakeholders. Instead, it's meant to be a starting point for the Government to build on the findings and enhance resilience across GAMA.

1. Key Shifts in Planning and Response

Institutional coordination and harmonization of planning and emergency management efforts is largely lacking among the many actors involved in disaster management, and this has contributed to the apparent absence of a concerted effort to address the myriad of shocks and stresses confronting GAMA. Moreover, hitherto, emergency management has largely focused on response rather than reduction of underlying risks. If risk mitigation measures are not addressed urgently, the trend suggests that there will be an increasing shocks and stresses in GAMA with potentially debilitating effects on the vibrancy of the region. More so, increased disaster risk is expected as a result of climate change, and therefore demands a change in focus in the planning process and disaster prevention and management regime in GAMA.

In the recent past, there has been a high-level commitment from the Government of Ghana to shift the national agenda for disaster management from response to prevention and risk reduction. The development of the Ghana Plan of Action on Disaster Risk Reduction (DRR) by NADMO, with technical and financial assistance from UNDP and the World Bank, respectively, constitutes a milestone in this process. Similarly, the Community Resilience through Early Warning (CREW) project[61] aims to build capacities within the country to reduce disaster risk by putting in place an integrated early warning system that is both scientific and people-centered. However, planning efforts have been largely centralized and not effectively integrated with the local governmental planning processes and management efforts. While there is a national disaster management plan, GAMA MMDAs do not have disaster management plans of their own and there are no special funds for planning and disaster management at the local government levels. Recently there have been attempts to mainstream DRR and Climate Change Adaptation (CCA) measures into MMDA development planning. Disaster risks, disaster preparedness and disaster reduction issues, programs, plans and strategies are now required to be integrated into the Medium Term Development Plans of the MMDAs, and form part of the FOAT assessments of MMDAs. These initiatives ought to be strengthened and institutionalized at the local level, and indeed at all levels of the governance structure.

The general consensus is that disaster management has multi-sectoral and multi-disciplinary factors, and therefore requires an integrated approach in its planning and implementation. In the GAMA region, because of the many local government entities involved, the process must necessarily be inter-jurisdictional as well. The path to enhanced resilience in GAMA therefore requires multi-level, multi-sectoral and inter-jurisdictional coordination and harmonization of planning and investment interventions among the many actors. The current statutory roles of the Greater Accra Regional Coordinating Council

[61] The CREW project is being implemented by NADMO, with technical and financial support from UNDP and the Norwegian Government, respectively, and by the Floods Early Warning Systems (FEWs) Project being implemented by the Water Resources Commission.

(RCC) (a deconcentrated arm of the national government, which oversees the GAMA region) and NADMO is limited and not capable of providing the leadership and coordination needed.

A new institutional framework is needed for integrated planning and collaboration. It should include a regional planning entity, providing a forum for the discussion and study of GAMA-wide problems with the capacity and statutory authority to drive the development of policies, plans and action for their resolution. The new framework and entity should come to the table to convene a broad perspective on the needs of the local governments, the opportunities for cross-sectoral policy coordination and implementation (across land use, transportation, disaster risk reduction and management, solid waste and drainage management), and the quality of life and resilience issues that influence local governments in their decision-making. The National Development Planning (System) Act, 1994 (Act 480) makes provision for the establishment of such an entity and process, allowing that the President of Ghana can designate any contiguous area as a Joint Development Planning Area (JDPA) and establish a Joint Development Planning Board (JDPB) for the purposes of formulating and supervising the implementation of development plans for the designated area. The designation of a JDPA and JDPB for the GAMA region is therefore an urgent precondition to enhancing the resilience of the GAMA region.

2. Short, Medium and Long Term Priorities

GAMA's rapid urbanization over the past three decades has been momentous, coinciding with rapid regional GDP growth and significant improvements in many human development indices. However, as has been revealed by the CityStrength diagnostic exercise, the lack of adequate planning and preparation to accommodate the rapid increases in human population and uncontrolled spatial expansion has left GAMA exposed to many shocks (flooding, fire outbreak, disease outbreak, and tidal surge—with associated coastal erosion) and a wide range of stresses (urban sprawl, housing shortage, proliferation of informality, traffic congestion, poor solid and liquid waste management, excessive unemployment, and land/chieftaincy conflicts). The trajectory of population and economic growth suggests that GAMA's rapid urbanization is expected to continue over the coming decades, and if not properly managed, could worsen the existing shocks and stresses and even lead to new ones with potentially devastating effects on the GAMA environment and quality of life for its residents.

Improving GAMA's resilience will require purposeful actions and investments, including i) concerted efforts and commitment to long range integrated spatial planning for effective urban development and management; ii) improvement of strategic infrastructure and basic services delivery to address deficiencies and build capacity for future demands; iii) adoption of collaborative mechanisms to facilitate joint planning, financing and implementation management of GAMA-wide resilience building initiatives and projects; and iv) addressing weak institutional capacity, community education on civic responsibility, and the enforcement of codes and regulations.

Informed by the discussions with participants in the CityStrength diagnostics, assessments of the many World Bank sectoral specialists, and the findings and recommendations discussed in previous sections, the following key four objectives have been identified to strengthen GAMA resilience:

A. **Improve Metropolitan Planning and Coordination:** Effective metropolitan (GAMA-wide) governance will engender a long term vision for the development of GAMA as a region which can be accompanied by effective urban and land-use planning that takes risk management into account. Emphasis should be given to key factors for urban resilience such as land management, information systems, and provision of infrastructure. Based on the findings of Metropolitan Management in Greater Accra Technical Assistance, the government can leverage current efforts

to formulate a Joint Development Plan, taking the establishment of Joint Development Planning Area (JDPA) and Planning Board (JDPB) as a first step. The National Development Planning (System) Act, 1994 (Act 480) endorses the establishment of the designated contiguous area as a Joint Development Planning Area (JDPA) and a Joint Development Planning Board (JDPB), for the purposes of formulating and supervising the implementation of development plans for the designated area. Therefore, the designation of a JDPA, encompassing the GAMA, and the establishment of JDPB are urgent preconditions to enhance planning and coordination as well as to develop a Joint Development Plan. The Government should also expedite implementation of the new Land Use and Spatial Planning Act, 2016 (Act 925) and new three-tier Planning Model. The Model provides a framework and process for preparation of comprehensive spatial development and structural plans for all MMDAs, sub-regions and regions in Ghana. The Act also requires upgrading of existing communities and can leverage current efforts, such as the preparation of a Greater Accra Regional Spatial Development Framework and an integrated sanitation and drainage master plan. Increased coordination will be key, as will capacity building efforts of staff in charge of the design and implementation of strategic plans.

B. **Integrate Urban Flood and Coastal Zone Management:** GAMA needs urban systems in place that are prepared to handle floods and sea level rise in the context of climate change, reducing the risk of exposure to these shocks. Quick wins include finalizing the GAMA-wide drainage and flood control master plan and updating existing plans for incorporation into current spatial development strategies and land use plans. Drainage and flood control infrastructure and management systems should also be improved. This can be done by: (1) mapping and demarcating floodplains and buffer zones of all drainage ways and enforcing existing regulations; (2) improving coordination between responsible agencies (HSD, Ghana Highway Authority, Department of Urban Roads, and Department of Feeder Roads) and the 16 MMDAs in GAMA for drainage works, operation and maintenance; and (3) a substantial increase in the daily operation and maintenance budget for the drainage system and hydraulic infrastructure at MMDA level, and not just on an emergency basis. Also on the preparedness side, GAMA should identify and secure areas to increase retention capacity and reduce runoff as well as develop green areas on floodplains. Adequate collection and disposal of solid waste, especially in critical areas, will prevent clogged drains that exacerbate flooding. This includes closer coordination between the private and informal sector to reach all areas of the city and awareness-raising on proper solid waste disposal. Moreover, at present, there is a significant shortfall in the availability of engineered and appropriately operated waste transfer and disposal capacity, which calls for investment in appropriate infrastructure.

C. **Enhance Resilience in Vulnerable Communities:** Vulnerable communities are the most affected during disasters and generally lack access to urban services and infrastructure. Nonetheless, impacts on vulnerable communities have repercussions for the city region's overall resilience due to geographic and systemic linkages. Many vulnerable communities are often located in low-lying areas particularly susceptible to floods, or elsewhere more exposed to cholera and malaria, or crime and violence. GAMA needs to prioritize the identification of vulnerable settlements across the 16 MMDAs to focus investment in the most exposed places. This key information can feed into a comprehensive slum upgrading and redevelopment strategy which needs to be integrated with local economic development initiatives and any existing development plans. Close coordination with the Regional Coordinating Council as well as with agencies in charge of social protection will enable the collection of important information about conditions on the ground.

D. **Improve Disaster Preparedness and Response to multi-hazards in GAMA:** It is essential to have a good understanding of the risks facing the GAMA region, including future climate change impacts such as sea level rise, in order to fulfill MMDAs' mandate to plan, mainstream and implement evidence-based disaster and climate risk management actions. Thus, a comprehensive and detailed risk assessment should be prioritized to create a risk profile for the region. Data needs to be collected regularly by the MMDAs to make sure that strategies are up to date. For example, the current sea defense wall intended to remediate tidal surges is negatively impacting some MMDAs. The information gathered can guide initiatives on preparedness, including strengthened early warning systems, especially for the most poor and vulnerable. A disaster risk management and climate change adaptation coordinating entity at the metropolitan (GAMA-wide) level can work jointly with NADMO to help implement policies and mandates at the MMDA level. Dedicated budget and adequate staff and equipment will be key to fulfill preparedness and response recommendations. For example, there is a lack of fire equipment necessary to respond to fire or take fire safety measures, especially in tall buildings and informal markets.

The next sections describe detailed priority actions and investments identified to meet the above objectives. These recommendations are based on the detailed sectoral and citywide priorities identified during different CityStrength diagnostics workshops. See Annex 2 for details of sectoral and citywide priorities.

A. Improved Metropolitan Planning and Coordination

i) Objective

The objective is to improve urban resilience in GAMA through enhanced planning and coordination with particular emphasis on key factors for urban resilience such as land, information systems, and provision of infrastructure.

ii) Rationale

Planning and coordination across the GAMA region is limited and fragmented with serious repercussions for service delivery and land management. The current institutional setup, with 16 individual MMDAs and several institutions involved in spectral interventions, leads to high risk of duplication and inefficiencies. Moreover, the existing planning instruments are not updated and do not reflect the reality on the ground, with negative impacts on both existing built up areas and green field sites, as well as on critical areas next to river beds and in core zones. The passing of new legal instruments for land use and spatial planning and for the creation of JDBPs create new opportunities

iii) Short-Term Actions

1) Expedite modalities for implementation of the new Land Use and Spatial Planning Act, 2016 (Act 925) and new three-tier Planning Model which provides a framework and process for preparation of comprehensive spatial development plans for all MMDAs, sub-regions and regions in Ghana. This recommendation requires the preparation of structure plans for all urban areas to guide future development, and redevelopment and upgrading of existing communities (including slum areas). In this direction, the following specific actions are required:

a. Expedite preparation of subsidiary legislation and other modalities to implement Act 925.

b. Invest in comprehensive update of land use plans (including the 1991 Master Plan), sector plans, using all available satellite imagery and procuring additional as necessary, and/or develop new, land use and spatial development plans for all MMDAs and GAMA region in accordance with Act 925. In

this regard, take advantage of the ongoing preparation of Greater Accra Regional Spatial Development Framework (under LAP 2, TCPD—World Bank) and ongoing drafting of integrated sanitation and drainage master plan (under GAMA project, MLGRD—World Bank) to set in motion processes for review of existing plans and preparation of new plans for the respective MMDAs and the entire GAMA region.

c. Devise and operationalize clear modalities to ensure the active participation of traditional authorities and other stakeholders in plan formulation and implementation.

2) Designate the GAMA region as a Joint Development Planning Area (JDPA) and constitute and resource a GAMA Joint Development Planning Board (JDPB) in accordance with provisions of the National Development Planning (System) Act 1994 (Act 480), to engender joint planning, harmonization, financing and coordination of development interventions within the GAMA region. It would take a combination of concerted investments in physical infrastructure, improved spatial planning and urban management, enforcement of building regulations and environmental by-laws and behavioral change interventions to address the underlying risks of disaster in GAMA. Therefore, effectively coordinated integrated land use and infrastructure planning and management is at the root of enhancing the resilience of the GAMA region. The designation of a JDPA and JDPB is the vehicle to make this happen.

3) Create a consolidated repository/observatory for maps, spatial data, and land use data at one institution (e.g., TCPD, Lands Commission or the Center for Remote Sensing and Geographic Information Systems (CERSGIS))—building on the existing frameworks including the Land Use Planning and Management Information System (LUPMIS) at TCPD, and the Ghana Enterprise Land Information System (GELIS) at Lands Commission or CERSGIS's database).

4) Address the human resource gaps at the local planning level by leveraging the TCPD planners in a consolidated manner across the 16 MMDAS to improve the technical capacity and coordination for planning and enforcement of spatial planning and building regulations, as well as operation and maintenance of urban management systems.

iv) Medium-Long Term Actions

1) Implement the GAMA Regional Spatial Development Framework (when completed) and the consolidated sanitation and drainage master plan when completed (under GAMA project) – and ensure correlation of the two plans across GAMA

2) Continue to address the weak institutional capacities of MMDAs by: expediting the completion of the ongoing decentralization reforms, especially strengthening sub-district structures of local governance; improving the technical capacity and coordination (LGSS to carryout mapping exercise to identify gaps in existing structures and personnel resources) among responsible MDA and MMDAs for planning and enforcement of spatial planning and building regulations as well as operation and maintenance of urban management systems; and devising and implementing a public education strategy that will engender behavioral change by instilling good civic responsibilities into GAMA communities.

3) Implement innovative and sustainable measures to improve municipal finance by: expediting completion of outstanding processes to pass the Municipal Finance Bill into law; completion of comprehensive street naming and property addressing to establish electronic, GIS-based database of properties and infrastructure within all MMDAs to aid with revenue planning and collection (expansion of property rates through regular valuation exercise, etc.); considering the establishment of community facility districts or assessment districts to enhance mobilization of funds for infrastructure development and operation and management; institute mechanisms to further develop public-private partnerships

(PPP) to access private funding for provision of infrastructure and services; and rationalizing the intergovernmental fiscal framework, including completing the ongoing decentralization reforms, especially fiscal decentralization.

4) Continue data gathering and management at the central repository for planning purposes, and integrate with accurate data gathering at the MMDA level to facilitate better planning and provision of urban services. The MMDAs are best suited to carry out ongoing data gathering in their respective MMDAs to assess needs in all sectors.

5) Improve regulatory framework for urban transport and empower MMDAs to fulfill their existing regulatory mandate under Act 462 to address traffic congestion in GAMA. Measures to be taken include: Implementing mass, well-regulated public transportation (including BRT); construction of pedestrian bridges, crossings and sidewalks at strategic locations to minimize vehicular-pedestrian conflicts and facilitate smooth flow of vehicular traffic; enforcement of regulations on street hawking and operations of taxis, *trotros* and motorcycles to address rampant indiscipline on GAMA roads which contributes to congestion on the roads. In this regard, leverage the momentum generated by the passage of by-laws by eleven Assemblies and their setting up of Urban Passenger Transport Units (UPTU) to provide the framework for planning and regulating urban passenger transportation, and the recent collaboration of the Assemblies in GAMA in setting up of a Greater Accra Passenger Transport Executive (GAPTE) to plan and regulate cross jurisdictional travel (more than 70 percent of total trips) in the GAMA area.

6) Institute a GAMA-wide "Waste Management Authority" (under or affiliated with the aforementioned JDPB). This entity will ensure effective GAMA-wide coordination on waste management initiatives. This will require political leadership and close partnership among the different jurisdictions in the city but there is clearly a need for close co-ordination in developing treatment and disposal capacity. There are also significant economies of scale associated with MMDAs working together to deliver this infrastructure. Responsibility for waste collection services would remain with MMDAs as collection is less capital intensive, and MMDAs are best suited to developing locally appropriate approaches.

7) Modernize and improve the coordination of traffic signals in the GAMA region to reduce intersection bottlenecks which contributes to the traffic congestion problem within the metropolis. Install power backups and Light Emitting Diodes (LED) technology for traffic signals to ensure uninterrupted operation and reduced energy consumption. This will reduce the incidence of vehicular conflict at key intersections and improve the safety of pedestrians at the junction crossings.

8) Develop, rehabilitate and modernize the rail-based mass transport system to complement and interlink with the road-based mass transport system by: rehabilitating the sub-urban railway lines (including, Accra–Nsawam, Accra–Achimota, Achimota–Asoprochona); completing construction of additional railway stations with adequate provision of parking along all routes, and interlink to other modes of transport in the city; undertaking feasibility study for the possible introduction of Tram services in the GAMA region; and increasing the number and quality of coaches on the route and frequency of service to make rail transport an attractive option within the Metropolis. In furtherance of this, **accelerate development and implementation of a railway master plan for GAMA**, working in collaboration with Ghana Railway Development Authority (GRDA).

10) Develop and implement a comprehensive and integrated transport master plan for GAMA (incorporating motorized and non- motorized transport facilities – coordinated with developments in low-income settlements) – in full integration with existing drainage and sanitation master plan.

9) Develop and implement a strategy for improved agriculture production based on land use planning to create economic, employment opportunities and food security and allow for use of green field areas in vulnerable basins to be protected

B. Adopt an Integrated Urban Flood and Coastal Zone Management Plan

i) Objective

The objective is to ensure the GAMA region is prepared to handle floods and sea level rise in the context of climate change with urban systems that work, reducing the risk exposure to these shocks.

ii) Rationale

Drainage and coastal zone management are intrinsically linked to the larger management of water resources in all of its dimensions. This stretches from the management of storm runoff, management of natural drainage systems and their riparian zones, and management of coastal wetlands and coastal zones in general. The coastal zone of GAMA is also primarily a high-energy environment and has some lowlands, which are prone to flooding. The coastal zone is home to about 20 million people, 25 percent of the nation's total population, and a place where about 70 percent of industries and businesses are located. The drainage and coastal zone management system in Greater Accra is not only highly vulnerable, but also a key entry point for sustainably managing floods in Greater Accra from an infrastructure perspective.

iii) Short-Term Actions

1) Finalize the comprehensive cross-jurisdictional (GAMA-wide) drainage and flood control master plan or update the existing master plan and ensure incorporation of same into any spatial development strategy and land use plans for the respective MMDAs. **Further improve the drainage and flood control infrastructure and management systems** by: mapping and demarcating floodplains and buffer zones of all drainage ways and enforcing existing regulations consistent with the national riparian buffer zone policy and local government development regulations; improve coordination between responsible MDAs (HSD, Ghana Highway Authority, Department of Urban Roads) and the 16 MMDAs in GAMA to jointly implement drainage works, operation and maintenance; collecting basic information needed for system planning and enhancement, including (i) the creation of an accurate digital elevation model (DEM) for GAMA, (ii) bathymetric surveys, (iii) mapping soil infiltration characteristics, (iv) updating land use information, and (v) updating statistics on short rainfall events and tidal conditions and developing rainfall-runoff models for the sub-basins.

2) Allocate appropriate resources to adequately and routinely maintain the hydraulic infrastructure (not just as emergency response after floods). This would facilitate undertaking substantial infrastructure investments in the drainage system, including dredging of the major lagoons and drainage basins of GAMA, constructing retention basins, lining of channels, installing sand traps and other infrastructure in accordance with the existing drainage master plans (1991 drainage master plan prepared by Mott MacDonald and Watertech and the new drainage master plan updated under the GAMA Sanitation project) that delineate the required drainage infrastructure. A substantial increase of the operation and maintenance budget for the drainage system at the level of MMDAs and HSD and WRC is required to ensure that drainage and desilting work can be conducted regularly and not just on an emergency basis.

3) Identify and secure areas to increase retention capacity and reduce runoff, and to develop green areas on floodplains. Upstream, the retention capacity and measures to reduce the sediment load (notably sand traps) are of primary importance to ensure that peak flows can be reduced and sedimentation in the lagoons and drainage basins are reduced. Securing land and constructing retention basins upstream is an

urgent priority going forward, as areas identified in the 1991 drainage master plan for the upstream construction of flood retention basins have to some extent already been built up and require the search, securing of land and coordination to ensure that these areas remain free for the construction of retention basins. This will require enforcement but also alternative land use (such as parks) to avoid future encroachment.

4) Protect raw water sources and implement drainage basin plans and riparian and coastal buffer zone policies. Expand water sources, including the utilization of ground water and rain harvesting; and develop programs to monitor and potentially recharge the aquifers protecting them from sea water intrusion. Additionally, implement continuous communication and public education on water conservation and management.

5) Improve solid waste management (in critical areas). At present, there is a significant short-fall in the availability of engineered and appropriately operated waste disposal capacity. Also, due to the long distances between many parts of the city and disposal locations, an effective network of waste transfer stations is needed to reduce travel time and increase the cost and time efficiency of waste transfer activities. The MLGRD has developed an Emergency Solid Waste Management Improvement Program (E-SWIMP) to address these issues. This plan should be refined to suit the exigencies of the GAMA region and implemented urgently. There is the need to **formulate a recycling strategy and modalities to appropriately integrate the informal and formal sectors in waste management.** The informal sector is very active providing waste collection and recycling services in the city. However, with some exceptions, the informal sector is working in competition with the formal sector. By engaging informal sector representatives (e.g. the Ghana Bola Taxi Union) there is an excellent opportunity to maximize the skills and resources of the informal sector to address the current gaps in waste collection service provision.

iv) Medium-Long Term Actions

1) Implement urgent actions in the drainage master plan when completed. Implement Drainage master plan investments at the GAMA-wide region.

2) Integrate land use planning and risk management mapping in the urban design as a tool to prevent flooding, including transport and housing policies and programs to be coordinated with flood and coastal zone management. It is important to improve coordination for the planning and enforcement of spatial planning and building regulations. Therefore early involvement of WRC, HSD, and DUR in the spatial planning and zoning process at the level of MMDAs is required. An overall coordination mechanism is needed, either as a separate institution or lose coordination mechanism for existing MDAs and MMDAs, to better address drainage issues in the GAMA region. This would allow coordination and implementation of drainage planning in GAMA “under one roof”.

3) Improve solid (and liquid) waste collection and disposal capacity for the entire GAMA region including the formal and informal sectors. It is important to optimize collection and treatment of solid waste transfer stations to increase the handling capacity to support the existing final disposal sites (landfills, etc.). This should include mainstreaming waste recycling and material recovery in waste management operations.

4) Increase drainage infrastructure capacity. Drainage infrastructure improvements should start with increasing the drainage capacity of the primary drainage system, followed by secondary and tertiary systems.

5) Identify and implement erosion control measures in GAMA’s coastal area. Implement Coastal Protection Plans using non-structural measures, preferably “green infrastructure” as measures for erosion control in all of GAMA’s coastal area

C. Enhance Resilience in Vulnerable Communities

i) Objective

The objective is to ensure that poor and vulnerable communities are protected against a variety of shocks and stresses, and have adequate access to urban services and infrastructure.

ii) Rationale

GAMA urban services are susceptible to several shocks and stresses, and the poor and vulnerable communities are the worst affected during disasters. The MMDAs are faced with decisions as to the types and locations of infrastructure, services, and buildings to optimize the overall resilience of the GAMA region. How the MMDAs manage and support the poorest and most vulnerable groups will greatly affect their overall resilience. Purposeful investments in urban services and infrastructure in vulnerable and disaster prone communities will improve the resilience of the region.

iii) Short Term Actions

1) Identify vulnerable settlements/communities in GAMA. Many informal settlements are located within the low-lying areas of the region and are worst affected during disasters, especially floods. There are no systematic studies, however, on the concentration of poor people in hazard prone areas, or how disasters such as flooding affect poor people. A study that systematically profiles areas exposed to hazards will aid in better targeting resources to support poor households. The MMDAs should do this in coordination with the Regional Coordinating Council as it will allow them to better understand the condition of the vulnerable communities in their MMDA. This should also include a stocktaking exercise of all the ongoing social protection programs to understand the current and future needs based on trends, current and projected population, and current and projected exposure to risks.

2) Formulate a comprehensive slum upgrading and redevelopment strategy, including a program to address main vulnerabilities of poor or informal settlements (e.g, housing and services) building on the experiences and lessons from the existing urban upgrading initiatives. The strategy and programs must be integrated with local economic development (LED) strategies and programs, and must be coordinated with and be consistent with any spatial development plan for the GAMA region or its constituent MMDAs.

iv) Medium-Long Term Actions

1) Formulate an inclusive Gama-wide housing strategy (coordinated with land use and infrastructure plans), and ensure incorporation of same into any spatial development plans of the respective MMDAs. The housing strategy and plan must be consistent with the provisions of the National Housing Policy and the National Urban Policy.

2) Incorporate skill building initiatives, job generating activities, and an exit-strategy for social protection programs. The MMDAs have a good system in place to register people in social welfare programs. This initiative should be complemented with a good exit strategy to make sure that people are not perpetually benefiting from the welfare system. Therefore, skill-building initiatives should be incorporated to provide people with the tools to become self-sufficient. The exit strategy would lay out a plan to get people out of the system as soon as possible. This should include targeted interventions and innovative mechanisms to help vulnerable groups.

3) Implement a program to address main vulnerabilities of poor or informal settlements (e.g., housing and services). Improve access to basic services (including water, sanitation, solid waste collection, transport, and drainage) in low income, vulnerable communities by ensuring provision of adequate critically needed infrastructure and services, and making available appropriate financing mechanisms for

households to access credit for construction of own facilities where possible. Improve the human resource and technical capacity and coordination among responsible MDAs and MMDAs for operation and maintenance of basic infrastructure and services.

4) Address deficiencies in land management and housing provision by decentralizing land registration to the MMDA level and scaling up the successful pilot projects under the land administration project. Data on land registration is centralized at the Lands Commission (in Client Services and Access Units (CSAU) and the Ghana Enterprise Land Information Systems (GELIS) under LAP 2) and should be decentralized at the MMDA levels. Measures should be introduced to instill more transparency in the local planning system, including online publishing of structure and local plans, and other measures to ensure public accessibility to aid with compliance.

D. Improve Disaster Preparedness and Response

i) Objective

The objective is to improve preparedness to multi-hazards in GAMA, including better understanding of hazards and climate impacts, strengthened disaster warning and response, and support for post-disaster recovery and reconstruction.

ii) Rationale

The MMDAs do not have a dedicated budget or staff to plan, mainstream, and implement disaster and climate risk management actions (as mandated by National Planning Development Act, 1994 (Act 480)). A comprehensive and detailed risk assessment is needed to develop a disaster risk mitigation and preparedness action plan. Flood and other disaster warning systems need to be strengthened at GAMA level, with adequate community preparedness, especially for the most poor and vulnerable. MMDAs lack adequate equipment and resources to respond to fire or take fire safety measures, especially in tall buildings and informal markets. And in some MMDAs, the current Sea Defense wall is exacerbating tidal surges. Better understanding of future sea level rise and mitigation options is needed.

iii) Short Term Actions

1) Undertake a detailed multi-hazard risk assessment for GAMA and establish a risk information system at GAMA level to be shared with MMDAs. It is highly important to continually understand what and where are the risks, in order to rationally allocate resources. This includes the following:

a. *Generation and analysis of hazard and risk Information:* This will focus on understanding risks and on generating hazard information and the development of risk analysis tools at national and local levels. It will also include relevant climate and disaster risk assessment and modeling.

b. S*eismic and flood hazard monitoring instruments and stations:* A systematic diagnostic could be carried out to identify gaps in earthquake and flood monitoring capacity (e.g., seismometers, flood gauges) to generate a prioritized action plan for developing a network of seismic and flood hazard monitoring stations.

c. *Undertake climate and disaster risk assessment* to plan for risk mitigation and emergency preparedness.

2) Assess flood and coastal surge prediction, warning and response system.

3) Develop early warning and response plans for most vulnerable communities. To better prepare for disasters (including flooding), the MMDAs need to establish or build on existing early warning systems

(e.g., CREW and FEWS), linking them with Ghana Meteorological Agency and NADMO. Flood preparedness plans need to be developed as a part of GAMA-level contingency plans and linked with preparedness activities at the community levels (especially those at high risk).

4) Identify actions for improved fire response and preparedness and Cholera/health related outbreaks.

5) Establish a disaster risk management and climate change adaptation coordinating entity across MMDAs at the GAMA level, with additional budget and staff in the MMDAs (Act 480, 1994). This is to complement the efforts of NADMO at the various administrative levels. The MMDA coordinating units will work with the respective MMDAs to mainstream DRM and CCA implementation measures into MMDA development plans, programs and projects. The joint GAMA-level coordinating disaster risk management entity can operate under the umbrella arrangement of the Joint Development Planning Board or be affiliated to it once it is constituted.

iv) Medium-Long Term Actions

1) Strengthen/implement flood and coastal surge warning systems. Implement early warning and response plans for the most vulnerable communities.

2) Implement actions for improved fire response and preparedness and cholera/health related outbreaks.

3) Develop and Implement flood and coastal zone management plans.

4) Develop/ Implement MMDA level DRM plans and allocate contingency budget

5) Formulate and implement a building regulatory reform agenda following Sendai's Framework, which is hinged on the realization that well-designed building and land use regulations are efficient and cost-effective tools for limiting chronic stresses (i.e. fire, spontaneous collapse, and unhealthy conditions) as well as shocks of natural catastrophes. To this end, it is recommended that GAMA MMDAs sign up with the Building Regulation for Resilience (BRR) Program[62] initiated and being funded by the World Bank. The program seeks to maximize the respective strengths of the public, private and non-governmental sectors to create a comprehensive building regulatory regime. Partners help develop and enforce modern compliance tools for improved information and communications systems aimed at risk management, building practitioners' certification, private third-party accreditation to inspectors, and the use of insurance mechanisms to augment building control. Specifically, it seeks to develop and promote a new stream of activities to increase regulatory capacity and, in turn, promote a healthier, safer, and less risky built environment. By leveraging good practice in building regulation as part of a strategy to reduce both chronic risk and disaster risk, it will set GAMA on the path to effective reform and long-term resilience.

The BRR program aims to implement a vigorous building regulatory reform agenda by means of the following actions:

[62] The Building Regulation for Resilience program is a partnership of Governments, international development institutions, and key public, private and non-governmental actors in the building sector—specifically professional associations and societies related to codes of practice; leading academic institutions in engineering, architecture, urban planning, construction, and building technology; accredited training institutions for the construction labor force; bodies responsible for licensing procedures for building professionals; and implementers of quality control processes for building materials.

- Ensuring the safety of new construction and reducing the risk of existing vulnerable settlements through regulatory reform
- Orienting regulatory and governance reforms toward compliance advice and support rather than just enforcement
- Developing the capacity of national and subnational institutions to implement building regulations that address chronic health and safety issues as well as disaster risk (i.e., ensuring sufficient funding, staffing, and training at the local level)
- Developing building standards that are accessible, affordable, and implementable by the poor and vulnerable, while also improving tenure security and reducing the cost of entry to legal land and housing markets
- Promoting innovation for effective land use and building control, including simplifying administrative procedures and reducing regulatory compliance costs

6) Leveraging private sector technical resources to expand the qualified workforce for regulatory implementation.

7) Develop/implement critical climate change and disaster risk and preparedness awareness campaigns for citizens' and schools

8) Undertake seismic micro-zonation, mountain and gully erosion study to identify mitigation options

9) Link disaster and climate risk assessments with master planning exercise

10) Undertake and implement disaster risk financing and insurance study

11) Establish a local disaster and climate fund to support risk mitigation measures.

3. Action Plan and Timeline

Table 19: Short-, Medium-, and Long-Term Priorities, and Implementation Responsibility

A. Improve Metropolitan Planning and Coordination			
No.	**Priority Action/Investment**	**Timeframe**	**Affected MDAs/MMDAs**
1.	Expedite implementation of the new Land Use and Spatial Planning Act (Act 925)	Short-Term	**All MMDAs/TCPD**/ MESTI/ NDPC
	a. Expedite preparation of subsidiary legislations to implement Act 925	Short-Term	**TCPD**/MESTI/**MOJ**/NDPC
	b. Develop land use and spatial development plans for all MMDAs & GAMA region and review existing plans	Short-Term	**All MMDAs/TCPD/** MLGRD/NDPC/RCC
	c. Ensure active participation of traditional authorities and other stakeholders in plan formulation and implementation	Short-Term	**All MMDAs**/TCPD/ MLGRD/NDPC/**RCC**
2.	Designate the GAMA region as a Joint Development Planning Area (JDPA) and constitute and resource a Joint Development Planning Board (JDPB) for GAMA (National Development Planning Act , 1994),—in accordance with ongoing work by	Short-Term	**NDPC/MLGRD/ TCPD**/ All MMDAs /RCC

	MLGRD		
3.	Invest in comprehensive update of land use plans (including the 1991 Master Plan), sector plans, using all available satellite imagery and procuring additional as necessary (complementary to ongoing drafting of integrated sanitation and drainage master plan under GAMA project, MLGRD—WB)	Short-Term	**All MMDAs/TCPD/ MLGRD**/MESTI/RCC
4.	Create consolidated repository/observatory for maps, spatial data, land use data—at one institution (e.g., TCPD—building on the existing LUPMIS framework or CERSGIS)	Short-Term	All MMDAs/**TCPD/ CERSGIS/**MLGRD/NDPC
5.	Address the human resource gaps at local planning level by making provision for use of TCPD planners in a consolidated manner across the 16 MMDAS	Short-Term	**All MMDAs**/TCPD/ MLGRD/**LGSS**/RCC
6.	Implement the consolidated sanitation and drainage master plan when completed (under GAMA project) June 2017?	Medium-Long Term	**All MMDAs/HSD/ MWRWH/MLGRD**/RCC
7.	Implement the GAMA Regional Spatial Development Framework (when completed); Ensure its correlation with the upcoming integrated sanitation and drainage master plan	Medium-Long Term	**All MMDAs**/TCPD/ MESTI/**MLGRD**/RCC
8.	Continue to address weak institutional capacity issues of MMDAs—LGSS to carryout mapping exercise to identify gaps in existing structures	Medium-Long Term	**All MMDAs/LGSS/** TCPD/ MLGRD/NDPC
9.	Implement measures to improve financial capacity of MMDAs—expansion of property rates through regular valuation exercise, etc.	Medium-Long Term	**All MMDAs/MoF/ MLGRD/**LGS/RCC
10.	Continue data gathering and data management at central repository for planning purposes	Medium-Long Term	**All MMDAs/TCPD/ RCC/ CERGIS/**MESTI/MLGRD
11.	Improve regulatory framework for urban transport (at MMDA level—Act 462)	Medium-Long Term	**All MMDAs**/**MoT**/ MLGRD/NDPC
12.	Institute a GAMA waste management authority (under or affiliated to JDPB)	Medium-Long Term	**All MMDAs/ MLGRD**/ RCC/MESTI
13.	Modernize and improve coordination of traffic signals in GAMA region	Medium-Long Term	All MMDAs**/GHA/ DUR /MRH**/MoT/ MTTD
14.	Develop, rehabilitate and modernize the rail-based mass transport system.	Medium-Long Term	**GRDA/GRC**/MOT/ RCC
15.	Develop and implement a strategy for improved agriculture production based on land use planning to create economic, employment opportunities and food security and allow for use of green field areas in vulnerable basins to be protected	Medium-Long Term	**All MMDAs/MOFA/ WRC**/HSD/RCC

16.	Develop and implement a comprehensive and integrated transport master plan for GAMA (incorporating motorized and non- motorized transport facilities—coordinated with developments in low-income settlements)— fully integrated with existing drainage and sanitation master plan	Medium-Long Term	**All MMDAs/MLGRD/ MOT/ MRH**/GHA/DUR/ GAC/GCAA/**RCC**

B. Adopt Integrated Flood and Coastal Zone Management			
No.	**Priority Action/Investment**	**Timeframe**	**Affected MDAs/ MMDAs**
1.	Finalize/Complete the Drainage Master Plan (include all the GAMA region);—to feed into Land Use Plan	Short-Term	**All MMDAs/HSD**/GHA /DUR/**MWRWH/RCC**
2.	Allocate appropriate resources to adequately and routinely maintain the hydraulic infrastructure (not just as emergency response after floods)	Short-Term	**All MMDAs/HSD**/GHA /DUR/**MWRWH/MOF**
3.	Identify and secure areas to increase retention capacity and reduce runoff, develop green areas on floodplains	Short-Term	**All MMDAs/HSD**/ WRC/ MWRWH/RCC
4.	Protect raw water sources and implement drainage basin plans and riparian and coastal buffer zone policies	Short-Term	**All MMDAs/WRC**/ HSD/ MWRWH/RCC
5.	Improve solid waste collection (in critical areas)	Short-Term	????
	a. Formulate modalities to appropriately integrate informal and formal sectors in waste management	Short-Term	**All MMDAs/MLGRD/** RCC/MoF
	b. Formulate Recycling strategy	Short-Term	**All MMDAs/EPA/ MLGRD**/MESTI/RCC
6.	Implement urgent actions in the Drainage Master Plan being developed	Medium-Long Term	**All MMDAs/HSD/GHA / DUR/MWRWH**/RCC
7.	Integrate land use planning/risk management mapping as a tool to prevent flooding, urban design – including transport and housing policies and programs to be coordinated with flood and coastal zone management	Medium-Long Term	**All MMDAs/HSD/GHA / DUR/MWRWH/**RCC
8.	Improve solid (and liquid) waste collection and disposal capacity for the entire GAMA region (include formal and informal sector)	Medium-Long Term	
	a. Optimize collection and treatment of solid waste transfer stations to increase the handling capacity to support Kpone land fill (short term)	Medium-Long Term	**All MMDAs/MLGRD**/ RCC /MOF
	b. Mainstream waste recycling and material recovery in waste management operations	Medium-Long Term	**All MMDAs/EPA/ MLGRD** / MESTI/RCC/ MOF

9.	Increase drainage capacity of primary drainage system, followed by secondary and tertiary systems	Medium-Long Term	**All MMDAs/EPA/ MLGRD** / MESTI/RCC/ MOF
10.	Identify and implement erosion control measures in GAMA's coastal area	Medium-Long Term	**All MMDAs/HSD/ GHA / DUR/**MWRWH/ RCC
11.	Implement Drainage master plan investments at the GAMA wide region	Medium-Long Term	**All Coastal MMDAs/ HSD/MWRWH**/RCC
12.	Implement Coastal Protection Plans / erosion control measures to all GAMA's coastal area	Medium-Long Term	**All MMDAs/MLGRD/HSD /MWRWH**/RCC/ MOF

C. Enhance Resilience in Vulnerable Communities

No.	Priority Action/Investment	Timeframe	Affected MDAs/ MMDAs
1.	Identify vulnerable settlements/communities in GAMA	Short Term	**All MMDAs**/MLGRD /MWRWH/ RCC
2.	Formulate a comprehensive slum upgrading and redevelopment strategy: • including a program to address main vulnerabilities of poor/informal settlements (housing/services)	Short Term	**All MMDAs/MLGRD / MWRWH/** RCC
3.	Formulate a GAMA inclusive housing strategy (coordinated with land use and infrastructure plans)	Medium-Long Term	**All MDAs/MWRWH** /MLGRD/RCC
4.	Incorporate skill building initiatives and job generating activities, and exit-strategy for social protection programs	Medium-Long Term	All MMDAs/**MGCSP/** RCC
5.	Implement a program to address main vulnerabilities of poor/informal settlements (housing/services) • Improve access to basic services (water, sanitation, solid waste collection, transport, drainage)	Medium-Long Term	**All MMDAs/MLGRD /MWRWH**/ RCC
6.	Scale up successful pilots under the land administration project	Medium-Long Term	All MMDAs/**MLNR/ LC/ TCPD**/ RCC
7.	Implement a GAMA-wide inclusive housing strategy (coordinated with land use and infrastructure plans)	Medium-Long Term	**All MMDAs/ MWRWH** /MLGRD/ RCC

D. Improved Disaster Preparedness and Response

No.	Priority Action/Investment	Timeframe	Affected MDAs/ MMDAs
1.	Undertake a detailed multi-hazard risk assessment for GAMA and establish a risk information system at GAMA level to be shared with MMDAs	Short Term	**All MMDAs/HSD/NADMO** /Gmet/ WRC/**GNFS**/ MLGRD / RCC/ MWRWH/

2.	Assess flood and coastal surge risk, warning and response system	Short Term	All MMDAs/**HSD/NADMO**/ Gmet/ WRC/ MLGRD/RCC/ MWRWH
3.	Develop early warning and response plans for most vulnerable communities	Short Term	**All MMDAs/HSD/NADMO /Gmet**/ WRC/ NFS/MLGRD / RCC/ MWRWH/
4.	Identify actions for improved fire response and preparedness and Cholera/health related outbreaks	Short Term	**All MMDAs/NADMO/ GNFS** / RCC/ MLGRD/**MOH** / MWRWH/
5.	Establish a disaster risk management and climate change adaptation coordinating entity across MMDAs at the GAMA level, with additional budget and staff in the MMDAs (National Development Planning Act, 1994)	Short Term	**All MMDAs/NADMO/** GNFS/**RCC**/MOH/MOI
6.	Strengthen/implement flood and coastal surge warning system: • Implement early warning & response plans for the most vulnerable communities	Medium-Long Term	**All MMDAs/HSD/ NADMO** / Gmet/RCC
7.	Implement actions for improved fire response and preparedness and Cholera/health related outbreaks	Medium-Long Term	**All MMDAs/GNFS/ NADMO**/ MLGRD/ RCC
8.	Develop and Implement flood and coastal zone management plans	Medium-Long Term	**All Coastal MMDAs/HSD/ MWRWH**/ RCC
9.	Develop/ Implement MMDA level DRM plans and allocate contingency budget	Medium-Long Term	**All MMDAs/GNFS/** RCC/ **NADMO / HSD/**MLGRD/
10.	Formulate and implement a building regulatory reform agenda following Sendai's Framework	Medium-Long Term	**All MMDAs/MWRWH/** NADMO / NFS/RCC/MOH/ MOI/MESTI
11.	Develop/implement critical climate change and disaster risk and preparedness awareness campaigns for citizens' and schools	Medium-Long Term	**GES/NCCE/MOE/All MMDAs**/EPA/NADMO/RCC
12.	Undertake seismic micro-zonation, mountain and gully erosion study to identify mitigation options	Medium-Long Term	**MESTI/MWRWH**/ MLGRD/RCC
13.	Link disaster and climate risk assessments with master planning exercise	Medium-Long Term	All MMDAs/TCPD/ NDPC/ HSD/MWRWH/RCC
14.	Undertake and implement disaster risk financing and insurance study	Medium-Long Term	MoF/GIC/MESTI/MWRWH/
15.	Establish a local disaster and climate fund to support risk mitigation measures	Medium-Long Term	All MMDAs/MLGRD/ RCC/MOF/MESTI

4. Moving Forward

GAMA is well positioned to undertake the challenge of enhancing resilience at the metropolitan level. There is strong commitment from leading Ministries to address the many hazards facing GAMA that can set back development gains. The rapid urbanization that GAMA is experiencing should be seen as an opportunity rather than challenge. It highlights the pull of the region as an engine of economic growth and an important gateway into West Africa. The findings and recommendations of this report will help GAMA address urban challenges, but most importantly, they highlight the need for a long-term vision for the region that includes projected population increase and climate change adaptation.

The city already has ongoing efforts that will help in the implementation of the different recommendations. Such efforts include the Ghana Plan of Action on Disaster Risk reduction being undertaken by NADMO as well as the Community Resilience through Early Warning (CREW) project and the Flood Early Warning Systems (FEWs). Bringing transformative change will require change in behavior and focus on catalysts—CSOs, Government officers, universities, and think tanks. The World Bank is supporting many follow up activities in 2017, described below to keep the momentum going on urban resilience:

(i) Accra Climate and Flood Resilience Strategy: The objective of Accra Climate and Flood Resilience Strategy is to prepare a diagnostic on resilient urban development informing a locally owned investment framework for better managing climate and disaster risks in Greater Accra Metropolitan Area (GAMA). The Greater Accra Climate Risk Mitigation Strategy will depart from the many studies and assessments related to climate change adaptation and disaster risk reduction in Ghana.

(ii) Accra DRM Poverty Survey: To better understand the relationship between climate change, hazard exposure, and poverty in Greater Accra Metropolitan Area (GAMA), a household level survey is being carried out in April/ May 2017 which will focus on how disaster and climate risks affect poor households, so resilience measures for the most vulnerable can be developed. This household survey will focus on the impact of the 2015 flood – how did the flood affect livelihood and household welfare of residents in urban slums and whether there is any difference in the impact of the flood between the poor and the non-poor. Also, this household survey will identify coping mechanisms used by the poor so appropriate mitigation actions can be identified.

Going forward, a dedicated program for strengthening resilience in Accra can be formulated to support ongoing efforts on improving resilience in GAMA. This will include improving overall drainage and other structural measures to mitigate flooding on one and softer, institutional, policy, and financial measures to improve metropolitan governance, coordination, risk sensitive landuse planning, data management, and flood warning and preparenss on the other hand. See Box below

Box: Proposed Intervention on Greater Accra Resilient and Integrated Development

Proposed Objective: The overall objective will be to improve flood management capacity in Greater Accra, and strengthen resilience and living conditions of the most vulnerable communities.

Expected Results: Improved drainage and flood management with a focus on most vulnerable communities. This will boost new investment in the area and improve quality of life – potentially transformative impacts within one basin and beyond; and Increased capacity of the Government at all levels to monitor, manage and inland and coastal flooding risks; Reduced vulnerability of infrastructure and public assets, households living in risk prone areas, reduction in income loss (livelihood, property and business) from flooding

Potential Areas of Interventions

I. Integrated Urban Flood Risk Management

1a: Drainage and flood management improvements: This will include in the short term, urgent actions to prepare for recurrent floods such as dredging, de-silting; waste collection improvements and rehabilitation of damaged drains. In the medium to long term, it will support drainage improvements and rehabilitation within the critical basin, along with the development of green spaces (parks and flood retention areas) and other associated improvements such as waste management, and water quality improvement. It will also include comprehensive planning, monitoring, coordination, operations and maintenance system for core infrastructure.

1b: Support to most vulnerable communities: This will include upgrading basic Infrastructure and services prioritized by most vulnerable communities: including developing and retrofitting drains, pavements, schools, health centers, and potential support to lower cost housing options. The work will be targeted within the critical basin, and in sync with integrated drainage and flood management improvement investments under 1a and the GAMA project.

II. Strengthening Capacity for Disaster Preparedness and Response in Greater Accra Metropolitan Area

2a: *Flood Early Warning & Response System Improvement in GAMA:* This will include improving hydromet services at national level (GMET, HSD, WRC), and, coordination, warning and response at GAMA and MMDA levels. It will also include preparation of disaster risk information system, disaster risk management, and emergency preparedness plans (response, recovery and reconstruction).

2b. *Support for Metropolitan Planning, and Coordination for MMDAs in GAMA*: This will include support for creation of Joint Development Planning Areas (JDPA) with particular emphasis on flood risk management, and close coordination across sectors. It will also include support for risk assessment, integrated & risk sensitive land-use planning, infrastructure and services master planning; building regulations, zoning, operation and maintenance finance and technical review at GAMA and MMDA levels. It will also include providing incentives and grants to MMDAs in GAMA to support metropolitan coordination, and local Disaster Risk Management and Emergency Preparedness Plan priorities, including but not limited to advocacy and training on early warning and response; simulation exercises; data sharing and planning; building retrofitting; emergency coordination center and equipment, and recovery and response support.

A Contingent Emergency Response Component (CERC) can be considered which can be triggered during emergencies to quickly use unused project funds for emergency activities.

Greater Accra is at a cross roads today. Business-as-usual will lead to higher impacts from future disasters. Investment in improving resilience, on the other, will lead to a thriving, competitive and inclusive city.

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VI. ANNEXES

Contents of the Annex section:

Annex A: Overview of historic major floods in Accra, 1955—2015

The table presented in this section describes major floods that affected Accra. It includes individual dates and the location, lives and assets affected. The information is based on NADMO records and Daily Graphic publication of June 5, 2015

Annex B: Qualities of Resilience

The CityStrength exercise includes the assessment of the individual sectors that make up the city against five characteristics of resilience: Robust, Inclusive, Coordinated, Reflective, and Redundant. This section lays out in detail what goes into each of the characteristics.

Annex C: Spatial Disaggregation of Shocks and Stresses

This annex consists of the findings from the discussions held during the CityStrength exercise at the cluster level. It includes a general information about each cluster that cuts across the 4 MMDAs grouped together. It then goes into a detailed description of the shocks and stresses that the cluster faces as identified by the stakeholders during the consultations. Each cluster section wraps up with the recommendations to address the shocks and stresses which were also identified during the CityStrength workshop.

Annex D: Profiles of individual MMDAs

This section consists of individual profiles of the 16 MMDAs that participated in the CityStrength exercise. The profiles include overall information on the land coverage, geography, climate, elevation, drainage patterns and population of the MMDAs. The section also includes shocks and stresses in the individual MMDAs that affect them the most as well as corresponding priority actions. Since the discussion was carried out at the cluster level which included 4 MMDAs in each, the shocks and stresses as well as the recommendations are similar across MMDAs in the same cluster. While there are certain aspects that will apply to some MMDAs more than others, in spite of being in the same cluster, the grouping was made based on geography and proximity and thus, the findings are generally applicable.

Annex E: Sectoral Recommendations

One of the days of the CityStrength consultations was dedicated to discussions at the sectoral level. During the discussion, city stakeholders were divided according to their sector affiliation and identified how different shocks and stresses impact their respective sector. A follow up exercise consisted in identifying recommendations that would address the identified vulnerabilities. Those recommendations were compiled and are presented in a table format with short, medium, and long term timelines, as well as implementing bodies. There is also a more detailed description of the recommendations included.

Annex F: Description of main objectives of the Ghana Water Resource Management Programme

Annex F presents the intended outcomes of the Ghana Water Resources Management Programme (2017–2019), including a baseline and short and medium-term targets.

ANNEX A: Overview of historic major floods in Accra, 1955–2015[63]

Date	Description of impacts and damages
June 23 (21), 1955	Major impacted areas included Adabraka, Agbogbloshie, Galloway, Railway Station, Adiedienkpo, and large areas around the Odaw and Korle Lagoon. Train trapped, three lives lost, walls collapsed on pregnant woman and daughter. Many injured and properties lost
June 2—3, 1959	Affected Selwyn Market area down Odaw stream, Old Accra Electricity station area, large areas of Achimota to the Guggisberg road bridge, and Korle Lagoon. Many properties lost
1963	Large areas along Odaw and other areas in the Accra Municipality. Five lives and properties lost
July 4, 1968	Accra records heaviest rainfall in 9 years; Accra registered a record rainfall of five inches in the last nine years.
June 19—23, 1973	Communities flooded included Kaneshie South Railway colony/Industrial Area, along major drains like Odaw/Onyasia, Nima, Awudome, Kpeshie and Klottey drains. Ridge Police station, Labadi, Dansoman, Bubuashie and North Kaneshie. Three lives lost, 500 people marooned and properties damaged. A car No. GS 2669 plunged into the Odaw River with driver.
1978	Odaw Basin and communities in the southern branches of the Odaw River. Life lost and properties damaged.
June 20, 1983	Affected Osu Klottey darin, Bank of Ghana houses and Awudome area. Houses pulled down and properties lost.
August 1, 1984	Affected Nima drain, Odaw stream, and Ring Road. Houses flooded and walls collapsed.
May 2, 1985	Affected Kwame Nkrumah Circle, Obetsebi Lamptey Circle, Aladjo Caprice Bridge, Ring Road/Industrial Area, Millet and Pepsi Factories.Also Modern Furniture, Mechanical Lloyd, Blackwood Lodge and Ghana Rubber Estates. Several bags of Millet soaked, 20,000 crates of Pepsi and many furniture destroyed
May 4, 1986	Affected Kwame Nkrumah Circle, Aladjo, Avenor, Odawna and many areas. 3 lives lost, P&T switching equipment damaged. Damages valued at 3.6 billion Cedis.
June 1987	Aladjo, Avenor Caprice bridge, New Abossey Okai, Mataheko, Nima drain and Standfast Street. Properties lost, walls collapse, and houses pulled down.
May 3, 1988	Affected Tesano Wabco Estates, Kaneshie, Nsawam Road, Sun Lodge Hotel. Walls/gates broken, properties destroyed
June 7—8, 1988	Affected Obetsebi Lamptey Circle, Kwame Nkrumah Circle, Industrial Area, Millet Factory, Old Dansoman, Chemu Lagoon, Ring Road West, Ghana Reinsurance Company, State Insurance, Central Automobile, Abossey Okai, Kaneshie, Atico Junction, Mataheko, Aladjo, Maamobi, Ring Road South, North Industrial Area, BBC Builders and Industrial Engineers, Modern Furniture, and Mamprobi. 1 life lost, houses (4 No.), schools and sheds destroyed, many vehicles grounded, traffic disrupted, property and merchandises damage.
May 8 and 10, 1989	North Kaneshie, Mataheko, Zongo Junction, Walako Hotel, Bubuashie, Accra Academy, Industrial Area near Guiness Depot, Labadi and Labone Secondary School area. Children trapped and one died. Bridges and properties damaged.
27 November, 1990	Flooded Awudome, Nima, Kaneshie, Mataheko, Tesano, Aladjo, Nsawam Road, Achimota Railway Crossing, and Accra New Town. Bridges, houses and roads destroyed.
July 15, 1991	Affected Aladjo, Tesano, Avenor, Adabraka, Agege, Mataheko, Achimota and Taifa. Lives,

[63] Based on NADMO records and Daily Graphic publication of June 5, 2015

	houses, and bridges lost.
November 18, 1993	Nima and surrounding areas. Car, hair dryers, personal effects and concrete slabs washed away.
June 5-6, 1994	Affected Mataheko, Abossey Okai, Nima, Maamobi, Dzorwulu, Tesano, Kwame Nkrumah Circle, Aadjo, Asylum Down, Modern Photos, and Neoplan Station. Paloma Shopping Center damaged and lost 80 million Cedis, 8 lives lost when Taxi cab (ARS 8127) plunged into Aladjo drains.
July 5, 1995	Flood havoc. Rains caused flooding by morning in low areas of the Accra metropolis. The flood not only affected commuters and vehicles but also the Achimota VRA substation, resulting in power cuts.
June 13, 1997	Hours of intermittent downpour for two days in Accra caused floods, which threatened to cut communication in various parts of the city. Some roads in the metropolis were affected, making it difficult for motorists to ply them. Major rivers such as the Odaw and Onyasia appeared on the brink of breaking their banks, forcing some residents to desert their homes for higher and safer grounds.
June 28, 2001	It is the worst in Accra since July 4, 1995 An early morning downpour submerged portions of the city, with many houses and structures at Madina, Achimota, Dzorwulu, Avenor, Santa Maria and Adabraka Official Town being affected.
May 5, 2010	Rains cause havoc In Central Accra, Ofankor and Begoro The country's capital city's vulnerability to floods manifested when parts of the city and its streets were deeply submerged in water after two hours of stormy rains.
February 24, 2011	A downpour wreaked extensive havoc on property in most parts of Accra and some of its surrounding communities. The property of residents of areas such as Adabraka, Kisseman, Alajo Junction, A-Lang at Santa Maria, Oyarifa, Haatso, Adenta and the Tema Timber Market were either submerged or washed away.
November 1, 2011	43,000 displaced by Accra floods.14 deaths recorded The death toll in Accra rose to 14, while 43,087 people were said to have been affected by the downpour, officials of the National Disaster Management Organization (NADMO) said.
May 31, 2013:	Morning downpour causes floods in Accra The rains, which started in some areas around 4.30 a.m., flooded areas such as the Kwame Nkrumah Circle, Darkuman Kokompe, the Obetsebi Lamptey Circle and portions of the Graphic Road, Santa Maria and the Dansoman Roundabout.
June 6, 2014:	Deluge hits Accra, more rains The heavy rains caused flooding in the city and its environs, including Adabraka, Awoshie, the Kwame Nkrumah Circle, Mallam, North Kaneshie, Abeka, Dansoman and Odorkor.
July 4, 2014:	Heavy rains leave havoc in trail Heavy rains resulted in havoc, with the worst hit areas in Accra such as Anyaa, Taifa, Dome, Nii Boi Town, Dansoman, some parts of Kaneshie, Adabraka, Awoshie, the Kwame Nkrumah Circle, Mallam, Abeka, Dansoman and Odorkor submerged.
June 3, 2015	Heavy floods in Accra

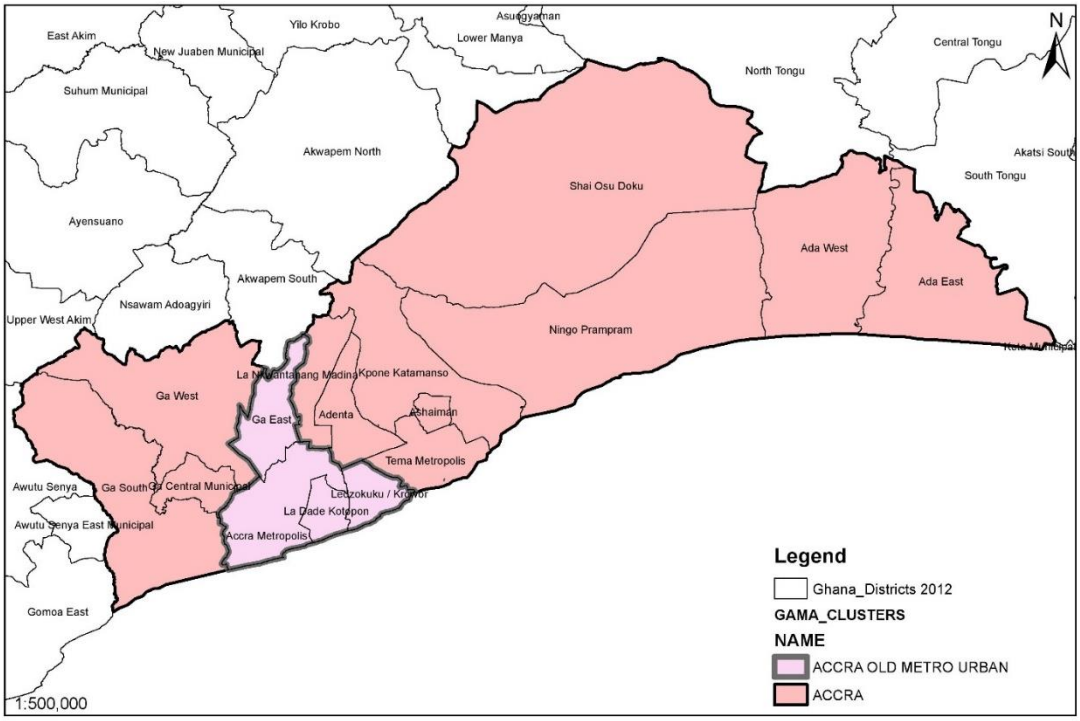
ANNEX B: Spatial Disaggregation of Shocks and Stresses

For the purposes of spatial disaggregation of the aforementioned shocks and stresses, the GAMA MMDAs have been grouped into four clusters. The clustering has been informed largely by the following attributes: 1) locational proximity; 2) spatial-economic characteristics; 3) historical administrative relationships; and 4) common drainage shed. The four clusters are the following: 1. Accra Old Metro Urban Cluster; 2. Tema Central Eastern Urban-Peri Urban Cluster; 3. Dangme Eastern Rural Cluster; and 4. Ga Western Urban-Peri Urban Cluster.

1. Accra Old Metro Urban Cluster

Comprising of Accra Metropolitan Assembly (AMA), La Dadekotopon Municipal Assembly (LaDMA), Ledzorkuku Krowor Municipal Assembly (LeKMA) and Ga East Municipal Assembly (GaEMA); these are the core contiguous areas of metro GAMA that are almost 100 percent urbanized and include the capital city, Accra. The cluster stretches from Dansoman-South Odorkor in the west to Nungua in the east along the Atlantic coast, and up north to the Dedekrom-Sesemi-Ayimensa area along the boundary with Akuapem South District Assembly. With the exception of GaEMA, the remaining three MMAs had been part of the original Accra Metropolitan Assembly until a few years ago. Figure 15 below shows the location of the Accra Old Metro Urban Cluster MMAs.

Figure 15: Accra Old Metro Urban Cluster



1.1 Shocks

The main shocks confronting MMAs in this cluster include floods, fires (both urban and bush), cholera outbreak, coastal erosion and collapse of buildings.

1.1.1 Floods

Floods are frequent phenomena in all MMAs within this cluster during the rainy seasons, with the low lying areas of its many drainage basins being the most vulnerable. The underlining causes of flood include

reclamation of wetlands for commercial and residential land use, building on or close to waterways, inadequate drains, disposal of solid wastes into drains, and removal of vegetation from the hills through sand winning (particularly in the Ga East Municipality).

The cluster is drained in the west by the southern low lying portions of the Densu drainage system (south of the Weija Dam) which culminate into the Sakumo I Lagoon around Pambros before discharging into the sea. Sakumo I Lagoon also receives the outflow from Lafa, which drains a large part of highly urbanized western Accra including Dansoman, Kwashieman, McCarthy Hill, and Awoshie. Not all drainage channels in this basin are natural; some have been constructed. However, heavy erosion takes place in the drainage channels flowing down existing tracks and roads. Consequently, during heavy rains, roads become impassable and areas are cut off from the city. Flooding is common along the lower Densu River downstream of Weija reservoir. Flooding is also prevalent in the Dansoman-South Odorkor area and along Lafa where the stream crosses Winneba and motorway extension roads.

The Korle-Chemu catchment drains largely the central AMA portions of this cluster, and covers an area of 250 km^2. The main stream in the basin is Odaw River, which together with its tributaries Nima, Onyasia, Dakobi, and Ado drain the major urbanized areas of Accra. Odaw drains to the sea via Korle Lagoon, with Chemu I Lagoon as a minor outlet. Many of the drainage channels within this basin are poorly developed and maintained and erosion and siltation are a major problem. Consequently, the low lying areas flood frequently. In the low lying areas near Accra Academy in Kaneshie and around Obetsebi Lamptey Circle, flooding has been aggravated by inadequate design of inlets and drains. Siltation, improper disposal of solid waste , and lack of maintenance reduce the capacities of the drainage channels in the flat areas of Nima, Dzorwulu, Darkuman, and Alajo and create localized flooding.

The Kpeshie and Osu basins drain largely the eastern part of AMA and LaDMA (Ridge, Cantonments, Osu, Labadi, and Burma Camp areas) covering an area of about 110 km^2. The two streams drain to the sea via Kpeshie Lagoon and the small Korle Lagoon at Osu. Some drains in Christianborg and South La have been straightened to improve the discharge capacity. However, in La Township drainage is inadequate; waterlogged areas occur even in light rains, and heavy rains cause serious damage to walls and foundations. Again, large parts of Teshie are without proper drainage, with only lower channel sections leading to the sea outfall, and these channels are heavily silted and choked with garbage. Consequently, the area is subject to severe flooding in the rainy season.

The 50 km^2 Songo-Mokwe basin drains the LeKMA residential development areas via two streams that flow into Mokwe and Songo Lagoons. Inadequate drainage channels in the western part of the catchment as well as along the coastal road to Tema create serious flooding in the Teshie/Nungua estates and around Nungua central market.

The major flooding hotspots in this cluster are: Accra Metropolis: Pambros Salt Ponds, Dansoman-Mpoase-South Odorkor corridor, Dansoman-Sukura-Chorkor corridor, Mataheko-Abossey Okai-Korle Lagoon corridor, Odaw-Dzorwulu-Awudome Industrial Area System and Darkuman-North Kaneshie-Tesano corridor; Ledzokuku-Krowor: Coco Beach, Kasapreko, Mukwedjor, Nkomefa and Rasta/Otabil; La-Dadekotopon: Adiembra, Adobertor, Burma camp, Cantonments, Ako Adjei, New La Kpanaa, Labone, New Kaajano Abafum/Kowe/Abese and Tse-Addo/Mantiase ; and Ga East Municipality: Kwabenya, Agbogba, Ashongman, Taifa, Dome, Okoe, and Christian Village.

1.1.2 Fire Outbreaks

Fire outbreaks have become a frequent occurrence within this cluster in the recent past, especially in the Accra Metropolis. There are four kinds of this phenomena namely, industrial, market, residential and bush fires afflicting this cluster with very devastating effects—including the loss of lives. Industrial fires are

mostly recorded in industrial areas of Accra Metropolis and are largely attributed to lack of safety precautions and electrical faults. Similarly, dilapidated electrical wiring, illegal electricity connections and unsafe cooking practices in the formal and informal market places of Accra have contributed to fires in the major markets such as Agbogboloshie, Kaneshie, Katamanto, Makola (AMA) and Dome (GaEMA). Fire outbreaks in the slums or informal communities of AMA and LaDMA are also common. A few of these communities are Old Fadama and Nima in AMA, and La in LaDMA. Residential fires are largely due to over-crowding in the communities, illegal connections, improper wiring by unqualified electricians and unsafe cooking habits. Moreover, bushfires are a regular occurrence in the northern rural portions of the Ga East Municipality during the dry season. The main hotspots for bushfires include, Adenkrebi, Ayi Mensa, Sesemi, Dedekrom, Bodomase and Ogoha.

1.1.3 Cholera Outbreak

Cholera outbreak is common mostly during or immediately after the rainy seasons within this cluster of MMAs. Cholera has been described as a poor sanitation and hygiene problem, and its spread is enhanced by the seasonal flooding vulnerability of this cluster. The hardest hit areas have been the slums or informal communities and the low-income indigenous neighborhoods which have inadequate access to improved toilet facilities and dump solid waste in gutters and still practice open defecation along the beaches and drains. The rate of waste generation and management in the municipalities is a matter of concern. With the increasing influx of people and the rapid urbanization, huge amounts of human and industrial waste are generated. In the Ga East Municipality for example, it is estimated that about 385 tons of solid waste is generated monthly out of which 261 tons are collected which represents 67 percent. This leaves a substantial amount of backlog that creates various kinds of inconveniences including a health hazard to people in the municipality. Out of the 261 tons collected the private sector collects about 81 percent through door-to-door collection. In the case of the Accra Metropolis, the City generates about 3,000 tons of garbage daily out of which the Assembly is able to collect 2,500 which represents 83 percent, based on the existing equipment holding. The huge backlog is reflected in choked drains, overflowing garbage heaps, and littered pavements.

The main hotspots during the last incidence of cholera included Old Fadama, Chorkor, Mensah Guinea, James Town, Gbegbeise in AMA and La Kpanaa, Abafum/Kowe/Abese, New La Kpanaa, Adienbra and Adobertor in LaDMA.

1.1.4 Coastal Erosion

Coastal erosion is a chronic issue along the coastline of this cluster, with the most severe cases occurring at Nungua and Teshie (LeKMA), La (LaDMA) and Mensah Guinea (AMA) according to the Department of Oceanography and Fisheries of the University of Ghana and officials of the affected MMAs. It is estimated that the coastline in this cluster is eroding at a rate of about 1.5m to 2m annually. The high erosion rates are adversely affecting coastal infrastructure and valuable cultural resources, and have greatly impacted the surrounding environment (including communities). Though recently banned, the construction sector of the coastal areas of GAMA relied heavily on coastal sand and pebbles in the building of houses, bridges and roads. The practice continues to be a source of sand supply for the real estate sector. This theft of beach and dune sand is a direct cause of erosion along the coastlines. In a time of rising sea levels, the sand is sorely needed as a storm energy buffer. Again, poor management at the coast especially by the inhabitants of the coastal communities over the years has contributed to the coastal erosion problem. Excessive and indiscriminate encroachment of buildings along the coast has also resulted in higher rates of erosion.

1.1.5 Collapse of Buildings

Collapse of buildings, both completed and uncompleted, has been witnessed with some regularity within this cluster of MMAs in the last few years. These include the six-story Melcom shopping mall (November 2012), a four-story building under construction at Cantonments (July 2015), a ten-story building under construction for Export Development and Agricultural Investment Fund (EDAIF) (November 2015), and the uncompleted five-story Airport City building (February 2016). These resulted in the loss of lives and properties. The city authorities descended vehemently on the owners of the buildings for not acquiring the necessary permits before putting up the structures and the building inspectors for their negligence and wanton disregard for the structural integrity of the buildings. A common excuse among most developers is that they build without acquiring the necessary permit due to the long waiting time before approval is given.

1.2 Stresses

The main stresses across MMAs in this cluster are rapid urban expansion/proliferation of informality, traffic congestion, increasing crime, and water scarcity.

1.2.1 Rapid Urban Expansion and Proliferation of Informality

Rapid urban expansion and its associated proliferation of informality are common phenomena within this cluster, affecting all MMAs. The MMAs within this cluster have experienced both rapid population increases and physical outward expansion over the past two decades and are currently almost completely urbanized. The issue is that the growth has not occurred in tandem with planning and adequate provision of housing and basic services, resulting in slums. There are about 29 slum communities in the Accra Metropolis. Access to adequate housing is an important ingredient in efforts to improve the livelihood and environmental sanitation for people living in the MMAs. However, the lack of sufficient housing units (among other stresses), especially in the core urban areas, has contributed to overcrowding, development of illegal structures, conversion of commercial facilities to residential use, children living in the streets, and pressure on social facilities and amenities. The result of these is the creation of an insanitary environment with no drains or properly demarcated sanitary sites. Waste is disposed-of indiscriminately and liquid waste flows freely on the poorly demarcated streets. There is a correlation between the incidence of reported cases of disease and the environmental and sanitation problems in poverty-prone neighborhoods. The transmission of the five major communicable diseases within this cluster comes from poor sanitation, and the residents over the years have complained about the poor sanitary conditions they are confronted with. About 90 percent of slum dwellers fall within the low to very low income brackets.

Consequently, rapid urbanization has been characterized by a proliferation of under-serviced, infrastructure-deficient communities, with increasing congestion, high levels of pollution, and limited employment opportunities. Such communities include: Sukura, Russia, Sempe, Sabon Zongo, James Town, Korle Dudor, Adedenkpo, Chorkor, Old Fadama, Mpoase, Gbegbeyise, Mamponse, Darkuman, New Fadama, Abeka, Akweteyman, Achimota, Maamobi, Kotobabi, Niiman, Mempeasem, Old Tesano/Adaman, Avenor and Alajo, Ayidiki, Babylon and Abuja in AMA; Teshie and Nungua old towns in LeKMA; La in LaDMA; and portions of Dome, Taifa, Kwabenya and Haatso in GaEMA.

1.2.2 Traffic Congestion

Traffic congestion is pervasive within this cluster of MMAs. This is a result of the influx of people into the cities, inadequate road infrastructure and maintenance and improper traffic management systems. The hotspots of traffic congestion are: the central business district, Kwame Nkrumah Circle, Obetsebi Lamptey Circle, Dansoman-Asoredanho, Dansoman-Sakaman and Kaneshie Market (AMA); Teshie-Nungua Beach

Road, Nungua Barrier, Spintex Road, Adogon Railway crossing—Baatsonaa road (LeKMA); Osu-La Beach Road, Labone, Switchback Road, Cantoments and Airport (LaDMA); and Achimota Golf Course-Dome Pillar 2, Dome old town, and Kwabenya-Ashongman corridor (GaEMA).

1.2.3 Crime

Crime has become a regular occurrence within this cluster of MMAs. Inadequate employment opportunities, a large portion of unemployed youth with limited skills and training, and a high school drop-out rate (especially among the many slums and traditional native communities) are contributing to a high crime wave, including armed robbery, increasing insecurity within this cluster of MMAs. In addition, inadequate policing and law enforcement infrastructure, and a seemingly over-stretched police force have been unable to control crime within the cluster. The crime rate appears to be higher in the high and middle class neighborhoods of the metropolis.

1.2.4 Water Scarcity

Water scarcity is recorded as one of the secondary stresses confronting the MMAs in this cluster. Nonetheless, potable water supply in the urban/peri-urban areas of this cluster has been a major challenge to the Assemblies, especially when they have no direct control over urban water supply. Accra Metropolis is currently being supplied by two major water sources, namely Weija Waterworks and Kpong Waterworks. Consequently, all distribution networks to the West of Accra are fed by the Weija Waterworks, while those to the East are fed by the Kpong Waterworks. These two Waterworks combined supply 401,800m^3 volume of water daily of the 532,570m^3 daily demand, representing 75 percent. There is therefore a daily shortfall in supply of water of over 130,000m^3. Under the scenario of perennial shortfalls, the option of balancing demand and supply is for the Ghana Water Company Limited to embark on rationing programs, which negatively affects socio-economic growth. There is marked variations with respect to income classes in the access to water. First class residential areas such as East Legon, Airport Residential, North Ridge, Asylum Down (AMA); Greda Estates, Manet Gardens, Airport Hills (LEKMA); and Cantonments, Burma Camp, Labone (LADMA) are connected to the water supply network receiving water most days of the week and paying official rates. In recent times it is common to have polytanks in such areas to supplement shortage that may occur. However large sections of the middle and low income earners in the metropolis have very poor or irregular supply of water although they are connected to the network. Areas like Dome, Taifa, Agbogba and Ashongman Musuko (GaEMA) have limited or no access to pipe-borne water. In such areas residents who can afford polytanks are compelled to purchase them as a matter of necessity to supplement their water supplies. Those who cannot afford the polytanks purchase water from vendors at high prices.

In the peri-urban areas and small towns in the Ga East Municipality however, the Municipal Assembly is responsible for water supply. The Assembly currently manages two small towns' piped schemes through its Water and Sanitation Development Boards (WSDD). These are Abokobi-Oyarifa-Teiman-Sesemi scheme, and Pantang Area Pipe scheme. The two schemes cover fifteen communities. This places an obligation on the Assembly to ensure that the facilities are managed in a sustainable manner.

1.3 Recommended Actions to Address Shocks and Stresses

The recommended actions identified by participants of the Citystrength process to address the shocks and stresses within this cluster of MMAs are presented below.

Table 20: Recommended Actions—Accra Old Metro Urban Cluster

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Dredging and desilting of all drainage channels, including the Korle Lagoon and the Odaw channel (fast-track implementation of the Conti Project) ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels, including the Korle lagoon and the Odaw and Lafa channels. ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans. ▪ Make the Early Warning Systems (EWS) and hydrological management systems fully functional and ensure that it covers the entire GAMA for early warning and evacuation planning in case of approaching storm event. ▪ Fast track completion of all sewage projects, including Accra Sewage Improvement Project and rehabilitation of Mudor Treatment Plant.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak	▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensive health screening of food handlers

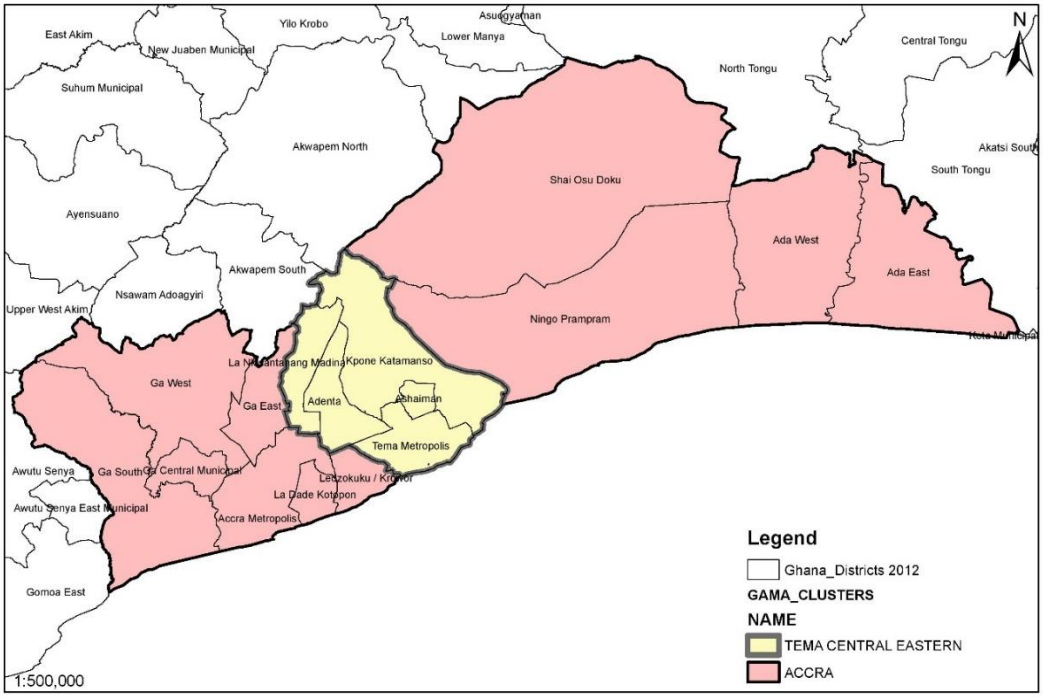
S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
		▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
4	Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas ▪ Enforcement of regulations on destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continuous public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods. ▪ Provision of adequate solid waste management facilities, including landfills to prevent indiscriminate disposal of solid waste which ultimately ends up on the coastline
5	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate traffic congestion. ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion ▪ Implementation of 'Operation Don't Cross the Red Line" to prevent traders from encroaching pavements and public right of way ▪ Control of road violations, especially by motorcycle taxis (Okada)
6	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision of adequate basic infrastructure and services ▪ Ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Strengthen immigration regulations to reduce illegal immigration from neighboring countries, which is contributing to the creation of slums

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
7	Crime	▪ Ensure provision of effective law enforcement services, especially in areas prone to crime ▪ Facilitate access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
8	Building Collapses	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Ensure adequate review of designs and development control ▪ Ensure adequate supervision of construction activities and vigorous enforcement of building codes ▪ Require the registration, training and certification of all building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of all building professions, especially structural engineers and architects. ▪ Institute immediate measures to ensure monitoring and reporting of issuance of building permits
9	Water scarcity	▪ Expansion of water sources, including the utilization of ground water and rain harvesting ▪ Expansion of treatment facilities ▪ Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines ▪ Installation of booster stations to improve flow pressure ▪ Regulation and institution of severe penalties against unauthorized tampering with water supply infrastructure ▪ Preservation of water resources by the implementation of the riparian buffer zone policies ▪ Continuous public education on water conservation

Tema Central Eastern Urban-Peri Urban Cluster

This cluster comprises of Tema Metropolitan Assembly (TMA), Ashaiman Municipal Assembly (AshMA), Kpone-Katamanso District Assembly (KKDA), La Nkwantanang-Madina Municipal Assembly (LaNMMA) and Adentan Municipal Assembly (AdMA). The cluster stretches from the Sakumono-Tema Beach road in the west to the Laloi Lagoon (just beyond Kpone) in the east along the Atlantic coast, and up north to the Oyibi-Ayimensa area via Gbetsile-Appolonnia-Kpose at its eastern extent and Teiman-Akokome-Agbogba on its western extents. With the exception of LaNMMA, the remaining four MMDAs had been part of the Tema Metropolitan Assembly until a few years ago. Figure 16 below shows the location of the Tema Central Eastern Urban-Peri Urban Cluster MMDAs.

Figure 16: Tema Central Eastern Urban-Peri Urban Cluster



Shocks

The main shocks confronting MMDAs in this cluster include floods, fires (both urban and bush), and coastal Erosion.

Floods

Floods are a frequent phenomenon in all MMDAs within this cluster during the rainy seasons. The underlining causes of flooding in this cluster of MMDAs include building on or close to waterways (including spillways of dams), development of slums close to wetlands, inadequate drainage infrastructure, disposal of solid wastes into drains, and general siltation of drainage channels.

The cluster is drained by the upper Korle-Odaw Basin and the Sakumo II Basin. The upper Korle-Odaw basin catchment drains largely the entire La Nkwantanang-Madina Municipality via smaller tributaries of the Odaw Stream eventually into the Korle Lagoon before flowing into the Atlantic Ocean. The Sakumo II Basin drains the larger portion of Tema Metropolis, Adentan Municipality, Ashaiman Municipality, and Kpone Katamanso District. The two main streams within this system are the Dzorwulu and Mamahuma. The Dzorwulu flows from the north of KKDA, through central AshMA and then TMA discharging into the Sakumo II Lagoon and into the Atlantic Ocean near Sakumono. The Mamahuma (with a series of tributaries including, Nugbete and Ogbojo) flows west from Adentan through Tema into the Sakumono II Lagoon and then outfalls into the Atlantic. Many of the drainage channels within these basins are poorly developed and maintained and erosion and siltation are a major problem. There is also significant encroachment into the drainage channels and the associated floodplains. The low lying areas, consequently, flood frequently during the raining season.

The major flooding hotspots in this cluster are: Communities 3, 5, 11, 12, 16, 18, 19 & 20, Sakumono, Tema Newtown, Lashibi/Klagon and Adjei Kojo in the Tema Metropolis; Adenta Commando Area, Ashiyie, Ashale-Botwe, Japan Motors, New Legon, Nanakrom, Abenwoha and Nsuonano in the Adenta

Municipality; Middle east, Damsite, Roman Down, Lebanon zone 5, Community 22, Jericho, Asensuba, Valco Flat, TDC old quarters and Ashaiman New town in Ashaiman Municipality; Aboman, Adenta West, Redco, Madina West, Labone, Firestone, Hanna, Agbogboshie, Arapa jay in La Nkwatanang-Madina Municipality; and Golf City, Zenu Dam site, Community 25, Kpone Shalom Estate, Kpone-Kokompe and Gbetsile Dam site in Kpone-Katamanso District.

Fire Outbreaks

Fire outbreaks are also frequent within this cluster. Similar to the scenario in the Accra Old Metro Cluster, four kinds of fires have been occurring within this cluster namely, industrial, market, residential and bush fires. Industrial fires are mostly recorded in the Industrial Areas of Tema Metropolis and Kpone Katamanso District and are largely attributed to lack of safety precautions and electrical faults. Again, old and faulty electrical wiring, illegal electricity connections and unsafe cooking practices in the formal and informal market places of the cluster have contributed to fires in the major markets such as Community 1 Market in Tema and Ashaiman Main Market. Fire outbreaks in the slums or informal communities of Tema, La Nkwantanang-Madina, and Ashaiman are also common. These communities include Old Tulaku and Adakordzi in Ashaiman, Madina Zongo and Tema Newtown. A challenge in combating these fires when they occur is the fact that most slums, and particularly Communities 1, 2, and 5 of Tema have inaccessible tracks and therefore very difficult for fire tenders to reach. Residential fires are largely due to over-crowding in the communities, unsafe cooking habits, illegal connections, and improper wiring by unqualified electricians. Due to climate change variability, wildfires or bushfires are on the increase, especially during the period from November to March when the dry, hot season is at its peak. The main hotspots for bushfires in this cluster are the northern, predominantly rural and peri-urban reaches of the cluster. These includes the general environs of Danfa, Addo Teiman and Otinibi in LaNMMA; Appolonia, Oyibi, Gonten and Nanoman in KKDA; and the Marlejor and Amrahia areas in AdMA.

Coastal Erosion

Coastal erosion is another phenomena affecting this cluster, along the coastline in Tema Metropolis and Kpone-Katamanso District. According to the Department of Oceanography and Fisheries of the University of Ghana and officials of the affected MMAs, the most sever cases are occurring at Tema and Kpone. As is the case with the Accra Old Metro Cluster, the high erosion rates are adversely affecting coastal infrastructure, livelihoods of the many fisher folks and coastal farmers, and valuable cultural resources. Again, the causes of coastal erosion in this cluster include sand and gravel winning for construction in the past, rising sea levels and associated increasing storm energy, poor management of the coast over the years, and excessive and indiscriminate encroachment of buildings along the coast. Representatives of TMA and KKDA at the prediagnostic workshop also indicated they believed the construction of sea-defense walls in nearby coastal communities has transferred the tidal pressure of the sea to their coastlines, resulting in the increasing rate of coastal erosion being recorded within their jurisdictions.

Stresses

The main stresses across MMDAs in this cluster are rapid urban expansion/proliferation of informality, traffic congestion/accidents, increasing crime, and land/chieftaincy conflicts.

Rapid Urban Expansion and Proliferation of Informality

Rapid urban expansion/proliferation of informality are stresses confronting all MMDAs of this cluster and have been taking place over the last few decades. Tema Metropolis and Ashaiman Municipality are currently almost completely urbanized. La Nkwantanang-Madina, Adentan and Kpone Katamanso are currently one of the main frontiers of growth and rapid urban expansion as the GAMA region continues to

absorb a large influx of population. However, the downside of this growth and rapid expansion is that it has occurred without advance planning and provision of adequate housing and basic services resulting in slums and near-slum situations. In both old, traditional communities and newly developing ones within all MMDAs in this cluster, the development pressure is occurring in various forms leading to the development of unauthorized, unplanned communities and authorities currently lack the capacity and resources to regulate such developments.

Such developments in the cluster include, Community 1 (Site 1 & 2 etc), Tema Manhean, Klagon, Sakumono Village, Adjei Kojo (TMA); Approtech, Ashiyie, Nsamanpom, Adentan Mamomo, Old Ashaley Botwe, Ogbojo, Adjiriganor and Otano Villages, Amanfro and Amrahia (AdMA); Kakasunanka, Zenu, Appolonia, Kpone Bawaleshie, Gbetsile, Kpone and the area just south of the Free Zone Enclave and north of Bankuman (KKDA); Ashaiman (AshMA); and Madina, Agbogba, Danfa, Otinibi, and West Adentan (LaNMMA).

Traffic Congestion and Associated Traffic Accidents

Traffic congestion and associated traffic accidents is a regular stress within this cluster of MMDAs. The congestion problem in this cluster of MMDAs is largely a result of inadequate road infrastructure, poor (pothole dominated) road conditions, road user indiscipline (driving on the shoulder of road), and improper traffic management systems. The jostling of motorists to beat the traffic congestion usually results in minor accidents which further aggravate the precarious traffic situation. The hotspots are: the Adenta—Madina Road and Ashale Botwe—Nmai Dzorn Road (AdMA); Motorway Roundabout—Dawhwenya Road, Motorway Roundabout—Afienya Road, and Kpone Township roads (KKDA); Atomic Junction Roundabout, Madina Market—Ritz Junction, and Ritz Junction—Ashale Botwe Road (LaNMMA); Ashaiman Interchange—Ashaiman Market, and Municipal Assembly—Bus Terminal (AshMA); and Ashaiman Interchange—Motorway Roundabout; Valco Roundabout—Motorway Roundabout, General Hospital Roundabout (TMA).

In the rural and peri-urban areas of the cluster, road accessibility is generally poor with only a few roads tarred. Most neighborhoods are also not accessible because roads are in a deplorable state. This leads to traffic slow down and the use of unapproved accesses and sometimes leads to accidents as drivers try to avoid the potholes. In most of these areas, during the rainy season, traveling becomes very difficult as pools of water collect in the potholes.

Crime

Crime is on the increase within this cluster of MMDAs, particularly in the urbanized and peri-urban portions. The huge influx of population into these areas and the unfulfilled dreams and aspirations create a recipe for crime. The large number of unemployed youth, the lack of employment opportunities, and the inadequate police presence and capacity all create conditions for crime to flourish. All MMDAs have recorded series of armed robberies (sometimes with fatalities), petty crimes and different shades of assaults, and the occurrence of these seem to be increasing as the population continue to increase.

Land and Chieftaincy Conflicts

Land and chieftaincy conflicts are quite pervasive within the rural and peri-urban portions of the cluster. This is attributable to the pervasiveness of informal land markets within the cluster (as is the case for most of the GAMA region), which only guarantees weak individual property rights. The high demand for land within the cluster creates opportunities for land and chieftaincy disputes. Most land within the cluster is traded informally through the traditional system, with the exception of the Tema Acquisition Land area and a few isolated places including the Adentan State Housing Acquisition lands where state agencies own

or control the land. Because of the chaotic land registration/titling system prevalent in Ghana, multiple sales of the same land are a common occurrence. Similarly, because of poor documentation of records and shear corruption among land professionals, multiple claims of ownership and boundary disputes among chiefdoms, families and even individuals are also very common. These situations most of the time escalate to a point whereby deployment of land guards sets in, which usually leads to lawlessness and disturbs the peace. The effects of a missing formal land market and weak oversight of available land by the city government are several physical development problems such as building without development permits, encroachment on drainage ways and road reservations, encroachment of land reserved for other special purposes (like landfills) and the lack of adequate urban services within most communities.

The main hotspots for land and chieftaincy conflicts are: Saduase, Saasabi, Mensa Bar, Oyibi, Katamanso and Appolonia, and environs (KKDA); Adjei Kojo and environs (TMA); Tulaku and dam and irrigation encroachment areas (AshMA); and Amrahia-Marlejor and Nii Ashaley environs (AdMA).

Recommended Actions to Address Shocks and Stresses

The priority actions identified to address the shocks and stresses within this cluster of MMAs are presented below.

Table 21: Recommended Actions—Tema Central Eastern Urban-Peri Urban Cluster

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
1	Flooding	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. ▪ Dredging and desilting of all drainage channels, including all roadside drains and sewers. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contributes to flooding). ▪ Enforcement of land use and building regulations to remove illegal structures along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate access improvements of fire prone areas (especially, markets and slum communities) ▪ Redevelopment of old neighborhoods to address hazard risks ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
3	Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continuous public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
4	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate traffic congestion ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during rainy seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion
5	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision of adequate basic infrastructure and services ▪ Formulate a comprehensive housing delivery strategy, and ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Ensure public familiarity with land use and building regulations, and ensure strict application of same without compromise
6	Crime	▪ Ensure provision of effective law enforcement services (including well-coordinated patrol units & neighborhood watch systems), especially in areas prone to crime ▪ Facilitate universal access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace and dangers of illicit drugs and ensure vigorous control of possession and use of such drugs
7	Land/chieftaincy conflicts	▪ Expeditious settlement of disputes within the court system ▪ Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region ▪ Decentralize land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ▪ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ▪ Continuous public education on planning and building regulations, and

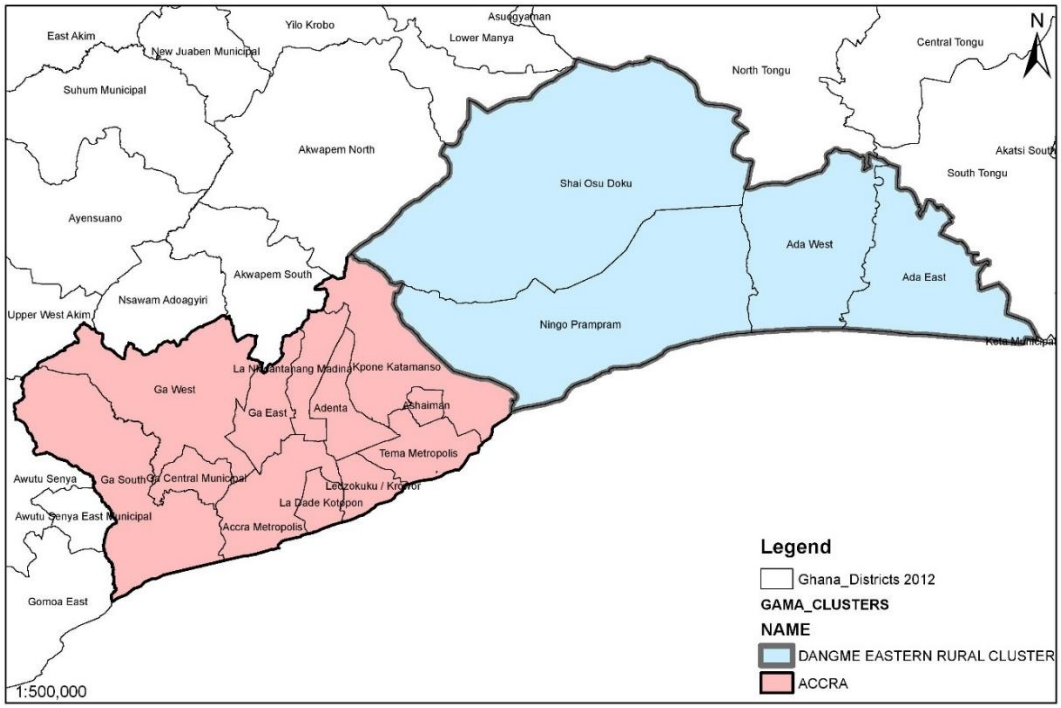
S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
		enforcement of same without compromise ▪ Enforcement of law and order, and adoption of strict effective measures particularly against activities of land guards, their sponsors and their patrons

Dangme Eastern Rural Cluster

The Dangme Eastern Rural cluster encompasses Ningo-Prampram, Shai-Osudoku, Ada West and Ada East District Assemblies, all of which are predominantly rural in nature and largely sparsely populated (except in the areas around their respective capitals). The boundary of this cluster is co-terminus with the boundary of the original Dangme District, which was subsequently divided into Dangme East and Dangme West District Assemblies. Dangme East was further subdivided into the present day Ada East and Ada West District Assemblies. Similarly, Dangme West was further subdivided to create the present day Ningo-Prampram and Shai-Osudoku District Assemblies.

It is the largest of the four cluster of MMDAs, covering more than 50 percent of the area of the GAMA region. It stretches generally from west of the Prampram area to Azizanya (on the Volta Estuary) along the Atlantic Coast. The eastern extents runs generally from the Volta Estuary to north of Tojeh, thence northwest to Volivo Gbesedom (on the Volta River). Its western extents runs through Dodowa to the Akorley Kwatse–Obetenya area in the north along the Volta River. FIgure 17 below shows the extents of the Dangme Eastern Rural Cluster MMDAs.

Figure 17: Dangme Eastern Rural Cluster



Shocks

The main shocks confronting MMDAs in this cluster include floods, fires (both domestic and bush), and tidal surge/coastal erosion.

Floods

Floods are a regular feature within all MMDAs in this cluster during the rainy seasons, due to the generally low lying nature of greater portions of the cluster and the dominance of lagoons within its southern sector. The cluster's drainage pattern can be described as dendritic, with most of the streams taking their source from the Akwapim range and then flowing in a northwest to south direction into lagoons on the coast. The extreme north-eastern portions of the cluster forms part of the lower Volta flood plain. The Volta is the major river that drains this cluster. Other significant streams and lagoons that drain the cluster include Futue, Luhue, Tamatoku, Kajah, Pagaga, Akplaba, Kablu, Woku, Taliba, Kasu, Narbayi, Nyapia, and Dzipor and Nyatia lakes, among others. In most locations, the lagoons are poorly managed resulting in not only serious environmental sanitation challenges but also making the area prone to flooding. In addition, the flat nature of the cluster topography exposes it to serious threat of flood disasters. The effects of flooding are devastating as it affects crop farms and contribute to outbreak of waterborne diseases (Cholera, Malaria). The situation is impacting seriously on construction cost in the cluster since a lot of resources are generally invested in controlling drainage and flooding.

The flood prone areas include Afienya, Tsopoli, Annewe Olowe, Ayetepa, Kpongunor, parts of Dawhenya, Old and New Ningo, and Prampram (NiPDA); Akplabanya, Anyamam, Wokumagbe, Goi, Lolonya, Luhuor, Agbedrafor, Matsekope and Addokope (Ada West); Dodowa, Odumase, Alikope, Ayikuma, Luom, Doryumu, Natriku, Asutsuare and Labuse (SoDA); and Ada Foah, Azizanya.

Fire Disaster

Fire disaster is among the major threats to the integrity of the vegetative cover of the land in this cluster. The loss of vegetative cover in the MMDAs through bush fires has seriously affected local communities by its effects on local hydrology and the loss of wide range of non-forest products. The impact of fire on the physical environment has led to a cycle of degradation, which locks the indigenous agrarian population in a spiral of decreasing crop yields and dwindling resources, and greatly increases the existing problem of poverty, poor health and diseases. Domestic fires are also experienced in the cluster. The major causes of domestic fire outbreaks are poor electrical connections, mismanagement of Liquefied Petroleum Gas (LPG), carelessness in the handling of domestic electrical appliances, and unsafe smoking of fish (as the houses that fish smokers live in are usually of poor quality, which makes them easily flammable).

The communities with the most recent incidence of fire are Addokope, Dorgobom, Kablevu, Sege and Akplabanya (Ada West); Dawa, Gbogbodziri, Agomeda; Asenema, Sanfo Dawu, Kpeyibo, Kentenkyiren, and Dzogbedi (SoDA).

Tidal Surge

Tidal surge is one of the biggest problems that affect the socio-economic life of the people along the coastal areas of this cluster of MMDAs. Heavy and strong tidal waves of the sea have eroded the sandy coastline leading to occasional flooding of some communities. The average annual rate of erosion of the coastline within this cluster is estimated to be as high as 4m around the Ada Foah area. The low lying nature of these coastlines, otherwise known as ***"coastline of submergence",*** has aggravated the problem. Again, the winning of sand and gravel along some coastlines within the cluster exposes these areas to higher vulnerability. Large scale sand and gravel winning occurs in Tehey, Sege and along the Ada West coast for the construction industries.

During high tide, houses are inundated and submerged leaving hundreds of people homeless and destroying the economic livelihood of the affected population. More than 300 people were displaced in late April/early May this year in Ada West alone. The situation exposes the inhabitants to threat of environmental sanitation, communicable diseases and squalor. In an attempt to address the erosion of the coastline associated with the surge, a couple of sea defense initiatives were implemented at Ada and Blekusu.

The main tidal surge and coastal erosion hotspots include the following: Kewunor, Lolonyakope, Pute, Otrokpe, Anyakpor, Elavanyo and Totope (Ada East); Akplabanya, Anyamam, Wokumagbe, Goi, Lolonya, and Kablevu (Ada West); and Kpongunor, Minya, Abia, Akokokrom and Prampram (Ningo Prampram).

Stresses

The main stresses across MMDAs in this cluster are water scarcity, lack of infrastructure/market connectivity, poor sanitation, and land/chieftaincy disputes.

Water Scarcity

Water scarcity is one of the stresses confronting all MMDAs within this cluster. All the four cluster MMDAs are part of a six-district water scheme that is controlled by one board. The other two members are North and South Tongu District Assemblies. Water is drawn from the Volta River, which then goes through a treatment plant and is distributed to community stand pipes and households. The current demand on the plant has exceeded its capacity and the MMDAs have not been able to provide piped water to all the communities. It is not possible for the MMDAs to dig boreholes to augment supply because the water table is too deep. Therefore, accessibility to potable water in many communities (especially in the rural areas) is generally inadequate. Except in bigger and sub-urban communities like Dodowa, Asutsuare, Osuwem, Ayikuma, Prampram, Ningo, Afienya, Sege, and Ada, that are connected to GWCL lines from Kpong and Osudoku Water Project, the smaller communities depend on dams, streams, rivers and dug-outs for drinking water and other domestic use. Even for those communities connected to GWCL lines, the flow of water is irregular in most communities.

The main water scarcity hotspots include the following: Otsebleku, Abbeypanya, Ajumador and Kpotsum, Nyigbenya to Dawa areas (NiPDA); Asasekorkor to Lanor areas (SoDA); Wonyi Ada to Medovunu areas (AWDA); and Asigbekope areas (AEDA).

Lack of Infrastructure and Market Connectivity

Lack of infrastructure/market connectivity is a common feature throughout the cluster. The cluster is accessed mainly by a mix of road network of highways, feeder roads and water transport. Unfortunately, most of the feeder roads (the most extensive mode) become impassable during the rainy season as a result of serious erosion problems due to lack of good drainage system and the bad condition of the roads. Locals attribute the state of the roads to the type of maintenance technology applied which, to some extent, aggravates the situation. Specifically, the annual ritual of reshaping without proper drainage exposes the roads to erosion and deep gulley development.

For a largely agrarian cluster of MMDAs, developed markets (encompassing proper physical infrastructure, good transportation networks, established functional forward and backward linkages with industry and agribusiness) are an absolute necessity to connect the local economic activities to larger markets and increase the local production capacities. However, the local markets within the cluster are anything but developed, leaving the agricultural potential of the cluster largely unexploited and poverty quite widespread.

Poor sanitation

Poor sanitation is identified as a common stress within this cluster of MMDAs. Along the coast, most communities are narrowly lying between the Gulf of Guinea and the lagoons with no provisions for essential facilities like drainage to allow free flow of storm water and sewerage systems for toilet facilities. This creates a situation of congestion and insanitary condition which is sometimes also worsened by the lack of access roads. In addition, the management of sanitation facilities in the cluster, especially in the area of liquid and solid waste is ineffective. Refuse and household waste are disposed of indiscriminately, with more than half of the population having no access to organized means of waste disposal. Disposal of waste therefore continues to be by dumping and burning.

Land and Chieftaincy Conflicts and Insecurity

Land and chieftaincy conflicts and insecurity are major stresses within the cluster, especially within the peri-urban portions of NiPDA and SoDA. The problem of land litigation has resulted in the phenomenon of operations of "Land Guards." Most private developers who acquire lands within the cluster have therefore developed the attitude of quickly developing lands without resorting to the physical planning scheme of the area just to secure their properties. This situation is adversely affecting land use planning and development.

Several armed robbery cases have also been reported in the cluster in recent times. Locals attribute the problem largely to the land litigation issues which leaves a large number of uncompleted buildings which then become a hub for armed robbers. Similarly, they complain about the lack of police presence in most of the communities. For instance, out of 145 settlements in the Shai Osudoku District, only 4 (Dodowa, Ayikuma, Doryumu and Asutsuare) have police stations. The inadequate number of police stations coupled with ineffective telecommunication network makes the maintenance of law and order difficult in times of riots, armed robbery, land disputes, ethnic and chieftaincy conflicts. This situation has seriously compromised the security of MMDAs within the cluster.

The main hotspots for land and chieftaincy conflicts are: Dawhenya and Afienya (NiPDA); and Dodowa, Ayikuma, Doryumu and environs (SoDA);

Land and Environmental Degradation

Land and environmental degradation as a result of sand and gravel winning operations and quarrying are spreading within this cluster. There are large deposits of quarry and sand pits which are exploited on a large scale in the cluster to support housing and **road** development both within and outside the cluster. This has given rise to the removal of the top soils without any plans to reclaim the land in most situations. Most of these operations leave behind in their trail large dugouts which get filled with large pools of stagnant water which attract mosquitoes—malaria and other related diseases abound in these areas. This phenomenon has led to the situation where agricultural lands are seriously being threatened, which is a big issue since agriculture is the economic bedrock of the cluster. Quarry sites located around the Shai hills area where large industrial quarry machines has been blasting these rock outcrops over the years, create a lot of environmental noise nuisance changing completely the otherwise peaceful atmosphere which use to characterize the area. There is also the herculean task of having to deal with the significant environmental dust in the air which gives rise to numerous upper respiratory and ear problems in the environs of the operations. The blasting of the rocks has also created cracks in buildings around the operating areas.

Hotspots for land/environmental degradation within the cluster include the following: Sege, Teheh (AWDA); Tamatoku, Amlakpo, Nakomkope and Kewunor. Mutukunya, Putupanya and Battrinya (AEDA);

Ayikuma, Mampong-Shai, Fiankonya, Shai Hills, Wedokum and Dodowa (SoDA); Ningo areas and Dawhenya areas (NiPDA).

Recommended Actions to Address Shocks and Stresses

The priority actions identified to address the shocks and stresses within this cluster of MMAs are presented below.

Table 22: Recommended Actions—Dangme Eastern Rural Cluster

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
1	Floods	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. ▪ Embrace comprehensive and detailed land use and infrastructure planning and build implementation capacity to prevent ▪ development of structures and other service infrastructure within flood prone areas and along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate access improvements of fire prone areas (especially, coastal slum communities) ▪ Assess the root causes of domestic and bush fires and create awareness on safe practices and dangers ▪ Redevelopment of old neighborhoods to address hazard risks ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Tidal Surge/ Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Resettlement/relocation of at-risk communities ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continuous public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
4	Water scarcity	▪ Expansion of water sources, including the utilization of ground water and rain harvesting ▪ Expansion of treatment facilities ▪ Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines ▪ Installation of booster stations to improve flow pressure ▪ Regulation and institution of severe penalties against unauthorized tampering of water supply infrastructure ▪ Preservation of water resources by the implementation of the riparian buffer

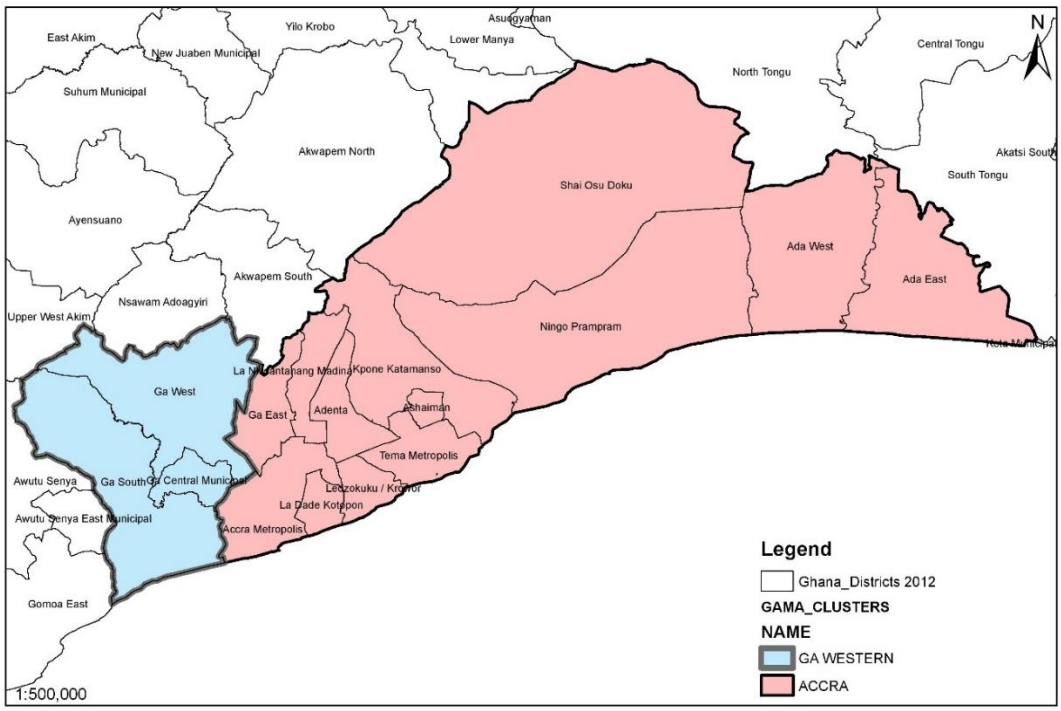
S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
		zone policies ▪ Continuous public education on water conservation ▪ Embark on extensive revegetattion along water-courses to protect against excessive evaporation during the dry season. ▪ Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations
5	Lack of Infrastructure	▪ Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Formulate plan and guidelines for adoption of public-private partnerships in infrastructure development and management, and pursue plan aggressively.
6	Poor sanitation	▪ Improve solid waste collection, transportation and final disposal facilities to forestall the indiscriminate dumping of solid waste ▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensify public awareness and good hygiene education, especially prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
7	Land/Chieftaincy disputes/ insecurity	▪ Ensure provision of effective law enforcement services (including well-coordinated patrol units & neighborhood watch systems), especially in areas prone to crime ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs ▪ Expeditious settlement of disputes within the court system ▪ Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region ▪ Decentralize land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ▪ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ▪ Continuous public education on planning and building regulations, and enforcement of same without compromise ▪ Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons
8	Land/environmental degradation	▪ Adopt comprehensive land use planning (following the new planning model) as a strategy to preserve prime agricultural lands and to avoid incompatible land uses; and ensure effective implementation of plans and enforcement of land use regulations ▪ Institute and/or enforce regulations on sand and gravel winning and quarrying to

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
		optimize benefits to the public ▪ Require the registration and certification of all sand and gravel winning and quarrying operations at the MMDA level by EPA and Minerals Commission (working in collaboration with the respective MMDAs) ▪ Require the submission of operations, management and reclamation plans for all ongoing and future sand and gravel winning and quarrying operations. ▪ Adopt standard technical operating manuals for sand and gravel winning and quarrying operations and vigorously enforce standards and carry out routine inspections.

Ga Western Urban-Peri Urban Cluster

This cluster delineates the western part of GAMA and encompasses the Ga West, Ga Central and Ga South Municipal Assemblies. In 2004, the Ga District was divided into two Districts, Ga East and Ga West. In 2008, Ga West District was further divided into two creating Ga West and Ga South. Ga Central was later carved out of Ga South Municipal Assembly (GSMA) and came into existence on 28th June 2012 by Legislative Instrument 2135. A map of the cluster is depicted below (Figure 18).

Figure 18: Ga Western Urban-Peri Urban Cluster



Shocks

The major shocks faced by this cluster are floods, fires, cholera outbreaks and windstorm.

Floods

Perennial flooding has become a common occurrence and a major cause of disaster in the Ga West, Ga South and Ga Central Municipalities. Like other parts of GAMA, the land is generally low-lying and dissected by a number of rivers and their tributaries that drain into the sea. Ga South Municipality is drained by two main rivers namely, the Densu and Ponpon Rivers, with the Weija artificial Lake also on the Densu River. Ga West is also drained by four major rivers—the Densu, Nsakyi, Onyansia and Doblo. The largest of the four, the Densu drains from the Eastern Region through the western portion of the Municipality to Weija where it enters the sea. The Onyansia, which drains through the central portions, flows into the Accra Metropolitan Area discharging into the Odaw River and Korle Lagoon. Ga Central is also drained by Lafa (which flows from southeast to southwest of the Municipality), Ole river (flows in the central-south to the north to join the Nsaki river), Nsufa (flows south west) and Nsaki stream (flows into the Northeast to the South west to join the Weija lake).

The cluster is naturally prone to floods due to the fact that a large portion of land lies in river basins. Encroachment on these river basins for physical development, lack of planning schemes and development control for most of these areas, the inadequacy of well-constructed drains coupled with silting of existing drains with rubbish, the spillage of the Weija Dam and effects of climate change have contributed to exacerbating the problem of flooding during the rainy seasons. In recent past (June, 2014), severe flooding which affected mostly Kotoku, Medie, South Ofankor, Fish Pond, Nsakina in Ga West; New Weija, Old Weija, Tetegu, Oblogo in Ga south; and almost the whole Municipality of Ga Central affected close to 9,000 people with over 20 deaths and damages estimated at GH¢35,000 in this cluster alone.

Cholera Outbreak

Rapid population expansion in all the Municipalities has brought with it attendant environmental and sanitation problems and challenges. Cholera outbreak, especially during the rainy seasons has been the result of these sanitation problems in the cluster. In 2014, a cholera epidemic which hit most parts of GAMA affected close to 32, 600 people with over 30 deaths in this cluster alone. Ga South and Ga West recorded the highest incidence in the cluster in areas such as Weija, Tetegu, Mallam, Gbawe, Oblogo, Amanfro, Bortianor, Kokrobite and South Ofankor, where sanitation problems such as open defecation due to inadequate household toilet facilities and improper solid and liquid waste disposal are acute.

Fire Outbreaks

Fire outbreaks in this cluster have been mainly domestic usually caused by electrical faults through illegal electricity connections and the use of unqualified electricians for home wiring. A fundamental issue lies with lack of safety and proper supervision and enforcement of building regulations. There is generally low level of citizen information on fire disaster management, prevention and response in the cluster.

Windstorm

Windstorm is seemingly a secondary shock affecting a small percentage of the cluster such as Lomnava and Israel (Ga Central); Amanfro and Obom (Ga South); and Manchie and Kotoku (Ga West). However, it is becoming a worsening phenomenon in recent times due to climate change. Buildings and livestock have been mostly affected and some injuries have also been recorded in this cluster. Between 2011 and 2016, over 200 houses and 30 people have been reported to have suffered some damages and injuries respectively due to windstorms in Ga West.

Stresses

The main stresses across MMAs in this cluster are uncontrolled urban sprawl, poor sanitation, traffic congestion, and chieftaincy and land disputes.

Uncontrolled Urban Sprawl

The cluster is 25 percent peri-urban and 75 percent urban in average and also expanding very rapidly without proper development planning. The effect has been unavailability or limited access to socio-economic infrastructure and services in these newly developed areas due to the high economic cost involved in servicing sparsely populated settlements.

In Ga South, majority of the settlements in the southern part are unplanned. The Municipality is growing towards the north-eastern direction and yet there are no development plans and building bye-laws to guide these developments. In Ga West, though some Planning Schemes exist and some more (Jei-Krodua Planning Scheme, Mendskrom Re-planning Scheme, Dunkonah Local 1 Planning Scheme and North Amanfrom Planning Scheme) are being developed and revised, enforcement of these planning schemes as well as building regulations has been a major challenge due to lack of cooperation from land owners, developers and activities of land guards. In Ga Central, the majority of the land in the Municipality were government owned and the structural layout was never planned. People acquired these lands 'illegally' and because of that, over 90 percent of the buildings and structures within the Municipality were built without permit and planning scheme. The Assembly is now taking steps to regularize these buildings and structures by: inviting landlords and occupiers to submit evidence of purchase of land for regularization; developing planning schemes for built-up areas; and the enforcing planning regulations.

Poor Sanitation

Poor sanitation remains a huge development challenge in the entire GAMA region due to rapid urbanization and this cluster is no exception. Though there is access to some type of sanitation facilities across the cluster, coverage is still below standard. In Ga West for instance, total sanitation coverage is estimated at 47 percent for domestic and 65 percent for institutions. Residents in this cluster still use unapproved toilet facilities like pit and pan latrines and practice open defecation. Poor drainage and sewerage systems also exist in the cluster. With respect to solid waste management, though there are systems in place to ensure door-to-door collection in the cluster, it is still inadequate, unaffordable to some households and ineffective. In 2013, 65 percent and 39 percent of annual waste generated was collected in Ga West and Ga Central respectively and thus indiscriminate dumping of rubbish is commonplace in the cluster. In Ga South, there is no engineered landfill site/ recycling or treatment sites, though there are 4 major old waste dump sites of about 158 acres and land fill sites which have recently been capped with support from the World Bank and the Government of the Netherlands. Like Ga South, the Ga Central Municipality has no final disposal sites and has no land to develop into engineered land-fill final disposal sites for both liquid and solid waste. Furthermore, the municipality depends on land fill sites at Adjen Kotoku (Compost Recycling Facility) in Ga West, Pantang (Ga East), and Kpone (Kpone-Katamanso). This situation increases the cost of final disposal of waste due to transportation cost.

There are existing Municipal Environmental and Sanitation Strategy and Action Plans (MESSAPs) for each of the municipalities but implementation is another issue due to inadequacy of funds and commitment from relevant institutions. Enforcement of sanitation bye-laws is virtually non-existent and there are no sanctions for persons who violate the environmental and sanitation bye-laws. The repercussions of this poor sanitation include the cholera outbreak experienced in the cluster.

Chieftaincy and Land Disputes

Chieftaincy and land disputes have been the main causes of conflict and to some extent lagging development in the cluster**.** The peri-urban nature of the cluster indicates that there is still some vacant land for investors. However, family land ownership and multiple sale of land due to improper administration and acquisition of these lands have often resulted in land conflicts. The resort to the use of 'land guards' to protect various interests in land is thus a common phenomenon in the cluster. Clashes have often led to severe injuries, damages and sometimes death. In Ga South, land conflicts have also been observed in the Tuba irrigation area and Bortianor. Irrigated and arable lands used for farming are being turned very fast into estate development. This attitude of selling land by the chiefs in the area has generated conflict between farmers and the landlords. Other hotspots of conflicts in the cluster are Ashalaja, Danchira, Kokrobite in Ga South; Sowutuom, Anyaa, Ablekuma, Olebu, and Agape in Ga Central; and Oduman, Nsakina, Ayikai Doblo, Oshuiman/ Abbeyman, Mayera, Obeyie, Achiaman, and Manhian in the Ga West Municipal.

Traffic Congestion

Traffic congestion in the cluster is generally due to poor surface accessibility, weak transportation planning and inadequate funding for transport infrastructure development. The cluster is connected by 1st class, 2nd class, and 3rd class roads and footpaths. These roads link various communities and other towns. However, the roads and footpaths in the interior of the cluster are in deplorable conditions and affect mobility and socio-economic activities in the various Municipalities. Alternative routes to Accra and other places do not exist to reduce the traffic on the major roads. In Ga South, apart from the main Mallam-Kasoa highway, only one trunk road has been rehabilitated along Kokrobite. The majority of the urban roads in the Municipality are unpaved while feeder roads are under developed. In Ga West, a large proportion of the road networks are unpaved and about 60 percent of road networks are in poor condition (majority are inaccessible especially during the rainy season). Two major highways pass through Ga West—the Achimota-Nsawam and Mallam-Kasoa Highways. Ga West also harbours the main Accra-Kumasi railway line which passes through the Municipality at Amasaman, Opah, and Adzen Kotoku. There are three main stations at Amasaman and Adzen Totoku but rail transport is not efficient and effective enough to reduce the pressure on road transport. Road accessibility in Ga Central Municipality is generally poor. The Municipality has only three major roads tarred, i.e. the small portion of N1 Highway adjacent to the Assembly, Awoshie-Pokuase road, the Kwashieman-Ofankor and Auntie Aku-Odorgonno SHS road. All other roads, streets or lanes are not tarred. Accessibility is very difficult since these untarred roads are in a deplorable state. Traveling within the Municipality and off the major roads is unbearable. The major traffic hotspots are Ga West—Pokuase U-Turn to Ofankor Roundabout, Sarpeiman, and Faase and Ga South—Toll booth to Kasoa first light. The lack of bus terminals, illegal parking on shoulders of the road and hawking on major roads in the cluster also add up to the traffic congestion problem. The cluster is expected to benefit from the proposed Urban Transport Project which will improve mobility through a combination of traffic engineering measures, management improvements, regulation of urban passenger transport and implementation of a Bus Rapid Transit system.

Recommended Actions to Address Shocks and Stresses

The recommended actions identified to address the shocks and stresses within this cluster of MMAs are presented below.

Table 23: Recommended Actions—Ga Western Urban-Peri Urban Cluster

S/N	SHOCKS & STRESSES	RECOMMENDED ACTIONS
1	Flooding	▪ Maintenance of drainage; ▪ Demarcation & enforcement of buffer zone; ▪ Improved waste management system
2	Fire outbreaks	▪ Public education and resettlement
3	Cholera Outbreak & Poor Sanitation	▪ Improved treatment facilities; ▪ Enforcement of by-laws on sanitation and sensitization; ▪ Improved waste collection; ▪ Improved household sanitation access
5	Uncontrolled Urban Sprawl	▪ Enforcement of local development plans; and design of structural plans where needed. ▪ Improve development permitting process; and Streamline land management and registration process
6	Traffic congestion	▪ Improved mass transit; ▪ Control pedestrian traffic, hawking and illegal parking
7	Land and chieftaincy Conflicts	▪ Expeditious settlement of disputes through judicial system and national house of chiefs. ▪ Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons ▪ Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ▪ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ▪ Continuous public education on planning and building regulations, and enforcement of same without compromise

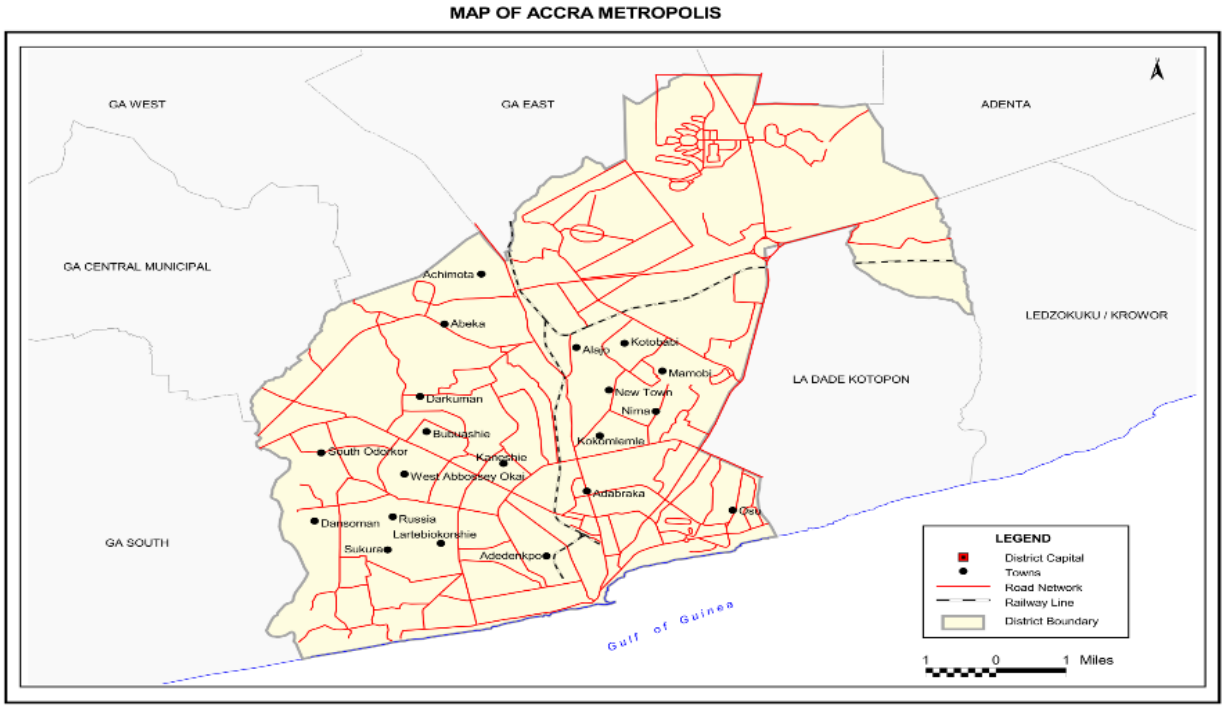
Annex C: GAMA MMDA Profiles

The GAMA, for the purposes of this diagnostic exercise, comprises of the entire geographical extents of all the sixteen (16) metropolitan, municipal and district assemblies (MMDAs) that make up the Greater Accra Region of Ghana. A description of the various MMDAs is provided below.

1. Accra Metropolitan Assembly (AMA)

The Accra Metropolitan Assembly with Accra as capital, is the most populous MMDA in the GAMA with a current estimated population of 1,977,600 (16.3 percent of national population). Growing at 3.1 percent per annum, the population is projected to reach 4,160,989 by 2040. AMA covers an area of 137sq km. Its current population density is 14,158 persons/sq. km, which is far higher than the density of the entire GAMA region of 1,356persons/sq. km. AMA shares boundaries with Ga Central Municipal to the West, Ga West Municipal to the North, La-Dadekotopon to the East and the Gulf of Guinea to the South (Figure 19).

Figure 19: Map of Accra Metropolis



Source: Ghana Statistical Service, GIS

The Accra Metropolitan Assembly lies in the Savannah zone with two rainy seasons and an average annual rainfall of about 730mm. The mean monthly temperature ranges from 24.7°C in August (the coolest) to 28°C in March (the hottest) with annual average of 26.8°C. Relative humidity is generally high varying from 65 percent in the mid-afternoon to 95 percent at night.

According to the 2010 Population and Housing Census, the total housing stock for AMA is 149,689 representing only 33.3 percent of the estimated housing needs of the Metropolis. Out of this figure, 6.6 percent are of low quality. Informal settlements and slum formation has become the outcome of this huge housing supply gap. It is estimated that 38.4 percent of the city's population live in slums. There are currently 29 squatter and slum communities at different levels of maturity in the city constituting about 15.6 percent (215sq km) of the total land area and accommodating 1,652,374 people. (UN Habitat, 2011).

There is a relatively high employment rate in AMA (92.8 percent) compared to the regional average of 82.6 percent and national average of 90 percent. Seventy percent of AMA's population is economically active. The main sectors of the local economy are services, construction, tourism, wholesale & retail trade, and manufacturing.

The 2014-2017 Medium Term Development Plan reports very low access to safe water (35 percent) mainly pipe-borne and protected wells and boreholes and 30 percent access to improved basic sanitation. About 3,000 tonnes of solid waste is generated daily in the city and 83 percent of this is collected.

AMA is endowed with a number of public and private schools. Available records for public schools indicate that there are: kindergarten (153), primary (262), Junior high school (294), Senior high school (15), technical/vocational (2) and handicapped school (1). Similarly, there are a wide range of public and private health facilities in the city. There are; teaching hospital (1), regional hospital (5), polyclinics (8), quasi-government hospitals (7), mission hospital (1) and 93 private facilities that includes maternity homes. These facilities are complemented by a number of pharmaceutical and chemical shops. There is also a 24 hour emergency service available and functional in the city.

AMA's revenue and expenditure analysis for (2010-2013) shows a deficit, implying that without grants and the District Assembly Common Fund (DACF), it will be very difficult for the Assembly to implement its plans. The major sources of revenue for the metropolis are; internally generated funds (62.7 percent), DACF (4.3 percent), Government of Ghana Grants (28.0 percent), and Donor Grants (4.41 percent).

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Dredging and desilting of all drainage channels, including the Korle Lagoon and the Odaw channel (fast-track implementation of the Conti Project) ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels, including the Korle lagoon and the Odaw and Lafa channels. ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans. ▪ Make the Early Warning Systems (EWS) and hydrological management systems fully functional and ensure that it covers the entire GAMA for early warning and evacuation planning in case of approaching storm event. ▪ Fast track completion of all sewage projects, including Accra Sewage

		Improvement Project and rehabilitation of Mudor Treatment Plant.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak	▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensive health screening of food handlers ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Provide for household toilet facilities for low income communities ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
4	Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion (Mensah Guinea and environs) ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas ▪ Enforcement of regulations on destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continues public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods. ▪ Provision of adequate solid waste management facilities, including landfills to prevent indiscriminate disposal of solid waste which ultimately ends up on the coastline
5.	Building Collapse	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Ensure adequate review of designs and development control ▪ Ensure adequate supervision of construction activities and vigorous

		enforcement of building codes ▪ Require the registration, training and certification of all building professionals and technicians. ▪ Review and vigorously enforce existing professional standards and requirements of all building professions, especially structural engineers and architects. ▪ Institute immediate measures to ensure monitoring and reporting of issuance of building permits
6	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion ▪ Implementation of 'Operation Don't Cross the Red Line" to prevent traders from encroaching pavements and public right of way ▪ Control of indiscipline on the roads, especially by motorcycle taxis (Okada)
7	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Strengthen immigration regulations to reduce illegal immigration from neighboring countries, which is contributing to the creation of slums
8	Crime	▪ Ensure provision of effective law enforcement services, especially in areas prone to crime ▪ Facilitate access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
9	Water scarcity	▪ Expansion of water sources, including the utilization of ground water and rain harvesting ▪ Expansion of treatment facilities

		▪ Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines ▪ Installation of booster stations to improve flow pressure ▪ Regulation and institution of severe penalties against unauthorized tampering with water supply infrastructure ▪ Preservation of water resources by the implementation of the riparian buffer zone policies ▪ Continuous public education on water conservation

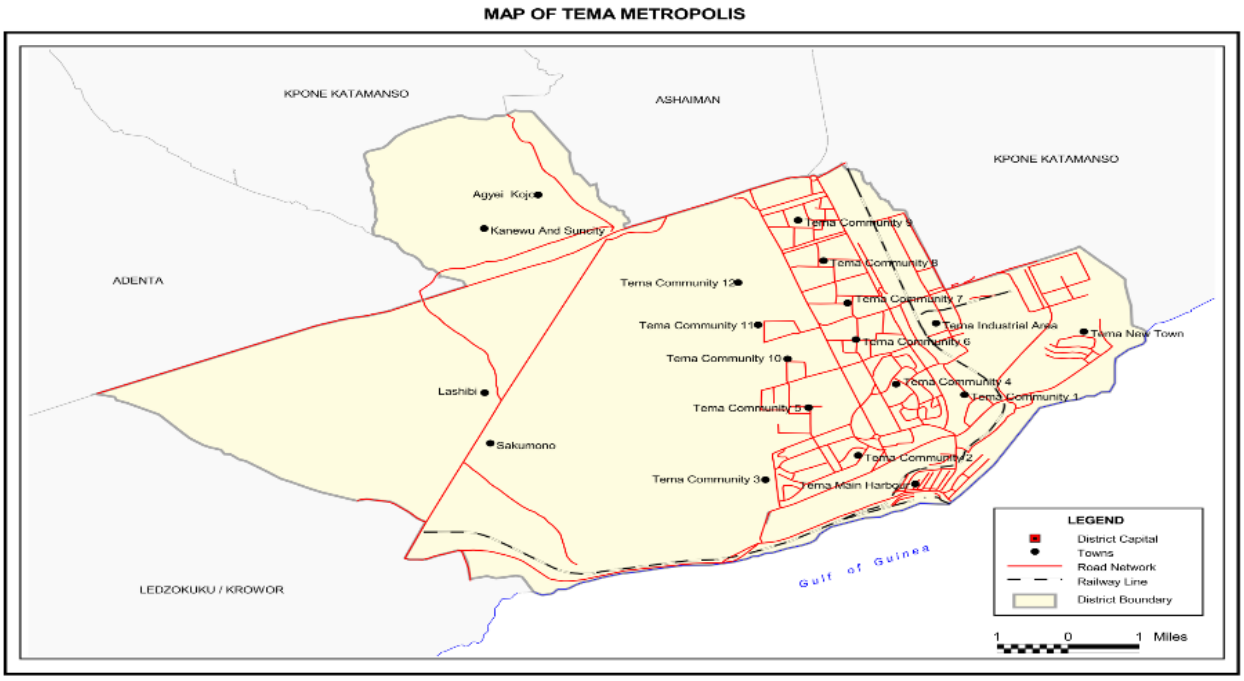
2. Tema Metropolitan Assembly (TMA)

Tema Metropolitan Assembly is a coastal district situated about 30 kilometers east of Accra, the capital city of Ghana. With an annual growth rate of 2.6 percent, the current population of TMA is estimated at 332,864. The city shares boundaries on the North-East with the Kpone-Katamanso and Ningo-Prampram Districts, South- West by Ledzokuku-Krowor Municipal, North-West by Adentan Municipal and the Ga East Municipal, North by the Akuapim South District and the South by the Gulf of Guinea. The Ashaiman Municipal is an in-lock enclave within the Tema Metropolis. The Metropolis has Tema as its capital and covers an area of about 396 sq km. TMA lies within the coastal savannah zone and therefore enjoys a dry equatorial climate. The topography is generally flat, ranging from 0-35m above sea level. Mean annual rainfall ranges between 730mm to 790mm. The rainy season is usually from April to July (major rainy season) and from September to November (minor rainy season). The highest amount of rain is experienced in May, June and early July. Temperatures are high all year round with significant daily and seasonal variations. The annual average temperatures range between 25°C and 30°C in the major rainy season while in the minor season temperatures range between 34°C and 40°C.

The Tema Metropolis is totally urbanized. It is a well-planned city and industrial hub with green belt based on the neighbourhood concept of city development. However, rapid urbanisation has led to the development of squatters in some parts of the city, in areas such as Tema-Manhean, parts of Community 1, and the industrial areas. The total land area constitutes 60 percent residential land use (both planned and squatters) and 40 percent commercial and industrial land use. The number of industries and waste generated in the Metropolis has been increasing without a corresponding increase in afforestation to absorb excess carbon mono-oxide generated by the industries. Also, reserved green belts have been exposed to encroachment by both residents and light industries. This has led to changes in weather condition with its associated effects such as loss of biodiversity and erratic rainfall pattern.

TMA has a high economically active population of 72 percent. Out of this figure, 90.4 percent are employed and 9.6 percent unemployed. The driving sectors of the local economy are industry, commerce and agriculture. The city relies on internally generated funds (47.2 percent) and grants (42.8 percent) as its major sources of revenue.

Figure 20: Map of Tema Metropolis



Source: Ghana Statistical Service, GIS.

Ninety percent (90 percent) of TMA's population have access to safe water. The Metropolis also has a water-borne sewerage system that was established in 1960 and connects to most part of the city. Currently however, the system does not function properly. There are about 70 public and private health facilities that includes a district hospital. There is however no emergency response centre in the Metropolis. The city depends on Accra for its emergency response services and has thus initiated discussions for establishment of such facility in the Metropolis. Public and private educational facilities for all levels; from crèche to tertiary in the Metropolis number over 450 in the city.

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

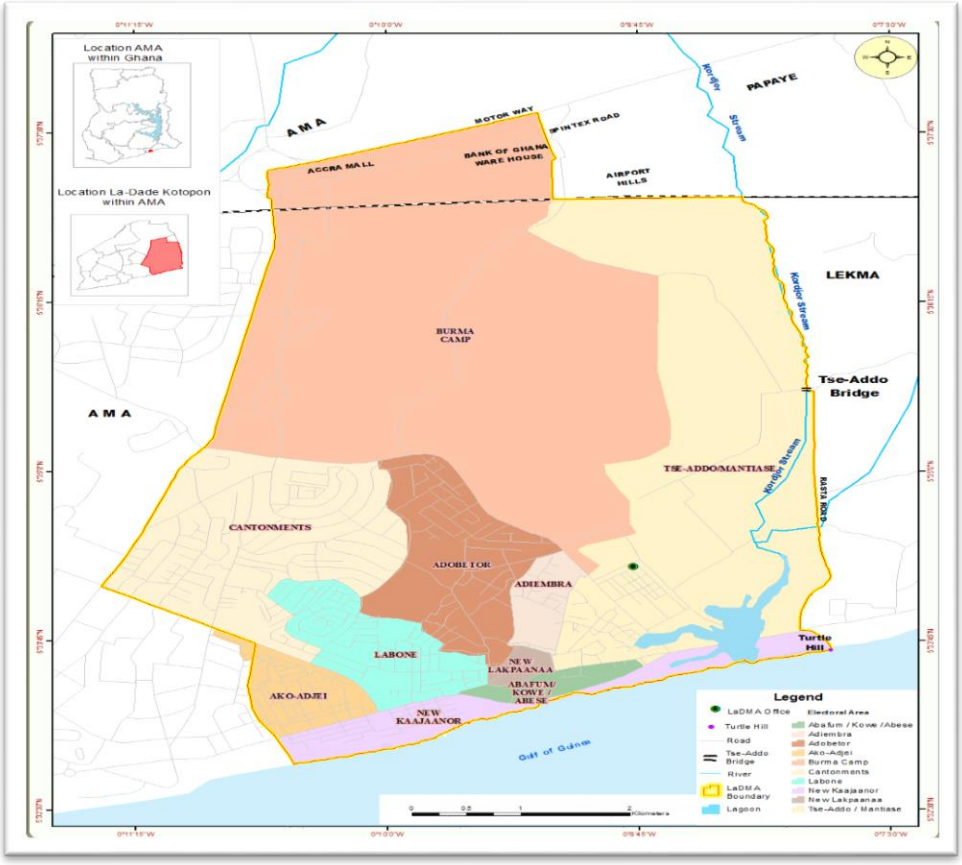
S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets and slum areas ▪ Dredging and desilting of all drainage channels (especially, Chemu and Sakumono lagoons), including all roadside drains and sewers. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Enforcement of land use and building regulations to remove illegal structures along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans. ▪ In-fill green areas with high-rise accommodation to accommodate population growth and prevent slum formation

2	Fire outbreaks	▪ Ensure immediate access improvements of fire prone areas (especially, markets and slum communities) ▪ Redevelopment of old neighborhoods to address hazard risks ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continues public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
4	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during rainy seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion
5.	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services and promote in-filling with high-rise building development ▪ Formulate a comprehensive housing delivery strategy, and ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Ensure public familiarity with land use and building regulations, and ensure strict application of same without compromise

3. La-Dadekotopon Municipal Assembly (LaDMA)

The La Dade-Kotopon Municipal Assembly (LaDMA), a coastal city was carved out of the Accra Metropolitan Assembly in June, 2012 and it is situated in the south eastern part of the Greater Accra Region. The capital of the city is La and has a total land area of about 36 sq km, which represents almost 1.1 percent of the total land size of the Greater Accra Region. Its boundaries are; the Accra Metropolitan Assembly to the West and North, the Ledzokuku-Krowor Municipal Assembly to the East and the Gulf of Guinea to the South. Current population for LaDMA is estimated at 212,758 with an annual growth rate of 3 percent.

Figure 21: Map of La Dade-Kotopon MMDA



Source: LaDMA MTDP 2014-2017

LaDMA exhibits similar topographical and climatic characteristics as the Accra Metropolitan Assembly. The Municipality is low-lying with a coastline that has a series of resistant rock outcrops and platforms and sandy beaches near the mouth of the lagoons. The coastline is exposed and because of the close proximity of the continental shelf, strong wind action and sand winning activities, it is subject to severe erosion. The city has two rainy seasons (May through mid-July and mid-August through October) with an average annual rainfall of about 730mm. There is very little variation in temperature throughout the year. The mean monthly temperature ranges from 24.7°C in August (the coolest) to 28°C in March (the hottest) with annual average of 26.8°C.

LaDMA's capital depicts an over-concentrated settlement as available data indicates that over 70 percent of the total population is situated in the heart of the city. The 2010 Population and housing census reported there are 19,174 housing units with 51, 000 households in the Municipal. Slums are a

commonplace in the city as indigenous neighbourhoods have not seen proper planning and investment in quality housing and services such as drains and toilet facilities. The Municipal has no spatial master plan but has land-use plan that to some extent guides the development of the City. The Municipal's land-use is largely residential (53 percent), business (19 percent), mixed use (16 percent), streets (9 percent) and vacant land (3 percent). There is a 95 percent access to safe water mainly from pipe borne (95 percent). The other sources are tankers and boreholes. Water consumption vary among the three income classes of the population with an average of 100.33 Liters/person/day.

The Municipality has 43 and 13 public and private basic schools respectively. There are five senior high schools; four of which are publicly owned and two technical and vocational schools. Health facilities in the city are a public district hospital and a CHP compound, three quasi-government facilities and three private facilities that include one hospital and two clinics.

Unemployment is relatively high in LaDMA, constituting 32 percent of the economically active population. Majority (60.7 percent) of the employed are engaged in the private informal sector. The service, whole sale and retail businesses and tourism form the economic backbone of the local authority. Revenue sources for the Assembly are internally generated funds (55.85 percent) and grants (44.15 percent).

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels, including the Kpeshie and Korle basins. ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout LaDMA and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans

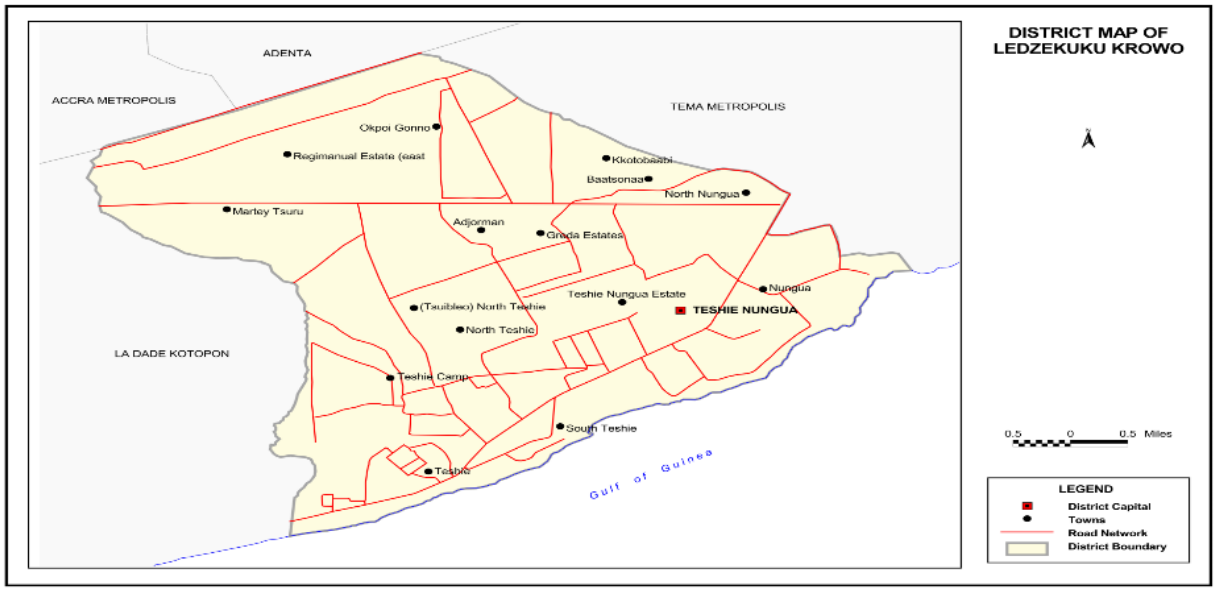
		and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak	▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensive health screening of food handlers ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Provide for household toilet facilities for low income communities ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
4	Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas ▪ Enforcement of regulations on destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continues public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods. ▪ Provision of adequate solid waste management facilities, including landfills to prevent indiscriminate disposal of solid waste which ultimately ends up on the coastline
5	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Control of indiscipline on the roads, especially by motorcycle taxis (Okada)
6	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic

		infrastructure and services ▪ Ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated and upgrade existing slums ▪ Strengthen immigration regulations to reduce illegal immigration from neighboring countries, which is contributing to the creation of slums
7	Crime	▪ Ensure provision of effective law enforcement services, especially in areas prone to crime ▪ Facilitate access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
8	Building Collapses	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Ensure adequate review of designs and development control ▪ Ensure adequate supervision of construction activities and vigorous enforcement of building codes ▪ Require the registration, training and certification of all building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of all building professions, especially structural engineers and architects. ▪ Institute immediate measures to ensure monitoring and reporting of issuance of building permits

4. Ledzokuku-Krowor Municipal Assembly (LEKMA)

The Ledzokuku-Krowor Municipal Assembly covers a total land area of 47.4 square kilometers and shares boundaries with La Dade-Kotopon Municipal to the West and Accra Metropolitan and Adentan Municipal to the North, Tema Metropolis to the East and also bounded at the south by the Gulf of Guinea. LEKMA's capital is Teshie-Nungua and lies in the Savannah zone which experiences a double maxima rainy season pattern with an average annual rainfall of about 730mm. Rainfall is usually characterized by quick and short intensive storms and causes flooding in areas of poor drainage. The annual temperature figures are also relatively stable with very little variation in annual temperature figures. August, the coolest month, usually comes with a mean temperature of 24.7°C while the hottest period is found in March with a mean of 28°C, recording an annual average of 26.8°C.

Figure 22: Map of Ledzokuku-Krowor MMDA



Source: Ghana Statistical Service, GIS

According to the 2010 Population and Housing Census report, the population of the Municipal stood at 227,932, representing 5.7 percent of the region's total population. About 71 percent of the population aged 15 years and older are economically active. Of this figure, 91.1 percent are employed. The private informal sector is the largest employer in the city, employing 69.7 percent of the population. LEKMA is predominantly a non-agricultural area since only 3.3 percent are engaged in agricultural production. The service, tourism and retail trade thus form the economic backbone of the Assembly.

The housing stock in LEKMA is 21, 366 representing 4.5 percent of the total number of houses in the GAMA region. The main sources of water in the city are pipe-borne and sachet water and water tankers. About 7.8 percent of the population do not have access to toilet facilities while 38 percent use public toilets. Access to electricity in the city is 92.9 percent. The Municipality has 40 public and 112 private basic schools and 4 senior high schools (2 public and 2 private). There are 8 public health facilities which include; a hospital, a polyclinic, a health centre, a reproductive health centre and 2 CHPS compounds. The private sector also serves the city with four hospitals and six clinics. LEKMA relies excessively on external sources of revenue for the running of its economy. In 2013, grants constituted 67 percent of revenue sources while internally generated funds constituted the remaining 33 percent.

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding).

		▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Dredging and desilting of all drainage channels, including the Kpeshie Lagoon and the Songo and Mokwe channels ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels such as the Songo-Mokwe basin ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout LeKMA and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak	▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensive health screening of food handlers ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Provide for household toilet facilities for low income communities ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
4	Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas ▪ Enforcement of regulations on destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continues public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods. ▪ Provision of adequate solid waste management facilities, including landfills to prevent indiscriminate disposal of solid waste which

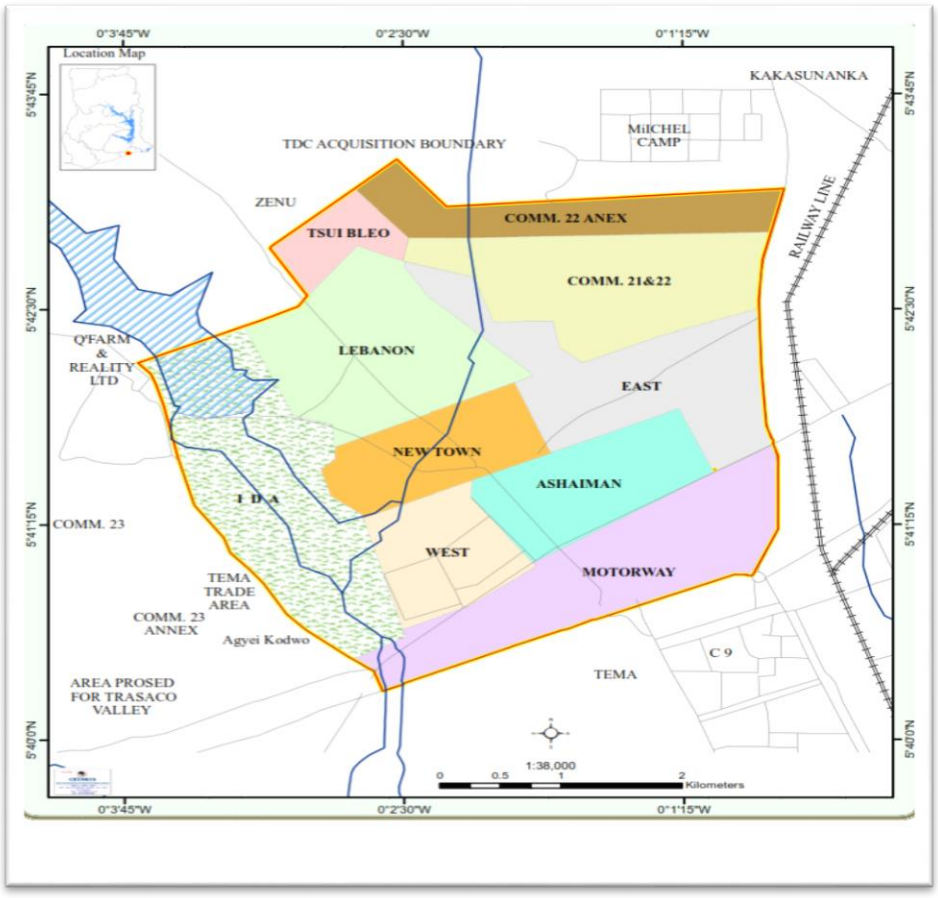
		ultimately ends up on the coastline
5	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion ▪ Implementation of 'Operation Don't Cross the Red Line" to prevent traders from encroaching pavements and public right of way ▪ Control of indiscipline on the roads, especially by motorcycle taxis (Okada)
6	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Strengthen immigration regulations to reduce illegal immigration from neighboring countries, which is contributing to the creation of slums
7	Crime	▪ Ensure provision of effective law enforcement services, especially in areas prone to crime ▪ Facilitate access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
8	Water scarcity	▪ Expansion of water sources, including the utilization of ground water and rain harvesting ▪ Expansion of treatment facilities ▪ Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines ▪ Installation of booster stations to improve flow pressure ▪ Regulation and institution of severe penalties against unauthorized tampering with water supply infrastructure ▪ Preservation of water resources by the implementation of the riparian buffer zone policies ▪ Continuous public education on water conservation

5. Ashaiman Municipal Assembly (AsHMA)

The Ashaiman Municipal Assembly (AsHMA) has Ashaiman as its capital and is located about four kilometres north of Tema and about 30km from Accra, the capital of Ghana. The Municipal Assembly covers an area of about 45km^2. It shares boundaries on the North and East with Kpone-Katamanso District Assembly and on the South and West with the Tema Municipal Assembly. AsHMA forms part of the Accra-Togo plains and therefore exhibits a generally flat topography with isolated hills which barley reach 65m high. Rainfall ranges from 730mm-790mm with an annual mean rainfall of 760mm. Temperatures are high throughout the year. March –April is usually the hottest period with temperatures reaching 32ºc during the day and 27ºc at night. Cooler temperatures occur from May-September with a high of 27-29°C during the day and 22-24°C in the night. The city is drained by River Gbemi.

AsHMA's population has grown from 190,972 in 2010 to 239,126 in 2015 at an annual growth rate of 4.6 percent. This represents 4.8 percent of the region's population. Forty–five percent of this population live in slums or informal settlements (ASHMA MTDP 204-2017) in a city that is fully urbanized but without a master spatial development plan.

Figure 23: Map of Ashaiman MMDA



Source: AsHMA MTDP 2014-2017

Total housing stock according to the 2010 Population and Housing Census is 17,021 housing units with 49,936 households living in these houses. About 45 percent of these houses are of low quality, including about 15 percent of dwelling units that are shacks made of wood and aluminium. Ninety-five percent of

households in the Municipality have access to safe water mainly from pipe-borne (95 percent) and water tankers (5 percent). There is however a low access rate to improved basic sanitation as only 50 percent of the population have access to improved toilet facilities. Access to electricity in the city is 88.5 percent. The Municipality has 17 and 78 public and private basic schools respectively and 9 senior high schools of which 7 are private. Health facilities available in the city are 26. The facilities include District hospital, health centres, clinics, and CHP compounds. Fifteen of these facilities are being provided by the private sector.

ASHMA has a high labour force; about 75.1 percentof the population aged 15 years and older are economically active out of which 91.6 percent are employed. Wholesale and retailing, agriculture, handicraft and manufacturing form the major sectors of the local economy. The main sources of the Municipality's finance are; Government of Ghana grants-5.65 percent, District Assemblies Common Fund-32.30 percent, Development Partners—9.48 percent and internal generated funds—25.97 percent.

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. ▪ Dredging and desilting of all drainage channels, including all roadside drains and sewers. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Enforcement of land use and building regulations to remove illegal structures along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate access improvements of fire prone areas (especially, markets and slum communities) ▪ Redevelopment of old neighborhoods to address hazard risks ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation

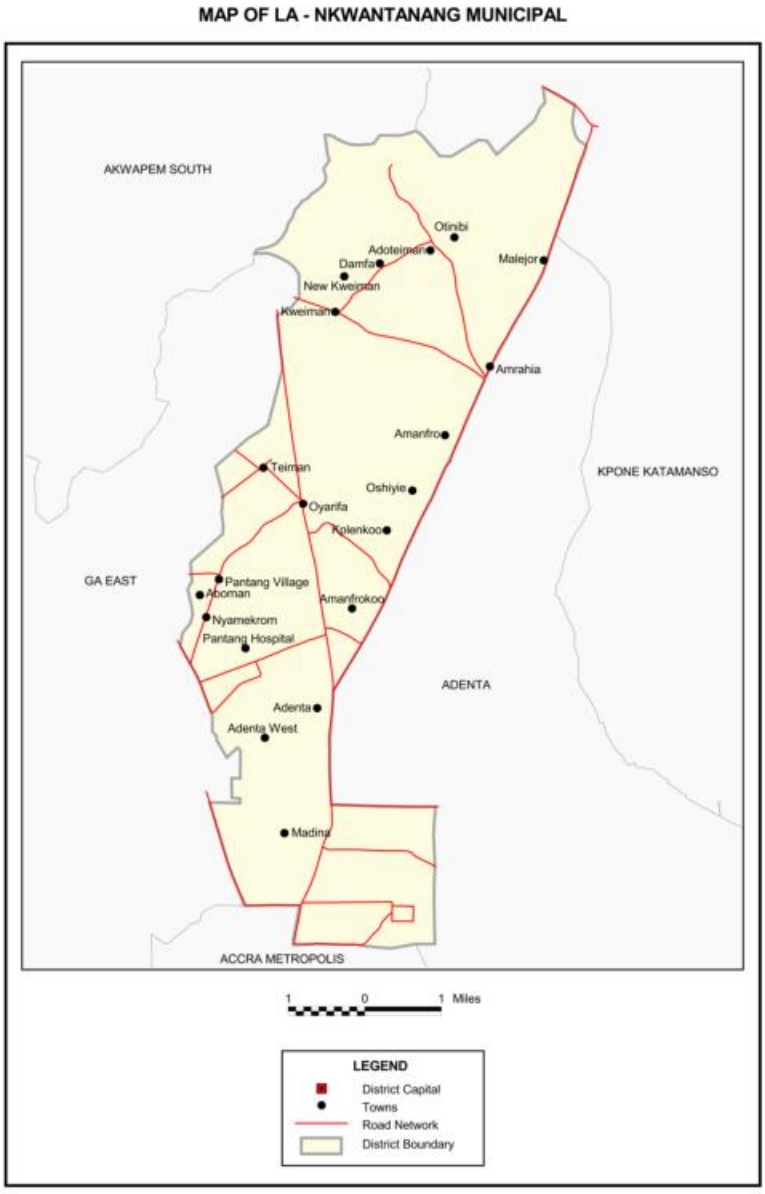
		▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during rainy seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion
5	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Formulate a comprehensive housing delivery strategy, and ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Ensure public familiarity with land use and building regulations, and ensure strict application of same without compromise
6	Crime	▪ Ensure provision of effective law enforcement services (including well-coordinated patrol units & neighborhood watch systems), especially in areas prone to crime ▪ Facilitate universal access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
7	Land/chieftaincy conflicts	▪ Expeditious settlement of disputes within the court system ▪ Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region ▪ Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ▪ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ▪ Continuous public education on planning and building regulations, and enforcement of same without compromise ▪ Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons

6. La Nkwatanang-Madina Municipal Assembly (LaNMMA)

The La Nkwantanang-Madina Municipal Assembly (LaNMMA) was carved out from the Ga East Municipal Assembly in June, 2012. The City's capital is located at Madina, a busy commercial and residential hub. LaNMMA is urban and peri-urban; 84 percent urban and 16 percent peri-urban. The city is located at the northern part of the Greater Accra Region and covers a total land area of 74.4 square kilometres. It is bounded on the West by the Ga East Municipal, on the East by the Adentan Municipal. The southern

portion is bounded by the Accra Metropolitan Assembly whilst the North-West and North-East are bounded by the Akwapim South and Kpone-Katamanso Districts respectively.

Figure 24: Map of La Nkwatanang-Madina MMDA



Source: Ghana Statistical Service, GIS

The Municipality falls in the savannah agro-ecological zone. Rainfall pattern is bi-modal with an average rainfall of 700mm in the minor rainy season and 770mm in the major season. The Akwapim-Togo Range heavily influences the rainfall pattern of the Municipality. The northern-most side of the Range, which is on a leeward side, receives a lot more rainfall and moisture (in the form of dew) than other parts of the Municipality thus creating a somewhat distinct ecological zone. It is however, mostly dry for the greater part of the year with average annual temperature ranging between 25.1$^{\circ C}$ in August and 28.4^{oc} in February and March. February and March are the hottest months.

The La Nkwatanang-Madina Municipal has a current estimated population of 138,016 that is growing at 4.6 percent per annum. Access to safe water and electricity in the city is 99 percent and 93 percent respectively. The main sources of water are; sachet water (61.9 percent), pipe-borne (22.5 percent), water tankers (10.3 percent) and borehole/well (3.2 percent). Access to improved toilet facilities is rather low. Available data indicates that only 48 percent of the Municipal population has access to improved basic sanitation (KVIP, Water Closet and VIP). Waste generated daily in the city is estimated at 750 tonnes out of which 490 tonnes representing 65 percent are collected. The total housing stock in the city according to the 2010 Population and housing Census are 13,647. Eighteen percent of these are houses are reported to be of low quality.

Educational facilities in the city are 97 basic schools (38 public and 59 private), 5 senior high schools, 3 of which are private, 3 tertiary schools (2 private) and 2 technical/ vocational schools. There are also 13 public and 18 private health facilities in the Municipality. These include 10 CHPS compound, a polyclinic, private hospitals and health centres and maternity homes.

The key sectors of the Municipal's economy are retail trading, service, agriculture, small scale manufacturing & processing and mining and quarrying. The city also has an economically active of 67.9 percent out of which 82.3 percent are employed. Municipal sources of revenue are internally generated funds (50.2 percent), DACF (29.4 percent) and Government of Ghana grants (13.3 percent).

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. ▪ Dredging and desilting of all drainage channels, including all roadside drains and sewers. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Enforcement of land use and building regulations to remove illegal structures along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate access improvements of fire prone areas (especially, markets and slum communities) ▪ Redevelopment of old neighborhoods to address hazard risks ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at

		regular intervals during use.
3	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during rainy seasons which slows down traffic and leads to congestion ▪ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion
5	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Formulate a comprehensive housing delivery strategy, and ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated ▪ Ensure public familiarity with land use and building regulations, and ensure strict application of same without compromise
6	Crime	▪ Ensure provision of effective law enforcement services (including well-coordinated patrol units & neighborhood watch systems), especially in areas prone to crime ▪ Facilitate universal access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
7	Land/chieftaincy conflicts	▪ Expeditious settlement of disputes within the court system ▪ Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region ▪ Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ▪ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ▪ Continuous public education on planning and building regulations, and enforcement of same without compromise ▪ Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons

7. Adentan Municipal Assembly (AdMA)

The Adentan Municipal Assembly (AdMA), (with Adenta as its Capital) lies 10 Kilometres to the Northeast of Accra. The Municipal has a land area of about 928.4sqkm and shares boundaries with Ashaiman Municipal Assembly and Kpone-katamanso District Assembly in the east and north, La Nkwantanang-Madina Municipal Assembly in the West and South.

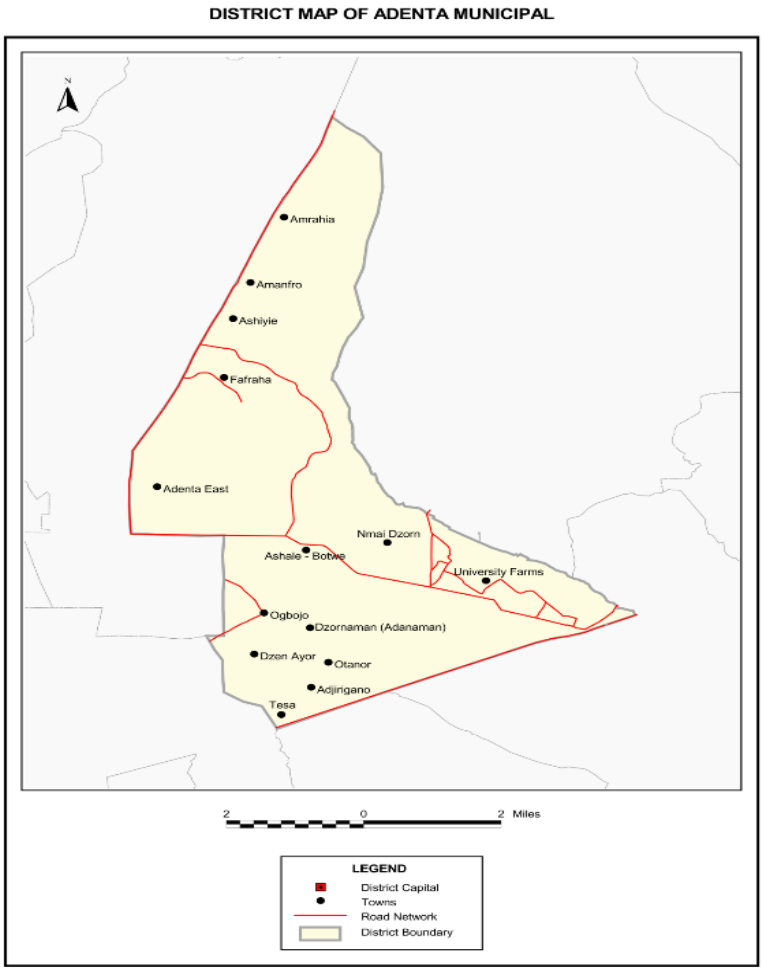
Adentan lies at the bottom, windward side and south of the Akuapim Range. It is a lowland area with an undulating terrain, which barely rises above 50 meters above sea level. Temperatures are generally high throughout the year. March-April is usually the hottest period with temperature reaching 32°C during the day and 27°C at night. Cooler temperature occurs from May-September with 27-29°C during the day and 22-24°C in the night. The area experiences two types of rainy seasons. The first and the major season start from April to July while the second but minor season is from September to November each year. Annual mean rainfall is 700–770mm.

AdMA has an estimated population of 108,887 with a growth rate of 2.6 percent per annum. About 62.5 percent of the population resides in urban and 37.5 percent in rural areas according to the 2010 Population and housing census. The total housing stock in the city as of 2010 was 10,010 houses being occupied by 13, 038 households. (2010 Population and Housing Census). There is close to 86 percent access to safe water by the population. The water is mainly from these sources; bottled and sachet water, pipe-borne and water tankers. Adentan is one of the few areas in the Greater Accra region that has relatively good sanitation and waste management though it has no final disposal sites for both liquid and solid wastes. This situation increases the cost of final disposal of waste due to travel distance.

Currently, Adentan Municipality has 11 Community-Based Health Planning Services (CHPS) compounds, 4 public health centres and 3 public clinics. There are 22 private health facilities that include hospitals, clinics and maternity homes. With respect to education, Adentan has 16 public basic schools and 137 private basic schools. There are nine (9) Senior High Schools (SHS) which are private. The Municipality has four tertiary institutions which are private.

AdMA has a 74.1 percent economically active population out of which 91.2 percent are employed, while the major sectors of the economy comprises: service, retail trading, handicraft and agriculture. The Municipalities sources of revenue are DACF (17.84 percent), internally generated fund (61.09), Government of Ghana grants (21.07 percent).

Figure 25: Map of Adentan MMDA



Source: Ghana Statistical Service, GIS

The major shocks and stresses that exist in the ADMA as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	• Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. • Dredging and desilting of all drainage channels, including all roadside drains and sewers. • Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). • Enforcement of land use and building regulations to remove illegal structures along drainage channels and dam sites • Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	• Ensure immediate access improvements of fire prone areas (especially, markets and slum communities)

		• Redevelopment of old neighborhoods to address hazard risks • Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code • Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. • Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations • Require the registration, training and certification of all electricians and other building professionals and technicians. • Review and vigorously enforce existing professional standards requirements of electricians • Require the inspection of all electrical installations before use and at regular intervals during use.
3	Traffic congestion	• Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement • Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation • Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) • Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation • Improvement of side drainage on roads to prevent creation of puddles and flooding during rainy seasons which slows down traffic and leads to congestion • Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion
5	Rapid urbanization/ proliferation of slums (informal settlements)	• Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations • Undertake community upgrading and provision for adequate basic infrastructure and services • Formulate a comprehensive housing delivery strategy, and ensure provision of adequate and affordable housing for all income brackets • Develop and implement resettlement schemes for informal communities which need to be relocated • Ensure public familiarity with land use and building regulations, and ensure strict application of same without compromise
6	Crime	• Ensure provision of effective law enforcement services (including well-coordinated patrol units & neighborhood watch systems), especially in areas prone to crime • Facilitate universal access to basic education and vocational/technical training to equip the youthful population with employable skills • Create enabling environment for the generation of employment opportunities to absorb the unemployed population • Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
7	Land/chieftaincy	• Expeditious settlement of disputes within the court system

	conflicts	• Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region • Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing • Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case • Continuous public education on planning and building regulations, and enforcement of same without compromise • Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons

8. Ga East Municipal Assembly (GaEMA)

The Ga East Municipal is located at the northern part of Greater Accra Region and covers a land area of about 85.7 square kilometers. The capital of the Municipal is Abokobi. It shares boundaries with the Ga West Municipal to the west, the La Kwantanang–Madina Municipal to the east, Accra Metropolitan to the south and the Akwapim South District to the north.

The Municipal falls in the savannah ecological zone and has bi-modal rainfall pattern is with the average annual temperature ranging between 25.1°C in August and 28.4°C in February and March. The land area consists of gentle sloped landscape interspersed with plains in the west. The Akwapim range rises steeply above the western end and lies generally at 375–420 meters north of Aburi in the Akuapim South District and fall to 300 meters southward in the Okaikwee North District. There are a few rivers and seasonal streams most of which are threatened by human activities. They include the Sesemi stream at Sesemi and the Dakubi stream at Ajako.

The City's population is estimated at 226,590 with a growth rate of 4.2 percent. It constitutes 82 percent peri-urban and 12 percent rural. The housing stock of Ga East Municipal is 23,424 representing 4.9 percent of the total number of houses in the Greater Accra Region. Access to water in the Municipality is quite low as available data indicates that only 42 percent of the population has access to safe water. Almost 55 percent of the population rely on sachet water as their main source of drinking water. The other sources are pipe-borne and borehole. While about 8 percent of the households do not have access to any toilet facilities, 32 percent have private toilet and 37 percent patronize public toilet. Estimated solid waste generated monthly in the Municipality is 385 tonnes out of which 261 tonnes (67 percent) are collected. The proportion of the population with electricity is 78.4 percent. The distribution of schools in the Municipality is quite even. There are six (6) privately owned Senior High Schools.The Municipality, however, is yet to have a public Senior High School of its own. There are 31 public Basic Schools made up of Kindergarten, Primary and Junior High Schools and 109 private schools that are sited mainly in the peri-urban areas of the Municipality.

Figure 26: Map of Ga East Municipal Assembly

Source: Ghana Statistical Service, GIS

About 70 percent of the population aged 15 years and older are economically active while about one-third (30.0 percent) are economically not active. Of the economically active population, 92.1 percent are employed while 7.9 percent are unemployed. The key sectors of the local economy are service, wholesale and retail trade, handicraft and agriculture. Ga East Municipal depends largely on external sources of funds for its management. The main sources of municipal finance are; grants-66.0 percent, internally generated funds-31 percent and others-3.0 percent

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels. ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout GaEMA and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak	▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensive health screening of food handlers ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Provide for household toilet facilities for low income communities ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
4	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation

		▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Control of indiscipline on the roads, especially by motorcycle taxis (Okada)
5	Rapid urbanization/ proliferation of slums (informal settlements)	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Ensure provision of adequate and affordable housing for all income brackets ▪ Develop and implement resettlement schemes for informal communities which need to be relocated and upgrade existing slums ▪ Strengthen immigration regulations to reduce illegal immigration from neighboring countries, which is contributing to the creation of slums
7	Crime	▪ Ensure provision of effective law enforcement services, especially in areas prone to crime ▪ Facilitate access to basic education and vocational/technical training to equip the youthful population with employable skills ▪ Create enabling environment for the generation of employment opportunities to absorb the unemployed population ▪ Intensify education on the menace of illicit drugs and ensure vigorous control of possession and use of such drugs
8	Building Collapses	▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Ensure adequate review of designs and development control ▪ Ensure adequate supervision of construction activities and vigorous enforcement of building codes ▪ Require the registration, training and certification of all building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of all building professions, especially structural engineers and architects. ▪ Institute immediate measures to ensure monitoring and reporting of issuance of building permits

9. Ga West Municipal Assembly (GWMA)

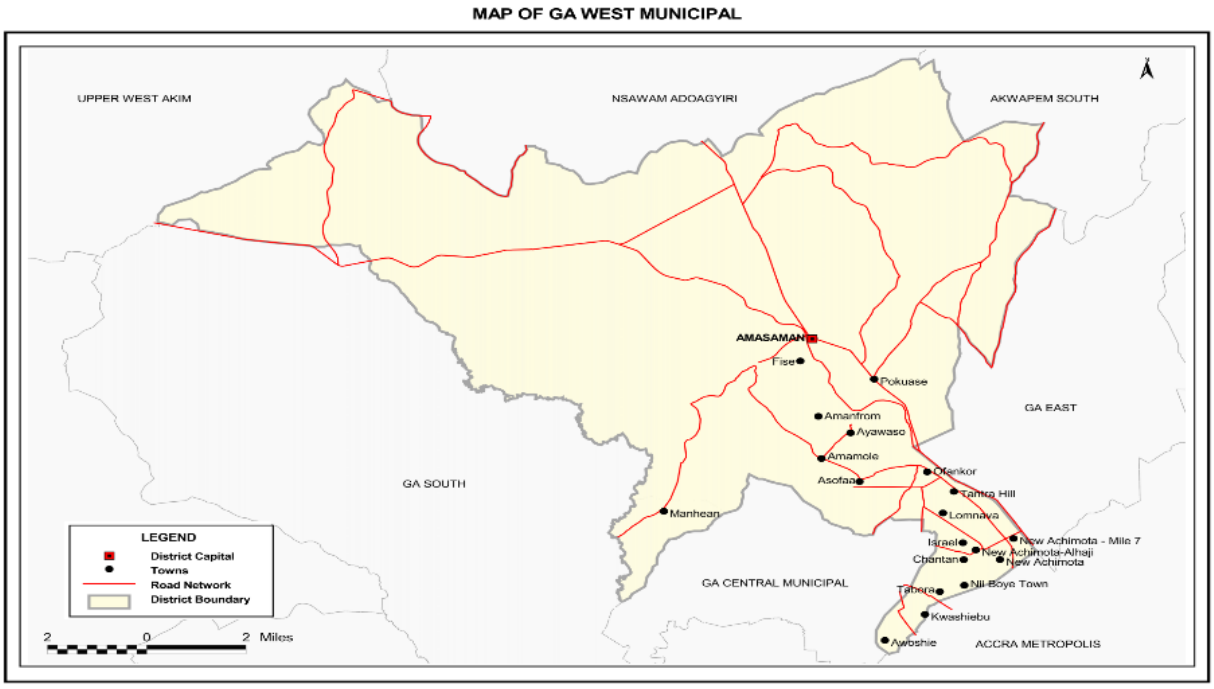
The Ga West Municipal was carved out of the erstwhile Ga District which was created in 1988 in pursuance of the government decentralization and local government reform policy. In 2004, the Ga District was divided into two Districts namely, Ga East and Ga West and in 2008. Ga West District was further divided into Ga West and Ga South Municipalities with Amasaman the former district capital remaining the capital for the newly created Ga West Municipal. The Ga West Municipality is about 25km west of Accra and shares boundaries with the Ga East and the Accra Metropolitan Area to the East, Akwapim South to the

North, Ga South to the South and Ga Central to the North-South. It occupies a total land surface area of 305.4sq km.

The Ga West Municipal lies in the dry equatorial climatic zone which experiences double maxima rainfall in a year. The average annual rainfall ranges between 790mm to 1270mm. The average annual temperature ranges between 25.1°C in August and 32.1°C in February and March. The Municipality lies wholly in the coastal scrub and grassland ecological zone. The relief is generally undulating and ranges from 76 metres above sea level as the lowest level to 300 metres as the highest level around the Akwapim range.

The population of Ga West is 269,986 and a growth rate of 4.2 percent per annum. The city is 50 percent urban, 30 percent peri-urban and 20 percent rural. This notwithstanding, level of employment in the municipal is high; constituting 91.5 percent and 7 out of 10 (71.2 percent) of the population aged 15 years and older are economically active. The service sector is the main sector of the economy constituting 74.9 percent. Only 2.8 percent are employed by Agriculture and the remaining 22.3 percent by Industry.

Figure 27: Map Ga West Municipal Assembly



Source: Ghana Statistical Service, GIS

The population of Ga West is 269,986 and a growth rate of 4.2 percent per annum. The city is 50 percent urban, 30 percent peri-urban and 20 percent rural. This notwithstanding, level of employment in the municipal is high; constituting 91.5 percent and 7 out of 10 (71.2 percent) of the population aged 15 years and older are economically active. The service sector is the main sector of the economy constituting 74.9 percent. Only 2.8 percent are employed by Agriculture and the remaining 22.3 percent by Industry.

The housing stock of Ga West Municipality is 30,447 representing 6.4 percent of the total number of houses in the Greater Accra Region. Access to potable water has always been a basic problem of the Municipality; only 27 percent of the rural population has access to potable water. The main source of

drinking water by households is sachet water, which is used by 63.2 percent of all households. The next major source of drinking water is pipe-borne outside dwellings (10.5 percent) and pipe-borne inside dwellings (8.6 percent). Total sanitation coverage is estimated at 47 percent for domestic and 65 percent for institutions and access to electricity is 85.5 percent.There are 71 public and 86 private basic schools and 11 senior high schools (2 public and 9 private) in Ga West. The Municipal has 6 hospitals (1 public and 5 private), a public health centre, 7 clinics (5 public and 2 private), 5 CHP Compounds and 5 private maternity homes. Sources of Municipal funds are mainly internally generated funds (52.2 percent), District Assembly Common Fund (13.7) and Government of Ghana and Other Grants (34.1 percent).

The major shocks and stresses encountered by the city as well as priority actions to address these challenges are detailed in the below table.

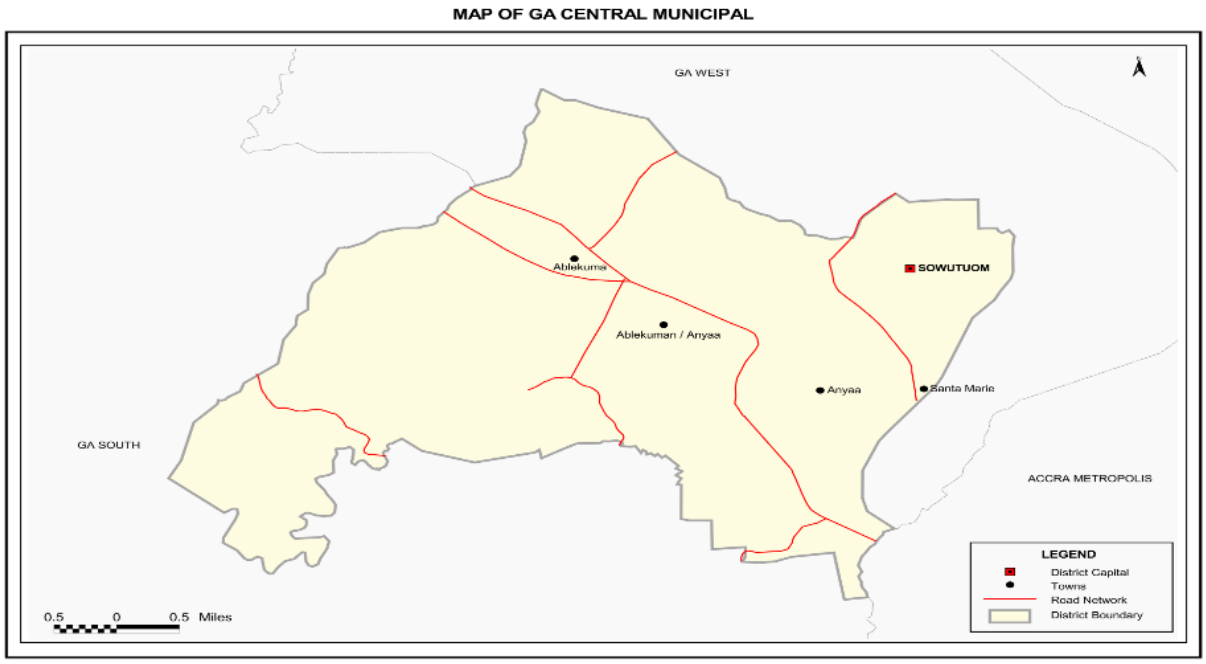
S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	• Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) • Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. • Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). • Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. • Regular maintenance and de-silting of all roadside drains and sewers. • Removal of illegal structures along drainage channels. • Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	• Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) • Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code • Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations • Install adequate fire hydrants throughout GaWMA and ensure they are always accessible and operational. • Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations • Require the registration, training and certification of all electricians and other building professionals and technicians. • Review and vigorously enforce existing professional standards requirements of electricians • Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak & Poor Sanitation	• Enforce the requirement for private household sanitation to reduce public defecation. • Ensure construction of adequate and improved public toilets in deficient neighborhoods

		• Intensive health screening of food handlers • Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season • Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others • Provide for household toilet facilities for low income communities • Ensure the provision of adequate liquid waste treatment plants (for desludging)
5	Uncontrolled Urban Sprawl	• Enforcement of local development plans; • Structure plans to control development; • Improve development permitting process; • Streamline land management and registration process
6	Traffic congestion	• Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement • Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation • Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) • Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation • Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion • Control of indiscipline on the roads, especially by motorcycle taxis (Okada)
7	Land and chieftaincy Conflicts	• Expeditious settlement of disputes within the court system • Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region • Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing • Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case • Continuous public education on planning and building regulations, and enforcement of same without compromise • Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons

10. Ga Central Municipal Assembly (GCMA)

Ga Central Municipal Assembly (GCMA) covers a total land area of about 48.997 square kilometers with a current population estimated at171, 035 and growing at 3.6 percent. It was carved out of the then Ga South Municipal Assembly in the Greater Accra Region and was established by Legislative instrument 2135 (2012) with the capital at Sowutuom. The Municipality shares boundaries with Accra Metropolitan Assembly to the South, Ga West to the East and North, and Ga South Assembly to the west. There are about 52 communities in the municipality with a high population concentration mainly along the urban and peri-urban areas of the Municipality. The city is 74 percent urban and 26 percent peri-urban.

Figure 28: Map Ga Central Municipal Assembly



Source: Ghana Statistical Service, GIS

The housing stock of Ga Central Municipality is 17,949 representing 3.8 percent of the total number of houses in the Greater Accra Region. Access to electricity is 83.6 percent and the main sources of drinking water by households are sachet water and pipe-borne constituting 43.3 percent and 36.4 percent respectively of potable water sources. Pit latrine (40.3 percent), water closet (27.4 percent) and KVIP (20.8 percent) are the most widely used toilet facilities in the Municipality. About five percent (4.9 percent) of households in the Municipality have no toilet facility. An estimated 123tons of solid waste is generated daily in the Municipality. Forty-eight (48) tons representing (39 percent) is collected. GCMA has no public health except a CHP compound. There are however 21 privately provided health facilities, constituting 3 hospitals; 10 clinics and 8 maternity homes. Education facilities in the city are; 14 public and 200 basic schools and 1 public and 11 private senior high schools.

Seven in 10 (70.2 percent) of the population aged 15 years and older are economically active while 29.8 percent are economically not active. Of the economically active population, 92.3 percent are employed while 7.7 percent are unemployed. The service sector employs the largest size (74.9 percent) of the employed population, while agriculture and the industry sector employ 2.3 percent and 22.8 percent respectively. GCMA relies largely on grants (64.23 percent) as its main source of funds while internally generated funds constitute only 35. 08 percent.

The major shocks and stresses encountered by the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels. ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout GCMA and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Uncontrolled Urban Sprawl	▪ Enforcement of local development plans; ▪ Structure plans to control development; ▪ Improve development permitting process; ▪ Streamline land management and registration process
4	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Control of indiscipline on the roads, especially by motorcycle taxis (Okada)

11. Ga South Municipal Assembly (GSMA)

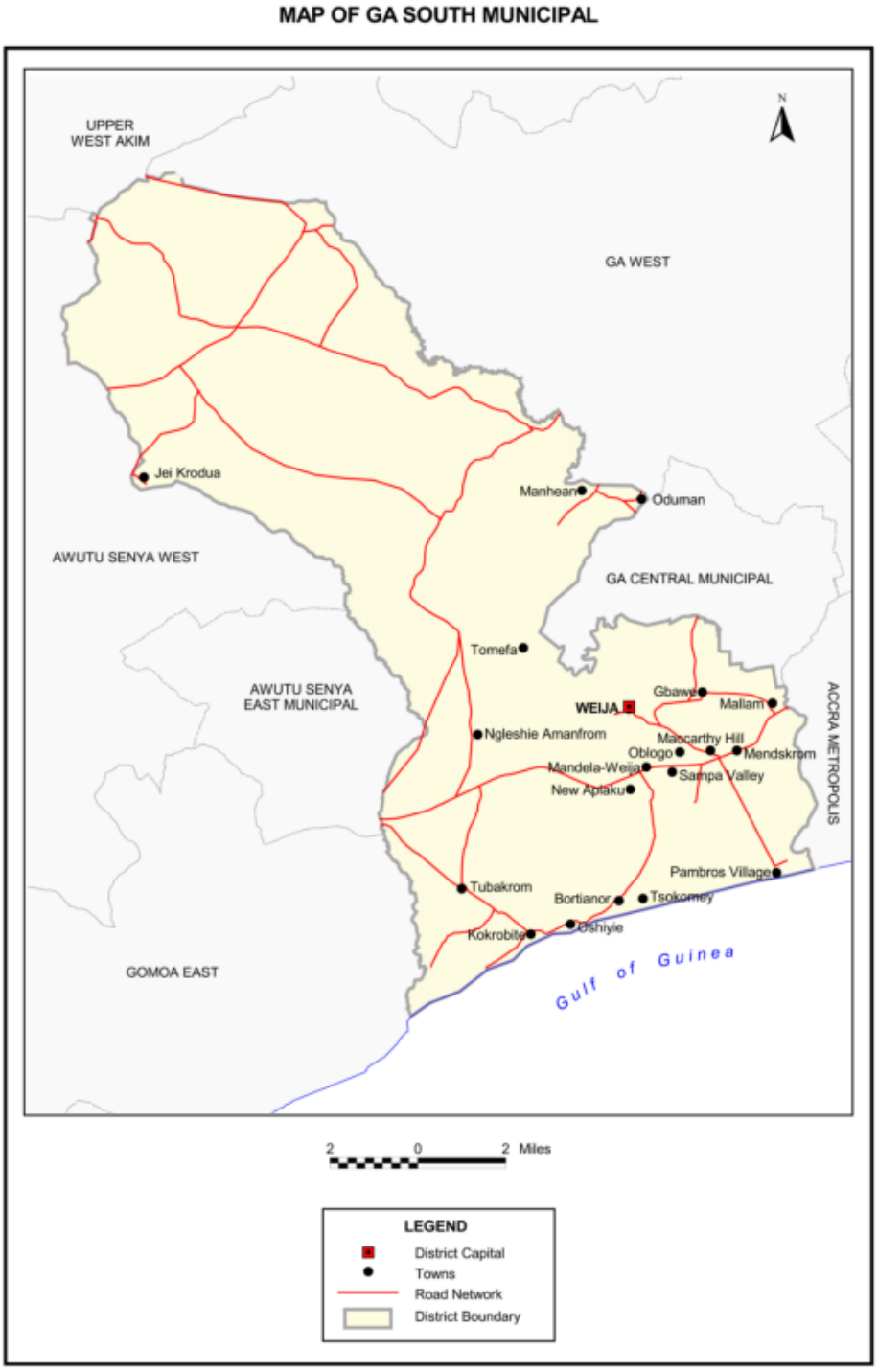
The Ga South Municipal Assembly was carved out from the Ga West District in November 2007 with Weija being the Municipal capital. It lies at the South Western part of Accra and shares boundaries with the Accra Metropolitan and Ga Central Municipal Assemblies to the South-East, Akwapim South to the North-East, Ga West to the East, West Akim to the North, Awutu-Senya to the West, Gomoa to the South-West and the Gulf of Guinea to the South. The District occupies a total land area of about 341.838 square kilometers with about 95 settlements.

The Municipality lies in the dry equatorial climatic zone with two rainfall seasons. The mean annual rainfall vary between 790mm along the coast to about 1,270mm in the extreme north. It experience a longer period of dry season in a year. The annual average temperatures range between 25.1°C in August and 28.4°C in February and March, the hottest months. The land area consists of gentle slopes interspersed with plains in most parts and generally undulating at less than 76 metres above sea level. The Akwapim range and the Weija hills rise steeply above the western edge. The crest of the Akwapim range lies generally at 300m southwards. This line of hills continues through to the Weija hills with the highest point reaching 192m near Weija. There are two main rivers namely, the Densu and Ponpon River, which drain the Municipality. Densu is one of the main sources of water supply to more than half of the population of the Accra Metropolis.

The current estimated population of Ga South Municipality is 398,845 representing about a tenth (10.3 percent) of the region's total population and growing at 4.3 percent annually. The Municipal is about 90 percent urban and 10 percent rural. The housing stock in the city is 76,536 representing 16.5 percent of the total number of houses in the Greater Accra Region. 85.4 percent of the housing stock is located in the urban areas. There is about 76 percent access to electricity in the Municipality, while access to safe water in the city is about 70 percent. The main sources of drinking water are pipe borne water (65.5 percent), sachet water (22.1 percent) and borehole (4.6 percent). The most important toilet facility used in the municipality is W.C. (26.6 percent), followed by pit latrine (24.0 percent), and then public toilet (WC, KVIP, Pit, Pan) representing 22.0 percent. A significant proportion of households have no toilet facility (13.5 percent) and therefore use bushes/beaches or fields as toilet facilities.

About 70 percent of the population 15 years and older are economically out of which 92.0 percent are employed. Of the employed population, about 32.3 percent are engaged in wholesale and retail, manufacturing is 13.2 percent, agriculture is 12.3 percent and construction is 8.6 percent. Educational facilities that are available in GSMA include; 90 public and 295 private basic schools, 3 public and 16 private senior high schools, 3 private technical/vocational school and a privately owned special school. There are about 59 health facilities both publicly and privately provided. The public facilities include a district hospital, 5 health centers, a health post and 7 CHPS compounds. The private ones on the other hand include; 6 hospitals, 14 clinics and 25 maternity homes. The main sources of Municipal funds are Government of Ghana Grants (35.67 percent), District Assembly Common Fund (13.60 percent), Internally Generated Funds (23.00 percent), District Development Fund (3.18 percent), Urban Development Grant (14.92 percent) and Development Partners (9.64 percent)

Figure 29: Map Ga South Municipal Assembly



Source: Ghana Statistical Service, GIS

The major shocks and stresses encountered by the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	▪ Creation and enforcement of buffer zones for drainage channels. (utilize buffer zones for playing fields, parks, green areas, and roads to prevent encroachment and assure sustainability) ▪ Re-engineering and expanding of the existing drainage systems, including road side drains to collect run-off from streets. ▪ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ▪ Expansion of Polluter Pay Principle to raise revenue to sustain improved solid waste collection, transportation and final disposal. ▪ Regular maintenance and de-silting of all roadside drains and sewers. ▪ Removal of illegal structures along drainage channels. ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	▪ Ensure immediate improvement of accessibility of fire prone areas (including markets, slum communities, and traditional indigenous communities) ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Undertake needs assessment of fire brigades and ensure the provision of adequate equipment and resources for their operations ▪ Install adequate fire hydrants throughout GCMA and ensure they are always accessible and operational. ▪ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Cholera Outbreak & Poor Sanitation	▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensive health screening of food handlers ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Provide for household toilet facilities for low income communities ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
5	Uncontrolled Urban Sprawl	▪ Enforcement of local development plans; ▪ Structure plans to control development; ▪ Improve development permitting process; ▪ Streamline land management and registration process

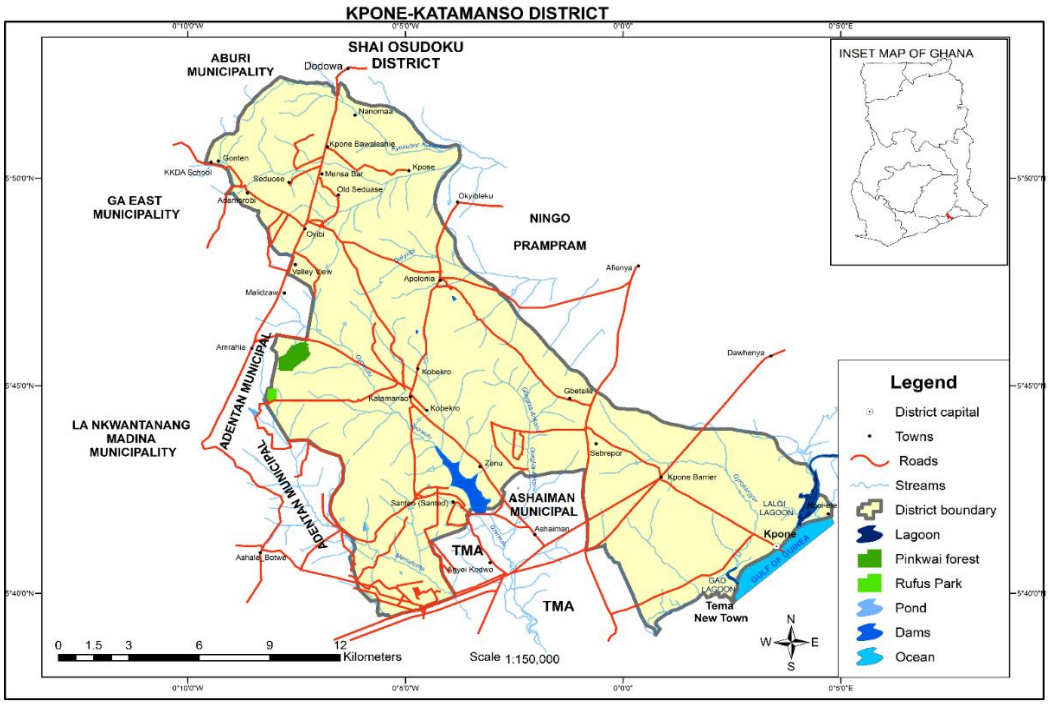
6	Traffic congestion	▪ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ▪ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ▪ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes) ▪ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ▪ Improvement of side drainage on roads to prevent creation of puddles and flooding during raining seasons which slows down traffic and leads to congestion ▪ Control of indiscipline on the roads, especially by motorcycle taxis (Okada)
7	Land and chieftaincy Conflicts	▪ Expeditious settlement of disputes within the court system ▪ Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region ▪ Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ▪ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ▪ Continuous public education on planning and building regulations, and enforcement of same without compromise ▪ Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons

12. Kpone-Katamanso District Assembly (KKDA)

Kpone-Katamanso District (KKDA) was carved from the Tema Metropolitan Assembly in 2012 with Kpone as the Capital and shares boundaries with Tema to the west, Dangme West to the east, the Gulf of Guinea to the south and Akuapem South to the north. Kpone-Katamanso District is about 293.86 km^2 and it is located along the coastal part of Tema in the Greater Accra Region.

The district is 90.4 percent urbanized and lies in the coastal savannah zone of Ghana. The topography of district is generally flat and forms part of the coastal plains, ranging from 0m (South) to 35m (North) above sea level. It enjoys a dry equatorial climate with a mean annual rainfall ranging between 730mm to 790mm. The rainy season is usually from April to July (major rainy season) and from September to November (minor rainy season). The highest amount of rain is experienced from May to July. Temperatures are high all year round with significant daily and seasonal variations. The annual average temperatures range from 25°C to 30°C in the major rainy season while in the minor season temperatures range from 27°C to 35°C.

Figure 30: Map Kpone-Katamanso District Assembly



Source: KKDA, MTDP 2014-2017

The current population of Kpone-Katamanso District is 127,981 representing 2.7 percent of the region's total population with a population growth rate of 3.1 percent per annum. The housing stock of Kpone-Katamanso District is 15,801 representing 22 percent of the total number of houses in the Greater Accra Region. 7.1 percent of these houses are of low quality.

About 75 percent of urban households and 73 percent of rural households have access to electricity respectively in the District. Also, about 60 percent of the households in the district have access to pipe borne water from the Ghana Water Company Limited. The remaining 40 percent who do not have access to pipe borne water, depend on water tanker services, dams, rivers, streams and lagoons as their source of water Most households (27.1 percent) in the District use the public toilet (WC, KVIP, Pit, pan) as places for convenient. Also, about 26.1 percent of households use W.C. A third of households (33.0 percent). Open defecation is quite high in the district with 23.9 percent of households engage in this practice. Overall there is about 54.9 percent access to improved basic sanitation in the District.

The 2010 Population and Housing Census data indicate that, about 75.1 percent of the population aged 15 years and older are economically active and 91.6 percent are employed. The main occupation in the area includes fishing, fish mongering, and farming (crop production and livestock rearing). Some of the youth in the district undertake sand winning as their means of livelihood. Most of the communities in the district are engaged in stone quarrying. Service and sales workers accounts for a little over one-third of all persons employed. Skilled agricultural, forestry and fishery workers in the district are only 4.1 percent of the employed population. About three in 10 (28.8 percent) of the employed population work in the wholesale and retail, repair of motor vehicles and motorcycles industry.

The district has 22 public and 55 basic school but has no public senior high schools. There are however seven that are privately owned. There is also a private tertiary institution. In terms of health facilities, there are 3 public health centres and 17 CHPS Compounds, a quasi-government facility, 5 private hospitals

and 4 private clinics. The District relies on grants and internally generated funds as its main sources of funding. These constitute 50.7 percent and 49.3 percent respectively.

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Flooding	○ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets and slum areas ○ Dredging and desilting of all drainage channels including all roadside drains and sewers. ○ Improve solid waste collection, transportation and final disposal facilities to forestall the dumping of solid waste into drainage systems (which contribute to flooding). ○ Enforcement of land use and building regulations to remove illegal structures along drainage channels and dam sites ○ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire outbreaks	○ Ensure immediate access improvements of fire prone areas (especially, markets and slum communities) ○ Redevelopment of old neighborhoods to address hazard risks ○ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ○ Install adequate fire hydrants throughout the GAMA region and ensure they are always accessible and operational. ○ Adopt comprehensive land use planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ○ Require the registration, training and certification of all electricians and other building professionals and technicians. ○ Review and vigorously enforce existing professional standards requirements of electricians ○ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Coastal erosion	○ Construction of sea-defense structures at locations experiencing severe erosion ○ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ○ Continues public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
4	Traffic congestion	○ Adoption of a comprehensive transportation management plan for the entire GAMA region, under the GAPTE arrangement ○ Development of alternative means of transport (including mass transportation, railway, bicycle, ferries) to reduce the pressure on road transport to alleviate the road traffic congestion situation ○ Development of alternative routes (expansion of road network to provide alternatives to the existing congested routes)

		○ Improvement of road surface conditions (pot-holes etc.) which slows down traffic and contributes to the congestion situation ○ Improvement of side drainage on roads to prevent creation of puddles and flooding during rainy seasons which slows down traffic and leads to congestion ○ Removal of illegal structures and settlements which impede free movement of traffic and leads to congestion
5.	Land and chieftaincy Conflicts	○ Expeditious settlement of disputes within the court system ○ Roll-out of the successful programs piloted under the LAP 1 & 2 for full adoption within the GAMA region ○ Decentralizing land registration and titling to the MMDA level to bring process closer to the ground and to expedite processing ○ Adoption of new planning bill and model, and fast-tracking implementation within the GAMA region as a special case ○ Continuous public education on planning and building regulations, and enforcement of same without compromise ○ Enforcement of law and order, and adoption of strict effective measures against particularly activities of land guards, their sponsors and their patrons

13. Ada East District Assembly (AEDA)

Ada East District was part of then Dangme East District and was carved out in March, 2012 with twenty seven electoral areas. The Ada East District is situated in the eastern part of the Greater Accra Region. The total land area of the District is 289.783 (square km). The District shares common boundaries with the Central Tongu District to the North, South Tongu District and Ada West to the East and West respectively. It is bounded to the south by the Gulf of Guinea, which stretches over 18 kilometers from Kewunor to Totope. It is also bounded by the Volta River South–Eastwards extending to the Gulf of Guinea southwards thereby forming an Estuary, about 2 kilometers away from the District capital, Ada-Foah.

The District forms the central portions of the Accra plains. The relief is generally gentle and undulating, a low plain with heights not exceeding 60 meters (200 ft.) above sea level. The Ada East District is encapsulated by the south-eastern coastal plains of Ghana which is one of the hottest parts of the country. Temperatures are high throughout the year and ranges between 23°C and 28°C. A maximum temperature of 33°C is normally attainable during the very hot seasons. Rainfall is generally heavy during the major seasons between March and September. The average rainfall is about 750 millimeters.

Figure 31: Map of Ada East District Assembly

Source: Ghana Statistical Service, GIS

The current estimated population of the District is 118, 293 representing 1.8 percent of the region's total population with a growth rate of 1.6 percent per annum. The housing stock of AEDA is 71,671 representing 1.8 percent of the total number of houses in the Greater Accra Region. About 60.6 percent of the District has access to electricity. The proportion for urban (68.0 percent) is higher than that of rural (44.7 percent). In the district, pipe-borne (40.9. percent) and sachet water (20.8 percent) are the main sources of drinking water for households. Quite significant proportions of households also depend on protected wells (11.7 percent), river/stream (8.5 percent) and unprotected wells (7.4 percent) as sources of drinking water in the households. Majority of the people in the district representing 35.2 percent do not have toilet facilities, while about 21 percent use KVIP. About 1.0 percent of the population in the district still uses bucket/pan latrines.

The district is predominantly an agrarian economy given the fact that the majority of the population (68.3 percent) lives in rural areas. Seventy percent of the population aged 15 years and older are economically active out of which 95.0 percent are employed. About 44.1 percent of households in the district are engage in agriculture. The predominant industries which employs people includes agriculture forestry and fishing (33.3 percent), wholesale and retail; repair of motor vehicles (22.2 percent) and manufacturing(16.0 percent). There are currently sixty- one (61) kindergartens, seventy-one (71) primary schools, forty-eight

(48) Junior High Schools, one (1) Technical Institute, two (2) Senior High School and one (1) College of Education which spread across the district. There are also a district hospital at Faithkope, two (2) health centres in Kasseh, and Ada-Foah, One (1) clinic at Pediatorkope and two (2) Community Health Planning Services (CHPs) compound at Anyakpor/Adedetsekope and Asigbekope.

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Floods	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. ▪ Embrace comprehensive and detailed land use and infrastructure planning and build implementation capacity. ▪ Enforcement of land use and building regulations to prevent development of structures and other service infrastructure within flood prone areas and along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Tidal Surge/Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Resettlement/relocation of at-risk communities ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continuous public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
3	Water scarcity	▪ Expansion of water sources, including the utilization of ground water and rain harvesting ▪ Expansion of treatment facilities ▪ Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines ▪ Installation of booster stations to improve flow pressure ▪ Regulation and institution of severe penalties against unauthorized tampering of water supply infrastructure ▪ Preservation of water resources by the implementation of the riparian buffer zone policies ▪ Continuous public education on water conservation ▪ Embark on extensive revegetation along water courses to protect against excessive evaporation during the dry season. ▪ Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations
4	Lack of Infrastructure	▪ Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services

		▪ Formulate plan and guidelines for adoption of public-private partnerships in infrastructure development and management, and pursue plan aggressively.
5	Poor sanitation	▪ Improve solid waste collection, transportation and final disposal facilities to forestall the indiscriminate dumping of solid waste ▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
7	Land/environmental degradation	▪ Adopt comprehensive land use planning (following the new planning model) as a strategy to preserve prime agricultural lands and to avoid incompatible land uses; and ensure effective implementation of plans and enforcement of land use regulations ▪ Institute and/or enforce regulations on sand and gravel winning and quarrying to optimize benefits to the public ▪ Require the registration and certification of all sand and gravel winning and quarrying operations at the MMDA level by EPA and Minerals Commission (working in collaboration with the District). ▪ Require the submission of operations, management and reclamation plans for all ongoing and future sand and gravel winning and quarrying operations. ▪ Adopt standard technical operating manuals for sand and gravel winning and quarrying operations and vigorously enforce standards ▪ Require routine inspection of all sand and gravel winning and quarrying operations ▪ Institute immediate measures to ensure monitoring and reporting of issuance of sand and gravel winning and quarrying permits at the MMDA level.

14. Ada West District Assembly (AWDA)

The Ada West District was carved out of the former Dangbe East District in the Greater Accra Region with its capital at Sege. The District shares boundaries with North Tongu District to the North, Ada East District and Ningo Prampram to the East and West respectively. It is bounded to the South by the Gulf of Guinea which stretches from Akplabanya to Goi. It is approximately 80 Kilometers from Accra, the regional capital. The total land size of the district is about 323.721 square kilometers and forms approximately 10 percent of the total land size of the Greater Accra Region. The District forms part of the central portions of the Accra plains. The relief is generally gentle and undulating, a low plain with heights not exceeding 60 meters (200 ft.) above sea level. The prominent relief features include the Anyamam boulders rising about 240 meters (800 ft.) above sea level. These boulders are scattered irregularly over the sea.

The Ada West District is encapsulated by the south-eastern coastal plains of Ghana which is one of the hottest parts of the country. Temperatures are high throughout the year and range between 23°C and 28°C. A maximum temperature of 33°C is normally attainable during the hot season. Rainfall is generally

heavy during the major seasons between March and September. The average rainfall is about 750 millimeters. The area is however very dry during the harmattan season when there is no rainfall at all. Humidity is about 60 percent high, due to its proximity to the sea, the Volta River and other water bodies. Daily evaporation rates range from 5.4–6.8 millimetres. The relatively high temperatures help in the quick crystallization of salt for the salt industry.

AWDA's current population is estimated at 68,873 given a growth rate of 3.1 percent. The district is predominantly rural with 70.31 percent living in rural areas and 29.70 percent living in urban areas. The housing stock of the District is 6,826. Access to electricity in the district is 66.0 percent. The main sources of water in the district are public borne (83.0 percent) and sachet water (7.2 percent). Daily waste generation in the District is estimated at 0.2 Metric Tonnes out of which 70.0 percent is collected daily. Meanwhile, a whopping 58.4 percent of households in the district do not have toilet facilities. Access to improved sanitation is only 34.5 percent.

Figure 32: Map of Ada West District Assembly

Source: Ghana Statistical Service, GIS

A little over 73.0 percent of the population aged 15 years and older are economically active while 95.8 percent of this figure are employed. The major sectors of the local economy are; agriculture (42.5 percent), manufacturing (15.8 percent) and wholesale and retail (14 percent).The district has three health centers, one each in Sege, Bornikope and Anyamam. There are also 3 CHPS compounds spread through the district. There are currently 58 basic schools, (kindergarten, primary and Junior High Schools) and one (1) Senior High Technical School. Main sources of municipal finance are; Internally Generated Funds (11.31 percent), District Assemblies Common Fund (38.7 percent) and grants 50.2 percent (DDF- 13.21 percent, GOG Grant-12.64 percent, Donor Grant-14.18, GSOP-.9.95 percent)

The major shocks and stresses that exist in the city as well as priority actions to address these challenges are detailed in the below table.

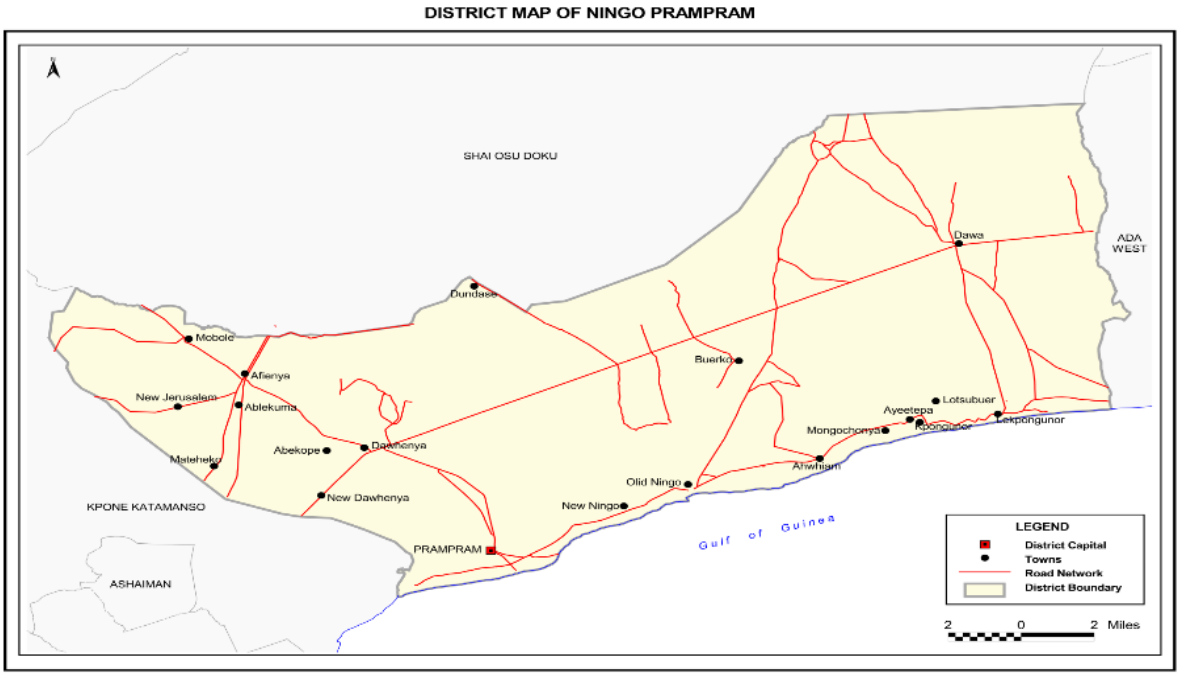
S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Floods	▪ Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. ▪ Embrace comprehensive and detailed land use and infrastructure planning and build implementation capacity. ▪ Enforcement of land use and building regulations to prevent development of structures and other service infrastructure within flood prone areas and along drainage channels and dam sites ▪ Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire Outbreaks	▪ Ensure immediate access improvements of fire prone areas ▪ Assess the root causes of domestic and bush fires and create awareness on safe practices and dangers ▪ Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code ▪ Install adequate fire hydrants throughout the District and ensure they are always accessible and operational. ▪ Require the registration, training and certification of all electricians and other building professionals and technicians. ▪ Review and vigorously enforce existing professional standards requirements of electricians ▪ Require the inspection of all electrical installations before use and at regular intervals during use.
3	Tidal Surge/Coastal erosion	▪ Construction of sea-defense structures at locations experiencing severe erosion ▪ Resettlement/relocation of at-risk communities ▪ Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) ▪ Continuous public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
4	Water scarcity	▪ Expansion of water sources, including the utilization of ground water and rain harvesting ▪ Expansion of treatment facilities ▪ Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines

		▪ Installation of booster stations to improve flow pressure ▪ Regulation and institution of severe penalties against unauthorized tampering of water supply infrastructure ▪ Preservation of water resources by the implementation of the riparian buffer zone policies ▪ Continuous public education on water conservation ▪ Embark on extensive revegetation along water courses to protect against excessive evaporation during the dry season. ▪ Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations
4	Lack of Infrastructure	▪ Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations ▪ Undertake community upgrading and provision for adequate basic infrastructure and services ▪ Formulate plan and guidelines for adoption of public-private partnerships in infrastructure development and management, and pursue plan aggressively.
5	Poor sanitation	▪ Improve solid waste collection, transportation and final disposal facilities to forestall the indiscriminate dumping of solid waste ▪ Enforce the requirement for private household sanitation to reduce public defecation. ▪ Ensure construction of adequate and improved public toilets in deficient neighborhoods ▪ Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season ▪ Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others ▪ Ensure the provision of adequate liquid waste treatment plants (for desludging)
6	Land/environmental degradation	▪ Adopt comprehensive land use planning (following the new planning model) as a strategy to preserve prime agricultural lands and to avoid incompatible land uses; and ensure effective implementation of plans and enforcement of land use regulations ▪ Institute and/or enforce regulations on sand and gravel winning and quarrying to optimize benefits to the public ▪ Require the registration and certification of all sand and gravel winning and quarrying operations at the MMDA level by EPA and Minerals Commission (working in collaboration with the District). ▪ Require the submission of operations, management and reclamation plans for all ongoing and future sand and gravel winning and quarrying operations. ▪ Adopt standard technical operating manuals for sand and gravel winning and quarrying operations and vigorously enforce standards ▪ Require routine inspection of all sand and gravel winning and quarrying operations ▪ Institute immediate measures to ensure monitoring and reporting of issuance of sand and gravel winning and quarrying permits at the MMDA level.

15. Ningo-Prampram District Assembly (NiPDA)

The Ningo-Prampram District was carved out of the then Dangme West District in 2012. The District covers a total land area of about 622.2 square kilometers and located about 15km to the east of Tema and about 40km from Accra, the capital of Ghana. The district is bounded to the north by Shai-Osudoku District, south by the Gulf of Guinea, in the east by the Ada East District and to the west by Kpone-Katamanso District. NiPDA forms the central portion of the Accra plains and thus has a generally gentle and undulating, low plain with heights not exceeding 70 meters. Temperatures are appreciably high for most parts of the year with the highest during the main dry season (November—March) and lowest during the short dry season (July—August). The maximum temperature is 40°C. Rainfall is generally very low with most of the rains being very erratic in coming mostly between September and November. The mean annual rainfall increases from 762.5 milliliters in the coast to 1,220 milliliters in the northern parts of the district.

Figure 33: Map of Ningo-Prampram District Assembly



Source: Ghana Statistical Service, GIS

The Ningo-Prampram District has a current estimated population of 82,774 with a growth rate of 3.1 percent. The District is predominantly rural as it is only 41.7 percent urbanized. There are 9,236 houses of which 63.6 percent percent are in rural locality and 36.4 percent in urban locality. Twenty-one percent (21.1 percent) of these houses are of low quality. The population with access to electricity in the District is 64.1 percent while access to safe water is 83.1 percent. The main sources of water in the district are pipe borne water and sachet water. Meanwhile, there is only 38.9 percent access to improved sanitation in the District. Majority of households (55.1 percent) do not have toilet facilities and therefore resort to fields, bush and beaches. Other households (27.1 percent) in the District use the public toilet (WC, KVIP, Pit, pan) as places for convenient.

About 66.8 percent of the populations aged 15 years and older are economically active. The employed proportion of the population is significantly high in the NiPDA as the 2010 population census reports indicate a 94.1 percent employment. Agriculture, wholesale and retail trading, and manufacturing remain the backbone of the local economy and constitute 33.7 percent, 17.9 percent and 157 percent

respectively. A key feature of NiPDA is the practice of irrigation farming on medium scale. About 15.6 percent of crop farmers are engaged in irrigation agriculture under the Dawhenya Irrigation Scheme.

Educational facilities available in the district are 50 public and 86 private basic schools, 3 senior high schools that includes one publicly owned, a tertiary and four public technical and vocational schools respectively. On the other hand, there are 8 public health facilities that include a polyclinic, a health center and 6 CHP compounds. Some private ones include a hospital, 3 clinics, a health center and a maternity home. Internally generated funds and grants are the two main sources of district finance and these constitute 52.14 percent and 47.86 percent respectively.

The major shocks and stresses that exist in NiPDA as well as priority actions to address these challenges are detailed in the below table;

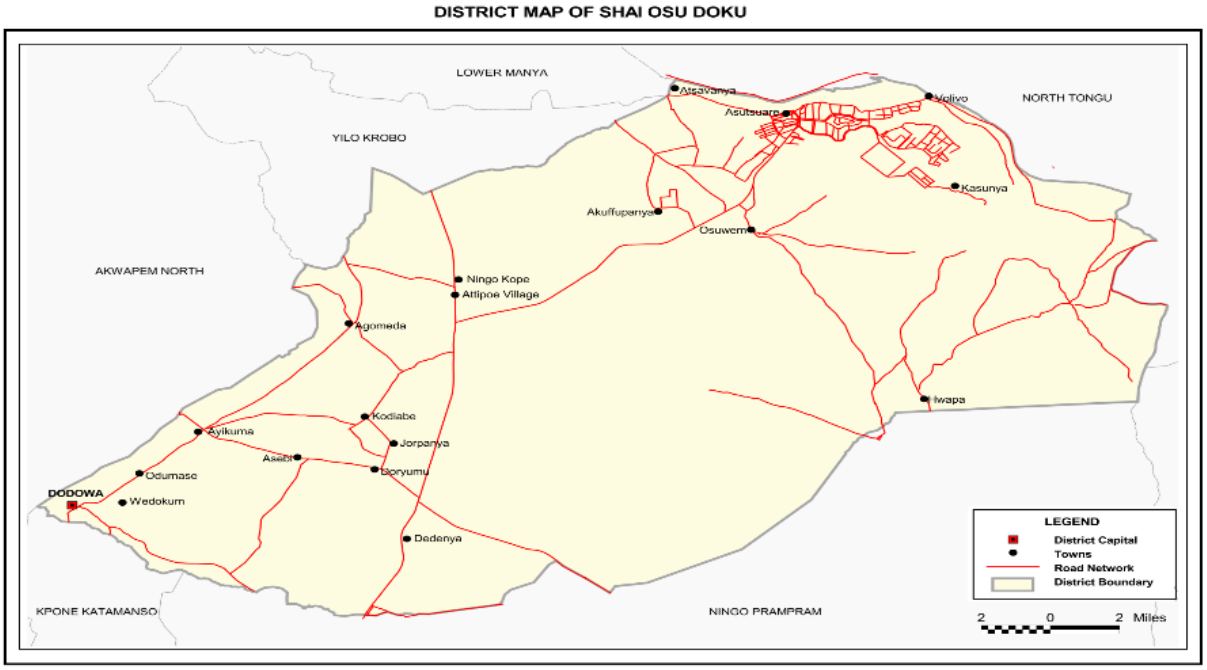
S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Floods	• Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. • Embrace comprehensive and detailed land use and infrastructure planning and build implementation capacity. • Enforcement of land use and building regulations to prevent development of structures and other service infrastructure within flood prone areas and along drainage channels and dam sites • Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Tidal Surge/Coastal erosion	• Construction of sea-defense structures at locations experiencing severe erosion • Resettlement/relocation of at-risk communities • Adoption of measures to prevent encroachment of incompatible land uses and destructive activities within the coastal areas (including the prohibition of sand winning and construction of buildings too close to the shoreline) • Continuous public education on the destructive activities and impacts of coastal erosion on the integrity of the coastal ecology and livelihoods.
3	Water scarcity	• Expansion of water sources, including the utilization of ground water and rain harvesting • Expansion of treatment facilities • Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines • Installation of booster stations to improve flow pressure • Regulation and institution of severe penalties against unauthorized tampering of water supply infrastructure • Preservation of water resources by the implementation of the riparian buffer zone policies • Continuous public education on water conservation • Embark on extensive revegetation along water courses to protect against excessive evaporation during the dry season. • Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations

4	Lack of Infrastructure	• Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations • Undertake community upgrading and provision for adequate basic infrastructure and services • Formulate plan and guidelines for adoption of public-private partnerships in infrastructure development and management, and pursue plan aggressively.
5	Poor sanitation	• Improve solid waste collection, transportation and final disposal facilities to forestall the indiscriminate dumping of solid waste • Enforce the requirement for private household sanitation to reduce public defecation. • Ensure construction of adequate and improved public toilets in deficient neighborhoods • Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season • Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others • Ensure the provision of adequate liquid waste treatment plants (for desludging)
7	Land/environmental degradation	• Adopt comprehensive land use planning (following the new planning model) as a strategy to preserve prime agricultural lands and to avoid incompatible land uses; and ensure effective implementation of plans and enforcement of land use regulations • Institute and/or enforce regulations on sand and gravel winning and quarrying to optimize benefits to the public • Require the registration and certification of all sand and gravel winning and quarrying operations at the MMDA level by EPA and Minerals Commission (working in collaboration with the District). • Require the submission of operations, management and reclamation plans for all ongoing and future sand and gravel winning and quarrying operations. • Adopt standard technical operating manuals for sand and gravel winning and quarrying operations and vigorously enforce standards • Require routine inspection of all sand and gravel winning and quarrying operations • Institute immediate measures to ensure monitoring and reporting of issuance of sand and gravel winning and quarrying permits at the MMDA level.

16. Shai-Osudoku District Assembly (SODA)

The Shai-Osudoku District covers a total land area of about 968,361 square km and is situated in the South-Eastern part of Ghana in the Greater Accra Region. The district was carved out of the Dangbe West District in 2012 and has Dodowa as its capital. It shares boundaries with the North Tongu District to the North-East, Yilo and Lower Manya Districts to the North-West, Akwapim North District to the West, Kpone Kantamanso District to the South-West, Ningo Prampram District to the South and the Ada West District to the East. The Volta River washes the North-Eastern portions of the district.

Figure 34: Map of Shai-Osudoku District Assembly



Source: Ghana Statistical Service, GIS

The district forms part of the central portions of the Accra plains and has a relief that is generally gentle and undulating, a low plain with heights not exceeding 70 metres. The general pattern of drainage in the Shai-Osudoku District is dendritic with most of the streams taking their source from the Akwapim range which also serves as a watershed and then flow in a North-West to South-West direction into lagoons on the coast. The Shai-Osudoku District is one of the hottest and driest parts of the country. Temperatures are appreciably high for most parts of the year with the highest during the main dry season (November—March) and lowest during the short dry season (July—August). Along the coast, close to the Akwapim range, temperatures are a few degrees lower than they are over most of the plains. The absolute maximum temperature is 40°C. Rainfall is generally very low with most of the rains that are very erratic in nature coming mostly between September and November. Mean annual rainfall increases from 762.5 milliliters on the coast to 1220 milliliters in the North and North-east close to the Akwapim Range.

The population of Shai-Osudoku District is currently estimated at 58,448 with a growth rate of 2.4 percent. SODA is 30 percent urban and 70 percent rural. The housing stock in the district is 8,351 with 84 percent in the rural areas. Access to electricity in SODA is close to 54 percent. Access to safe water is 70.3 percent and the main source of drinking water in the District is Pipe-Borne water which is accessed by 37.3 percent of the population. Access to mproved sanitation is rather low as 31 percent has no facility at all and resort to the bush. Another 30 percent and 21 percent use the public toilet and pit latrine respectively.

The 2010 Population and Census data shows that 69.2 percent of the population is economically active, out of which 93.3 percent is employed. Agriculture, forestry and fishing industry engages 46.4 percent of the employed population while wholesale and retail, and manufacturing industries also employ 15.2 percent and 12.7 percent respectively. The District has 51 kindergarten, 52 primary, 37 junior high and 7 senior high schools. Health facilities in SODA include; a district hospital, a quasi-government hospital, 2 health centres, 10 CHP zones, 12 CHP compounds and a private maternity home. Sources of District finance

are; District Assembly Common Fund (23.29 percent), internally generated funds, Government of Ghana grants (11.15 percent) and donor grants (8.74 percent).

The major shocks and stresses that exist in SODA as well as priority actions to address these challenges are detailed in the below table.

S/N	SHOCKS & STRESSES	PRIORITY ACTIONS
1	Floods	• Improvement and expansion of the existing drainage and storm water management systems, including road side drains to collect run-off from streets. • Embrace comprehensive and detailed land use and infrastructure planning and build implementation capacity. • Enforcement of land use and building regulations to prevent development of structures and other service infrastructure within flood prone areas and along drainage channels and dam sites • Review and vigorously enforce riparian buffer zone policies, sanitation bye-laws and land use plans.
2	Fire Outbreaks	• Ensure immediate access improvements of fire prone areas • Assess the root causes of domestic and bush fires and create awareness on safe practices and dangers • Revise the building code to require the use of fireproof designs and building materials, and vigorously enforce the revised building code • Install adequate fire hydrants throughout the District and ensure they are always accessible and operational. • Require the registration, training and certification of all electricians and other building professionals and technicians. • Review and vigorously enforce existing professional standards requirements of electricians. • Require the inspection of all electrical installations before use and at regular intervals during use.
3	Water scarcity	• Expansion of water sources, including the utilization of ground water and rain harvesting • Expansion of treatment facilities • Expansion of water distribution lines to deficient communities and rehabilitation of existing old leaky lines • Installation of booster stations to improve flow pressure • Regulation and institution of severe penalties against unauthorized tampering of water supply infrastructure • Preservation of water resources by the implementation of the riparian buffer zone policies • Continuous public education on water conservation • Embark on extensive revegetation along water courses to protect against excessive evaporation during the dry season. • Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations
4	Lack of Infrastructure	• Adopt comprehensive land use and infrastructure planning (following the new planning model) and ensure effective implementation of plans and enforcement of land use regulations

		• Undertake community upgrading and provision for adequate basic infrastructure and services • Formulate plan and guidelines for adoption of public-private partnerships in infrastructure development and management, and pursue plan aggressively.
5	Poor sanitation	• Improve solid waste collection, transportation and final disposal facilities to forestall the indiscriminate dumping of solid waste • Enforce the requirement for private household sanitation to reduce public defecation. • Ensure construction of adequate and improved public toilets in deficient neighborhoods • Intensify public awareness and good hygiene education, especially immediately prior to the onset of the rainy season • Enforce sanitation bye-laws and pursue prosecution of offenders to serve as deterrence to others • Ensure the provision of adequate liquid waste treatment plants (for desludging)
6	Land/environmental degradation	• Adopt comprehensive land use planning (following the new planning model) as a strategy to preserve prime agricultural lands and to avoid incompatible land uses; and ensure effective implementation of plans and enforcement of land use regulations • Institute and/or enforce regulations on sand and gravel winning and quarrying to optimize benefits to the public • Require the registration and certification of all sand and gravel winning and quarrying operations at the MMDA level by EPA and Minerals Commission (working in collaboration with the District). • Require the submission of operations, management and reclamation plans for all ongoing and future sand and gravel winning and quarrying operations. • Adopt standard technical operating manuals for sand and gravel winning and quarrying operations and vigorously enforce standards • Require routine inspection of all sand and gravel winning and quarrying operations • Institute immediate measures to ensure monitoring and reporting of issuance of sand and gravel winning and quarrying permits at the MMDA level.

ANNEX D: Sectoral Priority Actions and Timelines

Urban Development, Land Management and Housing

Timeline	Priority Actions and Investments	Implementation
Short term	▪ Designate the GAMA region as a Joint Development Planning Area (JDPA) and constitute and resource a Joint Development Planning Board (JDPB) for GAMA (National Development Planning Act, 1994)—in accordance with ongoing work by MLGRD ▪ Expedite implementation of the new Land Use and Spatial Planning Act (Act 925); complete and operationalize subsidiary legislation to effect law ▪ Leverage upcoming regional spatial development framework for enhancing resilience planning across GAMA ▪ Undertake mapping of key risk zones and existing housing stock in key risk zones, including land tenure status ▪ Implement provisions for sector coordination in the urban policy and recently approved housing policy ▪ Implement provisions in new housing policy at different levels (mainly at the district level). ▪ Disaster management plan (one for each MMDA and one consolidated)—or it can be grouped in larger groups. ▪ Implement provisions in housing policy (land tenure security, sites and services, slum upgrading) ▪ Sue utility providers in planning system to strengthen compliance with planning standards (e.g. MMDAs and ECG) ▪ Applying standards in more flexible manner and putting in place basic access for low income areas	NDPC, MLGRD, TCPD, MMDAs TCPD, NDPC, MOJ, MESTI, MLGRD Steering committee of the City Strength initiative along with RCC MMDAs; Support for survey from TCPD, GSS, and others MWRWH, MLGRD, MMDAs, others MWRWH, MLGRD, MMDAs, others MMDAs, NADMO, MLGRD, RCC MMDAs, MWRWH, MLGRD MMDAs, MLGRD, MOJ MMDAs
Medium term	▪ Develop land use and spatial development plans for all MMDAs & GAMA region and review existing plans ▪ Address consultative planning issues across all levels and ensure active participation of traditional authorities and other stakeholders in plan formulation and implementation ▪ Integration of CSAU, GELIS and LUPMIS, and decentralization of same to all MMDAs ▪ Introduce more transparency in the local planning system (publicity of the local plans)	MMDAs with national and regional agencies MMDAS, Lands Commission, TCPD, RCC MMDAs, Lands Commission, TCPD, RCC MMDAs, Lands Commission, TCPD, RCC

Timeline	Priority Actions and Investments	Implementation
Long term	▪ Improving urban services and protecting rights of way through partnerships with Private sector (Centre for Scientific Research; CSR)—e.g. example of alley ways ▪ Develop new ways to achieve compliance and enforcement of local land use plans (e.g., community/private sector participation in code enforcement).	MMDAs MLGRD, MMDAs

Disaster Risk Management

Timeline	Priority Actions and Investments	Implementation
Short term	▪ Update/Undertake systematic risk assessment for entire GAMA and MMDAs (to be conducted by Metropolitan Government) ▪ Develop flood risk management plan for GAMA including support for early warning and response plans for most at-risk areas ▪ Strengthen early warning and response system for flooding	HSD, NADMO, MLGRD, CERGIS HSD, MWRWH, MMDAs, MLGRD, Donors/Partners, CERGIS HSD, NADMO, MMDAs
Medium term	▪ Implement flood risk management plan ▪ Develop and implement detailed disaster and climate risk management plans for coastal erosion/zone management, fire, cholera, earthquake, building collapse ▪ Ensure dedicated DRM budget and human resources on DRM in GAMA metropolitan area and in MMDAs ▪ Develop a metropolitan level government to improve coordination across MMDAs	MMDAs, HSD, MWRWH, GHA, DUR, NADMO, MLGRD, MWRWH, MLGRD, MoH, NADMO, MMDAs, MoF, MMDAs, RCC NDPC, MLGRD, RCC, MMDAs
Long term	▪ Identify and implement risk mitigation options such as insurance, disaster risk financing ▪ Update building codes to ensure disaster resilience	GIC, MoF, MMDAs, MLGRD, MWRWH, MLGRD, MMDAs

Timeline	▪ Priority Actions and Investments	Implementation
Long term	▪ Establishing a contingency fund ▪ Improving the revenue collection and management systems ▪ Improve coordination of financing between Municipal and National governments and between sectors ▪ Promotion of insurance, for both households and the Municipal and National governments	MMDAs with technical support from national and international level.

Transport and Roads

Timeline	Priority Actions and Investments	Implementation
Short term	1. Strengthen technical capacity for road and drainage design in MMDAs. 2. Strengthen enforcement capacity in the MMDAs to minimize road abuse. 3. Promote coordination with HSD to ensure roadside drainage take drainage master plan	MMDAs with technical support from national government and international partners.
Medium term	1. Establish contingent financing mechanisms that support road repair and reconstruction after flooding. 2. Launch safety awareness campaign for use of pedestrian bridges. 3. Enforce regulations to minimize illegal road accesses, car parks, and lorry site sprawl.	National government with support from international partners.
Long term	1. Establish reliable, well-regulated bus system through PPP. 2. Develop and expand a reliable rail system.	National Government in coordination with MMDAs and support from international partners.

Water Supply and Sanitation

Timeline	Priority Actions and Investments	Implementation
Short term: Within 6 months:	Provision of Improved Household Toilets: • Affordable and environmentally friendly technologies should be developed. • Appropriate financing mechanisms for households to access credit for construction of household toilets should be made available.	Environmental Health and Sanitation Directorate (EHSD) & MMDAs.
Short-Midterm: 6-24months:	Expansion of Water Supply Distribution Infrastructure: • Areas where distribution network of the GWCL mains are not available should have the network extended.	GWCL.
Short-Midterm: 9-24months:	Provision of Sanitation Infrastructure: • Provide appropriate infrastructure for the treatment of sewage/septage/faecal sludge.	MMDAs in collaboration with each other to share treatment facilities.
Short-Midterm: Immediate-24months:	Improvement of Human Resource: Engage qualified personnel for municipalities who do not have qualified personnel and provide adequate capacity building to existing personnel.	Local Government Service Secretariat
Mid-long term: 12months-	• Protection of Raw Water Sources	Water Resources Commission
	• Ensuring Long term National Development Plan	National Development

Timeline	Priority Actions and Investments	Implementation
ongoing	Captures Key Priority Areas	Planning Commission
	• Protection of Raw Water Sources • Ensuring Laws and Regulations are implemented	Water Resources Commission/MMDAs

Solid Waste Management

Timeline	**Priority Actions and Investments**	**Implementation**
Short term	▪ Develop appropriate residual waste treatment and disposal and transfer capacity, for example by implementing the MLRGD's Emergency-SWM Improvement Program.	Across MMDAs
Medium term	▪ Form Joint Development Planning Board (JDBP) to co-ordinate SWM treatment and disposal.	JDPB and MMDAs with technical support from national level.
Long term	▪ An effective system of revenue collection needs to be implemented which serves to fund SWM services for all communities, including low income and informal areas.	MMDAs
	▪ The informal and formal sector need to be integrated appropriately.	MMDAs
	▪ Raise public awareness of SWM by developing an awareness-raising campaign and public engagement program.	JDPB and MMDAs

Community Development and Social Protection

Timeline	Priority Actions and Investments	Implementation
Short term and ongoing	▪ Ongoing and accurate data gathering at the MMDA level, stocktaking exercise of social programs, and analysis of current and future needs	Individual MMDAs
Medium to long term	▪ Come up with an exit strategy for the existing government social protection interventions.	MGCSP, MMDAs
Medium to long term	▪ Increase the level of funding and flexibility in the use of funds	MoF, MGCSP, RCC, MMDAs
Medium to long term	▪ Improve the education system and promote entrepreneurship to help address unemployment:	MoE, GES, MLSW, Private Sector
Short term and ongoing	▪ Long term consideration in the response to disasters (livelihoods, housing).	NADMO, MWRWH and MMDAs
Short term and ongoing	▪ Need for affordable housing	MLGRD, MWRWH
Short term and	▪ Continue public awareness of diseases (causes,	MoH and MMDAs

Timeline	Priority Actions and Investments	Implementation
ongoing	prevention, and response), and increase funding when needed	
Medium term and ongoing	▪ Better coordinate formal services with informal support structures and NGOs (family, social groups):	MGCSP, RCC and Individual MMDAs,

Drainage and Coastal Zone Management

Timeline	Priorities	Action Plans	Implementation
2016—2020	Community participation and behavioral change toward solid waste management;	Formal and informal education and public campaigning for waste reduction;	MWRWH, MLGRD, MMDAs
> 2020	Beefing up investments in solid waste management, processing and landfills;	Investments in solid waste management infrastructure with private sector participation	MESTI, MMDAs, RCC, Private Sector
2016—2020	Improved coordination between HSD / MMDAs / DUR and other relevant agencies in drainage management spatial planning;	Early involvement of HSD in spatial planning at MMDA level with regard to zoning and designation of use of land;	HSD, MMDA, TCPD
> 2018		Establish coordination mechanism in GAMA, which allows drainage planning under “one roof”;	RCC, MLGRD, MMDA, MWRWH, DUR
>2017	Enforcement of regulations and municipal by-law and of physical / spatial planning;	Increased capacity of HSD, MMDAs and others (funding and staffing);	MLGRD, MMDAs, TCPD, MOFEP
2016—2020	Improved maintenance and operation of drainage system;	Dredging and desilting coordinated under “one roof”	RCC, MLGRD, MWRWH, MMDAs, DUR
2016—2018	Effectively implement Drainage Masterplan for Greater Accra;	Updating existing drainage master plan for GAMA;	RCC, MLGRD, MWRWH, MMDAs, DUR
2016- 2018	Improve and lined drainage infra-structure starting from (i) PRIMARY drains, (ii) sand traps upstream and (iii) retention basins;	Secure land and construct retention basins;	MLGRD, MWRWH, MMDAs
>2018		Line / construct primary drains;	
>2018		Build tertiary drains;	
>2018		Build sand traps upstream;	
>2018	Coastal protection structures	Extend existing coastal protection	

Detailed sectoral recommendations:

Urban Development

There is a strong need to promote more proactive urban planning and implementation. The current practice accelerates urban sprawl, increases the costs of doing business and providing services and accentuates the risks and potential destruction associated with major climate change related shocks and stresses. The following specific actions have been proposed:

1. Promote consultative planning across all levels to ensure that risks affecting different groups, especially low-income communities, are taken into account in planning processes. Furthermore, introduce more transparency in the local planning system by providing public access to land use plans and programs (publishing of local plans)
2. Data of land registration should be decentralized (at this moment it is all centralized under the Lands Commission). Specifically, the integration of the Client Services and Access Units (CSAU) and the Ghana Enterprise Land Information Systems (GELIS) under LAP 2 should be carried out as a matter of urgency.
3. Develop and apply construction standards that are flexible to adapt to formal and informal housing. Furthermore, put modalities in place to ensure basic access for low income areas
4. Improving urban services and protecting rights of way through partnerships with private sector (Centre for Scientific Research -CSR)—e.g. introduction of programs to encourage private entities to participate in the operation and management of facilities that provide based services.
5. Implement provisions in housing policy to ensure quality housing for all residents, taking into account the spectrum of shocks and stresses. This includes issues like land tenure security, sites and services, and slum upgrading. Taking a stock of existing housing is important for this action.
6. Develop building codes that take into account the shocks and stresses that GAMA faces as well as predicted trends due to climate change. Furthermore, ensure the implementation and supervision of the codes. Community and/or private sector can participate in code enforcement.
7. Introduce a joint development planning board that facilitates metropolitan coordination, formulates and implements a disaster management strategy at the GAMA level, and oversees further strategies at the MMDA level, with inputs from the steering committee.
8. Improve performance of utility providers to strengthen compliance with planning standards (e.g. MMDAs and ECG)
9. Lack of different forms of tenure security (beyond titling) and regulation for rental housing,
10. Addressing and adjusting existing informal buildings with flexible use of standards (indigenous communities), providing publishing

Policy and Strategy Changes, Technical and Financial Resources

The proposed actions will be anchored in the existing provisions in the national Urban and Housing policies. However, it is clear that in order to have traction, the actions will require support and coordination from the Ministry and the RCC, as well as support from leadership in each of the MMDAs.

Each MMDA will have to assess to what extent the actions can be undertaken with existing resources and the additional TA and financial support that needs to be provided, for example, from various partners such as 100 Resilient Cities, Cities Alliance, and UNDP.

focus efforts on implementing. The urban policy is up for review in 2017 and it will be important to review the actual status of implementation across all the policy objectives, assess and assess if changes need to be made.

On the housing policy, it is important for the MWRWH to lead the coordination and mobilization of stakeholders to implement the policy, in accordance with priorities listed.

Disaster Risk Management:

The following recommendations are proposed for the DRM sector:

Short Term

1. Undertake systematic risk assessment—Probabilistic risk modeling for flooding, fire, cholera and earthquake should be carried out, including as part of coastal zone management.
2. Given that flooding is the most severe hazard in GAMA, a detailed flood risk management plan should be developed which includes cost and benefits of different solutions, focusing on areas that witness recurrent flooding.
3. Strengthening the early warning and response system for flooding– is a low hanging fruit which can save lives and property. This will require investment in G-Met's hydro-met system to ensure better flood predictability, as well as a warning and dissemination system to alert at-risk communities and enhance response activities.
4. Ensure dedicated DRM budget and human resources for DRM in GAMA metropolitan area and in MMDAs, to ensure development of local DRM plans and their implementation.

Medium Term

5. Implement flood risk management plan for GAMA, developed in earlier phase to ensure flood mitigation
6. Develop a metropolitan level government agency to improve coordination across MMDAs and host/coordinate a risk platform and monitor disaster and climate risk mitigation activities
7. Develop (as a part of urban development plan) and implement detailed multi-hazard and climate risk management plans for GAMA—Long term disaster and climate resilience plans should be mainstreamed as a part of master planning process to ensure periodic update and monitoring. Detailed strategies should be developed for at-risk areas and implemented with key partners
8. Update building codes to ensure disaster resilience—Building regulations should be reviewed with the objective of modernizing /updating them on the basis of risk assessment and public health related challenges. An implementation plan should be developed which includes training of inspectors, and improvement of building permitting processes.

Long Term

9. Identify and implement finance mechanisms such as insurance and disaster risk financing to have more resources to implement mitigation measures and handle consequences of shocks and stresses
10. Implement updated building codes—Provide support to implement resilient building codes developed in earlier phase.

Specific actions to manage the main risks in GAMA are presented below:

Floods: Integrated flood risk management

1. Construction of more drains and re-engineering of existing drains. Currently, there are high volumes of run-offs
2. Dredge river tributaries
3. Sensitization on proper waste management (no dumping in drains)
4. Declaring drains as protected areas with enforceable bye-laws
5. Integrate climate change considerations into drainage constructions
6. Collect annual data on climatic conditions and volume of run-offs due to rainfall and other causes across all drainage basins
7. Integrated planning & flood management approach (e.g. drain construction complemented by awareness raising on good solid waste management practices.
8. Cleansing and desilting of drains must continue
9. Coordination among adjoining MMDAs for infrastructure planning (e.g. Drain construction)
10. Population growth and projections should be factors taken into account during planning for infrastructure (drain)
11. Funding for post flood management
12. NADMO-led sensitization campaigns through(media, conferences, and events at markets, schools and community meetings
13. Enforcement of the building regulations
14. Improvement of early warning and response systems

Cholera outbreak

1. Campaigns for awareness raising on the causes, risks, and consequences of cholera, promoting behavioural change to adopt proper hygiene
2. Enforcement of sanitation bye-laws
3. Sensitization of the causes, risks and consequences of cholera, Increase provision household toilets (GAMA SWP)
4. Cholera outbreak early warning alerts
5. Improved sanitation and cleaning of areas where cholera may be present.
6. Better coordination between the Disease Epidemic Department and the EHS units at the MMDA level. MMDA level
7. Designation of certain hospitals with isolation wards to handle cholera patients
8. Screening of food vendors including sanitary conditions where food is handled. ,

Fire

1. Improve quantities of fire tenders and access to fire hydrants
2. Creating access to, all areas of the city as well as accurate locational maps of houses and infrastructure
3. Sensitization on fire safety, especially on safe cooking practices
4. Enforcement of regulations, especially safe electrical wiring
5. Institutional co-ordination led by a designated agency.
6. Enforce fire for buildings and houses and make electricians go through a certification process to ensure that electric connections are performed adequately.

Earthquake

1. Revise and enforce seismic regulations and building codes
2. Earthquake preparedness
3. Retrofit buildings starting with critical infrastructure; hospitals, schools, public buildings

Building collapse

1. Enforcement of building codes/ bye-laws and site inspection
2. Passing of the engineering bill

Coastal zone management

1. Sea defence
2. Further studies (to understand the reason behind tidal waves going beyond the defence. For example the sea defence wall being built in Ada East and seems to be pushing water to Ada East
3. Data and study to understand climate change and impact on the coastal zone in GAMA

Urban Finance

At present, MMDAs have very restricted financial resources, and also face severe liquidity constraints following unforeseen shock events. The overall priority for the sector is to ensure that timely financing is available to MMDAs to act before and after a disaster and reduce the over-reliance on external funding. Data is also needed on the potential costs that MMDAs could face following disasters of varying severity to identify needed funding. More specific recommendations have also been identified

Increase the control that MMDAs have over their financial planning:

- Establishing a contingency fund to be held at the Municipal level, with a mechanism to allow both the national government and donors to contribute to it would give MMDAs greater control and ownership of their finances, and would assist in their financial planning for unforeseen events.
- Improving the revenue collection and management systems in place will provide MMDAs with higher income from internal revenue sources. Revenue collection and management is currently undergoing change at the national level, so it may be possible for some of the lessons learned and proposed improvements to be applied at the municipal level.

Improve coordination of financing between Municipal and National governments and between sectors:

At present there is no clear definition of the financial obligations of municipalities and the national government for disaster-related expenditures. Establishing clear leadership and defined responsibilities for financing disaster relief would lead to an improvement in the coordination between MMDAs and the national government and also greater cost-efficiency. Defining such rules may also allow MMDAs to coordinate better with international donors who support disaster-related expenditures made at the Municipal level.

Promotion of insurance, for both households and the Municipal and National governments:

As mentioned earlier, insurance can increase the availability of funding to deal with shocks and their aftermath. This can include parametric insurance tools to provide rapid payouts following a disaster event to support the provision of emergency relief, and also indemnity insurance for public assets to support the reconstruction of damaged or destroyed assets. At present municipalities do not use insurance at all.

Technical assistance

In addition, MMDAs will require technical assistance on establishing rules for a disaster fund, and also on ways in which the use of insurance can be promoted.

Transport Sector

The overall priority for the sector is to reduce congestion, which has significant costs to the economy and hinders development of other sectors. This can be achieved mainly through the development of regulatory policies and provision of alternatives to road transport, including adequate mass public transport. It's also important to develop the capacity to enforce said policies.

Specific recommendations are presented below:

Ensure adequate and predictable financing: MMDAs lack necessary funding to ensure adequate maintenance, repair, and expansion of road transport infrastructure. Funds allocated for these tasks at the MMDA level and through the Department of Urban Roads are often consumed by unexpected repairs needed due to flooding. A separate contingency fund to be accessed in the event of shocks is therefore necessary. The government also requires financial resources to minimize risks to the private operators of public transportation by providing loans for bus procurement, or a sovereign guarantee.

Improve MMDA capacities and coordination: Overall sector resilience—including performance, planning, and enforcement—can be improved through strengthened technical capacities and coordination at the MMDA level. Higher technical capacity within MMDAs and coordination across sectors means improved design for roadside drainage works that takes into account drainage master planning and altered runoff/infiltration capacities due to increases in the number of households. Improved coordination across MMDAs allows for better land use planning and the development of a regional traffic management system. Higher enforcement capacities can cut down on illegal parking and illegal road use, lorry site sprawl, and hawking, therefore easing congestion. Nonetheless, lack of funding also affects the ability to obtain technical specialists.

Reduce traffic congestion: Through a series of policy and infrastructure development measures**,** traffic congestion can be reduced. For example, measures can address issues of road abuse and land use planning can be leveraged to ease points of congestions. Developing adequate public transport options, including bus and rail transport, can also contribute by removing individual cars from the streets.

Gaps in Resource and Data: Robust data is needed to determine where investments should be made. For example, data on the demand for public transport will help explore route viability and encourage private operators to participate in the system. Hazard mapping, including data on flood zones and runoff patterns, inform the government on areas that should be avoided for the construction or expansion of new roads. The risk data also contributes to the identification of expansion areas for settlements where transport services can be provided with ease.

Water and Sanitation

The recommended actions to improve resilience challenges in the water and sanitation sectors are as follows:

Water Resources Management: Some adaptation and mitigation measures that should be adopted include, setting up Water Basin Boards and creating and enforcing buffer zones; ensuring toilets in flood-prone areas are elevated above ground level during construction and ensuring the implementation of the new housing policy which encourages green areas. Other measures include regulation of loggers within the catchment areas, encouraging tree planting, ensuring there is increased infiltration so aquifers are recharged and making use of groundwater. Rain-harvesting and efficient use of water/water demand management should be adopted by GWCL.

Financial Resource Mobilization: Ensure there is money available at the GAMA level to provide critically needed infrastructure for sanitation services. Appropriate and affordable finance mechanisms need to be in place to ensure households can access funding for their toilets.

Dealing with Implementation Capacity Deficit: Plans and strategies for the sector have been developed and are comprehensive. Master plans are also being updated and expanded for the sector. The ability to implement these are critical.

Policy & Strategy Changes and Coordination: It is not expected that there would be major shifts in policy. The strategies for increasing access to sanitation and water facilities may have to be modified. GWCL may have to modify the connection fee for new households. The high cost prevents some households from accessing the connection service. GWCL may consider spreading the connection fee over 6 to 12 months to make it affordable.

The assemblies need to collaborate with each other to identify strategic locations for the construction of treatment plants for human excreta. The infrastructure costs for treatment plants will currently be beyond the financial capacity of the individual assemblies. Central government would have to support with resources. The assemblies would have to budget for operation and maintenance of these facilities. Where the private sector would be managing the treatment plants, the assembly personnel would require training to enable effective contracting and monitoring of the services.

Key priorities shall be implemented in close collaboration with other stakeholders in other sectors such as drainage, roads, transport, utilities and health. Other major stakeholders who should be engaged are the Local Government Service Secretariat, which has the responsibility of engaging staff from the assemblies and the National Development Planning Commission which has the responsibility of coordinating national medium and long term plans. In undertaking any new interventions, other sector stakeholders including staff within MMDAs, NGOs and private sector agencies carrying out WASH activities should be involved.

Additional recommendations:

In the short term:

- Efforts should be made to reduce open defecation in the metropolis and to ensure mechanisms are put in place for low-income households to construct toilets to reduce the reliance on public toilets. Efficient and low-cost technologies should be implemented in this regard.

In the short to medium term the following must be done:

- Appropriate treatment plants for fecal sludge/septage and sewage should be provided. This is essential to stop the practice of dumping huge amounts of untreated material into the ocean and drainage channels. The MMDAs will have to coordinate so two to four treatment plants can be strategically located across the MMDAs to ensure travel times for vacuum trucks are not excessive.
- The GWCL will need to expedite action on the expansion of the distribution network to the communities, which do not have adequate water supply. Low income communities are the most affected. Tariff collection has been a challenge in the past. The setting up of a Low-Income Consumer Support Unit by the GWCL is expected to facilitate the process of providing water and ensuring bills are served and tariff collected.
- The Water Resources Commission would have to be well resourced to undertake the implementation of the Integrated Water Resources Management Plan (IWRMP) for GAMA. Basin water boards should work within their given mandate and the laws that apply should be enforced to ensure the basins are not negatively affected by human activity leading to pollution.

In the medium to long term:

- The long term national development plan should incorporate the relevant strategies for ensuring the resilience of water and sanitation services and infrastructure.
- The appropriate laws on sanitation and water should be enforced to ensure maximum health benefits of water and sanitation interventions made over the years are achieved.

Solid Waste Management

The following actions are recommended to improve the resilience of GAMA's SWM system.
In the short term:

Critical action is needed to provide appropriate residual waste treatment and disposal capacity for this growing city region. At present, there is a significant short-fall in the availability of engineered and appropriately operated waste disposal capacity. Also, due to the large distances between many parts of the city region and disposal locations, an effective network of waste transfer stations is needed to reduce travel time and increase the cost and time efficiency of waste transfer activities. The MLGRD has developed an Emergency Solid Waste Management Improvement Program (E-SWMIP) to address these issues. This plan should be implemented urgently.
In the medium term:

Develop a Joint Development Planning Board with responsibility for SWM treatment and disposal (a form of 'Waste Disposal Authority'). Clearly, this will require political leadership and close partnership between different jurisdictions in the city, but there is clearly a need for close co-ordination between MMDAs and other stakeholders in developing treatment and disposal capacity. There are also significant economies of scale associated with MMDAs working together to delivery this infrastructure. Responsibility for waste collection services would remain with MMDAs as collection is less capital intensive and MMDAs are best suited to developing locally appropriate approaches.
In the long term:

An effective system of revenue collection needs to be implemented which serves to fund SWM services for all communities, including low income and informal areas. The current system of revenue collection by private waste collectors (in accordance with fixed fee rates) means that some parts of the city do not receive or participate in waste collection. In the short/medium term, this problem could be addressed by subsidizing or incentivizing the collection of waste from low income communities (e.g. by MMDAs paying waste collectors on the basis of tons of waste collected from these areas). In the longer term, consideration should be given to potentially replacing the current concessional system with a more conventional private sector service contract or MMDA 'in-house' service provision arrangements, with the fees for waste services collected as part of municipal taxes or electricity or water bills. This later approach has been particularly effective in a number of African countries.

The informal and formal sectors need to be integrated appropriately. The informal sector is very active providing waste collection and recycling services in the city. However, with some exceptions, the informal sector is working in competition with the formal sector. By engaging informal sector representatives (e.g. the Ghana Bola Taxi Union), there is an excellent opportunity to maximize the skills and resources of the informal sector to address the current gaps in waste collection service provision.

Raising public awareness of SWM issues have the potential to reduce dumping of wastes in drainage channels by encouraging participation in waste collection schemes. Raising awareness is also likely to increase political awareness of SWM issues which will be critical in delivering long-term improvements on the city's SWM services and infrastructure.

Gaps in data and information

The level of data available for different MMDAs varies considerably. Better and more recent data on waste generation, composition and management practices is needed for several MMDAs. This needs to be combined with good analysis and an assessment of the likely future growth in solid waste so as to inform the need for SWM services and infrastructure in the future.

Ongoing data collection at the GAMA level is also important to pursue proactively, to inform decision making for larger SWM efforts and monitor progress.

Coastal Zone Management and Drainage

Recommended actions for sustainably improving the drainage system in greater Accra build on the interplay of interventions along three lines: (i) substantial infrastructure investments in the drainage system, including retention basins, lining of channels, sand traps and other infrastructure; (ii) improved coordination among responsible MDA and MMDAs for planning and enforcement of spatial planning and building regulations as well as operation and maintenance of the drainage system, and (iii) behavior change by communities towards sustainably managing solid waste in greater Accra combined with public and private sector investments in solid waste management infrastructure and services.

With regard to drainage infrastructure, the effective implementation of the existing drainage master plan (1991 drainage masterplan prepared by Mott MacDonald and Watertech) and the new drainage master plan (drainage master plan updated under the GAMA Sanitation project) is important as it delineates the new drainage infrastructure. The 1991 drainage master plan pointed out four priorities for intervention:

1. Construction of flood retention ponds to reduce rapid run-off and flash flooding;
2. Channel alignment (lining, removal of meanders and altering of gradient to control flows);
3. Dredging of Korle and Sakumo lagoons, combined with annual operation and maintenance plans reducing the average annual sediment load of 70,000 tons in the seven drainage basins of the metropolitan area.
4. Improve inter-jurisdictional coordination among the entities responsible for drainage management.

Drainage infrastructure improvements should start with increasing the drainage capacity of the primary drainage system followed by secondary and tertiary systems. Upstream, the measures to increase the retention capacity and reduce the sediment load, notably sand traps, are of primary importance to ensure that peak flows and sedimentation can be reduced in the Korle and Sakumo lagoons. As much as interventions are necessary in the downstream areas to reduce obstructions in the drainage channels, the securing of land and construction of retention basins upstream is an urgent priority going forward. The areas identified in the 1991 drainage masterplan for the upstream construction of flood retention basins have already been built up to some extent, and require the search, securing of land and coordination to ensure that these areas remain free for the construction of retention basins. In addition, some of the basic information that would need to be addressed going forward includes (i) the creation of an accurate digital elevation model (DEM) for Greater Accra, (ii) bathymetric surveys, (iii) mapping soil infiltration characteristics, (iv) updating land use information, and (v) updating statistics on short rainfall events and tidal condition, and developing rainfall-runoff models for the sub-basins.

HSD estimates the short term and medium term cost for reconstruction and mitigation of the flood risk related to the primary drainage network following the June 3 floods 2015 at GHS 97.7 million (US$ 22.4

million) the needs for the reconstruction and desilitation and cleaning of the secondary drains were estimated by the affected MMDAs at GHs 7.9 million (US$ 1.8 million equivalent) (GHS 4.9 million of reconstruction and GHS 3 million for desiltation and cleaning of the network). Long-term mitigation needs are estimated at more than GHS 1.8 billion (US$ 418 million). The table below provides an overview of the flood mitigation measures for the major streams in greater Accra.

Table 24: Short-Term Reconstruction and Long Term Flood Mitigation Works for the Primary Drainage Network Identified by HSD

Stream	Estimated short term reconstruction and flood mitigation works (Thousand GHS)	Estimated long term flood mitigation works (Thousand GHS)
Odaw	39,000	363,000
Densu	1,800	36,000
Lafa	39,600	478,000
Kpeshie	1,600	137,000
Brekese	600	91,000
Chemu	1,100	45,000
Songo Osu Klottey Sakumo	1,200 6,100 6,700	10,000 - 664,500
TOTAL US$ equivalent	97,700 22.4 million	1,824,500 418 million

Source: Accra Flooding Assessment Report, MESTI 2016

Below is an overview of the required activities for the main streams in greater Accra:

Brekese stream. The proposed short-term measures include desilting and replacement of culverts with an estimated cost of GHS 600,000. For the long term, HSD plans to line the channel in areas close to the Ghana Marine Authority for an estimated GHS 91 million.

***Chemu drain*.** Short and medium term needs are estimated at GHS 1.1 million for the rehabilitation of drains and desilting. Long term needs are estimated at GHS 45 million.

***Densu stream*.** Although largely undamaged, the short-term needs for mitigating the flood risk are estimated at GHS 1.8 million largely for the construction of a culvert at Duba. The lining of drains is estimated at GHS 36 million for the long term.

***Kpeshie stream*.** Proposed short-term measures include the desilting of streams, replacement of culverts, and rehabilitation of drains and removal of obstructions in the immediate drainage system. The total short term and medium term needs are estimated at GHS 1.6 million. For the long term, HSD proposes the lining of channels, among others the Kordjor channel at a length of 8km. The total costs are estimated at GHS 137 million.

***Lafa stream*.** For the Lafa drain, the main short term and medium term needs for reconstruction and mitigation of underlying risks are the replacement and redesign of 26 culverts, widening of channels, demolishing of existing pipe drains and excavation to create channels and relocation of water mains. It also includes the widening and deepening of the Lafa stream on up to 13 km of length. The total estimated

short term and medium term needs are estimated at GHS 39.5 million. Long term needs, which would include the lining of the Lafa stream, construction of the Baaley stream and construction of drains are estimated at GHS 478 million.

***Odaw stream*.** The Odaw stream is the main natural drainage basin in greater Accra. Although the direct damages were limited to approximately GHS 9.6 million, the needs for short term reconstruction and mitigation measures sum up to GHS 39 million (GHS 19.2 million upstream and 19.8 million downstream). This includes the reconstruction or replacement of 17 culverts in the upstream areas, the reconstruction of the Mapelele steel bridge, desilting of major parts of the stream and reconstruction of drains and reconnection of roadside drains with the primary drainage network. Long-term needs are estimated at GHS 355 million for the lining of major parts of the Odaw upstream areas, including from Achimota flyover to Ashongman, and GHS 8 million for long-term mitigation measures downstream.

Osu Klottey stream. Although largely undamaged during the floods, short-term interventions to mitigate the flood risk can be estimated at GHS 6.1 million.

***Sakumo stream*.** Short and medium term measures include the replacement of three culverts (Araba, Lakeside, and Commando), desilting of large parts of the stream and realigning of the channel close to community 22. The costs are estimated at GHS 6.7 million. Long term needs relate according to HSD to the lining of major parts of the stream among others the Ashaiman drain, Gbemi drain, Onukpawahe drain, and Mamahuma drain with an estimated cost of GHS 664.5 million.

Songo stream. Short-term needs are estimated at GHS 1.2 million for desilting, repairs of drains and culverts. The lining of drains is estimated at GHS 10 million as a long-term intervention to reduce flooding.

Infrastructure investments need to go hand in hand with an improved coordination between responsible MDAs (HSD, Ghana Highway Authority, and Department of Urban Roads) and the 16 MMDAs in greater Accra to jointly implement drainage works, operation and maintenance. A substantial increase of the operation and maintenance budget for the drainage system at the level of MMDAs and HSD is required to ensure that drainage and desilting work can be conducted regularly and not just on emergency basis. So far HSD only receives a fraction of its planned budget every year.

Improved coordination in spatial planning and enforcement of building regulations is important. Therefore, an early involvement of HSD in the spatial planning and zoning process at the level of MMDAs is required. An overall coordination mechanism, either as a separate institution or loose coordination mechanism of existing MDAs and MMDAs to better coordinate drainage issues in the greater Accra area has been proposed. This would allow the coordination and implementation of drainage planning in greater Accra “under one roof”.

Last but not least, there is general agreement that greater Accra needs to better manage solid waste within the city through both (i) community awareness raising towards solid waste in form of educational campaigns; formal and informal education and (ii) improved solid waste management infrastructure and services. A behavioral change in attitude towards solid waste within the population is of great importance. The adequate management of solid waste is a key concern, but also provides an opportunity for the private sector to step in and take up some of the required investments to increase the capacity at the existing landfill and at the transfer stations. Also, with regard to safe and sustainable disposal of drainage material, slib and silt solutions need to be brought forward. For further information, see the solid waste management section.

Community and Social Protection

Recommendations

Accurate data gathering at the MMDA level: The MMDAs are best suited to carry out ongoing data gathering in their respective MMDAs to assess needs in the community and social protection sector. The MMDAs should do this in coordination with the Regional Coordinating Council

Develop exit strategy for the existing government social protection interventions: The MMDAs have a good system in place to register people in social welfare programs, to make sure that people are not registering twice and thus, taking advantage of the system. This is a good initiative and it should be complemented with a good exit strategy to make sure that people are not perpetually benefitting from the welfare system. The exit strategy would lay out a plan to get people out of the system as soon as possible. This should include targeted interventions and innovative mechanisms to help vulnerable groups. The skill-building initiative mentioned by TEMA is a good example of helping people in need by providing them with the tools to become self-sufficient.

Increase the level of funding and flexibility in the use of funds: The participants of the CityStrength consultations mentioned that the current level of funding for social programs is insufficient. It will be important for the central government to allocate adequate funding. Another shortfall of the current funding structure is that the MMDAs do not have flexibility in how the funds are allocated. The transfers made by the central government are generally earmarked for specific programs. By having flexibility, MMDAs will be able to move money based on their biggest needs. The central government can sometimes have delays on the transfer of money for specific programs so the flexibility in the use of funds would help in bridging that gap. Funding is also needed for programs that target people living in informality as well as modifying the scope of certain programs for that same purpose. The data gathering, stocktaking exercise and exit strategy will help the MMDAs to have a conversation with national line ministries that allocate funding for social programs.

Improve the education system and promote entrepreneurship to help address unemployment: There was strong agreement about the unpreparedness of recent graduates to engage in the workplace. Academic institutions are perceived to be focusing too much on concepts and theories but not translating them into practical skills that can be applied on jobs. A more practical and efficient educational system that encourages the development of competitive and entrepreneurial skills will help the students to be marketable whenever they apply for jobs. MMDAs should also promote entrepreneurship as an alternative income-generating activity. This includes working with financial institutions and the private sector to facilitate access to funding and remove barriers for the creation and expansion of firms, which will also lead to more employment. Good practices presented during the discussion include TMA's rehabilitation program for the poor and the disabled which focuses on vocational training. Ga West has a business advisory center but it would be beneficial to link it to social and welfare efforts.

Long term consideration in the response to disasters (livelihoods, housing): Currently, response to shocks is solely focused on short term needs. The respective MMDAs and NADMO work together to provide relief support such as shelter, food, and medicine. This level of support only lasts temporarily and there is no consideration of long term effects such as loss of livelihoods and housing. Moving forward, the agencies in charge of response need to think about needs of affected people in the long run and coordinate with social welfare agencies that can assist people.

Need for affordable housing. Even though other urban areas in Ghana are experiencing a higher urban growth than GAMA, people will continue migrating into the city. This requires the government to provide adequate and affordable housing, especially to low-income people and vulnerable groups.

Public awareness of diseases (causes, prevention, and response) and increase of funding when needed. The MMDAs are already carrying out public awareness campaigns. These efforts need to continue, and funding needs to be provided whenever there are serious outbreaks.

Better coordinate formal services with informal support structures and NGOs (family, social groups): Traditionally, in Ghana, people have a strong support system from their families and clans. The government needs to better understand informal structures and look for ways to leverage them in the provision of social services. There is also a lack of coordination with existing NGOs as there is some misunderstanding about the relationship dynamics between NGOs and MMDAs, which is something that needs to be clarified.

Annex E: Ghana Water Resources Management Programme (2017–2019)

No	OUTCOME DESCRIPTION	BASELINE (DEC.2015)	TARGET 2016	TARGET FOR MEDIUM TERM		
				2017	2018	2019
1	Relevant state agencies, District Assemblies and local communities supported to undertake reforestation programmes for water sheds protection	Created new buffer zones in Pwalugu, Djentiga 1 and 2, Kubore/Teogo and Yarigungu, and extended buffer zones in Mognori and Bazua in Upper East Region. 10.3km of targeted 20.5km on both sides covered.	• Manage existing buffer zones in Upper East Region • Mark and begin extension of buffers to cover remaining 10.2 km on both sides. • Initiate buffer zones in the Densu, Tano, Black Volta, Ankobra and Pra Basins	Continue with creation and management of buffers in the 6 river basins	Continue with creation and management of buffers in the 6 river basins	Complete creation and management of buffers in the 6 river basins

No	OUTCOME DESCRIPTION	BASELINE (DEC.2015)	TARGET 2016	TARGET FOR MEDIUM TERM		
				2017	2018	2019
2	Access to water resource knowledge base improved to facilitate water resource planning and decision making	•Upgraded the national database on water right holders and monitoring compliance to effectively manage information on water resources. •Nationwide water quality monitoring program established and exercises undertaken.	•Undertake Water quality monitoring and establish status of water bodies. •Undertake groundwater monitoring in the 3 northern regions and establish the status.	•Undertake Water quality monitoring and establish status of water bodies. •Undertake groundwater monitoring in the 3 northern regions and establish the status. •Collate and update surface water data and information countrywide	•Undertake Water quality monitoring and establish status of water bodies. •Undertake groundwater monitoring in the 3 northern regions and establish the status. •Collate and update surface water data and information countrywide	• Undertake Water quality monitoring and establish status of water bodies. • Undertake groundwater monitoring in the 3 northern regions and establish the status. • Collate and update surface water data and information countrywide

No	OUTCOME DESCRIPTION	BASELINE (DEC.2015)	TARGET 2016	TARGET FOR MEDIUM TERM		
				2017	2018	2019
4	Climate change adaptation in water resource management enhanced for water security and improved livelihoods.	•Climate change resilience and adaptation in water resources management integrated into District Medium Term Development Plans. •Developed flood risk maps for White Volta basin •Initiated improvement of Flood Early Warning System model for White Volta Basin •Completed the development of response plan for Drought Early Warning	•Complete climate change investment plan for White Volta Basin •District Assemblies to incorporate flood risk maps into physical and development plans •Complete the improvement of Flood Early Warning System model for White Volta Basin •Initiate development of drought early warning system (DEWS) for the White Volta Basin	•Initiate development of Flood Early Warning System model for Oti Basin •Complete the development of drought early warning system (DEWS) for the White Volta Basin	•Complete the development of Flood Early Warning System model for Oti Basin •Initiate the development of drought early warning system (DEWS) for the Black Volta Basin	•Initiate development of Flood Early Warning System model for Black Volta Basin •Complete the development of drought early warning system (DEWS) for the Black Volta Basin

No	OUTCOME DESCRIPTION	BASELINE (DEC.2015)	TARGET 2016	TARGET FOR MEDIUM TERM		
				2017	2018	2019
6	The regulatory framework for managing and protecting water resource for water security strengthened	Dam Safety Regulations developed and ready to be laid before parliament.	•Adopt the Dam Safety Regulations •Complete the review of the raw water quality guidelines and criteria for key water uses. •Review the existing technical guidelines on aquaculture development in the Volta Lake (include zonation and siting) •Complete the technical component engagement on Buffer Zone Legislative Instrument	•Initiate implementation of the Dam Safety Regulations •Develop guidelines to regulate spillage and dewatering into the environment •Initiate the development of regulations on wastewater (in collaboration with EPA) •Develop Buffer Zone Legislative Instrument	•Initiate the development of regulations on wastewater (in collaboration with EPA) •Complete and adopt Buffer Zone Legislative Instrument	•Complete and adopt regulations on wastewater (in collaboration with EPA)

No	OUTCOME DESCRIPTION	BASELINE (DEC.2015)	TARGET 2016	TARGET FOR MEDIUM TERM		
				2017	2018	2019
8	River basin and national IWRM plans and strategies prepared and implemented	• Completed the review of Densu Basin IWRM Plan. • National and 6 river basin IWRM plans developed	• Complete the review White Volta and Ankobra IWRM Plans • Initiate the development of IWRM plan for Black Volta basin	Complete Black Volta basin IWRM plan and initiate implementation	Review Pra and Tano IWRM Plans Initiate development of IWRM Plan for 7th priority river basin	Complete IWRM Plan for 7th priority river basin and initiate implementation

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Ministry of Local Government and Rural Development