RISK AND CLIMATE CHANGE ASSESSMENT PLAN

2024-2026

AGONA WEST MUNICIPAL ASSEMBLY

NOVEMBER 2023

PREPARED BY

MPCU

Contents

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

FRAMING CLIMATE ACTION

1.1 Introduction

Climate change stands out as the foremost challenge to sustainable development, particularly in developing nations like Ghana. The susceptibility of Agona West Municipality to the adverse effects of climate change is widely acknowledged, and without immediate and collective efforts, it could lead to extensive ecosystem deterioration, disrupting both socio-economic progress and the well-being of the populace. Given the evident and potential impacts, coupled with the existing vulnerabilities, prioritizing climate change adaptation is imperative for Agona West. The preparation of the "Risk and Climate Change Assessment Plan" aims to address this pressing need.

1.2 Climate Action in National Context

The inception of the Paris Agreement occurred following the 21st Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. A total of 191 countries, signatories to this pivotal agreement, pledged to undertake measures aimed at limiting the global average temperature increase caused by climate change to a level well below 2 °C, with a preferable target of staying below 1.5 °C. In preparation for COP21, over 160 nations submitted their Intended Nationally Determined Contributions (INDCs), outlining their strategies for emissions reduction and adaptation to a changing climate. Post-COP 21, countries have been urged to solidify these commitments by formally ratifying the Paris Agreement and presenting their Nationally Determined Contributions (NDCs) to the UNFCCC.

Ghana's Intended Nationally Determined Contributions (INDC) align with the framework of the Ghana National Climate Change Policy (GNCCP), emphasizing emissions reduction and outlining the nation's strategies for adapting to the impacts of climate change, all within the context of its unique domestic circumstances and capabilities. In line with its dedication to the Paris Agreement, Ghana has presented a comprehensive set of commitments, encompassing 20 measures for mitigation and 11 for adaptation across 7 key economic sectors. This commitment not only fulfills the country's international obligations as a party to the UNFCCC but also ensures that these commitments harmonize with Ghana's national development agenda.

1.3 Climate Change in Agona West

Climate change has been recognized as a significant developmental challenge since the early 1990s, mainly due to its predicted consequences for biodiversity, livelihoods, and the economies of nations worldwide. Studies suggest that the negative effects of climate change will disproportionately impact impoverished nations and individuals, with Africa bearing the brunt of this disparity. The limited institutional, financial, and technological capacities of these regions contribute to their challenges in both adapting to and mitigating the impacts of climate change.

The distinctive characteristics of Agona West, such as its rapidly expanding urban population and its topography defined by rivers and streams, combined with its location in the wet-semi equatorial climate zone, amplify its susceptibility to the effects of climate change.

In 2010, the municipal capital, Agona Swedru, faced adverse consequences of climate change manifested through a significant flooding incident. This disaster resulted in extensive damage and loss of life. Particularly, the communities proximate to the upstream river in the town suffered complete inundation, resulting in the collapse of a bridge and residences along the riverbanks. This impactful occurrence heightened the local government's awareness of climate change issues, prompting the integration of adaptation strategies into its medium-term planning initiatives.

2010 Floods: Buildings submerged in water | June Floods: Victims of flood | June Floods: Collapsed bridge.

Figure 1: Pictures of 2010 flood in Agona Swedru

1.4 Rationale for Planning for Risk and Climate Change in Agona West Municipality

It is important to plan for risk and climate change in Agona West due to the following reasons:

i. Climate change threatens development and thus needs to be considered in development efforts.

ii. The phenomenon of climate change and its impact is real and presently unfolding.

iii. An existing deficit in adaptation measures is evident, as the challenges posed by climate change variability have not been adequately addressed to date. Failure to promptly and effectively confront this adaptation deficit holds the potential to undermine the achievements thus far realized in the Municipality's developmental endeavors, exacerbating the challenges posed by climate change.

iv. The escalating impacts of climate change are observable through a heightened frequency of destructive storms, urban heat events, and recurrent flooding in Agona West. This discernible trend is anticipated to persist, posing a growing challenge in effectively managing the ramifications of climate change.

v. While individuals at the grassroots level are currently engaged in adaptation efforts to address climate change, their capacity to respond promptly and comprehensively may be limited. Consequently, there is a necessity for external interventions in the form of strategic plans, policies, legislation, and support for local initiatives to effectively address the prevailing situation.

vi. The Agona West Municipality is vulnerable to climate change due to the following factors:

- Rapid urbanization.
- Lies in the wet-semi equatorial climatic zone.
- Existence of river and other small water bodies.
- Widespread poverty persists, and the resultant dependence on the exploitation of endangered natural resources is exacerbated by the challenges posed by climate change.
- Proportion of population living in unplanned settlements and remote areas.
- High incidence of indiscriminate development (eg, homes along river banks, buildings in waterways).

- Vulnerable demographic groups, namely women, children, and the elderly, who are particularly susceptible to the detrimental effects of climate change, have limited access to climate change information.

Many sectors within the Municipality are vulnerable to adverse effects from climate change, encompassing agriculture and food security, water resources, wetlands, land use, forestry and biodiversity, energy, transportation, industry and commerce, financial services, human settlements and health, as well as disaster management. Given its status as a key commercial and agricultural (especially cocoa growing) driver of the Central Region's and national economy, the detrimental repercussions of climate change on Agona West Municipality hold profound implications for the region and country.

1.5 The Risk and Climate Change Assessment Plan

This document is based on the vulnerability assessment conducted in all six (6) zonal councils in the Municipality through focus group discussions and surveys. In addition, reports from key institutions such as the Department of Agric, Environmental Health and Sanitation Unit, National Disaster Management Organization, and Physical Planning Department were reviewed and analyzed to understand the context and situation of climate change in the Municipality. The initial draft of the document underwent validation by key stakeholders, yielding valuable feedback. This input was instrumental in refining and preparing the final version of the document.

The Risk and Climate Change Assessment Plan should be regarded as a dynamic document subject to periodic review and enhancement in response to advancements in our understanding of climate change and its implications for the Agona West Municipality. A comprehensive evaluation of the plan's implementation will be conducted three years following its adoption. This evaluation will serve as the foundation for a thorough review of the strategy's implementation.

1.6 Climate Change Legal and Institutional Framework

Sustainable Development as undertaken by MMDAs in Ghana is based on various interlinked legislative, policy and institutional frameworks that ensure sustainable development at the local level receives the necessary impetus. Normatively, these frameworks operate at the sphere of the national level and provide guidance and regulation to the local for implementation. With regards to Climate Change, these frameworks include The Constitution of the Republic of Ghana (1992); The Local Governance Act (Act 936, 2016); The Land Use and Spatial Planning Act, 2016 (Act

925); The National Climate Change Policy (2013); The Local Economic Development Policy (2020) and the Medium-Term Development Framework.

1.6.1 The Constitution of the Republic of Ghana (1992)

The constitution of Ghana is the supreme law of the land and lays out the structure of the state. It also guarantees the protection of the fundamental human rights and liberties of the citizens Article 36 (9) of chapter six of the constitution states "the State shall take appropriate measures needed to protect and safeguard the national environment for posterity; and shall seek cooperation with other states and bodies for purposes of protecting the wider international environment for mankind". Furthermore, under Article 241 clause 3, the constitution of Ghana enjoins MMDAs as the highest political authority in the district, and assigns them deliberative, legislative, and executive powers.

1.6.2 The Local Governance Act (Act 936, 2016)

The Local Governance Act 936, 2016 among other things provides for the creation and functions of Districts Assemblies. Section 113 (1) of the Act specifically, directs MMDAs to "prepare a response plan and make by-laws where necessary for emergency, disaster prevention and the provision of relief services for its area of authority". In addition, Section 113 (1) indicates that "the response plan and by-laws shall include mitigation, preparedness, response, and recovery measures".

1.6.3 The Land Use and Spatial Planning Act, 2016 (Act 925)

The Land Use and Spatial Planning Act, 2016 (Act 925) designates MMDAs as the authority for physical and spatial development planning at the district level. Effective spatial planning is crucial to ensure environmental sustainability of Ghana of which MMDAs through their local land use plans could effect the change expected.

1.7 Policy Framework

The Ghana National Climate Change Policy (2013) is the overreaching sectoral document intended to guide Ministries, Departments and Agencies (MDAs), whose activities will have impact on the lives of people at the local level in Ghana; as well as Metropolitan, Municipal and District Assemblies (MMDAs) formulating local development plans and strategies, which directly impact on the economy and quality of life of locals within their jurisdiction. The Climate Change Policy Objective is to create a climate resilient and climate-friendly environment to achieve sustainable development.

That aside, within the context of national development, climate change is reflected in a number of sectorial polices namely:

- The Ghana National Spatial Development Framework (2015-2035)
- The National Decentralisation Policy 2020-2024
- The National Urban Policy
- The Rural Development Policy
- The Ghana Nationally Determined Contributions

1.8 Strategic Inspiration for the Plan

The Risk and Climate Change Assessment Plan takes inspiration from the National Climate Change Policy (2013). As such, the RCCAP adopts and aligns its goals, objectives and priority areas to those of the NCCP (2013).

1.8.1 Goal of the Risk and Climate Change Assessment Plan

The goal of the Risk and Climate Change Assessment Plan is to achieve sustainable development through the creation of climate-resilient and climate-friendly environment in Agona West Municipality.

1.8.2 Objectives of RCCAP

The objectives of the Risk and Climate Change Assessment Plan which reflects the aspirations of the Municipality include:

Objective 1: Ensuring effective adaptation strategies.

Objective 2: Promoting social development initiatives.

Objective 3: Implementing robust mitigation measures.

1.8.3 Priority Areas

i. Agriculture and food security
ii. Disaster preparedness and response
iii. Natural resources management
iv. Equitable Social Development
v. Energy, Industry, and infrastructure

1.9 Stakeholders Engagement

To deliver RCCAP's ambitious and transformative goal and objectives in line with Ghana's Nationally Determined Contributions and the Ghana National Climate Change Policy, the Assembly must build and maintain constructive and sustainable relationships with stakeholders that will be impacted by climate change and RCCAP actions. The development of the RCCAP was underpinned by a rigorous stakeholder engagement to improve decision making, create understanding of and build support for the RCCAP among those it seeks to serve: the Municipality's residents, government agencies, local communities, traditional authorities, private sector stakeholders, civil society, and other interested parties. The stakeholders' engagement workshops were held to:

i. raise awareness of climate change and of concrete strategies to address it within Agona West Municipality;
ii. provide opportunities for input at various stages of the RCCAP development process;
iii. foster ownership of the RCCAP amongst various stakeholders; and
iv. ensure that wider benefits of climate action are distributed as equitably as possible.

These stakeholders were engaged through a series of workshops, which focused on different aspects of RCCAP development, such as scenario planning, policy development, action planning and implementation. These workshops were supplemented with a wider engagement campaign, which included focus group discussions at the various zonal councils and household surveys, to ensure the inclusivity of the proposed climate actions.

The various stakeholders identified can be found in table 1.

Table 1: Stakeholders Identification

Political	Economic	Environmental	Social	Technological	Legal
AWMA	Business owners	EHSU	DSWCD	MESTI	Court
MLGRDD	Agricultural Development Bank (ADB)	MESTI	Local communities	CSIR	AWMA

Member of Parliament	FBOs	NADMO	Assembly Members	MOFA	Police
	Fuel Stations	Parks and Gardens	Traditional Authorities	Agric Department	City Guards
	Hoteliers	Physical Planning Department	GWCL		
	GPRTU	Urban Roads Department	Women Groups		
	PROTOA	Works Department	Youth Groups		
	Artisans	Land Valuation	YEA		
		EPA	NYA		

CHAPTER TWO

SITUATIONAL ANALYSIS OF AGONA WEST MUNICIPALITY

2.1 Introduction

The analysis delves into various crucial sectors of the Municipality, aiming to pinpoint challenges arising from the threat of climate change. It assesses associated vulnerabilities and considers the implications of these challenges and vulnerabilities. The goal is to craft effective adaptation strategies while considering existing vulnerabilities. This assessment involved surveys, focus group discussions, reports from institutions such as Environmental Health Sanitation Unit, National Disaster Management Organization, and Physical Planning, and online resources. The findings from these sources were harmonized to generate composite information. It encapsulates hazard identification and vulnerability assessment.

2.2 Climate Hazard Identification

From the assessment, a total number of five (5) climate hazards were identified to be relevant to Agona West Climate Change context. They include: flood; windstorm/rainstorm; domestic, commercial, and bushfires; heat; and erosion.

2.2.1 Flood

In Agona West, floods do occur between the period of May and September. At least, 70 houses become flooded every year. As such, a substantial number of people become displaced. Additionally, many hectares of farmlands become inundated and destroyed, lives and properties are lost, economic activities stall in affected communities, school sessions become disrupted, and constant electricity supply becomes disrupted. Flood prone areas identified during the assessment include Agona Swedru, Agona Nyakrom, Agona Kwaman, Agona Bobikuma, and Nkranfo.

Flooded room

First Century Prep. School flooded

NADMO Officer helping an aged woman cross over after a heavy downpour of rains

Figure 2: Flood as an identified hazard

2.2.2 Windstorm/Rainstorm

Windstorm/rainstorm is a recurring event in Agona West. This also usually occurs during the rainy season, which is between the period from May to September. During this event, many buildings are ripped off; structures of buildings collapse; roads become blocked because of fallen trees; and

utility services to communities become disrupted. Areas susceptible to windstorm/rainstorm in Agona West include: Agona Swedru, Bobikuma, Nkum, Abodom, Ahamandonko, and Otsenkorang.

In 2022, the municipality recorded six (6) windstorm/rainstorm occurrences, affecting a total number of 287 persons, 22 houses and 2 schools. The estimated cost of property damaged was GH ₵ 104,220.

Roof of 2 buildings ripped off as a result of rainstorm

Side wall of a building collapsed due to windstorm

Figure 3: Windstorm/Rainstorm as identified hazards

2.2.3 Domestic, Commercial and Bushfires

Domestic and bushfires were also identified as climate hazards in the Municipality. These are primarily human induced hazards related to climate change. Activities including slash and burn farming method, cooking at farms, poor wiring, domestic cooking, and burning of wastes in homes contribute to these hazards. These hazards impact lives and properties as well as render people poor. In 2022, the Municipality recorded 3 fire outbreaks. The fire affected one (1) house and nine (9) stores, incurring an estimated cost of GH₵250,000.00. In addition, eight (8) persons were affected.

Commercial Fire Disaster at Osama Station

Bush Fire on a Cocoa Farm

2.2.4 Heat

72% of respondents, together with submissions during the focus group discussions revealed that heat is a climate hazard in Agona West. Accordingly, there has been relatively intense heat in the Municipality as compared to a decade ago. The area primarily at risk of heat stress is Agona Swedru. The Weather Spark (2023) reports that the hot season in Agona Swedru lasts for four (4) months, from December 26 to April 25, with an average daily high temperature above 90°F. The hottest month of the year in Swedru is March, with an average high of 92°F and low of 77°F.

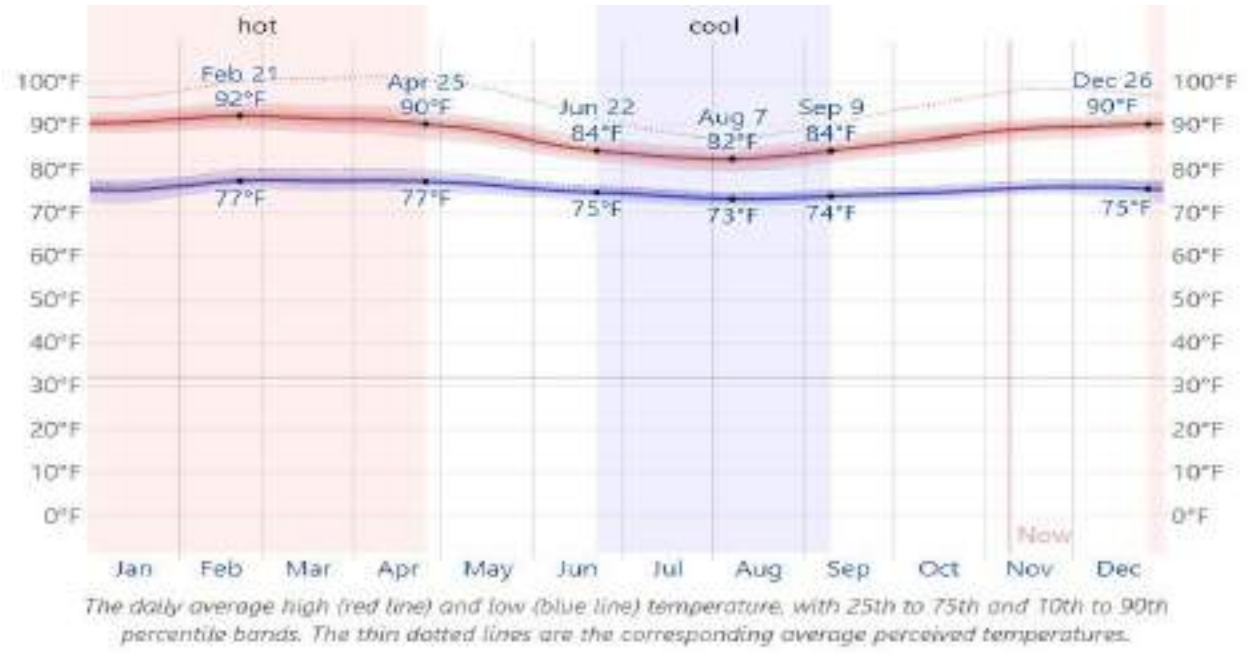

Figure 4: Average Temperature in Agona Swedru

Source: Weather Spark (2023)

2.2.5 Erosion

Erosion is identified as a climate hazard in Agona West. It is seen to impact roads, buildings, and farmlands in the Municipality. Erosion has caused death traps in some areas in the Municipality including Nkubem, Edukrom, Nsusososo, among others. It also has challenged transportation within the Municipality as some roads in the municipality have been eroded into deplorable states. Again, some access roads to various farms in the Municipality are plunged into immotorable states, making the conveyance of produce from farmlands difficult.

Erosion posing danger to social service delivery and residents

2.3 Risk Drivers

From the assessment, the following risk drivers were identified in the Municipality:

1. Locational characteristics: located in the wet-semi equatorial climatic zone,
2. Increasing population (growth rate of 3.2%).
3. Over-reliance on rain-fed agriculture.
4. Increasing conversion of greenery to brown/concrete surfaces.
5. Existence of urban river (Akora river) and other small rivers and streams in the municipality.
6. Existence of weak and old buildings in the Municipality.
7. Many communities located at river banks.
8. Many buildings close to rivers.
9. Buildings closer to high-tension poles.
10. Poor sanitation practices (burning of wastes).
11. Indiscriminate development (Non-adherence to building regulations).
12. Poor farming practices.
13. Increased number of automobiles.
14. Burning of car tyres.
15. Poor wiring systems in homes.
16. Weak institutional capacity.

17. Lack of integrated planning.
18. Low income level of residents.

2.4 Vulnerability Assessment

Agona West Municipality's demography, socio-economic, and physical characteristics make it vulnerable to climate change. The risk assessment revealed the important sectors of the Municipality that are vulnerable to climate change, indicating the type of hazards, level of exposure to hazards, and risks associated with such sectors.

2.4.1 Demography

According to the 2021 Population and Housing Census, Agona West Municipality has a total population of 136,882, comprising 65,502 males (47.9%) and 71,380 females (52.1%). This represents an increase from 115,358 in 2010, resulting in an annual growth rate of approximately 1.6% over the 11-year period. The growth is largely attributed to natural increase and internal migration, particularly into Agona Swedru and its adjoining communities. According to the 2021 Population and Housing Census, 104,874 persons, representing 76.6% of Agona West Municipality's total population, reside in urban areas, while 32,008 persons (23.4%) live in rural communities. This confirms the municipality's predominantly urban character, with most of the urban population concentrated in and around Agona Swedru.

The municipality covers a land area of 361 square kilometres, yielding a population density of approximately 379.6 persons per km². This reflects significant urban concentration and land pressure, especially within the Agona Swedru–Nyakrom corridor and other fast-growing settlements.

2.4.1.1 Multidimensional Poverty

The poverty profile of Agona West Municipality reveals notable disparities across urban and rural localities. The incidence of poverty (H), which measures the proportion of individuals considered poor, stands at 21.0% for the district overall. However, this figure masks significant differences: urban areas have a much lower incidence of poverty (16.4%), while rural areas experience a far higher rate (35.8%), highlighting rural-urban inequalities in poverty levels.

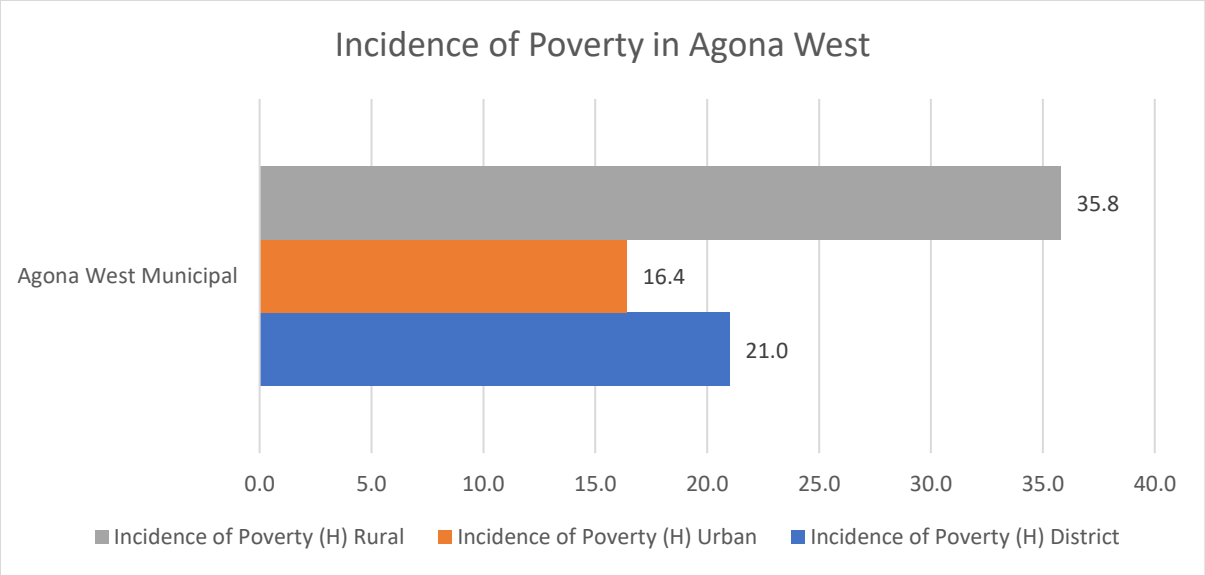

Figure 5: Incidence of MDPI

Source: Author's Construct based on 2021 PHC data

The intensity of poverty (A), which reflects the average shortfall from the poverty line among the poor, is relatively uniform across the district. The district average is 43.7%, with urban areas slightly higher at 44.0%, and rural areas marginally lower at 43.3%. This indicates that while poverty is more widespread in rural areas, the severity of deprivation is comparable across localities.

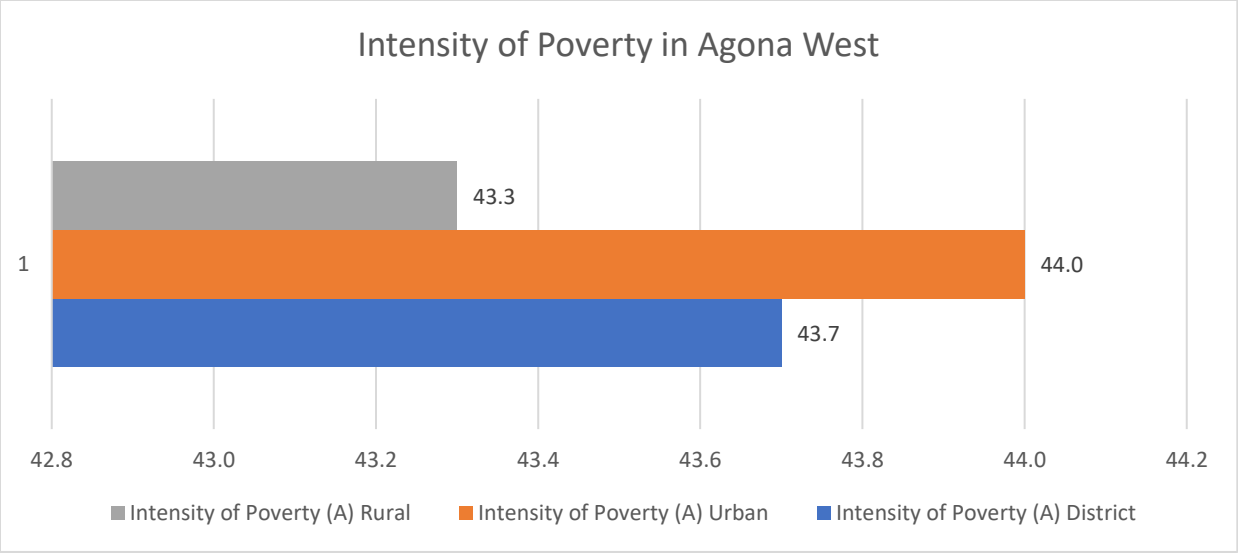

Figure 6: Intensity of MDPI

Source: Author's construct based on 2021 PHC data

2.4.2 Agriculture and Food Security

In the Agona West Municipality, agriculture has been the backbone of the local economy, with a focus on crops like cocoa, oil palm, maize, cassava, and vegetables. However, the reliance on rain-fed farming and the prevalence of small-scale, low-tech farming operations make the sector highly vulnerable to climate change.

Agriculture, employing 27.65% of the population, faces challenges due to erratic rainfall patterns, making planting times unpredictable. Increased precipitation leads to farmland inundation, damaging crops, poultry and livestock. Rising temperatures and heat stress pose further risks, impacting yields and water sources for the few practicing irrigation. Wind and rainstorms also contribute to crop and farming infrastructure (storage facilities, animal housing, among others) damage. Furthermore, the normalization of slash-and-burn practices among farmers poses an additional risk to the municipality in the face of climate change.

The repercussions extend to food security within the Municipality. Staple crops, including maize, cassava, vegetables, and plantain, have witnessed notable declines from 2018 to 2022 (refer to Figure 7). This trend exposes the Municipality to the dual challenges of increased hunger and diminished farm incomes. Moreover, it hampers the Municipality's progress toward achieving Goal 2 of the Sustainable Development Goals, which emphasizes eradicating hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. The decline in staple crop yields not only threatens the livelihoods of local farmers but also undermines the broader developmental objectives outlined in the Sustainable Development

Goals. Addressing these agricultural challenges becomes imperative for fostering food security and advancing sustainable development in the Agona West Municipality.

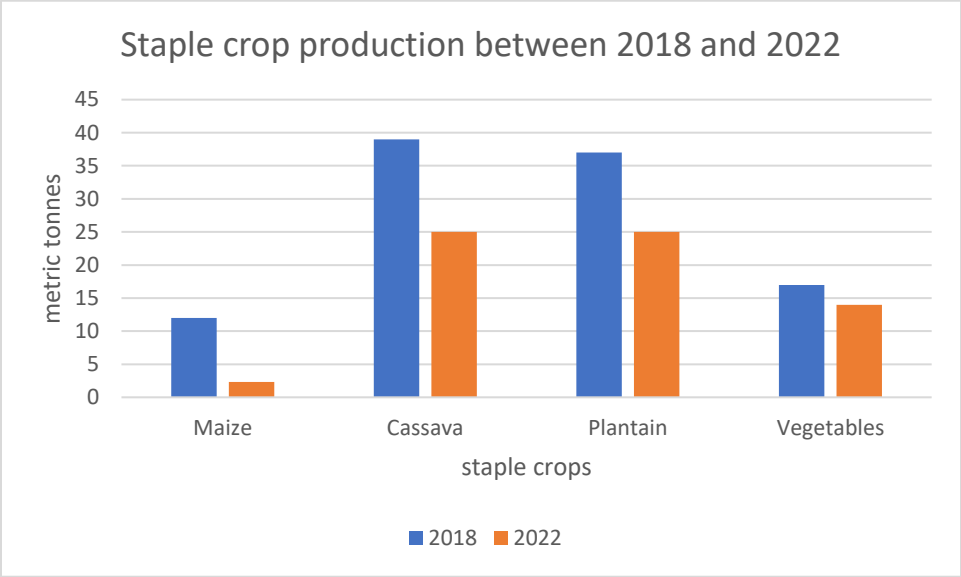

Figure 7: Staple crop production between 2018 and 2022

The impacts of climate change on agriculture not only pose significant threats to the local economy and food security but also carry the potential for loss of life in communities reliant on subsistence farming. Despite uncertainties in impact projections, there is a clear expectation of substantial land-use changes in the future due to rapid urbanization, heightening the likelihood of subsidence and inundation. These factors will exacerbate agricultural vulnerability and exposure, underscoring the urgency of proactive measures to address the risks faced by subsistence farming communities.

In response, sustainable farming practices, improved water management, and climate-resilient strategies tailored to the specific needs of farmers in the Municipality are essential for fostering long-term agricultural sustainability in the face of climate change.

2.4.3 Natural Resource Management

The economic base of Agona West, mirroring Ghana's economy, relies heavily on natural capital. Hence, the sustainable administration of its natural resources becomes pivotal for both economic growth and long-term sustainable development. These resources are not only vulnerable to the ecological consequences of climate change but are also at risk due to human activities that result

in deforestation, land degradation, pollution of water and air, soil erosion, and the depletion of wetlands, and biodiversity in the Municipality. Overlogging seem to be a key anthropogenic activity affecting forest trees hence makes the Municipality vulnerable to climate change and its impacts.

2.4.3.1 Water Resources

The primary water resource in the Agona West Municipality is the Akora River, complemented by smaller water bodies like Peprah, Abena, Enchiwi, and others. The escalating heat levels are warming and depleting these water resources. The elevated temperatures not only make the water less suitable for drinking, both for humans and animals, but also pose threats to aquatic life through destruction, stratification, oxygen reduction, increased toxicity, and algae proliferation, ultimately compromising water quality. Additionally, the diminishing water supply has ripple effects on agriculture, domestic water usage, and temperature regulation in the municipality.

Intense precipitation causes the water bodies to overflow, leading to consequential flooding, property damage, disruption of agricultural activities, and increased risks to the safety and well-being of residents—particularly those in communities along these water bodies and structures in proximity.

Figure: Buildings along the urban river

In the water supply sector, around 32% of Agona West's population relies on public taps and standpipes. However, the high density of settlements poses challenges to drinking water quality,

resulting in persistent shortages. Water demand in terms of quantity is also not being met, increasing consumption of packet and sachet water from vendors, where water quality regulation is also an issue. Additionally, residents resort to digging wells, and boreholes serve as alternative water sources. Climate-induced factors such as erratic precipitation patterns, flooding, and rising temperatures can directly impact the availability and quality of water sources. Moreover, the increased demand for alternative water sources, like packaged water, highlights the municipality's vulnerability to climate-related disruptions, as these variations can further strain the already limited water resources. The reliance on wells and boreholes also adds to vulnerability, as changing climate conditions may affect groundwater availability and quality. In essence, the existing water supply dynamics in Agona West intensify the municipality's exposure to climate risks, jeopardizing water security for its residents.

Given that women and low-income families predominantly bear the responsibility for water collection in various communities across the Municipality, any changes in the quantity, quality, or accessibility of water due to climate change would disproportionately affect them.

The assessment revealed that certain communities, including Ahamadonko, Kwaman, and other remote areas heavily dependent on surface water like streams, without access to piped water, are highly vulnerable to water insecurity.

2.4.3.2 Wetlands and Freshwater Ecosystems

Human activities, notably uncontrolled urbanization, have significantly reduced the proportion of wetlands, a phenomenon particularly evident in the Municipal capital, Agona Swedru, which is experiencing rapid urbanization. The escalating demand for land for commercial and residential purposes due to this urbanization has led to improvised land use, causing swift development that encroaches upon wetlands. This poses a climate change risk, specifically in terms of increased vulnerability to flooding.

Additionally, pollution has resulted in the infiltration of water hyacinth into a substantial portion of wetlands in the Municipality, particularly in areas such as Nyakrom and Abodom.

2.4.3.3 Land Use, Forestry, and Biodiversity

Due to urbanization, agriculture, and various human activities, the once extensive rainforest that covered much of the Municipality now exists only in remnants. Study conducted by Annobil (2023) in Agona West revealed that forest which was dominant in 1986 has consistently reduced parallel to the increasing years while build up has consistently increased parallel to the increasing years. The researcher identified open woodland as the land use with the dominant share from 1986 to 2023 in the total land area of Agona West Municipality.

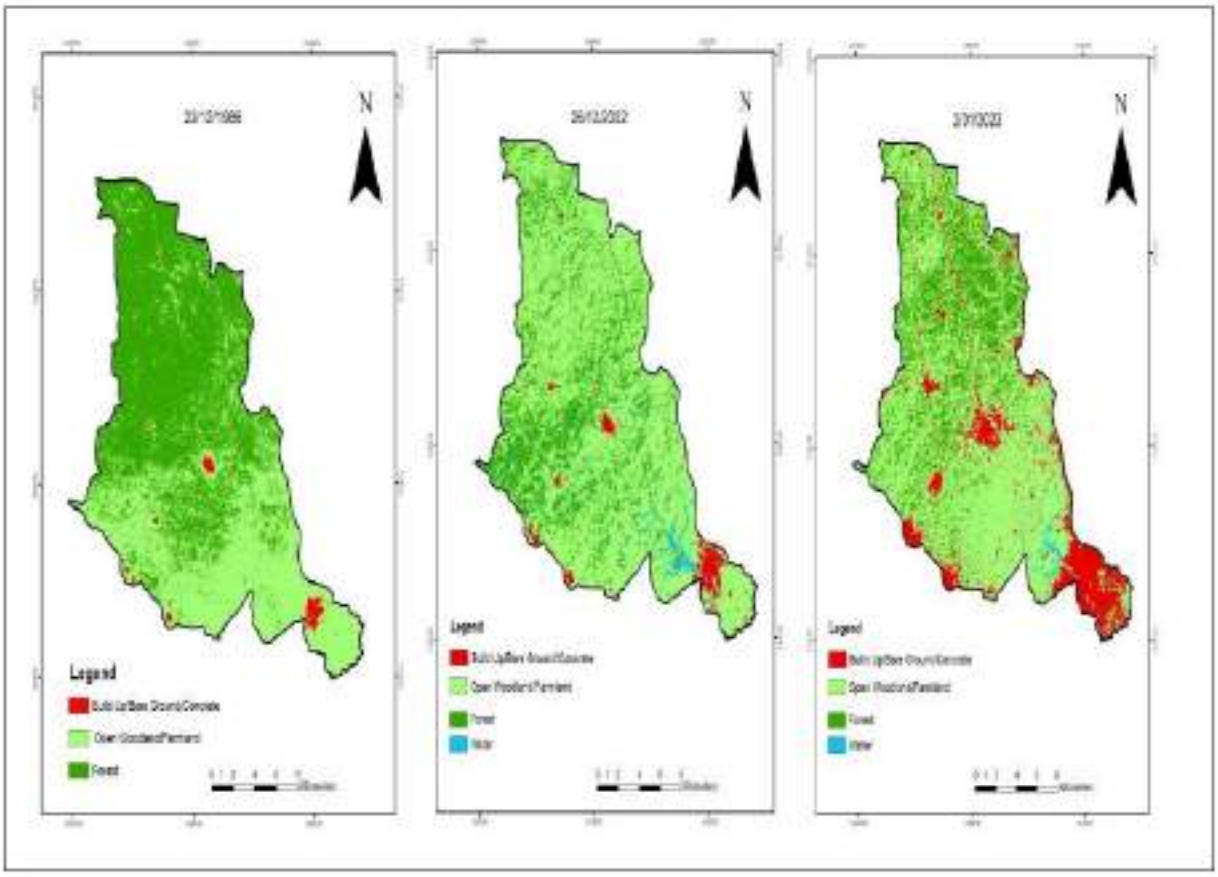

Figure 8: Landuse/LandCover Map for 1986, 2002 and 2023

Source: Annobil (2023)

These land-use changes carry significant implications for climate risk. The reduction of the forest means a loss of vital carbon sinks, contributing to increased greenhouse gas emissions. The shift to open woodland and built-up areas alters the landscape's ability to regulate temperature, water cycles, and biodiversity. Additionally, the diminished forest cover heightens the Municipality's vulnerability to climate-related risks such as flooding, soil erosion, and disruptions to local ecosystems, impacting both the environment and the communities dependent on it. It reduces the

Municipality's adaptation capacity to climate change impacts. The increasing built-up area, particularly in Agona Swedru as seen in figure 6 increases the capital's risk for urban heat stress.

Non-adherence to the Land Use and Spatial Planning Act, 2016 (Act 925) contributes to the rapid changes in land use/land cover. Properties are developed indiscriminately hence affecting ecological sensitive areas such as forest, wetlands, and waterbodies. Structures are also developed in water ways.

Trees in Agona West are cut down for roofing, wooden structures (residential and commercial), charcoal production, bridges (particularly coconut trees), and furniture. The residential wooden structures are usually used by poor families and individuals.

Lately, the Green Ghana Campaign led by the central government, alongside tree planting initiatives spearheaded by Parks and Gardens under the Physical Planning Department, Environmental Health and Sanitation Unit, and NADMO, has played a pivotal role in rejuvenating the forest cover in the Municipality.

Additionally, existing cultural beliefs and norms contribute to indigenous mitigation adaptation strategies. For instance, the taboo days in the various rural communities in the Municipality restrict farming activities on certain days thus reducing pressures on forestry, farmlands and reduce frequency of farming practices that are not climate-friendly. Again, it is believed that menstruating females are not allowed to visit a water resource in Nyakrom, which reduces the pressure on the water resources. Other water-related beliefs include not fishing on Fridays and Thursdays. These are some beliefs preserving forestry, farming, and water land uses thus reducing climate risks.

2.4.4 Energy and Infrastructure

Due to financial constraints, many poor households are unable to afford liquefied natural gas or kerosene, resorting instead to fuel wood or charcoal for cooking. This reliance on wood as a fuel source significantly contributes to deforestation, land degradation, and biodiversity loss. These consequences collectively erode the forest's capacity to sustain livelihoods and reduce adaptation capacity in the Municipality.

In the Municipality, there is limited adoption of biofuels, with only a few households and offices incorporating them as an emerging alternative fuel source. Fossil fuel usage, especially in automobiles and power plants, remains notably higher. Additionally, the practice of burning car

tyres, though not widespread, is observed, particularly in association with animal slaughtering. In terms of solar, only few homes, offices, and a few streetlights utilize solar energy.

Extreme weather events have contributed to infrastructural damages in the Municipality. Windstorm/rainstorm collapse buildings and rip off roofs and other metallic materials in the Municipality. High temperatures

In general, increasing temperatures can lead to the development of cracks in roads, while intense precipitation rates may create or worsen potholes. The transport infrastructure remains highly vulnerable to extreme weather events, despite its crucial role in supporting social, economic, and agricultural livelihoods. Roads facilitate trade, access to healthcare, education, credit, and various services, particularly in rural and remote areas in the Municipality. It is estimated that the cost of repair of road infrastructure in the Municipality next year is GH₵1,588,520.61

Storms, heavy rainfall, and floods can have severe repercussions on economic production sites and settlements, especially in densely populated areas like Agona Swedru. Informal settlements are particularly at risk due to the inherent weakness of structures and the limited adaptive capacity of residents to respond to disruptive events.

2.4.5 Transportation

Agona West heavily depends on road transport for the movement of people, goods, and services. Roads are prone to erosion and flooding caused by excessive rainfall, as well as the warping of tarmac due to intense heat. Consequently, they are highly vulnerable to the effects of climate change.

The introduction and rising use of commercial motorcycles, locally known as "okada," as a transportation mode in the Municipal capital have negative implications for sustainable development. Despite being initially popular in hard-to-reach communities in the Municipality, their increased presence in the capital has led to heightened traffic congestion, elevated accident risks, environmental pollution, and potential strain on existing transportation infrastructure. These consequences not only impact public safety but also contribute to noise pollution, affecting the overall well-being of the community. However, indigenous strategies such as no noisemaking, particularly at Nyakrom where each family chooses a week between August-December, and the

chief being the final observant from 23rd – 24th December contributes to reducing emissions from noise-making materials such as vehicles, motorcycles, tricycles ("pragyia" and "aboboyaa").

2.4.6 Industry and Commerce

Agona West is known for its vibrant commerce in the Central Region. Due to the Municipal capital's prospects for business growth owing to its increasing population, presence of markets, good infrastructural services (road, water, telecommunication, electricity, among others) and high living standards of most of its populace (incidence of poverty is less than 5%), Agona Swedru receives a lot of traders and industrial workers (construction workers, manufacturers of local products), from all walks of lives.

Despite low industrialization, the Municipality is experiencing rapid expansion in built areas, driven by the thriving real estate and construction sector. This burgeoning sub-sector contributes significantly to Agona West's economic growth. The increased demand for construction materials, roofing, wood, and skilled artisans has led to positive spillover benefits for related industries like block molding, woodworks, and metal fabrication.

The rapid growth of commerce is pressuring the Assembly to provide essential infrastructure. For instance, as part of the Ghana Secondary Cities Support Programme, the Assembly plans to construct a 3-storey building with 180 lockable stores at Mandela market in Agona Swedru.

Industrial and commercial activities significantly contribute to the heat and congestion, amplifying the urban heat island effect, a phenomenon expected to intensify due to climate change. Moreover, this sector plays a role in polluting the land, surface water, and groundwater in the Municipality.

Again, the construction and manufacturing industry, as well as the sale of agricultural produce, rely heavily on raw materials sourced from climate-sensitive sectors, particularly agriculture. Furthermore, the transportation of these raw materials and the distribution of finished products are significantly impacted by climate hazards such as flooding and erosion.

2.4.7 Financial Services

Specifically, the insurance sector faces significant vulnerability, particularly due to the increasing frequency of extreme weather events like the widespread flooding and rainstorm/windstorm causing displacements in Agona West Municipality. Consequently, climate-induced events are

anticipated to exert substantial pressure on insurance markets. Financial institutions, including banking and insurance firms, might encounter losses or bankruptcy resulting from claim settlements and loan defaults. To address this, these institutions may need to establish specialized credit and premium facilities to help clients adapt to the impacts of climate change.

2.4.8 Human Settlement and Health

The human settlement sector in the Municipality, particularly in Agona Swedru, faces a significant challenge in terms of physical planning. Agona Swedru was not planned from the outset, and sprawl development is continuing on wetlands, riverbanks, in waterways at an accelerated rate. Often, development precedes proper planning, resulting in a large portion of the city characterized by poor sanitation, limited water access, inadequate drainage, generally poor condition of buildings, limited open spaces, and inefficient waste management. These deficiencies contribute to water-borne diseases like malaria, negatively impacting public health.

In essence, some areas of the Municipality are characterised by poor and disorderly layouts which consequently affects accessibility and drainage. This poses a safety hazard to residents in affected areas as it leaves them vulnerable to floods and difficult to reach in times of emergency. Such developments and poor recourse to the settlement plans give the impression of a shantiness to some areas. In addition, the rampant leapfrog development done without consideration of the structural and layout plans because of indiscriminate sale of lands, generates not only tremendous pressure on utility providers but also puts at risk the conservation and protection of natural resources such as the water bodies and the green vegetation.

Particularly, communities and structures situated near rivers, coupled with the prevalence of old and weak buildings in the Municipality, highlight the faction most vulnerable to threats arising from escalating climate hazards, including flooding, windstorm/rainstorm, and heat. However, the lack of data regarding the number of structures located near rivers and the prevalence of old and weak buildings in the Municipality poses a challenge in assessing the potential threat to inhabitants.

2.4.9 Disaster Management

Several factors make Agona West vulnerable to both natural and human-made disasters. These include:

- The geographical location of the State, characterized by a generally sloppy topography, isolated hillocks, and high mean annual rainfall, making it prone to erosion and extensive flooding.
- The prevalence of poverty, which leads to human activities that increase exposure to disaster risks, such as the construction of buildings on floodplains.
- Ineffective enforcement of development control and building codes, further contributing to vulnerability.
- Non-adherence to building regulations.

The prevalent disasters in the Municipality are rainstorm/windstorm, flooding, fire, building collapse, and erosion. Of these, flooding, erosion, and destructive storms may be expected to increase as a result of climate change.

Agona West Municipality has National Disaster Management Organization but it appears to be under-resourced relative to the incidence of disasters it has to manage and spatial extent of the Municipality. Given the nature and extent of disasters in the Municipality, there is a clear need for improved disaster prevention and response strategies. Furthermore, considering the looming threat of climate change, it is essential to adopt effective disaster risk reduction measures in the Municipality.

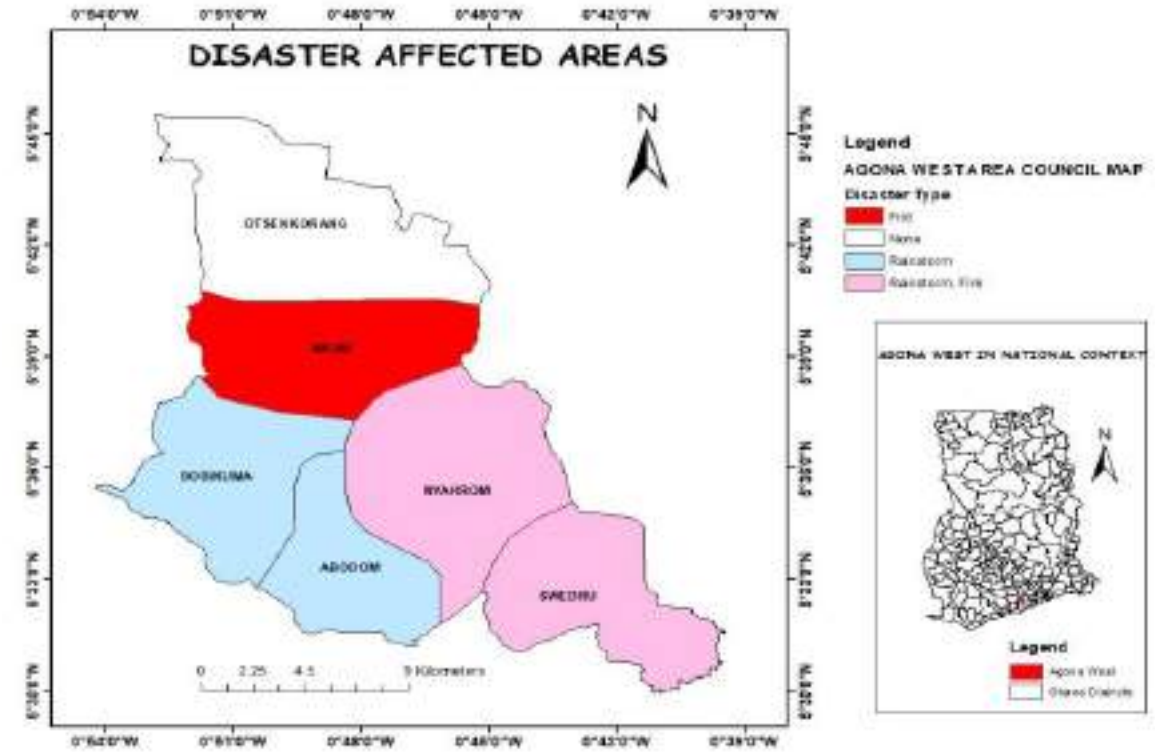

Figure 9: Disaster Affected Areas (Fire, Rainstorm)

Source: NADMO, 2022

2.4.10 Waste Management

The indiscriminate liquid and waste disposal expose the townships in the Municipality to climate change and its impacts. There is the crucial need to improve the situation through proper drainage and waste management systems. The Environmental Health and Sanitation Unit which is the responsible agency at the local level will need to be adequately supported and resourced to achieve this. Currently, the estimated waste generated in the municipality is pegged at 99,150 per annum. However, only about 58.5% representing 58,000 tonnes is estimated to be collected annually. Actual collection, notwithstanding, stands at 40,800 tonnes per annum.

Public toilets are the most popular form of sanitation infrastructure in Agona Swedru. However, their provision and hygienic conditions are often inadequate. Eighty-five percent of wastewater in the municipality is largely disposed inappropriately and in an unhygienic manner, i.e. thrown onto the street or gutter/open channels. Soak pits and septic tanks are not properly managed resulting

in seepage to groundwater sources, and there are not many parties providing desludging services or any approved disposal sites. There is also no regulation for disposal of black water. So far, water supply, sewage management, and remediation activities account for only 0.1 percent of the local economy.

More than 45 percent of the households in Agona Swedru dispose their solid waste in public dump containers and another 40 percent in open spaces. Only about three percent of the waste is collected door-to-door. Informal collection of papers, plastic cans/bottles and metals is carried out by informal workers and sold to scrap dealers, who recycle or reuse these products. Others also burn their waste, especially in the rural areas. Most waste is however bio-degradable waste. Waste is not segregated formally.

Households disposing of wastewater into gutters, septic tanks and onto the streets tend to live in poor dwellings, not have secure land tenure, have higher percentage of children in the household, and have smaller household sizes. The latter two factors, common in migrant families, suggest a demographic component who may not have access to good housing and tenure security. As such, they are highly vulnerable to climate change impacts.

The situation of sanitation and waste management exposes the Municipality to extreme climate change impacts such as flooding, and public health issues.

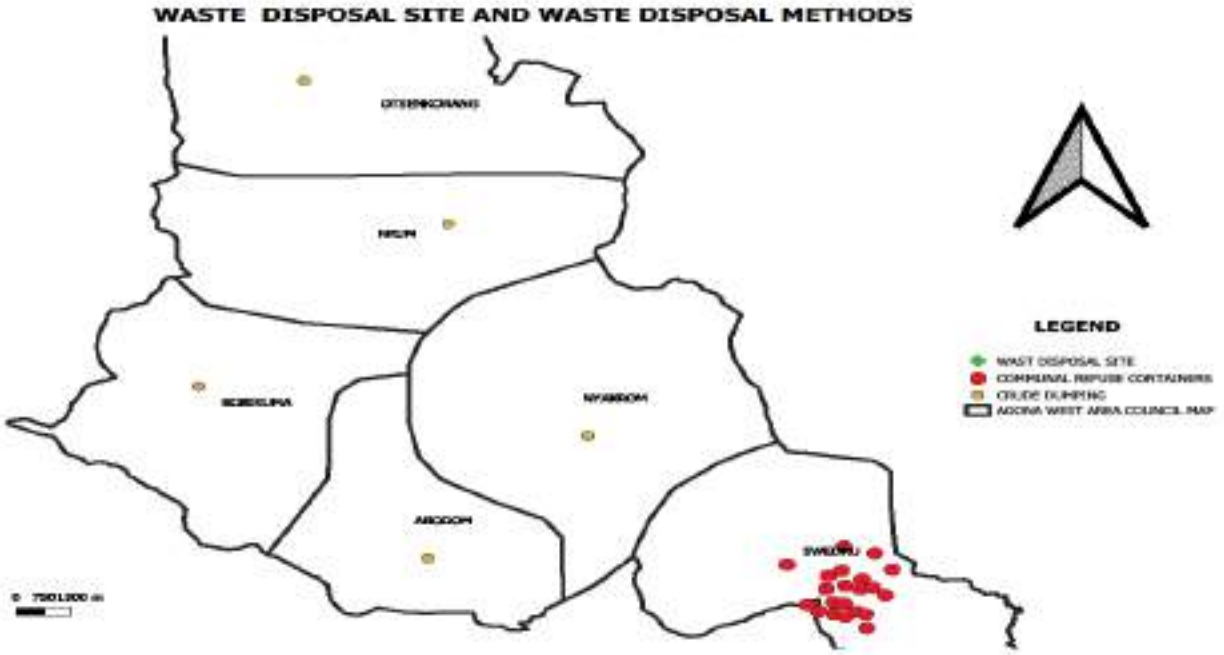

Figure 10: Waste Disposal Methods

Source: EHSU, 2022

2.4.11 Gender

Women bear a greater vulnerability to the impacts of climate change compared to men, primarily due to their higher representation among the impoverished and their heightened dependence on natural resources for livelihoods. Their limited adaptive capacities stem from enduring social inequalities, entrenched economic roles, unequal access to resources and decision-making, restricted information access, ineffective property rights, and reduced mobility. The exacerbated vulnerability of women to climate change is further underscored by their relatively low possession of assets—physical, financial, and social. Achieving climate justice requires addressing gender disparities, as climate change affects men and women differently.

The youth, constituting a substantial portion of Agona West's population, endure the long-term consequences of climate change. Consequently, the youth are pivotal stakeholders in the climate change process.

2.5 Existing Coping Mechanisms to Climate Change and its Impact in Agona West

2.5.1 Institutional Responses

The Municipality, through its Department of Agriculture, National Disaster Management Organization, Environmental Health and Sanitation Unit, Physical Planning Department, Works Department, Urban Roads Department, and Development Planning Unit has been developing interventions to mitigate and adapt to climate change impacts. Key interventions include:

i. Sensitization and public education programmes on climate change and its impacts, particularly through radio programmes and community engagements.
ii. Implementation of capital-intensive road projects. Notably, the implementation of the Ghana Secondary Cities Support Programme has contributed to the resilience of Agona Swedru, which is the most urbanized town in the municipality. The road and drainage projects implemented under the programme have improved conditions of road surfaces, reduced congestion at the Central Business District, controlled erosion, and checked recurrent flooding in the Municipal capital.
iii. Routine identification of hazards in the Municipality by NADMO.
iv. Tree planting exercises, spearheaded by Parks and Gardens, which is now immersed into the Physical Planning Department.
v. Enforcement of Assembly bye-laws to check pollution and other environmental and sanitation related issues.
vi. Preparation and review of local plans to check disorderliness of human settlement.
vii. Preparation of Structural Development Framework to check land use.
viii. Training of farmers by extension officers in conservation agriculture.
ix. Parking fines to regulate congestion at the CBD.
x. Organization of monthly clean-up exerices.

2.5.2 Local Community (Indigenous) Responses

In addition to the institutional efforts at mitigating and adapting to climate change, indigenous strategies are also being undertaken at the various communities. Key indigenous strategies include:

i. Taboo days to control pressure on forestry, farmlands, water resources, and pollution.
ii. Sacristy of Swedru Forest Reserve to protect the forest and its ecosystem.
iii. Indigenous healthcare delivery services, usually using herbs from plants.
iv. Rain harvesting.
v. Communal labour.

CHAPTER THREE

EXPECTED CLIMATE CHANGE AND ITS IMPACTS

3.1 Future Climate Changes

The absence of data on Agona West for modeling and projecting future climate changes challenged the projection of climate change in the Municipality. However, the situational analysis conducted – which revealed the municipality's rapid population growth (growth rate of 3.2%), increasing conversion of vegetation to concrete and bareland, influx of automobiles, practices including burning of wastes and tyres, and indiscriminate dumping of waste, provides the qualitative basis for projecting changes in climate in the Municipality.

Temperature: It is projected that temperature will rise and climate variability will increase slightly by the end of the century.

Rainfall: it is projected that the climate will be wetter, and annual rainfall will increase. There will be slight increase in precipitation and climate variability. The rainy season will start earlier and end later, resulting in a rainy season that will be longer by up to two (2) weeks.

These changes are projected to result in extreme weather events such as intense heat, more intense rainfall, and windstorm/rainstorm.

3.2 Sectorial Climate Change Risk Assessment

The expected hazards resulting from the expected climate changes and extreme events put the various sectors at risk. Table 2 depicts the risks and expected impacts on the sectors.

Table 2: Expected Climate Change Sectoral Impacts

Sector	**Climate Risks/Hazards**				
	Flood	**Rainstorm/Windstorm**	**Intense Heat**	**Fire (Domestic, Commercial, and Bush)**	**Erosion**
Agriculture and Food Security	Inundation of farmland. Destruction of food crops. Low crop yields.	Erosion of soil. Loss of soil fertility. Low productivity. Destruction of crops.	High demand of water for plant growth. Increased pest infestation.	Destruction of tree plants. Displacement of farm animals.	Destruction of root crops. Loss of soil fertility. Immotorable farm roads.

		Destruction of animal housing.	Drying up of water for irrigation purpose.		
Water Resources	Contamination of water bodies. Intrusion of salt water. Increased flooding.	Greater amount of runoff. High risk of water borne diseases. Increased sediments in water.	Drying up of waterbodies. Loss of aquatic life. High rate of evaporation. Water shortage/stress. High concentration and toxicity of pollutants. Increased algae growth thus affect water quality.	Destruction of water pipe lines.	Decrease water clarity. Increased turbidity of water. Increased sediment in water.
Wetland	Destruction of crops.	Destruction of already compromised wetland, mangrove swamps, and ecosystem.	Threats to wetland ecosystem as intense heat may increase dryness of wetland.	Destruction of wetland ecosystem including mangrove and other species.	Wetland eroded thus loses its ecosystem.
Land Use, Forestry	Displacement of human population. Changes in habitat conditions.	Increased water and air-borne diseases. Increased flooding. Destruction of some tree species.	Displacement of heat-intolerant species	Loss of biodiversity.. Loss of livelihoods.	Loss of soil fertility.
Transportation	Difficulty in using water transport. Disruptions in socio-economic activities. Reduction in quality of road conditions by creating and worsening potholes.	Flooding leading to destruction of road. Eroded road surfaces. Potholes on roads.	Cracks on road surfaces. Mechanical failure in cars, trucks and motorcycles.	Destruction of cars.	Reduction in road surface conditions.
Energy and Infrastructure	Destruction of energy infrastructure, such as power plants, and electricity poles. Disruptions in electricity supply. Collapse of weak and old buildings. Weakening of infrastructures.	Destruction of energy production facilities and transmission lines. Ripping off roofs and collapse of buildings. Disruption in socio-economic activities. Collapse of telecommunication infrastructure.	Higher demand for energy for cooling. Warping of tarmac. Danger of explosion.	Destruction of energy facilities and other infrastructures.	Exposure of transmission lines and pipe-lines. Impair recreational facilities (parks and gardens).

	Delay completion of projects. Disruption in socio-economic activities.				
Industry and Commerce	Damaging of industrial machines. Destruction of communication infrastructure. Disruption in economic activities.	Disruption of production by climate change-induced reduction in the supply of raw materials. Disruption in economic activities. Loss of properties. Increase in production costs.	Reduced productivity of workers due to heat stress. Increased cost of energy for cooling.	Destruction of materials and other facilities. Increase in debt.	Increased prices of goods and services.
Financial Services	Trigger disasters which will affect the Sector both directly and indirectly. Increase the need for insurance against disaster risks.	Flooding from excessive rainfall causing insurance claims and premiums to rise.	Low productivity due to heat stress. High cost of energy for cooling .	Loss of institutional data. Loss of savings.	
Human Settlement and Health	Loss of lives and properties. High-incidence of water-borne and skin diseases. Displacement of household and people. Depreciation of land values.	Damage to electricity, water, and telecommunication infrastructure. Loss of lives and properties. Death and injuries.	Greater incidence of heat related diseases. Heat stress. Out-migration to other areas leaving women, aged, and children behind. Malnutrition.	Loss of lives and properties. Damage to basic infrastructure.	Depreciation of land values. Poor accessibility.
Disaster Management	More pressure on disaster response systems. Displacement of people. Loss of lives and properties.	More pressure on disaster response systems. Displacement of people. Loss of lives and properties.	Greater incidence of heat stress could put more pressure on disaster response system and hospitals	Fire outbreak. Loss of lives and properties	Death traps
Waste Management	Greater incidence of diseases such as malaria, cholera, and diarrhea	Destruction of waste bin collectors. Destruction of waste management facilities.	Low productivity of waste management workers.		Trapping of waste which could become sources of diseases
Gender and PWD	Women, elderly, children, and PWDs become vulnerable	Women, elderly, children, and PWDs become vulnerable	Women, elderly, children, and PWDs become vulnerable	Women, elderly, children, and PWDs become vulnerable	Women, elderly, children, and PWDs become vulnerable

3.3 Spatial Dimension of Climate Risks

The climate risks assessment considered the spatial distribution of climate risk in the Municipality. Some spatial maps developed to assess climate risks across various zones in the Municipality include flood risk map, land surface temperature map, and urban heat island map.

3.3.1 Flood Risk

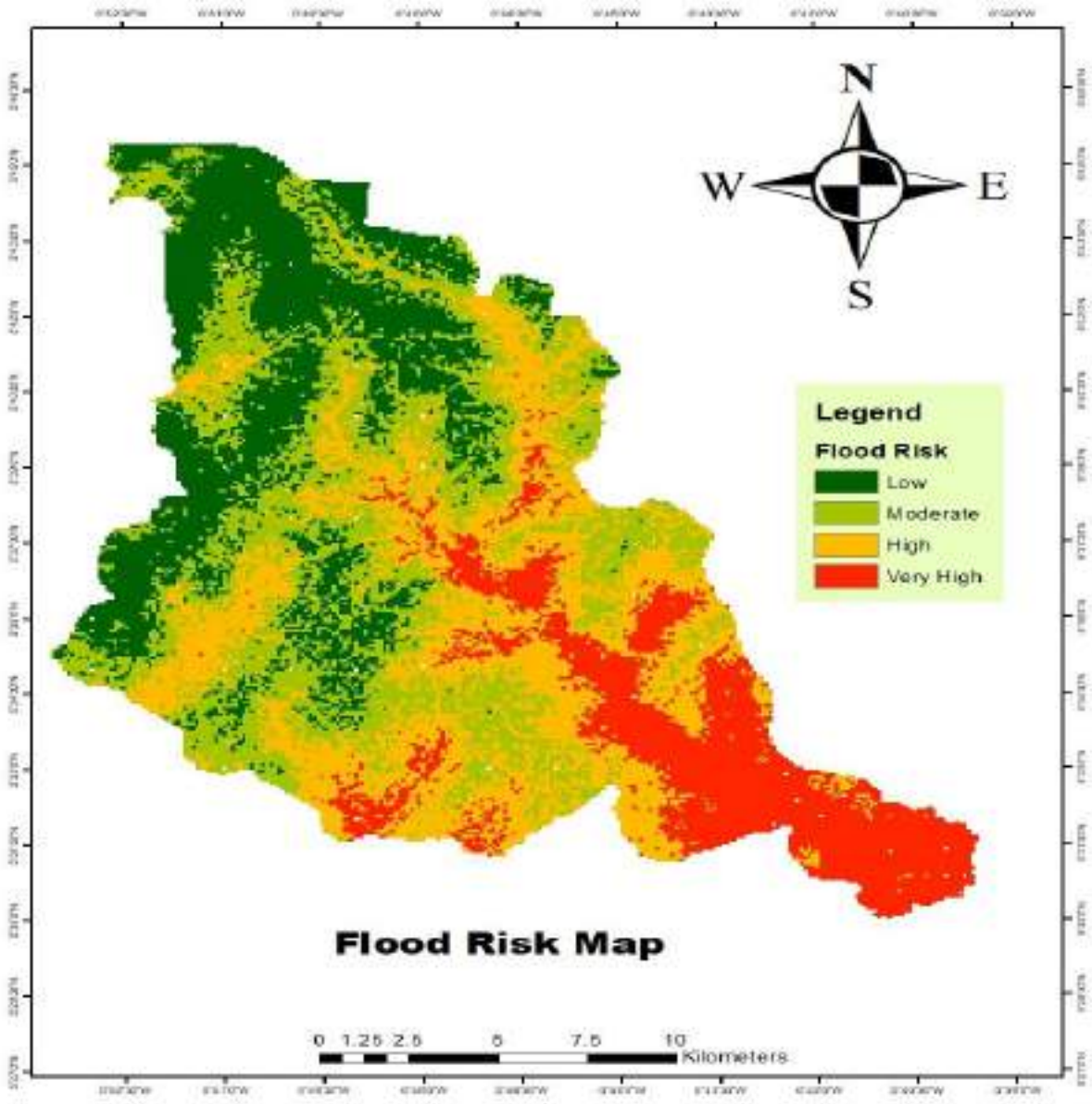

Figure 11: Flood Risk Map

From fig 10, the southeastern zone of the Municipality emerges as a focal point for greater flood risk. Furthermore, stippled regions in the southern and central belts exhibit pronounced risks. Predominantly, Agona Swedru, Nyakrom, Bobikuma, and Abodom townships, with Agona Swedru predominating, house communities situated in very high-risk zones. Conversely, Otsenkorang and Edukrom demonstrate lower risk profiles, while Nkum and Ahamadonko fall within moderate risk zones. These disparities emanate from divergent levels of impervious and concrete surfaces, diminished vegetation cover, and distinct settlement layouts within the Municipality.

Notably, the Swedru township emerges as the epicenter of flood risk, owing to its higher susceptibility. This susceptibility is attributable to the substantial built-up nature of the town, surpassing other locales within the Municipality. In essence, the disproportionate susceptibility of Agona Swedru to floods is closely tied to its rapid urbanization. The high concentration of built-up areas amplifies flood risk, as impervious surfaces prevent natural water absorption and increase surface runoff. The density of buildings in the town is low, and it relatively lacks green spaces. Additionally, there is high incidence of non-adherence to building regulations in the town, thus causing many buildings to be erected in waterways thus affecting proper drainage of water in the town. Similar trend is experienced in the other very high-risk zones but Swedru is paramount.

Flood triggering factors

Elevation: one of the prime factors controlling flood occurrence. Lower and low land areas may get flooded faster as water flows from high altitude to low regions. Areas located at a higher elevation usually have a lower probability of flooding compared to low lands. (Ullah & Zhang, 2020)

Slope: Slopes regulate surface water flow. The area having a lower slope is more exposed to flooding. (Ullah & Zhang, 2020)

Drainage Density: Drainage density is defined as the ratio of the total length of the watershed channels to the total area of the basin. A higher likelihood of flooding is directly linked to higher drainage density as it indicates a high surface runoff. (Ullah & Zhang, 2020)

LULC: important factors in generating surface runoff and potential flooding in a watershed. LULC directly or indirectly affects penetration, evapotranspiration, and surface runoff generation. (Ullah & Zhang, 2020)

Rainfall: In Agona West, flooding usually occurs after heavy rainfall. (Ullah & Zhang, 2020)

Proximity to river: heavy rainfall lead to a rise in water level of river and thus cause the river to overflow its banks. As such, areas closer to rivers are at risk. (Ullah & Zhang, 2020)

Proximity to road: Run-off and drainage could result in flooding of areas closer to road. However, this is in relation to land cover. (Rahman et al., 2021)

The flood risk assessment map was prepared through a rigorous multi-criteria analysis, incorporating factors such as slope, rainfall patterns, drainage density, elevation, land use patterns, proximity to water bodies, and road adjacency.

3.3.2 Land Surface Temperature (LST)

In anticipation of rising temperatures, a crucial attempt lies in elucidating the spatial distribution of Land Surface Temperature (LST) within the Municipality. Discerning variations in LST across diverse communities is pivotal for informed climate risks and resilience strategies. Figure 11 illustrates a discernible contrast in LST across the Municipality. The northern sector exhibits lower temperatures, while the southern counterpart contends with elevated temperatures. This nuanced variation in LST implies that specific zones, particularly in the southern regions and select areas within the middle belt, are predisposed to heat stress and associated impacts. Noteworthy locations encompass Agona Swedru, Nyakrom, Bobikuma, and Abodom.

The heightened temperatures observed in the identified areas are attributable to a confluence of factors, notably low vegetation cover and the prevalence of high impervious surfaces. The dearth of greenery diminishes the natural cooling effect, while the prevalence of impermeable surfaces exacerbates heat retention, collectively contributing to the observed elevated LST. The LST analysis involved determining the Top of Atmospheric (TOA) spectral radiance, Brightness Temperature Conversion, NDVI (health of vegetation cover, Proportion of Vegetations (PV), and Emissitivity.

Temperature will continue to rise.

From the analysis, Agona West has an average temperature of 21.8°C and it is estimated to rise in the future. The rising temperature could be attributed to increasing use of automobiles, conversion of vegetation cover to brown development, conversion of wetlands to brown development, slash and burn farming method, burning of tyres, increasing use of low energy efficient items such as refrigerators, air conditioners, among others, indiscriminate dumping of cans that emit CFCs, and burning of solid wastes.

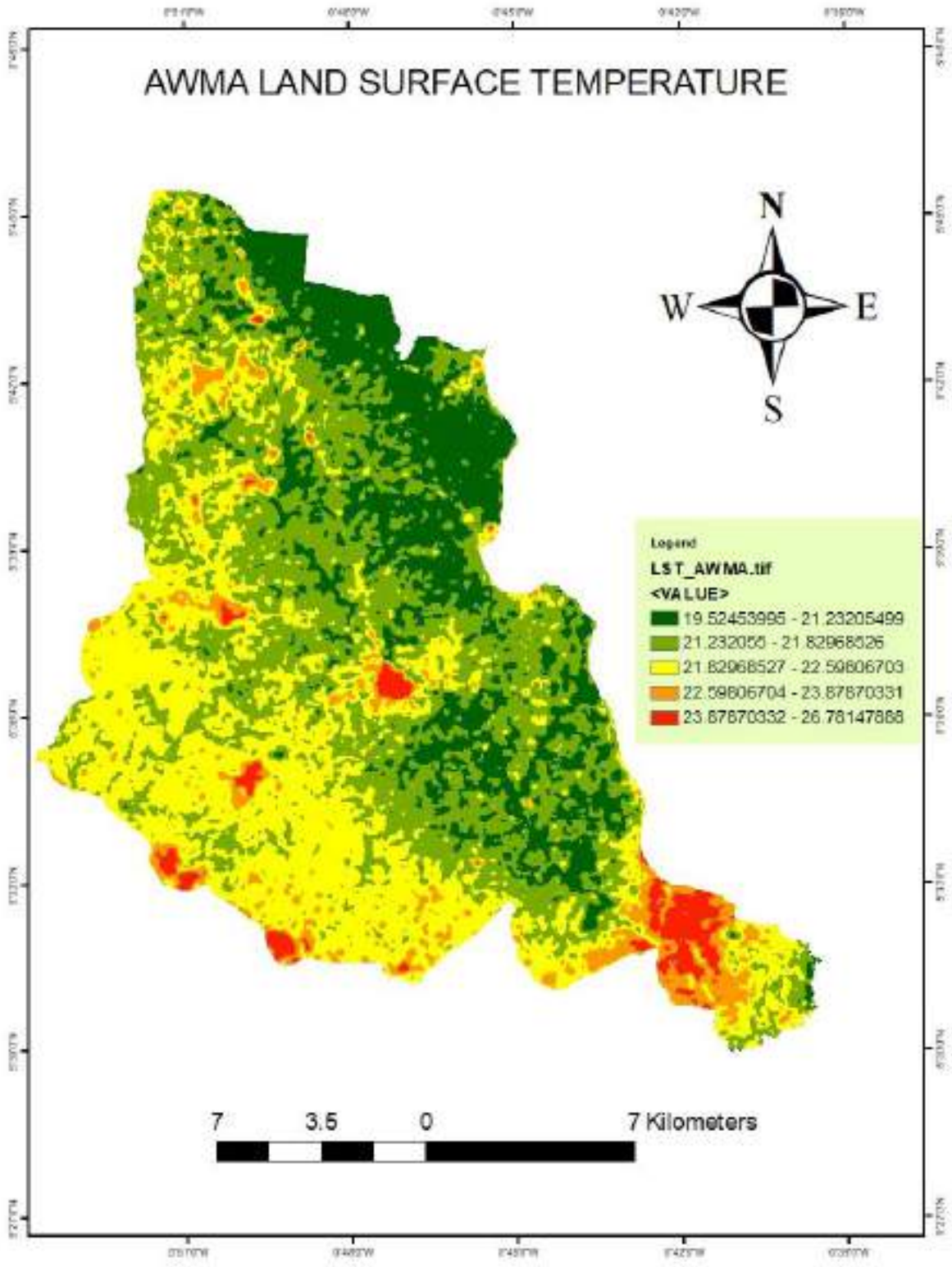

Figure 12: Land Surface Temperature

3.3.3 Urban Heat Island

Understanding the dynamics of the Urban Heat Island (UHI) is pivotal in delineating heat differentials between urban and rural locales within the Municipality. This understanding serves as a linchpin for identifying areas prone to heat stress and its associated ramifications. Figure 12 offers a visual representation of these thermal disparities.

The pronounced UHI effect is notably conspicuous in the extreme southeastern sector of the Municipality, particularly in Agona Swedru. This locale emerges as a focal point for heightened temperatures, indicating an elevated risk of heat stress and its concomitant impacts. Further scrutiny reveals that the risk extends to encompass additional areas, such as Nyakrom, Bobikuma, Abodom, and dotted areas in the northern zone.

Aggregate analysis underscores that the western and extreme southeastern zones exhibit an elevated risk profile concerning heat stress. The amalgamation of high temperatures in these regions is accentuated by the intricate interplay of impervious surfaces, reduced vegetation, and other urbanization-induced factors, amplifying the risks of these areas to heat-related challenges.

Insights from the analysis indicate that the rural areas of the Municipality are concentrated on the eastern part of the Municipality and thus at lower risks of heat stress.

Overview of UHI

Rapid increases in population and the pace of urban development, coupled with the augmented utilization of impermeable materials in the urban landscape, have diminished the presence of green spaces. The presence of green spaces exerts a discernible cooling influence, and in the absence of shade, urban areas can experience heat islands, characterized by localized temperatures significantly exceeding the average.

Urban Heat Islands pose chronic risks to residents, particularly the elderly and vulnerable populations, while heatwaves amplify the immediate risk. From the focus group discussions, residents in Swedru, Nyakom, ABodom, and Bobikuma confirmed their heat experiences. This implies that residents of these areas are at risk of heat and its related impacts in the future.

Walking rate in Agona Swedru, Nyakrom, Bobikuma, and Abodom is high, and heat islands in these areas can negatively affect people walking and cycling in these areas. Since walking and cycling are mitigating strategies, the heat islands could impact the effort at mitigating climate change impacts in the Municipality.

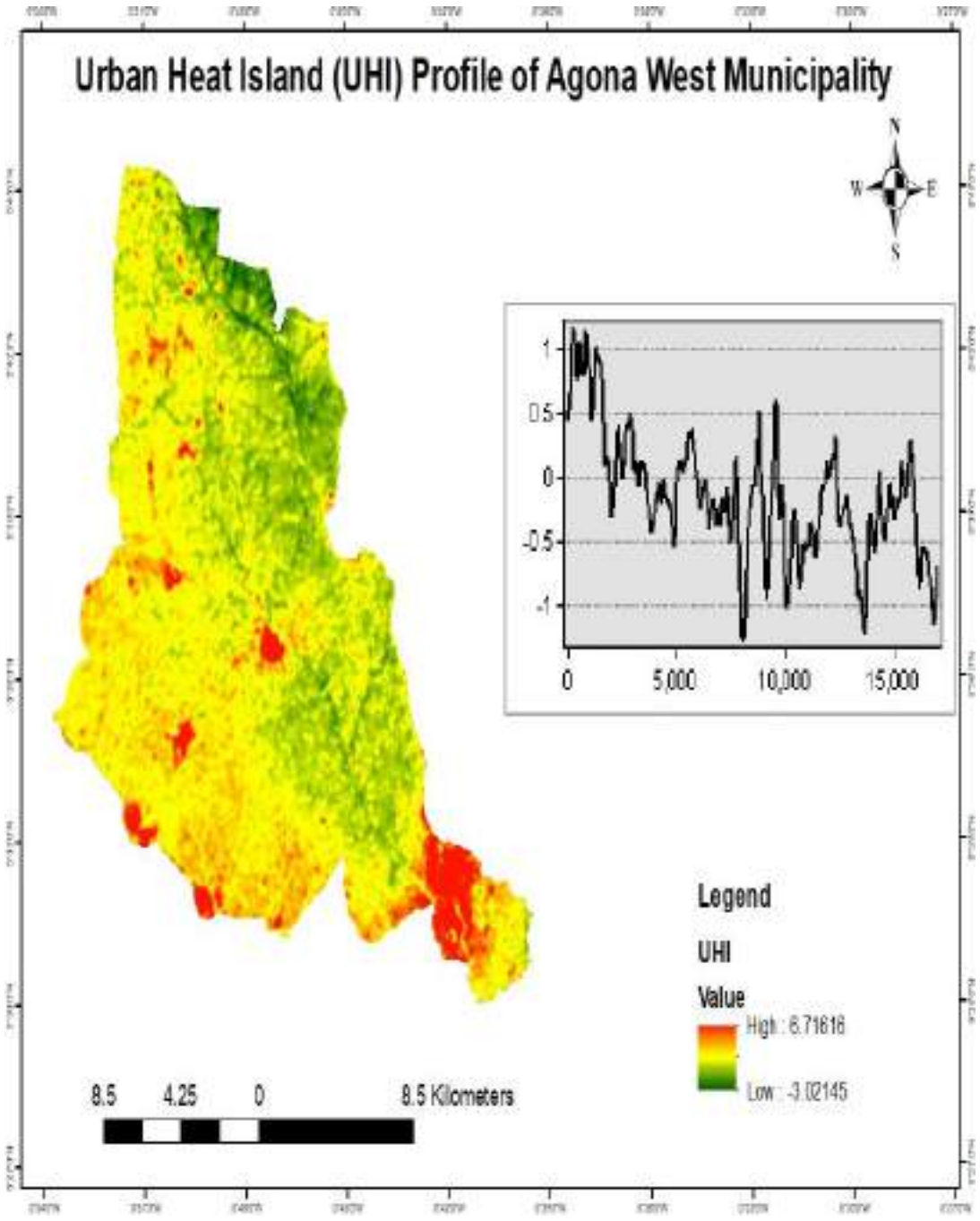

Figure 13: Urban Heal Island (UHI)

CHAPTER FOUR

GOALS, OBJECTIVES, AND STRATEGIES

4.1 Goal of the RCCAP

The goal of the Risk and Climate Change Assessment Plan is to achieve sustainable development through the creation of climate-resilient and climate-friendly environment in Agona West Municipality.

4.2 Objectives of the RCCAP

The objectives of the Risk and Climate Change Assessment Plan which reflects the aspirations of the Municipality include:

Objective 1: Ensuring effective adaptation strategies.

Objective 2: Promoting social development initiatives.

Objective 3: Implementing robust mitigation measures.

4.3 Priority Areas

The Agona West Municipal Assembly adopts the priority areas of the NCCP (2013) for this plan:

i. Agriculture and Food Security
ii. Disaster Preparedness and Response
iii. Equitable Social Development
iv. Natural resources management
v. Energy, Industry, and Infrastructure

4.4. Strategies to Priority Area Mapping

Table 3: Strategies to Priority Area Mapping

Priority Area	**Strategies**
Agriculture and Food Security	Develop climate-resilient agriculture and food security systems
	Develop human resource capacity for climate-resilient agriculture.
Disaster Preparedness and Response	Build climate-resilient infrastructure

	Increase resilience of vulnerable communities to climate-related risks
	Build local capacities to reduce risk and vulnerability.
	Improve spatial planning
Natural Resource Management	Conservation of trees through sustainable forestry and on-farm practices
	Plantation development (afforestation, reforestation and forest restoration)
	Improve governance, capacity and regulatory structures
	Ensure sustainable management of aquatic and terrestrial resources
Equitable Social Development	Improve public health measures (immunization, improved drainage, sanitation and hygiene) especially in vulnerable communities
	Ensure emergency health preparedness, e.g., provision of ambulances in vulnerable areas
	Ensure social protection and improved access to health care
	Strengthened disease surveillance and response systems
	Promote environmental sanitation education and hygiene education
	Improve access to safe drinking water
	Enhance water and land management
	Embark research and recycling endeaours
	Improve access to sanitation facilities

	Promote equal opportunities and affirmative action for women and vulnerable groups in climate change adaptation and mitigation
	Increase knowledge and strengthen capacity at all levels on gender-responsive climate change interventions
Energy, Industry, and Infrastructural Development	Improve greenhouse gas inventory mechanisms
	Strengthen measures to reduce greenhouse gas emissions, mainly from the energy (including power generation, oil and gas, transport, biomass), industry, and waste sectors.

CHAPTER FIVE

RISK AND CLIMATE CHANGE ACTION PLAN

5.1 Introduction

The action plan lays out the tasks Agona West need to implement to accomplish its goal. It also breaks up the process into actionable assignments based on a timeline. Table 4 indicates the Action Plan for implementation.

Table 4: Action Plan

Policy Area	Programme	Sub-Programme	Activity	Location	Timeframe			Cost						Implementing Bodies	
					Y 1	Y 2	Y 3	GoG	IGF	DACF	DACF-RFG	DACF MP	Others	Lead	Collab
Agriculture and Food Security	Economic Development	Agricultural Services and Management	Train 100 farmers in climate smart agricultural practices including mulching, agroforestry, and mixing cropping	Municipal wide					50,000.00					Dept. of Agric	FBOs
	Economic Development	Agricultural Services and Management	Train 100 farmers in conservative agriculture	Municipal wide					50,000.00					Department of Agric	MOFA, CSIR
	Economic Development	Agricultural Services and Management	Organize training for three vegetable FBO on	Municipal wide									4,600.00	Department of Agric	CA

			irrigation Methods												
	Economic Development	Agricultural Services and Management	Facilitate farmers access to credit	Municipal wide					10,000.00					Dept of Agric	Financial institutions, Cooperatives, CA
	Economic Development	Agricultural Services and Management	Organize sensitization programmes on agricultural insurance schemes	Municipal wide					10,000.00					Dept. of Agric	Financial institutions, Cooperatives, CA
	Economic Development	Agricultural Services and Management	Provision of drought resistant and improved seeds	Municipal wide				20,000.00	50,000.00				50,000.00	MOFA	Dept of Agric, CSIR, FBOs
	Economic Development	Agricultural Services and Management	Facilitate the provision of storage and processing facilities	Municipal wide						100,000.00			150,000.00	AWMA	MOFA
	Economic Development	Agricultural Services and Management	Train 10 extension officers in climate smart-agriculture to enhance support to farmers	Agona Swedru						20,000.00				MOFA	AWMA
	Economic Development	Agricultural Services and	Liaise with academia to conduct	Municipal wide						200,000.00			50,000.00	AWMA	University of Ghana

		Management	research on climate-smart agriculture												
	Economic Development	Agricultural Services and Management	Train women and other vulnerable groups on climate-resilience methods in the agricultural sector.						10,000.00					Dept. of Agric	Financial institutions, Cooperatives, CA
	Economic Development	Agricultural Services and Management	Data collection on indigenous agricultural knowledge and application of findings in climate-smart policies.										50,000.00	Dept. of statistics	Development Planning Unit, Dept of Agric
Disaster Preparedness and Response	Infrastructure Development and Management	Physical and Spatial planning	Review 3No. existing local plans within the Municipality	Municipal wide									90,000.00	PPD	Traditioinal authorities, Land owners
	Infrastructure Developme	Physical and Spatial planning	Conduct ground truthing exercise	Selected communities					30,000.00					PPD	CA

	nt and Management														
	Infrastructure Development and Management	Physical and Spatial planning	Completion of 1No. street naming exercise at Agona Nyakrom (Verification, Stenciling, Embossment and Signage post)	Agona Nyakrom									90,000.00	PPD	Traditional Authorities
	Infrastructure Development and Management	Physical and Spatial planning	Organize 4No sensitization programmes on the need to adhere to building regulations	Municipal wide					40,000.00					PPD	WD
	Environmental Management	Disaster Prevention and Management	Identification of hazards in the Municipality	Municipal wide									4,800.00	NADMO	EHSU
	Environmental Management	Disaster Prevention and Management	Organize public education on climate change and adaption	Municipal wide									6,200.00	NADMO	EHSU, Department of Agric
	Environmental	Disaster Prevention and	Organize public education on	Municipal wide									8,500.00	NADMO	EHSU

	Management	Management	hydrometeorological disasters												
	Environmental Management	Disaster Prevention and Management	World Disaster Day celebration	Municipal wide									25,000.00	NADMO	CA
	Environmental Management	Disaster Prevention and Management	Public education on domestic, commercial, and bush fires	Municipal wide									6,700.00	NADMO	EHSU
	Environmental Management	Disaster Prevention and Management	Organise 2No. orientation programme for key staff and other stakeholders on climate change and its impacts and disaster risk reduction	Selected communities									90,000.00	NADMO	EHSU, CA
	Environmental Management	Disaster Prevention and Management	Encourage relocation of settlements and economic activities from climate-related disaster-prone areas	Municipal wide					20,000.00					NADMO	EHSU, PPO, CA
	Environmental	Disaster Prevention and	Train technical staff of the Assembly to						25,000.00					Higher Educational	PPD, WD, URD, CA,

	Management	Management	adopt climate-responsive infrastructural designs in all physical works of the Assembly											Institution	EHSU, NADMO
	Environmental Management	Disaster Prevention and Management	Afforestation – Nursing and Distribution of 50 Tree Seedlings	Municipal wide									1,500.00	Department of Agric	NADMO, PPO
	Environmental Management	Disaster Prevention and Management	Prepare Comprehensive Operation and Maintenance Plan for Drains, Pedestrian Walkways, and Road Network Agona West Municipality	Municipal wide									63,000.00	URD	PPD, WD
	Infrastructure Development and Management	Road and Transport Services	Construction of 6No Pipe Culverts within the Municipality	Selected Communities							800,000.00			URD	WD, PPD, CA
	Infrastructure Development and	Road and Transport Services	Construction of 1No. double 1.2meter diameter pipe	Agona Swedru								160,062.00		URD	WD, CA, Assembly members, Traditional

	Management		culvert at Saint Germain in Agona Swedru (MP PROJECT)												Authorities
	Infrastructure Development and Management	Road and Transport Services	Dredging and concrete lining of 5km of Akora river (Ph1)										4,000,000.00	URD	WD, CA
	Environmental Management	Disaster Prevention and Management	Document and promote appropriate indigenous knowledge and best practices	Municipal wide										NADMO	Agric, EHSU, PPO, CA
	Environmental Management	Disaster Prevention and Management	Conduct research on appropriate infrastructure design standards that meet higher requirements against extreme weather-related natural hazard events	Municipal wide										WD	URD, Academia
	Management and Administration	General Administration	Organize Monthly Spatial Planning						36,000.00					CA	PPD

	Management and Administration	General Administration	Organize monthly Technical Sub-Committee Meetings					36,000.00					CA	PPD
	Management and Administration	Finance and Audit	GOG allocation to Physical Planning Unit	Agona Swedru				20,000.00					Finance	PPD, CA
Natural Resource Management	Environmental Management	Natural Resource Conservation and Management	Capacity building for key staff on natural resource management	Agona Swedru				30,000.00					MESTI	Forestry, Water Commission, Ministry of sanitation and water resources
	Environmental Management	Natural Resource Conservation and Management	Safeguard natural resources including water, forestry, wetlands, and other ecological sensitive zones	Municipal wide					30,000.00				PPD	GWCL, NADMO, EHSU, Agric, CA, traditional authorities, assembly members
	Infrastructure Development and Management	Physical and Spatial planning	Tree Planting and Maintenance	Municipal wide				80,000.00					PPD	NADMO, EHSU, Agric

	Natural Resource Conservation and Management	Natural Resource Conservation and Management	Organize sensitization programmes on rainwater harvesting	Municipal wide					50,000.00					Ministry of sanitation and water resources	AWMA
	Environmental Management	Natural Resource Conservation and Management	Facilitate local community involvement in resource management	Municipal wide						40,000.00				CA	Assembly members, Traditional authorities, forestry
	Environmental Management	Natural Resource Conservation and Management	Education on protection of natural resources and the environment	Municipal wide						15,000,00				PPD	NADMO, EHSU, CA
	Environmental Management	Natural Resource Conservation and Management	Revision of local plan to incorporate the protected areas							40,000.00				PPD	NADMO, EHSU, CA
	Environmental Management	Natural Resource Conservation and Management	Promote public education and awareness development permit application processes						15,000.00					PPD	NADMO, EHSU, CA
	Environmental	Natural Resource Conservatio	Regulate exploitation of wetland resources through by-laws						10,000.00					PPD	NADMO, EHSU, CA

	Management	n and Management													
	Environmental Management	Natural Resource Conservation and Management	Spatial Analysis on water reservation/buffer										20,000.00	PPD	NADMO, EHSU, CA
	Environmental Management	Natural Resource Conservation and Management	Frequent and effective monitoring on all developments around waterbodies										85,000.00	PPD	NADMO, EHSU, CA
Equitable Social Development	Social Services Delivery	Public Health Services and management	Construction of 1 no. two storey male and female ward including laboratory	Agona Swedru							580,000.00			MHD	WD, CA, PPD, Swedru Government Hospital
	Social Services Delivery	Public Health Services and management	Renovation of 2No. CHPS Compound	Selected CHPS Compounds									50,000.00	MHD	WD, CA
	Social Services Delivery	Public Health Services and management	Construction of wellness clinic at Mandela	Agona Swedru									50,000.00	MHD	WD, CA

	Social Services Delivery	Public Health Services and management	Construction Of RCH centers	Municipal wide									105,000,00	MHD	WD, CA
	Social Services Delivery	Public Health Services and management	Construction of 1-bedroom semi-detached Nurses' quarters connected to electricity and installation of polytank at Otabilkrom	Otabilkrom									250,000.00	MHD	WD, CA
	Management and Administration	General Administration	Organize district health committee meetings	Agona Swedru									30,000.00	MHD	CA
	Social Services Delivery	Public Health Services and Management	Map disease incidence and identification of vulnerable groups for climate-sensitive diseases	Municipal wide									50,000.00	MHD	CA
	Social Services Delivery	Public Health Services and Management	Identify, document, and incorporate climate-relevant traditional knowledge into	Municipal wide									25,000.00	MHD	CA

			health delivery systems and practices											
	Social Services Delivery	Social Welfare and community developmen t	Generate gender-specific information including sex-disaggregated data for determining the gender impacts of climate change	Municipal wide					20,000.0 0				DSWCD	CA, Gender Desk Officer
	Social Services Delivery	Social Welfare and community developmen t	Identify and analyse gender-specific needs, impacts, protection, and support measures related to climate change and variability such as floods, rainstorm, heat and diseases	Municipal wide					30,000.0 0				CA	DSWCD, Gender Desk Officer
	Social Services Delivery	Social Welfare and community developmen t	Organize 3No. workshops on climate change issues with women groups, youth groups, PWDs, and aged	Municipal wide					30,000.0 0				CA	DWSCD, NADMO, Gender Desk Officer

	Social Services Delivery	Social Welfare and community development	Sensitize women on acquiring credit facilities to promote their businesses	Municipal wide					5,000.00					GDO	CA, BAC, BRC, DSWCD
	Social Services Delivery	Social Welfare and community development	Embark on the registration and renewal of NHIS cards for indigents	Municipal wide				2,000.00						DSWCD	GDO, CA, NHIA
	Social Services Delivery	Social Welfare and community development	Embark on women and other groups' formation.	Municipal wide				1,500.00						GDO	DSWCD, CA
	Social Services Delivery	Social Welfare and community development	Organize training for 200 women on income generating activities	Municipal wide				5,000.0.0						DSWCD	CA, GDO, BRC
	Social Services Delivery	Social Welfare and community development	Support 150 PWDs to start a trade, expand their trade.	Municipal wide				100,000.00						DSWCD	CA, GDO, BRC
	Social Services Delivery	Social Welfare and community development	Support educational needs and medical needs as well as assist the various	Municipal wide				100,000.00						DSWCD	CA, GES, MHD

			PWDs groups to undertake their activities											
	Social Services Delivery	Social Welfare and community development	Embark on quarterly monitoring of PWDs beneficiaries of common fund support.	Municipal wide				6,000.00					DSWCD	CA
	Social Services Delivery	Social Welfare and community development	Provide hospital welfare services to clients.	Municipal wide				6,000.00					DSWCD	CA, MHD
	Social Services Delivery	Social Welfare and community development	Embark on 6 bi-monthly beneficiary households LEAP cash grant payments and monitoring.	Municipal wide				55,000					DSWCD	Assembly members
	Social Services Delivery	Social Welfare and community development	GoG support to people with disability	Municipal wide				400,000.00					CA	DSWCD
	Social Services Delivery	Social Welfare and community development	GOG allocation to Social Welfare and Community Development Department	Agona Swedru				17,932.00					CA	DSWCD

	Social Services Delivery	Social Welfare and community development	UNICEF Support to child protection programmes	Municipal wide									42,000.00	DSWCD	UNICEF, CA
	Social Services Delivery	Environmental Health and sanitation	Recycle water for domestic and industrial purposes	Municipal wide						120,000.00				EHSU	Ministry of sanitation and water resources, CSOs
	Social Services Delivery	Environmental Health and sanitation	Implement drinking water and sanitation programmes in areas at risk from climate change	Selected communities						20,000.00				EHSU	NADMO, NCCE, CA
	Social Services Delivery	Environmental Health and sanitation Services	Collate/Update Baseline Database on Waste (Solid and Liquid) and Prepare Municipal Environmental Sanitation Strategic Action Plan (MESSAP)	Municipal wide								90,000.00		EHSU	CA, Statistics
	Social Services Delivery	Environmental Health and	Clearing of final disposal site or landfill site	Agona Swedru						600,000.00				EHSU	CA

		sanitation Services													
	Social Services Delivery	Environmental Health and sanitation Services	Construction of Engineered Landfill site	Agona Swedru						800,000.00				EHSU	CA
	Social Services Delivery	Environmental Health and sanitation Services	Purchase Sanitary tools for management of solid and liquid waste activities	Agona Swedru					70,000.00					EHSU	CA
Energy, Industrial and Infrastructural Development	Management and Administration	Planning, Statistics, Coordinating and Budgeting	Data collection and documentation systems for GHG emissions, inventories and reporting	Municipal wide									70,000.00	Statistics	CA, NADMO, MESTI
	Management and Administration	Human Resource Management	Capacity building for staff to improve technical competencies in assessing GHG emissions, inventories, and reporting	Agona Swedru					20,000 00					Human Resource Department	CA, NADMO
	Social Services Delivery	Environmental Health and	Construction of faecal sludge management plant	Agona Swedru				800,000.00						Ministry of Sanitation and	CA, EHSU, PPD

		sanitation Services											Water Resources	
	Economic Development	Trade, Industry, & Tourism	Construction of Phase 2 of 2-storey 60 No lockable Stores with a parking lot, restaurant, sick bay electricity and water at Mandela in Agona Swedru	Agona Swedru								5,834,457.00	WD	PPO, URD, CA, Traditional Authority
	Economic Development	Trade, Industry, & Tourism	Construction of 20No. lockable stores at Abodom	Abodom							725,000.00			WD	PPO, URD, CA, Assembly member
	Infrastructure Development and Management	Road and Transport Services	Grading and reshaping of roads of 60km					350,000.00						URD	WD, CA
	Infrastructure Development and Management	Road and Transport Services	Construction of double sealed bituminous road with side drains – 0.57km of Otabilkrom road at Agona Swedru	Agona Swedru								1,423,520.61	URD	WD, CA, MLGRRD

	Infrastructure Development and Management	Road and Transport Services	Bitumen Surfacing of 4.65km road with walkways, roadline marking, rumble stripes and 0.6m diameter U drains at both sides for 650m length of the road at Woraba and Yaabem in Agona Swedru	Agona Swedru									10,000,000.00	URD	WD, CA, PPD
	Infrastructure Development and Management	Road and Transport Services	Bitumen surfacing of 1.7km Yabem area roads with 0.6m and 0.9m diameter U drains at both sides and road line marking of 1.2km in Agona Swedru	Agona Swedru									6,000,000.00	URD	WD, PPD, CA
	Infrastructure Development and Management	Road and Transport Services	Reconstruction of 25 metre length retaining in Swedru Mangoase	Agona Swedru							85,000.00			URD	WD, PPD, CA
	Environmental	Natural Resource	Sensitize public on efficient use	Municipal wide						20,000.00				MESTI	NADMO, CA

	management	Conservation and Management	of energy and of renewable energy sources											
	Management and Administration	Finance and Audit	GOG allocation to Urban Roads and Work Department	Agona Swedru				40,000.00					Finance	PPD, CA
	Infrastructure Development and Management	Public Works, Rural Housing and Water Management	Complete 6 No. Boreholes in 6 communities	Selected communities						250,000.00			WD	CA, Assembly members

5.2 Spatial Dimension of Projects and Programmes

The residential, health, educational, civic,tourism and other spaces shall be embedded in the broader and structured spaces of;

1. Commercial
2. Industrial
3. Agricultural

5.2.1 The Commercial Space

This includes Swedru and the environs of Swedru such as Otabilkrom, Wawase, Bebianeha, Oteprow etc where the enabling environment shall be created for commercial activities comprising banking institutions, retail and whole sale outlets (markets and ultra-modern shopping malls etc) through tax exemptions and public private partnership arrangements in the establishment of commercial ventures.

5.2.2 The Industrial Space

The major challenge facing the agriculture sector is that of marketing and appropriate and stable prices of their produce. This gap is to be addressed by industrialisation where ready demand shall be created for Agric produce thereby enhancing agricultural livelihood systems. A key strategy in this regard to establish industrial enclaves where enabling environments shall be created for industrialisation. For instance, it is envisaged that the private sector led cassava-based industry under the Government Flagship Policy on Industrialisation: The One District One Factory Project shall be established in the zone together with other industries to create economies of scale and forward and backward linkages within the network of industries to be established there. Other industries that would be established in the zone would be palm, fisheries, poultry and piggery based in view of natural comparative advantage principles. The industrial space shall structurally be classified into heavy and light where areas like Yamansokrom, Asasewomi, Nyamebekyre, etc shall comprise the heavy industrial enclave while Nima, Kojo Esilfi and Nyakrom shall constitute the light industrial zone.

5.2.3 The Agriculture Space

The linkage with the industrial space would be established in the demarcated agrarian areas through comprehensive out grower schemes to provide ready supply of raw materials for the industrial sector. Under the Planting for Food and Jobs policy being implemented in the Municipality emphasis shall be placed on cassava, palm, piggery, fisheries, and poultry production to feed the related industries to be established. Major agrarian areas that shall serve as the book basket as well as the sources of industrial raw materials include, but are not limited to, Otsenkorang, Kyekyewere, Edumasa and Abodom.

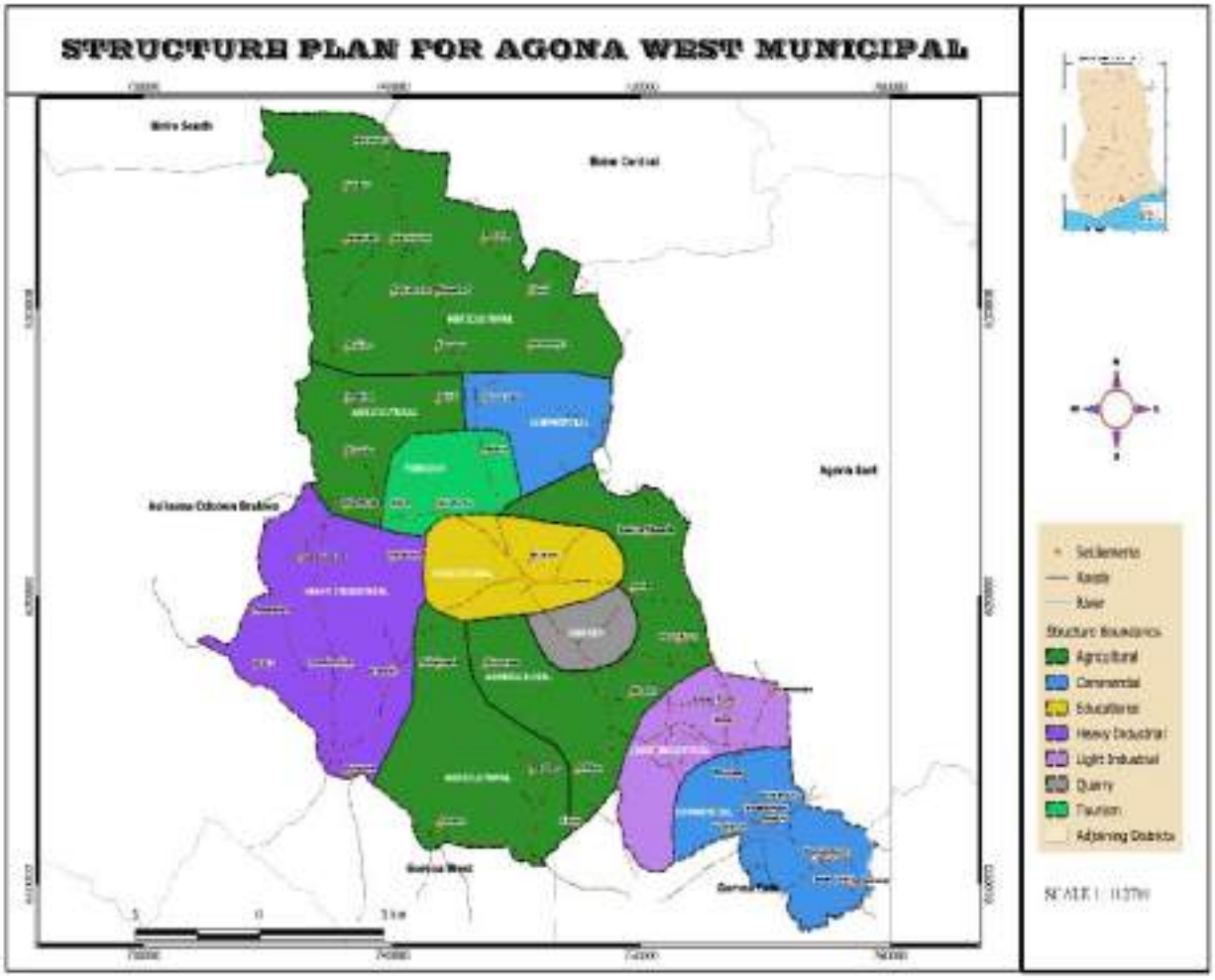

Figure 14: Structure Plan for Agona West Municipal

Source: PPD, 2023

The structure plan is envisaged to check climate risk and ensure sustainable development in the Municipality. It is to guide the land use of the Municipality and thus reduce the risks associated with climate change in the Municipality.

CHAPTER SIX

FUNDING SOURCES AND STRATEGIES

6.1 Introduction

This section presents the financing and implementation arrangements for this plan. It is based on a strategic approach that will help operationalise this plan and sustain its implementation.

6.2 Strategies to Financing the RCCAP

In Agona West, the financing of Risk and Climate Change interventions relies on various sources, including the District Assembly Common Fund (DACF), Internally Generated Fund (IGF), District Assembly Common Fund-Results Factor Grant (DACF-RFG), Ghana Secondary Cities Program (GSCSP) Fund, Climate Finane, MPs Common Fund, and contributions from Donor Agencies, among others.

However, when examining revenue patterns in Agona West from 2018 to 2020, as illustrated in Figure 9, it becomes evident that there is a fluctuating trend. This trend highlights the challenges associated with the fiscal transfer framework and the limitations faced by Agona West in generating revenue internally. The Assembly's revenue keeps dropping since after 2020, exposing gaps that pose obstacles to the successful financing of planned activities.

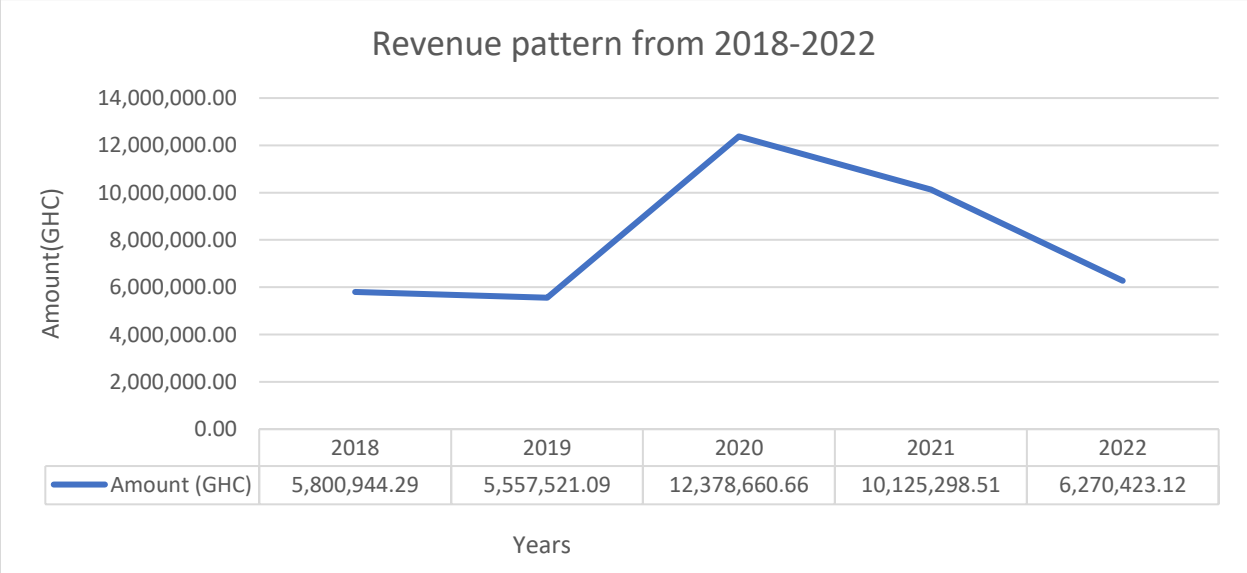

Figure 15: Revenue Pattern from 2018-2022

To address these financial gaps and create continuous opportunities for sustainable funding of Risk and Climate Change, the following strategies will be adopted by Agona West Municipality aside the usual revenue stream:

Public-Private Partnerships: While local governments may be saddled with the responsibility of public service delivery and infrastructure development, the private sector has the resources at its disposal in terms of capital and knowhow. It will therefore be necessary for the synergies of both the public and private agencies to be harnessed to overcome the challenges in providing modern, sustainable, and reliable infrastructure for sustainable development. Public-private partnerships when designed properly and implemented in a balanced regulatory framework brings greater efficiency to provision of public services to which Agona West can capitalise upon to develop climate-friendly and resilient infrastructure. Guidelines issued by the relevant supervisory ministries such as Ministry of Finance and the Ministry of Local Government, Decentralization, and Rural development will be adhered to, to ensure better allocation of risk between the Assembly and the private entities.

Land value capture: Land value capture is an approach that enables communities to recover and reinvest land value increases that result from public investment and government actions. It enables local governments to charge fees to developers and property owners and raise revenue that can be reinvested into the community and city services. The benefits of land value capture promote inclusive and equitable urban development, thereby creating a cycle where monetary benefits accrued pay for services such as basic sanitation and transport terminals, and amenities like parks and green spaces. Backed by legal and institutional frameworks, Agona West will pursue opportunities that will enable it generate revenue from LVC.

Attracting Investors: Aside seeking opportunities to increase its own revenue to be able to undertake climate change initiatives, it will be important for the Municipality to proactively lobby and seek investors into its strategic areas such as recycling. To this effect, the Assembly will submit proposals on bankable projects to a number of investors pointing out the economic opportunities in Agona West which they could sustainably explore.

Development partners and philanthropic financing: In Ghana, there are a number of international development agencies with adequate funding to support various interventions based on their strategic focus. Agona West will proactively engage some of these agencies as well as

philanthropic organisation to support various climate change interventions be it the delivery of hard or soft infrastructure. The Assembly intends to adopt three key strategies namely:

1. Organise annual donor conferences of institutions in the Municipality to solicit funding through the corporate social responsibility mandate of such institutions.

2. Establish a partnership with a sister city in the Global North.

3. Proposal writings to various institutions and organisations which include but are not limited to:

- Africa Women's Development Fund (AWDF);
- Global Environmental Facility Small Grants Program (GEFSGP);
- Adaptation Fund which is administered by Adaptation Fund Board and geared towards climate change adaption issues;
- International Fund for Agricultural Development (IFAD);
- Special Climate Change Fund by the Global Environment Facility;
- Strategic Climate Fund by World Bank; and
- Norway's International Climate and Forest Initiative by the Government of Norway.

Other strategies include:

- Vigorous enforcement of Assembly's bye laws on rate and fee paying
- Introduction of on street parking
- Donations from natives in the diaspora.

CHAPTER SEVEN

MONITORING, EVALUATION AND COMMUNICATION ARRANGEMENTS

7.1 Introduction

This chapter encapsulates the issues concerning monitoring, evaluation, and communication arrangements and indicates the monitoring matrix. It seeks to among others provide feedback and lessons for continuous improvement of risk and climate change mitigation and adaption process in the Municipality and provide feedback to inform plan review and subsequent programmes.

7.2 Monitoring Framework

Monitoring and evaluation play a vital role in continuously assessing the effectiveness of strategies implemented by the Municipality as part of its Rish and Climate Change Assessment plan. The key objectives of M&E are to gauge the progress of the mitigation and adaptation strategies, determine whether it is yielding the expected results, and identify and address any deviations or issues that may arise. Regular reviews of the RCCA plan are imperative to ensure it remains aligned with the ever-changing dynamics of the local sustainability issues. Equally important is the approach taken during these reviews, which should involve active participation from relevant stakeholders.

In the context of M&E, Key Performance Indicators (KPIs) are established based on locally verifiable evidence. These KPIs serve as quantifiable measures of the outputs and are crucial indicators of the success of key climate change interventions. They provide a means to assess whether the achieved results align with the initial plans and expectations. When selecting KPIs, the primary focus is on the core performance areas of the climate change mitigation and adaptation process, including safeguarding natural resources, improving agricultural practices, ensuring food and water security, reducing vulnerability, increasing resilience, sustained economic growth, increased job opportunities offering decent work, and the elevation of income levels. A monitoring matrix detailing the framework for M&E is outlined in Table 3.

In line with the MTDP of Agona West, the following standards for evaluation shall be adhered to:

Table 5: M&E matrix

Activities	KPIs	Timeframe	Means of Verification	Data Disaggregation	Use of Results

Train 100 farmers in climate smart agricultural practices including mulching, agroforestry, and mixing cropping	100 farmers trained	Annually	File verification, progress reports	Locality specific, sex specific, age specific	To track progress made in adopting climate smart agricultural practices
Train 100 farmers in conservative agriculture	100 farmers trained	Annually	File verification, progress reports	Locality specific, sex specific, age specific	To track progress made in practicing conservative agriculture
Organize training for three vegetable FBO on irrigation Methods	Three FBOs trained	End of Year	File verification, progress reports	Locality specific, sex specific, age specific	To track progress made in irrigation methods
Facilitate farmers access to credit	10% increase in farm capital	Annually	Field Survey, File verification, meetings	Locality specific, sex specific, age specific	To track progress made in agricultural financing and redefine targets
Organize sensitization programmes on agricultural insurance schemes	10 Farmers with agricultural insurances	Quarterly	Field Survey, File verification, meetings, progress reports	Locality specific, sex specific, age specific	To determine progress made in agricultural insurance in Agona West and redefine targets
Provision of drought resistant and improved seeds	Seeds provided	quarterly	File verificiation, field visits, progress reports	Locality specific, sex specific, age specific	To determine progress made at promoting food security
Facilitate the provision of storage and processing facilities	Storage and processing facilities provided	Annually	Field visits, progress reports, file verification, meetings	Locality specific, sex specific, age specific	To determine progress made at promoting food security
Train 10 extension officers in climate smart-agriculture to enhance support to farmers	10 extension officer trained	Quarterly	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made at adopting climate-smart agriculture
Liaise with academia to conduct research on climate-smart agriculture	Research conducted	Annually	File verification, progress reports		To determine progress made at adopting climate-smart agriculture
Train women and other vulnerable groups on climate-resilience methods in the	Women and vulnerable groups trained	Annual	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made at safeguarding women against the impact of climate change

agricultural sector.					
Data collection on indigenous agricultural knowledge and application of findings in climate-smart policies.	Data on indigenous agricultural knowledge collected	Annually	File verification, field reports, progress reports	Locality specific	To determine progress made at ensuring local climate change planning and management
Review 3No. existing local plans within the Municipality	3No. local plans reviewed	Annually	File verification, progress reports	Locality specific	To determine progress made at creating a resilient municipality
Conduct ground truthing exercise	Ground truthing exercise conducted	quarterly	File verification, progress reports, field visits	Locality specific	To determine progress made at creating a resilient municipality
Completion of 1No. street naming exercise at Agona Nyakrom (Verification, Stenciling, Embossment and Signage post)	1No. street naming exervise completed	annually	File verification, field visits, progress reports	Locality specific	To determine the progress made in street naming exercise
Organize 4No sensitization programmes on the need to adhere to building regulations	4 sensitization programmes organized	quarterly	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made in adherence to building regulations
Identification of hazards in the Municipality	Hazards identified and documented	quarterly	File verification, progress reports	Locality specific, hazard type	To determine progress made at building a resilient community
Organize public education on climate change and adaption	Public education organized	quarterly	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made at adapting to climate change
Organize public education on hydrometeorological disasters	Public education organized	quarterly	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made at adapting to climate change
World Disaster Day celebration	Disaster day celebrated	quarterly	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made at disaster prevention, preparedness,

					response, and management
Public education on domestic, commercial, and bush fires	Public education done	quarterly	File verification, progress reports	Locality specific, sex specific, age specific	To determine progress made at disaster prevention, preparedness, response, and management
Organise 2No. orientation programme for key staff and other stakeholders on climate change and its impacts and disaster risk reduction	2no orientation programmes organised	annually	File verification, progress reports	Sex specific, age specific	To determine progress made at improving institutional capacity in climate change issues
Encourage relocation of settlements and economic activities from climate-related disaster-prone areas	Relocation done	annually	File verification, progress reports, field visits	Locality specific	To determine progress made at reducing climate vulnerability
Train technical staff of the Assembly to adopt climate-responsive infrastructural designs in all physical works of the Assembly	Technical staff trained	annually	File verification, progress reports	Age specific, gender specific	To determine progress made at building the capacity of technical officers in climate change
Afforestation – Nursing and Distribution of 50 Tree Seedlings	50 tree seedlings distributed	Annually	File verification, field visits, progress reports	Locality specific	To determine progress made at climate change mitigation and adaptation
Prepare Comprehensive Operation and Maintenance Plan for Drains, Pedestrian Walkways, and Road Network Agona West Municipality	O & M prepared	Annually	File verification, progress reports		To determine progress made at climate change mitigation and adaptation

Construction of 6No Pipe Culverts within the Municipality	Pipe culverts constructed	annually	Field visits, file verification, progress reports	Locality specific	To determine progress made at building a resilient community
Construction of 1No. double 1.2meter diameter pipe culvert at Saint Germain in Agona Swedru (MP PROJECT)	Pipe culverts constructed	annually	Field visits, file verification, progress reports	Locality specific	To determine progress made at building a resilient community
Dredging and concrete lining of 5km of Akora river (Ph1)	Dredging and concrete lining done	annually	Field reports, progress reports, monitoring reports, file verification	Locality specific	To determine progress made at safeguarding urban river
Document and promote appropriate indigenous knowledge and best practices	Documentation done	annually	File verification, progress reports		To determine progress made at ensuring localized climate change mitigation and adaptation
Conduct research on appropriate infrastructure design standards that meet higher requirements against extreme weather-related natural hazard events	Research done	annually	File verification, progress reports		To determine progress made at building a resilient community
Organize Monthly Spatial Planning	Meetings organized	monthly	File verification, progress reports	Sex specific, age specific	To determine progress made at building a resilient community
Organize monthly Technical Sub-Committee Meetings	Meetings organized	monthly	File verification, progress reports	Sex specific, age specific	To determine progress made at building a resilient community
Capacity building for key staff on natural resource management	Trainings organized	Annually	File verification, progress reports	Sex specific, age specific	To determine progress made at building institutional capacity in climate change mitigation and adaptation
Safeguard natural resources including water, forestry, wetlands, and other	Safeguard measures developed	annually	File verification, field surveys, progress reports	Locality specific	To determine progress made at climate change mitigation

ecological sensitive zones					
Tree Planting and Maintenance	Tress planted and maintained	annually	File verification, field visits, progress reports	Locality specific	To determine progress made at climate change mitigation and adaptation
Organize sensitization programmes on rainwater harvesting	Sensitization programmes organized	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made to ensuring water security and reducing climate change vulnerability
Facilitate local community involvement in resource management	Local community involved	annually	File verification, progress reports, field visits, field surveys	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Education on protection of natural resources and the environment	Education done	quarterly	File verification, progress reports, activity reports	Locality specific	To determine progress made at raising awareness of safeguarding natural resources
Revision of local plan to incorporate the protected areas	Local plans revised	annual	File verification	Locality specific	To determine progress made at building resilience
Promote public education and awareness development permit application processes	Public education and awareness promoted	annual	File verification, field reports, progress reports	Locality specific, gender specific	To determine progress made at enhancing public knowledge on development permits
Regulate exploitation of wetland resources through by-laws	Exploitation of wetland resources regulated	annual	File verification, progress reports	Locality specific, gender specific	To determine progress made at reducing exploitation of wetland resources
Spatial Analysis on water reservation/buffer	Water reservation spatially analyzed	annual	File verification, progress reports	Locality specific	To determine progress made at determining water buffers
Frequent and effective monitoring on all developments around waterbodies	1No 2storey male and female wards constructed	annually	Field visits, file verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Renovation of 2No. CHPS Compound	2No. CHPS compound renovated	annually	Field visits, file verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability

Construction of wellness clinic at Mandela	Wellness clinic constructed	annually	Field visits, file verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Construction Of RCH centers	RCH centers constructed	annually	Field visits, file verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Construction of 1-bedroom semi-detached Nurses' quarters connected to electricity and installation of polytank at Otabilkrom	Nurses' quarters constructed	annually	File verification, progress reports, field visits	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Map disease incidence and identification of vulnerable groups for climate-sensitive diseases	Mapping done	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Identify, document, and incorporate climate-relevant traditional knowledge into health delivery systems and practices	Traditional knowledge incorporated	quarterly	File verification, field visits, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Generate gender-specific information including sex-disaggregated data for determining the gender impacts of climate change	Gender profiling done	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Identify and analyse gender-specific needs, impacts, protection, and support measures related to climate change and variability such as	Gender profiling done	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability

floods, rainstorm, heat and diseases					
Organize 3No. workshops on climate change issues with women groups, youth groups, PWDs, and aged	3no workshops organized	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Sensitize women on acquiring credit facilities to promote their businesses	Women sensitized	quarterly	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Embark on the registration and renewal of NHIS cards for indigents	Registration and renewal done	Quarterly	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Embark on women and other groups' formation.	Groups formed	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Organize training for 200 women on income generating activities	200 women trained	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Support 150 PWDs to start a trade, expand their trade.	Support given	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Support educational needs and medical needs as well as assist the various PWDs groups to undertake their activities	Support given	Annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Embark on quarterly monitoring of PWDs beneficiaries of common fund support.	Monitoring done	quarterly	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Provide hospital welfare services to clients.	Services provided	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability

Embark on 6 bi-monthly beneficiary households LEAP cash grant payments and monitoring.	Payments and monitoring done	midyear	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
GoG support to people with disability	Support given	annually	File verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
UNICEF Support to child protection programmes	Support given	annually	Field visits, file verification, progress reports	Locality specific, age specific, sex specific	To determine progress made at reducing climate change vulnerability
Recycle water for domestic and industrial purposes	Water recycled	Annually	Field visits, file verification, progress reports	Locality specific	To determine progress made at climate change adaptation
Implement drinking water and sanitation programmes in areas at risk from climate change	Drinking water and sanitation programmes implemented	annually	File verification, progress reports	Locality specific	To determine progress made at improving water security and sanitation practices
Collate/Update Baseline Database on Waste (Solid and Liquid) and Prepare Municipal Environmental Sanitation Strategic Action Plan (MESSAP)	MESSAP prepared	Annually	File verification		To determine the progress made in environmental management
Clearing of final disposal site or landfill site	Final disposal site cleared	quarterly	Site visits, meetings, file verification, progress reports	Locality specific	To determine progress made in improving environmental health and sanitation
Construction of Engineered Landfill site	Engineered landfill site constructed	quarterly	Site visits, meetings, file verification, progress reports	Locality specific	To determine progress made in improving environmental health and sanitation
Purchase Sanitary tools for management of solid and liquid waste activities	Sanitary tools purchased	Annually	File verification, progress reports	Locality specific	To determine progress made in improving sanitation
Data collection and documentation systems for GHG	Data collection and	Annually	File verification, progress reports, meetings	Locality specific, sex specific, age specific	To determine to progress made at promoting mitigation

emissions, inventories and reporting	documentation done				and adaptation strategies
Capacity building for staff to improve technical competencies in assessing GHG emissions, inventories, and reporting	Capacity of staff built	Annually	File verification, reports	Locality specific, sex specific, age specific	To determine to progress made at promoting mitigation and adaptation strategies
Construction of faecal sludge management plant	Faecal sludge constructed	Quarterly	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in improving waste management
Construction of Phase 2 of 2- storey 60 No lockable Stores with a parking lot, restaurant, sick bay electricity and water at Mandela in Agona Swedru	2storey 60No. lockable stores constructed	Monthly	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating a resilient Municipality and redefine targets
Construction of 20No. lockable stores at Abodom	20no lockable stores constructed	Annually	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating a resilient Municipality and redefine targets
Grading and reshaping of roads of 60km	60km roads graded and reshaped	Quarterly	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating a resilient Municipality and redefine targets
Construction of double sealed bituminous road with side drains – 0.57km of Otabilkrom road at Agona Swedru	Construction done	Monthly	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating a resilient Municipality and redefine targets
Bitumen Surfacing of 4.65km road with walkways, roadline marking, rumble stripes and 0.6m diameter U drains at both sides for	Bitumen surfacing done	Monthly	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating a resilient Municipality and redefine targets

650m length of the road at Woraba and Yaabem in Agona Swedru					
Bitumen surfacing of 1.7km Yabem area roads with 0.6m and 0.9m diameter U drains at both sides and road line marking of 1.2km in Agona Swedru	Bitumen surfacing done	Monthly	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating a resilient Municipality and redefine targets
Reconstruction of 25 metre length retaining wall in Swedru Mangoase	Retaining wall reconstructed	Annually	Site visits, file verification, meetings, progress reports	Locality specific	To determine progress made in creating resilient infrastructure
Sensitize public on efficient use of energy and of renewable energy sources	Public sensitized	Annually	File verification, meetings, progress reports	Locality specific, sex specific, age specific	To determine progress made efficient use of energy and adopting renewable energy resources
Complete 6 No. Boreholes in 6 communities	20% increase in water coverage	Annually	File verification, meetings, progress reports	Locality specific	To determine progress made in ensuring water security and redefine targets

7.3 Standards for Evaluation

In conducting evaluations, evaluation managers and evaluators would abide by the standards outlined below:

i. The Institutional Framework of Agona West Municipal Assembly

An institutional framework should be in place to guide the conduct of evaluations.

ii. Management of the Evaluation Function

The evaluation manager and the evaluator would adhere strictly to all the process entailed in the conduct of evaluation to ensure that the evaluation results are credible.

iii. Evaluation Competencies

In carrying out an evaluation, the evaluator would have the competencies required for the specific evaluation assignment.

iv. Conduct of Evaluation

The Assembly would be guided by the evaluation steps in the M&E Manual.

v. Quality of Evaluation

The Assembly would have a quality control system in place to make the results of evaluation acceptable to all stakeholders. The evaluation process is therefore expected to provide a better insight into the design of new or subsequent plans. The process entails the following activities.

i. Assessing the need for an evaluation (provide the background).

ii. Developing clear ideas on the rationale and objectives of the evaluation.

iii. Determining the type of evaluation to undertake.

iv. Specifying the methods, scope and timing of the evaluation.

v. Identifying and analysing stakeholders.

vi. Estimating the costs involved which should be factored into the budget of the AAP.

vii. Preparing Terms of Reference (TOR) and contractual agreements based on items (i) to (iv) above. The TOR should be prepared by the DPCU in collaboration with stakeholders. It is important to have a broad agreement on the TOR because it will form the basis for the evaluation exercise. More importantly, the TOR will be the formal reference for the consultant or team of consultants to be recruited.

viii. Recruiting a consultant or a team in accordance with the provisions of the Procurement Act, 2003 (Act 663).

ix. Organising meetings to discuss the inception and draft reports with stakeholders.

x. Organising a validation meeting with stakeholders before submission of the final report.

xi. Disseminating the results and acting on the findings and recommendations as part of the dissemination and communications strategy based on evaluation norms and standards).

7.4 Communication Strategy

The success of this plan from implementation to review depends on the extent to which it is effectively communicated and disseminated. Communication of the RCCA plan must be done clearly, publicly and proactively. The target group that serves as audience for this plan include:

government agencies,

donor community,

academia,

civil society,

private sector,

general public,

media

internal staff

The tools and approaches that will be adopted for external communication of the LED Plan and strategy include:

Launching of the RCCA Plan

Press releases.

District-wide dissemination meetings.

Delivery of copies to all major stakeholders.

Posters, brochures, infographics, and flyers.

Community outreach programmes by Information Services Department.

Special events including Local Policy summits, Town Hall Meeting, Local Results Fair, and Meet the Press series.

Media engagement and advocacy; quarterly panel discussion on local FM stations.

Promotion of climate change mitigation and adaptation strategies on MMDA websites.

Wide distribution of participatory monitoring reports.

Notice board

Website of Assembly

Social media

REFERENCES

AWMA (2023), Medium Term Development Plan (2022-2025).

BNRCC (2012), Towards a Lagos State Climate Change Adaptation Strategy

Ghana Statistical Service (2021), 2010 population and Housing Census, Retrieved from https://statsbank.statsghana.gov.gh/pxweb/en/PHC%202021%20StatsBank/

ISSER/Eparque (2019), Agro-Processing and Supply Chain Linkages in Agona West Municipality

ISSER (2020), Summary report, Agro-Processing and Supply Chain Linkages in Agona West Municipality What is preventing Agona Swedru from facilitating the growth of jobs, productivity, and liveability?

MLGRD (2020), National Decentralization Policy and Action Plan (2020)

NADMO (2022), Annual Progress Report

NADMO (2022), Disaster and Risk Preparedness Plan

Republic of Ghana (2016), Land use and Spatial Planning Act, 2016 (Act 925)

UNDRR (2022) "Technical Guidance on Comprehensive Risk Assessment and Planning in the Context of Climate Change", United Nations Office for Disaster Risk Reduction

USEPA (2014), Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans.

ANNEX

FOCUS GROUP DISCUSSION/SURVEY

1. **Are the following events already occurring?**
   a. **Increasing temperature (Days with intense heat)**
   b. **More intense precipitation**
   c. **Warm water**
   d. **Storm**
   e. **Drought**
   f. **Erratic rainfall**
   g. **Others……..**
2. **What event affects your business activities or your daily life?**
3. **How do you cope with the issues occuring?**
4. **Are these activities prevalent in your community?**
   a. **Using charcoal as fuel for cooking**
   b. **Building without permits**
   c. **Building in water ways**
   d. **Burning of lorry tyres (probe to know what they burn with or for)**
   e. **Slash and burn farming method**
   f. **Falling of trees (probe what for)**
   g. **Congestion**
   h. **Others……**
      ……
      ……..
5. **Do you have socio-cultural beliefs/practices that restrict certain climate related activities? eg. Not farming on certain days, not fishing on certain days, forest reserves..**
   a. **Yes b. No**
6. **If yes, list them……**
   ……
   …….
7. **What assets are the most important to your community? (a) education; (b) community identity; (c) culture; (d) economy; (e) health (f) others**
   ……..
8. **Are these assets affected by climate change?**
9. **Which of these impacts caused by climate change would cause major economic loss, social or**
   environmental? (a) effects on flora and fauna; (b) infrastructure loss; (c) effects on water; (d) effects on public health
10. **What environmental problems already exist in your community?**
    (a) Wastewater discharges
    (b) Erosion

(c) Floods
(d) Contamination
(e) Waste management
(f) Health
(g) Infrastructure maintenance
(h) Drinking water services
(i) Electric services
(j) Other(s)?

11. How would you grade the condition of these services/infrastructures/indicators on a scale of 5

Utility	Very Good	Good	Average	fair	poor
Water					
Electricity					
Telecommunication					
Transport infrastructure					
Drainage facilities					
Housing conditions					
Income					

12. Which gender is more exposed or vulnerable to climate change risks and effects, and why?

13. Indicate the level of vulnerability or exposure of the following age brackets to climate change risks, and effects. Explain why.
0-5, 5-12, 12-18, 18-25, 25-50, above 50

14. Does the community have an emergency response system/personnel?