



Strengthening Investments  
in Gender-Responsive  
Climate Adaptation

# CLIMATE RISK AND VULNERABILITY ASSESSMENT MION DISTRICT

SUMMARY VERSION



Plate 1: Participations in the first stakeholder engagement workshop  
Credit: Cephas Adorliyah, 2024



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# KEY TAKEAWAYS

Mion District is already experiencing the impacts of climate change, with intensifying climate variability marked by more frequent droughts, longer dry seasons, and erratic rainfall. These changes are threatening agriculture, water security, and livelihoods, leading to declining farm yields, increasing crop losses, and water scarcity. Vulnerable groups—especially women, young people, and female-headed households—are disproportionately affected, with young people migrating away from agriculture and women carrying the burden of fetching water. While some communities are using climate-smart practices, these are not being scaled up due to a lack of resources and infrastructure gaps. Traditional knowledge and social networks are also underutilized in district-level planning. The key messages highlight the urgent need for an inclusive, costed, and community-owned Climate Adaptation Plan to translate findings into practical action and build resilience for all groups.

## HOW TO CITE THIS DOCUMENT:

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### **Climate change is already impacting lives and livelihoods across Mion District**

Communities such as Zuro, Palari, and Nyentuo report more frequent droughts, longer dry seasons, and increasing crop losses, while farmers in Kayong and Dijeo face rising input costs and water scarcity.



### **Women and girls carry a heavy burden of climate stress**

In Kayong and Kpumi, women walk long distances to fetch water and provide unpaid care during extreme heat and drought periods, often at the expense of income-generating activities and girls' education.



### **Young people are losing confidence in agriculture and are migrating in search of opportunity**

Youth in Kpumi and Dijeo report declining farm yields and a lack of vocational alternatives, leading to increasing rural-to-urban migration and disconnection from land-based livelihoods.



### **Heat and bushfires are putting pressure on public health and ecosystems.**

In Nyentuo and Palari, extreme heat is disrupting school attendance, damaging crops, and contributing to bushfires that reduce soil fertility and expose homes to greater risk.



### **Access to safe water is becoming a daily struggle.**

Communities like Zuro and Kayong face prolonged dry-season water shortages due to borehole breakdowns and declining water tables, particularly affecting women-headed households.



### **Climate-smart solutions already exist but need support to scale.**

Farmers in Sang and Palari are using mulching, composting, and early planting to cope with erratic rains, but lack access to inputs, tools, and markets to expand these practices.



### **Infrastructure gaps are worsening climate risks.**

In Dijeo and Nyentuo, poor road conditions and lack of storage facilities make it difficult to transport and preserve harvests during climate extremes, leading to food and income losses.



### **Traditional knowledge and social networks are underutilized resources.**

Across all communities, elders and farmers possess time-tested knowledge on land, weather, and water, but these insights are rarely integrated into district-level adaptation planning.



### **Gender-responsive action strengthens community resilience.**

Women's farming groups in Kayong and youth innovators in Sang show strong potential for leadership in adaptation—yet need training, inputs, and inclusion in decision-making platforms.



### **Mion District needs an inclusive, costed Climate Action Plan to guide the way forward.**

The assessment reveals the urgency of translating findings into a practical, well-funded, and community-owned plan—one that reflects the needs of all groups and builds resilience for future generations.

# A

## INTRODUCTION

### A1. Background

This report summarizes key findings and strategic recommendations from the Climate Risk and Vulnerability Assessment (CRVA) conducted in Mion District under the SIGRA project. Funded by Global Affairs Canada and implemented by Cowater International, SIGRA supports Ghana's **National Adaptation Plan (NAP)** by helping local governments strengthen their systems, plan for climate risks, and promote inclusive adaptation strategies. The findings from Mion provide a foundation for targeted, equitable climate action that reflects the district's unique challenges and strengths.

The project aligns closely with Ghana's National Adaptation Plan (NAP), coordinated by the **Environmental Protection Authority (EPA)**, which emphasizes locally led, inclusive approaches to building climate resilience. SIGRA supports this vision by equipping District Assemblies with data, tools, and participatory methods to identify key climate hazards, assess vulnerabilities, and co-develop targeted adaptation strategies that respond to local realities.



**Plate 2:** A view of a typical home in Mion, featuring traditional mud-and-thatch roundhouse.  
Credit: Cephas Adorliyah, 2024

### A2. Scope and Objectives of the Assessment

The CRVA in Mion District aimed to understand how climate change is impacting social, economic, and environmental systems at the community level.

This inclusive and evidence-based approach ensured that the assessment captured diverse perspectives and produced actionable insights for climate adaptation planning. The specific objectives were to:

- Identify the main climate hazards affecting the district and their seasonal patterns;
- Assess the economic, physical, and social vulnerabilities of the population;
- Highlight how climate risks intersect with gender, age, and disability status;
- Propose actionable adaptation options that are inclusive, cost-effective, and aligned with district development priorities.

A mixed-methods and participatory approach was used to conduct this assessment. Data was gathered through stakeholder workshops, focus group discussions, household surveys, key informant interviews, geospatial mapping, and analysis of future climate scenarios using IPCC-aligned models (SSP2-4.5 and SSP5-8.5).

### A3. Prioritizing Gender and Vulnerable Groups

At the heart of this Assessment is a strong commitment to **equity and inclusion**. Climate change does not affect all people equally. Women, youth, persons with disabilities (PWDs), the elderly, and climate-displaced populations often bear a disproportionate share of its impacts—while having the least influence over planning and decision-making.

This assessment was therefore designed to **elevate the perspectives of these groups**, ensure their voices informed the findings, and prioritize actions that strengthen their resilience. The result is a clearer picture of the district's vulnerabilities—and a shared path forward toward a more just and climate-resilient future.

## A4. Profile of Mion District Assembly

### A4.1. Geographical Context

The Mion District is situated in Ghana's Northern Region at approximately 9.3667° North latitude and 0.2167° West longitude, covering an area of 2,714 km<sup>2</sup> characterized by **flat lowland plains, shallow valleys, and scattered highlands**.

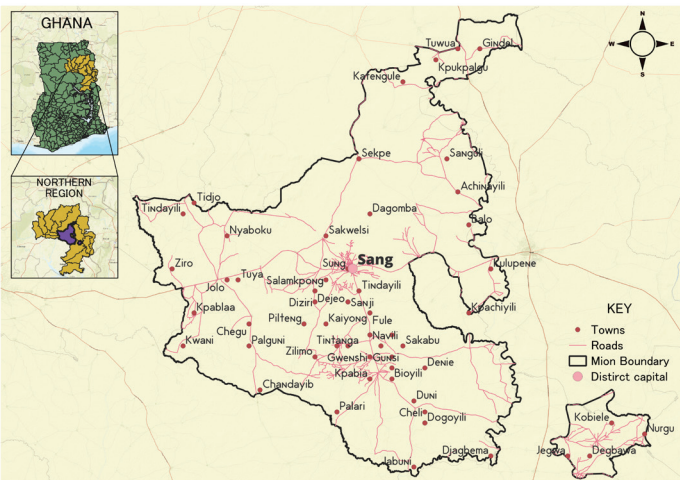


Figure 1: Map showing the Mion District with major communities

The Mion District shares boundaries with Yendi Municipal to the east, Gushegu District to the northeast, Karaga District to the north, Tamale Metropolis and Savelugu Municipal to the west, and Nanumba North District to the south, with Sang serving as the administrative capital.

### A4.2. Climatic Conditions

Mion experiences a hot savannah climate with two distinct seasons. The dry season (November–March) is **marked by extreme heat, with temperatures often exceeding 40°C**. The rainy season (June–September) brings intense rainfall, supporting agriculture but also causing flooding and erosion. These climatic **extremes increase the district's vulnerability to food insecurity, water scarcity, and health risks**.

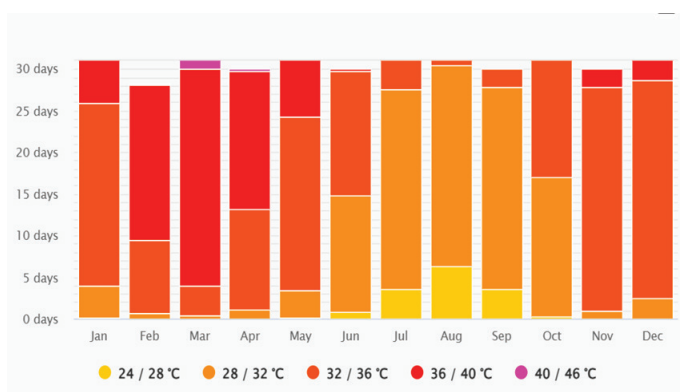


Figure 2: Maximum temperature patterns in Mion District  
Source: www.meteoblue.com (2024)

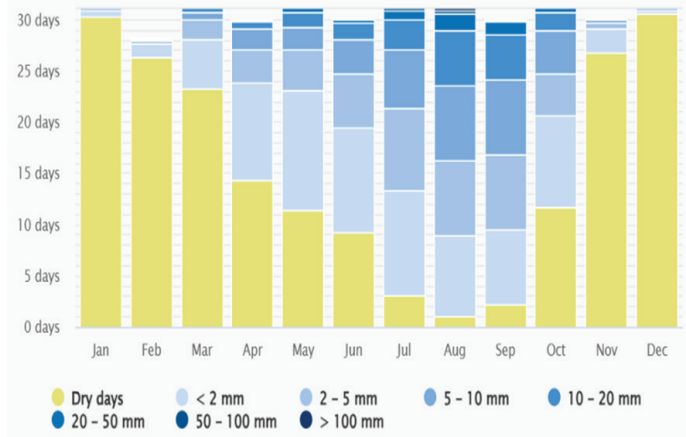


Figure 3: Monthly Precipitation amounts in the Mion District  
Source: www.meteoblue.com (2024)

### A4.3. Social Characteristics

With a population of nearly 95,000, the Mion District is youthful and rural, with over 50% under the age of 20. Women and persons with disabilities (PWDs) **face heightened vulnerability due to limited access to land, education, and decision-making** (Ghana Statistical Service, 2021). Only 10% of Assembly members are women. Cultural norms restrict women's land ownership and participation in leadership, while PWDs face mobility and access barriers, especially during climate shocks.

### A4.4. Economic Overview

**Over 90% of residents depend on subsistence agriculture, which is highly sensitive to climate variability**. Key crops include cereals and legumes, while livestock rearing is widespread. However, the absence of local financial institutions limits access to credit and economic inclusion. **Mion's multidimensional poverty rate (53.4%) is more than double the national average, with women, children, and PWDs disproportionately affected**. Deprivations in sanitation, housing, and employment further deepen vulnerability, especially during climate-induced disruptions.

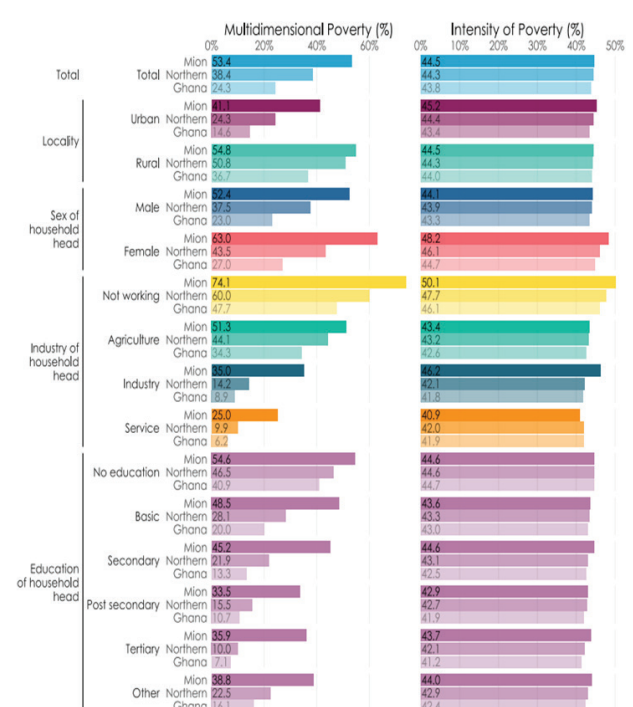


Figure 4: Multidimensional poverty and its intensity in Mion, Northern Region, and Ghana  
Source: Ghana Statistical Service, 2023

# B

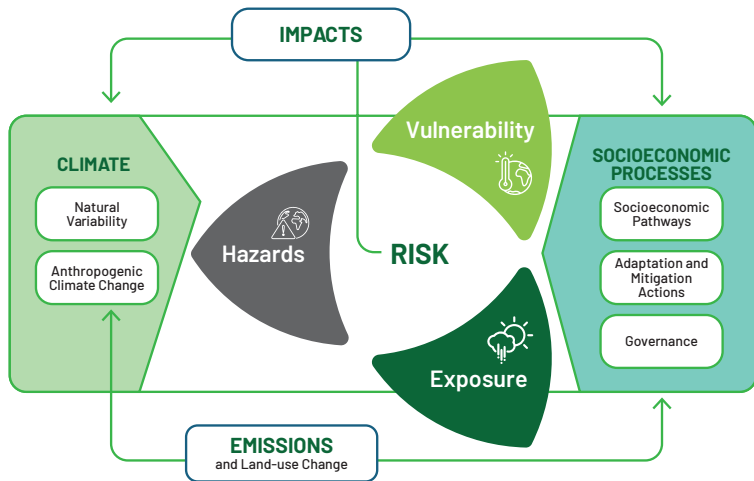
# METHODOLOGICAL APPROACH



**Plate 3:** Community members gathered under a tree in Zuro.  
**Credit:** Cephas Adorliyah, 2024

## B1. Introduction

The CRVA for Mion District employed a participatory, mixed-methods approach grounded in the Intergovernmental Panel on Climate Change (IPCC) AR5/AR6 frameworks.



**Figure 5:** The IPCC Risk and Vulnerability Framework illustrating the interaction of hazards, exposure, and vulnerability in shaping climate risks, with socio-economic processes influencing overall resilience.

This approach was applied to help generate a robust and locally grounded understanding of climate risks and vulnerabilities in Mion District.

The process was intentionally inclusive, ensuring the perspectives of women, youth, persons with disabilities, and traditional leaders were integrated into every stage of the assessment and adaptation planning.

### 1. Stakeholder Workshop and Participatory Exercises

A multi-stakeholder consultative workshop was held at the Mion District Assembly, bringing together district officials, traditional authorities, CSOs, women’s groups, youth leaders, private sector actors, and other community stakeholders. Participants collaboratively:

- Identified climate hazards and vulnerable hotspots.
- Conducted mapping and seasonal calendar exercises.
- Analysed historical climate impacts.
- Developed a Matrix of Function (MoF) to assess how spatial functions either enable or constrain climate adaptation.

A dedicated session on Gender-Responsive Adaptation explored how climate change disproportionately affects women and emphasized the need for inclusive planning.



Plate 4: Photocall of participations in the first stakeholder engagement workshop. Credit: Fuiseni Gariba, 2024

## 2. Participatory Community Selection

To ensure representation of the most vulnerable populations, stakeholders collaboratively identified seven focal communities based on levels of climate vulnerability, socio-economic status, and exposure to hazards. These included:

- Zuro, Kpumi, Nyentuo, Palari, Dijeo, Kayong (High vulnerability)
- Sang (Moderate vulnerability)

This process ensured a spatially balanced and socially inclusive representation of the Mion's diverse risk landscape.

No	Level of Vulnerability	Selected Community for FGDs	Selected Community for Survey
1	3=High	Zuro	Zuro
2	3=High	Kpumi	Kpumi
3	3=High	Nyentuo	Nyentuo
4	3= High	Palari	Palari
5	3= High	Dijeo	Dijeo
6	3= High	Kayong	Kayong
7	2= Moderate		Sang

Table 1: Communities selected for FGD and Survey

## 3. Focus Group Discussions (FGDs)

FGDs were conducted across all selected communities to gather qualitative insights into community experiences, perceptions, and coping strategies. Participants included:

Women, youth, elderly persons, PWDs, and community leaders.

Topics explored included observed climate changes, livelihood impacts, adaptation practices, and community needs. Separate sessions for women and men were conducted to ensure gender-responsive discussions.



Plate 5: FGD meeting in Dijeo Community Credit: Fuiseni Gariba, 2024

## 4. Household Questionnaire Surveys

A structured household survey was administered to 148 households across the seven selected communities. The survey covered:

- Income sources and levels.
- Asset ownership.
- Agricultural practices.
- Climate perceptions and adaptation strategies.

Sampling was conducted using a stratified random sampling approach, ensuring gender representation and inclusion of differently-abled persons.

## 5. Climate Projections and Scenario Analysis

Climate projections were based on historical data (1991–2020) and future scenarios using SSP2-4.5 and SSP5-8.5 pathways. The study relied on three key datasets to analyse historical and projected climate conditions in Mion.

- CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data):** Daily precipitation data from CHIRPS, with a spatial resolution of 0.05°, was used to examine variability in rainfall patterns across the district.
- ERA5 Reanalysis:** Hourly temperature records from ERA5, available at a spatial resolution of 0.25°, facilitated the assessment of temperature extremes over time.
- CMIP6 (Coupled Model Intercomparison Project Phase 6):** This dataset provided multi-model climate projections necessary for evaluating future scenarios of rainfall and temperature extremes under various Shared Socioeconomic Pathways (SSPs).

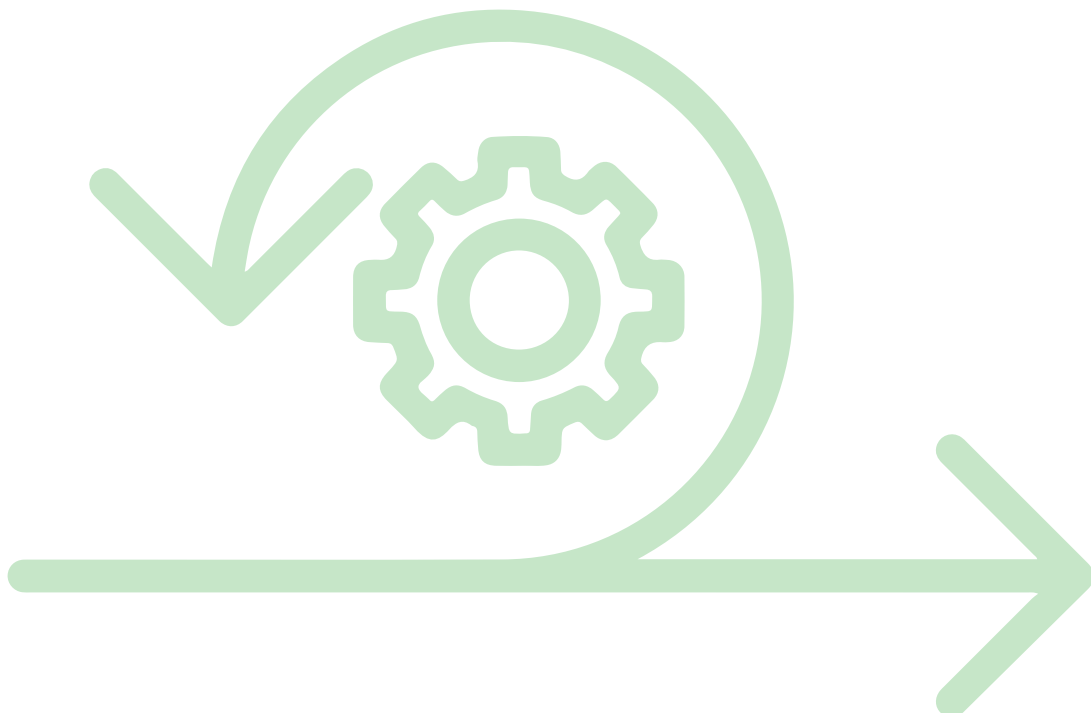
The analysis explored trends in extreme rainfall, dry spells, heatwaves, and shifts in seasonal rainfall. Climate indices such as Rx1day, CDD, and TXx were used to quantify hazards.

Category	Metric	Description	Interpretation	Units
Precipitation	Rx1day	Maximum 1-day precipitation. The highest amount of precipitation recorded in a single day during a given year or season.	Indicates the intensity of the most extreme daily rainfall event, highlighting potential for flash floods and extreme weather.	mm
	Rx5day	Maximum 5-day precipitation. The highest accumulated precipitation over any consecutive 5-day period within a given year or season.	Captures the intensity of extended heavy rainfall periods, which could lead to river flooding or waterlogging issues.	mm
	CDD	Consecutive dry days: The maximum number of consecutive days with less than 1 mm of rainfall.	Reflects drought conditions by showing prolonged periods without significant rainfall.	days
	CWD	Consecutive wet days: The maximum number of consecutive days with at least 1 mm of rainfall.	Represents extended wet spells, which may increase the risk of flooding, landslides, or crop saturation.	days
	R95p	Very wet days: Total precipitation from days when rainfall exceeded the 95th percentile of daily precipitation during a reference period.	Indicates the frequency and volume of extremely wet days, showing potential for extreme weather events driven by climate variability or change.	mm
	R95pTOT	Total precipitation from very wet days: The total amount of precipitation occurring on days with rainfall above the 95th percentile.	Illustrates the contribution of extreme rainfall events to the total annual precipitation.	mm
	SDII	Simple daily intensity index: The ratio of total precipitation to the number of wet days (days with 1 mm precipitation or more).	Measures the average precipitation intensity on wet days, reflecting the nature of rainfall events.	mm/day
Temperature	TXx	Maximum daily maximum temperature: The highest daytime temperature observed in a given year or season.	Reflects the intensity of heatwaves and extreme hot days, which can impact health, agriculture, and energy demand.	°C
	TNx	Maximum daily minimum temperature: The highest nighttime temperature observed in a given year or season.	Tracks warm nighttime temperatures, which can influence heat stress, particularly in urban areas, and impact human health and agricultural productivity.	°C
	TXn	Minimum daily maximum temperature: The lowest daytime high temperature recorded in a given year or season	Captures cooler days, which are potentially beneficial during extreme heat periods but also indicate cold snaps or unseasonal weather.	°C
	TNn	Minimum daily minimum temperature: The lowest nighttime temperature observed in a given year or season.	Reflects the occurrence of cold nights, important for assessing frost risks, agricultural impacts, and extreme cold weather events.	°C

Table 2: ETCCDI Climate Indices

## 6. Data Integration and Analysis

The study used a mixed-methods analytical framework to integrate findings from qualitative (FGDs, KIIs) and quantitative (surveys, projections) sources. Thematic analysis of transcripts revealed gendered vulnerabilities, while statistical analysis illuminated variations in exposure and coping capacity across demographic groups.



# C

## KEY ASSESSMENT FINDINGS

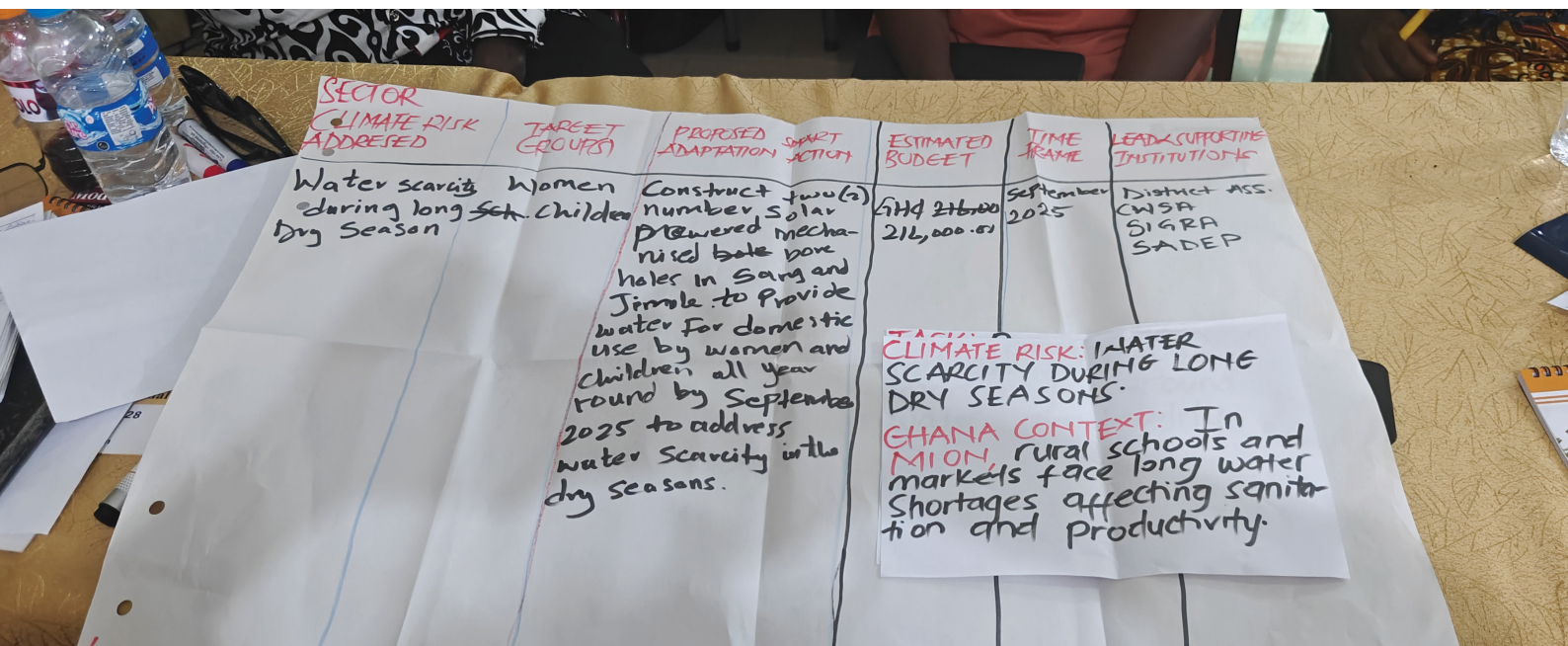


Plate 6: A participatory exercise on climate adaptation planning in the Mion District. Credit: Fuiseni Gariba, 2024

### C1. Climate Hazards and Exposure

The Mion District is increasingly vulnerable to a cluster of climate-related hazards that threaten lives, livelihoods, and local development efforts. The four most critical hazards—**prolonged droughts, seasonal floods, bushfires, and rising extreme heat events**—are unfolding with increasing intensity and unpredictability, particularly in the last two decades. These hazards do not occur in isolation; they interact in complex ways that deepen community exposure, especially among women, youth, persons with disabilities (PWDs), and the elderly.

The timeline of major climate events in Mion District reveals a recurrent pattern of extreme weather impacts—**particularly droughts and floods**—over the past three decades. Drought events, recorded in 1992, 2010, 2021, and most recently in 2024, have consistently disrupted agriculture and water availability, heightening food insecurity. Flooding incidents, notably in 1989, 2007, and 2022, have caused widespread destruction of crops, erosion, and infrastructure damage

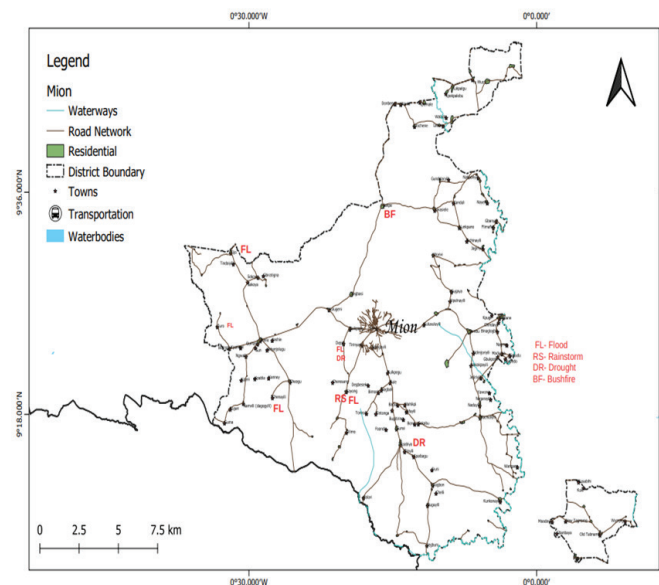


Figure 6: Hazard mapping by stakeholders

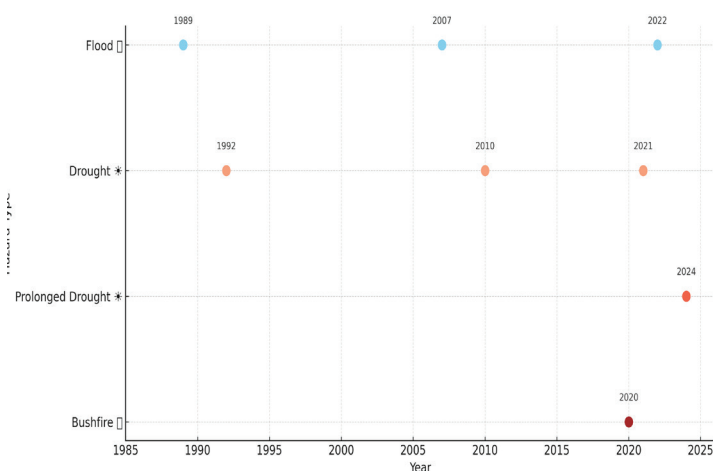


Figure 7. Visual chronology of climate events in Mion District (1989-2024)

### C1.1. Drought

Drought is the most persistent and destructive hazard reported across the district. In communities like Zuro, Kayong, and Palari, residents recount how the formerly predictable rainy season has become shorter and unreliable.

Dry spells between **November and March** are now longer and hotter, affecting every aspect of daily life.

- Farmers face widespread **crop failure**, particularly for maize, millet, and yam.
- **Livestock mortality** is common due to dried-up water points and pasture loss.
- **Women and girls** bear the brunt of water shortages, often walking long distances and sacrificing time for school, farming, or trade.
- **Soil conditions worsen**, making land preparation harder and delaying planting.

*"During drought moments, the soil becomes so hard that we cannot plant. Even to plant, we exert so much energy in tilling the soil, making farming difficult." – Farmer, Zuro*

### C1.2. Floods

Flooding, while seasonal, is becoming more **intense and erratic** due to shifting rainfall patterns. Communities like Dijeo, Kayong, and Nyentuo report **short, violent rains** from **July to September** that cause flash floods, erode topsoil, damage infrastructure, and destroy homes.

- **Waterlogging damages crops**, especially on low-lying farmlands.
- **Access to schools and clinics is disrupted** due to impassable roads.
- Households in flood-prone zones lack drainage, and water often enters living spaces.

*"When the heavy rain comes, our rooms are filled with water. Even going to the clinic becomes impossible." – Woman, Dijeo*

### C1.3. Extreme Heat

All seven communities reported an increase in daytime and night-time temperatures, especially during **February–April** and **October–December**. This trend is deeply felt in homes, farms, schools, and marketplaces.

- **Children miss school** during peak heat hours due to fatigue and dehydration.
- **Outdoor work is reduced**, affecting income and food production.
- **Elderly persons and women farmers report heat-induced illnesses.**

*"The heat is too much. Women working on the farm experience severe headaches and other diseases. Because of the extreme heat, the duration we spend on our farms is reduced to prevent sickness." – Male respondent, Kayong.*

### C1.4. Bushfires

Bushfires—most frequent between **December and April**—are worsened by land-clearing practices, hunting, and lack of traditional fire controls. In Nyentuo, Kpumi, and Palari, these fires have become an annual threat.

- **Farms are regularly destroyed**, forcing households to replant or abandon land.
- **Vegetation loss leads to erosion** and reduced soil fertility.
- **Livelihood assets**, including food stores and tools, are at risk of burning.

A majority of households—especially male-headed ones—report experiencing bushfires sometimes or often. Women also report significant exposure.

*"Bushfires are destroying our farms. Every year, we lose more. The soil too is becoming dry and weak." – Farmer, Nyentuo*

### C.1.5 Compound Risks and Climate Uncertainty

Mion's climate hazards often interact—bushfires exacerbate drought, floods erode topsoil, and extreme heat magnifies the hardship of both. These compound risks are particularly harsh for:

- Female-headed households, who often lack labor support or capital to recover after climate shocks.
- Youth, many of whom migrate seasonally due to declining farm productivity.
- PWDs, who face disproportionate barriers to emergency response and safe shelter.

Climate change is making it harder to predict the weather in Mion. The usual seasons and weather patterns are all mixed up, which is causing a lot of problems and putting people at risk.

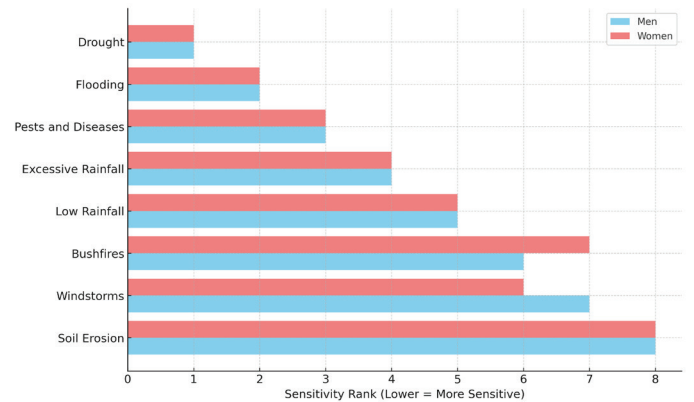


Figure 8: Gendered Sensitivity Ranking Mion

## C2. Vulnerability Analysis

The assessment revealed layered and overlapping vulnerabilities—economic, physical, social, and gendered—shaping how different groups experience climate risks. These vulnerabilities not only determine the severity of impacts but also influence communities' ability to cope and recover.

While all communities are affected, the burdens are not equally shared. **Women, youth, the elderly, and persons with disabilities are especially exposed** – not only to the hazards themselves, but to the ripple effects that follow them.

### C2.1. Economic Vulnerability

The economic landscape in Mion District is heavily reliant on crop and livestock farming, with over 90% of both male- and female-headed households identifying it as their main source of income. Most households rely on rain-fed farming, making them highly sensitive to rainfall variability. Key crops like maize and yam are declining in yield. Zuro, Nyentuo, and Kpumi reported widespread **post-harvest losses** due to dry spells and input shortages.

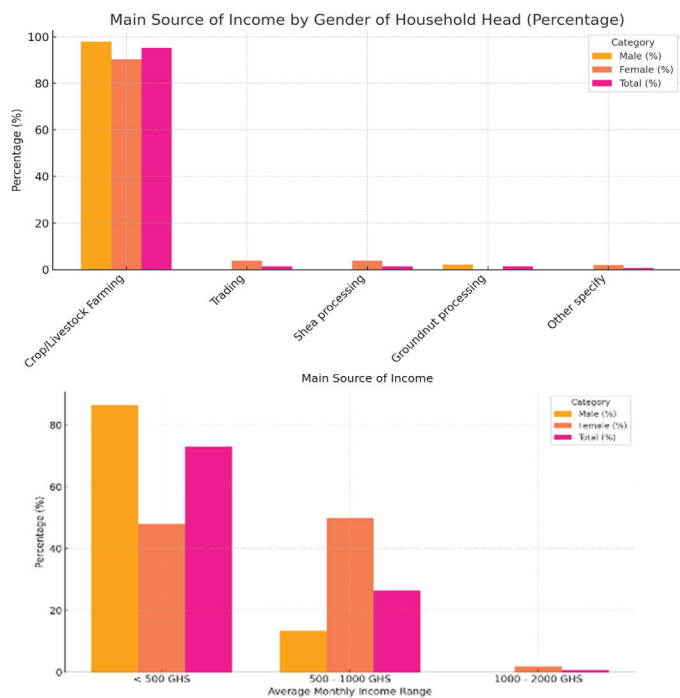


Figure 9: Main and alternative sources of income for households

Alternative livelihood options such as trading or processing (shea or groundnuts) are marginal, especially for women. Income levels are low and starkly gendered—nearly 80% of women earn less than GHS 500 per month, compared to just under 50% of men. These patterns highlight high economic vulnerability, especially for women, who face compounded constraints due to limited diversification opportunities, unequal access to productive assets, and low earnings.

Women and youth lack access to land and capital, pushing many into precarious labor or migration.

*“Even when the rains come, we have no fertilizer or good seeds. You plant and just pray.” – Woman farmer, Zuro*

In communities such as Dijeo and Palari, many farmers noted that rising input prices and shrinking harvests are undermining household savings and food security. The lack of access to rural finance or insurance schemes forces families to sell livestock or withdraw children from school to make ends meet. The economic precarity makes households less able to invest in long-term adaptation practices, deepening the cycle of vulnerability.

### C2.2. Physical Vulnerability

Based on the findings, key physical vulnerability issues facing households in Mion District (Figure 10) can be summarized as follows:

- **Frequent exposure to drought and extreme heat was reported**, with over 50% of households experiencing them “often,” affecting water availability, crop productivity, and household well-being.
- **Flooding remains spatially intense**, especially in low-lying areas, disrupting access to markets, health services, and education.
- **Windstorms, while frequent, are perceived as less intense**, but contribute to long-term damage to infrastructure and shelter, especially in areas with mud-and-thatch housing.
- **Water stress is acute**, with 90% of respondents indicating their water sources (mostly dams and rivers) are not available year-round.
- **Limited health infrastructure** is a major constraint—only

27.7% of communities have any health facility, and over 64% of households lack health insurance, exacerbating risks from heat-related illnesses and waterborne diseases.

- **Agricultural systems are highly sensitive**, with over half of households reporting drought, erratic rainfall, and pests as major threats to their farms.
- **Livelihood adaptation is constrained**, as only 4.1% of households receive extension services and just 10.1% belong to farmer-based organizations.
- **Women and female-headed households are disproportionately affected**, especially by floods and water-related burdens, while men report greater exposure to heat and drought through direct engagement in farming.
- **Mental health risks are rising**, with 33.8% reporting stress-related symptoms, largely unaddressed due to lack of awareness and services.
- **Roads, bridges, and housing are highly vulnerable** to erosion and flooding, with 98.6% of households lacking access to good road networks, affecting mobility and resilience.

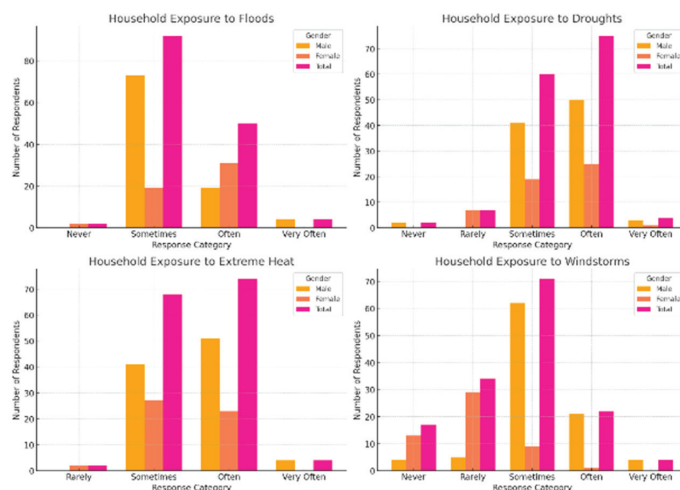


Figure 10: Households exposure to key climate-induced hazards

### C2.3. Social Vulnerability

The findings reveal that social vulnerability in the Mion District is deeply intertwined with gender inequalities and institutional gaps.

- **Gendered Decision-Making Gaps (Figure 11):** In male-headed households, men dominate financial and agricultural decisions, while women in female-headed households carry these burdens alone, often without adequate support.
- **Heavy Care and Domestic Workload:** Women—especially in female-headed homes—are overwhelmingly responsible for water collection and childcare, compounding their vulnerability to climate-related stress.
- **Limited Participation in Climate Decisions:** A significant percentage of households reported that women are excluded from climate-related decision-making, primarily due to traditional norms and lack of access to education or climate information.
- **Inequitable Access to Resources:** Women face significant barriers to land ownership, access to credit, inputs like seeds and tools (54.7%), and training/information (60.8%), undermining their adaptive capacity.
- **Cultural and Legal Constraints:** Deeply rooted gender norms and lack of enforceable legal rights remain major obstacles to women’s empowerment and resilience.

- **Low Educational Access and High Unpaid Labor:** Limited formal education and heavy domestic workloads restrict women’s ability to participate in resilience-building or income diversification.
- **Minimal Community Support Structures:** Only 25% of respondents reported the presence of local organizations supporting women’s climate adaptation, with lower awareness among female-headed households (15.4%).
- **Financial Disempowerment:** Few women belong to Farmer-Based Organizations or receive extension support, limiting their access to markets, credit, and climate-smart agricultural techniques.
- **Empowerment Gaps in Governance:** Women’s limited voice in local governance and adaptation planning processes reduces the responsiveness and inclusiveness of district-level climate strategies.

“We talk about farming, but women don’t sit at the chief’s table where decisions are made.” – Female elder, Palari

“When there is a meeting, no one calls the disabled. But we also have ideas.” – Youth with disability, Sang

### C3. Projected Climate Trends

Future climate scenarios for Mion District, based on national and regional models aligned with IPCC’s Sixth Assessment Report, point to a troubling yet actionable reality: **temperatures will rise, rainfall will become more erratic, and extreme weather events will intensify**, with wide-ranging impacts on lives, livelihoods, and ecosystems.

#### C3.1 Warming Temperatures: A New Normal of Heat

Across both SSP scenarios, **mean annual temperatures in Mion are projected to increase by 1.5°C to 2.5°C by 2050**, with the most significant warming expected under SSP5-8.5 (Figure 12). The increase in temperature is not uniform—it is accompanied by **greater variability and more frequent extremes**, particularly during **March–May** and **September–December**.

- The **TXx index (daily maximum temperature)** shows a marked increase in the number of hot days and intensity of heatwaves.
- The **TNx index (warmest night of the year)** suggests higher night-time temperatures, disrupting sleep and increasing heat stress for vulnerable groups such as the elderly, farmers, and schoolchildren.

These heat extremes will not only challenge **agricultural productivity** but also strain **human health, water demand, and energy needs**, especially in communities with limited access to shade, cooling, or clean water.

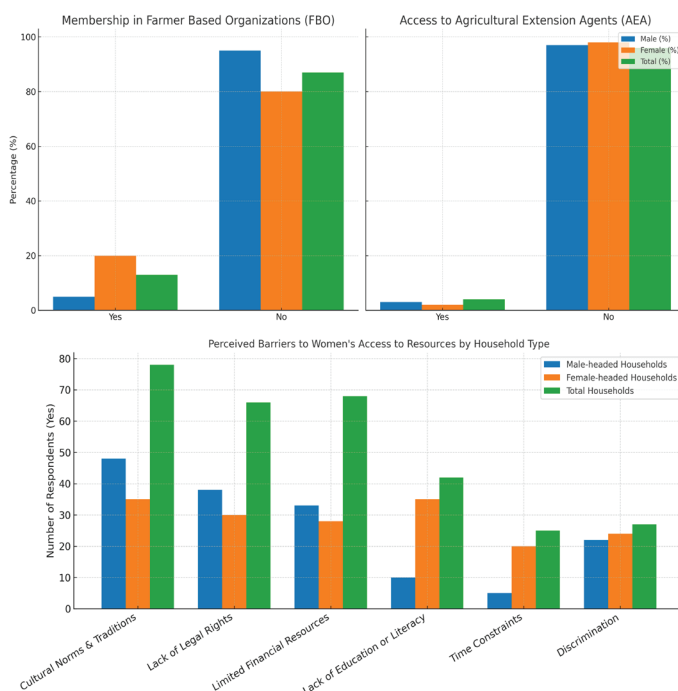


Figure 11. Social vulnerability indicators

#### C2.4. Gendered and Intersectional Vulnerabilities

The impacts of climate change are deeply gendered in Mion. Women play central roles in both food production and family care, yet they have **limited voice in decision-making and less access to land, credit, and extension services**.

- **Women-headed households**, especially widows, are often land-poor and excluded from traditional support systems. Women in Kayong and Dijeo shared stories of coping with **long walks for water** while simultaneously tending farms and children. Young people, especially girls, are more likely to drop out of school to support household needs during climate stress periods.
- **Youth**, particularly young men, face growing pressure to migrate in search of work, leaving behind aging parents and overstretched women.
- **Persons with Disabilities** have limited mobility during climate emergencies and are often **excluded from warning systems, disaster drills, or adaptation training**.
- **The elderly** struggle to adapt to changing seasonal calendars, often clinging to traditional farming schedules that no longer align with erratic weather.

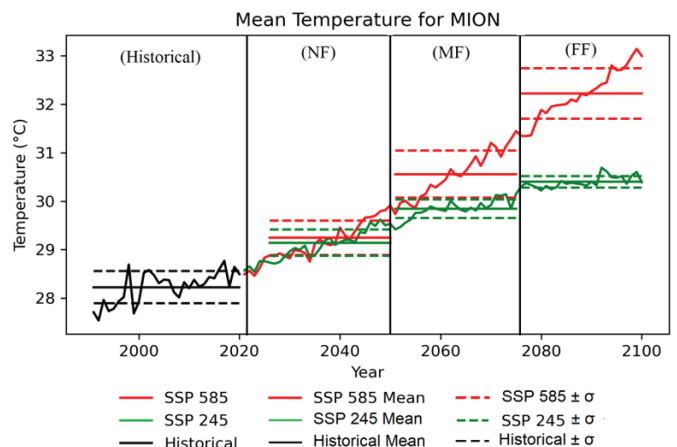


Figure 12: Historical and projected mean temperature patterns under SSP 5-8.5 and SSP 2-4.5 scenarios for Mion district.

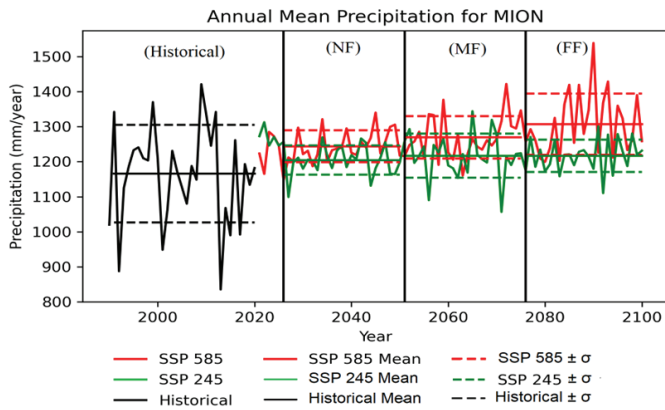
#### C3.2. Rainfall Patterns: More Uncertainty, Less Reliability

While total annual rainfall is projected to remain relatively constant, its **distribution is shifting dramatically**. Under both SSP2-4.5 and SSP5-8.5 (Figure 13):

- Rainfall will become **less frequent but more intense**, increasing the risk of **flash floods** and runoff-related erosion.
- The **CDD index (Consecutive Dry Days)** is expected to rise, indicating **longer dry spells**, especially before the onset of the rainy season.

- Extreme precipitation indicators such as **Rx1day** (maximum daily rainfall) and **R95p** (very wet days) show increases, underscoring the **likelihood of storm-driven damage** to crops, infrastructure, and settlements.

Farmers may need to adapt to **shorter growing seasons** and invest in water storage or soil retention technologies to cope with both early-season dryness and late-season flooding.

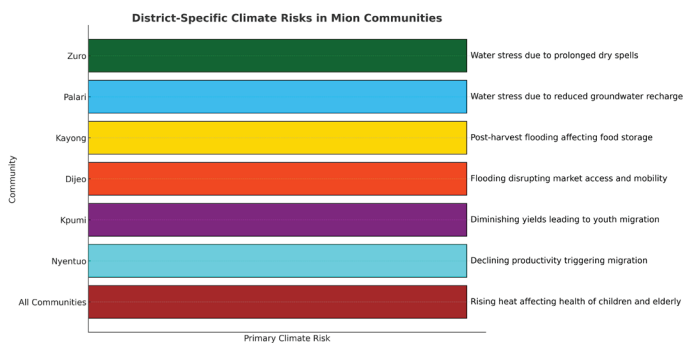


**Figure 13:** Historical and projected mean precipitation patterns under SSP 5-8.5 and SSP 2-4.5 scenarios for Mion, with descriptions.

### C3.3. District-Specific Risks

Projections suggest uneven impacts across Mion’s communities (Figure 14), shaped by geography, infrastructure, and socio-economic conditions:

- **Zuro and Palari** may face **acute water stress**, as prolonged dry spells reduce groundwater recharge, affecting boreholes and stream flow.
- **Kayong and Dijeo** are particularly **vulnerable to post-harvest flooding**, which threatens food storage and access routes to local markets.
- In **Kpumi and Nyentuo**, diminishing agricultural returns are expected to **amplify youth migration**, further depleting household labor and weakening social cohesion.
- Rising heat will likely **worsen health outcomes**, especially for **children in poorly ventilated classrooms and elderly persons with pre-existing conditions**.



**Figure 14:** District-Specific Climate Risks in Mion Communities

The future climate of Mion District is not a distant threat; it is unfolding now and is expected to intensify in the coming decades. These projections highlight the urgent need for adaptive planning across key sectors—agriculture, water, health, and infrastructure.

Climate Variable	Key Findings	Implications
<b>Rainfall Patterns</b>	<ul style="list-style-type: none"> <li>• Rainy days projected to slightly beyond historical levels under SSP 5-8.5</li> <li>• Wet days (WD) are expected to exceed 250 days, while dry days reduce significantly compared to historical trends.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased wet days can support agriculture but raise the risk of flooding and waterlogging.</li> <li>• Decline in dry days may improve water availability but could also disrupt traditional farming cycles.</li> </ul>
<b>Annual Precipitation</b>	<ul style="list-style-type: none"> <li>• Historical precipitation variability (840-1410mm) increases under future projections.</li> <li>• SSP 5-8.5 shows a steady increase in precipitation until the late century, exceeding 1500 mm.</li> <li>• SSP 2. 4.5 projects moderate precipitation increases with more stable seasonal distribution.</li> </ul>	<ul style="list-style-type: none"> <li>• Greater rainfall variability under SSP 5-8.5 may challenge water resource planning.</li> <li>• Stable seasonal precipitation under SSP 2-4.5 could benefit crop planning but may still require irrigation improvements.</li> </ul>
<b>Rainfall Extremes</b>	<ul style="list-style-type: none"> <li>• Moderate rainfall days (R 10mm) decline significantly, suggesting more intense but less frequent rainfall events.</li> <li>• Consecutive wet days (CWD) increase, while consecutive dry days (CDD) remain stable under SSP 2-4.5</li> </ul>	<ul style="list-style-type: none"> <li>• Fewer moderate rainfall days may increase soil moisture stress between intense rainfall events.</li> <li>• Increased consecutive dry days could heighten risks prolonged droughts impacting crop productivity.</li> </ul>

**Table 3:** Summary of projected climate trends in Mion district

# ADAPTATION PRIORITIES AND RECOMMENDATIONS

## D1. Strategic Adaptation Options

**Building climate resilience in Mion requires integrated, inclusive strategies across social systems, economic livelihoods, infrastructure, and governance, with a strong focus on empowering vulnerable groups and aligning with national adaptation frameworks.** To safeguard the future of Mion District, adaptation must go beyond isolated interventions—it must be holistic, inclusive, and grounded in the district’s lived realities.

The following strategies were identified through a participatory process involving local communities, district stakeholders, and policy actors. They represent a synthesis of on-the-ground realities and national policy priorities, particularly Ghana’s National Adaptation Plan. By drawing on diverse voices and contextual knowledge, the strategies respond directly to the key risks and vulnerabilities identified in Mion District. Each option is carefully aligned with one of four critical pillars—social systems, economic resilience, infrastructure, and institutional reform—ensuring that proposed actions are both locally grounded and nationally relevant. Together, they chart a forward-looking path for integrated and inclusive climate adaptation.

Together, these strategies provide a roadmap for inclusive, equitable, and sustainable climate resilience in Mion District.

### D1.1. Social Interventions

Climate resilience begins with people, especially those most affected by its impacts. Strengthening social systems is foundational for any meaningful adaptation effort.

- **Enhance climate and health literacy** among women, youth, and marginalized groups through community workshops, school programs, and radio campaigns. Understanding heat risks, drought signals, and safe water practices can save lives and improve adaptive decision-making.
- **Invest in caregiving infrastructure** such as rural daycare centers, school feeding programs, and mobile health outreach. These reduce the unpaid care burden on women, allowing more time for economic activities and community leadership.
- **Strengthen local disaster preparedness** by training Community Disaster Volunteer Groups (CDVGs) with inclusive tools. Early warning systems must be accessible to **persons with disabilities, the elderly, and women**, with information delivered in local languages and formats.

Recommendations	Adaptations Options	Expected Impact	Potential Partners
<b>Strengthen women’s leadership in climate governance</b>	<ol style="list-style-type: none"> <li>1. Establish women-led climate resilience committees</li> <li>2. Enforce gender quotas in community climate planning bodies</li> <li>3. Train women in climate negotiation and advocacy</li> </ol>	Inclusive decision-making, empowerment of women’s voices	Gender Ministry, NGOs, Traditional Authorities
<b>Expand access to education and training</b>	<ol style="list-style-type: none"> <li>1. Provide adult literacy and numeracy training for women</li> <li>2. Introduce climate education in schools</li> <li>3. Provide scholarships for girls in STEM fields</li> </ol>	Enhanced awareness, intergenerational resilience	MoE, GES, NGOs, Scholarships Secretariat
<b>Promote climate-health awareness</b>	<ol style="list-style-type: none"> <li>1. Train local women as peer health educators.</li> <li>2. Conduct campaigns on malaria, heat stress, and nutrition.</li> <li>3. Distribute climate-resilient health kits and info materials.</li> </ol>	Reduced disease burden, improved coping strategies	MoH, CHPS, Health NGOs
<b>Support vulnerable social groups</b>	<ol style="list-style-type: none"> <li>1. Create support networks for widows, elderly women, PWDs.</li> <li>2. Provide psycho-social support services.</li> <li>3. Develop inclusive community platforms for decision-making.</li> </ol>	Reduced isolation, better wellbeing and cohesion	Social Welfare Dept, Community Health Officers, Disability Councils
<b>Foster youth engagement</b>	<ol style="list-style-type: none"> <li>1. Develop climate clubs and youth adaptation internships.</li> <li>2. Organize youth-led clean-ups and tree-planting drives.</li> <li>3. Establish innovation hubs for green entrepreneurship.</li> </ol>	Increased youth ownership of adaptation process	NYA, Schools, Youth-led CSOs

Table 4. Strategies to Address Social Vulnerabilities in Mion District

## D1.2. Economic Strategies

The economy of the Mion District must become more **climate-resilient**, less dependent on erratic rainfall, and inclusive of all demographic groups.

- **Promote climate-smart agriculture (CSA)** by expanding access to early-maturing seeds, drought-tolerant crops, and agroforestry practices that restore soil health and diversify income. Farmer field schools and peer learning networks should be scaled up.
- **Support off-farm livelihoods** such as shea butter processing, leatherwork, artisanal crafts, and ecotourism services that engage youth and women. These alternative livelihoods buffer households from climate-linked income losses.
- **Facilitate access to rural finance** through credit cooperatives, microloans for adaptation technologies, and **climate risk insurance** schemes. Financial literacy and business planning support are crucial to ensure uptake and sustainability.

Recommendations	Adaptations Options	Expected Impact	Potential Partners
<b>Enhance access to diversified livelihoods</b>	<ol style="list-style-type: none"> <li>1. Train women and youth in climate-resilient livelihood skills (e.g., beekeeping, shea processing, solar drying).</li> <li>2. Promote eco-tourism and agro-processing cooperatives.</li> <li>3. Establish mobile business hubs for women entrepreneurs.</li> </ol>	Increased income, resilience to climate shocks, reduced economic dependency	MoFA, NGOs, Women's groups, Youth Associations, GEA
<b>Strengthen financial inclusion</b>	<ol style="list-style-type: none"> <li>1. Facilitate access to microloans for women-led households</li> <li>2. Establish community savings and credit schemes (e.g., VSLA).</li> <li>3. Integrate financial literacy training in women's community groups</li> </ol>	Enhanced financial security, women's empowerment	Rural Banks, MASLOC, NGOs, Financial Institutions
<b>Promote climate-smart agriculture</b>	<ol style="list-style-type: none"> <li>1. Introduce drought-tolerant and early-maturing crop varieties.</li> <li>2. Provide small-scale irrigation kits to women farmers</li> <li>3. Support climate advisory services using mobile platforms</li> </ol>	Improved yields, reduced losses from erratic rainfall	MoFA, Agric Extension Agents, GIDA, Esoko
<b>Support agricultural value addition</b>	<ol style="list-style-type: none"> <li>1. Set up women-led agro-processing centres.</li> <li>2. Link women producers to local and regional markets.</li> <li>3. Provide packaging and branding support for processed goods.</li> </ol>	Increased value capture, women's economic independence	Private sector, Trade Ministry, District Assembly
<b>Digital and market literacy</b>	<ol style="list-style-type: none"> <li>1. Train women and youth in mobile marketing and e-extension platforms.</li> <li>2. Provide digital tools (radios, apps) to access market and weather info.</li> <li>3. Develop a community digital resource hub.</li> </ol>	Improved decision-making, better market access.	Telecos, NGOs, ICT providers

Table 5. Strategies to address Economic Vulnerabilities in Mion District

## D1.3. Physical and Infrastructure Upgrades

Strengthening physical infrastructure is essential to protect lives and enable adaptation efforts to flourish.

- Promote rainwater harvesting systems for homes and schools, solar-powered boreholes, and small-scale irrigation schemes that allow dry-season farming and reduce pressure on overused water points.
- Upgrade rural roads and markets, especially in flood-prone areas like Zoggu and Sang, using climate-resilient design (e.g., raised roads, culverts, and permeable paving).
- Encourage heat-resilient housing designs using local materials, reflective roofing, shaded ventilation, and insulation. Pilot housing schemes should prioritize pregnant women, PWDs, and the elderly most vulnerable to extreme heat.

Recommendations	Adaptations Options	Expected Impact	Potential Partners
<b>Improve water security</b>	<ol style="list-style-type: none"> <li>1. Construct solar-powered mechanized boreholes in drought-prone communities.</li> <li>2. Expand rainwater harvesting systems for households and schools.</li> <li>3. Promote women-managed water user committees.</li> </ol>	Reduced water stress, improved women's health and productivity	WaterAid, Community Water Boards, NGOs, WASH Projects
<b>Expand resilient infrastructure</b>	<ol style="list-style-type: none"> <li>1. Upgrade roads and bridges with climate-proof designs.</li> <li>2. Construct culverts in flood-prone zones.</li> <li>3. Build climate-resilient storage and evacuation centers.</li> </ol>	Improved market and health access, reduced isolation	Ministry of Roads, Assembly, Contractors, NADMO

<b>Strengthen healthcare access</b>	<ol style="list-style-type: none"> <li>1. Build CHPS compounds in underserved areas.</li> <li>2. Provide solar energy and clean water to clinics.</li> <li>3. Establish mobile health units for remote women and PWDs.</li> </ol>	Enhanced maternal care, climate-related disease response	MoH, Solar NGOs, UNICEF, GHS
<b>Promote climate-resilient housing</b>	<ol style="list-style-type: none"> <li>1. Provide subsidies for storm-resistant roofing and local materials.</li> <li>2. Train women artisans in eco-construction techniques.</li> <li>3. Develop community demonstration housing projects.</li> </ol>	Safer homes, women's inclusion in infrastructure sector	Housing Ministry, NGOs, Local Masons
<b>Establish community infrastructure hubs</b>	<ol style="list-style-type: none"> <li>1. Develop multi-use centers for storage, training, and shelter.</li> <li>2. Install solar lights in markets and water points.</li> <li>3. Equip community centers with ICT and emergency kits.</li> </ol>	Improved night safety, increased productivity	District Assembly, UNDP, Women's Cooperatives

Table 6. Strategies to Address Physical and Infrastructural Vulnerabilities in Mion District

### D1.4. Institutional and Policy Reforms

No adaptation plan can succeed without strong institutions and responsive governance systems. Mion District's institutions must be capacitated to lead and coordinate long-term climate action.

- Mainstream gender and disability inclusion into District Medium-Term Development Plans and the forthcoming Climate Action Plan. Tools such as gender budgeting checklists and social inclusion scorecards should be integrated into planning processes.
- Build capacity of district officers—especially in planning, agriculture, education, and health—on climate budgeting, Monitoring, Reporting and Verification systems, and risk-informed planning.
- Enhance vertical coordination between Mion District Assembly and national bodies like the EPA, NADMO, and MoFA to ensure that climate data, financing, and policies flow effectively from national to local levels.

Key Area	Key Actions	Expected Outcomes	Key Partners
<b>Climate Finance Readiness</b>	Train staff on proposal writing, establish financial systems, host finance access workshops, build research-donor-CSO links	Improved funding access, enhanced project implementation, greater financial accountability	EPA, MoF, UNDP, NGOs, University of Ghana
<b>Gender-Responsive Adaptation</b>	Train women/youth, integrate gender indicators, support stakeholder engagement platforms.	Empowered women and youth, measurable gender equity in projects	MoGCSP, NYA, District Assembly, CSOs
<b>Inclusive Planning &amp; Governance</b>	Conduct participatory planning, develop inclusive M&E frameworks, build staff capacity on social inclusion	Greater inclusion, transparency and community ownership of adaptation efforts.	UN Women, Research institutions, Local Assembly
<b>Institutional Collaboration</b>	Create climate desks, inter-agency taskforces, multi-stakeholder forums, partner with academia.	Strengthened coordination and shared learning across sectors	University for Development Studies, Sector agencies
<b>Policy &amp; Infrastructure Integration</b>	Align with NAP/SDGs, integrate gender equity in policy, expand climate-smart infrastructure.	Policy coherence, stronger institutional response to climate challenges	NAP Secretariat, GSS, District Planning Units

Table 7: Institutional Capacity Building for Climate Adaptation in Mion



## D2. Community-Specific Recommendations

*Community-specific adaptation plans in Mion District are vital for addressing distinct climate challenges and harnessing local strengths, ensuring that resilience efforts are responsive, inclusive, and grounded in local realities.*

The selection of Zuro, Kpumi, Nyentuo, Palari, Dijeo, Kayong, and Sang as the focal communities for this climate vulnerability and risk assessment was carefully guided by considerations of climate exposure, social inclusion, and spatial representativeness. Together, these seven communities reflect the diverse socio-ecological profiles within Mion District and offer a microcosm of the climate challenges and resilience opportunities that define the broader landscape.

### 1. Sang: Enhancing Livelihoods, Resilience, and Sustainability

Sang, the capital of the Mion District, faces challenges with water scarcity, inadequate healthcare, and limited employment opportunities. Community members reported increased heat stress, low agricultural productivity due to droughts, and poor road infrastructure, limiting access to markets and essential services.

#### Recommended Actions:

- Expand water supply infrastructure.
- Develop solid waste management systems.
- Establish a community clinic with medical staff.
- Promote small businesses through financial support.
- Improve road networks.

### 2. Kayong: Addressing Resource Challenges and Enhancing Sustainable Development

Kayong community faces extreme water scarcity, poor road infrastructure, and limited healthcare access. Droughts and erratic rainfall significantly impact crop yields, and livestock suffer from insufficient pasture and water availability.

#### Recommended Actions:

- Construct mechanized boreholes and install rainwater harvesting systems.
- Establish a CHPS compound.
- Provide drought-tolerant crop varieties and agricultural training.
- Support women's cooperatives and alternative livelihoods.

### 3. Nyentuo: Addressing Water Scarcity and Economic Instability

Nyentuo faces challenges with water scarcity, poor road networks, and inadequate healthcare services. Droughts and low rainfall have reduced agricultural productivity, increasing food insecurity.

#### Recommended Actions:

- Establish community-managed boreholes and rainwater harvesting facilities.
- Promote sustainable livestock rearing practices.
- Provide mobile health services to remote areas.
- Improve road infrastructure.

### 4. Zuro: Improving Agricultural Resilience and Climate Vulnerabilities

Zuro experiences frequent droughts, low crop yields, and challenges with flooding. Farmers are highly dependent on rain-fed agriculture, and the lack of proper drainage systems results in frequent waterlogging.

#### Recommended Actions:

- Construct small dams and establish irrigation systems.
- Provide climate-resilient seed varieties and fertilizers.
- Develop drainage systems.
- Promote agroforestry and soil conservation practices.

### 5. Palari: Promoting Livelihood Resilience and Enhancing Water Access

Palari community faces persistent challenges with water scarcity, limited access to healthcare, and deteriorating road infrastructure. Agricultural productivity is heavily affected by droughts and low rainfall, leading to food insecurity.

#### Recommended Actions:

- Provide mechanized boreholes and rainwater harvesting systems.
- Establish a mobile health clinic.
- Promote drought-resistant crop varieties and training programs.
- Develop local storage facilities and market access.

### 6. Kpumi: Building Resilience to Climate Variability

Kpumi suffers from severe water scarcity, poor healthcare infrastructure, and limited livelihood diversification. Farmers face declining yields due to unpredictable rainfall patterns.

#### Recommended Actions:

- Construct small water storage systems and rehabilitate boreholes.
- Provide drought-resistant crop varieties and farming support.
- Establish savings and loan schemes for farmers.
- Develop a local health facility.

### 7. Dijeo: Strengthening Agricultural Resilience

Dijeo suffers from erratic rainfall, degraded soils, and market inaccessibility during peak harvest periods.

#### Recommended Actions:

- Train farmers on agroecological practices (e.g., soil bunds, composting).
- Improve road access to markets.
- Facilitate cooperative formation for input purchasing and sales.



# CONCLUSION AND NEXT STEPS

## E1. Summary of Findings and Emerging Insights

*Mion District is already facing serious climate impacts, but with targeted support and inclusive planning, its communities—especially women, youth, and smallholder farmers—can build on existing local knowledge and adaptive practices to strengthen resilience.* This climate risk and vulnerability assessment has provided clear evidence that the Mion District is already experiencing significant impacts from climate change. **Prolonged droughts, seasonal flooding, rising temperatures, and recurrent bushfires are disrupting livelihoods, degrading natural resources, and placing increased pressure on essential infrastructure and public services.**

The findings reveal that the district's **vulnerability is deeply rooted in socioeconomic challenges, including dependence on rain-fed agriculture, limited access to potable water and healthcare, and inadequate infrastructure.** These vulnerabilities are particularly acute among women, youth, persons with disabilities, and smallholder farmers—groups that are both disproportionately affected by climate hazards and frequently excluded from adaptation planning.

Despite these challenges, the assessment also highlights promising opportunities for action. Community members across the Mion District are already demonstrating adaptive strategies and strong local knowledge systems. There is also growing interest among women's groups and youth in sustainable livelihoods and climate-smart innovation.

These findings underscore the urgency—and the opportunity—to develop integrated adaptation responses that are informed by local realities and empower communities to shape a resilient future.

## E2. Call to Action

The findings underscore the urgent need for a coordinated and inclusive response. To build long-term resilience, the following priorities are essential:

- **Mainstreaming gender and social inclusion** into all climate adaptation planning and decision-making processes. Ensure that vulnerable groups—particularly women, youth, persons with disabilities, and smallholder farmers—are actively involved in shaping adaptation policies, programmes, and local governance frameworks.
- **Strengthening local institutions and community-based organisations** to lead and sustain climate resilience efforts. This includes building their capacity, fostering multi-stakeholder collaboration, and providing technical and financial support for locally led adaptation initiatives.
- **Mobilising targeted investments** in infrastructure, livelihoods, and essential services that address the specific needs of at-risk populations. Prioritise funding for interventions that reduce climate risk, close equity gaps, and enhance adaptive capacity at the community and household levels.

These actions require the sustained commitment of district authorities, national agencies, development partners, civil society actors, and the private sector. Collaborative governance and locally grounded interventions will be essential to avoid widening inequalities and to build adaptive capacity across the district.

## E3. Next Steps

The next critical step is to develop a **Costed Climate Adaptation Plan (CAP)** that transforms assessment findings into actionable, inclusive, and well-funded climate solutions for Mion District.

This plan will:

- Translate the assessment's recommendations into **prioritised, time-bound, and budgeted actions**;
- Identify **appropriate financing mechanisms**, including district budget allocations, climate funds, and partnerships with external actors;
- Establish a framework for **monitoring, reporting, and verification** to track implementation progress and outcomes;
- Ensure that all interventions are **inclusive, gender-responsive, and locally relevant**.

The CAP will serve as a strategic roadmap for the district's climate response, enabling Mion to secure funding, coordinate stakeholders, and implement effective and equitable adaptation measures. With decisive leadership, inclusive participation, and evidence-based planning, Mion District can become a model for climate-resilient development in Ghana's Northern Region.



Photo by: Bofo YA, 2024



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