ENHANCING THE ADAPTIVE CAPACITY OF VULNERABLE SMALLHOLDER FARMERS THROUGH CLIMATE RESILIENT LIVELIHOOD DIVERSIFICATION IN THE TRANSITIONAL ZONE OF GHANA

BACKGROUND

Smallholder farmers in Ghana's Transitional zone are highly vulnerable to climate change due to their reliance on rain-fed agriculture, declining soil fertility, unpredictable weather patterns, and limited access to income diversification options leading to low crop and livestock productivity. Livelihood diversification can enhance resilience by reducing dependence on rain-fed agriculture and improving household food security and income.

Climate change is causing significant impacts on rural livelihoods, ecosystems, and public health in the Transitional Zone. Heatwaves directly affect livestock production, water scarcity, and human health, while irregular rainfall and extended dry spells limit access to reliable water supply. Rising temperatures also promote vector-borne diseases. Indirect effects include increased rural poverty and unstable livelihoods, as crops fail due to drought or heat stress, leading to loss of income for farming households. Deforestation and unsustainable farming methods also contribute to land degradation, soil erosion, and biodiversity loss.

Climate change is a major driver of challenges in agriculture, but socio-economic factors like limited access to climate-resilient farming tools, poor infrastructure, and inadequate extension services delivery also exacerbate the situation, limiting income diversification and reducing farmers' adoption of climate-smart practices.

Agriculture remains a cornerstone of Ghana’s economy, contributing 21% to the nation’s Gross Domestic Product (GDP) in recent years. The sector encompasses a broad range of activities, including crop production, livestock rearing, fisheries, and forestry, and serves as a critical source of employment and livelihood for the majority of the population, particularly in rural areas. One of the most significant agroecological zones supporting agricultural activities in Ghana is the Forest-Savannah Transition Zone. Strategically located between the humid forest regions of the south and the semi-arid savannahs of the north, this zone acts as a vital ecological and agricultural corridor. It features a unique mosaic of forest and savannah vegetation, which supports diverse agricultural practices and offers significant potential for both subsistence and commercial farming.

The transitional zone benefits from a bimodal rainfall pattern, with an annual average of approximately 1,200 mm. Traditionally, the major rainy season occurs from March to July, followed by a minor season from September to October. However, recent shifts in rainfall patterns, driven by climate change, have altered these timelines, with the major season now occurring from April to August and the minor season extending from late September to early November. These climatic changes pose challenges to agricultural planning and productivity, highlighting the need for adaptive strategies, resilient farming systems, and sustainable land management practices to safeguard livelihoods and ensure food security in the region.

The paradigm shift will involve a move away from unsustainable agricultural practices. Technical support will be provided through training of climate-smart agriculture technologies, agroforestry, aquaculture, providing skills to vulnerable smallholder and support access to finance through development of financial packages with financial institutions, strengthening of FBOs and NGOs. As productivity and income increases farmers adaptive capacity will be enhanced.

The intervention of the project will enhance farmers adaptive capacity through livelihood diversification. Farmers will directly benefit from the intervention living in the targeted districts who will become less vulnerable to climate change. The strengthening of FBOs and introduction of VSLAs will be scaled up and be more accessible to farmers

The proposed project aligns with Ghana's National Adaptation Plan (NAP), Nationally Determined Contributions (NDCs), Medium-Term Development Framework, Coordinated Programme of Economic and Social Development Policy 2021-2025, National Climate Change Policy, Food and Agriculture Sector Development Policy, National Gender Policy, Gender and Agriculture Development Strategy.

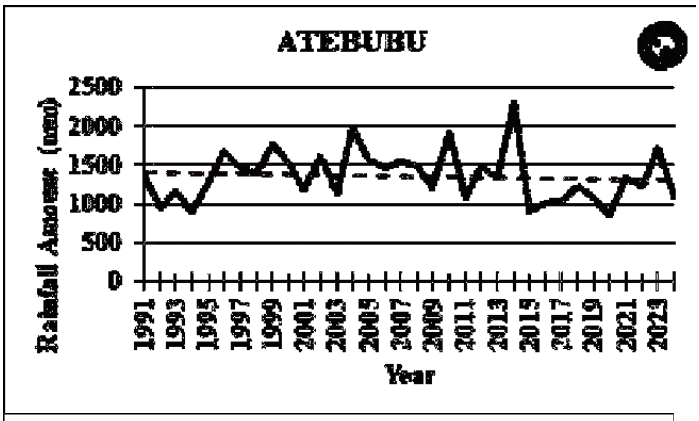
In the absence of targeted interventions, these climatic changes will continue to reduce crop yields and undermine livestock productivity two critical sources of food security and income for local populations. The lack of diversified, adaptive livelihood options will further deepen rural poverty, exacerbate food insecurity, and increase the risk of environmental degradation as communities turn to unsustainable coping strategies. GCF support is therefore crucial to building the resilience of vulnerable households through climate-smart agricultural practices, improved access to water resources, alternative income-generating activities, and ecosystem restoration. Without such support, the transition zone will face mounting socio-economic and environmental challenges, impeding national efforts to achieve climate resilience, sustainable development, and poverty reduction.

CLIMATE CHANGE CONTEXT

The Transition Zone supports a diverse array of crops due to its favourable climate and soil conditions. It is a significant producer of staple crops such as maize, rice, yams, cocoyam, cowpea, groundnut, cassava, plantains, tomato, pepper, eggplant, and okra. For the tree crops examples are citrus, cocoa, and cashew. Livestock farming is integral to the agricultural practices in the Transition Zone. Examples of the livestock include cattle, sheep, and goats, pigs and poultry, including local and exotic fowls and guinea fowl. Even though crops and livestock farming systems are prominent in the transitional zone, there is minimal integration.

The Forest-Savannah Transition Zone of Ghana has experienced significant climatic changes over the past decades, profoundly impacting agricultural practices and livelihoods. Since 1960, Ghana's average annual temperature has risen by approximately 1°C, with projections indicating an increase of 1.0°C to 3.0°C by 2050 and up to 5.4°C by 2080, particularly in the northern and inland areas. These rising temperatures have led to extended dry seasons and increased evapotranspiration rates, stressing both crops and water resources. Rainfall in the Transition Zone has become increasingly erratic and variable. Historical data from 1961 to 2000 show a decline in mean annual rainfall across all agro-ecological zones in Ghana. Projections suggest a further decrease in rainfall by up to 14.6% by 2080 in the Transitional zone, while data from the Ghana Meteorological Agency indicates that the average maximum temperature in the Transitional Zone during the 1991–2020 period was approximately 32.5°C**,** with some areas recording higher values.

The transition zone has displayed differing rainfall trend significantly across the years from 1991 to date. Over the years, Bui, Atebubu, Wenchi, Prang and Kete-Krachi has exhibited decreasing rainfall amount with the exception of Kintampo which experienced an increasing trend in rainfall patterns.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Rainfall Amount (mm)
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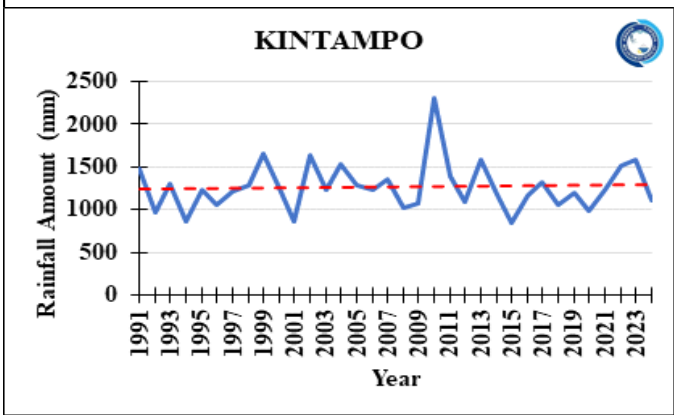
KINTAMPO
Rainfall Amount (mm)
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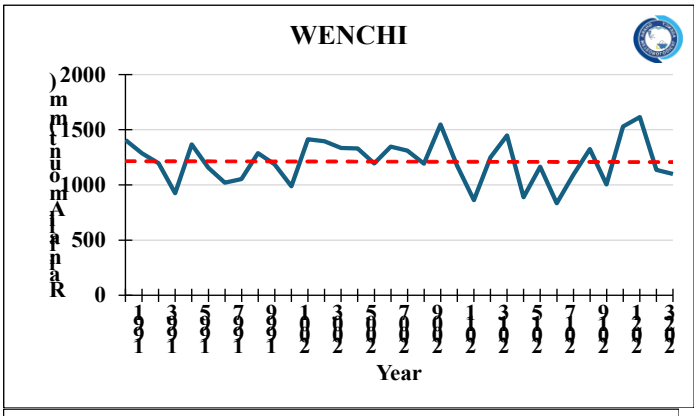
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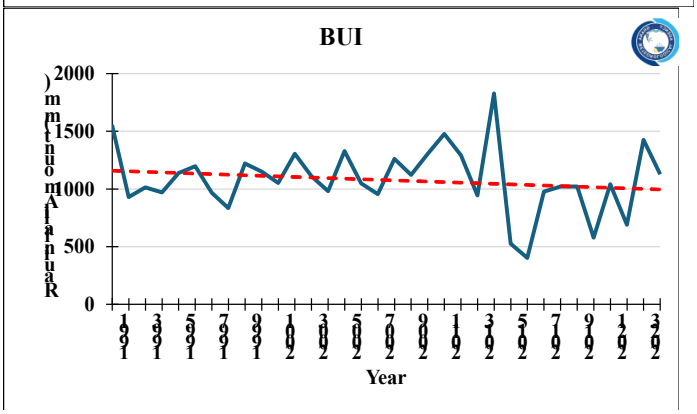
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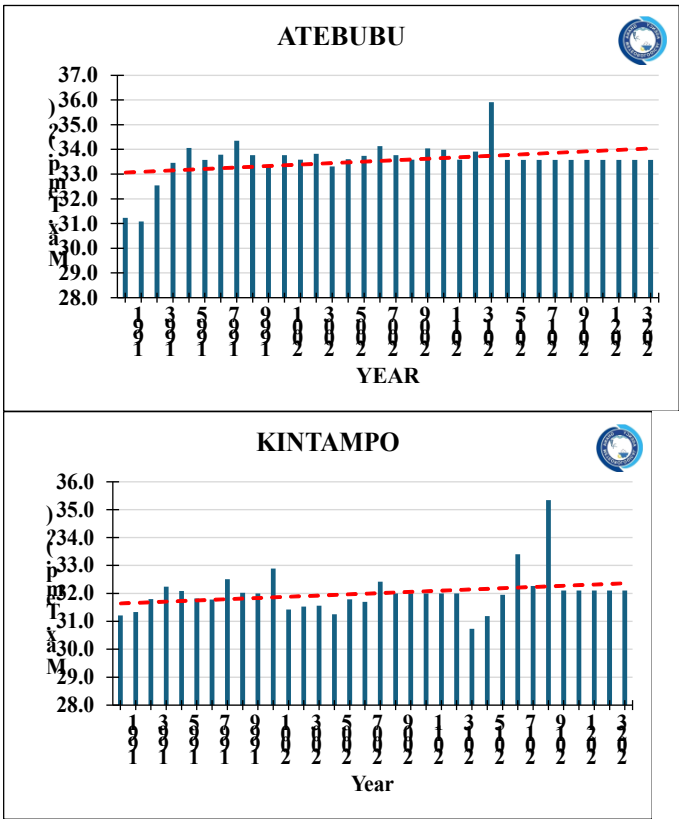
Fig 1: shows rainfall trends in the transitional zone from 1991-2023 source: Ghana Meteorological Agency

Considering the maximum temperature trend from 1991 to date, aside Prang and Kete-Krachi which experience a declining trend of temperature, all other areas in the transition zone experienced and increasing trend in temperature



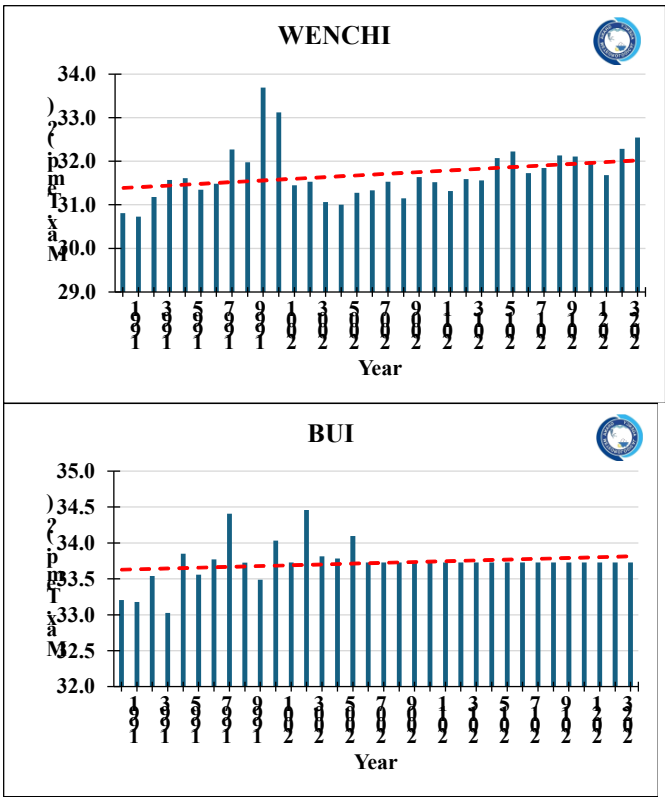


Figure 2: shows maximum temperature trends in the transitional zone from 1991-2023 source: Ghana Meteorological Agency

Under RCP 2.6, wet spell lengths in the Guinea Savanna, Rain Forest, Sudan Savanna, and Transitional Zones are projected to remain constant, averaging 170 days in the first three zones and 200 days in the Transitional Zone. In contrast, RCP 8.5 projects increasing wet spell lengths in the Guinea and Sudan Savannas, a decreasing trend in the Rain Forest Zone, and a constant trend in the Transitional Zone. Dry spell durations are expected to show little or no variation under both RCP 2.6 and RCP 4.5 scenarios, aside from an initial decrease.

Minimum temperatures in the Transition and Deciduous Zones are projected to increase by 0.6°C and 0.5°C respectively under RCP 2.6. Under RCP 4.5, the projected increases are 0.7°C in the Transition Zone and 0.5°C in the Deciduous Zone. The highest increases are projected under RCP 8.5, with rises of 2.5°C in the Transition Zone and 2.3°C in the Deciduous Zone.

Ghana Statistical Service (2024) reports that women make up 52% of the agricultural labor force in target districts, but they only control 15% of key resources like land, irrigation systems, extension services, credit facilities, and agricultural inputs. These disparities are rooted in cultural and institutional practices, with customary land tenure systems prioritizing male ownership and inheritance. These inequalities make women's farming activities vulnerable to climate variability in the Transitional Zone, and crop yields on women-managed plots are often lower due to insufficient access to inputs, capital, and extension support. The inequalities are exacerbated by the increasing climate variability in the Transitional Zone.

Gender-Disaggregated Data

Indicator	Women	Men
% Of labor in agriculture	52%	48%
% With access to extension services	21%	55%
% Owning land	14%	68%
% Accessing formal credit	12%	46%
Average plot size (ha)	0.7	1.5

Source: Ghana Statistical Service, 2024; Ministry of Food and Agriculture Gender Profile, 2023

PROPOSED PROJECT

IF vulnerable smallholder farmers are trained on diversifying their livelihood incomes and adopt these practices, THEN their adaptive capacity will be enhanced BECAUSE they will have access to flexible financial packages, markets and climate information services leading to a 25% increase in climate resilience scores across target communities

Component 1. Capacity Building and Training

The capacity building and training component is aimed at enhancing the knowledge, technical skills, and adaptive capacity of key stakeholders at various institutional levels and among vulnerable smallholder farmers. This will be implemented through a series of coordinated and targeted training programs focused on sustainable and climate-resilient agricultural practices. The activities under this component include:

1.1 Training for National, Regional, and District Departments of Agriculture

This activity involves structured training sessions for technical staff and extension officers at the national, regional, and district levels. The goal is to strengthen institutional capacity in the following areas:

- **Agroforestry:** Training will cover the integration of trees and shrubs into farming systems to improve soil fertility, enhance biodiversity, and provide additional income streams.
- **Aquaculture:** Participants will be trained on the establishment and management of fishponds, fish feed production, water quality control, and sustainable harvesting techniques.
- **Apiculture:** Training modules will include the construction and management of beehives, bee colony management, honey extraction and processing, and market access strategies.
- **Climate-Smart Agriculture (CSA):** This includes instruction on resilient cropping systems, conservation agriculture, water use efficiency.
- **Agribusiness:** Staff will receive training in value chain development, post-harvest management and business planning to support farmers in transforming agricultural practices into viable business ventures.

1.2 Training for Vulnerable Smallholder Farmers

This activity targets smallholder farmers, particularly women, youth, and persons with disabilities, who are disproportionately affected by climate change and economic vulnerabilities. The training will be delivered through Farmer Field Schools (FFS), demonstration plots, and community workshops. Key focus areas include:

- **Agroforestry:** Practical training on the benefits and techniques of incorporating multipurpose trees into farm landscapes to enhance resilience and improve livelihoods.
- **Aquaculture:** Basic fish farming skills tailored to small-scale operations, including pond construction using locally available materials, fish breeding, and sustainable feeding practices.
- **Apiculture:** Training in low-cost beekeeping practices, hive maintenance, and value addition through processing and packaging of bee products.
- **Climate-Smart Agriculture:** Emphasis will be on low-cost, locally adaptable practices such as drought-tolerant crop varieties, mulching, composting, and integrated pest management.
- **Agribusiness:** Farmers will be equipped with knowledge on entrepreneurship, market linkages, financial management, and cooperative formation to enhance their access to inputs, services, and markets.

Each training program will be accompanied by manuals, visual aids, and practical sessions to ensure knowledge retention and practical application. Periodic follow-ups and mentorship will also be conducted to support trainees in adopting and scaling up these practices within their communities and institutions.

Component 2. Support Financial and Market Access

This component seeks to address the critical challenges that smallholder farmers face in accessing financial services and reliable markets. By improving financial inclusion and strengthening market systems, the project aims to enhance the profitability and sustainability of climate-resilient agricultural enterprises.

2.1. Co-Development of Flexible Financial Packages with Financial Institutions

The project will engage commercial banks, rural banks, microfinance institutions, and other relevant financial actors to co-design tailored financial products that suit the needs and realities of smallholder farmers. These packages may include: Seasonal credit with grace periods aligned with cropping cycles, Group-based lending schemes with reduced collateral requirements, Weather-indexed insurance and microinsurance products, Low-interest financing for inputs, irrigation systems, and small-scale infrastructure. The co-development process will involve participatory stakeholder consultations to ensure products are farmer-friendly and gender-responsive.

2.2. Promotion of a Savings Culture Among Farmers

The project will introduce and promote structured savings mechanisms among farmers, particularly within farmer-based organizations and cooperatives. This includes: training farmers on the importance of savings for resilience and investment, facilitating the formation and strengthening of Village Savings and Loan Associations (VSLAs), encouraging digital/mobile

savings platforms to improve accessibility and reduce transaction costs. These efforts will help farmers build financial buffers, reduce reliance on predatory lending, and enable reinvestment into their farming activities.

2.3. Linking Farmers to Financial Institutions and Market Aggregators

To improve both input and output market access, the project will serve as a bridge between farmers and key market actors. Activities include: organizing agribusiness forums, trade fairs to connect producers with aggregators, processors, and off-takers, facilitating partnerships between farmer groups and financial institutions to ease access to credit and financial advisory services, supporting contract farming and out-grower schemes where feasible, to secure markets and improve price predictability. This will enhance farmers' ability to scale their operations and access better prices and services.

2.4. Strengthening and Supporting Farmer Organizations

Strong farmer-based organizations are critical for economies of scale, advocacy, and market competitiveness. The project will: strengthen organizational capacity in areas such as record-keeping, collective marketing, and input procurement, facilitate registration and legal recognition to improve access to finance and partnerships, empowered farmer groups will be positioned to engage more effectively with value chain actors, advocate for better services, and sustain the gains of the project beyond its duration.

Component 3. Climate Information Services

Access to timely and accurate climate information is critical for building the resilience of smallholder farmers to climate variability and change. This component aims to strengthen the production, packaging, and dissemination of localized climate information services to enable informed decision-making at the farm level.

3.1. Generation of Targeted Climate Information

The project will support national and sub-national meteorological agencies/offices and agricultural extension services to co-produce climate information that is tailored to the needs of smallholder farmers. Key activities include:

- Collaborating with climate experts and agricultural stakeholders to develop seasonal forecasts, weather alerts, and agro-meteorological advisories specific to key farming activities (e.g., land preparation, planting, harvesting).
- Integrating indigenous knowledge systems with scientific data to enhance the relevance and acceptability of weather forecasts.
- Using geospatial tools and local data to generate micro-climate assessments and risk profiles for the transitional zone.

This will ensure that the climate information is not only technically sound but also contextually relevant and actionable for farming communities.

3.2. Dissemination of Climate Information to Vulnerable Smallholder Farmers

To maximize reach and usability, the project will employ a multi-channel dissemination strategy to ensure that climate information reaches the last mile. This will include:

- Partnering with local radio stations to broadcast weather forecasts and agro-advisories in local languages**.**
- Using mobile platforms (SMS, voice messages, USSD codes**)** to deliver real-time alerts and tips directly to farmers' phones.
- Deploying community-based climate information centers and kiosks within farmer organizations and agricultural offices.
- Training agricultural extension agents and community volunteers as climate information intermediaries**,** capable of interpreting and translating technical data for farmer use.

Special emphasis will be placed on reaching women, youth, and persons with disabilities, ensuring that information is accessible and inclusive. Feedback mechanisms will also be developed to assess the effectiveness of communication and continuously improve delivery formats.

Component 4. Policy and Institutional Support

This component aims to strengthen the enabling environment for climate-resilient and diversified livelihoods by supporting sub-national policy advocacy and improving awareness and implementation of relevant national policies. It will focus on enhancing institutional coordination and policy uptake among local stakeholders and farming communities.

4.1. Policy Advocacy at Sub-National Level

To improve policy alignment and implementation at the local level, the project will engage in strategic advocacy and capacity-building for decentralized government institutions and traditional authorities. Activities will include:

- Organizing policy dialogue forums with Regional Coordinating Councils, District Assemblies, and local technical departments to advocate for the integration of climate resilience, sustainable land use, and livelihood diversification into local development plans and budgets.
- Building the capacity of local government officials and traditional leaders on relevant policy frameworks (e.g., climate adaptation strategies, agricultural extension reforms, natural resource governance).
- Facilitating the adoption and enforcement of by-laws that promote sustainable practices such as agroforestry, water conservation, and responsible small-scale mining.
- Promoting inclusive policy processes, ensuring the participation of women, youth, and marginalized groups in local decision-making spaces.

This will enhance institutional responsiveness to community needs and increase local ownership of resilience-building initiatives.

4.2. Dissemination of National Policies That Support Diversified Livelihoods

To bridge the gap between national policy and local action, the project will support the communication and uptake of national policies that promote sustainable and diversified rural livelihoods. Key actions include:

- Translating and simplifying national policy documents (e.g., Ghana's Climate Change Policy, Climate Smart Agriculture and Food Security Action Plan, Tree Crop Development Policy) into accessible formats and local languages.
- Organizing community sensitization events, radio discussions, and stakeholder briefings to disseminate key policy messages and explain the rights, responsibilities, and opportunities available to farmers and local institutions.
- Developing policy briefs, infographics, and audiovisual materials to support extension agents and community-based organizations in educating farmers on how to leverage policy instruments and incentives (e.g., subsidies, land tenure reforms, input support programs).
- Supporting feedback mechanisms and citizen engagement platforms that allow communities to share input on policy implementation and raise concerns with local authorities.

This will foster increased awareness, compliance, and benefit from supportive policies among rural populations, thereby improving their capacity to adopt sustainable livelihood strategies.