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Contextualizing National Level Climate-Smart Agriculture Guidelines at the District Level in Ghana[1]

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Abstract: Implementing climate-smart agriculture (CSA) provides adaptation and resilience pathways to address the negative ramifications of climate change impacts. CSA mainstreaming is strong at the global and national levels. It however remains a challenge at the local level. In the quest to understand CSA mainstreaming at the local level, we utilized mixed-content analysis to assess 11 local/district medium-term development plans for the 2018–2021 plan period for the Upper West Region, a semi-arid region of Ghana. We found strong awareness of climate change impacts on agriculture with weak mainstreaming of CSA into local plans. We, therefore, called for a review of the national guidelines for preparing local development plans by integrating resources for CSA, providing climate finance opportunities, enhancing climate assessment and information systems, building institutional capacity and fostering partnerships with local development actors that focus on CSA.

Keywords: climate change impacts, climate-smart agriculture, Ghana, local/district medium-term development plans, mainstreaming

1. Introduction

Ghana is a hotspot of climate change and ranked high among African countries most exposed to climate risks (World Bank, 2021; Atampugre et al., 2019). Temperature trends between the periods of 1989 and 2015 have increased by about an average of 1.0ºC across the country (Asare-Nuamah & Botchway, 2019). Under Ghana's dry climate scenario, temperatures are expected to exceed an average of 2.0ºC in the northern savannah agro-ecological zones by 2080 (Klutse et al., 2020) compared to 1.7-2.0°C and 1.3-1.6°C for the forest and transitional zones respectively (World Bank, 2020). Also, Ghana's annual rainfall trends have changed

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significantly (Bessah et al., 2021) with average reductions of 10.9% and 18.6% projected for 2050 and 2080 respectively in most parts of Ghana, especially in northern Ghana (Environmental Protection Agency [EPA], 2020). The implication is that farmers should expect more floods, droughts and wildfires in the future (Kyere-Boateng & Marek, 2021).

Following this realization are recommendations to implement climate-smart agriculture (CSA) as adaptation and resilience pathways to address the negative ramifications of climate change impacts (Diko et al., 2021; Akinyi et al., 2022; Gikonyo et al., 2022). CSA seeks to manage agriculture production through adaptation, mitigation, and resilience (Food and Agriculture Organization [FAO] 2017; Khatri-Chhetri et al. 2020; Abegunde & Obi, 2022). To ensure that CSA is captured in local, regional, and national development planning and policies, mainstreaming which refers to the "integration of policies and measures to address climate change into ongoing sectoral and development planning and decision-making" (Klein et al. 2005, p. 84) is strongly recommended due to Ghana's vulnerability to climate change impacts (Diko et al., 2021; United Nations Office for Disaster Risk Reduction [UNDRR], 2022). In as much as CSA is mainstreamed in regional and national climate change policies (Zougmoré et al. 2018), national climate change policies have not been adequately mainstreamed into local/district medium-term development plans (MTDPs) (Diko, 2018; Nkiaka & Lovett, 2018). Local development plans are germane development instruments used by local governments in partnership with different development actors to implement different development interventions—including those to support agriculture production. Local governments champion the translation of national development policies into local actions by preparing and implementing local development plans (Diko, 2018; Santhia et al., 2018; Pieterse et al., 2021). This difficulty in mainstreaming national climate change policies into local development plans has been attributed to: (1) CSA being ambiguous and controversial (Clapp et al. 2018; Ifeanyi-Obi et al., 2022) both as a concept and in its application; (2) inadequate financing, poor stakeholder collaboration and coordination, path dependency, and a knowledge gap between climate change information, research and policy (Imran et al., 2022; Chandra et al. 2018).

Without proper mainstreaming of CSA into local development plans, interventions to build adaptive and resilience capacities of farmers against climate change impacts would be absent, inadequate, and/or effective (Diko et al., 2021). Accordingly, we examined 11 local development plans from Ghana's Upper West Region to provide insights into whether global development ideas are diffused and localized through local development plans, and contribute to the emergent discourse on the dynamics and intricacies of human and social practices that occur in specific socio-ecological and institutional contexts (see Xiang, 2019).

2. CSA in Ghana

CSA was first introduced in 2010 at The Hague Conference on Agriculture, Food Security, and Climate Change. Subsequently, this has informed several actions including the publication of the 1st edition of FAO's CSA Sourcebook in 2013 and the 2nd second in 2017. The United Nations (UN) Sustainable Development Goals (SDGs) also emphasize CSA are ways to achieve global sustainable development (FAO, 2017). Accordingly, the Government of Ghana (GoG) has progressively mainstreamed climate change into its national development plans.

This started with Ghana's 2006-2009 Growth and Poverty Reduction Strategy (GPRS II) (Diko, 2018). Consequently, the GoG has given "special consideration" to climate change at all levels of development planning (National Development Planning Commission [NDPC], 2013), especially in the preparation of local development plans. Ghana's medium-term national development policy framework—An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All (First Step) 2018–2021—also sought to enhance "climate change resilience at all levels and across all sectors" by "deepening the mainstreaming of climate change in national and sub-national development planning and budgeting processes" in addition to "promoting and documenting improved climate-smart indigenous agricultural knowledge" (NDPC 2017). Also, in the light of climate change impacts on the agriculture sector, particularly smallholder farmers, such as: erratic rainfall; rising temperatures; frequent droughts; losses of arable land through desertification; outbreaks of crop and livestock pests and diseases; and salinization of agricultural soils from sea level rise and tidal flooding (World Bank & Ministry of Food and Agriculture [MoFA], 2020; UNDRR, 2022), different initiatives have been undertaken in Ghana to address these impacts. There was the establishment of a National Climate Change Committee (NCCC) in 2010. The NCCC subsequently developed four national documents on climate change, namely: National Climate Change Policy Framework and National Climate Change Adaptation Strategy in 2010, the National Climate Change Policy in 2014, and the National Climate Change Policy Action Programme for Implementation in 2015 (Diko 2018; Essegbey et al. 2015). These documents provide national direction for tackling climate change impacts in Ghana.

Specifically, to CSA, there have been CSA policy reports from the GoG in partnerships with organizations such as the Consultative Group for International Agricultural Research (CGIAR) Programme on Climate Change, Agriculture, and Food Security, which published the National Climate-Smart Agriculture and Food Security Action Plan of Ghana (2016-2020) in 2015. Following this was an Investment Framework for Mobilization of Resources into CSA in Ghana in 2018 (see FAO and MoFA, 2018). Again, in partnership with the World Bank, MoFA published the CSA Investment Plan for Ghana in 2020 (see World Bank and MoFA 2020). These policy documents and reports provide policy direction for CSA and its integration into agriculture and account for different agro-ecological zones and multilevel nature of CSA initiatives and their implementation in Ghana's decentralized local government system (FAO & MoFA, 2018). Consequent to these policy documents and reports, field studies have been conducted to develop investment frameworks and equip districts with information and knowledge on existing CSA opportunities and attract funding to support the agriculture sector. The studies revealed financing and incoherent policy alignments in addition to ad hoc and ineffective implementation of CSA practices and technologies due to insufficient integration into sectoral policies and local plans (Essegbey et al. 2015). These challenges are embedded in the realities of development planning in Ghana. According to Adu-Boateng (2015), despite nationally mandated guidelines that require attention to climate change issues in MTDPs, there are tensions between local development and national climate change priorities. This leads to "climate change policy divergence" (Diko 2018, p. 149) and some path dependency (Diko 2019, p. 518) in mainstreaming climate change into MTDPs in Ghana. These development

planning realities, therefore, give impetus to further examine the mainstreaming challenges of CSA into local development plans in Ghana.

3. Socio-ecological Profile of the Upper West Region

We randomly selected the Upper West region of Ghana for the study. The region is one of the five administrative regions out of the 16 regions in Ghana with a semi-arid climate. The region is characterized by Guinea savanna vegetation interspersed with grassland and woodland of drought-resistant trees. It has one rainy season and an average rainfall of 115 mm. The region has a population of 702,110 with over 83% being rural (Ghana Statistical Service, [GSS] 2013). As high as 72.8% of the economically active population is employed in the agriculture, forestry, and fishery sector (GSS, 2013; World Bank and MoFA, 2020). This notwithstanding, the region is characterized by high levels of food insecurity, malnutrition, and limited access to social services (GSS, 2020); as attributed to limited "access to modern inputs, extension services, irrigation, electricity, markets, and roads to support the development of a vibrant agriculture sector" (World Bank and MoFA, 2020). In addition to these non-climatic issues, the region is also more vulnerable to climate change impacts such as severe droughts, with critical implications for agriculture productivity and food security. These climatic and non-climatic stressors have led to many adaptations and resilience realities, with smallholder farmers increasingly adapting to the impacts of climate change (Lawson et al. 2020; Fagariba et al. 2018; Nyantakyi-Frimpong and Bezner-Kerr 2015). These socio-ecological conditions provide an appropriate context to analyse CSA mainstreaming in the region.

4. Methodology

We deployed a mix-content analysis to examine CSA mainstreaming in 11 2018-2021 MTDPs from the Upper West Region. This provided an analytical framework to examine text data to understand themes and patterns. We tailored the suggested report structure by Ghana's NDPC guidelines for preparing MTDPs in Ghana to general mainstreaming assessment frameworks (Fatemi et al. 2020, Pieterse et al. 2021). In the NDPC guidelines, there are seven recommended chapters namely: (1) Profile/Current Situation/baseline; (2) Prioritization/key Development Issues; (3) Development Goal, Adopted Objectives and Strategies; (4) Development Programs and subprograms; (5) Annual Action Plan; (6) Monitoring and Evaluation Plan; and (7) Communication Plan. The recommended chapters were reframed in relation to the eight CSA modules of the FAO's second edition CSA sourcebook (see FAO, 2017). Chapter (2) was reframed as problematization, chapters (3) and (4) merged and captioned as Development Programs, and chapters (6) and (7) merged as Monitoring, Evaluation, and Communication Plan (see Pieterse et al., 2021; Fatemi et al., 2020). The indicators were scored between zero (0[2]), one (1[3]) and two (2[4]) depending on the extent to which they have been met in the MTDPs by reviewing the various chapters and sections of the MTDPs that correspond to the parameters in Table 1.

[2] Not Present (0 point): The MTDP does not provide evidence or information of the indicator.
[3] Low (1 point): The MTDP meets the indicator in part by mentioning or discussing the indicator. It however does this at a basic level with little to no evidence and does not or partly connects to CSA or climate change throughout the plan.
[4] High (2 points): The MTDP explicitly addresses the indicator with reliable evidence (e.g., national and local assessment reports, baseline studies, consultant reports, academic studies, etc.) and connects to CSA or climate change throughout the plan.

Table 1: Assessment Framework for CSA Mainstreaming in MTDPs

Parameters	Indicators*
Climate Change Profile	Climate trends – past, present, future Climate change impacts
Climate-Smart Agriculture and problematization	Problems/priorities of water management Problems/priorities of climate-smart livestock production Problems/priorities of climate-smart crop production Problems/priorities of climate-smart soil and land management Problems/priorities of climate-smart forestry Problems/priorities of climate-smart fisheries and aquaculture Problems/priorities of genetic resources for food and agriculture Problems/priorities sustainable food systems and value chains
Development Programs on CSA	Clear goals related to CSA priorities or problems Clear objectives for each goal related to CSA priorities or problems Clear strategies for goals and objectives related to CSA problematization
Projects on CSA (Focus on projects identified in the Program of Action)	Projects on water management Projects on climate-smart livestock production Projects on climate-smart crop production Projects on climate-smart soil and land management Projects on climate-smart forestry Projects on climate-smart fisheries and aquaculture Projects on genetic resources for food and agriculture Projects on sustainable food systems and value chains Identifies implementation period for annual projects Identifies funding sources for annual projects Identifies implementation agencies for annual projects
Monitoring, Evaluation; and Communication Plan	Identifies clear strategies to monitor and evaluate CSA projects Identifies clear strategies to disseminate information about CSA
Terminology Count	Number of mentions of "Climate Change" Number of mentions of "CSA"

* Indicators are derived based on the review of FAO's CSA Sourcebook (2nd Eds.) The indicators were examined in the plans with explanations and examples from the Sourcebook as a guide.

5. Results

Parameters	Findings
Use of "Climate Change" and CSA in MTDPs	The average number of times the term "climate change" appeared in the 11 plans was 34.3 and 5.5 for CSA (including terms like climate-smart indigenous agriculture).
Climate Change Trends and Impacts on Agriculture	Overall, only two out of eleven MTDPs reviewed had weak mainstreaming. All the MTDPs scored low on the climate trend indicator as these plans provided basic to no reliable evidence of the past, present, and future climate trends. Generally, the plan narratives depict awareness of climate change and its impacts. But the absence of climate data in the majority of the MTDPs is a weakness as reliable data is critical for understanding the location, extent, and severity of climate change impacts to inform appropriate strategies in building adaptive and resilience capacities in the agriculture sector both in the present and for the future.
CSA and Problematization of the Agriculture Sector	The MTDPs identified key CSA related problems and/or priorities for water management, livestock production, crop production, soil and land management, forestry, fisheries and aquaculture, and sustainable food systems and value chains. Five out of eleven MTDPs problematized crop production in connection to CSA compared to the other indicators. None of the plans problematized or prioritized genetically modified organisms (GMOs)— probably because laws in Ghana prevent their adoption. Furthermore, CSA-related water management problems were high in two MTDPs; two MTDPs scored high on CSA-related livestock production problems; only one MTDP scored high for CSA-related land management problems; three MTDPs did not problematize fishery and aquaculture as CSA-related; and two MTDPs scored high on CSA-related value chain problems.

CSA Goals, Objectives, and Strategies	Eight out of the eleven MTDPs had very strong CSA mainstreaming. The MTDPs had very strong mainstreaming despite having poor and weak CSA mainstreaming in the problematization section, illustrating transitional gaps from problematization to CSA goals, objectives, and strategies. The difference between the districts lies in the way the goals, objectives, and strategies are linked to climate change.
CSA Projects in Development Plans	Water management projects were identified in all eleven MTDPs. However, only three MTDPs scored high on water projects aligned with CSA. In the other MTDPs, water management projects were vague in formulation or linked to urban water systems rather than agriculture specifically. Some MTDPs had projects on livestock production without emphasis on CSA. Six of the eleven MTDPs scored high on climate-smart crop production projects. Projects for climate-smart soil and land management are quite mixed with some MTDPs recognising CSA soil and land management issues without presenting corresponding projects. Furthermore, eight of the eleven MTDPs identified projects for climate-smart forestry. CSA mainstreaming for projects on fishery and aquaculture was challenging; six MTDPs had no projects for the sector. In some MTDPs, there were projects focused on improving knowledge on CSA—with no specific emphasis on particular agriculture activities.
Implementation Framework for CSA Projects	Six MTDPs had very strong CSA mainstreaming for their implementation framework. Project funding sources were the Government of Ghana, the District Assemblies, and NGOs and development partners/donors. Nonetheless, there was no mention of climate finance arrangements for CSA projects in the plans.
Monitoring, Evaluations, and Dissemination of CSA Interventions	In four of eleven MTDPs, CSA mainstreaming for the monitoring and evaluation (M&E) plan was high compared to two MTDPs that scored high on the dissemination plan. Yet not all CSA projects were captured in both the M&E and dissemination plans—with some projects worded differently. Overall, MTDPs of two districts had very strong CSA mainstreaming for monitoring, evaluation, and dissemination. For the remaining nine districts, the indicators were either generic and/or presented at a basic level with little to no evidence on monitoring, evaluation, and dissemination of CSA projects in the MTDPs. Thus, the identification and implementation of clear strategies to monitor and evaluate CSA-related projects and to disseminate information about CSA are limited and unclear.
Mainstreaming of CSA in MTDPs	Overall, the MTDPs for the Upper West Region showed strength in their awareness of climate change impacts, framing of CSA goals, objectives, and strategies, and the identification of funding agencies and implementation schedule for CSA projects. There were weaknesses in information for climate change trends, the problematization of CSA, formulation of CSA projects, and the dissemination plans for CSA project implementation. The only apparent gap was the absence of GMOs as an element of CSA practice.

Table 2: Mainstreaming Scores for CSA of the MTDPs

Parameters	Indicators	Score	Percentage Score	Mainstreaming
Climate Change Profile	Climate trends – past, present, future	11	50.0%	Weak
	Climate change impacts	20	90.9%	Very Strong
Climate-Smart Agriculture and problematization	Problems/priorities of water management	14	63.6%	Moderate
	Problems/priorities of climate-smart livestock production	13	59.1%	Weak
	Problems/priorities of climate-smart crop production	16	72.7%	Strong
	Problems/priorities of climate-smart soil and land management	11	50.0%	Weak
	Problems/priorities of climate-smart forestry	15	68.2%	Moderate
	Problems/priorities of climate-smart fisheries and aquaculture	10	45.5%	Poor
	Problems/priorities of genetic resources for food and agriculture	NA	NA	NA
	Problems/priorities sustainable food systems and value chains	12	54.5%	Weak
Development Programs on CSA	Clear goals related to CSA priorities or problems	17	77.3%	Strong
	Clear objectives for each goal related to CSA priorities or problems	18	81.8%	Very Strong
	Clear strategies for goals and objectives related to CSA problematization	18	81.8%	Very Strong
Projects on CSA (Focus on projects identified in the Program of Action)	Projects on water management	14	63.6%	Moderate
	Projects on climate-smart livestock production	11	50.0%	Weak
	Projects on climate-smart crop production	17	77.3%	Strong
	Projects on climate-smart soil and land management	12	54.5%	Weak
	Projects on climate-smart forestry	12	54.5%	Weak
	Projects on climate-smart fisheries and aquaculture	7	31.8%	Poor
	Projects on genetic resources for food and agriculture	NA	NA	NA
	Projects on sustainable food systems and value chains	15	68.2%	Moderate
	Identifies implementation period for annual projects	19	86.4%	Very Strong
	Identifies funding sourcing annual projects	14	63.6%	Moderate
	Identifies implementation agencies annual projects	16	72.7%	Strong
Monitoring, Evaluation; and Communication Plan	Identifies clear strategies to monitor and evaluate CSA projects	15	68.2%	Moderate
	Identifies clear strategies to disseminate information about CSA	13	59.1%	Weak

6. Lessons

1. Calls for CSA mainstreaming in local development have not adequately materialized in the semi-arid region of Ghana, where CSA is essential to climate adaptation for the agriculture sector—even when there was apparent high awareness of climate change impacts on agriculture.
2. Little evidence of the climate trends undergirded awareness of climate change impacts in plans as the spatio-temporal dimensions of climate change in the MTDPs were absent.
3. For problematization, sustainable value chain, water, and land management that critically support and enhance agriculture productivity and production had low connections to climate change in the MTDPs—although they are crucial to promoting CSA in crop and livestock production, especially for arid areas such as the Upper West Region.
4. Low focus on fishing and aquaculture in the MTDPs can be attributed to the climatic conditions of arid regions; with MTDPs focusing more on other agriculture activities. This is a weakness and speaks of the absence of innovation since with appropriate technology and investments, the region can utilize fishing and aquaculture as a potential to provide alternative livelihoods, especially for households living in proximity to rivers in the region.
5. Despite the advantages of GMO for addressing climate change impacts on agriculture, this was missing in all the MTDPs because, currently, there are no policies or regulatory framework for the adoption and utilization of GMOs in crop and livestock production in Ghana.
6. Goals, objectives, and strategies related to CSA diverged from findings on climate trends and problematization of the agriculture sector in the MTDPs—with the majority of the plans having very strong mainstreaming. This is due to the limited contextualization and alignment of agriculture goals with local problems and climate realities, which can render strategies and projects ineffective when addressing climate change impacts on agriculture.
7. Another mainstreaming weakness is a lack of clear identification of climate finance opportunities for CSA projects in the MTDPs. While the plans showed strong mainstreaming because they provided sector-related agencies for project funding and implementation— mainly the central government and the local authority (i.e., District Assemblies)— the specific funds were unclear.
8. Furthermore, the CSA mainstreaming challenge in the MTDPs in Ghana can be traced to the limitations of nationally mandated plans and their guidelines. While in the absence of such mandates and poor institutional capacity, development planning authorities in Ghana might not be able to prepare MTDPs, such mandates and their guidelines are not adequate for mainstreaming climate change at the local level.
9. Overall, the local development plans failed to effectively connect climate change impacts to CSA practices. CSA provides a pathway to mobilize political support, promote sustainable agriculture production, increase farmers' income, and build their adaptive and resilience capacities to climate change impacts. The current practices of CSA in the local development plans can therefore render proposed strategies and

projects ineffective, inefficient and counter-productive, thereby increasing the risks and vulnerabilities of the socio-ecological system within which CSA is practiced.

7. Conclusion and Recommendation

We demonstrate how CSA is reflected in the content of local development plans—which provide insights into how "human actions and social [and institutional] processes take place in specific socio-ecological context" (Xiang 2019, p. 7). Our findings demonstrate that climate change mainstreaming in Ghana at the local level remains a challenge, even in semi-arid regions. Accordingly, the strong momentum of CSA at the global level and in national development plans needs to be channelled and contextualized locally where the impacts and response to climate change take place.

CSA mainstreaming in local development plans with particular attention to specific socio-ecological contexts is vital to ensure this transition. To effectively mainstream CSA in local development plans, actions, and social processes related to capacity development efforts of local planning authorities are imperative. Such efforts should focus on enabling better use of assessment tools, reliable and up-to-date information to explicitly identify the places, people, and agriculture activities at risk of climate change impacts. This should be followed by identifying and investing in context-specific CSA practices to build adaptive and resilience capacities against climate change impacts.

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