



# **Beyond Policy Alignment: Assessing Climate Change Mainstreaming in Local Government Planning in Mwanga District, Tanzania**

**Fredy L. Maro**

*The University of Dodoma, Tanzania*

## **Article History**

*Received: 2025-01-04*

*Revised: 2026-05-29*

*Accepted: 2026-05-30*

*Published: 2026-06-03*

## **Keywords**

Climate change  
Government  
Mainstreaming  
Policy alignment

## **How to cite:**

Maro, F. L. (2026). Beyond Policy Alignment: Assessing Climate Change Mainstreaming in Local Government Planning in Mwanga District, Tanzania. *Eastern African Journal of Humanities and Social Sciences*, 5(2), 119-134.

## **Abstract**

Climate change poses significant challenges to local development planning, particularly in vulnerable semi-arid regions such as Mwanga District in Kilimanjaro Region, Tanzania. This study assessed the extent of climate change mainstreaming in Mwanga District development planning processes by examining the alignment of district planning documents with national climate change frameworks and evaluating the level of practical integration of climate change considerations into district governance systems. The study employed a mixed-methods approach involving document review, key informant interviews, and focus group discussions. Policy content analysis and indicator-based assessment were used to evaluate climate change integration through the Policy Alignment Matrix (PAM), Climate Mainstreaming Index (CMI), and the combined Climate Change Alignment and Mainstreaming Index (CCAMI). The findings indicate that Mwanga District achieved a strong overall policy alignment score (PAM = 61.7%) and a strong Climate Mainstreaming Index (CMI = 65%), resulting in an overall CCAMI score of 63.4%, suggesting substantial integration of climate change considerations into district planning processes. However, mainstreaming was uneven across dimensions, with stronger emphasis on climate adaptation, water resource management, environmental conservation, and disaster risk reduction, while climate finance, climate mitigation, and climate information systems remained weakly integrated. Major challenges affecting mainstreaming included a lack of awareness, limited technical capacity, inadequate financial resources, and weak institutional coordination. The study concludes that although Mwanga District has established an important foundation for climate-resilient planning, effective mainstreaming requires strengthened institutional coordination, dedicated climate financing, improved technical capacity, and enhanced climate information systems. The study contributes to local climate governance literature by demonstrating the importance of integrating policy coherence and implementation

Copyright © 2026





effectiveness in assessing climate change mainstreaming at the local government level.

## Introduction

Climate change poses significant threats to sustainable development and continues to undermine livelihoods, ecosystems, and development planning globally, particularly in developing countries (Rogers et al., 2023). At the local level, development planning responses play a critical role in addressing climate-related challenges and strengthening resilience (Oyugi, 2023). Consequently, the mainstreaming of climate change adaptation and mitigation into local development planning has emerged as an important policy strategy for enhancing resilience and sustainable development outcomes (Diko et al., 2021). Climate change and development are closely interconnected because climate impacts can hinder development objectives, while development pathways and greenhouse gas emissions influence future climate change and society's adaptive capacity (Hernandez and Bolwig, 2020). Integrating climate change adaptation and mitigation measures into local planning systems therefore supports both climate resilience and sustainable development (England et al., 2019).

Sub-Saharan Africa is considered one of the most vulnerable regions to climate change due to widespread poverty, dependence on climate-sensitive sectors, and limited adaptive capacity (Gebrechorkos et al., 2023). In eastern and southern Africa, vulnerability is influenced by social, economic, political, cultural, and environmental conditions (Williams et al., 2021). Climate change impacts vary significantly across countries, sectors, and communities depending on local contexts and capacities (Kweyu et al., 2023). In response, many African countries have begun integrating international climate frameworks and measures into national and local development policies and governance systems (Mwenje and Kumar, 2024). International commitments such as Sustainable Development Goals 13 and 15 emphasise urgent climate action, ecosystem protection, sustainable land management, and biodiversity conservation (Lewis, 2021).

Although many African countries have initiated climate change mainstreaming within planning systems, limited research has examined how local government authorities operationalise these strategies at sub-national levels (Nkiaka and Lovett, 2018). Existing research has largely focused on national policy responses, with inadequate attention to local governance systems and implementation processes (Rogers et al., 2024). In Tanzania, local government authorities are central to implementing national climate policies and development strategies because they directly coordinate planning and service delivery at local levels (Saito, 2013; Myers, 2021; Shimwela and Katera, 2025). Despite this important role, the extent to which climate change strategies are mainstreamed into local government plans remains insufficiently understood. This study, therefore, examined the extent to which climate change strategies are integrated into local government development plans and identified challenges affecting climate change mainstreaming in Mwanga District, Tanzania.

## Material and Method

### *Description of the Study Area*

This study was conducted in Mwanga District, one of the seven districts of Kilimanjaro Region in northern Tanzania. Mwanga District is located within semi-arid ecological zones that are highly vulnerable to climate change impacts, including droughts, rainfall variability, water scarcity, food insecurity, and land degradation (Mdemu, 2021). The district was selected because it represents one of the climate-vulnerable districts where climate change impacts increasingly affect livelihoods and local development planning processes. Specifically, the study focused on Kambi ya Simba village, which represents one of the drought hotspot areas within the district.



Mwanga District lies between latitudes 3°0'0"-4°0'0" south and longitudes 37°25'0"-38°0'0" east (Mdemu, 2021). The district contains both lowland and highland ecological zones. Elevation ranges from 500-750 metres above sea level in the lowlands to higher altitudes in the highlands (Smucker and Wangui, 2016). Climatic conditions differ significantly between the two zones. The lowland areas experience semi-arid climatic conditions characterised by prolonged dry seasons extending from late April to early December (Kitole and Komba, 2025). Annual rainfall in the lowlands ranges from 400-800 mm, mainly during the Masika rainy season, which occurs between March and May. In contrast, the highlands receive between 800 and 1,400 mm annually from both the Masika and Vuli rainy seasons, which occur between October and December (Pauline and Lema, 2024).

Temperature conditions also vary between ecological zones. June and July are generally the coldest months, while January is the hottest, with temperatures ranging from 28°C to 32°C (Mdemu, 2021). The district economy largely depends on agriculture and livestock keeping. Livestock production dominates the lowlands while crop cultivation is more common in the highlands (Rweyemamu and Mulokozi, 2019). Major crops include maize, beans, and sunflower. The district also contains diverse soil types, including clay, sandy, loamy soils, nitosols, cambisols, and fluvisols. Natural vegetation in the district includes Acacia-type shrubs in lowland areas and forests in the highlands. These forests form important water catchment areas that supply seasonal and permanent rivers and streams used for domestic, agricultural, and livestock activities (Mkonda, 2022; Bagambilana and Rugumamu, 2023). Due to these climatic, ecological, and socio-economic characteristics, Mwanga District provided an appropriate case study for assessing climate change mainstreaming within local government planning systems.

### ***Research Design***

The study employed a mixed-methods research design, combining qualitative and quantitative approaches. The mixed-methods design was selected because it allows integration of qualitative and quantitative data collection and analysis procedures in a single study (Busetto et al., 2020). The qualitative component was primarily used to analyse policy documents and to understand the extent to which climate change priorities are incorporated into district planning systems. The quantitative component was used to measure the degree of policy alignment and climate mainstreaming using indicator-based assessment techniques. The mixed-methods design was considered appropriate because climate change mainstreaming involves both measurable governance indicators and qualitative institutional processes. Therefore, combining the two approaches enhanced the reliability and comprehensiveness of the findings.

### ***Research Approach***

The study employed policy content analysis combined with indicator-based assessment techniques. Policy content analysis involved a systematic review of national climate change frameworks and district development plans in order to identify climate-related priorities, strategies, and policy themes. The objective was to determine whether district development plans reflect national climate change priorities and policy directions. The study further employed indicator-based assessment using 20 climate mainstreaming indicators grouped into six dimensions: policy and planning integration, institutional arrangements, budget and finance, climate information systems, implementation, and monitoring and evaluation (Goonesekera and Olazabal, 2022). These dimensions were selected because they represent important components of climate governance and local climate policy integration.



### ***Sample Size and Sampling Procedure***

The study employed non-probability sampling techniques, specifically purposive sampling, to select key informants. Participants were selected based on their experience, institutional roles, knowledge of climate change issues, and involvement in environmental and development planning activities.

A total of 20 key informants participated in the study. The selection of the key informants was based on their direct involvement in planning, environmental management, and climate-related activities in the district. Therefore, the value of the sample lies in the quality and relevance of its knowledge rather than in its numerical representation. Other reasons for selecting the key informants were to capture the vertical integration of climate policies from planning to implementation and to provide a comprehensive understanding of climate mainstreaming as a cross-cutting governance issue rather than a sector-specific concern.

At the district level, one (1) official was purposively selected from departments including planning, environment, agriculture, livestock, fisheries, forestry, health, education, land, water, and community development. In addition, one (1) representative from Same-Mwanga Environmental Conservation and Advisory Organisation (SMECAO) was included. This resulted in 11 key informants at the district level.

At the ward level, five (5) officials, including ward executive officers, community development officers, agricultural extension officers, ward councillors, and environmental officers, were selected. At the village level, four (4) participants, including village chairpersons, village executive officers, village development committee members, and village environmental committee representatives, were selected. Furthermore, two Focus Group Discussions (FGDs) involving ten participants each were conducted. One group consisted of farmers, while the second involved members of water user associations. Participants were selected based on their experience with climate-related challenges, involvement in local associations, and duration of residence within the village.

### ***Data Sources***

Both primary and secondary data sources were used. Primary data were obtained through key informant interviews and focus group discussions. Secondary data were collected through document review of national climate policies, district development plans, environmental plans, disaster management plans, and sectoral strategies related to climate change adaptation and mitigation.

### ***Data Collection Methods***

#### ***Document Review***

Document review was conducted using a structured checklist containing climate change themes and policy indicators. At the national level, documents reviewed included the National Climate Change Strategy (2012), National Adaptation Programme of Action (2007), Nationally Determined Contributions (2015/2021), National Climate Change Response Strategy (2021–2026), National Environmental Policy (1997/2021), and sectoral policies related to agriculture, water, health, livestock, natural resources, and infrastructure. The review enabled the extraction of key climate change themes, including climate adaptation, climate mitigation, climate-resilient agriculture, water resource management, and disaster risk reduction. These themes were later used as indicators during policy alignment analysis.



At the district level, documents reviewed included the District Strategic Plan (2021/2022–2025/2026), District Environmental Action Plan, Medium-Term Expenditure Framework (2024–2026), District Disaster Risk Management Plan, and sectoral plans related to agriculture, water, livestock, health, infrastructure, and environment.

#### *Key Informant Interviews*

Key informant interviews were conducted with district, ward, and village officials responsible for planning and implementation of climate-related activities. Interviews explored issues including climate challenges in the district, mainstreaming climate change into planning processes, climate budgeting, implementation practices, monitoring systems, institutional challenges, and recommendations to improve climate governance. Semi-structured questionnaires containing open-ended questions and Likert-scale questions were used during interviews. The interviews allowed the collection of contextual and institutional information regarding climate governance systems.

#### *Focus Group Discussions*

Focus Group Discussions were conducted with farmers and water user associations at Kambi ya Simba village. Discussions explored participants' perceptions of climate risks, the implementation of climate-related interventions, budgeting challenges, institutional coordination, and recommendations to strengthen climate mainstreaming. FGDs were useful for generating detailed contextual information and understanding community-level perspectives regarding climate change integration within local planning systems (Gundumogula, 2020).

#### *Data Analysis Methods*

##### *Content Analysis*

Qualitative data obtained from interviews and focus group discussions were analysed using content analysis. The process involved transcription, coding, categorisation, and thematic analysis of data (Humble and Mozelius, 2022). Similar codes were grouped into themes corresponding to study objectives. Findings were interpreted alongside existing literature and supported with direct quotations where appropriate (Nicmanis, 2024).

##### *Policy Alignment Analysis*

Policy alignment analysis was used to assess the degree of alignment between district plans and national climate change frameworks (Lewis, 2021). The analysis followed a series of seven steps: i) Extraction of national climate priorities from national climate frameworks (ii) Use of extracted priorities as indicators for assessing district plans (iii) Construction of a Policy Alignment Matrix (PAM) comparing district plans with national priorities (iv) Assignment of scores using a four-point scale namely; 0 = No alignment, 1 = Low alignment, 2 = Moderate alignment, 3 = High alignment (v) Calculation of the Policy Alignment Score (PAS) using the formula:

$$PAS = \sum_{i=1}^n A_i$$

Where:

PAS = Policy Alignment Score

A<sub>i</sub> = Score for each alignment item

n = Total number of national climate priorities assessed

vi) Calculation of percentage Policy Alignment Matrix (PAM%) using:



$$PAM\% = \frac{PAS}{3n} \times 100$$

Where:  $3n$  = Maximum possible alignment score

vii) Interpretation of PAM% scores: by which; 0–20% = Very low; 21–40% = Low; 41–60% = Moderate; 61–80% = High; 81–100% = Very high

*Climate Mainstreaming Index (CMI)*

The Climate Mainstreaming Index (CMI) was used to determine the extent to which climate change considerations are integrated into district governance systems (Wamsler and Osberg, 2022). The analysis employed descriptive statistics, including frequencies, percentages, and totals. The analysis followed five steps, namely: (i) Establishment of climate mainstreaming indicators; (ii) Assignment of scores based on a four-point scale: No mainstreaming = 0; Weak mainstreaming = 1; Moderate mainstreaming = 2; High mainstreaming = 3. The scoring system was adopted from previous climate mainstreaming studies (Bradaschia et al., 2024) (iii) Collection of scores through Likert-scale responses during interviews (iv) Calculation of Climate Mainstreaming Index using the formula:

$$CMI = \left( \frac{\sum_{i=1}^n S_i}{n \times S_{max}} \right) \times 100$$

Where: CMI = Climate Mainstreaming Index;  $S_i$  = Score obtained for each indicator;  $n$  = Total number of indicators;  $S_{max}$  = Maximum possible score

v) Interpretation of CMI scores guided by; 0–20% = Very low; 21–40% = Low; 41–60% = Moderate; 61–80% = High; 81–100% = Very high. SPSS and Microsoft Excel were used as tools during quantitative analysis.

*Combined Climate Change Alignment and Mainstreaming Index (CCAMI)*

To provide a comprehensive assessment of climate change mainstreaming, the study combined the Policy Alignment Matrix and the Climate Mainstreaming Index into a single composite indicator, the Climate Change Alignment and Mainstreaming Index (CCAMI). The combined index was intended to capture both policy coherence and operational implementation of climate change considerations within district planning systems. The use of combined assessment aligns with the literature advocating multidimensional approaches to evaluating climate governance and policy integration (Bleby and Foerster, 2023). In addition, the combined index enabled comprehensive evaluation of climate change integration within district planning systems and identification of governance gaps requiring improvement. The combined index was calculated using the formula:

$$CCAMI = \frac{PAM\% + CMI}{2}$$



Where: CCAMI = Climate Change Alignment and Mainstreaming Index; PAM% = Percentage Policy Alignment Matrix; CMI = Climate Mainstreaming Index

Interpretation of CCAMI scores guided by: 80–100% = Very strong climate alignment and mainstreaming; 60–79% = Strong climate alignment and mainstreaming; 40–59% = Moderate climate alignment and mainstreaming; 20–39% = Weak climate alignment and mainstreaming; 0–19% = Very weak climate alignment and mainstreaming

### Results

This section presents summarised findings on climate change mainstreaming in Mwanga District development planning processes. The findings are categorised into major climate challenges, policy alignment with national climate frameworks, the extent of climate change mainstreaming, challenges affecting mainstreaming, and proposed improvement measures.

#### *Major climate challenges in Mwanga District*

The study revealed that droughts and floods were the major climate-related challenges affecting Mwanga District, each accounting for 32% of responses. Landslides linked to heavy rainfall accounted for 25% of responses, while pest outbreaks, animal diseases, and strong winds were mentioned less frequently. Results from focus group discussions further revealed that prolonged droughts, floods, soil erosion, and crop diseases continue to affect agricultural production and livestock activities within the district. Participants emphasised that climate variability has significantly affected local livelihoods because most residents depend on climate-sensitive sectors such as agriculture and livestock keeping.

#### *Alignment of Mwanga District plans with the National Climate Change Frameworks*

##### *Alignment of Mwanga District Strategic Plan with National Climate Change Priorities*

Policy alignment analysis revealed that the Mwanga District Strategic Plan demonstrated strong alignment with national climate change priorities, recording a Policy Alignment Matrix (PAM) score of 66.7% (Table 1). Strongly aligned themes included climate adaptation, water resource management, and environmental conservation, while climate mitigation, climate finance, and climate information systems were weakly integrated. District officials explained that climate-related activities are mainly reflected in agriculture and water projects, although implementation frameworks remain weak.

Table 1: Showing Alignment of Mwanga District Strategic Plan (DSP) with National Climate Change Priorities

National Climate Priority	Score
Climate adaptation	3
Water resource management	3
Environmental conservation	3
Climate-smart agriculture	2
Disaster risk reduction	2
Climate governance	2
Monitoring and evaluation	2
Climate mitigation	1
Climate finance	1
Climate information and data use	1

PAS= 20; 3n= 30; PAM%=66.7% (Source: Field Data, 2025).

##### *Alignment of Mwanga District Environmental Action Plan (DEAP) with National Climate Change Priorities*

The District Environmental Action Plan recorded a slightly higher alignment score (PAM = 70%; Table 2), indicating strong integration of climate adaptation, water management, and environmental conservation themes. Moderate alignment was observed in climate-smart agriculture, governance, and disaster risk reduction, while climate finance and climate information systems remained weakly



integrated. District officials explained that forest conservation, land restoration, and water catchment protection are among the major district priorities.

*Table 2: Showing Alignment of Mwanaga District Environmental Action Plan (DEAP) with National climate change priority themes*

National Climate Priority	Score
Climate adaptation	3
Water resource management	3
Environmental conservation	3
Climate-smart agriculture	2
Disaster risk reduction	2
Climate governance	2
Monitoring and evaluation	2
Climate mitigation	2
Climate finance	1
Climate information and data use	1

PAS= 21; 3n= 30; PAM%=70% (Source; Field Data (2025))

*Alignment of Mwanaga District Medium-Term Expenditure Framework (MTEF) with National Climate Priorities*

The Medium-Term Expenditure Framework (MTEF) demonstrated moderate alignment with national climate priorities, with a PAM of 56.7% (Table 3). Strong alignment was mainly observed in climate adaptation and water resource management. However, climate finance, climate mitigation, monitoring systems, and climate information management remained weakly integrated. District officials pointed out that irrigation and water infrastructure projects receive relatively more financial support compared to long-term climate resilience initiatives.

*Table 3: Showing Alignment of Mwanaga District Medium-Term Expenditure Framework (MTEF) with National climate change priority themes*

National Climate Priority	Score
Climate adaptation	3
Water resource management	3
Environmental conservation	2
Climate-smart agriculture	2
Disaster risk reduction	2
Climate governance	2
Monitoring and evaluation	2
Climate mitigation	1
Climate finance	1
Climate information and data use	1

PAS= 17; 3n= 30; PAM%=56.7% (Source: Field Data (2025))

*Alignment of Mwanaga District Disaster Risk Management Plan with National Climate Priorities*

The Disaster Risk Management Plan demonstrated moderate alignment with national climate priorities, with a PAM score of 53.3% (PAS = 16; 3n = 30). Strong alignment (Score=3) was observed in climate adaptation and disaster risk reduction. Moderate alignment (Score=2) was recorded in water resource management and environmental conservation, while weak alignment (Score=1) was recorded in climate governance, finance, monitoring systems, climate mitigation, climate-smart agriculture, climate information and data use. District officials explained that disaster management remains highly reactive and focused on hazard response rather than long-term resilience planning.

*Overall alignment and Comparative insights across Mwanga District's development plan documents*

The overall comparative analysis revealed that Mwanga District achieved a strong policy alignment score of PAM = 61.7%. The District Strategic Plan (PAM=66.7%) and Environmental Action Plan (PAM=70.0%) demonstrated stronger alignment compared to the Medium-Term Expenditure Framework (PM=56.7%) and Disaster Risk Management Plan (PAM=53.3%). Climate adaptation, environmental conservation, and water resource management emerged as the most integrated themes, while climate finance, mitigation, and climate information systems remained weakly integrated across planning documents.

*Extent and pattern of climate change mainstreaming in Mwanga district plans*

The study further assessed the extent of climate change mainstreaming using the Climate Mainstreaming Index (CMI). Results showed that Mwanga District attained an overall CMI score of 65% (Mean = 65.24; SD = 5.28) (Table 4), indicating a relatively strong level of climate mainstreaming within district planning processes. The low standard deviation indicated strong agreement among respondents regarding the extent of mainstreaming across departments.

*Table 4: Respondents' perceptions on climate change mainstreaming into Mwanga District planning*

<b>Dimension</b>	<b>Mean Score</b>	<b>Standard Deviation</b>
Policy and Planning	3.63	0.32
Institution and Governance	2.91	0.39
Budget and Finance	2.43	0.39
Sectoral Implementation	3.33	0.29
Disaster Risk Reduction (DRR)	3.95	1.04
Capacity Building and Awareness	3.33	0.48
Overall Mean (CMI)	65.24	5.28
Climate Mainstreaming Index (CMI) %	65%	

*Source; Field Data (2025)*

*Policy and Planning*

The policy and planning dimension recorded the highest level of climate integration, suggesting that climate change considerations are formally recognised within district planning systems. However, findings suggest that this integration largely reflects policy compliance rather than deep operational integration.

*Institution and Governance*

Institution and governance recorded moderate climate integration, indicating that institutional structures for climate coordination exist but remain fragmented across departments. Respondents highlighted weak inter-sectoral coordination and limited collaboration among stakeholders.

*Budget and Finance*

Budget and finance recorded relatively low integration, indicating limited dedicated climate financing within district budgeting systems. District officials emphasised a heavy dependence on donor-funded projects and external support for implementing climate-related activities.

*Sectoral Implementation*

Sectoral implementation showed moderate climate integration, particularly in the agriculture, water, and environmental sectors. However, climate change integration in the district remained inconsistent across sectors. District officials pointed out that during the planning process, every department usually focuses on specified department priorities before those defined as cross-cutting issues.



*Disaster Risk Reduction (DRR)*

Disaster Risk Reduction recorded the highest mean score, indicating strong recognition of climate-related risks such as floods and droughts. However, high variability among responses suggests differences in institutional capacity and access to resources across departments.

*Capacity Building and Awareness*

Capacity building and awareness recorded moderate climate integration. District officials emphasised inadequate technical training, insufficient climate planning tools, and limited access to climate data.

***Combined Climate Alignment and Mainstreaming Index***

The combined Climate Change Alignment and Mainstreaming Index (CCAMI) was used to assess both policy alignment and practical integration. Results in Table 5 showed that Mwanaga District attained a relatively strong CCAMI score of 63.4%, derived from Policy Alignment Matrix (61.7%) and Climate Mainstreaming Index (65%). The results indicate that climate change considerations are substantially integrated into district planning systems. However, integration remains uneven across thematic areas and governance dimensions.

*Table 5: Combined Climate Alignment and Mainstreaming Index (CCAMI)*

<b>Indicator</b>	<b>Score (%)</b>	<b>Interpretation</b>
Policy Alignment Matrix (PAM)	61.7	Strong alignment
Climate Mainstreaming Index (CMI)	65	strong level of climate change mainstreaming
Climate Change Alignment and Mainstreaming Index (CCAMI).	63.4	Strong climate change alignment and mainstreaming

*Source: Filed Data (2025)*

***Challenges of Climate Change Mainstreaming***

The study identified several challenges affecting the mainstreaming of climate change in Mwanaga District. Lack of awareness (25%), limited technical capacity (23.5%), inadequate financial resources (22.1%), and weak institutional coordination (22.1%) emerged as the major challenges. The lack of climate data was the least-mentioned challenge (7.4%).

*Lack of Awareness*

District officials explained that climate change is still perceived mainly as an environmental issue rather than a cross-cutting development concern. Community members also reported limited awareness regarding district climate initiatives in their locality.

*Limited technological capacity*

Limited technical capacity was identified as another major challenge. District officials reported a shortage of personnel trained in climate science, environmental management, and climate data interpretation across various departments.

*Lack of financial resources*

Inadequate financial resources were also identified as major constraints to climate mainstreaming. District officials emphasised that climate priorities often compete with sectors such as health and education for limited budget allocations.



#### *Weak institution coordination*

Weak institutional coordination was another important governance challenge. District officials highlighted poor coordination among departments and civil society organisations involved in climate-related activities.

#### *Lack of climate data*

Although ranked lowest, the lack of climate data remained a significant challenge to evidence-based planning. Participants in focus group discussions reported limited access to weather forecasts and localised climate information needed to make informed decisions.

#### *Options for Improving Climate Change Mainstreaming*

The study further identified several options for improving climate change mainstreaming. The allocation of financial resources (23.4%) and the enhancement of institutional coordination (23.4%) emerged as the most important interventions. Other proposed measures included capacity building (21.9%), awareness creation (20.3%), and improved communication of climate data (10.9%). Respondents emphasised that strengthening climate financing, institutional coordination, technical capacity, and climate information systems would significantly improve the effectiveness of climate governance and climate-resilient planning processes.

#### **Discussion**

The findings of this study contribute to the growing discourse on climate change mainstreaming by demonstrating that integration of climate change into local government planning is influenced not only by policy inclusion but also by institutional capacity, financial commitment, and governance coordination. By combining the Policy Alignment Matrix (PAM) and Climate Mainstreaming Index (CMI) into the Climate Change Alignment and Mainstreaming Index (CCAMI), the study provides a comprehensive framework for assessing climate mainstreaming within local government systems in Tanzania and similar Sub-Saharan African contexts.

One important finding is the distinction between formal policy alignment and operational mainstreaming. Although Mwanga District attained a relatively strong CCAMI score of 63.4%, the findings indicate that strong policy alignment does not necessarily translate into equally strong implementation outcomes. Climate priorities are reflected within district plans and strategies, but implementation remains constrained by weak financing systems, limited technical capacity, and fragmented institutional arrangements. This reflects a condition of “institutionalised policy visibility but operational fragility,” in which climate issues are formally recognised but not fully operationalised within governance systems (Pieterse et al., 2020). Studies indicate that local government authorities in many Sub-Saharan African countries integrated climate issues into their policy system, but still there is weak implementation due to constraints such as limited technical capacity, inadequate climate awareness and financial constraints (Nkiaka & Lovett, 2018; Alemaw & Simatele, 2020; Nyashilu et al., 2023; Kitogo, 2025; Pieterse & Du Toit, 2025)

The findings further indicated that climate mainstreaming is uneven across governance dimensions. These findings suggest that local governments tend to prioritise climate dimensions that are politically visible or externally supported, such as adaptation and disaster response, while underinvesting in long-term institutional and financial systems necessary for sustained climate governance. The findings align with those of Shimwela and Katera (2025) and Kessy (2021), who argued that there is uneven integration of climate priorities within Tanzanian planning frameworks. In addition, the findings support Ofori et al. (2021), who noted inadequate domestic financing constrains climate adaptation implementation across Sub-Saharan Africa. Furthermore, Pilato et al. (2018) and Rogers et



al. (2024), argued that climate mainstreaming requires adequate financing, institutional coordination, technical expertise, and access to reliable climate information.

These findings align with Biesbroek (2021) and Nalau (2021), who argued that climate mainstreaming in developing countries often follows fragmented, project-driven pathways rather than fully institutionalised governance systems. The present study extends this literature by empirically demonstrating how fragmentation occurs within district planning systems through disparities between policy frameworks, budgeting systems, and implementation mechanisms. The findings align with those of Rogers et al. (2025), who observed fragmented climate governance systems and uneven sectoral integration in Tanzanian development planning. Similar findings were also reported by Thabiti et al. (2024), who identified inadequate vertical and horizontal coordination within Tanzanian climate governance systems. Similarly, Williams et al. (2021) identified institutional barriers as major constraints to climate adaptation initiatives in Africa.

The study also identified a “compliance-oriented mainstreaming pattern.” Strong alignment of district plans with national climate priorities, particularly in adaptation, environmental conservation, and water resource management, suggests that local governments are increasingly responding to national and international climate policy expectations. However, weak integration among climate finance, climate information systems, and monitoring mechanisms indicates that mainstreaming is still largely driven by policy compliance rather than by fully localised, evidence-based governance systems. This reflects the arguments of Myers (2021), who identified poor access to climate information as a key challenge affecting local climate adaptation planning in Tanzania.

These findings support Filho et al. (2021), who observed that climate mainstreaming in many African local governments is strongly influenced by top-down policy frameworks and donor-supported adaptation agendas. Nevertheless, the current study demonstrates that policy compliance may provide an important foundation for mainstreaming while simultaneously concealing underlying implementation weaknesses.

Another important contribution relates to the relationship between climate governance and development planning in semi-arid districts. The dominance of adaptation, water resource management, and disaster risk reduction within district plans reflects the district’s exposure to recurrent droughts and floods. This suggests that climate mainstreaming within Mwanza District is strongly shaped by immediate livelihood vulnerabilities and ecological realities. Consequently, climate priorities are integrated mainly in response to visible climate risks rather than through long-term governance transformation.

Methodologically, the study contributes by operationalising climate mainstreaming through a combined indicator-based framework integrating policy coherence analysis (PAM), institutional and operational integration (CMI), and composite governance evaluation (CCAMI). This approach responds to recent calls for multidimensional climate governance assessment tools capable of capturing both policy intent and implementation effectiveness (Bleby & Foerster, 2023). Unlike studies relying solely on policy review or perception-based analysis, the present study demonstrates the value of integrating document analysis, indicator scoring, and stakeholder perceptions to provide a comprehensive understanding of climate mainstreaming dynamics.

The study also revealed that barriers to climate mainstreaming in Mwanza District are not purely technical but fundamentally institutional and systemic. These findings suggest that climate governance effectiveness depends on interactions between institutions, resources, technical knowledge, and political commitment. Similar arguments were presented by Oberthür et al. (2021)



and Sanz et al. (2025), who emphasised the importance of governance systems, financing mechanisms, and institutional capacity for the effectiveness of climate governance.

Furthermore, the findings suggest that improving climate mainstreaming requires a systems-based governance approach rather than isolated sectoral interventions. Respondents identified financial allocation, institutional coordination, capacity building, and awareness creation as the most important interventions for strengthening climate mainstreaming. These findings demonstrate that effective mainstreaming depends not only on technical climate interventions but also on governance structures that support coordination, financing, institutional learning, and continuity.

Overall, the study advances climate governance literature by proposing that climate change mainstreaming should be understood as a continuum of institutionalisation rather than a binary condition of success or failure. Although Mwanza District demonstrates significant progress toward climate-resilient planning, persistent financial, institutional, and technical constraints indicate that mainstreaming remains in a transitional stage of governance integration.

### **Conclusion**

This study assessed the extent of climate change mainstreaming in Mwanza District development planning by examining the alignment of district plans with national climate change frameworks and evaluating practical integration within local governance systems. The results revealed that Mwanza District achieved strong scores in the Policy Alignment Matrix (PAM = 61.7%), Climate Mainstreaming Index (CMI = 65%), and the combined Climate Change Alignment and Mainstreaming Index (CCAMI = 63.4%). These results indicate that climate change is increasingly recognised as a cross-cutting development issue within district planning processes.

The study further demonstrated that climate mainstreaming remains uneven across planning instruments and governance dimensions. Strong integration was observed in climate adaptation, water resource management, environmental conservation, and disaster risk reduction, while climate finance, institutional coordination, and long-term implementation mechanisms remained weakly integrated. Major barriers identified included a lack of awareness, limited technical capacity, inadequate financial resources, and weak institutional coordination. The findings suggest that climate mainstreaming in Mwanza District remains largely compliance-oriented, with climate issues reflected in policy documents but not fully operationalised through financing, technical expertise, and governance systems.

The study recommends strengthening climate financing within district budgets, improving institutional coordination through climate coordination committees, enhancing technical capacity among district officials, and improving access to localised climate information systems. Public awareness-raising and the integration of climate change considerations across all sectoral plans are also recommended. Future studies should examine the long-term effectiveness of climate mainstreaming interventions and their contribution to community resilience outcomes.

### **References**

- Alemaw, B. F., & Simatele, D. (2020). Integrating climate change adaptation and mitigation into sustainable development planning: The policy dimension. In J. I. Matondo, B. F. Alemaw, & W. J. P. Sandwidi (Eds.), *Climate variability and change in Africa (Sustainable Development Goals Series)*. Springer. [https://doi.org/10.1007/978-3-030-31543-6\\_15](https://doi.org/10.1007/978-3-030-31543-6_15)
- Bagambilana, F., & Rugumamu, W. (2023). Determinants of Farmers' Adaptation Intent and Adoption of Adaptation Strategies to Climate Change and Variability In Mwanza District, Tanzania. *Environmental Management*, 1-20. <https://doi.org/10.1007/s00267-023-01792-2>.



- Biesbroek, R. (2021). Policy integration and climate change adaptation. *Current Opinion in Environmental Sustainability*, 52, 75-81. <https://doi.org/10.1016/j.cosust.2021.07.003>.
- Bleby, A., & Foerster, A. (2023). A Conceptual Model for Climate Change Mainstreaming in Government. *Transnational Environmental Law*, 12(3), 623-648.
- Bradaschia, G., Longato, D., Maragno, D., & Musco, F. (2024). Climate change adaptation mainstreaming through strategic environmental assessments. An in-depth analysis of environmental indicators from spatial plans in Friuli Venezia Giulia Region (Italy). *Environmental Impact Assessment Review*. <https://doi.org/10.1016/j.eiar.2024.107650>.
- Busetto, L., Wick, W., & Gumbinger, C. (2020). How to use and assess qualitative research methods. *Neurological Research and Practice*, 2. <https://doi.org/10.1186/s42466-020-00059-z>.
- Diko, S., Okyere, S., Mensah, S., Ahmed, A., Yamoah, O., & Kita, M. (2021). Are local development plans mainstreaming climate-smart agriculture? A mixed-content analysis of medium-term development plans in semi-arid Ghana. *Socio-Ecological Practice Research*, 3, 185 - 206. <https://doi.org/10.1007/s42532-021-00079-2>.
- England, M., Dougill, A., Stringer, L., & Vincent, K. (2019). Climate change adaptation planning and cross-sectoral policy coherence in southern Africa. <https://doi.org/10.17169/refubium-22409>.
- Filho, L., Totin, E., Franke, J., Andrew, S., Abubakar, I., Azadi, H., Nunn, P., Ouweneel, B., Williams, P., & Simpson, N. (2021). Understanding responses to climate-related water scarcity in Africa. *The Science of the total environment*, 806 Pt 1, 150420.
- Gebrechorkos, S., Taye, M., Birhanu, B., Solomon, D., & Demissie, T. (2023). Future Changes in Climate and Hydroclimate Extremes in East Africa. *Earth's Future*, 11. <https://doi.org/10.1029/2022EF003011>.
- Goonesekera, S., & Olazabal, M. (2022). Climate adaptation indicators and metrics: State of local policy practice. *Ecological Indicators*. <https://doi.org/10.1016/j.ecolind.2022.109657>.
- Gundumogula, M. (2020). Importance of Focus Groups in Qualitative Research. *Journal of Humanities and Social Studies*, 8, 299-302. <https://doi.org/10.24940/theijhss/2020/v8/i11/hs2011-082>.
- Hernández, A., & Bolwig, S. (2020). Understanding climate policy integration in the global South through the multiple streams framework. *Climate and Development*, 13, 68 - 80. <https://doi.org/10.1080/17565529.2020.1723471>.
- Humble, N., & Mozelius, P. (2022). Content analysis or thematic analysis. *European Conference on Research Methodology for Business and Management Studies*. <https://doi.org/10.34190/ecrm.21.1.316>.
- Kessy, A. (2021). Climate Change and Poverty Reduction Strategies: Challenges and Lessons from Tanzania. *Tanzania Journal for Population Studies and Development*. <https://doi.org/10.56279/tjpsd.v28i2.128>.
- Kitogo, A. (2025). Climate change governance in Tanzania: The role of institutions, policies, knowledge, science, stakeholders, and financing. <https://doi.org/10.3990/1.9789036565448>.
- Kitole, F., & Komba, C. (2025). Challenges and opportunities of climate change adaptation strategies among smallholder horticultural farmers in rural Tanzania. *Cogent Food & Agriculture*, 11. <https://doi.org/10.1080/23311932.2025.2554247>.
- Kweyu, R.M., Asokan, S.M., Ndesanjo, R.B., Obando, J.A., & Tumbo, M.H. (2023). Climate Governance in Eastern Africa: The Challenges and Prospects of Climate Change Adaptation Policies. In: Onyango, G. (eds) *State Politics and Public Policy in Eastern Africa*. Palgrave Macmillan, Cham. [https://doi.org/10.1007/978-3-031-13490-6\\_16](https://doi.org/10.1007/978-3-031-13490-6_16)
- Lewis, C. T. (2021). Climate change adaptation and sectoral policy coherence in climate governance. *Sustainability*, 13(15), 8518. <https://doi.org/10.3390/su13158518>



- Mdemu M.V. (2021). Community's Vulnerability to Drought-Driven Water Scarcity and Food Insecurity in Central and Northern Semi-arid Areas of Tanzania. *Front. Clim.* 3:737655. <https://doi.org/10.3389/fclim.2021.737655>.
- Mkonda, M. (2022). Awareness and adaptations to climate change among the rural farmers in different agro-ecological zones of Tanzania. *Management of Environmental Quality: An International Journal.* <https://doi.org/10.1108/meq-10-2021-0241>.
- Mwenje, E., & Kumar, P. (2024). Challenges for mainstreaming climate adaptation in African cities. A case study of Kigali, Rwanda. *Landscape and Urban Planning.* <https://doi.org/10.1016/j.landurbplan.2024.105017>.
- Myers, G. (2021). Urban Governance Dynamics and Climate Change in East Africa: A Comparison of Dar es Salaam and Nairobi. *Journal of International Affairs*, 74(1), 83–104. <https://www.jstor.org/stable/27169773>
- Nalau, J. (2021). Assessing adaptation implementation. *Nature Climate Change*, 11, 907 - 908. <https://doi.org/10.1038/s41558-021-01200-9>.
- Nicmanis, M. (2024). Reflexive Content Analysis: An Approach to Qualitative Data Analysis, Reduction, and Description. *International Journal of Qualitative Methods*, 23. <https://doi.org/10.1177/16094069241236603>.
- Nkiaka, E and Lovett, J.C (2018). Mainstreaming climate adaptation into sectoral policies in Central Africa: Insights from Cameroun. *Environmental Science and Policy*, 89, 49-58. <https://doi.org/10.1016/j.envsci.2018.07.012>
- Nyashilu, I., Kiunsi, R., & Kyessi, A. (2023). Mainstreaming Climate Change Adaptation Planning in Tanzania's City's Master Plans. A Critical Review. *International Journal of Social Science Research and Review*, 6(1), 160-176. <https://doi.org/10.47814/ijssrr.v6i1.761>
- Oberthür, S., Hermwille, L., & Rayner, T. (2021). A sectoral perspective on global climate governance: Analytical foundation. 100104. <https://doi.org/10.1016/j.esg.2021.100104>.
- Ofori, S., Cobbina, S., & Obiri, S. (2021). Climate Change, Land, Water, and Food Security: Perspectives from Sub Saharan Africa., 5. <https://doi.org/10.3389/fsufs.2021.680924>.
- Oyugi, M. (2023). The Imperatives in Mainstreaming Climate Change Mitigation and Adaptation in Urban Management Practices: African Perspectives. *International Journal of Environment and Climate Change.* <https://doi.org/10.9734/ijecc/2023/v13i113531>.
- Pauline, N., & Lema, G. (2024). Consideration of Climate Change on Environmental Impact Assessment in Tanzania: Challenges and Prospects. *Environmental Management*, 74, 350-364. <https://doi.org/10.1007/s00267-024-01972-8>.
- Pieterse, A., & Du Toit, J. (2025). Local responses to climate change: Navigating mainstreaming and transformative adaptation. *Cities.* <https://doi.org/10.1016/j.cities.2024.105606>.
- Pieterse, A., Du Toit, J., & Van Niekerk, W. (2020). Climate change adaptation mainstreaming in the planning instruments of two South African local municipalities. *Development Southern Africa*, 38, 493 - 508. <https://doi.org/10.1080/0376835x.2020.1760790>.
- Pilato, G., Sallu, S., & Gaworek-Michalczenia, M. (2018). Assessing the Integration of Climate Change and Development Strategies at Local Levels: Insights from Muheza District, Tanzania. *Sustainability*, 10, 174. <https://doi.org/10.3390/su10010174>.
- Rogers, N., Adams, V., & Byrne, J. (2023). Factors affecting the mainstreaming of climate change adaptation in municipal policy and practice: a systematic review. *Climate Policy*, 23, 1327 - 1344. <https://doi.org/10.1080/14693062.2023.2208098>.
- Rogers, N., Byrne, J. A., & Adams, V. M. (2024). Mainstreaming municipal climate change adaptation: Definition, objectives, pathways, and enablers: An overview article. <https://doi.org/10.2139/ssrn.5250782>



- Rogers, P., Mabhuye, E., & Pauline, N. (2025). Rethinking the Institutional Architecture for the Governance of Climate Change Adaptation Finance in Tanzania. *The Journal of Environment & Development*, 35, 520-546. <https://doi.org/10.1177/10704965251386572>.
- Rweyemamu, B., & Mulokozi, R. (2019). Understanding nexuses between precipitation changes and climate change and variability in semi-arid lowlands of Mwanga District, Tanzania. *African Journal of Environmental Science and Technology*. <https://doi.org/10.5897/ajest2018.2586>.
- Saito, N. (2013). Mainstreaming climate change adaptation in least developed countries in South and Southeast Asia. *Mitigation and Adaptation Strategies for Global Change*, 18, 825-849. <https://doi.org/10.1007/s11027-012-9392-4>.
- Sanz, E., Chelleri, L., Chiabai, A., & Sanz, M. (2025). Enhancing Local Governance for Climate Action: A Guiding Conceptual Framework. *Urban Governance*. <https://doi.org/10.1016/j.ugj.2025.09.002>.
- Shimwela, N., & Katera, L. (2025). Strengthening Link between National Adaptation Plans (NAPs), Sector Policies and National Development Plans: Implications for Climate Change Governance. *Environmental management*, 75(7), 1628-1641. <https://doi.org/10.1007/s00267-025-02141-1>
- Smucker, T. A., & Wangui, E. E. (2016). Gendered knowledge and adaptive practices: Differentiation and change in Mwanga District, Tanzania. *Ambio*, 45(Suppl 3), 276-286. <https://doi.org/10.1007/s13280-016-0828-z>
- Thabiti, M., Kristensen, S., Yanda, P., Busck, A., Kicheleri, R., & Greene, S. (2025). Building Resilience from Below: Mainstreaming of Climate Change Adaptation into District Council Planning in Tanzania. Søren and Yanda, Pius and Busck, Anne and Kicheleri, Rose and Greene, Sam, Building Resilience from Below: Mainstreaming of Climate Change Adaptation into District Council Planning in Tanzania. <http://dx.doi.org/10.2139/ssrn.5550119>
- Wamsler, C., & Osberg, G. (2022). Transformative climate policy mainstreaming – engaging the political and the personal. *Global Sustainability*, 5. <https://doi.org/10.1017/sus.2022.11>.
- Williams, P., Simpson, N., Totin, E., North, M., & Trisos, C. (2021). Feasibility assessment of climate change adaptation options across Africa: an evidence-based review. *Environmental Research Letters*, 16. <https://doi.org/10.1088/1748-9326/ac092d>.