

Climate Adaptation Governance and National Security in Zambia: Evaluating Policy Implementation Gaps and Strategic Opportunities

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DOI: <https://doi.org/10.47772/IJRISS.2026.100700695>

Received: 02 July 2026; Accepted: 07 July 2026; Published: 11 August 2026

ABSTRACT

Climate change is a growing threat to environmental security, socio-economic development, and National security in Sub-Saharan Africa. Recurrent droughts, floods, irregular rainfall and water scarcity are causing ongoing impacts on livelihoods, food security and the resilience of communities, especially in the Southern Province of Zambia. This study analysed climate change adaptation governance and its implications for national security, to assess the programme implementation and the level of institutional coordination among the Ministry of Green Economy and Environment, the Disaster Management and Mitigation Unit (DMMU), the sector ministries, and the local authorities, especially the effectiveness of coordination itself. The study focused on climate adaptation governance in the context of national security in Zambia in order to assess implementation gaps in climate adaptation policies and propose strategies for enhancing climate resilience and socio-economic stability. The study adopted a mixed-methods research approach with a convergent parallel design. Both quantitative and qualitative data were gathered from 350 respondents using structured questionnaires and 20 key informants through semi-structured interviews and focus group discussions. Data were analysed quantitatively using the Statistical Package for Social Sciences (SPSS), and data were analysed qualitatively thematically. The results showed that ineffective institutional coordination, poor governance, poor financing of climate adaptation, limited technical and institutional capacity, insufficient infrastructure, and low-level participation of communities are challenges to the effective implementation of climate adaptation in Zambia. The availability of climate information, activities of informality, lack of consultation with local communities, weak communication mechanisms and gaps in the integration of local knowledge were also identified as factors that made local communities less resilient and less able to adapt. In Southern Province, water tensions, land and pasture conflicts, farm-pastoralist clashes, food insecurity, livelihood vulnerabilities and socio-economic instability were related to climate-related scarcity of resources. The regression model showed a strong relationship between climate adaptation governance variables and national security outcomes ($R^2=0.721$), explaining 52.0% of the variation in national security outcomes ($R^2=0.520$, adjusted $R^2=0.514$). The overall model was statistically significant ($F(4,345)=93.54$, $p<0.001$). Institutional coordination was the strongest predictor ($\beta=0.301$, $p<0.001$), followed by climate adaptation financing ($\beta=0.238$, $p<0.001$), institutional capacity ($\beta=0.205$, $p<0.001$), and community participation ($\beta=0.184$, $p<0.001$). The study concludes that coordination, funding, institutional capacity, participatory governance, climate information dissemination and incorporating indigenous knowledge can add resilience to climate and socio-economic stability, sustainable resource management and national security in Zambia.

Keywords: Climate Adaptation Governance; National Security; Climate Change; Policy Implementation Gaps; Climate Resilience; Community Participation; Food Security

INTRODUCTION

Climate change is becoming one of the greatest environmental, socio-economic and national security issues known to the world at large. From the developing world, the effects of climate variability, such as floods, droughts, heatwaves and unreliable rainfall have worsened the vulnerability of communities that heavily depend on climate-sensitive industries such as agriculture and water resources. Climate risks in sub-Saharan Africa are becoming more deeply entangled with the need to conserve resources, as well as with food insecurity, forced migration, and social instability, using climate change as a cause for concern for national security (IPCC 2022).



As a result, governments are being pushed to strengthen decision-making on the governance of climate change adaptation in order to boost climate change resilience, mitigate vulnerabilities and ensure national stability within the context of climate change.

In the last 20 years, there has been a rise in the number of academic and policy studies focusing on the climate security link. There has been an increasing number of academic and policy papers that have been published on the climate security link in the past 20 years. Climate change, as noted by the Intergovernmental Panel on Climate Change (2022), is a threat multiplier that exacerbates and compounds pre-existing social, economic, and political crises, particularly in areas characterized by poverty and weak institutional development. Environmental stress, including the effects of prolonged droughts and reduced agricultural yields, has increased competition over land and water resources in many African countries, resulting in conflicts between farming and pastoral communities (Ide *et al.*, 2021). Adaptation policies are thus no longer seen as primarily an environmental policy but rather a tool for governance that is both strategic and has to be utilised so that the security of the nation, human security and socio-economic stability are maintained.

Zambia faces significant developmental and security risks because of the country's reliance on rain-fed agriculture and natural resources to produce its food and products. Agriculture plays an important role in employment and livelihood generation, especially in rural areas where the local people are living in subsistence farming. Climate change in the country, though, has caused a decline in crop yields, water supply, and food security due to rising temperatures and unpredictable rainfall, flooding and periodic droughts (World Bank, 2022). Climate shocks have affected the livelihoods in Southern Province, which has been one of the most climate vulnerable in Zambia, with frequent drought conditions and demand on natural resources (such as water, land, ground) becoming a source of farmers-pastoralists tension or conflict (FAO, 2022). These climate-induced pressures have created concern about the effects of environmental stress on national cohesion and security.

The Government of Zambia has seen the importance of implementing policy frameworks for adaptation and resilience against climate change due to the increasing threat of climate change. The National Climate Change Policy (2016) and the National Adaptation Plan (2021) are important policy instruments aimed at supporting climate-resilient agriculture, sustainable water management, disaster risk reduction and community resilience (Government of Zambia 2016). These policies aim to mitigate vulnerability to climate hazards and to promote sustainable development and national stability. Further, Zambia has ratified international climate conventions, including the Paris Agreement wherein climate adaptation and preparedness for climate change are a priority (UNIPCC, 2015). Notwithstanding these efforts, concrete implementation issues remain that hinder ability to achieve the effectiveness of a policy.

Persistent problems in Zambia in terms of the matching of policy and practice in climate change adaptation governance is one of the major challenges of concern. Even though such climate adaptation plans are relatively detailed at the aggregate level, the implementation of these plans in the country and at the local level have been limited by different institutional shortcomings, lack of funding, less involvement of the local communities, and poor coordination (UNDP, 2021). Lack of coordination across ministries has led to overlaps in responsibilities and delays in programme implementation for climate adaptation, and inadequate financial resources have decreased the scale of adaptation programme implementation in vulnerable rural areas. Moreover, many small asset holders don't know of supporting adaptation programmes for not doing enough dissemination on climate information and limited participation by stakeholders (CSO-SUN, 2022). These governance difficulties hinder adaptation policies and strategies to resolve security issues related to climate change.

Insufficient climate adaptation governance has far-reaching implications that go beyond environmental management impacts, to the impacts on national security outcomes as well. Struggle over water, land for grazing and agricultural resources has contributed to resource conflicts in increasingly more vulnerable areas in Zambia such as the Southern and Western Provinces, in the country under the influence of climate-induced resource scarcity. The reduction of water access and arable land, combined with the competing water demands of pastoral and farming populations, has led to increased tension and insecurity regarding these resources and the implications for social stability and cohesion (FAO, 2022). In addition, food insecurity and livelihood disruptions caused by the adverse impacts of climate change have led to escalating rural to urban migration, forcing strain on the urban infrastructure, employment systems and social services systems. In such contexts, there is a higher



possibility of social tension, poverty, and insecurity, highlighting the nexus between climate governance and national security.

The governance of climate adaptation has gained increasing attention in recent years as a way to decrease vulnerability and increase the resilience of climate-sensitive areas. Effective adaptation governance needs robust institutions, good participation and coordinated policy making that can tackle both social and environmental vulnerabilities, according to Adger (2006). Similarly, Sultana, (2021) argues that inequality in governance and access to resources should be tackled as underlying drivers of conflict risk if the goal is to improve stability and reduce conflict risks through climate change adaptation. However, in the Zambian context, the processes of adaptation governance continue to be hindered by low-level institutional capacity and weak monitoring systems and a lack of integration of the issue of climate adaptation into Zambia's existing national security planning frameworks. Consequently, interventions for adaptation frequently serve as short-term coping mechanisms rather than long-term resilience-building strategies that bolster national security and security capabilities.

While adaptation research has been increasing in Zambia, there has been little focus placed on the governance aspect of adaptation and the implications of adaptation governance for national security in Zambia. The current empirical research has been limited to examining the impact on productivity, the environment, and the technical adaptation measures, while neglecting to critically assess the impact of governance shortcomings on outcomes of climate security (Ngoma et al., 2021). Moreover, there is a lack of empirical studies on the links between the implementation gaps and the occurrence of resource-based conflicts, social instability and institutional vulnerabilities in climate-vulnerable areas. The lack of such literature translates into the existing knowledge defect on the wider linkages between climate adaptation governance and national stability in Zambia. Filling this gap is crucial to build more holistic and security-focused climate governance that can improve resilience and sustainable development.

The value of this study is thus an analysis of climate adaptation governance and national security in Zambia, the analytical gaps in the policy implementation process and opportunities for strengthening adaptation strategies and enhancing climate resilience and stability in the country. The Southern Province is the study's specific focus because of its resource-based conflicts and vulnerability to climate-related shocks. The study examines institutional coordination, resource allocation, community engagement and governance effectiveness to help add to the current debate of the climate-security nexus in sub-Saharan Africa. Results will contribute to policy-relevant information for better adaptation governance, strengthening adaptation resilience and mainstreaming climate adaptation into the national security planning processes. Finally, the study contends that sustainable national environmental management is a prerequisite for building long-term national security and socio-economic stability in Zambia and that successful climate adaptation governance is indispensable.

THEORETICAL FRAMEWORK

The study is anchored on two complementary theories: Vulnerability-Resilience Theory and Political Ecology Theory. The theories offer a detailed explanation of climate adaptation governance and national security aspects in Zambia. Vulnerability-Resilience Theory focuses on how institutional capacity and adaptive mechanisms increase resilience to climate shock, whereas Political Ecology Theory explores the influence of governance structures, power relationships and resource inequalities on vulnerability and conflict. The theories can offer a comprehensive analytical perspective for the study of policy implementation gaps and the impacts on climate resilience, socio-economic stability and national security.

Vulnerability-Resilience Theory

Vulnerability-Resilience Theory, first defined by Adger (2006), covers the ways in which societies and institutions react to their environmental stress, climate variation and natural hazards. The theory focuses on vulnerability as the ability of people, groups or institutions to predict, plan for, respond and adapt to climate change impacts and shocks. Adger (2006) has identified four key points that strengthen resilience: Effective governance, institutional readiness, adequate resource allocation, and active participation of the community. Instead of examining the frequency of the climate hazards, the theory is about the resilience and adaptation of social, economic and institutional systems to environmental shocks.



The theory applies well to Zambia, where livelihoods and the economy are significantly and highly sensitive to climate-related activities, particularly rain-fed agriculture. In Southern Province, recurrent droughts, floods, irregular and infrequent rainfall, and extended droughts have hurt agricultural production, food security, and the ability of vulnerable populations to withstand such events (World Bank, 2022). The National Climate Change Policy (2016) and the National Adaptation Plan (2021) have been adopted to boost climate resilience in Zambia, but implementation has been hampered by low institutional coordination, insufficient climate finance, small technical capacities, and poor dissemination of climate information, amongst the key implementing institutions such as MGEE, DMMU, sector ministries and local authorities (UNDP, 2021). These gaps are contributing to heightened community vulnerability and less resilience.

Vulnerability – Resilience Theory is the analytical tool used in this study to analyse how well Zambia's climate governance institutions are able to facilitate the implementation of the National Climate Change Policy (2016) and National Adaptation Plan (2021). Drawing on the theory, institutional coordination, climate finance, stakeholder engagement, technical capability and information exchanges are analysed to understand the effects of the implementation gaps on climate resilience and national security. Therefore, the study has the potential to highlight governance gaps that amplify vulnerabilities to food and resource insecurity, socio-economic crises, and the need for more institutional resilience, good governance for policy implementation, and more countries which are more secure as a result of inclusive and participatory governance of climate change adaptation.

Political Ecology Theory

The theory of Political Ecology was developed by Blaikie and Brookfield (1987) and, in some sense, describes the interaction between political, economic, and social processes and how these influence the management of the environment and utilisation of natural resources. The theory explains that environmental degradation/scarcity is not just a function of ecology but needs to be looked at as part of governance systems, institutional frameworks, power dynamics and socio-economic disparities. The issue remains that access to productive assets like water, forests, and land is unequal, which unfolds environmental injustice, social exclusion, and conflict, especially in climate-sensitive areas (Robbins, 2020).

The theory is very pertinent to Zambia because of the intensification of competition for land access, water resources and/or grazing land due to climate change, especially in Southern Province. The recurring droughts and water shortages have contributed to rising conflicts relating to the use of water resources between farmers and pastoralists (FAO, 2022). The Zimbabwean policy on climate governance outlines policies and plans, such as the National Climate Change Policy (2016) and the National Adaptation Plan (2021), that support coordinated climate adaptation, but coordinated implementation is constrained by overlapping institutional mandates, low sub-sectoral institutional coordination, small financial scope and unequal access to climate adaptation support. All of these governance challenges have made the effectiveness of adaptation interventions more constrained, and decreased the level of resilience (Robbins, 2020).

This study uses a tool of analysis called Political Ecology Theory to critically examine the impact of governance structures and institutional arrangements on the implementation of Zambia's climate adaptation policies. The theory specifically examines the impact of coordination between the Ministry of Green Economy and Environment, the Disaster Management and Mitigation Unit (DMMU), sector ministries, local authorities, and other institutions of climate governance on the implementation of policies and adaptations. The theory explores how the fragmentation of institutions, poor governance and unequal sharing of adaptation resources explain climate-induced insecurity, resource conflicts and socio-economic instability. It thus strengthens Vulnerability–Resilience Theory by establishing that good governance in climate change adaptation requires institutional coordination and effective institutional governance, which must be accountable and ensure equitable resource distribution for strengthening Zambia's national security.

EMPIRICAL LITERATURE REVIEW

Climate Adaptation Governance and Institutional Coordination

In recent years, adaptation governance has increasingly entered the arena of sustainable development and national resilience, especially in countries with a high climate variability. Breakthrough adaptation governance

will critically require institutional coordination, policy coherence and the interaction between government, local governments, civil society and development partners. Countries with governance systems that integrate them are more likely to have their adaptation programmes as these create synergy in policies, allocate resources effectively and promote accountability, as outlined by Berrang-Ford et al. (2021). Their global assessment also reveals that governance is often weak, with multiple layers that can stall the implementation of an adaptation policy and hinder the efficacy of resilience-building interventions.

Evidence from sub-Saharan Africa also suggests that institutional coordination is one of the most significant challenges and obstacles to climate adaptation. Dazé and Hunter (2022) noted that weak inter-sectoral coordination and communication between implementing agencies, overlapping institutional mandates and imperfect execution were major challenges for adaptation outcomes as observed in National Adaptation Plan (NAP) implementation in African nation-states. Similarly, Nkiaka et al (2020) noted that while several African governments have adopted comprehensive climate adaptation strategies, their execution is uneven due to unclear institutional roles of ministries, departments and agencies and a lack of coordination.

In Zambia, neo-Daniels et al. (2023) noted a significant improvement in policy framing having occurred in the process of establishing climate governance institutions, led by the National Climate Change Policy and the National Adaptation Plan. Nevertheless, coordination across national, district, and community levels remains a challenge to implementation. They believe further institutional cooperation and capacity building in climate governance is an urgent need to make policies actionable at the ground level, to be implemented in a resilient fashion and to mitigate climate-induced threats to security.

Climate Adaptation Financing and Institutional Capacity

The availability of money and institutions is well known to be cornerstone factors in successful climate adaptation. Supportive budget provides governments with the resources to fund resilient infrastructure, early warning systems, sustainable agriculture and disaster preparedness programs. Buchner et al. (2023) reported that global adaptation funding is far from reaching adaptation needs, especially in developing countries where reliance on external funding sources and loans can negatively impact sustainability outcomes. The authors also point out that low investment at home weakens the institutional capabilities of governments to have effective adaptation policies.

On the same note, institutional capacity can affect the effectiveness of adaptation because of the availability of skilled personnel, technical know-how, monitoring systems, and administrative support. Ford et al., (2021) concluded that countries with robust institutional capacities are consistently implementing higher rates of adaptation than countries with less institutional capacity. They also highlight that an increased focus on institutional learning, technical capacity building, and knowledge management is a key input for enhancing governments' capacity to adapt to growing and more complex climate risks.

These results corroborate the literature from Southern Africa. The African Development Bank (2022) noted that several countries in Africa are still grappling with the challenges of insufficient access to climate finance, technical capacity, and monitoring and evaluation systems and this remains a liability in the implementation of Africa's adaptation. The limits in capacity of governments to mainstream climate adaptation into national development planning through institutional capacity is echoed by Stringer et al. (2020) who reported that insufficient institutional capacities resulted in increased vulnerability of climate-sensitive communities.

Community Participation and Indigenous Knowledge in Climate Adaptation

The involvement of the communities has emerged as a key tenet in climate adaptation governance due to the fact that in reality, local communities have valuable knowledge about the environmental changes and locally relevant climate adaptation strategies. Nalau et al. (2021) show that adapting initiatives that engage communities in planning and implementation are more likely to be sustainable as they promote community ownership, accountability, and increased local resilience. Participatory governance thus bolsters institutional legitimacy and the effectiveness of adaptation. In addition, participation ensures long-term sustainability of interventions by giving lived-up-to contexts and priorities in policy implementation. Active participation also increases the



sustainability of adaptation since it embeds locally embedded contexts and priorities in policy implementation (Reid et al., 2022).

Similarly, ICS is the subject of significant scholarly research as an alternative source of knowledge on climate adaptation. Makondo and Thomas (2018) suggest indigenous forecasting systems, traditional agricultural practices and community-based resource management offer local solutions that require adaptation to face climate change and increase both local resilience and adaptability. Also, Onywere, Onyangwa, and Onyango Nyongesa (2022) report that harmonizing between indigenous knowledge and scientific climate information contributes greatly to strengthening food security of the vulnerable rural communities and enhance farmer's adaptability. This integration lets adaptation strategies be more specific to local contexts, culturally appropriate, and more sensitive to environment elements, increasing their effectiveness (Hiwasaki et al., 2020).

This also reflects limited community engagement that is evident in Zambia, even in the light of participatory adaptation policy support. Chisanga, Mafongoya and Mweemba (2023) noted that the low level of dissemination activities of the Climate related information, inadequate public awareness programmes and low stakeholder engagement were still affecting the low participation of communities in the CAAD plans. In order to achieve better adaptation result, the study calls for enhancing community engagement and promoting the incorporation of indigenous knowledge into the process of climate governance, in climate-sensitive districts. The results implied that improved stakeholder involvement and strengthen climate awareness programmes will play significant roles in COBs to prepare resilient communities to effectively face the challenges of climate risks (UNEP, 2023).

Climate Adaptation Governance and National Security

In the last ten years, the connection of Climate Change Adaptation and National Security has gained attention from scholars. There is widespread acknowledgement that climate change is a threat multiplier raising vulnerabilities in socio-economic areas that can worsen over the scenario of conflict, displacement, and political instability. Indirect drivers of insecurity that are linked to climate variability include a decrease in agricultural yields, an increase in competition for limited natural resources, and a reduction in livelihoods, especially in fragile states where governance capacity is low (Mach et al. 2019). The study also asserts that enhancing the adaptive governance systems is crucial to lessen the perceived long-term security threats caused by environmental changes induced by climate.

Empirical evidence also indicates that in recent years, governance quality is a key factor determining the relationship between climate stresses and insecurity. Through the illustrative example of the DRC, the authors of the article, Ide et al. (2021), show that climate change does not necessarily lead to violent conflict, but only when combined with weak institutions, bad governance, poverty, and unequal access to resources. They found that the determinants of increasing governance institutions or improving adaptation capacity significantly lessen the risks and emergence of climate-related conflicts. This calls for institutional effectiveness and inclusive governance to avoid climate-related instability and improve the resilience of a nation.

However, in Southern Africa, Simpson and Jewitt (2019) noted an intensification of competition for water, grazing land and production over time in agriculture, among the rural communities, thus generating tension between them. In Zambia, Ngoma et al (2021) also determined that the impact of climate related insecurity and degradation of crop production has rendered livelihoods more vulnerable, rural poverty, and migration pressures, while creating larger socio-economic and security issues. The results here further underscore that the inclusion of climate adaptation governance in national security planning process is important. Therefore, improving climate adaptation institutions and scaled up implementation of coordinated policies a crucial measure to ensure human security and sustainable national development in Zambia.

Research Gap

The existing empirical literature presented here shows a great deal of advances in climate adaptation governance, institutional coordination, financing, participation of communities and security in face of climate change. In previous studies, these variables have been studied separately, and most focus on climate adaptation policies or agricultural resilience, institutional capacity and/or environmental sustainability. While a number of studies in



the international arena have examined the climate-security nexus, the literature has been largely limited to a narrow focus on the impact of climate adaptation governance on national security outcomes in the policy formulation process in developing countries.

The research conducted in Zambia has mostly focused on climate-smart agriculture, food security, disaster risk minimization and environmental sustainability. There has been little empirical focus on assessing the inclusion of implementation gaps to climate adaptation governance, and understanding how the overall effectiveness of institutional coordination, financing, community engagement and governance will impact national security. In addition, very little research has been conducted in the province of Southern Province, where the conditions are particularly dry, resource-based conflicts and food insecurity. In addressing this gap in knowledge, this study will attempt to analyse the implementation gaps in climate adaptation governance and the need to build resilience, socio-economic stability and national security in Zambia using an integrated and participatory approach to assessing the challenges of policy implementation and strategic opportunities.

METHODOLOGY

Research Approach

The study was conducted using mixed methods research approach for the study of climate adaptation governance and national security in Zambia. The mixed-methods approach combines quantitative and qualitative research in a single study to gain a holistic view of a social phenomenon more fully understood by a single method than the other (Creswell & Plano Clark, 2018). The use of quantitative methods enabled the collection of measurable evidence of climate adaptation governance practices, whereas qualitative methods enabled in-depth understanding of the experiences, perceptions and institutional challenges of the different stakeholders. Both approaches, combined, helped to increase the information value and the validity from various different sources, and therefore a triangulation of the findings.

Research Design

The study used a convergent parallel design, a type of research design that is carried out concurrently, both analysis of quantitative and qualitative data was carried out separately, and the results of quantitative data analysis and qualitative data analysis were combined during interpretation of the results (Creswell & Creswell, 2023). This design was selected because it allowed for comparison, validation and supplementation of results of various methods. The design also enabled a more holistic analysis of climate change adaptation governance, in particular by integrating statistical insights with qualitative asides on the issue of implementation gaps and how it impacts on national security.

Study Area

The study was carried out in Southern Province of Zambia where is one of the most climate sensitive areas in the country. The province is heavily vulnerable to the impact of climate change due to the frequent drought, erratic precipitation, flooding and food insecurity it faces. There has been also increased competition for land and water in the region, which has helped to trigger conflict on the basis of resources between farmers and pastoralists. The following enabled Southern Province to be an appropriate case study to explore climate adaptation governance and its implications for national security.

Target Population

The number of the population to be targeted consisted of 2,500 respondents from the selected districts in the southern part of Province. The study focused on key stakeholders, directly engaged with climate change adaptation governance and natural resource management, which were comprised of farmers, pastoralists, community leaders, government representatives, non-governmental organization (NGO) representatives and climate change experts. These groups were chosen as they have practical experiences and understanding with regard to the process of climate adaptation planning, implementation, and governance on both a community level and an institutional level.



Sample Size and Sampling Techniques

A total sample of 350 respondents was selected in the quantitative component, and a total sample of 20 key informants was selected in the qualitative component for them to participate in interviews and focus group discussions. Farmers and pastoralists were sampled stratified to be fully represented across the study area in terms of livelihood groups and communities. A purposive sampling approach was then used to include climate officials, climate experts, NGOs and community leaders due to their relevant skills, duties and engagement in governance on adaptation to climate change. The mix of these two approaches was beneficial in obtaining good information from participants who had knowledge and decent samples in the mix.

Data Collection Methods

These quantitative and qualitative data collection instruments were used to gather primary data. Structured questionnaires with quantitative data was used for the sampling respondents. The questionnaires used closed ended questions to elicit answers around institutional coordination, financing for adaptation, community participation, the effectiveness of governance and national security effects. Prospective study methods included qualitative data collection using semi-structured interviews and focus group discussions with key informants and selected community representatives. In Zambia, these methods facilitated the ability of the participants to give detailed accounts on the experiences, perceptions and recommendations on the climate adaptation governance.

Data Analysis

A Statistical Package for the Social Sciences - SPSS was used for coding, entered and analyzed quantitative data. The characteristics and perceptions of the respondents were summarized using descriptive statistics: frequencies, percentages, mean and standard deviation. Inferential statistical methods were also used (when applicable) to establish the relationships between important study variables. Transcription, organisation and analysis of qualitative data (derived from interviews and focus group discussions) was performed through thematic analysis which were also coded. Thematic analysis consisted of coding the information, recognizing themes and making sense of patterns that facilitated or hindered the participants in understanding the nature of their climate change adaptation governance experiences and perceptions related to national security.

Ethical Considerations

A rigorous adherence to the ethical aspects of the research process was ensured. Sufficient information was given about the study, and participants were informed that they have the right to enroll in the study voluntarily and at their own discretion. Participants provided informed consent and confidentiality was ensured by the anonymity and also by keeping participants' identities anonymous during data analysis and findings reporting. Consenting respondents were also made aware that they could terminate their participation in the study at any time without facing any consequences. These ethical actions ensured adherence to accepted research ethics, and validated the trustworthiness and integrity of the study.

FINDINGS

This section summarises and analyses the mixed data and information on climate adaptation governance and security at the national level in Zambia. The results are presented in four major areas of the government: institutional coordination, funds allocation, community participation and governance effectiveness. The qualitative results obtained from interviews and from stakeholders' perspectives complement the quantitative results to give a deeper message. The section also explores the impact of governance and policy implementation gaps on climate-related issues, resource-based conflicts, socio-economic stability and the general national security situation in Southern Province, Zambia.

Institutional Coordination and Climate Adaptation Governance

The role of institutional coordination in climate adaptation governance is pivotal as its poor performance impacts the effectiveness of policy implementation, resource mobilisation and stakeholder cooperation to jointly use the tools and resources for climate adaptation. The study examined the coordination level within the key institutions



that implement Zambia's climate adaptation policies, namely the Ministry of Green Economy and Environment, the Disaster Management and Mitigation Unit (DMMU) under the Vice President's Office, the Ministry of Agriculture, the Water Resources Management Authority (WARMA), District Council or Municipal Council and NGOs engaging in climate adaptation in Southern Province. Though climate change is concerned with these institutions are functioning in the context of the National Climate Change Policy (2016) and the National Adaptation Plan (2021), there is a lack of coordination because they have overlapping mandates, limited information sharing, and limited collaboration between them.

Inter-Ministerial Coordination in Climate Adaptation Implementation

Quantitative Findings

The study examined the perceptions of the effectiveness of inter-ministerial coordination for the implementation of adaptation to climate change. Table 1 shows the results.

Table 1: Challenges Affecting Inter-Ministerial Coordination in Climate Adaptation Implementation (N = 350)

Statement	Frequency (n)	Percentage
Dissatisfaction with institutional coordination	68	19%
Delays in project implementation	82	23%
Overlapping institutional responsibilities	71	20%
Poor coordination limiting adaptation support services	74	21%
Weak collaboration between national and local institutions	55	17%
Total	350	100%

Source: Field Data (2025)

Delays in project implementation were reported as the greatest problem to be faced in climate adaptation governance, with 23% of the responses, as shown in Table 1. The respondents reported that these delays are largely due to poor coordination within the Ministry of Green Economy and Environment, DMMU, the Ministry of Agriculture, WARMA and the district councils in charge of the climate adaptation programmes. The poor coordination in providing adaptation support services was reported in 21% and overlapping institutional responsibilities in 20% of responses. Additionally, a high number of respondents, 19%, expressed dissatisfaction with the coordination of institutional activities, and 17% reported a low level of collaboration between national and local institutions. The results indicate that gaps in repository institutionalism and the weak governance integration, and the fragmentation of institutionalism, remain a challenge for the implementation of good climate adaptation in Southern Province, Zambia.

The quantitative results also indicate that the weak coordination mechanisms have a negative impact on the implementation of climate adaptation interventions, including provision of irrigation support, dissemination of climate information, and drought response interventions. Resultantly, fragmentation of governance has the potential to decrease both the efficiency of implementing and the effectiveness of adaptation planning efforts in vulnerable communities.

The qualitative results supported the quantitative results with concerns about uncoordinated governance approaches and low level of inter-agency cooperation. The Minister of Agriculture's official said:

“Even as several ministries are tasked with climate adaptation activities, coordination among them is limited, with some ministries having duplicate activities that delay implementation of projects” (Government Official 1, Interview, March 2025).

This finding indicates that respondents perceived poor coordination among the Ministry of Green Economy and Environment, DMMU, the Ministry of Agriculture, WARMA, and district councils. This was due to overlapping responsibilities, duplication of adaptation initiatives and low information flow between these institutions, which has resulted in the slow progress of action on the National Climate Change Policy (2016) and National Adaptation Plan (2021), which respondents noted.

Infrastructure and Institutional Capacity Gaps

Effective capacity gaps within institutions and infrastructure are key to how well adaptation governance systems perform. This sub-section analyses how much influence the level of technical capacity, infrastructure availability, staffing and monitoring systems have on the implementation of adaptation to climate change in Southern Province, Zambia. The results specifically highlight the role of institutional strengths and weaknesses in creating inefficiencies in adaptation and lowering climate resiliency.

Table 2: Respondents’ Perceptions on Infrastructure and Institutional Capacity Gaps (N = 350)

Statement	Frequency (n)	Percentage
Inadequate technical capacity	242	69%
Insufficient adaptation infrastructure	256	73%
Staffing shortages affect implementation	228	65%
Weak monitoring and evaluation systems	231	66%
Institutional weaknesses reduce adaptation effectiveness	249	71%

Source: Field Data (2025)

As presented in Table 2, the evidence suggests that the climate adaptation governance in Zambia is negatively affected by infrastructure and institutional challenges. The technical capacity of institutions with the primary responsibility for climate adaptation implementation was also noted as inadequate, with approximately 69% of respondents reporting this. Additionally, 73% noted that the lack of infrastructure has a negative impact on adaptation delivery in the rural communities. Moreover, 65% reported that staffing deficiencies affect the effectiveness of implementation and negatively impact institutional effectiveness. The results also indicated that weak monitoring and evaluation systems are linked to weak accountability and disjoint monitoring of adaptation interventions. Generally, 71% of the respondents thought that institutional weaknesses have a very significant negative impact on reducing the effectiveness and resilience building activities in terms of adaptation.

The qualitative findings supported the quantitative findings, highlighting issues with limited technical expertise and low operational systems. One local government official explained:

“The lack of skilled and qualified staff in most district institutions prevents them from effectively constructing programs for adaptation at the community level” (GOH, Interview 2, May 2025).

This quote exemplifies (and reinforces) the impact of institutional weakness on the efficiency of implementation and effectiveness of adaptation governance. The capacity of institutions to provide climate services, to carry out monitoring of adaptation efforts, and to react and respond effectively to environmental shocks is limited by limited technical and logistical support. This institutional shortfall such as this, therefore, undermines resilience and increases vulnerability to climate insecurity in impacted communities. Participants also expressed that these capacity gaps, including unavailable technical capacity, low operational budget and lack of proper monitoring

systems, slowed effective implementation of the climate adaptation programmes, especially in district councils, the Ministry of Green Economy and Environment, DMMU and WARMA.

Community Participation and Climate Resilience

Climate adaptation governance is inclusive, as it involves members of the community and their involvement is crucial to tackling climate risks, given that they are most directly affected by climate risks and climate resource insecurity. The study focused on the impact of community awareness, involvement and adaptation practices on climate resilience in Southern Province, Zambia. The results indicated that the impacts of climate change are great in the communities, but the adaptation planning and implementation is moderately low because access to information is restricted and there is limited involvement of the various actors.

Community Awareness of Climate Adaptation Policies

The following subsection considers the level of awareness of the local population on climate adaptation policies and programmes in Southern Province. Results are oriented towards ones identified regarding; awareness of adaptation activities, participation in adaptation activities, and access to the climate information by vulnerable communities.

Table 3: Main Challenges Affecting Community Awareness of Climate Adaptation Policies (N = 350)

Statement	Frequency (n)	Percentage
Lack of awareness of adaptation policies	78	22%
Limited access to climate information	65	19%
Limited participation in adaptation consultations	83	24%
Inadequate adaptation training programs	57	16%
Poor communication systems	67	19%
Total	350	100%

Source: Field Data (2025)

From Table 3, the main problem for community awareness of climate change adaptation policies was limited participation in adaptation consultation in Southern Province with 24 % of the respondents. This was also followed by low climate information availability (19%) and communication systems (19%). Additionally, one of the key challenges faced by respondents including in awareness and participation in climate adaptation governance was lack of adequate adaptation training programs (16%). The results highlight the challenges of weak stakeholders' engagement and distributed information on climate change that still hinder community involvement and effectiveness in vulnerable communities.

The qualitative results corroborated these observations, identifying challenges of communication between institutions and local communities. One farmer explained:

“Projects are not advertised in rural area until in poor people's life, while most people don't know about the program of climate adaptation” (FG D 5, 18 May 2025).

This is reflected in this quotation that weak communication systems coupled with the lack of engagement of stakeholders with the communities, as far as adaptation interventions are concerned, demean community participation and provides limited community ownership. Thus, there is need to enhance resilience building processes, and reduce the resilience effect of governance arrangements for adaptation to climate change in vulnerable communities due to inadequate awareness.

Community Participation and Local Adaptation Practices

Engaging communities and leveraging indigenous adaptation strategies plays a vital role in building resilience and sustainability among vulnerable populations in a climate-sensitive context. This subsection highlights the importance of local involvement, indigenous knowledge and local adaptation in Southern Province's climate adaptation governance.

Table 4: Main Community Participation and Local Adaptation Practices Identified by Respondents (N = 350)

Statement	Frequency (n)	Percentage
Greater community participation in adaptation planning	82	23%
Importance of indigenous knowledge systems	74	21%
Use of local adaptation practices	66	19%
Community participation improves sustainability	71	20%
Local involvement reduces resource conflicts	57	17%
Total	350	100%

Source: Field Data (2025)

According to the result in Table 4, more participation of the communities in adaptation planning and implementation was noted as the most important local adaptation practice, showed 23% out of the respondents. The next most significant was importance of indigenous knowledge systems (21%), and community participation enhancing sustainability (20%). Also, 17% of respondents and 19% local adaptation practices are judged as significant in enhancing resilience, while 17% are seen as important to mitigate resource-based conflicts through local engagement. The results indicate that participatory adaptation governance and indigenous knowledge systems are influential in boosts climate resilience, sustainability and social stability in vulnerable populations.

The results of the qualitative assessments also highlighted the need for participatory adaptation governance. One community leader said:

“By engaging with the community, their understanding of local environmental pressures is key to long-term sustainability, avoiding conflicts regarding resource access” (Community Leader 3, Interview, May 2025).

The results have indicated that involving meaningful communities is an underlying requirement for good governance of adaptation to climate change, since community ownership of adaptation, increased trust between communities and institutions, and sustainable adaptation interventions all rely on it. The community leader's declaration shows that local communities have an important indigenous knowledge and practical experience on environmental changes that can be leveraged in context specific adaptation strategies and limit competition over environmental resources. The integration of indigenous knowledge and scientific opportunities can create more inclusive and responsive adaptation programmes that will address local realities and needs, the result of which is relevant to policy design. Therefore, increased community participation and participative governance in delta planning could be a short path to building climate resilience, while avoiding or resolving resource-based conflicts and ensuring long-term socio-economic stability and national security in Zambia.

Governance Effectiveness and National Security Implications

Governance is central to understanding the linkages between climate adaptation and national security on the ground in Zambia. Effective governance is the key to understanding climate adaptation and national security



linkages in Zambia. The results showed that weak governance systems are one of the major causes of climate-related conflicts, food insecurity and insecurity in vulnerable communities. The respondents attribute these deficits in governance arrangements to poor institutional coordination between the Ministry of Green Economy and Environment, DMMU, WARMA, the Ministry of Agriculture and local governments in charge of the implementation of national climate adaptation policies. The quantitative results showed that there was a lack of adaptation governance, which had a negative impact on resilience and exposure to socio-economic instability and national security risks, while the qualitative results showed that the lack of resilience was mainly due to a lack of adaptation governance.

Climate Governance and Resource-Based Conflicts

In this subsection, the linkage between climate governance and resource-based conflicts is explored on the specific issues of farmer–pastoralist conflict, water scarcity conflict and land competition due to climate variability in Southern Province.

Table 5: Climate Governance and Resource-Based Conflict Challenges Identified by Respondents (N = 350)

Statement	Frequency (n)	Percentage
Climate change as a driver of resource conflicts	84	24%
Increased water scarcity tensions	77	22%
Growing competition over land and grazing areas	65	19%
Frequent farmer–pastoralist conflicts	59	17%
Weak governance worsening resource conflicts	65	18%
Total	350	100%

Source: Field Data (2025)

Table 5 indicate that climate change was identified as the most important governance challenge as a consequence of resource-based conflicts, covering 24% of the answers. This was succeeded by increased tensions involving water scarcity, with 22% of the responses reflecting this, and growing land and grazing tension at 19%. Additionally, worsened resource conflicts due to weak governance were mentioned in 18% of the responses and frequent farmer–pastoralist conflicts in 17% of responses. These findings indicate that together, limited access to resources due to climate change plus poor governance and lack of adaptive responses are a major part of the liaison experienced by local communities in Southern Province.

These worries were extended by qualitative results, which showed experiences of community members with resource deprivation and escalation of conflict. One of the community respondents said:

“Few resources reduced during droughts lead to conflicts to access water and pasture grounds between farmers and pastoralists.” (Community Respondent 6, FGD, May 2025).

This quote reflects the direct intersection of the absence of resources and local instability and tensions in vulnerable communities due to climate causes. The assessment also indicates that the capacity for effective adaptation planning and good management of environmental pressures and resource competition is negatively affected by the presence of weak systems of governance for climate. The statement also suggests that weak systems of governance for climate and ineffective adaptation planning undermine the capacity of institutions to adequately manage environmental pressures and competition for resources. Thus, farmer–pastoralist conflicts, food insecurity and national security threats are heightened due to governance failures in Southern Province, Zambia.



Climate Adaptation Financing and Resource Allocation

The study focused on the overarching financial barriers to implementation of climate adaptation programmes in Southern Province. The following is the frequency distribution shown as an illustration.

Table 6: Climate Adaptation Financing and Resource Allocation

Statement	Frequency (n)	Percentage
Inadequate government funding for adaptation	91	26%
Delays in the release of adaptation funds	74	21%
High dependence on external donor funding	67	19%
Limited community access to adaptation finance	63	18%
Inadequate funding for climate-resilient infrastructure	55	16%
Total	350	100%

Table 6 shows that insufficient funding for adapting to climate change emerged as the greatest financial limitation, with 26% reporting it. This was, in turn, followed by slow release of adaptation funds at 21% and reliance on external donor funds at 19%. Fewer than a third of communities reported being able to access adaptation funds (18%), with sub-optimal funding to build climate-resistant infrastructure receiving 16% of the responses. The distribution implies that opportunities for climate adaptation programme funding are limited and uncertain, potentially limiting implementation and sustainability.

Regression Analysis of Climate Adaptation Governance and National Security

Using multiple linear regression analysis showed the relationship of the variables of climate adaptation governance with national security outcomes. Predictors included institutional coordination, climate adaptation financing and institutional capacity and community participation.

Table 7: Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of Estimate
1	0.721	0.520	0.514	0.486

Table 7 shows that the model had a high correlation coefficient between the climate adaptation governance variables and national security outcomes ($R=0.721$). The R^2 value of 0.520 implies that the predictors in the model share 52.0% of the variance in the national security outcomes, and the adjusted R^2 value of 0.514 reflects the significance that the model possesses after accounting for the number of predictors. The standard error of estimate is 0.486, which represents the average level of error prediction around the regression line. As pointed out in Table 7, except for prior arrangements, the explanatory power of climate adaptation governance factors is significant in the context of national security outcomes.

Table 8: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	88.30	4	22.075	93.54	<0.001

Residual	81.42	345	0.236	—	—
Total	169.72	349	—	—	—

Table 8 reports that all the model coefficients were statistically significant and that the regression model was statistically significant ($F(4,345) = 93.54$; $p < 0.001$). This means that the varying parts of the national security outcomes have been statistically evaluated and found to be accounted for by institutional coordination, climate adaptation financing, institutional capacity, and community participation. Table 8 thus indicates that governance variables have a significant association with the national security outcomes.

Table 9: Regression Coefficients

Predictor	B	Std. Error	Beta (β)	t	Sig.
Constant	0.684	0.182	—	3.76	<0.001
Institutional coordination	0.286	0.052	0.301	5.50	<0.001
Climate adaptation financing	0.214	0.049	0.238	4.37	<0.001
Institutional capacity	0.191	0.051	0.205	3.75	<0.001
Community participation	0.167	0.047	0.184	3.55	<0.001

Results in Table 9 indicate that all four climate adaptation governance variables demonstrated a measure of statistical significance at the $p < 0.001$ level for predicting the national security outcome. The relative contributions of the different indicators were determined, with institutional coordination showing the highest contribution with $\beta = 0.301$, followed by climate adaptation financing with $\beta = 0.238$, institutional capacity with $\beta = 0.205$, and community participation with $\beta = 0.184$. The positive regression coefficients indicate that better national security outcomes are correlated with better governance along these dimensions. Table 9 indicates that improving institutional coordination, adaptation financing, institutional capacity and community participation is crucial in establishing improved measures of climate resilience and national security.

DISCUSSIONS

The results show that, institutional coordination plays an important role in effective climate adaptation governance in Zambia. The descriptive results showed that poor inter-institutional harmony, lack of cooperation between the national and Provincial level and delayed implementation of programmes are constraints to delivery of climate adaptation interventions in Southern Province. In particular, respondents felt that insufficient cooperation between the Ministry of Green Economy and Environment, DMMU, WARMA, the Ministry of Agriculture and district councils posed a great challenge in implementing the National Climate Change Policy (2016) and the National Adaptation Plan (2021). This fragmentation of institutions led to a duplication of mandates, activation of adaptation projects, possible implementation delays, and inconsistent service delivery.

These institutional shortcomings undermine policy coherence and slow decision-making and the ability of policy actors to provide adaptation services to climate-vulnerable groups when and where they are needed. The regression results also show that institutional coordination was the most significant of the governance variables examined in terms of its relative contribution ($\beta = 0.301$) ($p < 0.001$) and therefore showed a positive and statistically significant relationship with the security outcomes in the country. This result conforms with the suggestion of Berrang-Ford et al. (2021) that better adaptation outcomes can be achieved in the context of integrated governance (IG) arrangements by promoting greater policy coherence, coordination and accountability. Dazé and Hunter (2022) also find institutional fragmentation and lack of inter-sectoral coordination as key challenges for effective adaptation implementation in African countries.

The findings also show that limited institutional capacity constrains the implementation of climate adaptation programmes. Serious gaps in technical capacity, the quality of staff, adaptation infrastructure and monitoring and evaluation significantly limit institutions' ability to plan, implement and evaluate adaptation interventions effectively. In the regression analysis, national security outcomes were also found to be positively and significantly related to institutional capacity, ($\beta = 0.205$), ($p < 0.001$)). This finding underpins the Vulnerability-Resilience perspective which holds that not only are exposure to environmental hazards important, so too are institutional preparedness, adaptive capacity and access to resources (Adger, 2006). Maintenance of technical capacity, strengthening of national/local level monitoring and institutional capacity can, therefore, enhance climate resilience and reduce vulnerability to socio-economic and security impacts of climate change.

Governance also emerged as a key point about funding climate adaptation. Limited access to adaptation resources, such as local institutions and vulnerable communities, at a local level may restrict the reach and viability of adaptation programmes due to financial constraints. The regression results showed that amongst the various climate adaptation financing variables, the financing variable had the second highest coefficient ($\beta = 0.238$) with statistically significant p value < 0.001 among various results indicating that financing has the strong association with climate adaptation national security outcomes. This is consistent with previous studies by Buchner et al. (2023), which indicate that adaptation finance continues to be significantly short of what is required, especially in the developing world. This also aligns with Ford et al. (2021) who point out that financial resources and institutional capacity go hand in hand with governments' capacities to act on adaptation to strengthen resilience. The results thus make a statement on the need for regular financial flows and adequate allocation and investment in locally suitable adaptation programmes.

The results also show that special attention needs to be given to the inequalities in access to adaptation resources and decision-making processes. According to a Political Ecology view, vulnerability to the environment is not only determined by climatic hazards but also by other determinants such as the governance arrangements, the existing power relations and unequal access to resources. The positive linkages between the governance variables and national security outcomes endorse the notion that the governance settings and national resource distribution matter for vulnerability and resilience. This conclusion also confirms Blaikie and Brookfield (1987), who stress the political and institutional aspects of environmental change and resource access. In Zambia, increased accountability and equitable access to adaptation resources could help decrease vulnerability and increase the ability of climate-sensitive communities to cope with environmental stress.

The study also highlighted community engagement as a crucial aspect of climate adaptation governance. The results showed that the lack of climate information dissemination and lack of communications with local stakeholders, combined with the lack of integrating local knowledge, limit the ability of the communities to own adaptation interventions. The findings from the regression analyses revealed that for national security outcomes a positive association existed with community participation ($\beta = 0.184$), ($p < 0.001$)). The findings of its standardized contribution revealed the potential significance of inclusive participation in adaptation governance – albeit not as significant as that of institutional coordination, financing and institutional capacity. This result aligns with Nalau et al. (2021) who suggest that local actors can be engaged to ensure greater ownership, accountability and sustainability of adaptation interventions. The potential of incorporating the tools of the indigenous knowledge system into scientific modelling to create adaptation strategies that are pertinent and effective in addressing the needs of communities has also been illustrated by Makondo and Thomas (2018).

The results of regression analysis strengthen the links to a relationship between climate adaptation governance and national security outcomes. From Table 7 the given model accounted for 52.0% of the variation of the dependent variable ($R^2 = 0.520$), and Table 8 revealed a significant overall regression model ($F(4,345) = 93.54$, ($p < 0.001$)). In addition, Table 9 indicated that the model is statistically significant, where institutional coordination, climate adaptation financing, institutional capacity and community participation were all significant predictors. These findings indicate that the governance of climate adaptation is multi-faceted and its progress in multiple domains can start to add up to resilience and national stability.

The results show that climate adaptation governance is an area of weakness with important repercussions on resource security and socio-economic stability in Southern Province. The issues identified as problems were: (a) scarcity and stress over resources due to climate change, (b) access to land and grazing land, (c) tension between

farmers and pastoralists, and (d) farmer–pastoralist tension. The results are in line with those of Mach et al (2019), who show that climate stresses can exacerbate ongoing social, political and economic tensions to create greater conflict risks. Similarly, Ide et al. (2021) note that the dynamics of insecurity are more likely to be triggered when climate vulnerability is exacerbated by some of the barriers to security, including the absence of strong institutions, poverty and unequal access to resources. The results thus indicate that adaptation of climate change into a larger development and security planning process can contribute to increase resilience, better resource governance and lessen risks stemming from socio-economic instability caused by climate change in Zambia.

CONCLUSION

The study reviewed climate adaptation governance and its effect on the national security of Zambia with Southern Province as a case study. These results identified institutional weaknesses in coordination, delays in implementing projects, overlapping responsibilities, low technical capacity, lack of infrastructure, a lack of personnel, and low monitoring systems as some of the barriers for facilitating adaptation implementation. Limited awareness of adaptation policy, restricted climate information, lack of consultation, lack of training and poor communication are also issues faced by communities. However, it was noted that community involvement, local knowledge, and local adaptation practices are also relevant for resilience and sustainability. The scarcity of resources, driven by climate conditions, was linked to tensions over water, competition for pasture and agricultural land, farmer – pastoralist conflict, food insecurity, vulnerability to livelihoods and socio-economic insecurity, and heightened national security issues.

The research also finds the link between governance and climate adaptation and national security. Institutional coordination, climate adaptation financing, institutional capacity, and community participation together accounted for 52.0% of the variance in national security outcomes and the model as a whole was statistically significant. Institutional coordination contributed the most relative, and climate adaptation financing came next, while institutional capacity and community participation came in turn. The main findings also included poor funding from the government, late fund releases, reliance on donors, engagement with adaptation funds and infrastructure investments were not resilient. Thus, better coordination, continuity of funding, institutional capacity, involvement of communities, integration of indigenous knowledge and monitoring are the key to enhance resilience and sustain stability of a nation.

RECOMMENDATIONS

The research recommended that climate adaptation governance in Zambia can be strengthened by enhancing institutional coordination, financing and deepen the involvement of communities. The government should set up integrated mechanisms of coordination between ministries and local institutions in order to enhance the effectiveness of policy implementation, accountability and adaptability. There should also be enough domestic investment for the investments in climate-resilient infrastructures, drought response programmes and adaptation programmes at community level, so as to lessen the reliance on external donors. The study also calls for the inclusion of participatory governance aspects by raising awareness, involving the public, and incorporating indigenous knowledge systems in adaptation planning processes. Improving inclusive and community-based adaptation systems will increase resilience, mitigate resource-related conflicts and strengthen national security situation in climate sensitive areas.

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