

Strengths, Weaknesses and Opportunities of Collaborative and Integrated Approaches in Droughts and Floods Management in Kenya's Arid and Semi-Arid Lands

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ABSTRACT

Kenya's Arid and Semi-Arid Lands (ASALs) areas experience recurrent climate extremes, particularly prolonged droughts and episodic floods, which significantly undermine livelihoods, food security, and ecosystem stability. Increasing climate variability has intensified the frequency and severity of the weather hazards, exposing communities to food insecurity, livestock losses, displacement, and persistent poverty. Management of droughts and floods has largely been done in isolation formats that have ultimately largely missed out on integrated approaches, resulting in absence of capacity building of the affected communities to take proactive and sustainable measures. This study shares findings from a study set to examine approaches to droughts and floods management in Kenya's ASALs, focusing on the role of community practices, and stakeholder collaboration in the semi-arid area of Ikanga-Kyatune Ward of Kitui County, Kenya. The research also aimed to establish the strengths, weaknesses and opportunities in collaborative approaches. 71 people from the community and stakeholders were interviewed, and descriptive statistics used to analyze the accrued data. The study found that despite the challenges posed by the multi-stakeholder approach, working together raises opportunities for integrated ways out in management of droughts and floods, and building adaptive capacities that promotes resilience through coordinated early warning systems, livelihood diversification, and infrastructure investments. The study recommends encouragement of collaborative and integrated frameworks that also take cognizance of indigenous knowledge. Strengthening the approaches can help transform reactive disaster response into proactive risk management.

Keywords: Collaboration, livelihoods, restoration, vulnerability, adaption.

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1.0 Introduction

Droughts and floods in Kenya's ASALs are insidious natural hazards, and there is no clear understanding of

their onset, termination, and common techniques to measure their severity and spatial extent. Drought rarely draws public sentiment, and the response generally lacks as compared to the dramatic, more visual natural hazards

such as floods that result in significant structural damage to infrastructure. However, the impact characteristics of the two differ for different climate regimes and are directly proportional to societal vulnerability. The impact in a region depends on the adaptive capacity of communities or the ecosystems to cope.

Kenya's ASAL regions are fragile ecosystems, and heavily dependent on climate-sensitive livelihoods (GoK, 2026). The areas are increasingly affected by climate variability and extreme weather events, particularly droughts and floods, which threaten livelihoods, food security, and environmental sustainability. As climate change intensifies, the ASAL communities are increasingly caught between two extremes: too much water and not enough. Floods and droughts, once considered opposite challenges, are now occurring more frequently, often in the same regions and sometimes in rapid succession. This dual threat is becoming the norm. The majority of households rely on rain-fed crop growing and livestock production, which prolonged droughts lead to failure, losses, and water scarcity. Episodes of intense rainfall often result in flash floods that damage infrastructure, erode soils, and destroy crops. The combined occurrence of these extreme weather events places significant pressure on already vulnerable communities and undermines long-term development in the region (Yang *et al.*, 2024).

Coping with drought and floods using exclusively traditionally accepted measures are clearly not enough to avoid increasingly severe impacts that negatively impact livelihoods and set back development targets. Some reasons for this are, for instance, the changing livelihoods patterns and the consequences of migration, lack of clear property rights (different for men and women). These often mean a loss of important traditions at the community level in a scenario where drought and flood cycles are shorter. Indeed, the impacts spread well beyond agriculture. As greater demand for water increases with increasing population and development, periods of water shortages resulting from extended periods of deficient precipitation and high temperatures often result in serious impacts on sectors such as energy, tourism and recreation, transportation, health, and ecosystem services. The socio-economic effects of drought occur at the local level but ripple through the economy to the regional and national levels (Rahman & Kim, 2025). In many countries, one of the most significant effects is the irreversible migration of the affected rural population, usually to urban areas.

The pastoralists, agropastoralists and crop farmers in the ASALs are among the most vulnerable groups in the country whose needs are rarely reflected in national development policy. The drylands embrace a range of climatic conditions, with a common characteristic of high temperatures, and limited water resources because precipitation is characteristically scarce and unreliable and evaporation is typically high. On average, the ASALs drylands exhibit a gradient of increasing primary productivity from hyper-arid, arid, and semi-arid to dry sub humid areas. But averages mask considerable variability. Rainfall totals often vary greatly from year to year and over short geographical distances. The result is a group of physical environments characterized by dynamism. The resident populations' proven resilience can be increased with an improved understanding of how such ecosystems operate especially under severe water-scarce scenarios that cause disequilibrium in the systems.

Drought and floods impacts illustrate the vulnerability of societies to the calamities and programs that provide assistance to those affected by drought are essentially treating the symptoms of vulnerability rather than the causes. Many assistance programs result in increased vulnerability to future events by making individuals and societies more reliant on government programs or assistance from donor organizations. As a consequence of an increased frequency of drought and floods, societal vulnerability to extended periods of water shortages, the economic, social and environmental impacts of droughts have increased significantly worldwide (Jehanzaib *et al.*, 2021). Because of their long-term socio-economic and environmental impacts, droughts and floods are by far the most damaging of all natural disasters.

Droughts and floods affect all systems across a range of scales and sectors, either directly or indirectly, in tangible or intangible ways and with both negative and positive impacts (Blauhut, 2020; Stahl *et al.*, 2016). Despite their interconnected nature, the associated risks are still often managed in isolation. Traditionally, response to drought and floods throughout the world has been through a reactive, crisis management approach. This approach to management responds to the impacts of drought once they occur is an attempt to speed the recovery process. The crisis management approach has been noted to be costly, largely untimely, poorly coordinated, and often results in resources or assistance being misdirected. Additionally, limited research has examined how stakeholders can work together to support recovery from both droughts and floods and facilitate

resilience building. This study therefore sought to explore the strategies employed in droughts and floods management in the ASALs, with a view to discerning how community-based practices and stakeholder collaboration facilitates cooling the fangs of the two climatic threats. Specifically, it pursued to identify the existing practices and their strengths, weaknesses and opportunities in cooperatively addressing droughts and floods and building people's resilience capacity space to prepare for, live in, and recover from the two weather whims. The study proposed to examine the existing approaches in planning, survival and recovery strategies. Agreeably, effective coordination between communities, the government and other stakeholders is critical in ensuring that disaster response and recovery programs are well aligned and sustainable. By assessing how the different entities interact and support resilience-building initiatives has the capacity to provide insights that can also improve policy implementation and resource allocation in the ASAL regions.

2.0 Research Methodology

2.1 Geographical Study Location

The Ikanga-Kyatune Ward is located to the south of Kitui County, Kenya. The area is semi-arid and characterized by low and unreliable rainfall, recurrent droughts, and occasional flooding during heavy rains. The inhabitant communities are agro pastoralists. When drought occurs, crop failure, livestock deaths, and water scarcity become widespread, leading to food insecurity, poverty, and migration in search of alternative livelihoods. Environmental degradation further intensifies the impacts of the climate hazards. Deforestation, overgrazing, unsustainable farming practices, and poor water management have reduced vegetation cover and weakened the land's capacity to retain water. As a result, the region has become more susceptible to both drought and flooding, while soil erosion continues to undermine agricultural productivity and ecosystem stability. In response to the challenges, communities, government institutions, and development partners have introduced various resilience-building initiatives. These include climate-smart agriculture, pasture reseedling, water harvesting and the promotion of drought-resistant crops. Community-based practices such as soil and water conservation, local early-warning systems, and livelihood diversification have also been encouraged to help households cope with climate shocks.

2.2 Methodology of Data Collection

The study adopted a mixed-methods research design, combining both qualitative and quantitative approaches to obtain a comprehensive understanding of the mechanisms used to address droughts and floods in the semi-arid land Ikanga-Kyatune Ward. A structured questionnaire was used to collect data from 71 respondents, capturing both measurable patterns (quantitative) and contextual insights and experiences (qualitative). The target audience consisted of smallholder crop and livestock farmers, community leaders and elders, members of community-based organizations (CBOs), local government officials in disaster management, non-governmental organizations (NGOs) and development partners and representatives from microfinance institutions and insurance providers. These groups were selected because they play critical roles in household and community resilience, risk management, and post-disaster recovery processes.

The survey provided peoples experiences with droughts and floods, recovery strategies adopted, accessibility to social safety nets and financial insurance, participation in community resilience initiatives and the perceptions of stakeholder support. The role of government agencies, non-governmental organizations, community groups, and development partners in collaboratively supporting recovery and resilience building were elucidated, characterized by identification of prevailing strengths, weaknesses and opportunities in implementing undertakings was carried out to be able to make conclusions and recommendations on the integrated approaches to droughts and floods episodes. A limitations of the study is that it was limited to the Ikanga-Kyatune Ward of Kitui County and therefore the findings may not fully represent all semi-arid and arid regions in Kenya.

3.0 Results and Discussion

3.1 Effects of Droughts and Floods to Lives and Livelihoods

The study found that the semi-arid regions generally display strong climate variability, both temporally and spatially, and they frequently face extremely dry situations. Socio-economic changes such as population growth, urbanization, increasing demand for water per capita, land use changes, or loss of traditional knowledge

and practices to adapt to drought, can exacerbate the vulnerability of particular populations to drought.

Responses to the research consisted of 48 (67.6%) women and 23 (32.4%) men. 12 (16.9 %) of the interviewed people fell in the age bracket of 18 to 30 years, 17 (23.9%) in 31 to 45 years, 32 (45.1%) in 46 to 60 years, and 10 (14.1%) being above 60 years old. 40 (56.3%) of the people indicated to be in agropastoralism, 17 people (24%) practiced crop farming only while 14 people (9.7%) were into small businesses. 69 people (97.2%) had stayed in the study area for more than 10 years, while 2 people (2.8%) had stayed in the area for a period of between 5 to 10 years.

Age and length of residency came out to critically shape how individuals experience, perceive, and recover from droughts and floods. These demographic factors determined an individual's physical mobility, access to early warning information, reliance on community support, and overall psychological and economic resilience during extreme weather events. Age-related differences came to be realized to significantly affect vulnerability and coping capacity. Older adults often faced disproportionate physical risks due to reduced mobility, health conditions, and sensory impairments. During droughts, the aged were indicated to suffer from a lack of age-appropriate food. In floods, they were highly susceptible to pre and post-flood morbidity. However, older individuals often served as custodians of traditional coping mechanisms and local cohesion. Young adults were found to often bear the brunt of economic and labor burdens. During prolonged dry spells, younger adults were found to at times need to migrate to seek off-farm income or travel long distances to graze livestock.

The length of stay revealed to influence drought and flood hazard experiences. Individuals who had resided in an area for long had built local ecological knowledge and obtained personal benchmarks to compare prevailing droughts or floods with past events, which significantly informed how they perceived and adapted to changing conditions. By virtue of being newcomers to the milieu, short-term residents lacked advanced historical context of the area's micro-climate. Newcomers were often unaware of localized flood zones or historical drought cycles. They typically largely relied on official alerts or community networks for guidance, leaving them at greater immediate risk if formal early-warning systems are inadequate

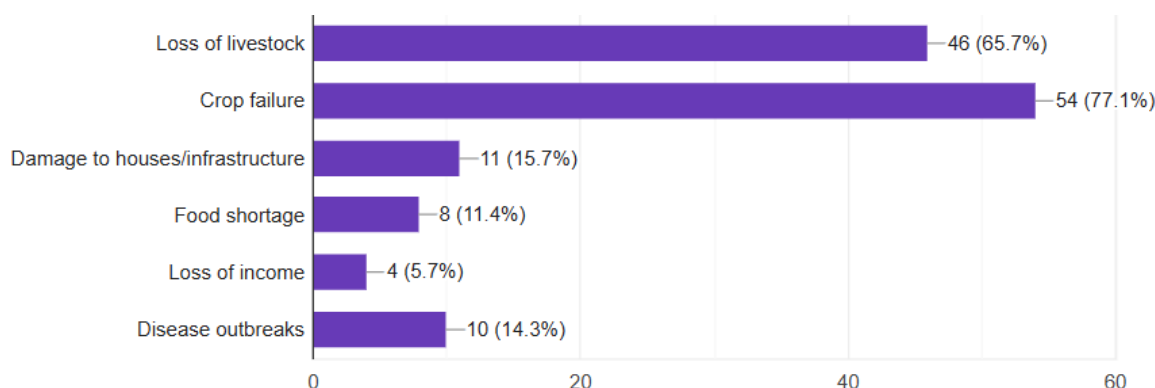
The interplay of age and residency was established to form the local community's core adaptive capacity. Older long-term residents possessed valuable traditional coping strategies but may physically had to struggle to execute evacuations during flash floods. Conversely, young recent arrivals were found to have the physical strength to escape sudden hazards but often lacked the generational community ties or informal safety nets required for long-term drought or flood recovery. Understanding these demographic indicators proved to be essential for effective drought and floods disaster risk management and community resilience planning.

Figure 1 shows that crop losses due to droughts and floods affected 77% of the respondents, leading to loss of food for people and their livestock. 65% of the respondents indicated that livestock losses had the heaviest negative impact to their households, while 16% pinpointing that excess rains had led to damage of infrastructures that included homes, bridges, and roads. The deleterious manifestations of the two weather events in disease outbreaks were reported by 14% of the people. Despite the resultant food shortages, only 11% of the people complained to have experienced food shortage due to the lack of rainfall. The main reason given by the rest was that they had options in acquiring food that included borrowing from neighbors and support from relief food agents. 6% of the respondents complained of income losses as they lost their employment due to droughts and floods.

3.2 Stakeholders in Drought and Floods Management

The national and County Governments were indicated by 41% and 46% of respondents respectively to have played key roles in providing support to households and local institutions in living during the droughts and floods periods and consequent recoveries. As such, they were appreciated by the community as core stakeholders in reducing the people's vulnerability. 12.9% of the people cited non-governmental organizations, community based organizations, faith based organizations and the private sector to intervene in the droughts and floods recovery process. Neighborhood alliances, family set-ups and local groups were indicated by 30% to provide social insurance programs. Cash saving groups, cash transfer programs and index-based livestock insurance were mentioned by 21 respondents to benefit the people on the impacts of droughts and floods.

Figure.1 Impacts of droughts and Floods on households and livelihoods



3.3 Strengths of Integrated Approaches in Droughts and Floods Management

a) Stakeholder Manifestation

The presence of different stakeholders, their willingness and ability to participate in droughts and floods management in the semi-arid study location was voted for by about 75% of the people to be the supreme strength. The baseline presence of local, national, and community-based institutions was found to serve as a powerful foundational pillar, providing a framework to transition from fragmented crisis responses to proactive, integrated management of droughts and floods. It was appreciated by 62% of respondents to be a pointer to possibilities of having integrated approaches for droughts and floods. The stakeholders were realized to have resources, and capacity to mobilize more which can be used in supporting during the weather calamities. 38% of the people felt that having institutions present was only an initial strength, as realizing their full potential requires deliberate and authentic coordination. While presence is a strength to effectively combat both moisture stress (droughts) and sudden excess (floods) in the semi-arid regions, institutions must move past isolated operations.

About 93% of the stakeholders showed a common conviction that the value of the institutional baseline includes the power contained through institutional capital network infrastructure. Indications were provided to the effect that established bodies possess the jurisdictional framework, personnel, and networks required to deploy aid. Institutional presence allowed for localized weather stations and data collection points that could help with early warning systems, and permit the translation of climate data into early action, mitigating risks before

they could become disasters. Local networks which carried community-based support illustrated fostered bonding relationships necessary to build community trust.

Integrating droughts and floods disaster risk management and weather change adaptation were vouched for by 74% of the study participants to require institutional actors to share a common vision. This was foreseen to yield building of synergy between policies that avoid fragmented responses, and permit resource and data sharing. Integrated approaches were seen to encourage different groups to pool resources and standardize crisis calendars, ultimately fostering long-term resilience. The respondents were sure that when institutions collaborate, they can pivot from short-term relief to long-term resilience. This includes implementing sustainable land management, constructing climate-proofed water infrastructure like strategic boreholes and water pans, and promoting livelihood diversification away from vulnerable rain-fed agriculture.

69% of the respondents were convinced that integrated approaches to drought and flood management in semi-arid regions can provide a dual-benefit framework. A core advantage was identified in capturing excess seasonal floodwaters to recharge depleted aquifers to sustain agricultural operations during severe dry spells. The core strengths of this dual-hazard methodology was indicated to include strategic groundwater recharge. The holistic strategy was vouched for to directly mitigate extreme climate volatility, minimize socioeconomic losses, and restore local ecosystems. By directing, slowing, and storing short, intense runoff, the systems replenish local aquifers that aids in converting a destructive flash flood into a reliable, long-term water

source to buffer against prolonged droughts. Utilizing natural infrastructure such as wetlands, sand dams, and terracing was qualified to be significantly cheaper than conventional concrete flood defenses and provides a lower carbon footprint. By integrating early warning systems with proactive policy frameworks, communities are makes to shift from reactive emergency responses to established preparedness, minimizing economic disruption and aiding ecological co-benefits. Nature-based interventions reduce soil erosion, prevent desertification, and support local biodiversity.

b) Synthesis of Multifaceted Illuminations

An integrated and collaborative approach in drought and flood management was expounded to link water availability, land, ecosystem health, and disaster response across the milieu. Respondents identified key advantages to include optimized water use (65%) (Table 1). Capturing excess water during high-flow seasons was reputed to recharges aquifers and fills reservoirs to provide a buffer for extended droughts. Cost savings and resilience were pinpointed by 58% of the people to emanate from unified strategies as they prevent infrastructure overlap, allowing communities to lower emergency response and recovery expenses across both hazard scenarios. The aspect proved to have capacity to reduce disaster recovery costs by up to 50%, consequently minimizing service disruptions during

rapid climate transitions, and shifts management from reactive crisis responses to proactive risk preparedness. Unified strategies were appreciated to prevent infrastructure overlap, allowing communities to lower emergency response and recovery expenses across both hazard scenarios. Collaboration between stakeholders and the integrated approach were stated by 48% of the people to yield considerations of multifunctional landscapes concerns, allowing working with nature rather than against it restores such as in wetlands and catchment vegetation, improving biodiversity while naturally slowing water flows to reduce runoff and erosion. The efforts were realized by 38% of the respondents to benefit from stakeholder empowerment, where collaborative platforms ensured early warning systems and policies were demand-driven, securing public buy-in and building localized resilience.

According to 33% of stakeholder respondents, collaboration brought alignment that was manifested in breaking down institutional and sectoral silos, giving birth to various government agencies, NGOs, and local communities read from the same page, resulting in stronger consensus and more sustainable policies. 16% of the respondents reported experiencing collaboration that yielded establishing long-term monitoring and early warning systems, benefiting some people in the region in preparing for extreme climate swings rather than scrambling when a crisis strikes.

Table.1 Strengths of Blended Cooperation

Recompenses		[N=71]
1.	Optimized water use	46
2.	Stakeholder empowerment	27
3.	Cost Savings and resilience	42
4.	Proactive resilience through M&E	11
5.	Multifunctional land use	34
6.	Stakeholder alignment	23

Table.2 Common Weaknesses in Addressing Droughts and Floods

Weakness		[N=71]
1.	Isolated obligations	27
2.	Fragmented coordination	40
3.	Data gaps	37
4.	Weak infrastructure	41
5.	Reactive mindset	50
6.	Capacity constraints	46

3.4 Weaknesses approaches for droughts and floods Management

a) Downsides

About 70% of the stakeholders were of the opinion that while integrated and collaborative frameworks were sound, they often faltered operationally. Common weaknesses included fragmented institutional responsibilities, severe data and monitoring gaps, and a reticence to change traditional crisis-management routines. Institutional and governance bottlenecks where isolated mandates existed were indicated by 38% of the respondents (Table 2). Organizations were found to be typically structured to handle either floods or droughts exclusively, making it difficult to bridge the divide between water scarcity and excess.

According to 56% of the respondents, fragmented coordination existed with responsibilities often spanning across multiple national and county-level agencies, leading to unaligned objectives, conflicting priorities, and resource wastage. Information and infrastructure shortfalls was reported to be manifested in data gaps by 52% of respondents to the disadvantage of accurately assessing socio-economic risks across cascading flood-drought events is limited by insufficient standardized methods for collecting and sharing hydrological data.

Weak infrastructures in the semi-arid areas were stated by 58% of the people to lead to poor transport and communication, hampering emergency response and preparedness. A major weakness that was indicated by close to 70% of the respondents was the financial barrier that led to reactive mindsets. Despite policy shifts, stakeholders were found to frequently default to post-impact crisis management, consequently over-relying on relief aid rather than long-term proactive adaptation. This also made the agencies take time and have participatory decision making. A secondary result was absence of capacity building of support recipients to be able to plan and take larger parts in droughts and floods planning and management activities. The capacity constraints caused severe limitations in financing, coupled with a lack of localized, well-trained personnel, inhibit the implementation of mitigation efforts on the ground, issues reiterated by 65% of community members. A general reservation was given by 61% of respondents on inadequacies in involving the people in decision making regarding drought and floods responses. 59% stated that there was no good coordination among the stakeholders,

which saw duplication of efforts and thin coverages. Stakeholders made their own plans and gave the support they deemed fit for the people. The unpredictable variability espoused by extreme weather complicated the ability to project and plan for future climate risk. Weaknesses in addressing droughts and floods were experienced through technical and environmental complexities, leading to conflicting needs such as in managing a river basin which synergistically requires careful balancing. For example, maintaining natural floodplain storage to mitigate floods could sometimes conflict with water retention strategies needed for prolonged droughts.

b) Approaches in Support Dispensation

About 65% of the respondents observed that despite government and development partner interventions aimed at improving climate resilience, recovery efforts remained largely reactive and fragmented. Many disaster response strategies were blamed to focus on short-term humanitarian relief such as food aid and emergency water supply, rather than long-term recovery and resilience building. As a result, households often struggle to fully recover before the succeeding climate shock occurs, creating a cycle of vulnerability and dependency. 72% of the people also felt that although community-based adaptation practices-such as water harvesting, soil conservation, drought-tolerant crops, and traditional coping mechanisms existed, their potential contribution to integrated disaster recovery had not been sufficiently integrated into formal resilience programs. Furthermore, limited coordination among key stakeholders, and community groups, often led to duplication of efforts, inefficient use of resources, and gaps in weather disaster recovery planning.

Another major challenge cited by about 60% of the people was the limited access to sustainable social protection and financial risk-management mechanisms for rural households. Many smallholder farmers were found to lack access to affordable climate-risk insurance, credit facilities, and social safety nets that could help them absorb shocks and rebuild their livelihoods after disasters.

Without such mechanisms, households often resorted to negative coping strategies such as selling productive assets, reducing food consumption, or withdrawing children from school, which further entrenches poverty and vulnerability.

Given the increasing frequency of climate-related disasters, about 80% of respondents vouched for a critical need to develop integrated recovery approaches that combine community-driven practices, effective stakeholder collaboration, and sustainable social and financial insurance mechanisms.

76% of the responses suggested that weaknesses in integrated approaches for managing droughts and floods in semi-arid areas stem primarily from institutional fragmentation, and the tendency to manage both extremes as isolated events rather than a single interconnected hydrological cycle. Droughts and floods management were found to have traditionally handled by entirely separate agencies, creating misaligned policies where water scarcity strategies actively hindered effective flood mitigation. 36% of the responses had consensus on existence of policy neglect in rural areas, with most integrated strategies focusing on urban adaptation, often failing to address the highly vulnerable semi-subsistence agropastoral communities that characterize the semi-arid lands.

To 48% of the respondents, a weakness was in existence due to technical and data deficits. The semi-arid areas were reckoned to be typically poorly gauged, resulting in a fundamental lack of field measurements for variables like soil moisture, groundwater recharge, and precipitation. The inadequacies were found to have led to imprecise forecasting. Rain in semi-arid areas often falls in brief, high-intensity storms. Thus, traditional modeling approaches were to be often imprecise, resulting in extremely short lead times for flash-flood warnings and emergency evacuations. Additionally, structural and operational imbalances existed with focus on droughts. Conventional water and infrastructure management was heavily biased toward mitigating prolonged droughts, leading to a lack of readiness when sudden flash floods strike.

The semi-arid areas face high evaporation losses. Integrated nature-based solutions and surface-water retention face severe limitations due to extreme heat and high evaporation rates, which rapidly deplete open water storage. 38% of the people found opportunities in storing water in sand contained in the seasonal rivers which can be accessed throughout the year.

The advantages of the infrastructures include the natural water purification provided by sand, and the preservation of the riverine system. A weakness exists in that the

knowledge in provision of the sand dams is lacking, which has made the existing ones fail to be sustainable water resources.

According to 52% of respondents, socioeconomic limitations exist that heighten vulnerability. The socioeconomic assessments were indicated to however often overlook how physical climate variables (environmental shocks) interact with local economic conditions, limiting the ability to adapt to rapid changes. The scenarios were made worse by uncertainty of climate models. Projected changes, such as higher evaporation, dropping overall precipitation, and increasingly erratic rainfall were identified to create high uncertainty that integrated multi-risk management frameworks struggle to incorporate.

Despite the various experiences and lessons learnt in droughts and floods, about 70% of the respondents opined that they were not better prepared for future droughts and floods. They accused the government and other stakeholders for failing to capacity-build them on planning, accessing information, resources mobilization and livelihood diversification which they feel holds some key to preparedness.

c) Stakeholder Insufficient Collaboration

65% of the respondents indicate that despite various interventions by government agencies, non-governmental organizations, and other development partners, communities remained highly vulnerable to recurring climate shocks. They blamed the situation to the lack of being involved in making decisions on mitigation and recovery measures, with the support agencies giving what they wanted. On the other hand, the support agencies were found to operate in solo forms, and therefore not wanting to let others know what they were doing.

Given the challenges posed by droughts and floods to living in, and recovery from the effects of droughts and floods, and the realized uncoordinated efforts to meet the encounters, 78% of the people prescribed an integrated approach that combines community-driven practices, and stakeholders' collaborative governance with the aim of building the planning, living during the weather induced calamities, recovery and resilience building and space. The approach was seen to offer opportunities for adapting differentiated ways of reducing vulnerabilities, including sustainable financial mechanisms and livelihoods diversification to strengthen resilience.

Table.3 Barriers to synergized drought and flood framework

Barrier		[N=71]
1.	Siloed mandates	55
2.	Information asymmetry	34
3.	Resource fragmentation	61
4.	Community disconnection	46

Fragmented man dates and lack of collaboration among government agencies, NGOs, and communities were experienced to be major bottlenecks in the droughts and floods disaster management. Without synchronized mitigation, agencies often worked at cross-purposes. Table 3 shows stakeholders' indications on the barriers to a synergized drought and flood framework to have typically included siloed mandates (78%), information asymmetry (48%), resource fragmentation (86%), community Disconnection (65%).

Institutions were found to operate in isolation, focusing entirely on emergency crisis response rather than proactive risk reduction. Crucial meteorological data and early warning systems were poorly shared between agencies, county governments, and local actors, resulting in disjointed responses.

Financing towards the emergency was mostly reactive, with drought contingency funds and flood relief resources being deployed independently, missing opportunities to invest in cross-cutting infrastructure such as dams and retention walls that serve both flood control and dry-season irrigation). Community disconnection was highly evident, with stakeholder identification and involvement being frequently resource-intensive and overlooked, leaving local communities, who were the first to experience both extremes out of policy planning and decision-making.

This made 65% of the respondents conclude that building a true whole-of-society approach requires shifting from crisis-response to integrated risk management. This would involve creating institutional bridges where catchment restoration, land-use planning, and early warnings are shared across the board.

d) Sidelineing of Indigenous Knowledge

The study found that the local communities possessed valuable indigenous knowledge and coping strategies for managing droughts and floods, such as water harvesting,

traditional soil conservation techniques, and livelihood diversification. However, these practices were often overlooked or inadequately integrated into formal disaster management and development planning. Majority (75%) of the respondents had the view that appreciating these practices could help highlight locally driven solutions that can strengthen resilience and improve recovery outcomes.

Drought and flood recovery practices included livestock restocking (19%), water harvesting (39%), starting to plant drought tolerant crops (33%), and livelihood diversification (10%).

e) Plummeting Social Insurance

The study assessed the effectiveness of social protection insurance mechanisms in supporting recovery from droughts and floods related shocks among vulnerable households. It was found that social insurances in rural areas provide a crucial safety net for lives and livelihoods by mitigating risks from health crises, crop failure, livestock deaths, and income loss. These mechanisms prevent vulnerable households and individuals from resorting to negative coping strategies, such as selling productive assets or removing children from school. Despite this, social insurance was established to face structural weaknesses that left the rural lives and livelihoods highly vulnerable.

Key challenges included income volatility, and low trust. These gaps prevented people from building recovery and resilience against shocks emanating from droughts and floods. Additionally, the rural households were noted to be growing towards being individualistic. When social insurance was perceived as a purely individual transaction rather than a collective necessity, the structural risk-pooling and intergenerational equity upon which it relied broke down. A purely individualistic mindset was blamed to causing individuals to resist paying into systems when they did not see a direct, immediate personal return.

3.5 Opportunities in integrated approaches for droughts and floods Management

a) Tweaking and Enhancing Approaches

Integrated approaches were indicated by about 60% of the respondents to not only address the immediate challenges of managing droughts and floods but also contribute to long-term sustainability and resilience in communities. By adopting integrated strategies, communities found themselves to become better prepared for and respond to the unpredictable nature of the weather changes and their impact on people and their livelihoods. Opportunities in integrated approaches for droughts and floods management in semi-arid regions were advised to focus on collective ability to turn devastating climate extremes into water security and economic resilience. These models and human, financial and technical skills resources were found to offer opportunities for flash floods to recharge groundwater and fill storage for prolonged droughts, bridging disaster risk reduction with sustainable agriculture and climate-smart value chains. About 60% of the respondents were of the opinion that implementing nature-based solutions characterized by community-led catchment reforestation, sand dams, wetland conservation, and floodplain zoning to slow floodwaters to had the capacity to reduce soil erosion, and restore rangeland biodiversity.

The deduction of the audience is that this is critical in building local specific resilience against the droughts and floods adverse consequences. Integrated approaches in attending to droughts and floods were vouched for to leverage the wealth of strength contained in interest towards climate-smart agriculture and livelihoods. 74% of the respondents were convinced that scaling regenerative agriculture with drought-tolerant seeds, micro-irrigation, and alternative livelihoods such as beekeeping to protect communities from total crop failure during droughts can reduce vulnerability to droughts and floods. Sustainability of this was envisaged by respondents to benefit from early warning systems obtained from multiagency collaboration. Deploying localized, gender-inclusive digital and meteorological forecasting to help communities anticipate both flood peaks and drought onset, giving ample time to for example move livestock and resources. A second aspect presented by about 40% of the people was empowering local stakeholders through devolved climate funds that support small-scale infrastructure.

b) Embracement of Integrated Water Resources Management Approach

About 74% of the respondents stated that to build and enhance resilience against drought and floods extremes, agencies must adopt a more holistic strategy that embraces an integrated water resource management approach. This was identified to offer a coordinated way for an adaptive framework for drinking water, wastewater, storm water, floodwater and reuse water. 56% of the respondents were convinced that by integrating water needs across all systems, water users and managers can reduce capital and operational costs while strengthening all seasons water security, and flood protection. The added value was indicated to be in providing opportunism in appropriate planning and a practical toolkit for building climate resilience.

c) Popularization of Financial Insurances

The study assessed the effectiveness of financial insurance mechanisms in supporting living in and recovery from drought and floods related shocks among vulnerable households. It was found that people in the rural areas are not well versed with financial insurances on their lives and livelihoods. The few who had been exposed to the insurances cited frustrations from the intervention. Negative past experiences with insurance schemes were found to breed deep skepticism. Complex paperwork, technical policy terms, and opaque terms discouraged first-time rural consumers from participating. Financial insurances were also indicated by about 86% of the respondents to often mainly fail due to volatile, low-income streams that prevent premium payments. The rural people rely on seasonal incomes. As such, paying fixed premiums when funds are scarce was found to lead to policy lapses. Weather and natural disasters were indicated by affect whole regions simultaneously, making agricultural insurance expensive to administer and difficult for insurers to cover without high rates of fraud or moral hazard. Additional core weaknesses included high product complexity, inaccessible distribution channels, and a severe lack of trust driven by historical mismanagement or delayed claim payouts scheme.

13% of the respondents reputed the financial insurance in rural areas to serve as a critical safety net, shifting households from poverty to resilience. Opportunities were identified to center on de-risking livelihoods and

protecting basic needs through micro-insurance models, such as weather/drought indices, livestock coverage, health plans, and community-based savings. The primary opportunities and models driving rural financial insurance were indicated to include index-based agricultural and climate insurance, microinsurance for income and livelihoods, bundling with financial services, and making uses of digitization and agtech platforms to allow farmers to purchase policies, obtain production insights, and receive insurance payouts instantly without traveling to physical branches.

Opportunities were also stated to exist in micro insurances as they provided critical safety nets to protect low-income earners, against shocks. By mitigating the risks, insurance fostered livelihood stability, encouraged agricultural investment, and prevented households from relying on devastating coping mechanisms like selling assets.

4.0 Conclusion and Recommendations

The study concluded that the semi-arid regions remain highly vulnerable to negative impacts of droughts and floods which ultimately threaten the inhabitants lives, livelihoods, and sustainable development. To address the problem, the study vouched for embracement of a collaborative and integrated approach that combines community-based adaptation practices, strong stakeholder partnership, and sustainable social and financial insurance mechanisms. Partnership among the community members and groups, government institutions, non-governmental organizations, and the private sector were found to offer sustainable outlets for enhancing preparedness, resource mobilization, knowledge gathering and sharing and having multifaceted address to droughts and floods. The study recommended strengthening the community-based adaptation strategies and livelihood diversification in order to enhance long-term resilience and sustainability. Innovative financial tools, such as climate insurance and social protection programs, were identified to be relevant in providing important safety nets that enable vulnerable

households to recover from droughts and floods losses. As such, they need to be part of community and stakeholders strengthening measures, coupled with access to early warning systems and climate forecasting to enable communities to prepare for droughts and floods.

4.1 Conflict of Interest

The authors declare no competing interests.

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