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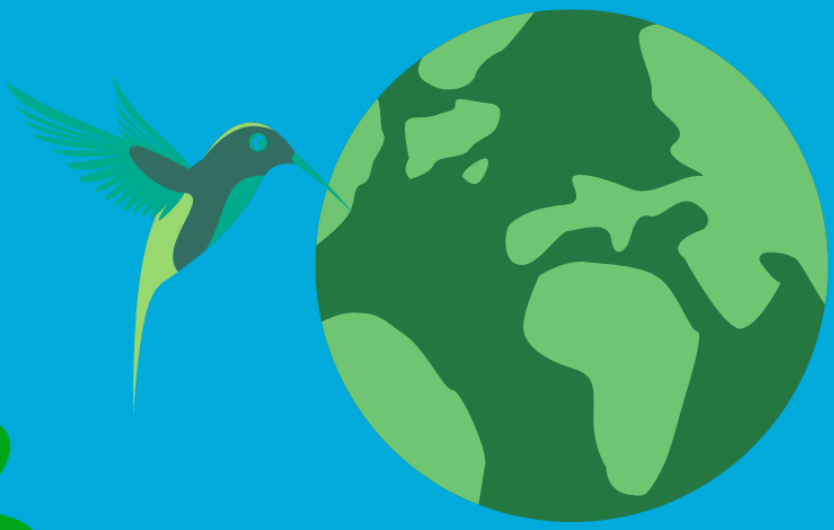
COMMUNITY RESILIENCE IN THE HORN OF AFRICA: INSIGHTS FROM ETHIOPIA, KENYA AND SOMALIA



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FOREWORD

In the face of increasing climate variability, and socio-economic challenges, the concept of community resilience is a critical topic in the Horn of Africa given the region's vulnerability. Ethiopia, Kenya, and Somalia, each with their unique histories and cultures, share a common struggle against the impacts of climate change, conflict, and economic instability. The region with its unique ecological and socio-political landscape, presents a complex environment where resilience is not just about survival but thriving amidst all these challenges. This report, Community Resilience in the Horn of Africa: Insights from Ethiopia, Kenya, and Somalia, shed light on the resilience of communities within these countries, highlighting their adaptive capacities, innovative solutions, and the collaborative efforts that have been crucial in navigating these multifaceted challenges from the ground up, highlighting the voices and perspectives of those most affected by these adversities. This report tells the story of the local People and reveals the structure of resilience as perceived and practiced by communities in Ethiopia, Kenya, and Somalia.

The communities of the Horn of Africa have demonstrated remarkable strength and resourcefulness, turning adversity into opportunity. This foreword serves as an invitation to explore the resilience narratives of Ethiopia, Kenya, and Somalia. It is also a call to action for policymakers, development practitioners, and researchers to engage with these insights, adapt inclusive dialogue, and support resilient pathways that can withstand future uncertainties. The insights gathered emphasize the critical role of social cohesion, indigenous knowledge systems, and the involvement of women and youth in enhancing resilience.

One of the key takeaways from this work is the importance of adaptive capacity and community engagement in resilience building. The communities highlighted the necessity of diversifying livelihood sources, leveraging indigenous knowledge, and addressing the underlying drivers of vulnerability such as climate change, conflict, and poverty. These grassroots insights are key for informing policy and program development aimed at building more resilient societies in the Horn of Africa. The report also emphasizes the challenges to implementing resilience policies and programs, pointing out issues like governance, limited community participation, and inadequate infrastructure.

Based on evidence collected from the field, the report offers an understanding of community resilience, stressing the importance of leveraging existing resources, cultural values, and social networks. By integrating local approaches into existing disaster risk management, conflict risk reduction, and climate change adaptation creates pathways for ongoing resilience solutions that can inform future programmatic interventions aiming to address community resilience challenges effectively based on a sound foundation of local knowledge. The lessons drawn from the study are not only relevant for the Horn of Africa but can serve as a guiding framework for community resilience-building efforts in other geographical settings.

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We extend our heartfelt gratitude to the UNDP Ethiopia Country Office, UNDP Somalia Country Office, UNDP Kenya Country Office, the Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC), and NORCAP who supported different phases of the work. We are thankful to the local communities in Ethiopia, Kenya, and Somalia who participated in the data collection exercise. Their insights, experiences, and resilience in the face of adversity have been the foundation of this work. We are particularly grateful to the community members, leaders, and key informants who generously shared their time and knowledge during focus group discussions, panel discussions, and interviews. Special thanks to the editorial and communications team who have keenly reviewed and prepared the report for publication. Their attention to detail and commitment to quality have ensured that the report is a valuable resource for policymakers, practitioners, and communities alike.

Dr. Zeynu Ummer
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EXECUTIVE SUMMARY

Fragile settings are situations in which communities lack resources and capacities to perform core functions, making them vulnerable to complete breakdowns during shocks and crises. These settings often struggle to recover and have difficulty establishing strong state-society relationships. In the Horn of Africa, areas classified as Arid and Semi-Arid Lands (ASALs) are found to be fragile settings. The countries Ethiopia, Kenya and Somalia contain borderland and lowland areas that face significant challenges — a major one being resource-based conflict among and between pastoralist and sedentary communities — that hinder their environmental, economic and social development.

This study was undertaken through a partnership between the United Nations Development Programme (UNDP) Resilience Hub for Africa and the Intergovernmental Authority on Development (IGAD) Climate Prediction and Application Centre (ICPAC). The study seeks to understand the concept of resilience from the point of view of the communities themselves in fragile settings. Further, the study looks at community-based approaches to resilience-building and finds examples of how resilience plays out in in practice in different African geographies.

Resilience, according to the United Nations Common Guidance on Helping Resilient Societies, refers to the ability of individuals, households, communities, cities, institutions, systems and societies to prevent, resist, absorb, adapt, respond and recover from a wide range of risks while maintaining functioning and long-term prospects for sustainable development, peace, security, human rights and well-being (United Nations, 2020).

The insights from this study validated the Roots of Africa Resilience (ROAR) research findings by bringing the community level perspective on resilience building. ROAR AUC Common Guidance on Resilience (working title) aims to support the Member States and Regional Economic Communities to develop holistic multi-hazard and multi-sectoral, effective short- and long-term resilience programmes, policies and projects. In addition, ROAR puts forward a list of indicators pertaining to each dimension of resilience, identified as relevant for the continent, to measure achievements and gaps at national level.

This study was conducted between October and December 2022 in: 1) Gursum and Tuli-Guled Districts, Somali Region, Ethiopia; 2) Kilifi and Turkana Counties, Kenya; and 3) Gabiley and Salaxley Districts, Somalia. A total of 110 community members participated in focus group and panel discussions, while 41 key informant interviews (KIIs) were held with government officials (at the national and sub-national level), community leaders and sector experts involved in resilience-building efforts. The selection of these communities was based on multiple criteria, including vulnerability to climate change impacts, prevalence of conflict and instability and degradation of natural resources.

The study aims to inform policy and programme development by identifying dimensions of community resilience, the role of existing resources and the importance of participation. The study was conducted during a period of five consecutive droughts, which only heightened the need for evidence-based resilience strategies.

The study highlighted the role of social cohesion and social capital in supporting communities during shocks and crises. It noted the importance of providing support to those affected by drought and livestock diseases. Respondents emphasized the need for adaptive capacity, community engagement and social transformation to promote resilience and sustainable development.

The study identified several key factors driving vulnerability in the region, including climate change, population growth, social cultural practices, poverty, food insecurity, conflict and violence. These factors exacerbate cycles of poverty and environmental degradation, negatively impacting the resilience of communities.

Indigenous knowledge systems (IKS) were found to play a significant role in enhancing resilience. Traditional practices, such as weather forecasting, conflict management, seed storage, water management and human and animal health practices, contribute to the capacity of communities to adapt and cope with adversities.

The study emphasized the importance of women and youth involvement in resilience-building efforts. Women actively engage in resource conservation, household management and promoting peaceful coexistence, while youth take on roles such as providing security and identifying necessary resources during periods of drought and other challenges.

Despite the existence of resilience policies and programmes, implementation remains weak in the study areas. Factors like poor governance, limited community participation, remoteness and inadequate infrastructure hinder the effective implementation of policies and programmes.

Improving governance structures and increasing community involvement were found to be crucial for strengthening resilience initiatives in the face of the multiple challenges. One of the critical ways of building resilience in vulnerable communities was noted to be the ability of communities to diversify their livelihood sources.

Engaging with communities in fragile settings requires a comprehensive approach that integrates disaster risk management, conflict risk reduction, ecosystem management and climate change adaptation. Stakeholders will need to identify the drivers of community resilience, the factors that contribute to community resilience, the role that indigenous knowledge plays in building community resilience and how these three elements can be leveraged to build more resilient communities in the Horn of
africa.

In conclusion, this study underscores the importance of understanding community perspectives on resilience and the need to support existing resources and knowledge to build resilience in crisis-affected areas. It emphasizes the significance of social networks, infrastructure and cultural values in resilience-building efforts. The study underlines the importance of involving women and youth and leveraging
indigenous knowledge systems in enhancing community resilience. The findings likewise highlight the challenges faced when implementing resilience-oriented policies and programmes, including governance issues, limited community participation and lack of basic infrastructure. Addressing these and other challenges is essential for translating policy commitments into effective and sustainable resilience interventions.

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Background: Vulnerabilty in the Horn of Africa

Africa is highly susceptible to the impacts of climate change (IPCC 2022), despite contributing only a small fraction (only 3.9 percent in 2021) of global carbon emissions (Statista, 2023). In the Horn of Africa region, climate change vulnerability stems from the prevalence of pastoralism and agro-pastoralism as the primary livelihoods, which are heavily dependent on climate and weather (IPCC 2022). Extreme events, such as droughts and floods, have become more frequent and severe, exacerbating challenges already faced in the region, including water scarcity, food insecurity, political instability, conflict and weak governance.

Between 2020 and 2022, the Horn of Africa experienced five consecutive failed rainy seasons, leading to significant impacts on lives and livelihoods. Recovering from such crises is increasingly difficult for communities as the events occur more frequently and severely.

The sites covered by this study are primarily arid and semi-arid lands, often marginalized and marked by an increased frequency of dry spells, floods, pests and diseases that harm agricultural and livestock production. Other detrimental factors are human-induced environmental degradation, land degradation, poverty, market instability, labour shortages due to human diseases, weak institutions, limited access to basic services and conflict over resources.

In addition, three external challenges in the past few years have compounded vulnerability in the Horn of Africa. The Covid-19 pandemic led to economic shocks around the world, hitting the most vulnerable communities, like the Horn of Africa, the hardest. The Ukraine War disrupted the region's supply of key food commodities, driving up prices and exacerbating food insecurity. And finally, recent conflicts within the Horn of Africa, such as in Ethiopia, further intensify challenges faced by local communities.

Layered on top of existing vulnerabilities to climate variability, shifts in growing seasons and environmental stressors, conflicts have also had severe negative impacts on agriculture and livelihoods. Displacement of populations and the destruction of infrastructure caused by conflict make it even more difficult for communities to adapt to environmental challenges significantly impeding their ability to sustain food security.

Communities that have experienced crop failures through these consecutive drought seasons often lack alternative sources of income. With low incomes and limited or no savings, most live hand-to-mouth. Inability to access financial markets, accumulate assets, obtain insurance and save money greatly restricts people's ability to deal with shocks when they occur. Even when pastoralists can travel great distances to protect their cattle from dying, their quality of life is still negatively impacted. For instance, children may have to drop out of school, they may have restricted access to healthcare and disputes may arise with host communities.

Background: Case study countries and areas

Ethiopia

The country of Ethiopia has an agricultural-based economy, with smallholder rainfed farming accounting for 95 percent of total agricultural production (Matewos, 2019). The sector faces several challenges, such as limited land area, lack of resources, deteriorating soil quality, poor governance and conflicts. Climate change has further aggravated the situation, causing frequent and prolonged drought conditions and irregular rainfall patterns that affect food production (Zerssa, 2021; Alemu, 2019).

According to UNFPA,[1] Ethiopia's population as of 2023 is approximately 126.5 million, making it the second most populated country in Africa after Nigeria. On the other hand, average farm size in Ethiopia has decreased from 1.20 hectares in 1995 to 0.95 hectares in 2017, as reported by the Ethiopian Ministry of Agriculture and Rural Development (2017).

Despite an increase of about 34 percent in per capita food supply over the past three decades, access to adequate and nutritious food remains a challenge as it is affected by factors such as poverty, inequality and conflict (FAO, 2020).

Rangeland degradation has significantly affected pastoral systems in Ethiopia. Anthropogenic factors, including urbanization and villagization initiatives, have contributed to this problem. Abadiga et al. (2019) found that villagization led to the fragmentation of grazing lands into smaller areas, which are easily overgrazed, leading to soil degradation and a decline in forage quality. Similarly, urbanization has caused a significant loss of rangelands in peri-urban areas, resulting in overgrazing and soil compaction (Ayana and Berhanu, 2017). The cases of rangeland fragmentation and conversion into agricultural land and settlements have resulted in soil degradation, overgrazing and a decline in forage quality, negatively affecting pastoral community livelihoods in Ethiopia.

Since October 2020, Ethiopia has been experiencing a severe drought, attributed to La Niña. The worst drought in 40 years has been devastating to the country's food systems. The drought specifically is affecting the Somali, Oromia and Southern Nations, Nationalities and Peoples (SNNP) regions, leading to significant impacts on people's lives and livelihoods. In drought-affected areas alone, 11.8 million people require food assistance, representing a 59 percent increase from early 2022. Notably, 3.8 million women and children need assistance in preventing and treating malnutrition. Food insecurity in these areas is expected to worsen as Ethiopia struggles with compounding shocks, including conflicts, displacement, drought and macroeconomic volatility (WFP, 2023).

It is projected that Ethiopia's population will continue to grow, with the United Nations estimating that it could reach 210 million by 2050 and exceed 340 million by 2100. This projected population growth will further strain limited resources and agricultural land.

1. www.unfpa.org/data/world-population/ET.

At the same time, changes in temperature and precipitation patterns are expected to lead to more frequent and intense droughts and erratic rainfall. These climate impacts will have significant impacts on food production and water availability in the country.

These challenges highlight the urgent need to understand community resilience in fragile settings in Ethiopia and to implement effective interventions and promote greater resilience among the affected communities.

Kenya

Frequent droughts have had a detrimental impact on Kenya's agricultural sector, which is a significant contributor to the economy. In 2022, due to prolonged drought, the agricultural sector shrunk by 1.5 percent, leading to a 0.3 percent reduction in the country's gross domestic product (GDP) (World Bank, 2022). Approximately 4.8 million people are affected in 23 out of 47 counties in Kenya classified as Arid or Semi-arid Lands (ASALs) (Njoka et al., 2016).[2] ASALs, such as Kilifi and Turkana Counties which are part of this study, are geographically vulnerable to the consequences of climate change and have the highest rates of poverty and food insecurity.

Droughts in Kenya have had severe consequences, including crop failure, water and food scarcity, poor pasture conditions, livestock deaths, high rates of malnutrition among children under 5 and intercommunal conflicts over limited resources. These challenges have led to a loss of livelihoods and have diminished community resilience.

As a result of these recurring droughts, the risk of food insecurity is high, especially among small-scale farmers and pastoralists (Ndayiragije and Li, 2022). Additionally, the unfavourable conditions have caused a 30 percent reduction in pastoralism (Nabenyo, 2020).

In 2021, the drought was declared a national emergency in Kenya, with ASAL counties experiencing the most significant impact. The United Nations World Food Programme (WFP) found a fivefold increase in the number of people in urgent need of food assistance between August 2021 and June 2022, rising from 739,000 to 3.5 million (WFP, 2023). The same report indicated that in December 2022, about 4.4 million Kenyans faced acute food insecurity, ranked at Integrated Food Security Phase Classification (IPC 3) and above.

In addition to the challenges posed by drought and its impacts on the agricultural sector, Kenya faces significant population growth. Kenya's population is projected to reach 85 million by 2050, significantly higher than the current population of around 53 million (United Nations, 2019). This rapid population growth, combined with the impacts of climate change, such as rising temperatures, changes in rainfall patterns and increased frequency of extreme weather events, like drought and floods, pose significant challenges for the country.

Increased pressure on land, water and food resources and rising poverty will be felt at the household level and have a particularly devastating impact on pastoralists in ASALs where livestock production and agro-pastoralism are the main source of incomes and livelihoods.

2. Arid regions are mostly pastoral, while semi-arid areas are agro-pastoral, with integrated crop and livestock systems (Government of Kenya, 2018).

Given the projected increase in the frequency and severity of droughts due to climate change, understanding and addressing the challenges faced by communities in Kenya's ASALs is crucial for building resilience and promoting sustainable development.

Somalia

Somalia faces heightened vulnerability to climate change impacts, which manifest in extreme weather conditions like prolonged droughts, flash floods, erratic rainfall, disrupted monsoons, cyclones, sandstorms, and dust storms (IDLO, 2023). Many extreme weather events over the past 25 years had a negative impact on the agricultural sector of Somalia, the most important for the economy (Sharmake et al., 2022). Approximately 40 percent of Somalia's gross domestic product relies on agriculture, predominantly centred around a nomadic pastoralist way of life (IDLO, 2023). However, climate change poses a threat to this traditional livelihood by impacting the already fragile natural resources essential for livestock husbandry (Crane et al., 2018). Recently, communities in Somalia have shifted away from traditional sources of livelihood, often in response to climate change (Crane et al., 2018).

The Somalia National Development Plan (2017-2022) highlights an ongoing shift away from nomadic, pastoralist livelihoods, driven by increasing urbanization and rural-urban migration. Half of the total population of Somalia now lives in urban and peri-urban environments. Recurrent droughts and flooding, caused or intensified by climate change, have resulted in increased internal displacement, often translating into flows of migrants to urban centres from the countryside.

The Somalia's food systems have been deteriorating due to climate change, compounded by three decades of ongoing conflicts and international shocks, such as the war in Ukraine (IRC, 2022). Like other countries in the Horn of Africa, Somalia is experiencing its worst drought in 40 years, with five consecutive failed rainy seasons (Pfeifer et al., 2018). This has pushed many citizens into a critical state of food insecurity, with children bearing the brunt of famine and malnutrition. The prolonged drought has caused tremendous loss, including crop failures season after season and death of livestock (Food Security Cluster, 2022).

Communities implement coping mechanisms to cushion them during times of drought, for example, selling livestock to buy food commodities, such as cereals. However due to the drought, the remaining livestock are often in poor condition, forcing sales at low prices. Meanwhile, due to crop failures, food commodity prices are often high, which further pushes families to extreme poverty (MHADM, 2018; Hussein et al., 2021). For the people of Somalia, the cumulative effect of civil war, marginalization in decision-making, inadequate market systems, deficient infrastructure and land tenure issues have been compounded with the current recurring droughts to contribute to the loss of their resilience to different shocks over time.

Sources of livelihoods in the study areas

The main source of livelihoods in the study areas are pastoralism, agro-pastoralism, and crop farming. Agri-business activities are common across the three countries. People living in urban and peri-urban areas seek employment, both on-farm and off-farm, along the agricultural value chain and other commercial activities.

Influenced by the changes in weather patterns, people in all the study sites have been forced to diversify their sources of livelihoods to non-conventional sources of livelihoods outside their traditional mode of life. Respondents indicated that they had started engaging in activities such as irrigation agriculture, planting of drought tolerant crops, beekeeping and agri-business. Below are some specific examples of livelihood diversification taking place.

- In Turkana and Kilifi counties in Kenya, community members in the study areas have ventured into motorcycle businesses, commonly known as “bodaboda,” as a source of income. Respondents stated that this was popular among the youth. (However, in most cases the drivers are not well trained, leading to an increase in road traffic accidents and crime.) Table banking, a group-based funding system, has been useful, especially for women, as a savings plan and a quick way to access loans to cushion them during difficult times in the two counties.

- Due to water scarcity, farmers in Kilifi County, Kenya, have moved away from planting maize, a water intensive crop, to planting crops such as green gram millet, sorghum and sweet potatoes, which are drought tolerant and mature early. Communities living near the Turkwel River in Turkana County, Kenya, practice irrigated agriculture, which is considered more resilient to climate change.

- In Kilifi County, access to the Indian Ocean allows people to earn a living through fishing, reducing their dependence solely on agriculture and pastoralism.

- In Gabiley District, Somalia, farmers have begun planting early maturing wheat varieties to take advantage of the short rains and be able to have a harvest despite below normal rainfall.

- In Gursum District, Ethiopia, respondents stated that because camel herders roam large distances in search of water and pasture for their cattle as a coping technique, they tend to be relatively resilient to drought. Additional activities that take place in Gursum District, Ethiopia, and Turkana County, Kenya, are beekeeping, horticulture farming (of drought tolerant fruits such as guavas, pawpaw and watermelon) and growing drought tolerant crops (sorghum, millet, green grams, millet and cowpeas).

- In Gabiley and Salaxley Districts, Somalia, financially capable farmers have installed boreholes and use solar power to pump water, enabling them to practice irrigation farming.

Livelihood diversification is not always easy, especially for the poor and most vulnerable with limited capacity, since diversification requires capital and knowledge.

With the prolonged drought devastating Ethiopia, Kenya and Somalia and causing severe income losses in livestock and crop farming, some people in these communities have ventured into mal-adaptive activities, such as production of charcoal and other wood fuels, despite being a driver of both climate change and vulnerability.

Background to the study process

Justification for Selecting the Study Areas

The selection of Ethiopia, Kenya and Somalia as study sites is based on several factors. These areas are all located in the Horn of Africa, which is known for its vulnerability to climate change and extreme weather events, such as droughts and floods. This region experiences frequent and severe climatic shocks, which have devastating impacts on the livelihoods of communities, especially those dependent on rain-fed agriculture and pastoralism.

Another important consideration is the high levels of poverty and limited resources in these areas. The population growth rates in the three areas are significant, putting additional strain on already limited resources and services. This creates a context in which communities are highly susceptible to the impacts of climate change and are facing significant challenges in building resilience.

Overlapping conflicts within these areas further compound the vulnerabilities faced by communities. In particular, ongoing conflict in Somalia, as well as recent conflicts in Ethiopia and Kenya, have resulted in widespread displacement, loss of livelihoods and increased vulnerability to the impacts of climate change. Addressing the challenges faced in conflict-affected areas is crucial for building resilience and ensuring sustainable development.

Additionally, Ethiopia, Kenya and Somalia share borders and significant transboundary livelihood systems are in place. This means that disturbances or shocks in one area can have spillover effects on communities across the borders. Understanding the interconnectedness and transboundary aspects of livelihoods is key to developing effective strategies for resilience-building in the region.

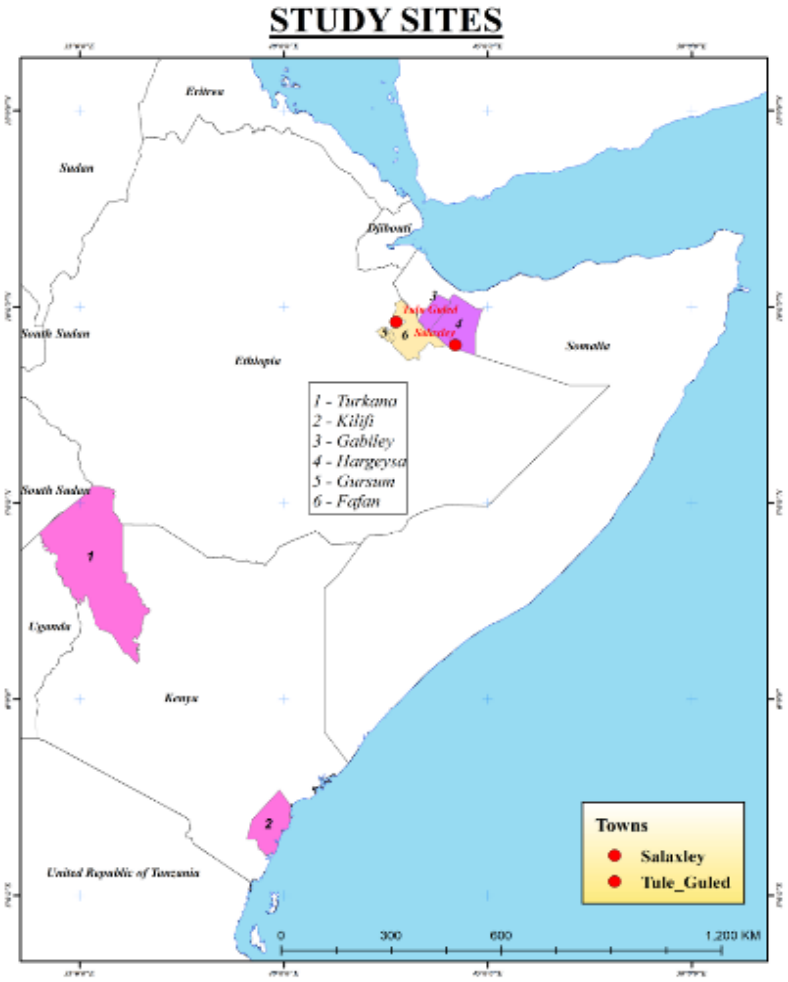
Materials and Methods

The data collection process for this study had three parts: literature and policy review; key informant interviews and focus group discussions (panel format). The study utilized a participatory research approach through focus group discussions and semi-structured interviews, which specifically targeted community members impacted by climate change and other complex crises. The use of ground-level panels was to establish a platform for community members to share their experiences and perspectives on resilience and its management, as well as to identify proposed areas for change in the Horn of Africa region. Select community members were involved in the research design, empowering them and democratizing the research process. Through this approach, community

members had a significant degree of participation and control. The study participants for the key informant interviews were identified through purposive sampling and snowballing to identify additional participants based on referrals and recommendations from initial participants.

The community participants were selected from specific areas of the three study countries (see Figure 1):
1) Gursum and Tuli-Guled Districts, Somali Region, Ethiopia;
2) Kilifi and Turkana Counties, Kenya; and
3) Gabiley and Salaxley Districts, Somaliland.[3]

Figure 1: Map of study sites



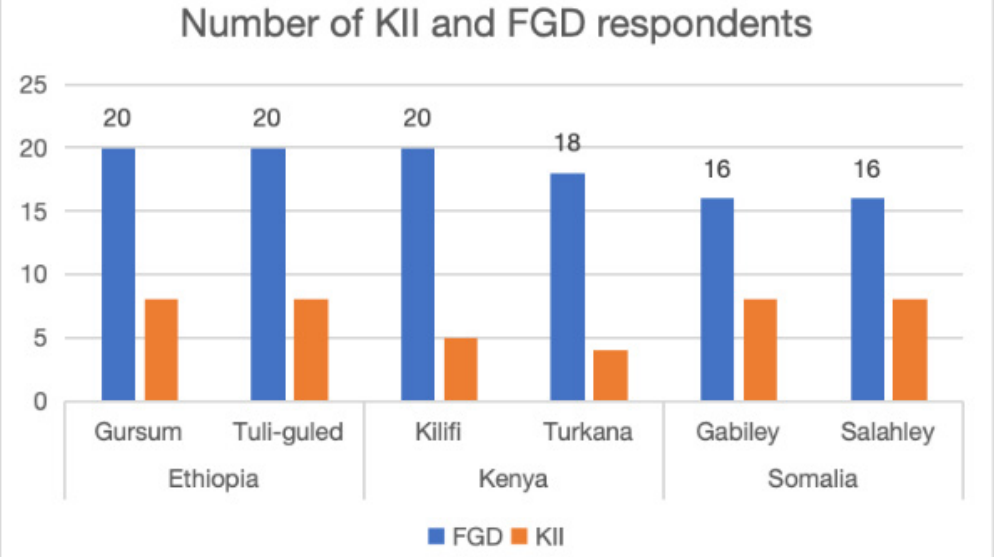
The selection of these communities involved multiple criteria based on vulnerability to climate change impacts, prevalence of conflict and instability and degradation of natural resources. The communities selected ranged from those affected by increased variability (i.e., deviation from the mean) resulting in decline of crop production, climate change induced conflict and communal strife and rangelands facing multiple challenges, such as degradation and high population growth. The selection process involved consultations with local stakeholders, such as community leaders (cultural and religious leaders) and representatives from local government agencies and non-governmental organizations. This was done to ensure that the selected communities were representative of the wider region and that the interventions proposed in the study were aligned with the priorities

3. The Republic of Somaliland is an unrecognized sovereign state in the Horn of Africa. The use of the term Somaliland in this report does represent any legal or official recognition of status of its territory on the part of the United Nations, any of its bodies, or the authors of this report, nor does it imply any opinion whatsoever on the delimitation of frontiers or boundaries.

and needs of the local communities.

The study was undertaken between October and December 2022 in Ethiopia, Kenya and Somalia and involved a total of 110 community members and 41 interviewees, the latter of which were drawn from government officials (national and sub-national level) and other actors working on resilience building in the region (Figure 2). The individuals from the community who participated in the study were selected through a combination of research and outreach efforts by the UNDP Resilience Hub for Africa, UNDP country offices, IGAD Climate Prediction and Application Centre (ICPAC) and meteorological offices. Factors such as the availability and accessibility of participants and relevant information were also taken into consideration during the selection process.

Figure 2: Number of key information interviews and focus group discussion participants in the study areas



The panelists:

• Each panel consisted of a group of a minimum of 16 individuals from diverse backgrounds but from the same community. The panel comprised community cultural and religious leaders (custodians of community knowledge), elders, women and youth, community resident technocrats, political and elected leaders.

• Each Ground Level Panel had three days to exhaustively discuss resilience in their community and identify sustainable solutions (see the programme for the workshops in Annex 1). This was complemented by a one-day field visit to ensure that the consultations were grounded in the realities of the communities.

• Respondents were encouraged to use their preferred language during the panel discussions to promote open and free-flowing dialogue. Photos and videos were taken throughout the data collection process for effective visual representation.

The analysis of the data in this study was inspired by grounded theory as described by Charmaz (2009) deriving categories and themes from the transcripts, guided by research questions. Transcripts were coded and analyzed using Dedoose software, a cloud-based application that allows users to organize and analyze qualitative data. The research team reviewed and cleaned all transcripts to ensure quality control. Two experts independently reviewed the transcripts and generated codes using both deductive and inductive approaches. The deductive approach involved applying pre-existing concepts or theories to the data, while the inductive approach allowed for the emergence of new ideas and themes from the data itself. This iterative process enabled comprehensive analysis of the data. In some cases, the codes were organized in hierarchy (i.e., 'parent' codes and 'child' codes). Parent codes captured overarching concepts while the child codes represented more specific sub-concepts within each parent code. Child codes provided more detailed information and allowed for a deeper exploration of the parent code.

Based on the initial coding, two transcripts were double coded by a senior expert and their codes were used as a further guide to facilitate discussion on differences and similarities between codes and themes. Where necessary new codes were developed and differences in codes were agreed on. The codes were then validated by the whole research project team. These themes were selected through 'data saturation' whereby the majority of the respondents were speaking to the same issue. The study strived to pay attention to how themes were represented across the interviews and panel discussions, that is, both how many people supported a specific view and if insights were located with certain segments of the interviews, and if so, what could explain a divergence in views.

For policy analysis, policies related to resilience were gathered using Google searches and government websites, as well as global and regional databases of relevant documents that address community resilience and resilience in general. Additionally, relevant policy documents were identified through key informant interviews with government officials and other stakeholders supporting resilience interventions in the case study areas. The policies analyzed were selected based on whether they address resilience and communities in resilience building. The analysis was mainly descriptive to capture the policies in relation to resilience and governance contexts.

Limitations of the Study

The level of community engagement and their interests were confirmed through the analysis and sources of data (i.e., desk-based literature review and interviews). While these sources provided valuable insights, it is important to acknowledge that they may not have captured the full range of perspectives and nuances within the communities. Despite this limitation, the study authors' believe that the inclusion of diverse perspectives from communities, government representatives and international actors working on resilience in the three countries enabled robust conclusions to be drawn from the results. Thus, the mapping and analysis presented in this study are considered representative of the areas of study of the three countries.

Policy Analysis

To understand the existing policy and governance systems related to community resilience in the three case study areas, current national and sub-national policies, legislation and institutional frameworks, such as government acts, laws, policies, plans, strategies and frameworks, were gathered and reviewed. Below is the analysis per country.

Ethiopia

Ethiopia has had legislation, regulations and policies that address resilience (ecological, institutional, infrastructure and social) in place for some time. In 2011, Ethiopia launched a Climate-Resilient Green Economy Strategy. The strategy focuses on the agriculture and forestry sectors due to their significance to Ethiopia's economy and people's livelihoods. It outlines a pathway for realizing a green economy and sustainable development.

In 2013, the government established the national policy and strategy on disaster risk management. This policy is currently being implemented to reduce disaster risks and potential damage by establishing a comprehensive and coordinated disaster risk management system. The government has also established a Disaster Risk Management Strategic Framework and Investment Programme to operationalize the disaster risk management policy.

More recently, the government developed and implemented the Ethiopian Sustainable Land Management Investment Framework (ESIF) 2019-2023 to alleviate rural poverty through restoring, sustaining and enhancing the productive capacity, protective functions and biodiversity of Ethiopia's natural ecosystem resources.

Considering the importance of early warning in resilience building, in 2021 the government launched a national climate services framework to enable the development and delivery of climate services across government agencies to enhance risk management in planning, policy and implementation.

Other key policy frameworks include the Nationally Determined Contribution of the Federal Democratic Republic of Ethiopia (2015 and 2021), to the UNFCCC's Paris Agreement and Ethiopia's National Adaptation Plan (2007 and 2019).

The government of the Somali Region of Ethiopia has made substantial advances toward promoting durable solutions through cross-government, multi-partner interventions. The Somali Regional State Durable Solutions Strategy 2022-2025 was established to provide a pathway for displaced communities to move from dependency on humanitarian, urgent life-saving assistance to a condition of self-sufficiency and resilience.

Based on the policy analysis, it was found that the federal government of Ethiopia has established policies and legislation that—if efficiently implemented—could make a substantial impact in building the resilience of communities. Importantly, the devolution

of the government to the regional level has made it possible for the needs and priorities of the different regions, often incredibly unique from each other, to be met.

Kenya

Kenya has made significant strides in developing resilience-related policies to build resilience in various sectors. The resilience policies in Kenya are diverse and multifaceted. The various policies demonstrate Kenya's commitment to building resilience across multiple sectors to mitigate the impacts of multiple risks and address underlying vulnerabilities.

The Kenyan Constitution of 2010 recognizes the importance of ethnic, cultural and religious diversity to the country's sovereignty. The national government is mandated to safeguard pastoral land by enacting appropriate legislation that aligns with the Constitution of Kenya and the National Land Policy of 2009.

Kenya established the National Drought Management Authority in 2016, with its mandate to coordinate all matters related to drought risk management, is intended to manage drought risks and build resilience in arid and semi-arid areas through early warning systems, drought response and preparedness measures. The National Disaster Management Policy of 2017 provides a framework for disaster management in Kenya, with a goal of reducing disaster risks, enhancing preparedness and improving response and recovery efforts.

Other resilience related policies in Kenya include the Climate Change Act (2016); the National Climate Change Response Strategy (2010); the National Adaptation Plan (2015-2030) and the National Policy on Climate Finance (2016).

The National Climate Change Action Plan of 2018-2022 prioritizes reducing greenhouse gas emissions, adapting to climate change impacts and strengthening resilience in vulnerable sectors such as agriculture, water and energy. A resilience programming framework 2022-2030 has been designed for Kenya ASALs to sustainably build the resilience of chronically vulnerable individuals, households and communities to the recurrent and frequent hazards and shocks and escape poverty and chronic vulnerability.

At a sub-national level, Kilifi County has taken significant policy strides towards building resilience in its vulnerable communities and sectors. The Kilifi County Disaster Risk Management Policy of 2016 provides a framework for disaster risk reduction, response and recovery, specifically tailored to the county's unique needs. The policy's focus is building resilience in the agriculture, water and health sectors to mitigate the impacts of potential disasters. Furthermore, the Kilifi County Climate Change Adaptation Strategy promotes climate-smart agriculture, improving water management and enhancing disaster risk reduction to reduce the county's vulnerability to climate-related risks. The Kilifi County Health Sector Resilience Plan aims to improve preparedness and response to disease outbreaks and other health emergencies so that the country can be better equipped to manage public health crises and mitigate their potential impacts.

Similar resilience policies are being implemented in Turkana County. The Turkana County Drought Management Policy is specifically designed to provide a framework for drought

management in the county. The policy focuses on building resilience in the agriculture, livestock and water sectors. The Turkana County Climate Change Adaptation Strategy is putting in place a systematic holistic disaster risk management framework. This framework ensures that the linkage between disaster risk reduction, climate change adaptation, poverty reduction, gender and all the Sustainable Development Goals (SDGs) are integrated in all county government processes, plans, programmes and budgets at all levels to facilitate and realize disaster resilient counties. Furthermore, the Turkana County Disaster Risk Management Plan provides a comprehensive framework for disaster risk reduction, response and recovery, particularly in vulnerable communities and sectors such as health, education and infrastructure. By prioritizing resilience in these critical areas, the plan aims to mitigate the impacts of potential disasters on the county's most vulnerable populations.

Turkana County has been particularly affected by inter-community conflicts, which have often led to displacement and increased vulnerability to various risks. Thus, the county has established peace committees to mitigate conflict and promote peaceful coexistence which are essential in building resilience; these committees provide a platform for communities to work together towards a more resilient future. This peace infrastructure is nationwide, not only unique to Turkana County. It aims to drive institutions, processes and policies that help design, support and enhance social resilience to violent conflict.

Kenyan policies grasp the importance of addressing multiple risks and vulnerabilities to ensure a sustainable and resilient future for communities. The county-based policies demonstrate a devolution of power to county governments which has presented an opportunity for communities to establish appropriate structures, including local institutions, to manage their resources. The sub-national policy initiatives demonstrate county-level commitment to building resilience and reducing the impacts of disasters and other risks. County-based policymaking also allows for context-specific policies that address the unique challenges faced by different parts of the country.

However, the study finds that while these policies and strategies focus on one or a few sectors and/or specific risks, they are not simultaneously considering different risks and sectors: in other words, they are not holistic. Nonetheless, decentralization has allowed for more localized decision-making and the promotion of community-led resilience building efforts.

Somalia

Somalia[4] faces numerous challenges that threaten its stability and resilience, among them insecurity, economic fragility and environmental degradation. However, the country has made efforts to address these challenges and build resilience through various policies and strategies. One of the policies that addresses building resilience is the National Development Plan 2021-2025. The plan has a strong focus on enhancing resilience in various sectors, including education, health, agriculture and infrastructure. The plan also aims to create job opportunities and promote economic growth, which enhances the resilience of human capital.

The Climate Adaptation Strategy of 2012 promotes environmental sustainability, which is essential for building resilience in the face of environmental shocks. The strategy promotes sustainable land use, improving water management and improved disaster risk reduction.

4. The policies reviewed under this section are for Somaliland. However, the Republic of Somaliland is an unrecognized sovereign state in the Horn of Africa. The use of the term Somaliland in this report does represent any legal or official recognition of status of its territory on the part of the United Nations, any of its bodies, or the authors of this report, nor does it imply any opinion whatsoever on the delimitation of frontiers or boundaries.

The National Disaster Management Policy of 2018 enhances disaster risk management and response capabilities in the country. It emphasizes the need for early warning systems, disaster risk reduction measures and building capacities at the community level to prepare and respond to disasters. The policy also established the National Disaster Management Authority to coordinate disaster response efforts and build community resilience.

In the Environment Policy and Strategy of 2019, it acknowledges the region's environmental degradation and promotes sustainable development. The policy emphasizes the need for environmental conservation and management, including sustainable land use and resource management, to build resilience to environmental shocks such as droughts.

Comparative Analysis

In assessing the policies and governance systems related to community resilience across Ethiopia, Kenya and Somalia, it is evident that these countries have each made significant strides toward addressing diverse challenges. An additional comparative analysis highlights both the strengths and the areas that require improvement within their respective policy frameworks. Looking at the effectiveness, efficiency and feasibility of national and sub-national policies in the context of fostering resilience, some conclusions can be drawn.

Kenya's resilience-building policies, for instance, exhibit a robust commitment to addressing multiple risks and vulnerabilities. The National Climate Change Action Plan (2018-2022) in particular stands out for prioritizing greenhouse gas emissions reduction, climate change adaptation and enhancing resilience across critical sectors. Notably, the establishment of the National Drought Management Authority in 2016 reflects a proactive approach to managing drought risks and building resilience within arid and semi-arid areas. The National Disaster Management Policy (2017) further underscores Kenya's endeavours to reduce disaster risks, enhance preparedness and streamline response and recovery efforts. At the sub-national level, in Kilifi and Turkana Counties, their Disaster Risk Management Policy, Climate Change Adaptation Strategy and Health Sector Resilience Plans showcase a localized focus on building resilience. Tailoring policies to the unique needs of the counties exemplifies effective implementation at the grassroots level. Additionally, Kenyan policies demonstrate a holistic approach to resilience across sectors, such as agriculture, livestock and water management. The establishment of peace committees to mitigate inter-community conflicts in Turkana County for example highlights a commitment to societal resilience.

Ethiopia's policies emphasize ecological, institutional, infrastructural and social resilience. The national policy and strategy on disaster risk management establishes a comprehensive and coordinated approach to disaster risk reduction. The Ethiopian Sustainable Land Management Investment Framework, Climate-Resilient Green Economy Strategy and National Climate Services Framework collectively underscore Ethiopia's multifaceted strategy to bolster resilience. The focus on marginalized groups through the Ethiopian Sustainable Land Management Investment Framework and the integration of climate services in policy formulation reveal the government's responsiveness to key resilience needs. Ethiopia's regional approach, particularly the Somali Region's Durable Solutions Strategy, demonstrates a commitment to self-sufficiency and resilience among displaced communities. The region's strategy aligns with national policy objectives, indicating the effectiveness of the government's devolution strategy in meeting localized needs.

Somalia's policies reflect efforts to address challenges of insecurity, economic fragility and environmental degradation. The National Development Plan places resilience enhancement at the forefront across sectors like education, health, agriculture and infrastructure. The Somalia Climate Adaptation Strategy contributes to environmental sustainability and resilient communities by focusing on sustainable land use, water management and disaster risk reduction. The National Disaster Management Policy prioritizes disaster risk management and response capabilities, with a spotlight on early warning systems and community capacity-building. The Somalia Environment Policy and Strategy and Poverty Reduction Strategy demonstrate a clear intention to build resilience by emphasizing environmental conservation, sustainable land use and economic growth. The inclusion of peacebuilding strategies, exemplified by the Somali Compact, further highlights Somalia's determination to foster resilience by addressing underlying conflict dynamics.

While each country has taken commendable steps towards resilience-building, the analysis reveals the need for more holistic and integrated approaches. Many policies tend to focus on individual sectors and specific risks, potentially limiting their overall effectiveness. A shift towards comprehensive policies that consider various risks simultaneously would greatly enhance their impact. The analysis also underscores the importance of community-level interventions, where the immediate effects of shocks and stresses are acutely felt. Capacity-building within communities should be prioritized to empower them with the skills to effectively address multiple challenges. Efforts to enhance governance structures and institutional frameworks are equally important for ensuring the efficient implementation of policies and strategies. A concerted effort across sectors and levels of governance is essential to effectively navigate the complex interplay of stressors facing these countries.

In conclusion, the policies present in Ethiopia, Kenya and Somalia exemplify notable progress in resilience-building, yet the journey towards comprehensive resilience is ongoing. A synchronized approach that integrates community involvement, capacity-building and coherent governance structures is key for navigating the intricate challenges posed by the interconnected stressors to achieve impactful resilience outcomes. Focusing on community-level interventions becomes paramount, as it is at this level that the impact of shocks and stresses is most acutely felt.

Results and findings

In this section the study provides evidence on community resilience emerging from engaging with grassroot communities in case study areas.

Community Definition of Resilience

The study engaged in a community participatory visioning exercise to gather and analyze different definitions of community resilience as perceived by members of the community. This helped to foster a shared understanding of community resilience and to lead to more effective and community-led efforts to improve resilience. Below are some of the definitions of community resilience that emerged from the exercise (Figure 3).

Figure 3: Community member definitions of resilience

The various definitions that emerged from the discussions highlight several recurring themes and variations. The words ‘recover,’ ‘cope’ and ‘adapt’ were the most frequently used words, indicating that the definition is focused on the ability of the community to recover and adapt to changes. The word cloud (see Figure 4) visualizes the central themes and concepts expressed in the definitions, which can be helpful in comprehending the primary emphasis of definitions proffered.

Figure 4: Word cloud of centra themes and concepts

Based on the community visioning exercise on the definition of community resilience, the emerging central themes, together with the study's analysis, a definition of community resilience was formulated in its most basic form as: **"The ability of a community to recover, adapt and thrive in the face of challenges and adversity, through the use of the communities' own resources and capacities and by establishing strong social networks and partnerships."** Communities from the three case study countries further identified resilience variables, such as social networks, leadership, culture, religion, ubuntu ("my humanity is wrapped up in the humanity of others") and ujamaa ("cooperative economics") that allowed them to shape their own understanding of what community resilience means in their respective communities. The variables identified offered a holistic perspective on community resilience, recognizing the deep-rooted cultural values that influence how communities respond and adapt to risks.

On the other hand, communities were more focused on coping, bouncing back, adapting and recovering than on transforming. In the light of expected future shocks and socio-economic dynamics, abilities to transform will be critical, however this was not raised as important by communities.

The contribution of the study is its empirically exploration of how the concept of community resilience is defined at context-specific locations (Ethiopia, Kenya and Somalia) to inform the understanding of community resilience at the grassroots level. It is believed that the results of this study do advance the definition of community resilience.

A systematic review conducted by Patel et al. (2017) on community resilience reveals that there is a lack of a clear-cut definition of the term. The generally accepted definition tends to be extensive, making it challenging to apply at a local level and to incorporate local priorities that support the pre-existing local structures. Based on this study's findings, an alternative approach would be to forego the pursuit of a precise and singular definition of community resilience. It may be more fitting to view community resilience as a broad term encompassing various elements depending on context.

Indicators of Community Resilience

The study sought to understand community perceptions of a resilient community in Ethiopia, Kenya and Somalia. The multiple stressors experienced in the region, including prolonged droughts, the COVID-19 pandemic, external challenges like the Ukraine War and extreme climatic events have exposed vulnerability, fragility and vulnerabilities in the economic, social and environmental systems. In their own understanding and based on the context, community members shared the following indicators of resilience.

Ecological Indicators

Ecological resilience is defined as the capacity of an ecosystem to bounce back and restore its fundamental characteristics after experiencing shocks like fire, drought, floods and earthquakes (Scheffer, 2009). Climate, topography, ecosystems and water and soil availability play a crucial role in determining resilience.

The ecological characteristics of a particular place, including its topography and ecosystems, significantly contribute to its level of resilience. determining its vulnerability to shocks and its ability to recover. Areas with significant tree cover, for example, are less susceptible to drought and tend to recover more quickly compared to areas with sparse tree cover or none at all.

The study sites in this research are all located in ASAL areas, which are highly susceptible to various climatic shocks, in particular droughts and floods. Pastoralism and agro-pastoralism are the main sources of livelihoods. Despite the high vulnerability of these sectors to climatic shocks, they continue to be relied upon due to lifestyle preferences, tradition and limited alternatives and opportunities to diversify.

The study sites face an emerging ecological challenge involving the proliferation of invasive species, which significantly disrupts ecosystems and hampers their resilience. A notable invasive species in this regard is Prosopis Juliflora, a thorny scrub tree resembling mesquite. It has become a significant concern in Turkana County, Kenya, and Gursum District, Ethiopia, as it outcompetes indigenous plants and increases their vulnerability to drought conditions.

Economic Indicators

One important indicator that communities across the three countries highlighted is the diversification of the local economy. They recognized that a community with a diverse economy, encompassing a range of industries and sectors, is better equipped to withstand shocks and maintain resilience. This diversification can include a mix of both traditional and emerging industries, as well as a balance of small, medium, and large enterprises. In crop farming, an example of diversification mentioned by the respondents was embracing drought-tolerant crops, such as sorghum, millet, sweet potatoes, green grams and macadamia, ensures a more sustainable income regardless of changing circumstances. Furthermore, transitioning from rainfed agriculture to irrigated agriculture, as exemplified by the GCF funded project implemented by UNDP in Tuli-Guled, Ethiopia, provides communities with a more resilient approach to agriculture in the face of drought. The adoption of non-agricultural income-ge-

nerating activities such as tourism, petty business, beekeeping and fishing also contribute to livelihood diversification across the study sites. In a bid to generate income, some individuals across the three countries, especially youth, engage in mal-adaptive activities, such as deforestation and charcoal burning.

Another crucial indicator that communities highlighted is the investment in human capital. Communities in all the study sites understand that educational and skills development programs play a significant role in enhancing individual capacities to adapt to changing economic conditions. Communities whose members have been equipped with knowledge and skills, opportunities for innovation and entrepreneurship are said to be more resilient to climate-related challenges compared to communities who lack such empowerment. Therefore, investing in human capital acts as a building block for overall resilience, providing communities with the foundations on which to build their economic future.

Communities also recognize the importance of robust and responsive local institutions and networks. A respondent in Turkana Kenya mentioned that these institutions, which can take the form of local government bodies, economic development organizations, business associations, and community groups, play a critical role in supporting economic growth and resilience. These institutions provide crucial services such as business support, access to capital, workforce development, and infrastructure planning.

Additionally, communities in all the study sites placed emphasis on access to employment opportunities as an indicator of resilience. Strategies such as enhancing agricultural produce value chains, which can lead to increased income and market prospects for farmers, are considered effective means of promoting job creation. Communities further mentioned that the presence of strong community-based financial systems, such as village savings and loans associations, community group savings schemes (e.g., table banking) and micro-finance institutions, demonstrate the resilience of communities. These financial mechanisms contribute to a savings culture and provide access to credit, enabling individuals to build financial assets and invest in income-generating activities. Therefore, a resilient community is one that has achieved financial stability and has transitioned from a hand-to-mouth culture to a savings-based one. able use of natural resources to ensure long-term resilience.

By focusing on economic indicators of resilience and harnessing strategies such as diversifying livelihood sources, investing in human capital, strengthening local institutions and networks, and providing access to employment opportunities, communities can cultivate the capabilities to withstand shocks and pursue sustainable economic growth. It is crucial to address challenges such as mal-adaptive activities and promote the sustainable use of natural resources to ensure long-term resilience.

Social indicators

Social indicators of community resilience refer to various factors that can help determine the strength and ability of a community to withstand and recover from adversity and crisis situations. These indicators reflect the social infrastructure, cohesion and support systems within a community, which are critical for resilience-building and crisis response.

Communities in the study emphasized the significant role that social cohesion plays in promoting security, peaceful coexistence and sustainable natural resource management. The presence of social networks enables community members to rely on one another for support during times of crisis or adversity. Communities with strong social networks are better equipped to collaboratively solve problems, share resources and provide emotional support to one another. These networks can be formed through various community associations, clubs, or neighborhood groups. Somali communities in Ethiopia and Somalia, for example, practice community social insurance, where in times of droughts, households who have lost their livestock are supported by the community members to restock and therefore the burden is not just individual but is shared communally.

In Gursum District, Ethiopia, respondents mentioned that establishing relationships between conflicting clans and communities through inter-marriage events has contributed to social cohesion, leading to peaceful coexistence. Similarly, in Turkana County, Kenya, church crusades, workshops and prayers have been utilized to foster peacebuilding and enhance community interactions. A village committee in Salaxley District, Somalia, along with traditional leaders, has been instrumental in resolving conflicts at the village level.

Furthermore, social cohesion has proven to be beneficial for sustainable natural resource management. In Kilifi, Kenya, community members have implemented community laws governing water use from a community dam and conservation measures to protect water levels, fishing practices and pollution. The successful implementation and transmission of this traditional water management system across generations ensures the sustainable management of community resources.

Communities highlighted the significant role of quality education in enhancing community resilience. Quality education equips individuals with knowledge, skills and critical thinking abilities necessary to cope with shocks and stressors. Education helps build financial management, disaster preparedness and adaptation skills, enabling individuals to identify new opportunities and effectively manage changing circumstances. Social cohesion, combined with education, contributes greatly to community resilience. For instance, the establishment of farmer groups enables sharing of knowledge and weather and climate information services, resulting in improved agricultural productivity.

Trust within a community is another important social indicator of resilience. Trust promotes cooperation, communication and collective action, especially during times of hardship. Communities with higher levels of trust are more resilient to shocks, such as natural disasters. Establishing trust requires ongoing relationship building, open and transparent communication and mutual respect among community members. Table banking, which is embraced by women's groups in Kenya, is seen as a form of community trust and a practice that strengthens social cohesion and resilience. By collectively saving money and providing easy access to loans, individuals and communities can better withstand and recover from

disasters, like droughts. Social cohesion is instrumental in reducing conflicts and ensuring peaceful coexistence, particularly between farmers and herders. Trust among community members also enables the establishment of food banks, for storing food for use in times of scarcity.

Institutional indicators

The study examines the institutional indicators of resilience. The findings emphasize the importance of adaptive governance, effective disaster management frameworks and inclusive decision-making in promoting resilience. Resilient communities were characterized to have an effective governance system that promotes conflict management, cross-sectoral collaboration, strong leadership, public participation, transparency and the rule of law.

The communities in the three countries emphasized the importance of conflict management and transformation in preventing disputes and conflicts from escalating. They also highlighted the significance of cross-sectoral collaboration in enabling different stakeholders to work together to address complex challenges. Strong leadership was recognized as crucial in guiding resilience-building efforts, while public participation ensured inclusive and accountable decision-making processes.

Policies were emphasized as playing a crucial role in guiding actions towards resilience-building. Policy support for equitable resource sharing was seen as key to preventing conflicts and ensuring fair access to resources for all community members. These policies establish mechanisms that consider the needs and rights of different stakeholders, promoting social justice and reducing potential sources of conflict.

The sustainable management of natural resources, such as rangelands and water resources, was highlighted as critical to ensuring peaceful coexistence between herders and crop farmers. This comprises both formal and informal natural resource management. In Kilifi for example, the community have put in place a traditional system for managing natural resources. The system has been passed down from one generation to another and has proven effective. A governance system that promotes conflict management and transformation was seen as essential in resolving disputes and preventing conflicts from escalating.

Overall, conflict management and transformation, cross-sectoral collaboration, strong leadership, public participation, and supportive policies were identified as vital components of effective resilience-building efforts.

Infrastructure indicators

Community members in the study areas indicated that critical infrastructure, access to basic services and information are required for resilience. Access to risk-informed and well-maintained infrastructure was seen as crucial for community resilience. This includes a well-connected road network to ensure the transportation of food supplies from areas of high supply to areas with high demand. The availability of silos and community food storage facilities are needed for the establishment of food banks and reserves, ensuring food availability during droughts. Sustainable water investments such as deep boreholes and rainwater harvesting systems provide water for both humans and livestock, reducing

the community's reliance on relief aid during droughts.

Access to bridges, affordable and sustainable energy, schools and sewerage infrastructure was seen as critical to building community resilience. For instance, lack of access to affordable and sustainable energy leads to deforestation for charcoal burning and wood fuel, contributing to environmental degradation and increasing community vulnerability. Well-planned housing that can withstand shocks and stresses such as floods and other extreme events was also prioritized as a key determinant of community resilience.

In Kilifi County, Kenya, community members described a resilient community as one with access to good roads, food and other social services. They further expounded on the cross-cutting nature of water, giving an example of how water impacts food availability, health and education, among other sectors. Community perspectives on connectedness and simultaneous impacts of different sectors (e.g., water, energy, housing, education, health) illustrate the importance of a whole system approach in building resilience.

Additionally, respondents described a resilient community as one that has access to information, including early warning data (both scientific and indigenous), extension services and the capacity to respond to the information received. A resilient community thus receives timely early warning information which can be understood and translated into action.

For example, in Kilifi and Turkana Counties, Kenya, community radio stations are the main sources of weather and climate information. Information is disseminated to the communities in their own languages (Kiswahili and Turkana) and therefore, the communities can understand and take early action. In all three countries, both scientific and indigenous early warning systems have been established. However, strengthening and formally

integrating indigenous early warning systems into science-based systems is needed to gain buy-in and use by the communities.

Community Resilience and Development

Development and community resilience are interconnected. Investments in water, energy, transportation and infrastructure, health care, education and other sectors are required for development and poverty reduction. They also represent the foundations of robust, sustainable and inclusive economies which allow communities to be more resilient and make them better able to cope with shocks and stresses.

Water access cuts across all development sectors, including agricultural production, food security, health, energy and education, to name a few. The study revealed that water was a critical issue affecting resilience across all the study sites, with the concern being access and availability. Due to the lack of access to water, communities in these regions have limited livelihood options, with rain-fed agriculture and pastoralism being their primary sources of income. This makes them highly vulnerable to shocks and stresses, such as drought, resulting in crop failure, livestock deaths and food and income insecurity. Following the prolonged drought experienced in the region since 2020, the communities have been adversely affected by subsequent crop failure, livestock deaths, income losses, jobs and food insecurity.

Additionally, the lack of water access exacerbated by the prolonged drought has directly impacted education with increased school dropouts, especially among the pastoral communities, as people migrate to different areas in search of pasture and water for animal and domestic use. School-going girls tend to use more time in search of water and thus reduce the amount of time they would use for studying, resulting in a drop in school performance.

Energy is another development building block whose availability, or lack thereof, influences vulnerability and resilience. Energy cuts across all sustainable development goals. Access to clean and efficient energy affects the availability of food, water, health services and job opportunities, among others. As an example, the Ukraine War has led to an increase in fuel prices globally, which in turn has affected global food prices. Respondents across all the study sites noted that energy-insecure communities tend to practice deforestation and charcoal burning to substitute their household energy demands. This leads to environmental degradation and desertification, which further increases fragility. At the same time, energy access can lead to positive economic growth and enable the introduction of innovative and modern technologies that optimize productivity.

The social amenities of transport and health services are likewise critical for resilience building. Risk-informed and resilient transport systems ensure that people can access essential services and food commodities during disasters and, if needed, evacuate vulnerable areas. The ability of community members to access medical services is essential, and critical during periods of climate extremes and disasters, such as floods and drought, when health needs may mount. For instance, due to lack of access to safe drinking water in times of crisis, disease outbreaks like cholera and typhoid can occur.

The study findings highlight the detrimental impact of high youth unemployment on both

social instability and environmental degradation. Driven by a lack of economic opportunities, some young people have resorted to criminal activities and maladaptive activities, such as deforestation and charcoal burning. This further pushes them into fragile conditions due to environmental degradation, as well as limiting their options to depend on rain-fed agriculture and pastoralism, making them more susceptible to shocks and stresses. Diminishing agricultural yields and livestock productivity have influenced youth urban migration, which in turn has led to rising youth unemployment rates in urban areas (Tamirat, 2023). Furthermore, lack of employment opportunities can lead youth to seek opportunities in other countries (Danish Institute for International Studies, 2020). This was particularly evident in Gursum District, Ethiopia, where community members indicated that young people were moving to urban areas or leaving the country altogether in search of better lives. These trends impede efforts to build long-term resilience.

Drivers of Vulnerability

Climate Change

> Most of the rainwater is lost through runoff to the sea. This motivated me to harvest this water. This is why I embarked on constructing this water pan. It not only serves me, but also the surrounding households and members of the community. I have embarked on construction of a second bigger water pan, since evapo-transpiration is a major challenge owing to the increase in temperature in our region.
>
> *- Focus group discussion participant and agro-pastoralist, Salaxley District, Somalia*

Climate in the areas of study

The study engaged meteorologists and other climate-related professionals, including environmentalists, conservationists and experts, from climate-sensitive sectors in the three countries to discuss weather and climate generally and climate change specifically. The general consensus was that the Horn of Africa is an extremely fragile region climatically and this adversely affects the level of resilience of local communities and hence increases their vulnerability. This theme of fragility was evident in Gabiley and Salaxley Districts in Somalia, Gursum and Tuli-Guled Districts in Ethiopia and Kilifi and Turkana Counties in Kenya.

With the exception of Kilifi County, Kenya, where agro-pastoralism is dominant, the study sites are primarily pastoralist. The study established that pastoralism is the principal mode of production in the study sites with livestock following seasonal migration patterns. A review of historical climate data in the study area indicates that over the last three decades significant changes have occurred in the socio-economic conditions of both agropastoralist and pastoralist communities (Cuni-Sanchez et al., 2019).

These substantial changes have been caused by variations in the duration of wet and dry seasons, frequent droughts, weakening ecosystem services, new and emerging land

management patterns and poor management of fodder banks, impacting negatively on livestock health and productivity. Thus, household incomes, which are highly dependent on rainfed agriculture and availability of water and fodder for their livestock, have eroded over the years, making households increasingly vulnerable to climatic shocks. These shocks, according to the IGAD Climate Prediction and Application Centre (ICPAC), are confirmed by the recent five failed rainy seasons.

During focus group discussions across the three countries, respondents neared unanimity in the perception that climate change, shortages of arable land, population increases, and a scarcity of alternative energy sources are key causes of vulnerability. According to most respondents, these issues constitute the main motivating factors for deforestation in all the study areas. This in turn produces a vicious cycle of poverty underpinned by environmental degradation fueled by a collapsing indigenous knowledge system and patchy and inconsistent conventional ecosystem conservation approaches.

Perceptions of climate change in Gabiley and Salaxley Districts, Somalia

During the focus group discussions, the perceptions of the impacts of climate change in Gabiley and Salaxley Districts in Somalia were similar. In Salaxley District, which is predominantly a pastoralist area with a more recent transition toward sedentary farming, respondents noted significant changes in weather patterns, temperatures and the duration and distribution of rainfall as compared to previous years. These changes, residents argue, render traditional weather forecasting unreliable and, therefore, no longer able to inform seasonal and livelihood decisions.

One key coping strategy, according to respondents in Salaxley District, has been a change in the breeding calendar of sheep. These perceptions are not in a vacuum, but rather are in the context of a general degradation of the already fragile ecosystem in the area. This degradation has manifested in rapid soil erosion, reduced vegetation cover and deforestation leading to biodiversity loss. This, together with loss of indigenous knowledge and information systems on community-based natural resource management and local veterinary knowledge, among other issues, means that the ability of the community to prosper and thrive has been curtailed. The five consecutive failed rainy seasons, in particular, have had a direct bearing on incomes for most families and the socio-economic status of households has been undermined.

Meanwhile in Gabiley District, which is considered the food basket of the Somalia region, similar observations have been made. Gabiley District produces over 80 percent of the food for Somalia, growing a wide variety of fruits, cereals, vegetables and tubers. Gabiley District is the more fertile of the two study sites in Somalia.

According to focus group participants in Gabiley District, drought conditions in the past occurred once every decade, however, recently, droughts have been more frequent. Farmers in Gabiley District depend on rain-fed agriculture, and as a consequence of the more-frequent droughts and higher temperatures, farmlands have become drier and more difficult to plough resulting in diminished harvests. Higher temperatures and increased evaporation have increased demands for water and led to water shortages. Study participants explained that despite the droughts and the low annual rainfall, meanwhile

occurrences of heavy rainfall were causing poor soil fertility due to soil erosion. This was having a negative impact on the production of cereal crop yields and leading to land and soil degradation.

In both study communities in Somalia, study participants believe that these climatic-based changes call for enhanced, new and improved coping mechanisms.

Resilience strategies in Somalia

Water harvesting in Salaxley District

One focus group discussion respondent in Salaxley District reported growing a wide variety of crops, including pawpaw, birds eye chili and cucumber. This agro-pastoralist constructed a water pan for his fields and other nearby households. He collaborates with other farmers in the community to offer training on water harvesting techniques to other agro-pastoralists. The meteorological office is currently working closely with the agro-pastoralists in Salaxley District, providing them with crucial weather and climate information to reinforce their decision-making and boost their resilience. These efforts are examples of community resilience in the face of climate change.

Tapping sources of underground water and growing drought-tolerant sorghum in Gabiley District

A farmer in Gabiley District believes the solution to recent climate-related problems lies largely in tapping underground water sources. He has invested heavily in drilling boreholes and uses solar pumps to ensure that his farm receives an adequate water supply. The farmer says, “I have spent upwards of US$65,000 in drilling underground water and installing solar pumps and drip irrigation pipes.” He suggests that the utilization of underground water resources should go hand in hand with cultivating drought-tolerant crops, such as sorghum. The reason behind this recommendation is that the current reliance on cultivation of maize lacks resilience against the effects of climate change. The farmer emphasizes the importance of returning to traditional crops, like sorghum, but with a focus on specific drought-tolerant varieties that demand minimal water usage compared to maize. As the host of the local agricultural research institute, he firmly believes that delving into research concerning various crops and innovative crop production methods is the key to tackling the challenges posed by climate change.

Perceptions of climate change in Kilifi and Turkana Counties in Kenya

Discussions with meteorological experts in both Kilifi and Turkana Counties in Kenya point to the challenges of climate change facing grassroots communities in those areas.

A representative from the meteorological department in Kilifi County noted that, “droughts and floods adversely affect both productivity and food security in Kilifi and these twin challenges are expected to grow in the near future owing to the negative effects of climate change. These coupled with low grade infrastructure (roads, water harvesting/storage systems, irrigation systems, etc.), restricted coverage by extension workers owing to vast distances, poor quality and eroded soils and minimal agricultural input application are some of the key factors that aggravate the impacts of climate change.”

During the study, it was established that the National Drought Management Authority and non-governmental organizations (including, World Vision and the Kenya Red Cross) and community-based organizations provide early warning information on drought risks, conduct food security assessments and support farmers to manage the effects of climate change and variability. Farmers and farmer groups in Kilifi County currently apply a number of on-farm approaches to cope with climate risks and shocks. These approaches include using drought-tolerant crop variations (sorghum, millet, pigeon peas, chickpeas), water harvesting, tree planting, creating added value for agricultural products, and securing easier access to credit for farmer groups, farm inputs, markets and information.

In Turkana County, farmers largely depend on pastoralism and rain-fed agriculture. This makes them particularly vulnerable to climate change. Drought and excessive heat are major challenges to pastoralists and agro-pastoralists in Turkana County. These events often lead to loss of pasture, famished livestock, water sources drying up and conflict between pastoralists over resources, the latter of which is increasingly becoming a common way of life.

In both counties, communities propose leaning into indigenous knowledge systems to ameliorate the current climate situation, in particular the prolonged drought. These knowledge systems comprise skills and philosophies developed by local communities with long histories of interaction with their immediate and natural environment. Indigenous communities often possess a deep understanding of their local environment, weather patterns and sustainable practices that have been passed down through generations. The communities encouraged the documentation and preservation of these systems through community-led initiatives.

Communities proposed fostering a melded approach that combines indigenous knowledge with modern scientific methods to achieve more effective climate adaptation and risk reduction strategies. Collaborations between traditional weather experts and modern meteorologists are suggested to lead to information sharing and the development of localized climate forecasts that are more relevant to specific communities. The communities further suggested the use of traditional food storage techniques while also exploring innovations that enhance their efficiency and sustainability. This can help with food security during periods of climatic uncertainty. The communities’ proposals emphasized the primacy of recognizing and integrating indigenous knowledge into modern scientific and technological climate adaptation efforts for more effective and culturally relevant solutions to climate-related challenges. This approach not only will enhance resilience but can engender a sense of ownership and empowerment within the affected communities.

Resilience strategies in Kenya

Community rain gauge readers

The Kenya Meteorological Department in their Kilifi County Office is conscious of the need to involve end users in forecasting processes. The typical approach to obtaining a clear comprehension of climate variability begins with historical data. In the case of rainfall, historical data offers essential information about accumulated amounts in both time and space and forms the source for fitting and testing stochastic data-based distribution models. The Kenya Meteorological Department has provided manual rain gauges to select members of the Kilifi County community so that they can observe and record rainfall data. The advantages of manual gauges are their affordability and ease of use.

Involving community members in data collection demystifies the weather forecasting process and promotes ownership and a stronger belief in conventional forecasting. The weather forecasts cease to be the 'property of KMD' and are co-owned both in terms of accuracy and explanation. Ground observation data helps both the community and the forecasters to generate increasingly accurate data. The data generated is used by various stakeholders to make decisions on what and when to plant, weed and harvest. These decisions help reduce vulnerability and build the resilience of communities in the face of climate change.

Solar powered solutions for irrigation

Turkana County is an arid county, meaning that access to water for production is a high priority. The Katilu Green Farmers Group, with 200 members, has found a way around the challenges of erratic rain and high temperatures. The group uses a diesel-powered generator for irrigation from River Turkwel to ensure year-round production of crops, including watermelon, beans, maize, tomato and vegetables. However, according to group members, this is not sustainable due to the high cost of fossil fuels and the pollution that they acknowledge contributes to global warming. Thus, the group seeks a solar powered solution. The group also requires tanks to store the water and to transform their irrigation system to a drip irrigation system that can conserve more water. They argue that a solar water pump will reduce both costs and pollution in the long term.

These farmers are also supported by the Turkana County Meteorological Office through receiving forecasts on rain and water levels in the water bodies, such as the river, which irrigate their farms. These farmers and others in the county rely on the forecasts to make cropping decisions. On the other hand, some farmers have been assigned the role of community rain gauge readers, collecting rainfall data and submitting it to the Meteorological Office. This mutually beneficial relationship has increased the trust and uptake of weather and climate information. As a result, farmers can make informed farming decisions and expand their crop enterprises, significantly reducing their vulnerability to climate-related challenges.

Perceptions of climate change in Gursum and Tuli-Guled Districts in Ethiopia

In the same vein as the Somalia and Kenya study participants, a majority of the farmers

and agro-pastoralists in Gursum and Tuli-Guled Districts, Ethiopia, were of the view that there has been a decrease in rainfall amounts and increase in temperatures in their area. They mostly pointed to the five failed rainy seasons as evidence of climate change and the high rate of evapo-transpiration in their localities. Meteorological data drawn from a discussion with the Ethiopian Meteorological Institute showed a general reduction in rainfall during the main growing seasons.

In addition, Tuli-Guled District in Ethiopia has witnessed inter-communal strife, which has led to the rapid growth of internal displacement. The conflict is driven by competition for resources and an increasingly unpredictable climate.

Resilience strategies in Ethiopia

Crop diversification

Many farmers in Gursum District in Ethiopia have shifted to onion farming, as they found that onions have a shorter growing period (up to four weeks less) and an earlier harvest than other crops commonly grown in the area. Onions are seen as a game changer in terms of returns and have contributed significantly to improving farm incomes and consequently livelihoods. Farmers who have diversified into onion farming have been able to meet the needs of their families on a day-to-day basis and enjoy a more prosperous life. The success and potential of this intervention has led to farmers referring to onions as the “new gold” in the Ethiopian Somali Region. Scaling up such interventions could potentially transform production outputs in the entire region.

This is one example of how communities are diversifying from crops that require more water to those that are highly profitable and require less water. Farmers are able to use economies of scale to pump water from the river and ensure that their fields are sufficiently watered, and the crops are healthy. This, however, may not be accessible to farmers who fall in the ‘vulnerable’ category as they may not have sufficient resources to procure irrigation equipment, such as water pumps and pipes.

The model farmer approach

Some farmers in the Tuli-Guled District of Ethiopia have successfully adopted innovative agricultural practices, such as crop diversification, to adopt to the changing environment. These farmers are part of a model farmer system, established through a GCF funded resilience building project implemented by UNDP and they have become symbols of success and resilience within their communities due to their ability to maintain food security despite challenges. Model farmers empower other farmers to adapt to changing climate conditions and resource constraints, enhancing the overall resilience of the community. Some of the study respondents indicated that they are model farmers and other farmers in their locality look up to them for advice and guidance. From discussions with key informants, it is evident that the model farmer approach has augmented extension coverage, enhanced information and technology propagation and enabled the inclusion of nearly all farming households in extension and advisory systems.

Non-climate drivers of vulnerability

The non-climate drivers of vulnerability were unique in each community and varied depending on geography, cultural, economic, political and social conditions. One of the primary factors contributing to vulnerability among respondents was inter-communal and inter-ethnic conflicts. This was particularly true in Turkana County in Kenya, which has been in persistent inter-ethnic conflict with neighbouring West Pokot County for years (KIBE, 2020). These two counties share the longest border in Kenya and are predominantly composed of pastoralists. Due to the scarcity of natural resources, such as pasture and water, competition for these resources has become ingrained in the culture of the communities. In Turkana County, Kenya, and Somali Region, Ethiopia, young herders are praised for fattening livestock during severe droughts, fueling the competition for resources and conflict. One community member in Turkana County pointed out that "if a herder loses livestock during a severe drought, it is normal to raid across the border as a form of restocking." A local leader added: "Initially young men used bows, arrows and spears to raid the neighbouring communities, but now the availability of illegal guns in the hands of youths who are not disciplined has complicated the situation and raiding has taken a different course." This has led to greater instability and disruption of social and economic activities as well as displacement and loss of both lives and livelihoods.

In Kilifi County, Kenya, communities are welcoming towards nomadic pastoralists from neighbouring counties, such as Garissa and Tana River and even lease out their land for grazing. Nonetheless, at times this arrangement has led to conflict between herders and residents, due to contravention of lease agreements by bringing in large grazing herds of livestock that exceed the land's livestock carrying capacity. Members of the community reported that herders often trespass on farms and damage crops, leading to disputes that are largely fueled by competition over land use and dispossession, as well as social and economic distress and insecurity.

Respondents noted that poverty levels have been on the rise in recent years, leading to increased vulnerability within communities. Many community members report struggling to support their households due to loss of livelihoods and low incomes. One respondent in Gursum District, Ethiopia, mentioned spending almost an entire week burning charcoal to sell a single bag for around $3. Respondents explained that their inability to provide enough food for their households is due to the low earnings as well as the loss and reduced numbers of livestock. One respondent said that "the weakened state of the animals makes it difficult to sell them threatening people's survival." Another respondent from Salaxley District, Somalia, pointed out that very few people in the village can afford two meals a day, and that the majority live in poverty. The pervasive poverty in these communities has significantly increased people's vulnerability, making them heavily reliant on aid to meet their basic needs and making it difficult for community members to provide diversified livelihoods, leading to food insecurity and other challenges. Thus, urgent interventions are needed to address the underlying causes of poverty and support these communities in building resilience and sustainable livelihoods.

Community members similarly identified political interference as a significant driver of vulnerability in the three case study areas. Political leaders incite their communities through utterances and public statements that sometimes trigger disputes. During

election periods, political aspirants take advantage of these disputes to stoke ethnic tensions and gain bloc votes from members of ethnic groups. One respondent in Kenya cited: “When election period is approaching, the disputes become more intense as political aspirants engage in divisive politics to gain support from their ethnic communities.” This pattern of behaviour reinforces ethnic divisions and perpetuates cycles of instability that make it difficult for communities to thrive, regardless of their political affiliations.

The majority of community members indicated that traditional cultural systems have a significant impact on how individuals perceive risks and vulnerability. Different aspects of culture have been observed to either reduce or increase vulnerability, affecting a community’s choices regarding their livelihoods and values. For example, in Somali Region, Ethiopia, and in Somalia, men’s cultural identity is tied to owning a large herd and severe droughts have led to many pastoralists losing their livestock, which cause them to feel a loss of power in the community and turn to the cultural practice of chewing khat. In Kilifi and Turkana Counties, Kenya, girls are meant for wealth, and thus are married off at a younger age for dowry, perpetuating gender discrimination and limiting women’s access to education and economic opportunities. While some believe that culture is untouchable and resistant to change, the potential exists to facilitate an evolution in culture practices and integrate them into efforts to address vulnerability. **A community leader in Somalia noted: *“Maintaining the traditional culture, will not bring progress. We need to change our mindset and ensure that everyone including women participate in decision-making processes.”***

Another significant driver of vulnerability articulated by many respondents throughout the case study sites was gender. In Turkana County few women are involved in leadership and decision-making at the grassroot level where traditional and cultural practices are dominant. The communities are rigid, especially on livelihoods. Women are discriminated against and have less economic opportunities to exploit. Their access to education, training and support services is thus limited. A notable aspect of this gender-based vulnerability pertains to access to land and ownership of productive assets. Women face barriers in securing land rights and ownership, which significantly restricts their economic opportunities and independence. This limited access to resources, combined with reduced availability of education, training and support services, further compounds their vulnerability. As a result, they do not contribute actively to development hence causing them to rely heavily on their male counterparts who dominate economic activities. Despite the challenges faced by women in traditional cultural systems, evidence abounds of progress towards greater gender equality in some communities. One positive development has been the increasing autonomy of women, which has been partly driven by the impact of droughts on male power dynamics. As one community member noted, “Due to the loss of livestock during droughts, women are intruding on spaces that were traditionally reserved for men like providing for families.” This shift in gender roles and values is not unique to Turkana County but is also observed in Somali Region, Ethiopia, and Somalia as a result of loss of livestock due to prolonged droughts that led to pastoral drop out. While there is still much work to be done to address gender discrimination and promote women’s empowerment, these signs of progress offer hope for the future. The respondents highlighted the need to facilitate access to credit and financial services for women to support entrepreneurship and income generation as well as Promote vocational training programmes that equip women with marketable skills and opportunities for economic independence.

Role of youth and women in resilience

Youth and women are vital in fostering community resilience but also encounter various obstacles. Women and men have different access to resources across the three study areas (Ethiopia, Kenya and Somalia). Women mostly lack adequate access to financing, farm resources, land ownership and extension services. In most cases, women make less money than their male counterparts and are occasionally not allowed to assume traditionally masculine roles, such as leadership and decision-making (World Bank, 2022). Women tend to own smaller animals like rabbits, goats, sheep and chickens and are also interested in kitchen gardening, while men own land and large livestock like cattle, camels etc. Men engage in more extensive agriculture, such as maize and cash crops, while women engage in kitchen vegetable farming, mainly due to limited access to farm inputs.

The role women play varies depending on the culture. In Ethiopia, Kenya and Somalia, women play a critical role in agriculture, food and nutrition. Women engage in subsistence farming and in managing smaller animals, such as sheep, goats and chickens, among others. Women further influence the household's nutrition and ensure food availability for the family by engaging in food handling and preparing meals for their households. A respondent in Tuli-Guled District, Ethiopia, mentioned that "women care for infants and ensure that their nutritional needs are met." Women play a major role in managing household incomes as they engage in value addition and marketing livestock products, such as milk, butter, yoghurt, hides and skins, and manage the utilization of income. This role is key to reducing vulnerability and boosting resilience, not only at the household level but for the community at large.

Women possess talents, expertise and distinctive local and traditional experience that can strengthen community resilience. They are engaged in natural resource conservation by ensuring sustainable consumption. For example, in the three countries, women are responsible for fetching water and firewood for household use. Because they understand the effort it takes, they use the resource sustainably without wasting them. Women are often custodians of indigenous knowledge on plants with medicinal values and thus, they not only pass down the knowledge to younger generations, but also engage in conserving them. With the knowledge they have accumulated over time, women should be involved in decision-making on using and managing resources such as land, forests and freshwater.

Among the pastoral communities across the three countries, youth play a central role in assessing pasture conditions and identifying potential areas to which households can migrate. They provide information to the community elders who make decisions on whether the households can migrate or not by further analyzing the identified areas. The higher energy levels of youth are particularly important as they must scout long distances to establish the existence of pasture and water, something that would be more difficult for the elderly to accomplish. Thus, youth are critical for helping build the community's resilience by preventing livestock deaths due to drought. Youth also play a role in ensuring peace and security within a community by providing surveillance of incoming raiders and fighting to prevent cattle rustlers from stealing their livestock, killing their people and destroying property. They also identify criminals encroaching into their community and stand as a crucial line of defense against various threats.

During disasters, the youth act as a buffer to the community, protecting them by evacuating the women, girls and children.

A community member in Somali Region, Ethiopia, explained that women play a significant role in sustaining peace and security among conflicting clans through organizing intermarriage between and among them. These organized marriages are a traditional solution to conflicts within the community that involves youth and women. The study established among the pastoralist respondents that women are perceived as effective in community mobilization and organization during conflicts. Women contribute to peacebuilding efforts and enhance community interaction and relationships. Women and youth are effective participants in community awareness-building and peacebuilding campaigns.

Indigenous knowledge systems

> Our locally elected representatives understand the ways of our community. They are aware of the challenges of weather and climate, the dangers of overfishing and the challenges posed by the entry of herders from the arid lands onto the local ecosystem. They are able to blend our local knowledge into laws and by laws that protect our environment and build resilience in our community.
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> - Beach Management Unit official, Kilifi County, Kenya (November 2022)

The regional context of Indigenous knowledge systems

The study areas in the Horn of Africa are characterized by a rich variety of Indigenous Knowledge Systems (IKS). These knowledge systems, which encompass language, cultural practices, natural resource management and spirituality, play a crucial role in informing local decision-making processes and shaping communities' daily lives (IPCC, 2007). This unique knowledge can serve as a foundation for the development of effective and context-specific approaches to sustainable development, vulnerability reduction and resilience building in these arid and semi-arid regions.

The Indigenous Knowledge Systems if the study areas cover forecasting, cattle rustling control, conflict management, food storage, human-wildlife conflict and human and animal health. The participants in the study consistently acknowledged the valuable contributions of IKS to resilience, sustainability and productivity within their ecosystems.

In Turkana County, Kenya, a participant noted that IKS are often not fully understood because they are so deeply ingrained in the cultural fabric of communities. IKS in their context encompasses a wealth of experiences, beliefs, religious practices and community by-laws, among other elements. In general, there is a consensus within the study area that existing IKS approaches contribute significantly to enhancing resilience and reducing vulnerability levels.

The study sites exhibit several common elements in their Indigenous Knowledge Systems, with traditional conflict resolution and indigenous weather forecasting methods being

two prominent threads found across all sites. While each site has unique aspects of IKS, these two common threads resonated throughout the study research.

The drought in the Horn of Africa brought to light the significance of indigenous knowledge systems in the region. Indigenous weather forecasting methods guide decision-making regarding land preparation and migration routes during such challenging times. Meanwhile, traditional conflict resolution methods enable communities to maintain harmony and resolve disputes under such increased stress. These crucial roles of IKS are essential for reducing vulnerability and building resilience within the affected communities.

Study participants reflected on the importance of traditional food storage facilities in promoting food security. In Kilifi County, Kenya, for example, communities would gather their harvested grains and store them in a communal facility, ensuring that a stable food supply was available during times of scarcity. This practice was coupled with seasonal management, where households or groups of households, would plan and manage their food supplies based on the seasonal conditions. However, participants noted that the introduction of county government silos in urban areas has not effectively addressed food security concerns for vulnerable populations. The presence of these silos has not contributed to building resilience among the most vulnerable individuals or households. The participants expressed the need to revive the traditional practice of grassroots food banks. They recognized that this approach not only strengthens local communities' ability to address food security challenges but also retains valuable cultural traditions. By promoting the revival of traditional food storage facilities, communities felt they could once again take ownership of their food security and ensure a reliable and sustainable food supply.

The examples provided highlight the positive outcomes of utilizing IKS in fostering peace and harmony between rival communities. The Lokiriama Peace Accord, signed in 1973 between the Matheniko and Turkana communities, stands as a significant testament to this. This landmark agreement, facilitated by IKS practices, played a crucial role in ending hostilities and promoting peaceful coexistence between the two communities.

Furthermore, the Tobong'u Lore Turkana Cultural Festival serves as another demonstration of the power of IKS in breaking down cultural boundaries and fostering inter-community interaction. This annual event brings together communities from Ethiopia, South Sudan, Uganda and beyond, enabling them to engage in cultural activities that promote understanding, unity, and the sharing of ideas. Over time, this cultural exchange has set the foundation for increased cooperation and intermarriages, further solidifying peaceful relationships.

Communities in all study sites rely on IKS for predicting seasons, which is considered a crucial function. While the specific approaches may vary, the overarching goal is to provide a foundation for decision-making for both pastoralists and agro-pastoralists. In the case of agro-pastoralists in Kilifi and Turkana Counties, Kenya, IKS plays a significant role in seed preservation practices.

In Somali Region, Ethiopia, and Somalia, the study revealed the adaptability of the long-standing Somali clan system in addressing resource-based conflicts. A respondent from

Somali Region emphasized the effectiveness of the clan system, with its established hierarchy and mechanisms for dispute resolution, in rapidly addressing and resolving localized conflicts within the community, thereby preventing escalation. He indicated that clan elders play a crucial role in conflict prevention. These elders are highly respected members of their communities and are seen as custodians of peace and justice. By leveraging their knowledge of the historical dynamics and interpersonal relationships within the clans, elders are able to mediate conflicts.

Monitoring of the honey market was raised as a valuable skill of traditional knowledge systems. A scarcity of honey in the market indicates a lack of vegetation and, potentially, drought, prompting appropriate decisions to be made.

In Gursum and Tuli-Guled Districts, Somali Region, Ethiopia, conflicts have emerged due to a range of interconnected factors. These include issues surrounding water and pastoral resource ownership and utilization, the impacts of climate change and land disputes stemming from agricultural expansion and investments. Previously, land ownership was communal, with decisions made through consensus among agro-pastoral communities. Because the dynamics of communal land ownership have shifted, conflicts now primarily arise from ethnic groups seeking to establish new settlements, increase their political representation and compete for their share of resources.

In Kilifi County, Kenya, resource-based conflicts manifest on two levels. Firstly, conflicts arise between local communities and herders from the Northeastern Kenya. The influx of herders leads to heightened competition for grazing land, which exceeds the capacity of the local fields and sparks conflict. This competition spills over into farmland, further exacerbating the conflicts. Secondly, human-wildlife conflict is a prevalent issue in areas like Ganze. Due to prolonged drought in the region, the community constructed a dam as a means to adapt and build resilience. However, this unintended consequence drew elephants from the nearby national park, resulting in the destruction of the dam and crops. Hence, the community's effort to enhance resilience paradoxically exacerbated their vulnerability to wildlife raids.

The conflicts in Kilifi County demonstrate the complexities and challenges faced by local communities in managing their natural resources and adapting to a changing environment. In the face of these challenges, embracing IKS can provide valuable insights and strategies for addressing resource-based conflicts. Understanding and integrating local knowledge into decision-making processes can facilitate the development of sustainable solutions.

Blending IKS with conventional forecasting

The majority of the respondents in the study areas, both pastoralists and agro-pastoralists, were in consensus that communities have, over generations, developed elaborate modes of gathering, forecasting, explaining and making decisions in relation to weather and climate. In all the three study areas, communities have the knowledge and practices to build resilience using indigenous knowledge. The implication of this is that the enhancement of indigenous capacity is one key to empowering local communities and consequently building resilience.

However, IKS on its own, according to most respondents, is not sufficient in building

resilience and there is a need to apply conventional forecasting alongside the use of indigenous knowledge. Respondents in all three areas stated that they are better able to adopt new ideas when these ideas can be seen in the context of existing community practices.

In Somali Region, Ethiopia, the respondents argue that traditional knowledge on meteorological aspects can be used and blended with modern science to help forecast the climate conditions and anticipate rainfall. The general consensus is that this indigenous knowledge has been effective for centuries for the pastoral and agro-pastoral communities to boost their resilience to climate change and shocks.

In Turkana County, Kenya, there is a strong integration of indigenous knowledge in weather and climate forecasting alongside conventional methods. The Kenya Meteorological Department (KMD), Turkana County Office, has recognized the value of working closely with Indigenous Technical Knowledge (ITK) elders in improving weather forecasts. During significant seasons (like the March, April and May season (MAM) and the October, November and December season (OND)), the county meteorological director organizes a Participatory Scenario Planning workshop to brings together key stakeholders from various sectors, including farmers, pastoralists, agriculture and water experts. While the county meteorological director provides forecasts based on conventional methods, the ITK elders contribute their forecasts based on IKS. Traditional forecasting methods include: observing animal behaviours, such as the flight patterns, feeding habits and movements of certain animals; studying celestial bodies like the sun, moon and stars, and wind and cloud patterns; and interpreting indicators from local plants, such as the opening or closing of flower buds, the direction in which certain plants lean, or the thickness of leaves. These traditional methods complement conventional forecasting techniques, providing a more holistic and accurate approach to weather forecasting in the region.

During the study, a practical forecast by both entities (i.e., ITK elders and Met Office) was undertaken and the results from both forecasts bore an uncanny resemblance. Both forecasts indicated that the OND Season of 2022 predicted that Turkana County would experience erratic rainfall in the entire county. This forecast was scientifically proven true. Furthermore, both KMD and IKS predicted undefined onset and cessation of rains and most significantly, both KMD and IKS predicted poor distribution of rain in space and time. Most significantly, in the previous seasons both KMD and IKS predicted the same scenarios and were proven right. The clear collaboration between KMD and IKS, according to respondents, allows for greater use of the weather forecast as generated conventionally. The community has witnessed an increase in trust and uptake of the weather forecasts in Turkana County.

It is also important to note that IKS goes beyond weather forecasting, and in some cases, such as in the Somali Region, Ethiopia and Somalia, it encompasses complete understanding of the ecosystem and climate change. One participant explained, “locally the rainfall patterns have changed where the dry periods became unusually prolonged. We have also witnessed beneficial productive vegetation reducing in coverage and even some of them have totally disappeared and thorn bushes and invasive plants are covering the land leaving little room for productive vegetation species.”

Other elements of IKS that may boost resilience

The study established that other elements of IKS may be applicable in modern day contexts. In Kilifi County, Kenya, study participants identified and discussed an IKS crop management system that involves crop rotation, which regularly replenished soil nutrients and resulted in consistently high yields.

A local leader in Kilifi County stated, "the silos built in different parts of Kilifi County are helpful, however, the majority of community members are not able to access these silos. There are critical issues such as distance and the quantity of harvest that a farmer can economically bring to the silo. It would be better to decentralize the silo system to the grassroots so that willing community groups store their harvests where they can receive help when the weather is not good or sell surplus when in need of cash, while paying a minimal management fee for the service."

Participants in the study were generally in consensus that IKS methods in seed storage were still appropriate. The use of ash to preserve seeds from one season to the next is still useful in today's context. Seed soaking was also proposed as a method of boosting germination during this current period of drought and erratic rainfall. These elements of IKS according to the respondents should be perfected to ensure that the most vulnerable in the community have access to clean planting material that has a clear link with food security and hence resilience building. Additionally, participants from Kilifi County explained how sustainable fishing techniques would ensure no overfishing occurred, for instance the setting of rules at the fishing sites and their enforcement. Furthermore, these rules would work best when taken up by the county legislative assembly that deliberates issues within Kilifi County.

In Kilifi County, participants stated that IKS has been used for pest control. They specified the use of neem tree extract to manage pests. This is environmentally friendly and reduces the need for chemical pesticides that are responsible for the reduction in bee population, which negatively impacts honey production.

IKS and crop selection

Communities in the study area have been pushed to revert to traditional crops owing to climate change and its effects. A community leader in Gabiley District, Somalia, explained, "inflation and increased prices of imports and food items are pushing us to revert to our traditional crops and utilize local production rather than depending on imported food as has been the norm. Again, the outbreak of new diseases and epidemics are also pushing us to revert to our traditional crops which include sorghum, groundnut, beans and the tuber family."

Participants in the study explained that most of the traditional foods are drought resistant and have a higher market value due to the drought facing their region and hence it is a motivation to grow these crops.

IKS plays a crucial role in the selection of traditional crops. Indigenous communities have developed an intimate understanding of their local environments and have identified

crops that are well-suited to thrive in those specific conditions. They have observed and selected crops that can better tolerate drought, resist pests and diseases and have better yields. These selections are based on a combination of factors, including generations of experience, local climatic conditions, soil types, availability of water resources and cultural preferences. Overall, the use of traditional crops and the incorporation of Indigenous Knowledge Systems in their selection provide a sustainable and resilient approach to agriculture, particularly in regions with challenging climates and limited resources.

Challenges to Resilience Building

The respondents discussed the main challenges faced by communities, which are mostly related to climate change, governance, socio-cultural practices, poverty, conflict and violence and food security.

One of the primary challenges stressed across the three case study countries is the impact of **climate change** on the community's livelihoods. This has resulted in food insecurity, lack of fodder for livestock, malnutrition and poverty. For example, Tuli-Guled in Ethiopia, Turkana County in Kenya and Salaxley District in Somalia have experienced five consecutive dry seasons. This has led to loss of livelihoods, food shortages and water insecurity. The main challenge which is gradually evolving into a risk is that of reduced rain. This affects the ability of communities to plan and make decisions on livelihoods and food security, further exacerbating vulnerability. The majority of the respondents from all three study sites indicated that population increases have led to increased competition over water and land resources, further exacerbating the impact of droughts. In Ethiopia, Kenya and Somalia, it is evident that climate induced displacement has also increased pressure on natural resources, as well as social services.

Various **governance system** challenges were noted in the study areas, including inadequate governance structures, lack of accountability, insufficient community participation, poor planning, corruption, lack of justice, inequity and dependence on donor aid. A respondent from Kilifi County, Kenya, said that "the lack of community participation in decision-making processes results in resilience strategies that do not align with the needs, traditions and priorities of the community, making them ultimately unsustainable." Furthermore, a lack of political will and commitment from government officials restricts the delivery of services and access to justice. Limited community engagement in decision-making, coupled with a lack of public awareness, deprives individuals of their understanding of their institutional rights.

Respondents highlighted **social-cultural practices** as a challenge that limits resilience building, in particular rigid livelihood practices and the lack of education, particularly for girls. Low-income levels combined with strict cultural practices, such as the demand for a high bride price in the form of livestock, means sections of the study communities feel compelled to resort to coercive means of wealth acquisition. Many respondents recognized that an increase in early marriage rates, restrictions on women owning land and gender roles serve as barriers to women's participation in resilience building efforts. Early marriages mean more girls drop out of school, denying them access to basic education and future opportunities. In Turkana County, Kenya, it is reported that girls as young as 12 years are being married off. Respondents from Turkana County also noted that women are often excluded from decision-making processes due to cultural beliefs that prioritize men's voices. Similarly, in Somali Region, Ethiopia, women do not own property or land and their rights are often limited in comparison to men. Such examples illustrate how social-cultural practices can make social inclusion in communities more difficult, hindering efforts to build resilience.

A cross-section of community members found that integrating indigenous knowledge systems (IKS) with scientific knowledge was a major challenge. They pointed out that

younger generations are not interested in learning and adopting indigenous knowledge due to changes in rural livelihood systems. This is a cause for concern, as accumulated knowledge and practices of indigenous communities, which have been honed over generations, offer valuable insights into ecosystem management and sustainable development. In Kilifi County, Kenya, for instance, young people label traditional forecasters as witches and have even killed them which led to a campaign called "uzee si uchawi" meaning old age is not witchcraft. Similarly in Turkana County, Kenya, pastoralist communities have long relied on their indigenous knowledge to manage natural resources, conflicts and respond to climate variability. However, the introduction of modern technologies and western scientific knowledge has displaced the use of these systems in some communities. In Somali Region, Ethiopia, pastoralist communities have been forced to settle due to environmental degradation, leading to leaving behind pastoral livelihoods and a decline in the use of indigenous knowledge. Similarly, in the study areas in Somalia, the introduction of modern education has led younger generations to view traditional practices as outdated and irrelevant. Community members from the three case study sites found this loss of knowledge and skills alarming and emphasized the urgent need to address cultural practices that undermine the value and importance of indigenous knowledge systems.

Respondents noted that due to **poverty levels** and loss of livelihoods people at times opt for mal-adaptation activities, like deforestation, cattle rustling, overgrazing, climate displacement, early marriage and charcoal burning. Such negative resilience responses and mal-adaptation activities are usually not good for the long-term interests of the communities, as they often lead to further vulnerabilities, reduced well-being, fewer opportunities, thus increasing community risks to shocks and stressors.

Conflict and violence within and between communities has undermined social cohesion. Changes in lifestyle and availability of modern weaponry have ensured that what was once a cultural practice (cattle rustling) has morphed into an organized illegal and deadly activity, further impoverishing communities and undermining resilience. In Turkana County, Kenya, for instance, after losing their livestock during dry seasons, cattle herders raid neighbouring communities as a form of restocking, which negatively affects the livelihoods of the community.

Owing to **food insecurity** in the regions, an over-reliance on food relief from humanitarian organizations has led to increased vulnerability and aid dependence in the long-term. For example, in Gursum District, Ethiopia, where IDPs have settled in the outskirts of the urban area, the communities are reliant on food relief. This creates food dependency limiting households from producing their own food and being self-reliant.

Long term and short-term resilience interventions

The communities engaged by the study proposed short-term and long-term interventions that could be prioritized for resilience building. Their suggestions are presented in this section.

WATER SOURCE DEVELOPENT AND MANAGEMENT. Water was raised as a cross-cutting issue, with its scarcity causing immense challenges across various sectors. Water shortages are impacting agricultural productivity (leading to food shortages), jobs (increasing unemployment), education (school dropouts and closures), health and the ecosystem (including biodiversity loss).

Respondents proposed investments in sustainable water initiatives both immediately and over the long-term. This could be done by first harnessing the low-hanging fruit, such as empowering communities on rainwater harvesting technologies, such as sinking farm ponds and shallow wells and installing roof water collection gutters and tanks, as proposed across the three study areas. Most respondents indicated that water resources exist that can be developed for the long-term. However, the challenges are with access and management. Thus, respondents proposed conducting groundwater mapping and investing in deep aquifer water extraction. Also suggested was the strengthening of water governance systems and establishing mechanisms for sustainable and equitable use of transboundary water resources. It was noted that integrated water resources management is crucial for ensuring the conservation and rehabilitation of the available water resources. The communities proposed initiatives such as river pegging and planting trees to reduce surface run-off and promote aquifer recharge. In Turkana County, Kenya, respondents suggested the need for rehabilitating Lake Turkana and the Turkwel and Kerio Rivers.

AGRICULTURAL AND PASTORAL SUPPORT. To ensure food security, the communities proposed agricultural initiatives ranging from the provision of extension services and disseminating weather and climate information to guaranteeing the greater availability of farm inputs and infrastructure. Across all the study sites, the communities proposed investing in irrigation schemes to support agricultural productivity during the dry season.
To allow farmers to increase their production and efficiency, it was proposed to provide farm and pastoralist inputs and extension services so that farmers and herders could gain access to the best possible agricultural and animal rearing practices. This includes offering capacity building to farmers and pastoralists in modern production systems, including climate-smart agriculture and specialized livestock production systems, such as interbreeding to improve livestock for more resilient breeds. Through the extension services, agro-pastoralists should receive information on identifying grazing areas during drought and floods, fodder reseeding and establishing food and fodder banks.

INCOME DIVERSIFICATION. Under the short-term category for building community resilience, the respondents proposed empowering them to diversify their incomes so that

households are not 100% reliant on agriculture and/or pastoralism. Initiatives proposed include building capacities on value addition of farm and livestock production. For example, in Gursum District, Ethiopia, respondents proposed developing markets and market outlets for local products and creating market information sharing mechanisms for local communities.

ACCESS TO FINANCE. Enhancing access to financial resources, including formal and informal loans and savings mechanisms, was noted as an opportunity to build community resilience. Strengthening village savings and loan associations (VSLAs) and table banking, prominently used in all the study sites, was suggested.

RISK TRANSFER. Developing national capacities to manage risks through finance and risk transfer were proposed by the respondents across the three study areas. Crop and livestock insurance were proposed as a means of building community resilience and promoting food security. This type of insurance is already in use across the three countries. In Ethiopia, for example, the United Nations World Food Programme, through public-private partnerships with financial service providers, is building community resilience by enrolling pastoralists in index-based livestock insurance. The system uses Normalized Difference Vegetation Index (NDVI) information to assess vegetation density. To strengthen the insurance system and increase community buy-in, respondents proposed that insurance companies should not only rely on NDVI to ascertain vegetation cover and to determine when to issue payouts but conduct physical analysis to complement NDVI. This is due to the invasion of invasive species, such as Prosopis Juli flora, which is a common problem across the study sites and often misinforms decisions on issuing insurance payments.

ENVIRONMENTAL CONSERVATION. Environmental degradation contributes to extreme vulnerability and fragility and renders the region highly susceptible to climate change events, including more frequent and severe droughts and floods. Communities proposed promoting soil conservation (to prevent soil erosion and soil degradation) through the construction of soil bands, stone check dams and gabion check dams, reforestation and afforestation. Also suggested was the empowerment of community members to participate in environmental conservation through awareness creation and provision of relevant tools.

RESOURCE GOVERNANCE. An important intervention suggested for building resilience in both the short- and long-term is the strengthening of resource governance. For instance, in Kilifi County, Kenya, where fishing is a crucial livelihood activity, the community emphasized the importance of discouraging fishing in breeding sites. Resource governance can be achieved by establishing and reinforcing policies governing the use of natural resources, such as in the case mentioned, fishing licenses. Similarly, among pastoral communities, it was recommended to focus on sustainable management of rangelands by strengthening governance. The respondents cited making governance inclusive by involving marginalized groups in decision-making processes; this was seen as an opportunity to build community resilience by promoting social cohesion and reducing inequalities.

Pastoral communities are often marginalized (Kimokoti, 2022) and the pastoralist communities in the three case study countries are no exception. It is therefore necessary to ensure the inclusion of pastoralist representatives in local government councils, committees and decision-making forums. For example, in Ethiopia, the government has established a Pastoralist Parliamentary Group (PPG) and Pastoral Development Commission (PDC) to promote pastoralist livelihoods and economic development through various initiatives that advocate for community needs. In Kenya, the government has implemented a National Livestock Policy that seeks to enhance access of pastoralist communities to basic services and enacted the Community Land Act to provide for the recognition, protection and registration of community land. In Somalia, the government established a Ministry of Reconciliation to oversee conflict resolution processes among pastoralist communities. Such policies recognize the unique culture and way of life of pastoralist communities and acknowledge their contributions to society.

As part of the decentralized governance system in Kenya, some policies have been devolved to the county level, e.g., the Climate Change Policy for Kilifi County and the establishment of a climate change committee at the sub-county level for coordination. Such institutions act as links between higher levels of government and the people at the grassroots. The devolution of the government to the county level also is seen in the form of County Integrated Development Plans, which allow for investments in resilience at the local level.

LOCAL LEADERSHIP INSTITUTIONS. There was a widely held view across the case study areas that strengthening local institutions, such as traditional authorities, local governments and civil society organizations, could help provide a solid foundation for building resilience. These institutions promote social cohesion and provide vital services and support to communities.

SOCIAL COHESION AND NETWORKS. A section of respondents suggested building on existing community networks to create stronger social networks that can be leveraged to support resilience-building efforts. For instance, women in communities are successfully involved with group savings plans and table banking which provide safety nets during droughts and other crises and provide soft loans to members for petty businesses, which are a source of income and alternative livelihoods. Such networks can be used to facilitate the exchange of knowledge, skills and resources and to promote collective action in the community.

Discussions and conclusions

The community participatory visioning exercise demonstrated the importance of engaging with community members to obtain their perceptions and understanding of community resilience. By involving the community in the process of defining and identifying resilience variables, the study developed a more comprehensive and context-specific definition of community resilience.

The findings suggest that the concept of community resilience is complex and multifaceted and cannot be fully captured by a single definition. Skerratt (2013) and Rapaport et al. (2018) view the community resilience concept as increasingly ubiquitous and predominantly defined in terms of the ability to recover from external shocks. Rather than striving for a precise definition, it may be more beneficial to view community resilience as an umbrella term that encompasses a range of elements that are critical in enabling communities to cope with and recover from adversity.

This study adds to the growing body of literature on community resilience (Patel et al., 2017; Rapaport et al., 2018; Ungar, 2021; Matarrita-Cascante et al., 2022; Zhang et al., 2023) and provides insights into how the concept can be defined and understood at the grassroots level. The results confirm, once again, the importance of community-led efforts to improve resilience. The findings underscore the need to engage with communities and incorporate local priorities and structures into resilience-building strategies.

The study highlighted the communities' perception of indicators that contribute to community resilience. These indicators span four dimensions: social, economic, ecological stability, and institutional. The identification of these dimensions aligns with previous research and resilience assessment tools conducted by Patel et al. (2017), Gillespie-Marthaler et al. (2019), Cutter (2016), and Sharifi (2016). The inclusion of these dimensions in the study is consistent with the resilience dimensions identified in the Roots of African Resilience (ROAR), indicating their relevance in building resilience at various levels.

The drivers of vulnerability are not determined by natural causes alone and communities in fragile settings are particularly vulnerable to both climate and non-climate drivers of vulnerability. Existing literature highlights the complex and interconnected nature of climate and non-climate drivers of vulnerability especially in fragile settings. Several studies (Lavell et al., 2012; Fan et al., 2016; Peters et al., 2020; Buhaug and von Uexkull, 2021) suggest that the impacts of climate change, such as changes in temperature, rainfall patterns and extreme weather events, can exacerbate existing vulnerabilities, leading to increased poverty, food insecurity and displacement. Similarly, a study by McMichael et al. (2018) highlights that climate change and associated extreme weather events can contribute to the destabilization of already fragile political and social systems, leading to conflict and displacement. These drivers exacerbate pre-existing challenges and create new ones, making it difficult for communities to cope and recover from shocks.

The non-climate drivers of vulnerability, such as conflict and political instability, play a significant role in exacerbating vulnerabilities. Béné et al. (2019) argue that these drivers

can limit access to basic services, such as healthcare, education, water and sanitation, and undermine social cohesion, leading to increased poverty and inequality. Non-climate drivers can further exacerbate the impacts of climate change and extreme weather events by limiting access to resources, exacerbating inequalities and weakening governance systems. Conflict, for instance, disrupts food production and distribution, limits access to water and forces people to flee their homes.

To sum up, both climate and non-climate drivers of vulnerability are significant challenges for communities, particularly those living in fragile settings. Effective adaptation and resilience-building efforts must, therefore, address both sets of drivers and focus on building strong, sustainable systems that can withstand the shocks and stresses of rapidly changing environments. This requires a holistic approach that addresses the root causes of vulnerability and that empowers communities to identify and implement solutions that work for them.

The study highlights that women play a crucial role in agriculture, food security, natural resource conservation and sustainable livelihoods. Addressing gender disparities and empowering women and youth are vital for fostering community resilience in the Horn of Africa region. Providing equal access to resources, education and decision-making opportunities for women can enhance their contributions to both household and community resilience. Similarly, involving youth in activities like pastoralism, peacebuilding and disaster response is essential for building resilient communities. By valuing the talents, expertise and local knowledge of women and youth, the region can strengthen community resilience, promote sustainable development and foster a more inclusive and equitable future.

The process of formulating robust, resilient sets of policies in the study areas is clear and the current policies in Ethiopia, Kenya and Somalia align well with regional efforts. However, the implementation of resilience-oriented policies remains extremely feeble. This can be attributed to a multiplicity of factors, which includes poor governance in the most vulnerable areas and which is compounded by remoteness and a lack of basic infrastructure. Furthermore, some of the most vulnerable areas are affected by conflict and instability. In such areas, policy enforcement is significantly curtailed. Therefore, in theory resilience policies are in place, however the reality on the ground is very different. In the entire area of study, the disconnect between the existence of policies and their implementation was evident. This calls for the provision of essential resources and continued engagement of all relevant stakeholders.

Addressing many underlying challenges in the Horn of Africa region is crucial for promoting resilience, reducing vulnerabilities and fostering sustainable development. Development investments in infrastructure, education, healthcare, water and energy access and other critical services are essential components of a holistic approach. These development areas are interconnected and have a significant impact on the region's ability to withstand and recover from shocks and stresses, such as droughts, floods, conflicts and economic instability. By prioritizing these areas, a more resilient and prosperous future can be built in the region, reducing the need for emergency relief and creating long-term solutions that promote the well-being of communities and individuals.

In two of the six study sites, namely Kilifi and Turkana Counties in Kenya, a connection was established between conventional meteorology and indigenous knowledge systems regarding weather forecasting. The Kenya Meteorological Department had successfully integrated indigenous forecasters into the seasonal forecasting and update process in these counties, leading to increased acceptance and support from local communities. Anecdotally, the confidence levels in forecasts from these areas are higher compared to areas where indigenous knowledge systems are not given significant attention. However, it is important to note that the effectiveness of indigenous forecasting systems can still be undermined by the changing climate, much like conventional forecasts. These challenges collectively disrupt the knowledge systems within these communities and weaken efforts to build resilience. As a result, communities possess fragmented knowledge systems (both conventional and traditional) that often fall short in supporting meaningful resilience-building efforts.

In the study areas in Ethiopia, innovative extension systems have been implemented to improve food security and build resilience. One such approach extensively used in Tuli-Guled District is the model farmer approach. However, the study findings highlight the need to critically evaluate the selection criteria and methodology for choosing model farmers. Additionally, establishing an efficient feedback and response mechanism is crucial to ensure that farmers can fully benefit from this extension-based approach. The study sheds light on the impact of the model farmer-based extension method and its role in enhancing resilience in terms of food security and access to climate information in Somali Region, Ethiopia. These findings emphasize strong interconnections between food security, climate information and resilience.

The study area had concrete examples of the use of indigenous knowledge systems to ameliorate the challenges caused by climate change and conflict. However, as indicated elsewhere in this report, most of this knowledge is no longer retained in the community, since the present generation shows little interest in it. This lack of interest creates gaps in the traditional mode of transfer of knowledge from one generation to another. This situation is worsened by the emergence of modern knowledge systems, which are often not well understood and occasionally viewed as being in competition with traditional knowledge and hence causing change in the community, in the context of resilience building, fails to gain traction.

The study reveals that communities in the three case study countries face several challenges, such as the impact of climate change on livelihoods, poor governance, rigid cultural practices and the decline in indigenous knowledge systems. Climate change affects farming productivity, livestock and fishing that has led to food insecurity, malnutrition and poverty. Poor governance undermines the trust of the community in governance systems, resulting in ineffective response efforts. Gender and cultural roles also challenge resilience building efforts for instance, women's exclusion from decision-making processes due to cultural beliefs that prioritize men's voices hinders women's participation in resilience-building efforts. Incorporating indigenous knowledge systems and respecting local knowledge and practices can contribute significantly to building community resilience in the face of modernization. To address these challenges, community perception suggests the need for behavior change, grass-root prioritization of development and resilience activities.

Based on the findings of the study, it can be concluded that there are several opportunities to enhance community resilience in pastoral communities in Kenya, Ethiopia and Somalia. These opportunities include leveraging existing community networks, strengthening local institutions, promoting inclusive governance and diversifying livelihoods. The community networks that already exist can be used to facilitate the exchange of knowledge, skills and resources to promote collective resilience action in the community. Strengthening local institutions, such as traditional authorities, local government and civil society organizations, can provide a solid foundation for building resilience by promoting social cohesion and providing vital services and support to communities. Inclusive governance, for instance, builds community resilience by promoting social cohesion and reducing inequalities. By ensuring the inclusion of marginalized groups such as pastoralist representatives in decision-making processes communities have a say in the policies and initiatives that affect their livelihoods. This study's findings further suggest engaging in non-livestock activities, such as agriculture, beekeeping, tourism, trade and fishing, to generate income from multiple sources, spread risk and enhance the ability to cope with shocks and stresses.

Understanding the needs and priorities of the community is crucial for resilience building. Communities in the Kenya, Ethiopia and Somalia study areas proposed interventions that focus on natural resources management, watershed management, sustainable water infrastructure, agricultural activities that sustain food security and livelihood diversification. The proposed interventions were similar across the study sites, reflecting common challenges and vulnerabilities. Water was noted as critical to all of their resilience-building strategies, with short-term water source initiatives suggested, specifically rainwater harvesting technologies. Long-term water source plans proposed involve groundwater mapping, construction of dams and deep aquifer water extraction. Strengthening water governance, integrating water resources management and promoting conservation and rehabilitation of water resources were also suggested. Enhancing food security, environmental protection and livelihood diversification were all stated to be essential to resilience-building, with a focus on empowering farmers, pastoralists and communities.

Recommendations

Policy Recommendations

Governments to ensure participatory formulation of resilience-based policies

Resilience-based policies can be meaningfully enhanced when those who face the vulnerabilities are accorded a level of participation and ownership. Vulnerable communities are more likely to view resilience-based policies as being just if they are engaged in the process and the results of discussions are clearly outlined.

Thus, governments in the Horn of Africa should systematically engage stakeholders from the outset of policy development, including in the discussion of challenges and consideration of possible solutions. Agro-pastoralists and pastoralists should be adequately and, in a timely manner, informed of scheduled resilience policy consultations.

Improve governance generally

To address the numerous governance challenges raised by respondents, it is imperative to improve governance overall in the study areas. Transparent and accountable governance systems that prioritize community interests and encourage participation in decision-making processes are required. Mechanisms should be created that hold decision-makers accountable as this and other methods help build trust with communities. When discussing, formulating and implementing policies, local and national governments must maintain close dialogue with local communities, ensuring that policies address their needs and interests effectively. It is important to also address other governance challenges mentioned by community members, such as corruption and dependency on donor aid.

Downscale weather and climate information to the local level

An urgent need was raised for customizing weather and climate information for the localities where agro-pastoralists and farmers live. Apart from the study sites in Kenya, the rest of the study sites reported relying on large scale forecasts that cover a wide area, which are often not accurate, and which contribute to a mistrust of conventional forecasting. Downscaling seasonal forecasts through grassroots-oriented forums (for instance, using Participatory Scenario Planning methods) can create a greater sense of ownership and provide agro-pastoralists and farmers with a firmer basis for seasonal decision-making.

Leverage loss and damage funds

Often loss and damage caused by climate change cannot be prevented through adaptation measures alone. Thus, support loss and damage funds shift away from a reactive approach that comes in the form of humanitarian aid and instead focus on proactive measures that build community resilience. Such funds can help reduce the long-term costs of responding to recurrent crises in the region and support the development of more sustainable and resilient communities.

Programming Recommendations

Conduct context analysis as a first step

Interventions for enhanced community resilience anywhere in the world should start from a thorough understanding of the unique characteristics and needs of the local context. This is no less true in the three study areas of this report. Thus, it is recommended to begin any intervention by conducting a comprehensive context analysis that looks at the socio-economic, institutional and environmental factors that contribute to local vulnerabilities and those that can be seen as opportunities for building resilience.

Consult and collaborate locally

Organizations implementing projects and programmes should consult local stakeholders and collaborate with local communities and local governments to reach a common understanding of the required interventions and establish a shared vision for enhancing community resilience. Promoting local buy-in and ownership will be one key to successful interventions.

Lean into indigenous knowledge systems

Learn about and refer to indigenous knowledge systems to understand local conditions and contexts related to systems of production and conflict resolution mechanisms, among other issues. Consider supporting the codification of indigenous knowledge systems in the body of local laws and by-laws.

Support income-generation diversification

Support interventions that diversify sources of income. Such income-generating activities might include petty trading, beekeeping, handcrafts, agro-processing and other value addition activities. However, when supporting diversified livelihoods, carefully consider differential access and impacts by gender and also their impact on the environment and the available natural resources.

Long-term investments in physical infrastructure are needed, particularly roads, markets and water sources. These investments will improve access to basic services, including safe drinking water, water for irrigation and markets, thereby improving food security.

Document and mainstream indigenous knowledge systems

A primary area of concern highlighted by study participants is the limited recording and application of indigenous knowledge systems within communities. Across the board, participants recommended codifying indigenous knowledge systems in resilience policy formulation processes. But for this to happen, the first step is to document existing indigenous approaches to resilience and ensure that what is documented is mainstreamed into resilience building policy formulation processes. Documenting indigenous knowledge systems and combing in them with conventional approaches will offer communities a greater sense of ownership of both indigenous and conventional approaches.

The study established that a specific area of documentation would be indigenous food plants, as it is believed that such studies should be undertaken before climate change irreversibly limits access to these

important plants. A follow-up step would be to distribute information about edible wild plants collected across the area of study. Another area mentioned for documentation is traditional weather forecasting techniques. These techniques can support conventional forecasts and can be generated on a seasonal basis and updated on a monthly and ten-day basis.

Boost the Model Farmer approach

Some study respondents indicated that they are considered 'model farmers' and that other farmers in their locality refer to them for advice and guidance. From discussions with key informants, it is evident that the model farmer approach has augmented extension coverage, enhanced the possibility for information and technology propagation and enabled the inclusion of nearly all farming households in extension and advisory systems. Stakeholders in the Horn of Africa might consider adopting and expanding such model farmer approaches.

Such efforts should keep in mind that while some farmers are able to partake in model farmer systems, and to join efforts that use economies of scale to improve their crops, such as shared water pump irrigation, those farmers that are vulnerable may not have the resources to join these efforts (for example, if they are called upon to buy irrigation equipment).

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Annex 1: Relevant legislation, policies, plans and strategies

Relevant legislation, policies, plans and strategies		
Country	**Domain**	**Information**
Ethiopia	Climate change and disaster risk management	National Disaster Prevention and Preparedness Strategy (1989) National Policy on Disaster Prevention and Management (1993) Climate Change NAPA of Ethiopia (2007) National Policy and Strategy on Disaster Risk Management (2013) DRM STRATEGIC PROGRAMME AND INVESTMENT FRAMEWORK (2013) NDC of the Federal Democratic Republic of Ethiopia (2015) Ethiopia's Second NC to the UNFCCC (2015) Ethiopia's National Adaptation Plan (NAP) (2019) National Framework for Climate Services (2021) NDC of the Federal Democratic Republic of Ethiopia (2021)
	Socio-economic and sustainable development	National Conservation Strategy (1994) Food Security Strategy (2002) Poverty Reduction Strategy Paper (2006) National Action Plan for Gender Equality (2006) Ethiopia's Climate-Resilient Green Economy Strategy (2011) Second Growth and Transformation Plan (2016)
	Land	The Ethiopian Constitution of 1995 Rural Land Administration Proclamation, No. 89/1997 Lease Holding of Urban Lands Proclamation Proclamation to Provide for the Expropriation of Land Holdings for Public Purposes and Payment of Compensation 2005 Proclamation to Amend Proclamation No. 56/2002, 70/2003, 103/2005 of Oromia Rural Land Use and Administration Ethiopian Sustainable Land Management Investment Framework (ESIF) (2019-2023)
	Climate change and disaster risk management	National Policy for Disaster Management in Kenya (2009) National Climate Change Response Strategy (2010) Kenya's Second NC to the UNFCCC (2015) Common Programme Framework to End Drought Emergencies (2015) National Progress Report on the Implementation of the HFA (2015)

Kenya		Kenya's NAP (2016) The Climate Change Act (2016) National Policy on Climate Finance (2016) National Climate Change Action Plan (2018) Kenya Climate-Smart Agriculture Implementation Framework 2018-2027 (2018)
	Socio-economic and sustainable development	Kenya Poverty Reduction Strategy Paper (2005) Kenya Vision 2030 (2008) Kenya Green Economy Strategy and Implementation Plan (2016) National Food and Nutrition Security Policy Implementation Framework 2017-2022 (2017) Implementation of the Agenda 2030 for Sustainable Development in Kenya (2017) Third Medium Term Plan 2018 – 2022 (2018) National gender and Equality Commission Strategic Plan 2019-2024 (2019)
	Land	National Land Policy (NLP) (2009) The Constitution of Kenya of 2010 Land Act No 6 (2012) Land Registration Act No 3 (2012) National Land Commission Act No 5 (2012) Environment and Land Court Act (2011) Land Control Act of 1967 (revised 2010) Environmental Management and Coordination Act (Act No.8 of 1999/revised 2012) The Evictions and Resettlement Bill (2015) Community Land Bill (2015)
Somalia	Climate change and disaster risk management	Puntland disaster management framework (2011) Somalia's NAPA on Climate Change (2013) Somalia's INDC (2015) The Drought Recovery and Resilience framework (2017) Initial NC for Somalia to the UNFCCC (2018) Somalia National Climate Change Policy (2020) National Drought Plan for Somalia (2020
	Socio-economic and sustainable development	National Gender Policy (2011) National Development Plan 2017-2019 (2017) National Youth Policy (2017) Social Protection Policy (2019) Poverty Reduction Strategy Paper (2020) National Development Plan 2020-2024 (2020)
	Land	The Constitution of the Federal Republic of Somalia (2012) Agricultural Land Law (1975)