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Pastoralists' Perspectives on Early Warning, Anticipatory Action, and Emergency Response

Desk Study 1 in the Diverse Perspectives on Humanitarian Action in the Pastoral Drylands Series

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“Pastoral systems are fluid, flexible, and adaptive.... The challenge is that external interventions that focus on money and markets cannot tolerate alternative values of friendship, rules of sharing, and reciprocity, which are central to the pastoral economy.”

—Interview with academic, June 22, 2023

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CONTENTS

1. INTRODUCTION	1
1.1 Methodology	2
1.2 Definitions and Concepts	2
1.3 Paradigm Shift: Reframing Early Warning and Response Among Pastoralists	4
2. EARLY WARNING AMONG PASTORALISTS	5
2.1 Indigenous Early Warning for Climate Shocks	6
2.1.1 Meteorological Signs	6
2.1.2 Biological Signs	6
2.1.3 Astrological Signs	7
2.2 Indigenous Early Warning for Conflict	8
2.3 Challenges of Indigenous Early Warning Information	8
2.4 Exploring the Integration of Indigenous and Conventional Early Warning Systems	9
3. ANTICIPATORY ACTION AMONG PASTORALISTS	11
3.1 Mobility	12
3.2 Adaptation and Diversification	13
3.3 Skilled Herding	14
3.4 Fodder Storage	15
3.5 Cross-Border Linkages and Market Exchanges	16
4. EMERGENCY RESPONSE AND CUSTOMARY SAFETY NETS AMONG PASTORALISTS	17
4.1 Herd Redistribution	18
4.2 Informal Social Safety Nets	19
5. IMPLICATIONS OF PASTORALIST PRACTICES FOR HUMANITARIAN RESPONSE	20
REFERENCES	23

1. INTRODUCTION

This desk study is part of a Feinstein International Center, Tufts University research project on reexamining early warning systems and humanitarian responses in pastoral areas of the Sudano-Sahel and the Greater Horn of Africa. The project focuses on how early warning systems and humanitarian responses in pastoral areas can be more aligned to the realities and local needs of communities, thereby improving the lives and livelihoods of pastoralists. Reexamining early warning systems and responses among pastoralists is significant because the regions occupied by pastoralists in Sudano-Sahel and Greater Horn of Africa have experienced the multiseason droughts and intermittent floods affecting rangelands across Africa, causing multiple layers of stress and crises (Anderson et al., 2023; Stites et al., 2016). Recurrent shocks persist and increase the vulnerability of pastoral communities who rely on natural resources to maintain their livestock (Behnke, 2008).

Research on pastoral systems highlights the adaptive capacity and ability to transform in the face of shocks and how pastoralists respond to risks and uncertainties (McPeak and Little, 2017; Achiba, 2018, Catley, 2017). However, three factors—climate change, conflict, and policies—are compounding the challenges faced by pastoral communities and may overwhelm these strengths and flexible strategies. Climate change appears to be increasing the frequency and severity of hazards in these pastoral areas (Crane, 2010). The Horn of Africa, for instance, has until recently been experiencing one of the worst droughts ever, with five consecutive failed rainy seasons. Recent rains experienced in the region have also resulted in floods.¹

At the same time, conflicts have long occurred in some pastoral areas. Some studies show the multiple drivers of conflict related to competition for access to water and grazing lands. In Karamoja, for example, the recurrence of conflict during the dry seasons is mainly linked to historical state marginalization coupled with climate stresses in which communities increasingly experience fewer sustainable livelihoods options to earn a living (Caravani, 2019; Nyambura,

2003). Research from the Sahel further points to land pressures and structural conditions that shape land conflicts (Benjaminsen et al., 2012). Recent analysis on conflict among pastoralist communities in Kenya reflect land fragmentation, dispossession, and political disputes alongside climate crises (Mkutu and Lokwang, 2017). In addition to climate and conflict stresses, policies leading to structural changes in rural areas (Dabasso et al., 2019), land enclosures, and threats to management of commons are complicating the ability of pastoralists to cope in a complex and changing environment (Dario Magnani and Ancey, 2022).

The intersections between climate change, conflict, and policies remain complex and are linked to multiple factors (Froese and Schilling, 2019), including political, economic, and social issues, systemic challenges at the institutional level, inequalities, and low economic development. But the combined result is that pastoral areas have been reported to experience an increase in food insecurity and even famine (Maxwell et al., 2021). A number of studies point to not only high rates of widespread acute malnutrition but also to the long-lasting nature of persistent global acute malnutrition in select pastoral locations (Young and Marshak, 2018). This factor, among other stresses affecting pastoralists, strains their livelihoods and adaptive capacity.

In this context, given the challenges to the adaptability and resiliency of pastoral systems, it is critical to identify ways to better support pastoral communities. Pastoralists have developed indigenous early warning and emergency response that is centered on local knowledge and practices (Mohamed, 2022). External actors have also been engaging on developing conventional early warning systems to support humanitarian response.² While there has been important learning on pastoralism, incorporating local knowledge and improved practices (Levine, 2011; Maxwell et al., 2021), the framing and standard practices on early warning and response adopted by external actors do not necessarily apply to pastoralism or align with pastoralists' own knowledge and forms

¹ Interview with a pastoral community leader, November 10, 2023.

² Interview with academic, August 15, 2023.

of response (Scoones and Stirling, 2020). A better understanding of pastoral modes of production and local knowledge is crucial in supporting successful interventions (Caravani et al., 2022). Recent research has identified the importance of understanding drylands and pastoralism as dynamic systems in order to incorporate flexible and adaptive programs (Scoones, 2018).

Early warning systems and emergency response in these regions have developed over decades to counter the climate and conflict crises that threaten people's lives and livelihoods.³ This desk study aims to help bridge the disconnect between pastoralist knowledge and local practices and external interventions by providing a synthesis of the known literature on pastoral knowledge and practices from the Greater Horn of Africa, Sudano-Sahel regions, and beyond. It focuses on how pastoralists engage with climate, conflict, and other stresses and shocks through indigenous early warning systems, preventive and mitigating activities, and local emergency response and customary safety nets. The review centers pastoralist communities' knowledge and practices in daily activities as a means to promote better understanding and to identify more supportive and effective intervention by national and international humanitarian actors.

1.1 Methodology

The desk study was based on literature review and landscape review interviews. The literature review focused on existing evidence, in the form of peer-reviewed and "gray" literature, on indigenous early warning knowledge, and preventive and mitigating practices among pastoralists and emergency response. The literature review was derived through searches on the Web of Science and Google Scholar using the key search terms of "pastoralists early warning," "indigenous early warning," "anticipatory action," "preventive and mitigating activities," and "emergency response." The resulting articles were reviewed for relevance and further search words identified. Where gaps on specific topics were identified, a further literature search was conducted with the specific search words. The research team and interviewees involved in this study shared additional relevant literature and included it in the list of the literature for the desk study.

Landscape review interviews were conducted with 60 individuals. Interviewees included researchers and academics working in the Greater Horn of Africa and Sudano-Sahel, national and local actors in the pastoral areas, and international humanitarian actors. The notes from these landscape interviews were analyzed and integrated into this desk study.

While the desk study literature search aimed to review a broad range of literature, most of the search yielded literature from the Horn of Africa on indigenous early warning and pastoral practices of response. Arising from this limitation, interviews with researchers from countries in the Sudano-Sahel were included for further insights. The next section focuses on definitions and framing of pastoralism, early warning, anticipatory action, and response among pastoralists.

1.2 Definitions and Concepts

Before turning to the examination of pastoralist approaches, we clarify some definitions and concepts that will be used to frame the discussion. Studies on pastoralism in Eastern Africa and Sudano-Sahel reflect pastoralism in the drylands as the most viable mode of production (Krätli, 2015; Catley et al., 2013). Recent anthropological studies have provided insights into livestock management knowledge among pastoral communities and livelihood diversification (Derbyshire, 2020; Rodgers, 2020). These studies highlight the flexible mode of production and practices that are common across pastoral groups globally. In all the instances, researchers and scholars have made attempts to define pastoralism.

One common definition that emerges refers to pastoralism as the extensive use of rangelands through mobile livestock-keeping through mobility (Krätli, 2021; Scoones, 1995). Other scholars highlight the importance of livestock products and community networks in sustaining pastoral economies (Manzano et al., 2021; Mohamed, 2022). Some literature, however, critiques the attempts to classify pastoral groups based on the uniform aspects of their livelihood. Pastoralism can be viewed as a cultural practice and a close interaction of the herd, the people, and the environment.⁴ The interaction of pastoralists with the herd and the commitment to pursuing the livelihood system even after losing their herd is reflected in the practice of people going back

³ Interview with national actor, August 10, 2023.

⁴ Interview with academic, June 7, 2023.

to pastoralism or remaining linked to pastoralism through markets and other related livelihoods.⁵ While these debates on the definition of pastoralism are still ongoing, some common features that define pastoralism emerge, which include livestock keeping, mobility as central to pastoral livelihood, and the management of variability and weather changes over time.

Definitions of early warning systems and anticipatory action in pastoral areas have evolved over time. The definitions are not neutral and vary across different actors and spaces. A conventional early warning system represents a set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.⁶ Early warning is therefore based on assessing causal factors and tracking multiple factors about where and when hazards will be present (Maxwell et al., 2021).

Other definitions from international organizations have emerged in which holistic early warning systems include the formulation of the warning, the issuance of the warning, the reception and response to the warning, and feedback to those who developed and issued the warning (Macherera and Chimbari, 2016). Among pastoralists, early warning systems have mainly encompassed indigenous knowledge and practices that pastoralists draw on to manage, shift, or prevent risks in their daily activities and in the future.⁷

Anticipatory actions have been defined as actions taken in anticipation of a crisis, either before the shock or at least before substantial humanitarian needs have manifested themselves; these actions are intended to mitigate the impact of the crisis or improve the response (Maxwell et al., 2021). International humanitarian actors have conceived of anticipatory action as a proactive intervention, which takes place upon issuance of a warning or activation of a trigger (Levine et al., 2023). While the concept has attracted attention from international humanitarian actors, national actors have focused on the need for triggers.⁸ Recent research on anticipatory action also calls for a shift

in the definition to “a way of thinking” (Maxwell et al., 2023). This formulation of anticipatory action as a way of thinking highlights the importance of continuous awareness on the likelihood of events over time. This is important in understanding pastoralists’ livelihoods because multiple activities and practices define the skills and knowledge that pastoralists deploy for anticipatory action. Among pastoralists, therefore, we understand anticipatory action to encompass preventive and mitigating activities and practices that support their daily decisions of production and livestock management. These decisions, while referred to as part of anticipatory action, are actually part of a pastoralist’s daily life, managing their extended families and herds with a constant eye to managing the risks. While these practices are often presented as uniform options available to pastoralists, they are highly varied and differentiated across social-economic groups and regions. The same strategies apply to response and customary safety nets among pastoralists after emergencies or crises.

Literature on emergency response among pastoral settings centers on external support from State actors (Caravani et al., 2024) and humanitarian organizations (Fitzpatrick, 2024). Most of the external interventions have been linked to poor understanding of pastoralism, causing setbacks in pastoral development and in some cases resulting in maladaptive practices⁹ (Oba, 2020). Emergent focus on the implications of such support and the impact on livelihoods has often shown the failure of such projects and interventions to cushion pastoralists’ livelihoods adequately. However, pastoralists on their own have developed internal strategies and practices to respond to crises and emergencies arising from both climate and conflict shocks. Across the Sudano-Sahel and the Greater Horn of Africa regions, social relations, and especially group membership, determine one’s access to resources and support in cases of emergencies or loss of livestock. Literature on access to communal resources further highlights the importance of identity and belonging and the political dynamics in access to resources and support (Berry, 1998).

Increasingly, research has shown that pastoralists continue to confront and embrace uncertainty, while managing high variability in which the future

⁵ Interview with national actor, July 11, 2023.

⁶ <https://preparecenter.org/topic/early-warning-systems>.

⁷ Interview with national actor, June 12, 2023.

⁸ Interview with academic, July 7, 2023.

⁹ Interview with academic, October 2, 2023.

is unpredictable (Scoones, 2021). This idea sheds light on the need to reframe the thinking around pastoralism by focusing on pastoralists' own sensitive, flexible, and caring responses, which are attuned to the ecosystems they occupy.¹⁰ Reshaping the assumptions that guide understanding of pastoralism is central to how international humanitarian interventions can better understand the choices and decisions of pastoralists. A summary of the framing adopted in this desk review follows in the next section.

1.3 Paradigm Shift: Reframing Early Warning and Response Among Pastoralists

Recent scholarly views on pastoralism and the broader understanding of drylands ecology are largely pro-pastoral and provide evidence on the pastoral system's rationale and productivity. A new rangeland paradigm took center stage in the 1990s and overshadowed earlier persistent debates that portrayed pastoralism as unproductive and the cause of desertification (Niamir-Fuller and Huber-Sannwald, 2020; Hardin, 1968). Evidence on pastoral mobility, for instance, has shown how livestock movement is an appropriate strategy for the drylands (Behnke et al., 1993; Niamir-Fuller, 1999; Scoones, 1995).

Recent research on pastoralism has cast doubt on the thinking and assumptions that inform how shocks and crises are understood by external actors in pastoral settings (Krätli, 2021; Scoones, 2021). This research sheds light on how pastoralists manage given the spatial and temporal heterogeneity of the ecology, economy, and politics in their settings (Bostedt et al., 2023; Scoones, 2021; Robinson et al., 2021). Pastoralists draw on the dynamic nature of the rangelands through herding practices that support their livelihoods (Swift et al., 2016).

The research on understanding of shocks and crises in pastoral settings calls for a paradigm shift and focuses on how pastoralists manage variability in their daily decisions to sustain their modes of production (FAO, 2021; Krätli, 2019). Pastoralists draw on these experiences through knowledge from multiple social actors (Berkes and Ross, 2013; Adger, 2000). The recognition and the importance of actors, positions, and roles in pastoralist

communities are intimately connected to their daily choices and response to climate and conflict shocks (Crane, 2010; Semplici, 2021) and are linked to how pastoralists navigate uncertain and unpredictable settings (Scoones, 2021). While some studies have highlighted how pastoral livelihoods are often closely connected with culture and identity (Semplici, 2021; Hassan et al., 2023), others question the assumption that pastoralists are a cohesive group (Eneyew and Mengistu, 2013).

Nevertheless, an important change in thinking has emerged over the past decade in a body of literature that shifts the debate from predictability to uncertainty. Uncertainty in contrast with predictability provides an opportunity to interrogate conditions whose future outcomes are unknown (Stirling, 2010). Not all shocks can be predicted, and not all uncertainty is negative. Indeed, Krätli and Schareika (2010) present uncertainty as a resource for pastoralists that supports their livelihoods in the rangelands and their livestock management practices. Central to shifting the thinking about prediction and prevention of crises among pastoralists is the idea that not everything can be controlled (Li, 2007).

In line with this thinking, Scoones and Stirling (2020) propose a caring approach that is centered around community practices and knowledge in managing variability. These new approaches align with pastoral realities because pastoralists have over the years invented their own strategies to engage with the complexities and changes that affect household decisions, groups dynamics, and markets and global exchanges. For instance, the ability of pastoralists to draw on flexible land access arrangements, social arrangements that support their livestock production, and strong collective social relations reflects their adaptive management and orientation for practical solutions (Pollini and Galaty, 2021; Roe, 2020).

In terms of how we can best understand early warning, preventive and mitigating activities, and emergency response among pastoralist communities, local knowledge on early warning and practices in response to shocks are critical. Yet, most of the conventional early warning systems and tools of rational risk management rely on the likelihood of expected outcomes (Flachs and Richards, 2018).

¹⁰ Interview with academic, June 22, 2023.

These tools cannot be useful when the likelihood of outcomes is not known. Instead, pastoralists draw on multiple knowledges and networks and learning through experience in response to uncertainty and crises (Wilmer et al., 2020). This approach is in contrast with the external approach that requires risks to be assessed first before action is planned for. This shift requires broader understanding of flexible pastoralist practices and knowledge that support reliability and real-time livelihood needs (Roe, 2020). The idea that pastoralists draw on variability is central to how early warning, anticipatory action, and response can be

understood. As such, climate stresses and shocks that have been understood in western culture as challenges can instead be understood as avenues of opportunities that pastoralists engage with to support their herds and livelihoods.

These framings and paradigms are useful in understanding how pastoralists view and manage climate and conflict crises as well as uncertainties compared to conventional early warning systems and response in pastoral areas. The above framing on pastoralism is adopted in this desk study.

2. EARLY WARNING AMONG PASTORALISTS

Consideration of early warning among pastoralists and subsequent studies on the need for early warning for livestock production have increased over the years (Mohamed and Scoones, 2023; Sileshi et al., 2000; Funk et al., 2019; Buchanan-Smith and Davies, 1995). Pastoralists have over multiple generations lived in close contact with nature in mostly arid and semi-arid settings (Zuma-Netshiukhwi et al., 2013). Pastoralists apply early warning knowledge to manage their livestock and livelihoods (Mohamed, 2023; Steiner, 2008). Early warning information in this complex ecological variability has been found to encompass knowledge systems that have evolved over time and have been shared down generations across different pastoral settings (Ngulube, 2017; Mbewe et al., 2019).

Literature on pastoralists' local knowledge shows their ability to assess short- and long-term ecological trends. The art or skill of assessing conditions and making predictions has been accumulated across generations (Luseno et al., 2003). While indigenous knowledge on early warning has mainly

been presented as available information that is applied across pastoral settings, some studies have highlighted this knowledge as only available to specific people who have divine knowledge from God (Guye et al., 2022). Most studies, however, refer to early warning knowledge as practices that local communities engage in rather than special knowledge held by a few. This difference in how early warning is understood highlights how not all early warning knowledge among pastoralists is documented and that pastoralists' application of this knowledge keeps changing over time based on multiple needs and crises (Mbilyni, 2020). Indigenous knowledge therefore entails reading of signs and conditions from the natural environment that can foretell or predict what is going to happen, whether it's a good season or drought, a raid or a period of peace, or diseases and other outbreaks.¹¹

The next section highlights a range of early warning information and knowledge documented mainly among pastoralists in the Greater Horn of Africa and parts of Sudano-Sahel. While some of the

¹¹ Interview with academic, June 7, 2023.

practices have been reported among specific pastoral communities, there has been convergence on some practices that the pastoralists use, including meteorological, astrological, biological factors.

2.1 Indigenous Early Warning for Climate Shocks

This section highlights a summary of pastoralists' indigenous early warning across different communities, conflict early warning where it has been studied, and finally challenges facing early warning systems among pastoralists today. The summary reflects broad indigenous systems of early warning, categorized here as meteorological, biological, and astrological signs or indicators as documented by several studies across different settings (Acharya, 2011; Alemayehu and Hizekeal, 2022). It must be noted that early warning knowledge, processes for collecting, and indicators vary greatly across pastoralist groups; the literature on indigenous early warning presented in this study is mostly from the Greater Horn of Africa (Nyambura, 2003).

2.1.1 Meteorological Signs

Among many pastoral communities, observing signs or indicators in clouds and wind is a common practice to determine the onset or cessation of rain (Egeru et al., 2014; Acharya, 2011). Although the interpretations differ, many pastoral groups examine both the configuration of the clouds and cloud formations. Among Borana, Somali, and Oromo pastoralists, for instance, the advent of heavily dark clouds signifies that the good rains are near (Oba, 2001; Pratt, 2002). Other communities, like the Gabra pastoralists, rely on certain cloud formations and the direction of the cloud formations to ascertain whether the rainfall season will be interrupted. Indicators of rain failure are visible in the speed of cloud movement from east to west (Nyambura, 2003).

Pastoralists also observe the direction and the magnitude of the wind to forecast drought or rainfall onset. Alemayehu and Hizekeal (2022) document the practices of applying wind indicators among pastoralists in Ethiopia where dusty, fast winds from the west are considered good signs of imminent rain, while fierce wind blowing from the east are considered an indication of drought or delayed rains. The reliance on wind patterns for early warning has

also been reported among agropastoral areas in East Africa (Chengula and Nyambo, 2016).

The study of these two meteorological indicators can occur simultaneously. For example, the appearance of dark clouds and the direction and strength of wind can indicate the onset of rain. Overall, the literature suggests that indigenous knowledge on early warning is specific to a particular location. Common indicators like clear skies and mist in the morning can indicate delayed rains and drought in southern Ethiopia (Alemayehu and Hizekeal, 2022). In the Sahel where north-south seasonal movements are common at the end of the dry season, pastoralists report they can see the advancing of the rains by the lightning in the southern night skies. Their animals also sense this, and so they move their herds southwards to meet the advancing rains and take advantage of it earlier than if they remained in the same location (Behnke, 2021).

2.1.2 Biological Signs

Some of the most widely practiced and documented sources of early warning information among pastoralists in Africa are animal- and plant-related indicators, both referred to in the literature as biological indicators (Guye et al., 2022; Pratt, 2002). Pastoralists may especially rely on animal indicators because they recognize intrinsic abilities in their livestock. One such belief is that animals can sense, and in some instances, detect inconsistencies, changes, and occurrences in their surroundings and thereby predict coming climate events (Balehegn et al., 2019).

Animal Behavior

Among many pastoralists in the Greater Horn of Africa, behavior displayed by livestock, wild animals, and birds serve as early warning information (Mafongoya and Ajayi, 2017; Pratt, 2002). For example, commonly reported behaviors that indicate imminent drought or dry seasons include cattle refusing to graze and preferring to stay near watering points. Other behavior among cattle is lack of interest in reproductive activities and bulls refusing to mate. Pastoralists take these as signs of an approaching bad season (Bouabdelli et al., 2022). The behavior of camels after grazing is also considered to be telling. If the camels refuse to enter the pen and congregate at the entrance, pastoralists think that this behavior heralds a good season, as the camels know that the rains will soon fall, and the pen will be muddy and thus inappropriate for

them to enter.¹² Other studies have documented pastoral beliefs that camels and cattle have instincts or can smell the coming of rain or dry seasons. Their behavior will indicate to the herder what to expect. Among the Borana pastoralists, the condition of local livestock reflects the general situation of pasture and therefore provides valuable information for mobility.¹³

Apart from herd behavior, pastoralists also observe the behavior of wild animals. Among hyenas, for instance, yawning in the morning or late afternoon or failure to eat the remnants of dead animals is linked to rains being expected to come soon. When a fox yells near pastoral homesteads for consecutive days, it is an indication that the rains will fall short that season (Guye et al., 2022).

Bird behaviors are also observed by pastoralists as valuable indicators of rains or of the quality of the coming season. While different pastoral communities pay attention to distinct bird species, the common behavior reported across several pastoral groups in the Horn of Africa includes specific birds singing at midnight or birds singing for a long time. These behaviors signify that a rainy season is approaching. In contrast, when the same birds disappear or only sing for a short time, then it is a sign that a dry season with failed rains is expected (Oba, 2001; Pratt, 2002).

Intestine Reading

The reading of intestines is an indigenous early warning mechanism that is practiced widely and has been relied on over time (Ayal et al., 2015). This practice is a unique and special skill performed by a limited number of indigenous experts. Different animals are used by different pastoralist communities for this practice, but goats and sheep appear to predominate.¹⁴ Among the Gabra, goat and sheep bowels are considered reliable to forecast rainfall. While different pastoral communities apply different procedures, the most reported process entails slaughtering the animals, detaching the intestines, and placing them at the place of observation (Howell, 2003). Several interpretations of the intestines are then made based on the distribution of the intestines. For instance, dark spots or blood spotted in the interior of the intestines are signs of plentiful rainy seasons while blood veins on the exterior parts and bright intestines are a prediction

of drought and hard times.¹⁵ Indigenous experts also look at the food in the intestines as key signs of the forecast (Ngenga et al., 2021). Intestinal reading is linked to predicting conflict or peace as well as the state of wellbeing in the community (Howell, 2003, Ayal et al., 2015). The practice of intestine reading is widely practiced by pastoralists in the Horn of Africa (Luseno et al., 2003; Nyambura, 2003).

Plant Indicators

Apart from animal behavior and intestine reading, pastoralists also observe plant species to determine and forecast certain weather events. The leaves and barks of specific plants either blossom or fall only during specific seasons signify expected weather changes (Alemayehu and Hizekeal, 2022). The budding and blossoming of the *Acacia tortillis* during the end of a dry season is associated with the coming of rain. Some plants tumble fall and dry before maturing; this is the sign of a coming dry season (Mascndeke and Shoko, 2014). Some specific plant species are used as robust indicators by pastoralists (Jiri et al., 2016). Some of the plants are seasonal; thus, some predictions only apply to a specific season (Speranza et al., 2010).

2.1.3 Astrological Signs

Pastoralist communities also rely on astrological indicators, mainly constellations and positions of the sun, moon, and stars.¹⁶ Indigenous astrologers referred to by multiple communities in the Horn of Africa as “ayaantu” can identify specific signs by observing the moon and the stars (Egeru et al., 2014; Acharya, 2011). Among the pastoralists of Northern Kenya, for instance, the appearance of three stars (torban, busana, and bakalcha) observed in a cluster in the east occurs only when a rainy season is approaching. Similarly, when the same stars descend to the west late in the evening, it is a sign that there will be a difficult season and drought.

Among pastoralists in Ethiopia, the indigenous astrologers rely on a similar set of star constellations whose appearance predicts the timing and distribution of rainfall (Alemayehu and Hizekeal, 2022). In addition to observation of the stars, the radiance of the sun during sunrise is observed, alongside other indicators. The same applies to observation of the position of clouds in relation

¹² Interview with a national actor, August 4, 2023.

¹³ Interview with a national actor, November 10, 2023.

¹⁴ Interview with academic, June 16, 2023.

¹⁵ Interview with academic, June 7, 2023.

¹⁶ Interview with a pastoral community leader, November 9, 2023.

to the stars. While these observations are mainly done by those individuals thought to have specific knowledge, multiple sources of indicators are relied upon at different times to predict weather patterns.¹⁷

The meteorological, biological, and astrological signs of early warning shared above are not in any way exhaustive. Pastoral communities rely on multiple indicators to forecast weather patterns and magnitude of events (Radeny et al., 2019). Most of the indigenous early warning methods have evolved over time, with some methods remaining relevant to-date for both climate and conflict early warning (Luseno et al., 2003).

2.2 Indigenous Early Warning for Conflict

Literature on how pastoralists engage with early warning is rich in diversity but mainly focuses on indigenous early warning knowledge (Pratt, 2002), predominantly around climate shocks with droughts and weather predictions. Conflict—although pervasive in many pastoral areas—has not featured as prominently in regard to early warning systems. However, some recent studies have highlighted the need to incorporate conflict analysis into conventional early warning systems (Maxwell and Hailey, 2021; Maxwell et al., 2021).

As stated earlier in this desk study, some studies in the Horn of Africa and Sudano-Sahel provide useful insights on the links between climate conditions and specific conflict occurrences. In Turkana, pastoralist raids and efforts to access pasture have been reported during droughts (Adem et al., 2012). Similar findings on the push among pastoralists to access pasture in East and West Africa are reflected in the farmer-herder conflicts (Schilling et al., 2016). Other studies in Sudan show how pastoralists in Darfur region move southwards to the cultivated regions, causing similar conflicts (Suliman, 2011).

The limited studies on conflict early warning among pastoralists rely on signs that are similar to climate early warning indicators, with some research highlighting specific signs (Nyambura, 2003). Some documented conflict early warning mechanisms are similar to those around climate, such as observations of stars for insights into the direction of the attack. The behavior of animals can also be indicators,

including barking of dogs or mooing of cattle: these indicate the presence of strangers or enemies. Similarly, reading of intestines can provide signs of bloodshed or imminent attack on the community. Supernatural indicators like reading of shoes among pastoralists in the Greater Horn of Africa are also widely practiced and predicts the coming of a good or bad thing (Wasonga and Lotiro, 2023). Studies among the Turkana of Kenya highlight the scarcity of pasture and food deficit as conflict indicators, and cultural practices like payment of dowry during marriage seasons are indications for likely attacks from neighboring communities.

Other research from northern Kenya points to the use of local intelligence for conflict early warning. Mobile phones play a major role in sharing information about conflict as well as locations for grazing. Motorcycle operators who scout for pasture and water and provide transport sometimes also operate as local defense teams.¹⁸ The same motorcycle services are applied to access agrovet dealers who supply drugs and medicines; through this exchange, information on many issues, including security of the area, is exchanged (Mohamed and Scoones, 2023).

2.3 Challenges of Indigenous Early Warning Information

Indigenous early warning systems among pastoralists provide dynamic and adaptable information for communities that is easily applicable, familiar, and accessible at the local level (Speranza et al., 2010; Wasonga and Lotira, 2023). Some studies have found community forecasting to be a practical task that involves local groups and is therefore easier to disseminate locally (Shoko, 2012; German et al., 2013). One of the widely relied upon indigenous early warning methods is intestine reading, a practice that is conducted each time herders slaughter small ruminants or during long seasons of drought, during which community members organize for special intestine reading ceremonies.

Despite these benefits and the applicability at the local level, recent research from Ethiopia shows that indigenous early warning systems are deteriorating and knowledge around these systems is weakening (Alemayehu and Hizekeal, 2022). According to researchers, reasons for this declining trend include

¹⁷ Interview with a national actor, November 9, 2023.

¹⁸ Interview with academic, October 2, 2023.

questioning of the indigenous knowledge by local communities and external actors, disappearance of indigenous indicators, religious interpretations, culture change, and top-down development interventions (Lwasa et al., 2017; Ayal et al., 2015). First, some studies cast doubt on indigenous knowledge, citing lack of precision and certainty and the overreliance on supernatural indicators (Radeny et al., 2019). This has been a challenge for indigenous early warning, as the uptake of such information becomes impossible when there is lack of trust, and the institutions of early warning are constantly under scrutiny.

Second, the disappearance of some biological indicators means that certain plant species that are crucial in forecasting are no longer available.²⁰ Some studies link this to the effect of extreme climate variability (Kidemu et al., 2020). Third, the spread of adherence to monotheistic religions across many pastoral settings has introduced new norms and beliefs, some of which contradict indigenous knowledge and practices. For instance, for Gabra pastoralists who have become Muslims, Islam forbids some indigenous practices such as reading stars and predicting the future (Soga, 2006). Similarly, some Borana who converted to Christianity refer to indigenous experts as “witch doctors” and contest their ability to predict the future, as the future is known only by God (Speranza et al., 2010). These religious restrictions have thus prompted significant changes in how indigenous knowledge is practiced across pastoral settings in many areas.²¹

Closely linked to religious restrictions are cultural changes, particularly whereby younger members of the community are not as enthusiastic as the elders about indigenous systems and practices (Turner and Wilks, 2022). Balehegn et al. (2019) found that with less interest from the community to engage in the practices, indigenous knowledge systems weakened over time.

Another important challenge is the top-down approaches that have sidelined pastoralists’ knowledge and practices. Local pastoral communities observe that documentation of indigenous knowledge is uncoordinated,

thereby weakening community-level prediction and practices.²² According to Scott et al., 2013, indigenous early warning practices had been neglected in the past and were barely documented, thereby hindering the transfer and adoption of such knowledge. While recent reports from pastoralists in Kenya show increased interest in indigenous early warning practices among some groups,²³ some of the indigenous knowledge and skills have evolved over time and were handed down orally across generations, which means practices may be lost or forgotten as they are not documented.²⁴ Development and humanitarian activities in pastoral areas have not adequately incorporated local practices and knowledge over time, thereby undermining indigenous knowledge on early warning (Alemayehu and Doda, 2020). International early warning systems have also often been centered on agricultural communities, thereby leaving out pastoralists and their indigenous early warning mechanisms.²⁵

Despite these challenges, indigenous early warning systems remain operational and, in recent years, have received increased attention that could potentially help to revitalize the practices. In addition, pastoral institutions of local governance remain custodians of community practices and knowledge, which is crucial in enhancing social support networks in times of crises (Ayal et al., 2015).

2.4 Exploring the Integration of Indigenous and Conventional Early Warning Systems

Pastoralists rely on multiple sources of early warning information to adapt to emerging risks and plan their future.²⁶ Such sources include indigenous early warning systems discussed in this desk study and early warning information from the state (Caravani et al., 2024) and perspectives of international humanitarian actors (Fitzpatrick, 2024). Literature reflects the differences in these multiple sources of early warning information. In particular, there is often a striking difference between scientific information and that arising from local indigenous systems. Evidence from the literature also shows

²⁰ Interview with a pastoral community leader, November 10, 2023.

²¹ Interview with international humanitarian actor, July 11, 2023.

²² Interview with international humanitarian actor, July 13, 2023.

²³ Interview with academic, June 7, 2023.

²⁴ Interview with national actor, July 7, 2023.

²⁵ Interview with academic, June 16, 2023.

²⁶ Interview with academic, June 22, 2023.

how local communities engage with external sources of information and the difficulty of fitting it into their daily contexts (Lin and Chang, 2020). In some instances, these difficulties have to do with the differences between the indigenous and conventional early warning systems.²⁷

Recent literature on the multiple and diverse sources of early warning focuses on the need to integrate these two broad types of early warning knowledge systems (Hermans et al., 2022). In conceptualizing the integration of early warning information, scholars understand this as the process of combining specialized knowledge (Berggren et al., 2011), and as transforming knowledge held by individuals to collective knowledge, which entails ownership by community (Okhuysen and Eisenhardt 2002), or as synthesizing the knowledge from local and scientific sources into an efficient and flexible system aimed at reaching a common understanding (Hermans et al., 2022).

The landscape review interviews pose questions on the efficacy of integrating these two types of early warning systems. Integration seems to underline a binary approach to knowledge that does not include the recognition of hybrid knowledge and adaptation to the local context.²⁸ The challenges of integration entail both technical and relational dynamics of incorporating different early warning systems (Hermans et al., 2022). A process of integration has challenges and requires resources of funding, time, and intellectual time. Such resources are not always available to support the process of integration (Magee et al., 2016; Plotz et al., 2017). Further, power dynamics and the knowledge hierarchy inherent in early warning systems work foster distrust and inequity. The preference for conventional knowledge in some contexts creates an unequal dynamic around the incorporation of indigenous knowledge (Kniveton et al., 2015).

Linked to the unequal power dynamics and the perceived hierarchy of knowledge is the often-cited lack of trust between the local actors on the one hand and the humanitarian organizations on the other. Literature points to the nature of climate predictions and the implications in thinking about how communities may—or may not—implement early

action when there is an impending crisis (Taylor et al., 2020). The delay experienced by communities in receiving timely assistance in emergencies has exacerbated a lack of confidence in the institutions that deal with early warning. In some cases, communities feel excluded from early warning discussions (Gwenzi et al., 2016).

Other studies point to differences in how indigenous and conventional early warning systems utilize technology and early warning information. Lin and Chang (2020) show that communities convert conventional early warning information into practical context-specific data in collaboration with external actors. The process also involves complex triangulation between information from indigenous sources and the conventional forecast available (Grey, 2019). This triangulation introduces an important component of knowledge co-production and co-learning that bridges the gaps in the integration attempts through exercises like participatory scenario mapping for early warning. A forthcoming synthesis report delves further into this.²⁹

Reflections from our landscape review interviews point to the need to understand integration as a process of collaboration rather than one of combining knowledges: “integration is working together under one tree; this means that before this information is disseminated, have we come together to share what we foresee, so we that come up with concrete points.”³⁰ This illustrates that it is not sufficient to just document indigenous knowledge to fill gaps in expert knowledge, but rather we must foster a process of deliberation on what that knowledge means. The deliberative process of knowledge construction then becomes important: “instead of using indigenous knowledge as a sort of instrumental archive body of knowledge out of context, you use it like any other form of science, as provisional and contested information.”³¹ Early warning systems emanating from such a process have the potential to reflect the different contexts, with predictions that provide room for uncertainty.

Pastoralists engage with early warning information through such deliberations. Working together with communities on early warning is thus not necessarily about creating more knowledge but

²⁷ Interview with a national actor, June 12, 2023.

²⁸ Interview with humanitarian actor, July 13, 2023.

²⁹ See our synthesis report “[Under One Tree”? Exploring Pastoral, National, and International Approaches to Humanitarian Action](#).”

³⁰ Interview with a national actor, September 14, 2023.

³¹ Interview with academic, November 15, 2023.

rather a process of discussion, building trust and developing options to move forward. This joint knowledge-making is also a process of reordering of social, political, and moral relations: “it’s not just about getting people around the table to come up with a sort of uniform version of knowledge. It is actually the process of co-creation [that] re-constitutes the politics of that intervention.”³²

The approach to the different knowledges and early warning systems has important implications as to what constitutes integration. A process of co-learning and co-production—as opposed to integrating the indigenous into the conventional—acknowledges both the challenges already mentioned and also the role of social relations and power dynamics inherent in the different early warning systems.

3. ANTICIPATORY ACTION AMONG PASTORALISTS

Pastoralists take precautions through anticipatory actions, henceforth referred to as “preventive and mitigating activities,” based on multiple knowledge of their environment, including information on early warning. Research on these preventive and mitigating activities has focused primarily on how pastoralists engage in livestock production, make plans to mitigate effects of shocks, and adopt interventions that support the survival of the herd and households needs (McCabe, 2021; McPeak, 2006; Asfaw and Davis, 2018). Common narratives in this literature are concepts of “risk management” and “coping strategies.” These concepts of risk management and coping strategies lead to the general conceptualization of events in the drylands as predictable and preventable occurrences and of the drylands themselves as essentially stable (Luseno et al., 2003). The literature that refers to anticipatory actions as risk management fails to recognize that preventive and mitigating activities deployed by pastoralists are interconnected and unpredictable in nature. These practices are complex and draw on the variability of the drylands (Krätli and Schareika, 2010; Mohamed, 2023).

Further, the framing of anticipatory action as coping strategies is based on the idea that conditions are

always stable and events that can be predicted, such as shortages of pasture, evolving household needs, and adverse effects of climate and conflict crises (McCabe, 1990). In reality, anticipatory actions among pastoralists entail an active process of engaging with the environment and opportunities available to enhance productivity and secure their livelihoods, thereby drawing on the uncertainties and unpredictable situations that overlap in pastoral settings (Nori and Scoones, 2019).

Anticipatory actions among pastoralists are diverse in nature. This desk study presents the widely documented practices that pastoralists draw on and engage with and includes the transformation and changes of these practices over time. While the literature on what constitutes anticipatory action among pastoralists in the Greater Horn and Sudano-Sahel is broad, most of it relates to climate change adaptation and livelihood diversification. This desk study focuses on the aspects that the literature considers to be the key preventive and mitigating actions, including mobility, adaptation and diversification, skilled herd management, fodder storage, and cross-border linkages and market exchanges.

³² Interview with academic, November 15, 2023.

3.1 Mobility

Mobility is one of the most-cited terms in social and ecological research studies on pastoralism. However, use of the term over the years has spanned from historical misunderstandings by governments and outsiders to the rationale of moving with livestock by pastoralists (Oba and Lusigi, 1987). Scholars use “pastoral mobility” to distinguish pastoralism from other forms of livestock husbandry. While there has been a recent embrace of the logic of livestock movement in dryland areas, mobility is still seen as a fundamental unchanging fact of pastoralist culture rather than as a rational act that is a form of anticipatory action.³³ Further, pastoralists engage in different forms of mobility tied to different livelihood opportunities, all which are enmeshed in the wider pastoral economy.³⁴

Pastoralists incorporate strategic livestock mobility into their livelihood systems in response to the variable environment, and various principles guide the nature of this movement (Behnke et al., 2020; Young and Ismail, 2019). First, most of the lands that pastoralists occupy experience highly variable rainfall, fluctuating plant and fodder availability, and recurrent drought (Krätli, 2019). Pastoralists thus move their animals to benefit from water and different forms of forage and pasture resources in these variable environments (Young et al., 2009; Behnke et al., 1993). Second, the practice of mobility relies on communal principles that allow access to land and water (Whyte et al., 2019; Jeppesen and Hassan, 2022). These flexible and reciprocal arrangements support pastoral movement and access to pasture (Scoones, 2021).

Third, pastoralists move with their herds based on the herd and household needs. For instance, drought-weakened animals are harder to move and thus may remain close to the home base while the stronger animals migrate. Some studies have found a change in mobility when droughts are harsher. In some cases, pastoralists move the animals farther away during droughts from the home base in search of pasture. In other cases, and especially in times of protracted crises, less movement is reported when animals are too weak to move long distances (Behnke, 2008; Moritz et al., 2014).

The knowledge on different forms of mobility provides pastoralists with opportunities to mitigate

events such as disease outbreaks and prolonged drought by allowing the herds to access the drier areas during the wet season and the humid areas during the drier season (Niamir-Fuller, 1999; 2005). This knowledge on mobility practices has been critical in supporting pastoralists to create value out of their herd and support their livelihoods even during shocks and crises. Apart from adapting to climate crises, pastoralists also avoid conflict through livestock movements; they actively avoid conflict locations to avert animal loss (Adriansen and Nielsen, 2005). Mobility among pastoralists therefore can be seen as an institution that supports livestock nutrition, avoids security risks, and maximizes opportunities (Turner et al., 2014).

While mobility is a common feature of pastoralism, two distinct types of mobility have been widely documented in the literature: travel mobility and grazing mobility (Turner and Schlecht, 2019). Travel mobility refers to the movement of livestock herds between two bases around which livestock graze. Grazing mobility entails strategic movements adopted by herder. Sulieman and Young (2019) offer a similar categorization of long distance, short distance, and sedentary mobility, with the last describing highly localized movements.

Literature on travel mobility presents several interrelated patterns of mobility. These patterns include seasonal movement, daily movements, migration between different bases or camps, and surveillance movement. Seasonal movement aims to exploit reserved pasture and water in certain seasons. Daily movements involve moving with some animals and taking care of young and sick animals near the home base, with temporary camps set up to support the movement. Migration between the home base or main camp and the bush camps is linked to access to other services available near the home base while herding. With surveillance movement, scouting is done prior to the movement to ensure that herders move strategically before the onset of drought (Mohamed, 2023).

Several forms of grazing mobility have also been documented through the use of GPS technology. This documentation shows the strategic decisions herders make during movements. The movements constantly change and are modified according to the needs and threats that pastoralists encounter (Turner et al., 2014). Recent research on the transformation

³³ Interview with academic, June 22, 2023.

³⁴ Interview with academic, July 7, 2023.

of pastoral mobility indicates differentiated forms of mobility based on wealth and land tenure type (Rotich et al., 2023) and an increase in livestock concentration near home bases, creating an imbalance in the availability of pastoral resources (Turner and Schlecht, 2019). While regulated access to grazing areas and reduced social ties account for this change, the flexibility of livestock mobility is critical in regulating herds and optimizing the natural resources available.

Mobility plays a critical role as a preventive and mitigating activity against shocks and crises. Researchers see mobility as providing hope and opportunity; using it, pastoralists are able to navigate the complexity that shocks present in the drylands (Kleist and Thorsen, 2016). Today, mobility is still essential among the pastoralists. Present-day modifications of mobility include the use of trucks, motorbikes, and mobile phones to move animals and herders, and to get fodder and water. These modifications are enhancing pastoralists' ability to manage variability (Mohamed, 2023; Butt, 2016). Land competition and urban expansion is also affecting mobility among pastoralists today (Rotich et al., 2023). Mobility requires specific knowledge of the specific contexts, strong social networks and relations, and reciprocal arrangements that support movement. Mobility is both an economic and a social-cultural activity.

3.2 Adaptation and Diversification

In the literature on pastoralism, the lack of uniform definitions of adaptation and diversification is acknowledged (Little et al., 2001). Research shows how adaptation and diversification of pastoralism in Eastern Africa has been intertwined with multiple range of subsistence activities (Davies, 1993). Pastoralist adaptation is understood as the way pastoralists and related institutions use the rangelands through adaptive management, living with and from uncertainty, and seeing variability as an opportunity (Scoones and Nori, 2023). Pastoralists thus engage with adaptive management in their daily contexts, responding to the contingencies that arise to avoid bad consequences while drawing on opportunities that arise (Krätli, 2015). Adaptation is mediated by multiple actors and collectives to deal with environmental and social changes (Davies and Hossain, 1997; Eriksen et al., 2015).

Some scholars define diversification as involving a widespread process of maintenance and continuous adaptation to varied activities to secure and improve livelihoods (Marty et al., 2023; Ellis, 2005). A more applied definition of diversification entails the pursuit of any nonpastoral income-earning activity, whether in rural or urban areas (Little et al., 2001). Scoones (1995) highlights the different motivations for diversification to differentiate the active choice to invest and accumulate from the diversification undertaken to cope with climate stresses.

While there are multiple forms of livelihood diversification among pastoralists, there is also a distinction between positive and negative diversification. According to Little (2016), positive (or adaptive) types of diversification entail activities that do not compromise or weaken the predominant pastoral livelihood. Negative (maladaptive) diversification in contrast threatens pastoral livelihoods and undermines the available opportunities, including hindering opportunities for others (Young and Ismail, 2019).

Pastoral livelihoods have incorporated adaptation and diversification in their daily practices as well as in response to shocks. Adaptation and livelihoods diversification are documented as key anticipatory action activities that pastoralists have engaged in over the years. Adaptation has been widely defined as activities that involve adjusting and modifying existing livelihood activity. Diversification involves expanding livelihood streams beyond pastoralism (Rotich et al., 2023; Scoones, 2021).

Adaptation by pastoralists has been useful to minimize their vulnerability to climate and conflict shocks (Ellis, 2006). Some of the major adaptation strategies involve longer-term shifts in livelihood strategies like mobility, and herd composition and splitting, as well as shorter-term activities like fodder storage. Adaptation strategies are broad in nature and encompass most of the anticipatory actions among the pastoralists that are discussed in this section.

Livelihood diversification in many pastoral areas in Africa has been on the rise in the last decades due to the structural and social economic changes in the region (Ellis, 2005). Livelihood diversification has taken the form of spreading income activities into multiple ventures as a livelihood strategy. These activities are, however, usually highly differentiated by wealth groups and thus are not uniformly

available to all pastoral groups. For example, those who have wealth establish urban connections and engage in livestock-based markets. Additionally, livelihood diversification, just like other forms of anticipatory action, is supported by social relationships and ties, which has been linked to the moral economy of pastoralists.

Livelihood diversification as part of anticipatory actions among pastoralists has been attributed by researchers to both external and internal factors. External pressures refer to policies and actions that push pastoralists to diversify out of pastoralism due to climate and conflict crises. Other push factors include population increase, reduced land to support mobility, and privatization of shared resources as well as competition for land for other forms of production by external actors (McPeak and Little, 2017; Catley, 2017). Internal factors imply that pastoralists are active agents in making decisions about diversification, and therefore they engage with the markets and improved transport systems to expand their livelihoods and opportunities (Achiba, 2018; Catley et al., 2013). Some examples of livelihood diversification among pastoralists include farming, small businesses in urban areas, petty trading, seeking wage employment, and small-scale service provision like motorcycle and water truck businesses. Other diversification activities entail engaging in labor in nearby towns, burning and sale of charcoal, and sale of firewood (Nyambura, 2003). Recent literature on pastoralists' economic activities shows how interlivelihood relations have transformed over time and that mobile herding has relied on socioeconomic ties to other livelihood activities (Derbyshire, 2020).

Adaptation and diversification, like other forms of anticipatory actions among pastoralists, go beyond economic activities to include rangeland management decisions, and social relations and community networks that support different adaptation and diversification options (Ellis, 2005). For instance, the traditional practice of adaptation that involved herd splitting relied on labor drawn from household members and community networks. Today, while pastoralists continue to split their herd and engage in different adaptation activities, labor organization has changed. Household members may be engaged in different nonpastoral activities, including wage labor (Konaka, 2021). Despite the changes in labor available for herding, pastoralists rely on household solidarity and communal pooling

to ensure that the different activities support livestock production (Spencer, 2012; Moritz, 2013).

Some scholars argue that the reciprocal exchanges that support anticipatory actions among pastoralists are declining, thereby straining the solidarity networks that enhance cohesive support in the community (Bollig, 2018; Oba, 2001). Despite these dynamics, sharing, reciprocity, and social relations remain central to how pastoralists prevent and mitigate climate and conflict crisis (Moritz et al., 2011; Iyer, 2016).

3.3 Skilled Herding

Herd management as part of anticipatory action is important for pastoral livelihoods because livestock remains a strategic and central resource to pastoralists' economic and social cultural wellbeing (McPeak et al., 2011; Lind et al., 2016). Overall, research shows that livestock production remains the most efficient option for pastoral livelihoods, as well as the most effective strategy for accessing and engaging in market opportunities (Nori et al., 2009; Moritz et al., 2011). The knowledge and skills of managing herds are therefore critical for pastoralists' anticipatory action and effective use of available resources.

Herders' skills and knowledge of animals form an important part of anticipatory action that supports prevention and mitigation of climate shocks (Scoones, 2023). Studies on pastoralists' knowledge and skills in handling and caring for their livestock provide insights into how the flexible and open approach to herding is crucial for herd health and growth (Krätli, 2015). Some of the interrelated practices of skilled herding discussed in this desk study include knowledge on diversity of animals in the herd, livestock care practices, and organized herd labor.

Pastoralists have accumulated knowledge on the herd needs and therefore are able to maximize the opportunities presented by the environment for different livestock breeds. Apart from carefully selecting the type of herds for specific seasons, pastoralists have knowledge on how to maximize diversity across lineage groups. Research among pastoralists in Niger and Chad shows how the selection of bulls and management of breeding by the herders are part of their central strategy (Krätli, 2015). Stronger breeds are introduced in case of harsher weather or climate crises. Similar practices

among pastoralists in the Greater Horn of Africa reflect selective breeding and management of herds based on deep knowledge that is linked to successful grazing and milk production. The Borana and Maasai pastoralists divide their herds according to household needs, including for multiple uses of land in subdivided grazing lands (Nori, 2021). Pastoralists in Sudan (and elsewhere) practice destocking and restocking to either increase or shrink their herd based on the availability of grazing lands, water, and resources to sustain the herd (Daoud et al., 2016).

Pastoralist knowledge on animal husbandry includes practices of establishing special herds with specific productive or reproductive purposes. These special herds are detached from the main herd during hard times or remain near the home to support household needs and to enhance the livestock's chances of surviving a harsh season (Nori, 2019; Catley, 2017). Many pastoralists keep some animals close to resource areas or near water points to enhance access to grazing areas or fodder (Krätli and Swift, 2014).

Pastoralists' skills are reflected in animal care practices used to guide animals to specific grazing areas. These care practices are crucial in supporting movements during drier seasons (Dahl, 1979). Some research documents the intimate interaction of herders and their animals, which involves livestock care and nourishment during different seasons that support the survival of the herd during crises (Krätli, 2015). Such caring skills for livestock are practiced by different households differently. The principles of communal sharing remain central to how pastoralists care and manage their herds collectively (Ancey et al., 2022; Abdullahi et al., 2019). External anticipatory actions in pastoral areas should reflect avenues of engaging in existing practices such as communal sharing in order to better support the pastoral system.

Another important aspect of managing herds is through household labor specialization. In many pastoral settings, herders divide livestock care among household members to allocate tasks based on the specific needs of the herds. While grazing and making decisions on herd mobility has largely been done by men, women are engaged in managing calves and sick animals, and managing milk. Children support the animals during dry seasons near the

home bases (Mohamed, 2023; Wangui, 2008; Dahl, 1979). Labor management is important in all forms of anticipatory actions among pastoralists. Multiple aspects of the knowledge and skills are required, including herders' physical strength, agility, and experience (Dahl, 1979). Additionally, different seasons require specific attention or communal pooling in which younger and older herders share roles according to their experience.

3.4 Fodder Storage

Fodder growing, harvesting, and storage as an anticipatory action is a growing practice among pastoralists in many parts of Africa. Pastoralists store pasture and water resources for their livestock and manage the feeding when the grazing resources diminish (Agrawal and Perrin, 2009). Fodder storage plays a vital role in augmenting natural pastures and livestock feed requirements.³⁵ Traditionally, fodder storage took the form of portioning off grazing areas to ensure there was enough pasture reserved for use in the dry seasons. In East Africa, most of these resource areas were managed communally by male elders who made decisions around when herds could access these areas as well as when to harvest the fodder for storage (Cormack, 2016). Pastoralists in Isiolo have over the years engaged in fodder storage. Fodder storage is often referred to as “cut and carry,” which involves collecting fodder for their own herds as well as selling fodder to generate income (Wanyoike et al., 2018). An example of this practice is Borana pastoralists who produce and sell hay, grass seeds, and lease pasture as part of managing in times of drought.

Recent practice of fodder storage in northern Kenya has evolved with the demand for fodder.³⁶ While fodder storage is a common practice, some studies have pointed out that cultural beliefs and perceptions about storing fodder versus a preference for natural forage have affected uptake of this method. Storage could help pastoralists mitigate the effects of climate crisis (Mwaura et al., 2015). With the climate uncertainty and opportunities for pasture storage, more pastoral groups, including women, are engaging in fodder storage in anticipation of drought.³⁷

The potential for fodder storage in pastoral areas has also attracted private sector actors.³⁸ Research

³⁵ Interview with a pastoral community member, November 10, 2023.

³⁶ Interview with a pastoral community member, November 10, 2023.

³⁷ Interview with a pastoral community leader, November 10, 2023.

³⁸ Interview with academic, August 4, 2023.

from Kenya, for instance, shows that most of private sector involvement is still at the infancy stage. Private sector involvement is mainly concentrated in town centers and draws on pasture from areas neighboring the pastoral rangelands (Wanyoike et al., 2018). Despite the growing sale of fodder in pastoral settings, research shows that pastoralists' willingness to purchase fodder is low, with a majority relying on communal grazing areas (Mengistu et al., 2021). Research from Ethiopia indicates that fodder sales enabled by adequate storage and sale have both significantly contributed to income levels of pastoralists and safeguarded their herd during droughts (Berhe et al., 2016).

Fodder storage—like most forms of anticipatory action by pastoralists—requires specialized knowledge and labor. Several studies point to the role of pastoral women in the labor required for fodder storage. Wario et al. (2016) document how Borana women engage in the skilled task of collecting pasture and storing it as fodder. This role taken up by Borana women is linked to the proximity of these activities to the home bases, thereby providing opportunities for household members to support the herd without having to travel great distances (Sala, 2019).

3.5 Cross-Border Linkages and Market Exchanges

Pastoralist communities in the Greater Horn of Africa and Sudano-Sahel are mostly located at the periphery of each country's territory and include populations with cross-border identities (Little et al., 2014). Many pastoralists rely upon interdependent relations across state borders that are based upon familial, clan, and friendship ties. Literature on pastoralists' cross-border connections shows that multiple sources of knowledge and social relations are involved in establishing and maintaining these relationships, sometimes across multiple generations. For mobility, historical knowledge on routes across the borders and local governance systems that are shared by communities living across the border are crucial (Semplici and Campbell, 2023; Davies et al., 2018).

Pastoralists have for many generations relied on these historical cross-border routes and networks in times of shocks or crises (Moutari and Tan,

2008). In recent times, mobile phone technology is transforming the nature of cross-border linkages by allowing groups to share real-time information on mobility, terms of trade, or the security situation (Bisson et al., 2021; Abubakar, 2022). Recent research from Mali, Niger, Sudan, and Ethiopia however shows that conflict is affecting pastoralists' movement across the borders (Krätli and Toulmin, 2020). In other words, the same opportunities provided by cross-border linkages can also be cleavages that fall victim to conflict. While crises and shocks can place strain on cross-border relations, these ties have remained strong among the Borana of Kenya and Ethiopia despite the effects of the recurrent droughts on mobility patterns and markets.³⁹

Though livestock is a crucial livelihood asset, most pastoralist areas are poorly integrated into livestock marketing systems, and local pastoralists are not connected to the broader market systems (Little et al., 2014). However, international livestock trading markets are expanding fast. Livestock exports in the Horn of Africa have been reported to exceed 1 billion United States dollars (USD) annually (Little et al., 2014). Local market exchanges among the pastoralists themselves continue to be constrained given the lack of developed livestock markets in pastoral areas (Elmi and Birch, 2013). Despite the challenges of integration into the international livestock system at the local level, pastoralists negotiate through their social connections and stock friendships to engage in the market system locally.⁴⁰ Trading in informal cross-border markets, such as between southern Ethiopia and northern Kenya and between southern Somalia and northeastern Kenya, is also an option for pastoralists in the region (Little et al., 2014).

However, not all groups or households are able to access cross-border grazing or partake in dynamic livestock markets as a means of anticipatory action.⁴¹ Pastoralists with strong political and social networks draw upon symbiotic stock associate relations in times of stress. Furthermore, wealthy pastoralists and traders have the option of trucking fodder and water to herds in distant grazing locations during droughts. The role of stock associates across national and international borders is important during drought. Households exchange labor and herds when the situation means one area has pasture

³⁹ Interview with a pastoral community leader, October 10, 2023.

⁴⁰ Interview with academic, June 14, 2023.

⁴¹ Interview with national actor, August 4, 2023.

and water and the other does not. These exchanges apply to sale of fodder and other cross-border businesses.⁴²

Pastoralists' anticipatory actions in the form of preventive and mitigating activities are embedded in pastoral practices and community rules of sharing and local solidarity networks. These networks

form the basis of customary safety nets, which are particularly critical during periods of shock or crisis. We next examine the ways in which pastoral communities utilize these customary safety nets as one component of localized response to emergencies.

4. EMERGENCY RESPONSE AND CUSTOMARY SAFETY NETS AMONG PASTORALISTS

While pastoralism is well adapted to cope with drought and rainfall variations, multiyear droughts, rising temperatures, extended conflicts, and overlapping drought and conflict conditions pose greater challenges to the adaptability and resilience of pastoral systems⁴³ (Ellis and Swift, 1988). Despite multiple forms of preventive and mitigating strategies used by pastoralists and their wealth of knowledge on early warning, the severity of climate conditions in particular poses multiple challenges and applies pressure to pastoral livelihoods, at times resulting in emergency conditions (Homewood, 2004; Scoones, 2021).

Research has highlighted various responses among pastoral communities that rely on internal adjustments and draw on and make productive use of uncertainty (Scoones, 1998; Krätli and Schareika, 2010). While some of the responses linked to preventive measures have already been discussed, pastoralists also engage in practical communal actions during emergencies and crises. These actions include culturally accepted forms of support and redistribution in the form of a “moral economy” (Khalif and Oba, 2018; Moritz, 2013; Scoones, 2021). Moral economy refers to a set of indigenous

networks and collective solidarities that enable transfer of values and resources to help community members in times of crises (Mohamed, 2023; Nori, 2021). Drawing on close connections, pastoralists practice sharing among diverse social groups; this sharing is guided by community institutions and cultures. The idea of sharing is based on the knowledge that there exists uneven resource access and capacity to respond to shock. Community members therefore turn up as part of their obligation to support those most affected by crises events, thereby supporting the moral economy (Aredo, 2010).

Research on the moral economy among pastoralists focuses on social security networks and transfer of livestock among pastoral households (McCabe, 1990; Ensminger, 1994; Bollig, 2018). The ideals of giving and reciprocal arrangements linked to communal pooling are also central to the practices of the moral economy (Lesorogol, 2008; Hughes, 2006). Pastoralists draw on linkages by specific members of the community, such as women's rotational systems that share animal products and exchange labor (Khalif and Oba, 2018). Other forms of credit that are based on trust and social norms of support

⁴² Interview with a pastoral community leader in Kenya, October 10, 2023.

⁴³ Interview with academic, November 9, 2023.

and repayment are critical in helping communities in times of need (Galvin, 2008; Nori, 2010). In many pastoral settings, there are examples of the positive role of sharing to support household nutrition needs through sharing milk and animal products during periods of decreased food availability (Galvin et al., 1994). These customary rules and institutions offer the governance and reinforcement of sharing and communal support in times of dire need (Ali and Hobson, 2009).

The moral economy practices among pastoralists are rooted in customary institutions and further reinforced by religious beliefs and customs (Bollig, 2018; Oba, 2001). For example, the Gadaa system among the Borana of Kenya and Ethiopia provides guidance and community rules of support (Oba, 2001). This authority system is based on kinship lines and provides broad community rules and a supreme decision body. The Gadaa also makes declarations about how to disperse support when emergency response is required (Udessa, 2019; Bassi, 2012). Iyer (2016) documents the social networks among men and women in Uganda's Karamoja sub-region as a set of organized relations that support the community in times of crises and help people to transform their livelihoods after livestock losses. While the customary mechanisms in pastoral settings and the aspects of the moral economy have transformed with the times, they remain central to addressing community needs during crises.

Herd redistribution and rules of sharing livestock after emergencies is a significant support system among pastoralists. The next section highlights herd redistribution and a range of informal social safety nets as key emergency response mechanisms among pastoralists.

4.1 Herd Redistribution

Leadership institutions and decision-making processes within pastoral communities center on supporting households to sustain herds over different seasons, including management and governance of natural resources in the different territories that herds and herders can access (Nori et al., 2008). During emergencies, much of this support shifts to redistributive solidarity. This practice includes sharing animals with those who experienced major losses during crises such as drought, diseases, and raids (Oba, 1990; Ensminger, 1994). Traditional

herd redistribution among pastoralists in the Horn of Africa was based on collective solidarity and individual stock associations (Dahl, 1979).

The analysis of collective redistribution among most pastoral communities shows that male clan elders rally community members to support specific households after droughts or livestock losses (Iyer, 2021). Recent studies on pastoral livestock redistribution describe different forms of animal transfers, including permanent transfers, temporary exchange, and life-cycle transfers (Mohamed, 2023). While these broad categories differ across setting, this section highlights the various means through which pastoralists generally practice livestock redistribution.

Under the model of permanent sharing, pastoralists give animals and their offspring as gifts to friends to support specific households to rebuild their herds after losses.⁴⁴ Doing so allows these households to benefit from the animal products as well as long-term animal ownership. Those who share animals anticipate reciprocity in the form of future exchanges, but this reciprocity is not guaranteed. Apart from friendship alliances, community members are bound by culturally defined obligations to help those who have shortages after hard seasons. Other obligations emerge from marriage alliances, familial and clan ties, and religious connections among pastoralists (Mohammed, 2023). Such connections and ties are applied based on the rules of generosity and close identity, and therefore vary for different individuals.⁴⁵

Among the Borana community in northern Kenya and southern Ethiopia, the “buusa gonofa” practice is one means of permanent sharing of livestock (Tache, 2008; Cormack, 2016). This practice involves a call to restock for the poor through different clan requests. The clan elders together review the requests and assess the vulnerability of different groups and organize cattle redistribution for those in dire need (Dahl, 1979). Islamic principles of neighborliness and the institution of obligatory giving known as “zakat” also support livestock redistribution among Muslim pastoral groups. These norms and processes function in a similar way to broader norms of solidarity and reciprocity. Local mosques in pastoral areas organize zakat collection in response to livestock shocks. The

⁴⁴ Interview with a pastoral community leader, November 10, 2023.

⁴⁵ Interview with academic, July 11, 2023.

aim is to support restocking for the most affected groups (Mohamed, 2023).

Herd redistribution takes different forms among pastoralists today, with multiple identities supporting the response in time of calamities. Other forms of redistribution practiced today include “harambees” and saving clubs. Harambees are community fundraising activities based on collective support. Those who can share are asked to do so. Savings clubs, rotational credits, and merry-go-rounds offer benefits for those who come together for steady social support. Besides restocking of herds, harambees and savings clubs in northern Kenya have been fundamental in supporting pastoral communities with household needs like school fees and payment of medical bills (Oba, 2012).

Where the clan elders come together to fundraise for specific members, the principles of busaa gonofa that rely on clan involvement and validation of the neediest also apply (Mohamed, 2023). Different forms of solidarities therefore emerge, all geared towards support through different needs and times of crises (Tache, 2008). While some of the support networks have been weakened due to reducing stock and for households too poor to reciprocate, those who have close relations have continued to support each other over time.⁴⁶

4.2 Informal Social Safety Nets

Pastoralist communities draw on social exchanges that are primarily rooted in livestock and livestock products such as milk, butter, and ghee (Oba, 2012). The social value of these animal products is higher during droughts and hard times, when households store some of the food products and share across their social ties (Iyer, 2016). Some researchers have documented the importance of sharing animal products and the enforcement of this sharing through cultural prohibitions on the sale of such products that are meant to be shared freely (Oba, 1990).

Informal social networks are critical in restoring harmony in times of conflict or in postconflict recovery. Efforts to gradually reestablish the web of community connections can allow for the rebuilding of broken trust and social norms that may have been strained or violated during crises (Fitzpatrick et al., 2022). Working in Darfur, for instance, Fitzpatrick

et al. (2022) found that communities that had experienced a cleavage in their social ties (such as between pastoral groups thought to be associated with the Janjaweed militias and more settled groups who had been displaced) rebuilt these ties slowly through initial outreaches such as bringing food to a household following a death in the family. This example illustrates that these informal social networks are not static; they can bend and even break in times of crises, but the previous existence of such networks can (at times) allow rebuilding to take place and the network to again function in a dynamic fashion.

Social support mechanisms also arise from pastoral friendships and neighborhood links in normal times and allow households to meet their needs more effectively (Fitzpatrick et al., 2022). This support is normally reciprocal in nature and usually linked to identity (such as to clan or family) or proximity (Stites et al., 2021). Literature on communal sharing highlights different benefits for these different forms of sharing. The main benefit is social insurance. Communities forego the income or animals to create stronger bonds among themselves (Mohamed, 2023).

Remittance sending is another and perhaps the most well-known form of a social safety net. For instance, among Somali pastoralists, strong social networks support organized sending of remittances; these exchanges have often provided critical support in response to crises (Nori, 2010). Remittances can play an important role in helping those pastoralists who are able to maintain links with families and friends in times of crises (Maxwell, 2019).

Labor exchanges as an informal social mechanism can involve rotating work groups. These groups often complete difficult manual tasks suited to communal labor, such as building structures or clearing fields. Labor exchanges can also involve the sending of children from poorer households to herd, farm, or otherwise assist richer relatives, stock associates, or neighbors in exchange for food or payment during hard times. In addition to herd redistribution discussed above, richer families offer lactating animals to their needy relatives or neighbors to support their household milk supply to cushion each other. In other instances, surplus milk is stored and distributed to poor households who may have lost their animals (Mohammed, 2023). Research

⁴⁶ Interview with academic, November 9, 2023.

from Ethiopia shows how pastoralists organize food and livestock contributions and share it with households most affected by droughts or livestock loss (Skinner, 2010).

Apart from responding to shocks and crises, community social safety net mechanisms allow for sharing of risks and supporting of those households who might struggle to meet daily needs. Fitzpatrick et al. (2022) find that social support in the Darfur region of Sudan is incorporated into daily practices in ways that may be invisible to outsiders. Community members offer each other assistance and crucial support, such as shared evening meals during difficult times as well as on a day-to-day basis. Tied to this practice is the principle of preservation of dignity for those receiving assistance, whereby assistance is normalized as opposed to exceptional. Informal social safety nets therefore take many forms and are practiced by pastoral individuals, households, and groups in different ways and at different levels.

The benefits of social capital and sharing, however, are not equal for all community members (Adger,

2010). Indeed, gender, wealth, and other power relations shape social networks and communal pooling activities (Rotich et al., 2023), and determine who is likely to be included or excluded from such networks of exchange. Furthermore, social ties and connections keep changing through people's lives and between generations, as some relations may fade and new ones built (Maxwell et al., 2016).

While the variety and potential strength of pastoralist's emergency response mechanisms are clear, the literature indicates that these local practices and institutions are facing increased pressures from the frequency and severity of shocks. These shocks are compounded by the effects of restrictions on access to rangeland resources, commercialization of goods and services and associated need for cash, and the threat of conflict and insecurity. Just as these aspects affect the resilience of pastoral communities and the effectiveness of preventive or mitigating actions, they also negatively influence the viability of local response capacities. We discuss the implications of pastoralist practices for humanitarian response in the next section.

5. IMPLICATIONS OF PASTORALIST PRACTICES FOR HUMANITARIAN RESPONSE

This desk study of how pastoralists engage with early warning, anticipatory action, and emergency response shows that local community knowledge and practices are central to how pastoralists respond to climate and conflict crises. From this review, several principles that guide how pastoralists have managed shocks and cushioned their livelihoods and

livestock losses emerge. These principles include embracing uncertainty, adaptive management or anticipatory practices, communal pooling, and collective solidarities towards response.

These principles that underpin pastoral livelihoods in which connection, networking, and collaboration

is important provide avenues of learning for the international humanitarian response. Of note, these principles do not imply that pastoral settings are equitable. There exist different forms of exclusion in pastoral systems based on class, gender, age, and ethnicity that influence the social relations and effectiveness of anticipatory or emergency actions for different groups. However, the principles that enhance social relations remain central in supporting the trust and reciprocity required in pastoral settings (Anderson, 2014).

External interventions focused on early warning, anticipatory action, and humanitarian response in pastoral settings often run counter to these principles. Most of the assumptions and frameworks applied from outside aim to bring stability, make predictions, and control the outcomes (Scoones, 2023; Li, 2007). Even where attempts are made to consider local community practices, pastoral groups have remained on the margins of national territories and are often seen as political threats, security risks, or hindrances to development agendas. Their livelihood systems are often misunderstood (Scott, 2017).

Three possibilities for changing international humanitarian practice might be enacted to embrace community-based practices. First, humanitarian responses in pastoral areas could draw on and potentially uphold or support community-based practices. Doing so would entail considering the systems that communities may already have in place and institutions that govern and support these systems, and then considering how best to uphold or support these mechanisms.⁴⁷ This process applies for different levels of interventions in humanitarian response. Jaspers and Shoham (1999) highlight the importance of community-based practices for targeting of humanitarian response. Community-based targeting thus engages community members to develop methods of targeting that do not rely on standard vulnerability measurements but rather respond to specific needs of a community.⁴⁸

Pastoral communities apply locally adaptive methods to identify the neediest and therefore include multiple community interests.⁴⁹ The complex

nature of pastoral settings in times of conflict further presents the need to rethink how external interventions are done. Emergency response in conflict crises presents different layers of vulnerabilities, including political exclusion, which are not only linked to poor households (de Waal, 2005).

Second, drawing from research that links pastoralism to critical infrastructures, Roe (2020) presents the concept of high-reliability professionals among pastoralists. This concept links to the ability of pastoralists communities to maneuver different risks and overcome crises in the system over centuries (Nori and Scoones, 2019). While the high-reliability professionals may not have entire control of the system, they draw on multiple sources of knowledge and make critical decisions as and when needed.⁵⁰ These decisions and actions proposed are generally seen as correct as they are endorsed by institutions that are viewed as legitimate, and they build a network on trust and connection. Given that they are trusted and well-connected, high-reliability professionals offer crucial information on the ground within pastoral communities. International humanitarian response can work closely with pastoralist networks and high-reliability professionals, thereby incorporating networks and knowledge systems. Incorporating the knowledge networks can support early recognition of challenges, thereby allowing communities to plan accordingly (Sabel and Zeitlin, 2008).

For instance, consideration of different knowledges and early warning systems has implications to what constitutes integration and incorporation of local networks. A process of co-learning and co-production—as opposed to integrating the indigenous into the conventional—acknowledges both the challenges already mentioned and the need to recognize power dynamics inherent in the different systems. A critical way forward entails asking questions around the assumptions that guide integration of early warning systems. This includes recognizing the plurality of knowledge and process adaptation in different contexts.

⁴⁷ Interview with national humanitarian actor, November 11, 2023.

⁴⁸ Interview with academic, October 2, 2023.

⁴⁹ Interview with national humanitarian actor, November 11, 2023.

⁵⁰ Interview with academic, August 4, 2023.

Third, while dynamic and flexible natural resource access arrangements are common practices by pastoralists and support pastoral systems in times of shocks, new forms of private sector linkages have emerged.⁵¹ The private sector as crucial actor for humanitarian response is critical because new forms of practices have equally emerged, drawing on rural-urban linkages as well as investments in pastoral town centers (Ancy et al., 2022; Catley et al., 2013). International humanitarian interventions should draw on private sector linkages in pastoral areas that are critical for access and inclusion.

Overall, pastoral communities have unique practices that support their livelihoods. Communities are not based purely on a collection of households but on broader kinship and familial ties. Social networks rely on flexible and real-time responses when uncertainties are confronted. These processes require navigation and local negotiations that rely on multiple relationships and linkages. This effort includes mobilizing different sources of knowledge about the future, even if the future is unpredictable. Closer collaborative processes in international humanitarian interventions that engage pastoralists who are rooted in community networks are crucial in confronting crises.

51 Interview with international humanitarian actor, July 13, 2023.

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