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TRANSBOUNDARY CLIMATE RISKS TO AFRICAN DRYLAND LIVESTOCK ECONOMIES

Sarah Opitz-Stapleton

Key messages

- Livestock production and trade of live animals and animal products (the livestock sector) contributes significantly to national economies in African dryland countries. Pastoralists have traditionally employed temporary to permanent mobility of livestock within and across national borders. Such mobility reduced the risk of land and vegetation degradation from overgrazing, contributed to soil fertilisation from dung and was a disaster-resilient mechanism that helped to protect herds from drought and disease.
- The livestock sector is exposed to transboundary climate risks (TCRs) – the potential cross-border, negative impacts of climate change or responses to manage these impacts through mitigation and adaptation.
- Biophysical, and trade- and policy-related TCRs are being created through climate change interacting with sub-national to regional political, social and economic vulnerability factors. These factors – ranging from a lack of enforced land tenure and usage rights for pastoralists, to policies favouring agriculture, to the expansion of agricultural land and urbanisation – are reducing livestock mobility and climate resilience.
- TCRs to the livestock sector include (among others) the potential for widespread livestock deaths due to the projected increase in duration of drought from two to four months across parts of the Sahel, decreases in rangeland productivity, trade disruption and the spread of livestock diseases.
- Adaptation planning and implementation at all scales needs to consider land tenure security, land use planning and the protection of cross-border rangelands (both within and between countries) and livestock routes to protect the livestock sector from TCRs. This requires greater cooperation at the local, sub-national and multi-country levels to adopt and implement existing policies. Regional economic cooperation, trade and natural resource management initiatives provide frameworks and momentum for stronger regional cooperation on adaptation to TCRs in the livestock sector.

Sundown at Thaba Manzi Ranch, Magaliesburg, South Africa
Photo credit: StormSignal, CC BY-SA 2.0

1. Introduction

The livestock sector, including cross-border trade of live animals and animal products, contributes between 5% and 30% of the national gross domestic product (GDP) in African dryland countries; in West Africa it constitutes around 40% of agricultural GDP (De Haan, 2016; Molina-Flores et al., 2020). Livestock production employs a mixture of strategies along a mobility continuum, from agropastoralism to transhumance and nomadism (Simonet and Carabine, 2021). Many herds travel across national boundaries in either cyclical (transhumance) or permanent mobility (nomadism). Historically, livestock routes within and across borders followed the rains and vegetation.

The very transboundary nature of African livestock economies exposes them directly to a number of climate hazards such as drought, heat wave and more variable rainy seasons. But, the actual transboundary climate risks (TCRs) – the potential cross-border, negative impacts of climate change or responses to manage it through mitigation and adaptation – often depend more on the underlying socioeconomic and political contexts, and insecurities in land tenure that create vulnerabilities and exposures rather than climate hazards (Box1). These risks can spread between countries via pathways such as shared nature resources and ecosystems or trade. Some TCRs were highlighted in *Transboundary Climate and Adaptation Risks in Africa: Perceptions from 2021*.

This issues brief explores some of these transboundary vulnerabilities, and how they give rise to TCRs in Sahelian livestock sectors. While the vulnerabilities are complex, it is here that adaptation actions can be taken by local and even national governments, in cooperation with the Regional Economic Communities (RECs), to reduce TCRs for Sahelian livestock sectors.

BOX 1: A WORD ABOUT RISK

Risk is the potential for negative consequences (e.g. loss of life and livelihoods, destroyed or damaged assets and infrastructure, etc.) that could occur, but have not yet happened. Impacts are negative consequences that have occurred. They are triggered by a hazard interacting with underlying vulnerability, exposure and capacity contexts. The Intergovernmental Panel on Climate Change (IPCC) defines risk as (2022: 2921):

> The potential for adverse consequences for human or ecological systems [where something of value is at stake and where the outcome is uncertain (IPCC, 2014: 1722)], recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change … In the context of climate change impacts, risks result from the dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards. In the context of climate change responses, risks result from the potential for such responses not achieving the intended objective(s), or from potential trade-offs with, or negative side-effects on, other societal objectives …

Risk is the potential outcome of a hazard interacting with pre-existing vulnerability and exposure; it is **not** the hazard, vulnerability or exposure. Adaptation to climate change ideally focuses on reducing risks to human and ecological systems by addressing underlying vulnerabilities and exposures through more sustainable, risk-informed and equitable development. Mitigation reduces the severity and frequency of climate hazards. But, as noted by the IPCC, both of these can create risks to various groups of people and the ecosystems upon which they depend. The United Nations Office for Disaster Risk Reduction (UNDRR) notes (2015: 33):

> Disasters [impacts] are manifestations of unresolved development problems … Exposure and vulnerability, as well as hazard itself (through climate change and environmental degradation) are socially constructed through underlying risk drivers, including globalised economic development, poverty and inequality, badly planned and managed urban development, environmental degradation and climate change.

This issues brief focuses on a set of TCRs to livestock sectors across the Sahel. In particular, it highlights some local to multi-country vulnerabilities that are contributing to the risks to pastoralists. A focus on transboundary vulnerabilities points to where adaptation and cooperation in implementing various adaptation actions are needed. Other vulnerabilities at different scales across Africa are covered in the *2022 Sixth IPCC Assessment Report of Working Group II*, 'Chapter 9: Africa' (Trisos et al., 2022).

2. TCRs in the livestock sectors

There is considerable dynamism in the livestock sector, with growing incomes, population and urbanisation, demand for meat, livestock products, and the provision of inputs increasing and creating new business opportunities for herders (Banerjee et al., 2022). Livestock markets are strong, with livestock herders and traders exporting live animals and frozen meat across national borders and even to Middle Eastern markets (e.g. the sale of goats and cattle from Somalia and Sudan to Saudi Arabia and the Gulf) (Simonet and Carabine, 2021; Banerjee et al., 2022). Yet, in the face of climate change, the viability of these cross-border systems is under threat. A variety of political, social and economic factors from sub-national to regional levels are creating transboundary vulnerabilities that, when combined with climate change, are giving rise to transboundary biophysical, trade- and policy-related climate risks for the livestock sector.

What are some of these TCRs? The linked biophysical and trade TCRs to pastoral systems are the most visible. Should a mean global warming of 2˚C be reached, it is projected that the duration of meteorological droughts may double from two to four months across the western Sahel and increasing frequency and magnitude of precipitation and temperature extremes is highly likely (Trisos et al., 2022). Widespread livestock deaths can occur during multi-country droughts due to reduced water and fodder availability, as is currently happening across the Horn of Africa where an unprecedented four-season drought has contributed to the death of more than 3 million livestock across Somalia, northern and eastern Kenya, and parts of Ethiopia (FEWS NET, 2022). By 2040, all of north Africa and parts of both the Horn and southern Africa are likely to experience water stress, where demand outstrips supply (Lukorito et al., 2021). Delays in the onset and duration of the rainy season, along with increases in variability, may cause pastoralists to move herds farther beyond traditional grazing areas in search of pasture and water. Animals already under stress due to drought conditions are more susceptible to dying on prolonged treks. And, it may increase the risk of conflict between herders and settlements along the migration routes.

Beyond drought-related TCRs, other biophysical transboundary climate risks do exist. Overall rangeland productivity and fodder availability are threatened. There is high scientific agreement that West Africa rangeland productivity could decrease by up to 40% above a mean global warming of 2˚C; northern and southern Africa could respectively experience decreases of 32% and 37% at warming of 2.4˚C by 2050 (Trisos et al., 2022). Climate extreme events in one country can trigger impacts that spread regionally through Sahelian livestock economies and impact the livestock-based livelihoods of millions. Shifts in temperatures, precipitation patterns and humidity facilitate the spread of existing or novel livestock disease across national borders (Kardjadj and Lancelot, 2019). The Rift Valley fever outbreaks of 2007 and 2019 in Sudan led to livestock export bans from Saudi Arabia, causing significant losses to Sudan's nearly $400 million annual sheep export trade (Godde et al., 2021).

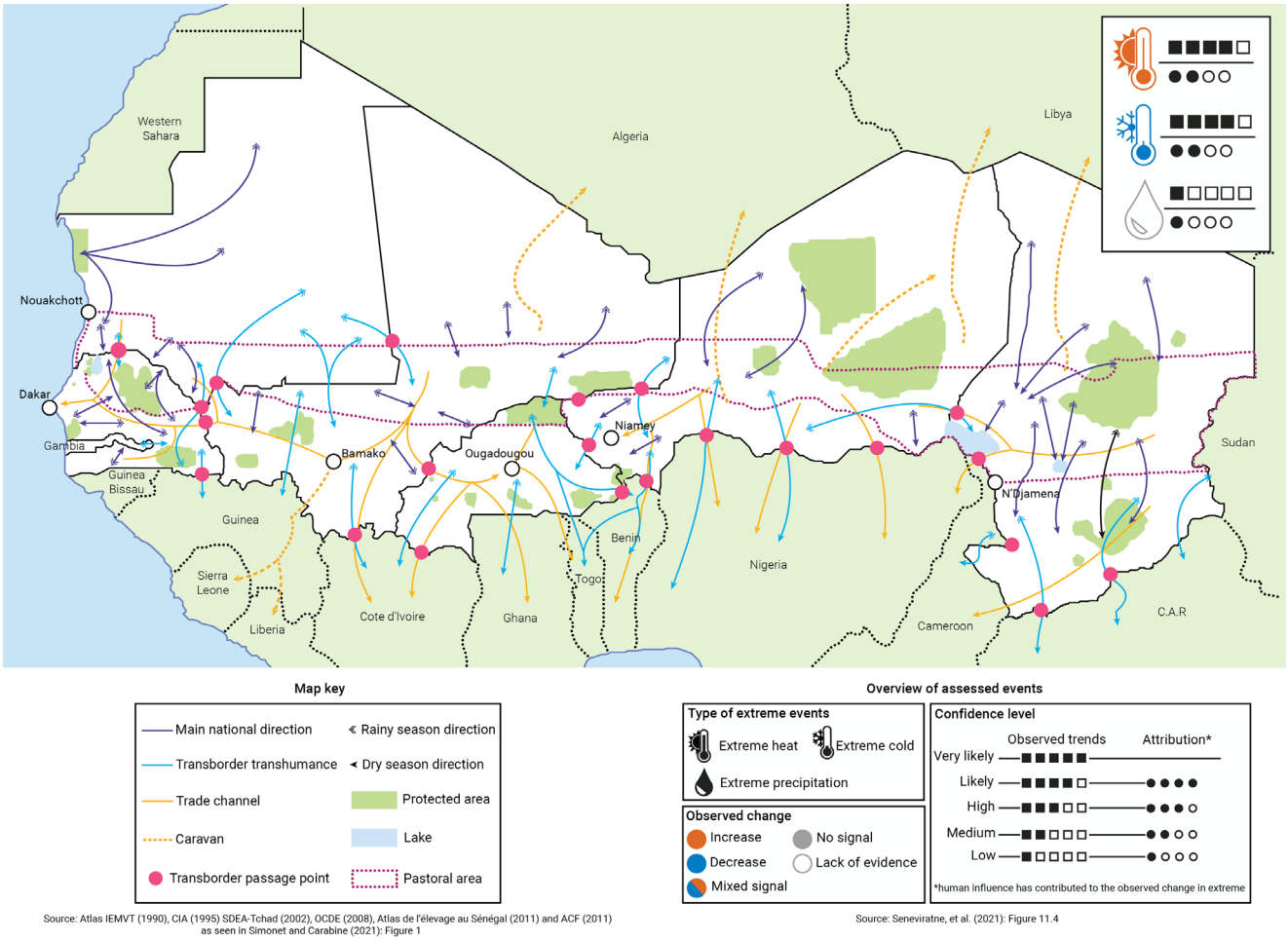
Changes in the frequency and intensity of temperature and precipitation extremes already are, and will continue to impact the livestock sector. Cattle in the southern reaches of the Sahel are likely to face increasing numbers of lethal heat waves, which will reduce livestock reproduction, lead to dairy product spoilage (in the absence of cool storage), and impact meat quality (Trisos et al., 2022). Heavy rains and flooding already disrupt livestock routes and livestock exports to regional and Middle Eastern markets by damaging transportation infrastructure and making terrain muddy and treacherous for animals. And the pre-existing land degradation and desertification of drylands will be accelerated by hotter temperatures and increased evapotranspiration, thereby further reducing fodder and other ecosystem services needed for livestock production; forage and feed quality and quantity for non-tropical species are also directly impacted at temperatures above 35˚C (Godde et al., 2021).

But how do these TCRs arise? And what can be done by governments, pastoralists and others to manage these risks? Answering these questions requires taking a step back and examining the factors that make pastoral systems and livestock sectors vulnerable to climate risks across boundaries.

Rangelands, fodder and water resources underpin the viability of pastoral systems and livestock sectors, and shape cultural pastoral identities. The drylands stretching across Senegal to Ethiopia are characterised by low, variable annual precipitation. In these drylands, extended dry periods are the norm. Pastoral communities have moved and continue to move herds vast distances within and across country borders, in search of sufficient fodder and water resources as well as to trade livestock and livestock products. During the rainy season, pastoralists move herds to seasonal pastures in northern parts of the Sahel, and move south to more humid areas when the dry season sets in. Historically, customary resource management systems governed how pastoral groups collectively used water, fodder and other resources over vast areas spanning up to 200 kilometres (Davies et al., 2018 – see Figure 1). Pastoral mobility reduced the risk of land and vegetation degradation from overgrazing; contributed to soil fertilisation via livestock dung; and was a disaster-resilient livelihood mechanism that protected herds from drought and/or disease (Assouma et al., 2019; Liao et al., 2020).

This risk reduction capacity is being challenged by the growing transboundary vulnerability of decreasing mobility. This is due to the segmentation and loss of rangelands and restrictions on moving herds within countries and across national borders. The causes

FIGURE 1: KEY TRANSBOUNDARY LIVESTOCK AND TRADE ROUTES ACROSS THE SAHEL AND OBSERVED TRENDS IN CLIMATE EXTREMES ALREADY FACED ALONG THE ROUTES



Source: Simonet and Carabine (2021): Figure 1; Seneviratne, et al. (2021): Figure 11.4

of reduced mobility are many, but they all reflect a fundamental lack of enforced land tenure and usage rights security for pastoralists. Some national governments, such as Kenya and Nigeria, have instituted grazing reserves. However, other sub-national and national governments have instituted policies promoting rural commercial farming instead of pastoralism, ranching, the exploitation of mineral and fossil fuel resources and private investments in agriculture – as seen in Ethiopia's *2010–2020 Agricultural Sector Policy* (Flintan et al., 2021). Border management is also becoming increasingly securitised (African Union, 2018). Even where grazing reserves and livestock routes have been gazetted or agreed through customary practice, there is often failure to prevent settlement and encroachment by farmers or land seizures by elites (Higazi and Hassan, 2022). Many of the national adaptation plans (NAPs), national adaptation plans of action (NAPAs) and intended nationally determined contributions (INDCs) prioritise farming over pastoral systems, as will be explored in the case study (Box 2). And, many international donor-funded development projects perpetuate commercial farming biases.

Also, some sub-national and national governments regularly implement border closures and livestock migration bans in response to livestock disease outbreaks and incidences of conflict (Davies et al., 2018). Both Ethiopia and Kenya have had their livestock products banned, and regional and international livestock exports disrupted due disease outbreaks. Lack of multi-country livestock disease monitoring and control, particularly along cross-border routes and at border market towns, has implications for widespread livestock disease and livestock trade disruption as TCRs.

At the same time, populations have increased rapidly, about 3% a year since 1990, leading to more pressure on land, vegetation and water resources (Walther, 2021). In Niger and Mali, for instance, the extent of land cultivated for millet more than doubled between 1970 and 2005 – from 2.3 million to 5.9 million hectares in Niger and 0.54 million to 1.5 million hectares in Mali (Doso, 2014). As a result, lands under agricultural cultivation have expanded significantly, even into lands that are legally reserved for pastoralists. Agricultural cultivation is encroaching upon

pastoral rangelands and watering points. This contributes to incidences of violent conflict between farmers and herders, and strengthens some grievances that support the flourishing of armed groups (Higazi and Hassan, 2022). Reductions in rangeland grazing area and livestock routes have also contributed to overgrazing and land degradation in certain areas. Urbanisation is also an important factor contributing to rangeland fragmentation and resource competition. Since 1990, urban populations across Africa have tripled in size (OECD, 2022); there are estimates that, in West Africa, nearly half the population will live in cities by 2030, particularly border cities (Trémolières and Walther, 2019).

The net result is that pastoralists are losing access to their linchpin climate-resilient strategy: mobility. And, as a result, they are exposed to TCRs such as livestock disease, climate impacts on rangeland productivity and water resources, and disruption to multi-country livestock trade. Without movement within countries and across national borders, the pressures on rangelands that are already under threat from urbanisation, agriculture and mineral/fossil fuel exploitation are exacerbated further by herds that are forcibly concentrated on smaller parcels of land. This creates a feedback loop that increases the sensitivity of rangelands to climate change.

BOX 2: CASE STUDY – PASTORALISM AND ADAPTATION PLANNING

TCRs related to potential impacts on natural resources, livelihoods, trade and economies are recognised within adaptation planning by multiple African countries – Senegal, Chad, Nigeria, Kenya and Ethiopia, to name a few. It was the African Group of Negotiators who successfully petitioned for Article 7, the Global Goal on Adaptation, which states that 'adaptation is a global challenge with local, subnational, national, regional and international dimensions' (UNFCCC, 2015). Yet, how TCRs are explicitly recognised in policies and how they are characterised in terms of vulnerability and exposure factors to whom and what sectors, reflects what kinds of adaptation options and actions a country prioritises.

The NAPs, NAPAs, INDCs and other national plans related to climate adaptation, such as national Great Green Wall strategies or national livestock or agricultural strategies, of various countries reflect a diversity of views around pastoral systems and how pastoralism should be managed (Opitz-Stapleton et al., 2021). National policies, even within a single country, may reflect conflicting views.

Common characterisations of transhumance and nomadism in NAPs, NAPAs and other plans and policies relevant to adaptation include descriptions of mobility as (ibid.):

- a national security issue and a question of sovereign border control
- contributing to widespread land and natural resource degradation through overgrazing, trampling of vegetation and setting bushfires
- increasing competition over natural resources with settled farmers and crop damage and destruction due to the movement of livestock, thereby contributing to conflict and insecurity
- contributing to multi-country livestock disease outbreaks due to poor coordination and collaboration with neighbouring countries
- an outcome of climate change, with pastoralists moving to escape impacts on natural resources.

These views around pastoralism are sometimes in contrast with sub-national and national economic and agricultural policies towards farming and settled ranching. Legal frameworks and sectoral mandates for livestock, agriculture, land, resource rights management and mobility may be held by different government ministries that act in silos, contributing to reduced coherence in adaptation planning that touches multiple sectors. Policy language focuses predominantly on the changes in seasonality and climate extremes, and the risks they pose to agricultural production, food security and food prices. Some countries explicitly mention biophysical risks to pastoralism and livestock production either in conjunction with, or separate from, agricultural concerns. But, others such as Nigeria in its *2020 National Adaptation Plan Framework* provide only a cursory mention of such risks.

National climate policies do not address the local to regional vulnerability and exposure factors that give rise to TCRs for the livestock sector. Adaptation and economic options focus on technological solutions, ranging from agricultural intensification, improving access to irrigation, and improved crop varieties to strengthening the cross-

BOX 2 (CONT'D): CASE STUDY – PASTORALISM AND ADAPTATION PLANNING

border and regional trade of agrifoods. Multiple countries have also signed on to the Great Green Wall initiative, a multi-country antidesertification scheme through the planting of trees and shrubs. As such, these proposed adaptation options are not as detailed for livestock production as they are for agriculture.

Even where pastoralism is seen as a key economic sector and prioritised within adaptation plans, the characterisation of TCRs to pastoral and livestock systems often fails to mention the role of land security and usage rights in creating and perpetuating cross-border risks. Adaptation measures for the livestock sector may advocate ranching, feed lots, and improvements in animal breeding. Somalia's NAPA is one of the few to acknowledge that a scarcity of pasture is contributing to climate risks for pastoralists and calls for planned migration with defined livestock routes to be coordinated within and across national boundaries with neighbouring countries. Burkina Faso's INDC calls for cooperation on establishing watering points along livestock routes. A few countries, such as Kenya, do mention pastoralism positively and call for strengthened disease surveillance and coordination with neighbouring countries to reduce the risk of transboundary animal diseases.

3. Critical reflections on existing policy tools and governance arrangements and limitations

Given the regional interconnectedness of livestock markets and shared rangeland ecosystems, no single African country alone can manage the TCRs to pastoralism and the livestock economies. As has just been illustrated, TCRs are not just driven by climate change extremes and shifts in seasons, but also by socioeconomic and political vulnerabilities on local and regional scales. Even sub-national barriers towards pastoral mobility and rangeland resources can have multi-country impacts.

Sub-national, national and regional adaptation planning need to consider land tenure security and the protection of cross-border rangelands (both between sub-national and country) and livestock routes as part of livestock sector TCR management in national and regional adaptation planning. It is not the place of adaptation planners to tackle land tenure and resource security issues through policies, but such issues do need to be explicitly recognised within adaptation policies and remanded to the appropriate government, judicial and customary systems. Land tenure security for grazing and livestock migration routes, and usage rights for water and vegetation resources, need to be better protected through: enforcing existing legal mechanisms; reviewing and updating land laws from the colonial era that favoured settled farming over pastoral mobility; and working with traditional systems of land and resource governance.

This requires greater cooperation at the local, sub-national and multi-country levels, as well as the adoption and the **implementation** of: (a) regional freedom of movement protocols; (b) the African Union's 2011 Policy Framework for Pastoralism in Africa; and (c) the revised *2018–2030 Migration Policy Framework for Africa*. The continent-wide pastoral policy framework explicitly calls for 'securing access to rangelands for pastoralists through supportive land tenure policies and frameworks, and further development of regional policies to enable regional movements and livestock trade' and to recognise 'the rights of pastoralists, and the need to provide security, services, infrastructure and economic opportunities in pastoral areas which are comparable to non-pastoral' (African Union, 2013). Securing cross-border feed and water points, and stepping up pastoral-consulted vegetation restoration efforts in rangelands as part of Great Green Wall and other multi-country natural resource management initiatives, would help herds in drought and extreme heat situations, while reducing ecosystem degradation risks and trade disruptions.

Beyond addressing land tenure and resource security and livestock routes, enhanced multi-country coordination and cooperation on regional livestock disease surveillance and management systems is needed. Weak legal frameworks for coordinated cross-border disease control and patchy surveillance contribute to transboundary livestock health risks. Some countries have proposed coordinated surveillance along with other disease control measures, such as Kenya in its *Climate Smart Agriculture Strategy 2017–2026*, or they are working with the Food and Agriculture Organization of the United Nations' (FAO) Emergency Centre for Transboundary Animal Diseases (ECTAD) to strengthen their capacity for prevention and monitoring.

While assessing and adapting to TCRs in the pastoral sector is challenging, multi-country steps are being taken. In a 2021 TCR perception study, African adaptation planners and policy-makers were surveyed about the perceived severity and likelihood of some transboundary risks (Opitz-Stapleton et al., 2021). They were also asked what could be done to address them. Respondents indicated that further development and implementation of regional policies, as well as enhancing coordination on action through the RECs, could help in managing TCRs. The Economic Community of West African States (ECOWAS)

recently validated its *Regional Climate Strategy and Action Plan 2022–2030* and explicitly mentions the need for adaptation in the livestock sector (ECOWAS, 2022); the East African Community (EAC) and the Intergovernmental Authority for Development (IGAD) already have regional strategies that touch upon pastoralism. IGAD's *Protocol on Transhumance*, which was endorsed by member states in 2020, calls for 'allowing the free, safe and orderly cross-border mobility of transhumant livestock and herders in search of water and pasture as an adaptation mechanism to climate change and weather variability' (IGAD, 2020: 6).

Regional economic cooperation, trade and natural resource management initiatives provide frameworks and momentum for stronger regional cooperation on adaptation in pastoralism. However, actual adoption and **implementation** of: (a) the recommendations outlined within the African Union pastoral framework; and (b) regional pastoral and transhumance protocols into national and regional adaptation policies and actions are key. Policy formulation without implementation will not help pastoralists adapt to TCRs. And, pastoral networks and organisations need to be involved in national and regional adaptation planning and action.

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