

PASTORALISM AND CLIMATE IN AFRICAN DRYLANDS



African drylands have always been characterized by highly variable rainfall. Pastoralism in Africa's drylands has evolved over millenia in response to this variability. It is a system that is innately adapted to unpredictable climate, and is founded on the pillars of flexibility, mobility, and "keeping options open."

Hindering mobility and flexibility reduces pastoralists' ability to agilely respond to short- and long-term climatic events. Over decades, various "nonclimate stressors" have been mostly responsible for limiting pastoralist movements and adaptations, amplifying pastoral vulnerability across Africa.¹ New technical and policy narratives are also emerging that cast pastoralism in a negative light. For example, high-level debates on global food systems include proposals to dramatically reduce human consumption of animal-sourced foods because meat, milk, and extensive livestock production are "bad for the environment." Although pastoralism is the world's most widespread form of extensive livestock rearing, its environmental and climatic impacts remain highly misunderstood and misrepresented.

¹ Krätli et al., 2023.

This briefing paper presents African pastoralism as an adaptation to uncertain and changeable climate, as well as some of the main challenges that compromise pastoralists' inherent adaptive capacity. It is a complement to *Pastoralism in Africa: A Primer*.² The paper is divided into five parts. Part one is an introduction to pastoralism and climate variability in Africa. Part two focuses on pastoralism in the context of climate change. Part three lays out key nonclimate stressors that cripple pastoralists' ability to adapt and increase their vulnerability. Part four analyzes the narrative linked to "livestock, meat, and milk are bad for the environment." Part five presents key conclusions and recommendations.

Pastoralism and climate variability: a background

It is normal in Africa's drylands, where rainfall is characteristically low, that the amount of rain can be markedly different between years, within years, and even between areas in one year.³ It is also normal that the grasses, bushes, and trees on which livestock depend—in terms of availability and nutritional quality—arise and disappear variably and unpredictably in these landscapes.⁴

Pastoralists have internalized this variability so that it is at the heart of their livelihood and production strategies, and at the core of the customary governance and land use arrangements that mediate their interaction with the environment.⁵ When pastoralists are enabled to practice these strategies, they respond very effectively to the opportunities, and challenges, of variable climate.

Key among their strategies is mobility—sometimes over long distances and across borders—which is essential for accessing resources and minimizing risk. Mobility allows pastoralists to quickly move their herds towards areas where there is sufficient nutritious pasture and available water as and when they become available. This ensures seasonally nutritious, and natural—hence “low-input”—feed,⁶ as is typical of extensive livestock production systems.⁷ Mobility additionally allows the management of herds to coincide with, ideally, the peaking of the nutritional value of pastures and availability of water, and allows quick and strategic response to nonclimate factors, such as to escape conflict, avoid disease, or access markets.

Within their herds, pastoralists also hedge against climate risks.⁸ They select breeds that are suited to the local environment. They keep large herds to build their financial assets and improve the chances of recovery after climate shocks.⁹ They split herds across different ecological locations to spread risk. They keep different species within the herd, for their different grazing needs and resistances to disease and drought, and for their different economic and reproductive capacities. As conditions become drier, camels are favored due to their ability to produce milk with minimal watering needs.¹⁰ Families also loan surplus animals to other community members for subsistence needs and to build up their herds. This strengthens social ties, helps buffer the vulnerable in times of need, and encourages future reciprocity.

Pastoralists are also skilled at continually enhancing their herds to more tightly match their environment. For example, the WoDaaBe in Niger “don't wait for their cattle to adapt” but use selective breeding, over

2 Hesse and Catley, 2023.

3 Anderson et al., 2008.

4 Hesse and Catley, 2023.

5 Krätli et al., 2023.

6 Behnke, 1994; Nassef et al., 2009; Krätli et al., 2023.

7 Karki et al., 2018.

8 Hesse and MacGregor, 2006; Nassef et al., 2009.

9 Catley and Aklilu, 2013.

10 Kagunyu and Wanjohi, 2014; Wako et al., 2017.



generations, to enhance traits that make the animals better suited to the harsh and changeable context.¹¹ This allowed the WoDaaBe to weather the severe droughts of the 1970s and 1980s.

Indigenous pastoral land use and governance arrangements are tailored to enable mobility and flexibility. For example, pastoral communal land tenure, based on customary law and well-observed rules, does not emphasize fixed land “ownership” but rather multiple and overlapping access rights to grazing opportunities over wide landscapes. These rights are negotiated and renegotiated over time, and depend on strong social ties with multiple land users over wide areas.¹²

Climate change and pastoralism

Climate change is introducing new levels of climate uncertainty in African drylands. Global climate models, alongside local observations, indicate increasing temperatures, decreasing rainfall in many places, and increasing variability and unpredictability of the rain—with more/intense rains in some areas, reduced rain in others, and shifts in onset, cessation, and length of rainy seasons, as well as increasing incidences and intensities of natural disasters such as droughts and floods.¹³ High-level narratives on African pastoralism tend to overlook the uncertainty of climate models in specific areas, or how different models predict opposing trends. Yet these narratives also conclude that climate change means the end of pastoralism. In contrast, pastoralism in Africa evolved hundreds of years ago in response to climate variability, and pastoralists use practices such as changing their patterns of mobility, modifying herd composition, storing feed and water to reduce risk, and diversifying livelihoods.¹⁴

¹¹ Krätli, 2008.

¹² Flintan et al., 2021; Pastoralism and Land Access Issues in Africa in this series.

¹³ Hesse and Cotula, 2006; Nassef et al., 2009; Global Center on Adaptation, 2022.

¹⁴ Tugjamba et al., 2023.

For example, droughts have caused substantial excess mortality of cattle in the drylands of Ethiopia and Kenya in recent years. In part, this relates to nonclimate stressors on pastoralist systems (see below). A key response in both countries has been for pastoralists to shift from cattle to camels, which are more drought resistant; this has occurred even among communities for whom camel rearing was considered taboo in the past.¹⁵ These changes illustrate the ability of pastoralists to recognize climate trends and respond by adapting their practices.

In some specific countries and areas, floods have had comparable consequences. In South Sudan, large areas are typically flooded in each year, and pastoralists graze their livestock on lush grass as the floods recede. However, recent years have seen a vast expansion of flooded areas, leading to high loss of livestock.

Pastoralists have responded by shifting towards livelihoods unrelated to livestock, such as canoeing and fishing, and moving to towns.¹⁶ Livelihoods diversification is common when pastoralists deal with hazards.¹⁷ However, diversification doesn't mean that pastoralism is dying, as households can diversify temporarily and until they are able to rebuild their herds. Studies in South Sudan have shown that while livelihood diversification has been key in the aftermath of floods, many people—particularly in rural areas—seek to return to livestock rearing when conditions improve. In rural areas, far from towns and markets, livestock are seen as the best and most secure form of food, providing on-the-spot meat, milk, and blood, when other options are not available or difficult to access.¹⁸ Some seek to practice pastoralism alongside other livelihoods, while others exit pastoralism altogether. Pastoralist aspirations in the context of a changing climate depend on many factors, including rurality, wealth, gender, age, and shock exposure.¹⁹ They also depend on whether pastoralism, with its core characteristics of mobility and flexibility, is enabled or obstructed by nonclimate stressors.

Nonclimate stressors hindering pastoralist adaptive capacity

The Moving Up-Moving Out analysis explains how multiple long-term trends combine to cause gradual changes in pastoralist communities in Africa.²⁰ These trends include declining access to productive rangeland due to appropriation of pastoral land and related pressures on mobility as land becomes fragmented. As increasing numbers of households own fewer animals, adaptation around livestock management becomes more difficult. Commercialization of pastoralist livestock systems is another important nonclimate factor that skews livestock ownership and pushes households into poverty traps, where adaptation options are limited.

In addition to demographic, economic, and land access trends, there is a long history of often well-intentioned but ill-informed development programs and policies. These have often focused on settling pastoralists and “modernizing” them, but have compromised pastoral adaptive capacity and failed to improve their development. A study in Kenya showed that in 80% of pastoralist households, those who were mobile were less likely to lose their livestock and become food insecure than those who were settled.²¹ Similarly in Ethiopia, livestock was more at risk of succumbing to drought among settled pastoralists, and many people abandoned pastoral settlements to escape drought.²² Ill-informed permanent water provision in parts of the drylands has also backfired, causing settlement, and in turn overgrazing and land degradation in pastures that were traditionally only seasonally grazed to allow them to recover.²³

15 Kagunyu and Wanjohi, 2014; Wako et al., 2017.

16 Humphrey et al., 2023a; Humphrey et al., 2023b.

17 Fitzpatrick and Young, 2016.

18 Humphrey et al., 2023b.

19 Ibid.

20 Hesse and Catley, 2023.

21 Little et al., 2008.

22 Devereux, 2006.

23 Wako et al., 2017; Nassef and Belayhun, 2012; Krätli et al., 2023.

Although mobility is critical for efficient and flexible pastoralist livestock production, the formal policy context in Africa is varied in terms of supporting mobility and therefore indigenous pastoral adaptation to climate change. Higher-level policies of the African Union and some Regional Economic Communities explicitly support pastoralist mobility within and between countries, whereas at national level, policies often continue to call for settlement and “modernization,” seeing pastoralists’ way of life as an obstacle to development and pushing fixed-point means of production, including cash crops and industrialized or “modernized” livestock production. In parallel, land privatization is spreading, and has weakened communal tenure systems, opening up land to users who are not tied by the norms and rules so crucial to enabling mobility.²⁴

Historical and ongoing land appropriation in the drylands, for other “more productive” land uses such as conservation and agriculture has compounded the problem. Excising land in this way—usually under private tenure arrangements—fragments the drylands, removes critical grazing areas, and hems in pastoralists, frustrating their mobility and hobbling their capacity to flexibly respond to the demands of climate.

The Intergovernmental Panel on Climate Change (IPCC) acknowledges that these nonclimate factors increase pastoralists’ vulnerability to climate change, and while climate shocks are outside the realm of control, policies and development pathways in the drylands are not.²⁵

Are livestock, meat, and milk from pastoral production really that bad for the environment?

The current global narrative around livestock and climate change argues that because livestock are an enormous source of greenhouse gas emissions, diets must shift away from meat and milk towards plant-based foods and alternative protein sources, such as cultured meats, and land use must move away from extensive livestock production to more “efficient” and “land sparing” uses that are better for our planet.²⁶ This narrative is highly problematic in pastoral contexts for multiple reasons.

For example, the most influential reports that inform this narrative—including reports by the IPCC and the UN Food and Agriculture Organization (FAO)—are based on a narrow set of data derived mainly from industrial livestock production systems in high-income countries.²⁷ These systems focus on intensive livestock farming, involving feedlots, imported feed, and fossil fuel- intensive processes. They position livestock as a consumer item, with an endgame of meat and milk. In turn, emissions calculations focus mainly on the farm as a unit of production, and on livestock “products” such as meat and milk—from production to retail.

Mainstream emissions calculations therefore represent a very narrow focus that misses the bigger picture in a pastoralist system, where livestock are not just a “product” but perform many other vital economic functions.²⁸ Pastoral production is indispensable for the livelihoods of millions of people for whom it provides nutrition,

income, assets, and insurance, aside from draft power, fertilizer, and transport. Beyond the economic tangibles, livestock are also central to social capital and the networks that support vulnerable households during crises.²⁹ Mobile grazing of grasslands and shrublands is also vital for ecosystem health, as these landscapes have been grazing-dependent for millennia and have co-evolved with wild and domesticated herbivores.³⁰ Grazing also

24 Mwangi and Dohrn, 2006.

25 Krätli et al., 2023.

26 Houzer and Scoones, 2021.

27 Ibid.

28 Ibid.

29 Weiler et al., 2014.

30 Price et al., 2022.



contributes to the sequestration of carbon and nitrogen in the grasslands, with active grazing contributing more to carbon sequestration than no grazing,³¹ and light grazing, enabled by livestock mobility, contributing to carbon sequestration, unlike heavy grazing, which causes soil carbon and nitrogen loss.³²

Taking a systems approach to emissions calculations in pastoralist areas, which factors in the multiple functions of livestock, drastically changes the emissions picture. For example, a study in Kaptumo, Kenya, showed that factoring in the nutritional, economic, and livelihoods role of livestock yielded emissions calculations of 2.0, 1.6, and 1.1 kg CO₂-e/kg milk, respectively, which is lower than the global average of 2.4 kg CO₂-e/kg milk and the Sub-Saharan African average of 7.5 kg CO₂-e/kg milk as presented in global studies.³³ Meanwhile, a study in the Ferlo region of northern Senegal found that while emissions produced by livestock and manure were estimated at 0.71 t CO₂-eq per year, this was offset by livestock-assisted carbon sequestration at a value of 0.75 t CO₂-eq per year.³⁴

Besides the problem with emissions calculations, it is important also to question the suggestion to replace extensive grazing systems for more “efficient” and “land-sparing” land uses in the drylands.³⁵ Aside from the fundamentally different view of efficiency in pastoral landscapes, which goes beyond the limited commercial

31 Shi et al., 2013.

32 Zhou et al., 2017; Chen et al., 2015.

33 Ibid.

34 Assouma et al., 2019.

35 Houzer and Scoones, 2021.

and industrial view of efficiency in terms of milk and meat production,³⁶ there is also the question of sparing the land for what? For example, removing livestock from Africa's drylands and allowing "re-wilding" will likely mean the grazing niche will be replaced by wild herbivores, which are also methane emitters.³⁷ Tree planting, often promoted by the global narrative,³⁸ may also be a misguided solution for climate change mitigation in such contexts, as grasslands may have higher potential for carbon sequestration than forests and are safer from fire as underground carbon stores.³⁹ Also, the risks and constraints associated with large-scale tree-planting initiatives need to be properly assessed and are likely to mirror the challenges of many other failed development programs in pastoralist areas, including poor planning, inappropriateness to local ecosystems, and limited or no involvement of pastoralists themselves.⁴⁰

Finally, advocating for less production and consumption of animal-sourced foods is misplaced in an African pastoralist context. Livestock products have high nutritional value and are essential foods for young children, and pregnant and lactating women, in populations at high risk of severe malnutrition. Foods of comparable nutritional value are not available or affordable in these areas.

Conclusions and recommendations

This briefing paper presents pastoralists as skilled navigators of climate variability and outlines the critical nonclimate factors that prevent pastoralists from adapting to climatic events. The paper also reviews wider global debates on livestock emissions and climate change, and shows that emissions calculations for nonpastoralist systems should not be extrapolated to pastoralism. Pastoralism in Africa has long suffered from basic technical misunderstandings at technical and policy levels, and current high-level climate change-livestock narratives are yet another layer of inappropriate science and analysis being applied to pastoralism.

Pastoralism in Africa has evolved specifically to adapt to climatic variability, and when allowed to function, these adaptations are highly appropriate and climate-sensitive. Major barriers to these adaptations are national policies that continue to support the fragmentation of pastoral lands and so reduce herd mobility and efficient livestock production. While this fragmentation is often framed under modernization agendas, the political economy of private land acquisition is clear.

For agencies such as United States Agency for International Development (USAID), important challenges include:

- How to raise awareness and common understanding of pastoralist systems in Africa, the economic and ecological rationale of livestock mobility, and how this is the basis for indigenous climate-related adaptability.
- How to ensure that in relation to global climate change debates, livestock emissions data from nonpastoralist systems are not misapplied to African pastoralism. How can more research and analysis that is specific to African pastoralism and climate change be supported through a systems approach?
- Under USAID's Policy on Indigenous Peoples and in line with USAID's localization agenda, how can pastoralist communities be better involved in local decision-making and action on climate change? How can climate-related initiatives in pastoralist areas be co-designed and co-evaluated?
- How can the clear policy support to pastoralist mobility in the African Union and Regional Economic Communities be better transferred to national policies and actions in countries with pastoralist populations?

36 Manzano and White, 2019; Houzer and Scoones, 2021.

37 Manzano and White, 2019; Alibés et al. 2020.

38 Houzer and Scoones, 2021.

39 Ibid; Dass et al., 2018.

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Gerald J. and Dorothy R. Friedman
School of Nutrition Science and Policy
FEINSTEIN INTERNATIONAL CENTER



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