

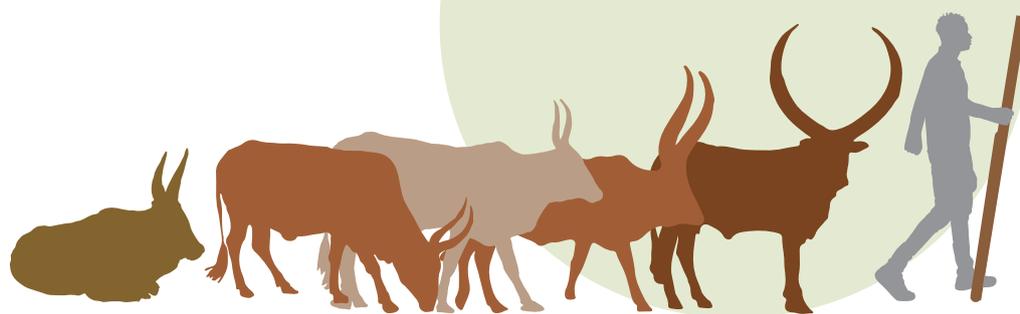


Climate Resilience – What can we learn from Pastoral Systems in Africa’s Drylands?

Policy Brief

Key messages

- As global temperatures continue to increase, food systems are facing a double burden: while emitting over one third of global greenhouse gases, they are jeopardised by climate change at the same time. Increasing energy inputs to stabilise production from rising climate variability also increases global warming. A fundamental overhaul of global food systems is needed with an alternative approach to climate resilience, with low emission strategies at the core.
- Pastoralism in Africa’s drylands offers valuable lessons for climate resilience. Pastoralists in highly variable environments are professionals in adapting to change and dealing with uncertainty while not relying on energy-intensive processes that have caused climate change in the first place. Key factors supporting pastoralists’ resilience include strategic mobility, diversity of assets, adaptive resource management strategies, and strong customary institutions.
- Pastoralists’ climate resilience is put under pressure by diverse non-climate stressors, including policies of sedentarisation, the reduction and fragmentation of traditional pastoral areas, and inappropriate land governance.
- Maintaining pastoralists’ resilience to climate variability depends on an appropriate enabling environment including good governance and regulations that allow for mobility, access to land and water, appropriate infrastructure, and reliable and accessible basic services.
- Smallholder farming in drylands can learn from pastoralism to address the challenge of sustainably producing food in an increasingly unpredictable climate.



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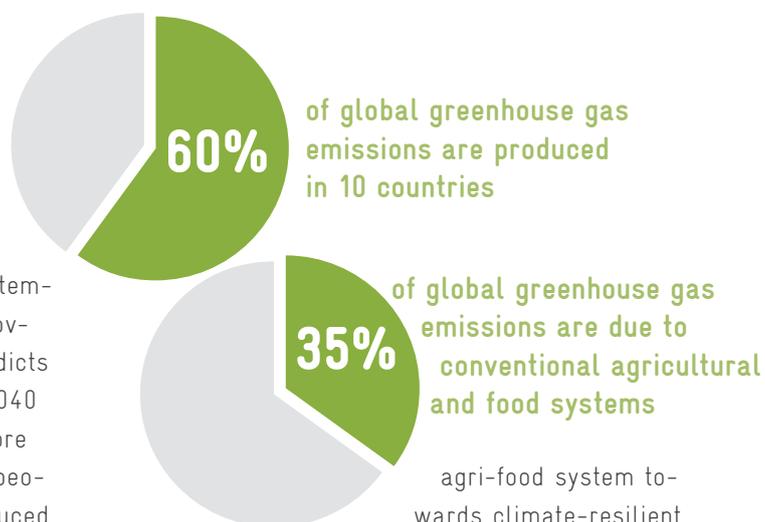




Background

Since the industrial revolution, global average temperature has increased by over 1°C. The Intergovernmental Panel on Climate Change (IPCC) predicts that global warming will reach plus 1.5°C by 2040 or earlier. Higher average temperatures and more frequent weather extremes expose millions of people worldwide to acute food insecurity and reduced water security. Beyond 1.5°C there will be a sharp increase in the risk of triggering a tipping point in one or more of Earth's natural systems like oceanic currents. In that case, their capacity to adapt to climate change and to provide critical ecosystem services may be substantially lowered or even lost. Already today, dryland areas are characterised by high uncertainty, water scarcity and food insecurity, affecting millions of small-scale food producers particularly in sub-Saharan Africa.

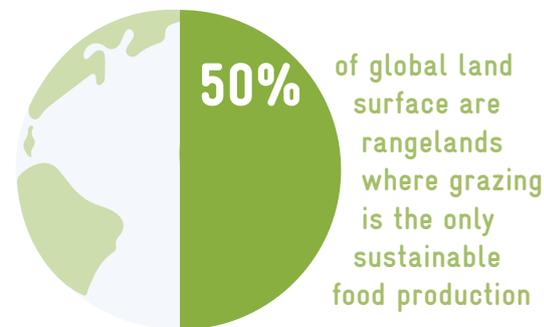
Conventional agricultural and food systems are a major driver of climate change with a contribution of about 35 per cent to global greenhouse gas emissions. At the same time, they suffer significantly from climate change as well as elevated CO₂ levels, increased weather extremes and pest and disease outbreaks destroy harvests, increase livestock mortality, reduce areas suitable to crop cultivation, and foster water scarcity – factors predominantly affecting smallholder-based production systems. To enhance food security, improve rural livelihoods and maintain life-supporting ecosystem functions, a fundamental rehaul of the



agri-food system towards climate-resilient and low-emissions systems is critically needed. In this process it is important to challenge the current perception of climate resilience in agriculture. Agricultural systems that rely on operating in artificially stable environments appear more resilient to current levels of climate variability. But with increasing global climate variability they are rapidly becoming unsustainable as their resilience largely depends on high, fossil-based energy inputs.

In this context production systems like pastoralism in drylands – with high adaptive capacity to variable environments and uncertainty relying on little external inputs – provide valuable insights. This policy brief aims to draw attention to the lessons pastoral systems offer in the face of climate change. Exploring the key factors enabling and hampering the resilience of pastoral systems to climate change, it indicates how the challenge of sustainable and resilient food systems could be tackled under increasingly unpredictable climatic conditions.





Professionals in adaptation to a changing environment

Over half of the global land surface is rangelands i.e. regions that can be used economically and sustainably for food production only through grazing. Pastoral systems are able to make use of about 70 per cent of the rangelands, including some of the most extreme environments in terms of natural and climatic conditions. Estimates of the number of pastoralists worldwide vary between 200 and 600 million people, depending on definitions. By making use of the vast expanses of rangelands not suited for crop production, pastoralist systems produce substantial economic value. Despite chronic under-investment, pastoralism's contribution to agricultural gross domestic product (GDP) can make up to 40 per cent in some sub-Saharan African countries, often providing the bulk of meat for both domestic markets and exports.

As pastoralist systems make only negligible use of external inputs, they are among the most efficient in the world in terms of sustainably producing human-edible proteins.

Resilience to climate variability is at the core of pastoralist livelihood systems. The concept of

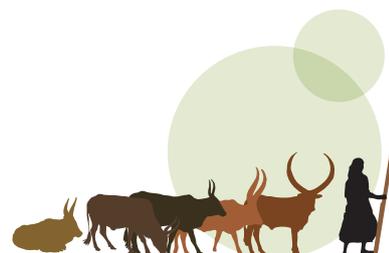
resilience describes the capacity of intricately linked social and ecological systems to withstand sudden shocks and to adapt or even transform in the face of unexpected change. This understanding of resilience emphasises adaptability and transformability in light of uncertainty, while recognising the interconnectedness between ecological and social dimensions.

Pastoralists achieve a relative stability of food production under extreme and variable natural conditions because they are experts in managing uncertainty. This is realised by working with nature and adapting to environmental circumstances rather than by creating artificially controlled environments, i.e. separating production from nature. Pastoralists' capacity to adapt to variability within the ecosystems they inhabit and manage makes pastoralism the most suitable agricultural land use system in drylands. Compared to other land use systems, pastoralism is further characterised by the sustainable use of natural resources, resulting in significant ecosystem benefits.

Figure 1 Achieving relative stability by matching highly variable inputs with equally variable strategies



Figure adapted from Roe E. 2020. [A New Policy Narrative for Pastoralism? Pastoralists as Reliability Professionals and Pastoralist Systems as Infrastructure](#), STEPS Working Paper 113, IDS, Brighton, United Kingdom.



Variability in strategies and diversity of assets – The key elements of pastoralist resilience

Pastoralists' underlying logic of integrating and adapting food production within highly variable natural environments is at the core of their resilience. Their ability to use unpredictable environments and to benefit from variability is based on keeping the production system itself highly flexible. They adopt production strategies and operational processes variable enough to match the variability of inputs from the natural environment. As pastoralists specialise in operating with uncertainty rather than externalising it, they can be described as 'better prepared to be surprised' – a strategy that becomes increasingly important with climate change.

The most obvious example of this systemic variability in pastoralism is strategic mobility – a strategy to increase livestock productivity by optimising the use of short-lived and unpredictable grazing opportunities. Strategic mobility enables pastoralists to arrive on the forage at the time when nutrients peak, and do so for months on end, although in every location they visit this opportunity only lasts for a few days. Mobility also allows pastoralists to minimise their exposure to drought and other non-climate stressors.

Variability is also embedded in other areas of pastoral livelihood strategies. Their livestock breeding systems combine populations that make use of constantly changing landscapes. Thus, breeds

are permanently in the making to include genetic diversity as well as multiple, complex and rapidly adaptable combinations of animal learned behaviour and performance. Having a diversity of assets – including substantial livestock holdings of a variety of species, in order to take advantage of their specific qualities – reduces pastoralists' sensitivity to individual hazards. Non-livestock assets can be easily converted into cash. Large networks of kin and friends spanning rural and urban contexts in often distant locations contribute to bonding and bridging ties within and outside communities and support pastoralists in their mobility on their routine routes and during exceptional migrations.

Customary social organisation and institutions in drylands have evolved in view of the need to keep options open. Such institutions are usually based on inclusionary principles and a combination of individual and collective decision-making and natural resource governance, e.g. in terms of access to grazing land and water. For instance, communal land tenure systems, developed as customary law over generations and tailored to the needs of natural resource users in drylands, allow multiple and overlapping access rights to grazing opportunities. They facilitate seasonal patterns of crop-livestock integration, with specialist farmers and specialist pastoralists using the same space for their purposes at different times of the year.



Environmental benefits – Important but often neglected

Pastoralism not only benefits from well-functioning dryland ecosystems, but typically ensures ecosystem health – a positive interaction which is increasingly acknowledged. Pastoralist systems allowed to operate according to their specialisation excel in water use efficiency and in the provision of ecosystem services and biodiversity. Ecosystem services from pastoralism range from seed dispersal and control of shrub growth to landscape functionality and ecosystem connectivity via mobility. Synergies between pastoralists and farmers also bring multiple benefits to the rural economy. For example, pastoralists breed animals that farmers can use for draught (oxen) and transportation (donkeys, camels and oxen). By moving with their herds, pastoralists take affordable high-value proteins and natural fertiliser to crop-farming communities. Yet, many of the benefits pastoralists offer in relation to the ecosystems they naturally manage are still too often neglected and underappreciated.

This also applies to the contribution of pastoralism to the benefits from healthy ecosystems for carbon sequestration. Pastoral systems operate as part of rangeland ecosystems, which hold amongst the largest carbon stocks in the world. An assessment of the carbon footprint of a pastoral system in the Sahel – based on an 'ecosystem approach' that includes the rangeland ecosystem that pastoralism uses and maintains – found it to be carbon neutral. Pastoral systems mimic natural carbon cycles and replace natural methane emissions from wild herbivores rather than adding to them. If pastoralism were to be removed, the forms of land use that would fill the same ecological niche would either release soil carbon or maintain emission rates similar to those of pastoralist systems.



The impact of non-climate stressors on pastoralist resilience

For decades, pastoralists have been affected by the intended and unintended outcomes from a long history of interventions and policies based on a view of pastoralism as a barrier to development. These outcomes have led to non-climate stressors that deeply affect the socio-economic and political conditions in which pastoralists live and operate. Most prominently, they include the promotion of sedentarisation and related measures. For example the creation of permanent water sources in seasonal rangelands and the provision of basic services only to settled populations, restrict the mobility of pastoralists and increase the pressure on the existing resources e.g. through overgrazing. Inappropriate land policies, the privatisation of natural resources, and exclusionary conservation programmes, among others, are increasingly leading to the loss or fragmentation of rangelands, the loss of crucial dry season grazing reserves, competition with crop farming, mining, urbanisation, and (violent) conflicts between herders and farmers.

A recent example of non-climate stressors is associated with the ongoing COVID-19 pandemic. Closing the borders further limited the mobility of pastoralists and their access to markets. Combined with the overstretching of already inadequate health services, this seems to have caused more harm to pastoralists than COVID-19 itself.

The IPCC states explicitly that 'addressing non-climate stressors facing pastoralists, including policy and governance features that perpetuate their marginalisation, is critical for reducing vulnerability'. This highlights the strong influence of socio-economic conditions, and their institutional and governance context, on the resilience of pastoral systems. And it points out how non-climate stressors – especially those that limit mobility, reduce the diversity of assets, and undermine social organisation and institutions – have increased pastoralists' vulnerability to climate stressors.



Strengthening pastoralist resilience

Protecting and strengthening the resilience inherent in pastoral systems means to recognise and adjust the damaging legacy of past and existing development policies. Pastoralists need to be able to use and restore traditional systems with their logic of keeping options open. An enabling socio-political and legal environment for pastoral systems at national and regional level should avoid limiting options for pastoral systems, and allow them to operate flexibly instead. The protection of pastoralists' core resilience mechanisms – process variability and diversity of assets – needs to become a governance focus. Land, water and tree tenure systems with multiple overlapping rights for different natural resource user groups can support rural livelihoods and peaceful co-management of resources. Land use planning also needs to account

for customary and traditional institutions including land and natural resource tenure traditionally held by pastoralists. Embedding systemic variability in the provision of basic services and infrastructure could be achieved by developing parallel channels of health-service provision – mobile phone based, and mobile/community based – for people and animals. Access to climate-related information can help to be better prepared for the rising unpredictability associated with climate change. All these measures can be successful only in dialogue with pastoralists and by building on their expertise. Policy development at local, national and landscape level needs to be based on genuine participatory planning with producers – farmers and pastoralists, men and women, young and old.

Figure 2 The social-ecological resilience framework

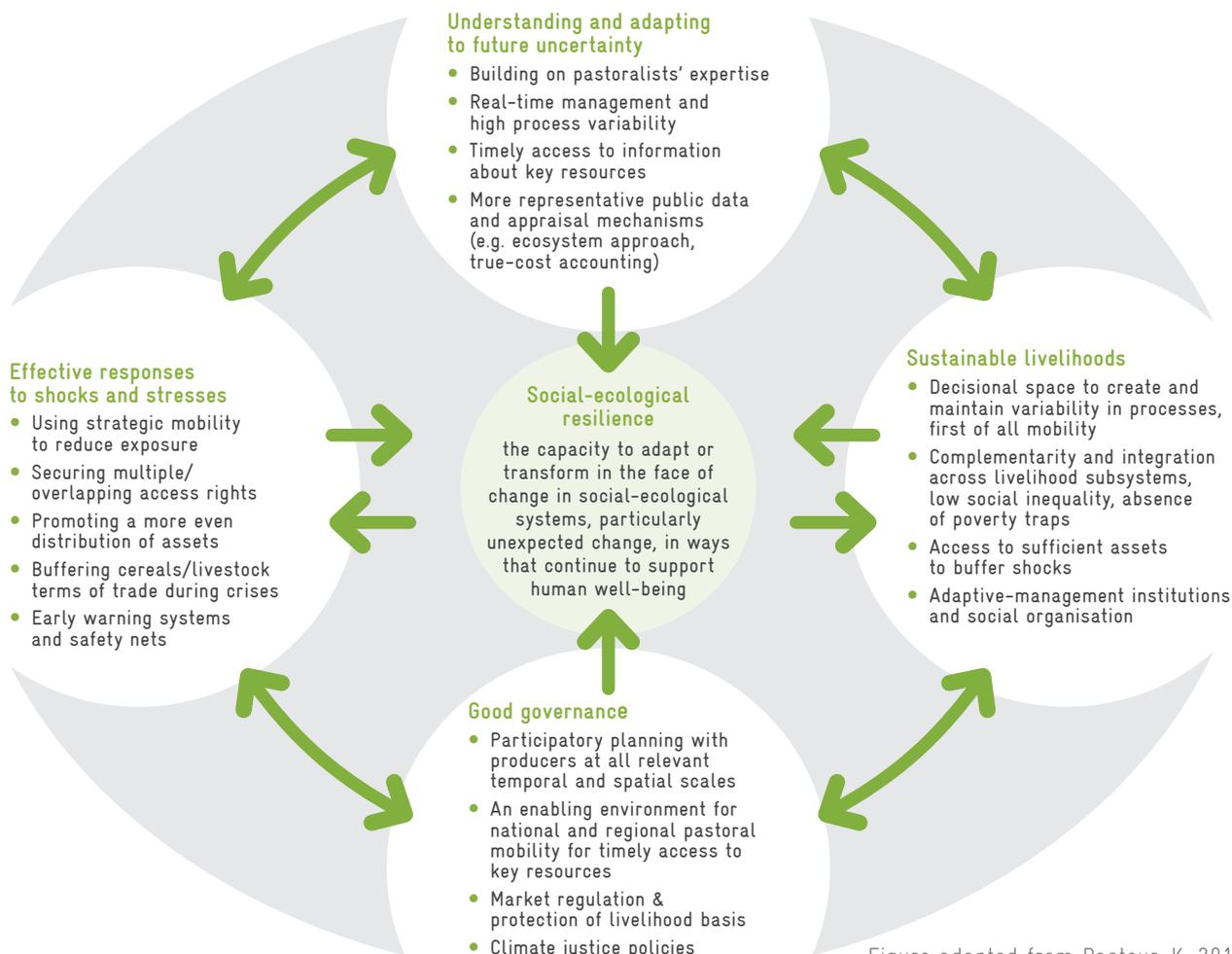


Figure adapted from Pasteur, K. 2010. [From Vulnerability to Resilience](#), Practical Action, Rugby, United Kingdom.

Lessons learned for smallholder farming systems in drylands

Livelihoods of small-scale producers in the drylands are already being destroyed in connection with climate change. Including through the measures that powerful players are taking, in order to brace themselves for the mounting uncertainty – measures from land grabbing to geopolitical reordering. This situation will drastically worsen in the future and is likely to lead to a shift in areas suitable for staple food production, further straining local livelihoods and employment opportunities in drylands and beyond. This underscores the critical need to strengthen the resilience of smallholder-based production systems.

Learning from pastoralism can foster the resilience of smallholder-based agri-food systems more broadly. This concerns both the core elements of pastoralist adaptation strategies (process variability and diversity of assets) as well as the need to remove non-climate stressors. Smallholder farming households also have developed variable strategies in their traditional farming systems which have come increasingly under pressure through agricultural and economic strategies focussing on large-scale, conventional agriculture. Fostering resilience to climate change therefore needs to look at ways of supporting and enabling well-targeted process variability in drylands farming systems. At

the same time, interventions should not pressure the local population to adopt adaptation measures based on high energy inputs or driven by the conventional approach that externalises natural processes. It is also important to include the different existing farming systems (sedentary and mobile) and to reflect and strengthen the interaction between them.

In conclusion, such an approach could enable both agroecosystems and rural communities to better cope with variable environmental circumstances, enhance adaptive natural resource management and achieve fairly resilient agri-food systems even in the face of increasing climate variability. Yet agri-food systems can achieve their full resilience potential only if backed by ambitious climate change policies to avoid a climate catastrophe, and by an appropriate political and a legal environment that allows for adaptive co-management of natural resources and the peaceful cohabitation of diverse natural resource user groups.

For more information, please see the technical background paper on: www.celep.info and www.giz.de/en/worldwide/104357.html



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