SPARC
Supporting Pastoralism and Agriculture in Recurrent and Protracted Crises

AGNES
African Group of Negotiators Experts Support

Adaptation Without Borders

August 2023

POLICY BRIEF

HOW CAN AFRICA MANAGE THE TRANSBOUNDARY CLIMATE RISKS IT FACES?

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Key Messages

- The impacts of climate change, as well as the mitigation and adaptation actions taken in one or more countries, can generate risks to neighbouring countries or cascade across regions and the wider world. These are transboundary climate risks.
- Transboundary climate risks have the potential to set back economic development gains, jeopardise trade and food security and impact infrastructure investments in Africa.
- Growing populations and shifting diets are creating new dependence on food imports in Africa, which generates new transboundary climate risks for food security.
- Foreign direct investment and infrastructure investments are a critical part of Africa's green, sustainable development agenda, but infrastructure which is not resilient to climate change impacts is at risk of damage, poor performance or destruction. This raises a number of risks regarding debt and cascading regional economic losses as a result of disrupted connectivity.
- Hydropower is responsible for the majority of Africa's electricity generation, but climate impacts to water supply, such as prolonged drought, create issues for hydropower generation which can cascade and create trigger cross-border risks.
- Transboundary climate risks call for greater cooperation and management between the African Union, regional economic communities and their Member States in areas such as trade, regional infrastructure and agriculture.

Background

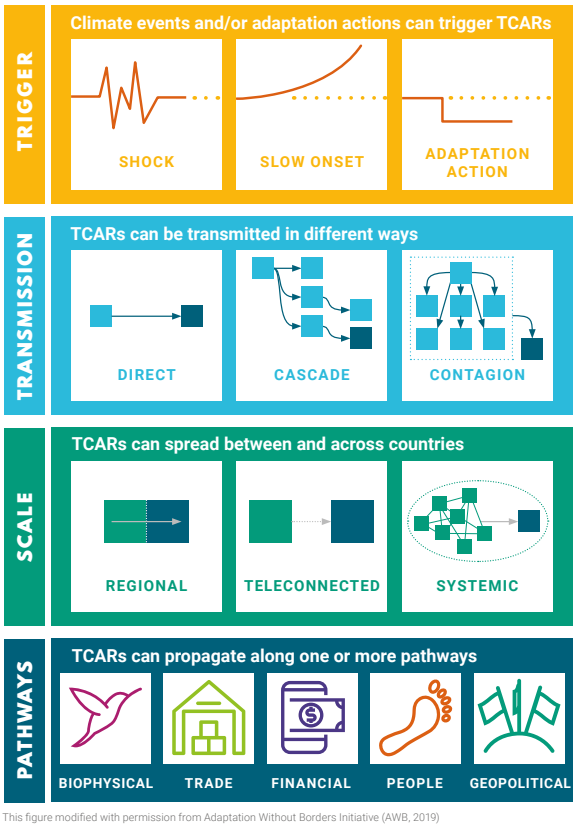
In our interconnected world, the impacts of climate change, as well as the mitigation and adaptation actions taken in one or more countries, can generate risks to neighbouring countries, or cascade across regions and the wider world. These are 'transboundary climate risks' or TCRs.

TCRs can be transmitted between neighbouring countries, within regions or among countries thousands of kilometres apart along a number of different pathways (see Figure 1 and Opitz-Stapleton et al., 2021). This brief focuses on five risk pathways: **biophysical** (potential impacts on shared natural resources or the cross-border spread of livestock disease); **financial** (such as foreign direct investment in major infrastructure projects); **trade** (import and export of climate-sensitive goods like rice and implications for food security); **people-centred** (cross-border movement, ranging from displacement to transhumance); and **geopolitical** (regional cooperation on multi-country efforts like the Great Green Wall).

A recent study by the programme Supporting Pastoralism and Agriculture in Recurrent and Protracted Crises (SPARC) found that African policymakers are concerned with some 25 transboundary climate risks, in particular cross-border livestock and crop disease, regional displacement, and insecurity (see Figure 2 and Opitz-Stapleton et al, 2021).

There are, moreover, transboundary climate risks in trading with countries and regions beyond the continent, including to agricultural supply chains with implications for food security or to pharmaceuticals (Harris et al., 2023).

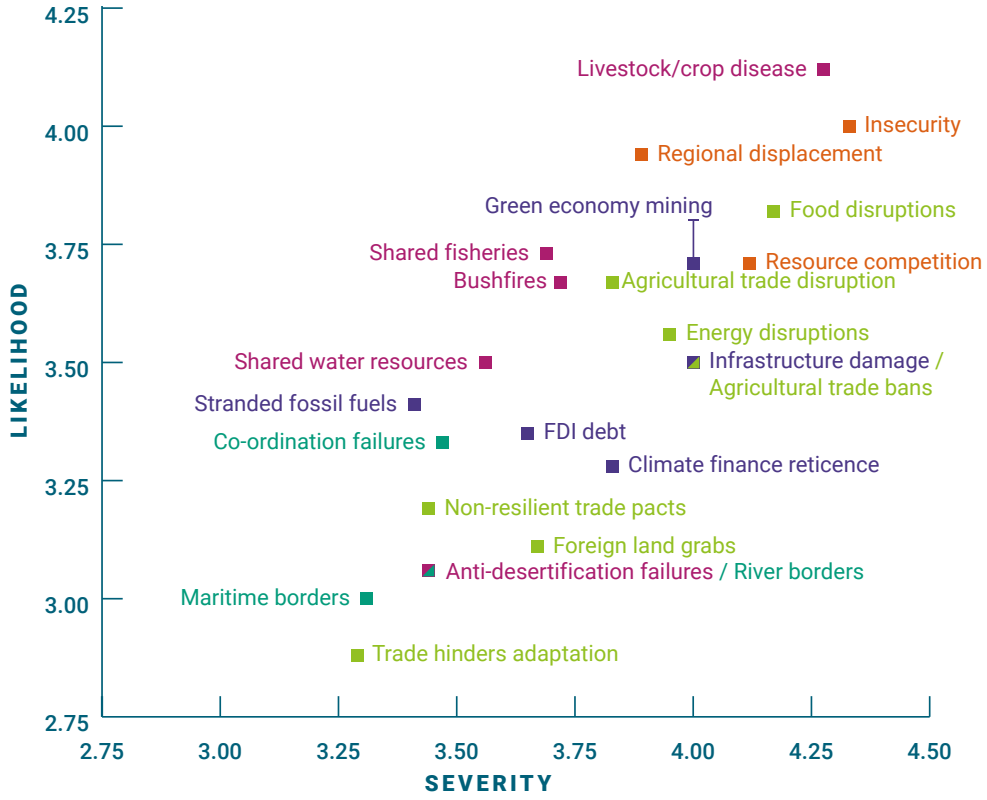
FIGURE 1. TCRS – WHAT TRIGGERS THEM AND HOW THEY CAN SPREAD



This figure modified with permission from Adaptation Without Borders Initiative (AWB, 2019)

Source: Opitz-Stapleton et al., 2021

FIGURE 2 LIKELIHOOD AND SEVERITY RANKINGS OF TCRS FROM A RISK PERCEPTION SURVEY



KEY: Risk pathway

- Biophysical
- Trade
- Financial
- People
- Geopolitical

Top 5 TCARs by likelihood

1. Livestock/crop disease
2. Insecurity
3. Regional displacement
4. Food disruptions
5. Shared fisheries

Top 5 TCARs by severity

1. Insecurity
2. Livestock/crop disease
3. Food disruptions
4. Resource competition
5. Three-way tie: Agricultural trade bans, green economy mining, infrastructure damage

Source: Opitz-Stapleton et al., 2021.

Scientific evidence about climate change shocks or slow-onset events triggering impacts that cross national boundaries has been highlighted in multiple Intergovernmental Panel on Climate Change (IPCC) reports for several decades. The Sixth Assessment Report recognises that (IPCC, 2022: 19):

> *Weather and climate extremes are causing economic and societal impacts across national boundaries through supply chains, markets and natural resource flows, with increasing transboundary risks projected across the water, energy and food sectors (high confidence). Supply chains that rely on specialised commodities and key infrastructure can be disrupted by weather and climate extreme events… Precipitation and water availability changes increases the risk of planned infrastructure projects, such as hydropower in some regions, having reduced productivity for food and energy sectors including across countries that share river basins.*

But the potential cross-border impacts of adaptation and mitigation – whether directly spreading through a region, cascading through linked systems, or a contagion spreading through global systems – have only recently begun to be recognised by policy makers and by scientists. For the first time in IPCC reports, it is recognised that 'risk can be introduced by human responses to climate change'; the inclusion of risks arising from human mitigation and adaptation actions is new to IPCC risk concepts (IPCC, 2022: 5).

African policy makers are also calling attention to the transboundary risks that can arise from mitigation and adaptation actions. The African Group of Negotiators was instrumental in the of Article 7 of the Paris Agreement and the recognition '*that adaptation is a global challenge with local, subnational, national, regional and international dimensions*'. At the continental level, there is also recognition by African institutions of the need to manage transboundary climate risks. This is embodied in the Africa Climate Change and Resilient Development Strategy and Action Plan (2022-2032) that sets out inter alia, to '*enhance coordination between the regional economic communities and Member States in addressing and managing transboundary and cascading climate risks*' (AU, 2022). And at the 18th Session of the African Ministerial Conference on the Environment (AMCEN), the ministers acknowledged, '*We recognise the importance of enabling African Member States to identify, manage and adapt to transboundary and cascading climate risks in line with Africa's Climate Change and Resilient Development Strategy and Action Plan*'.

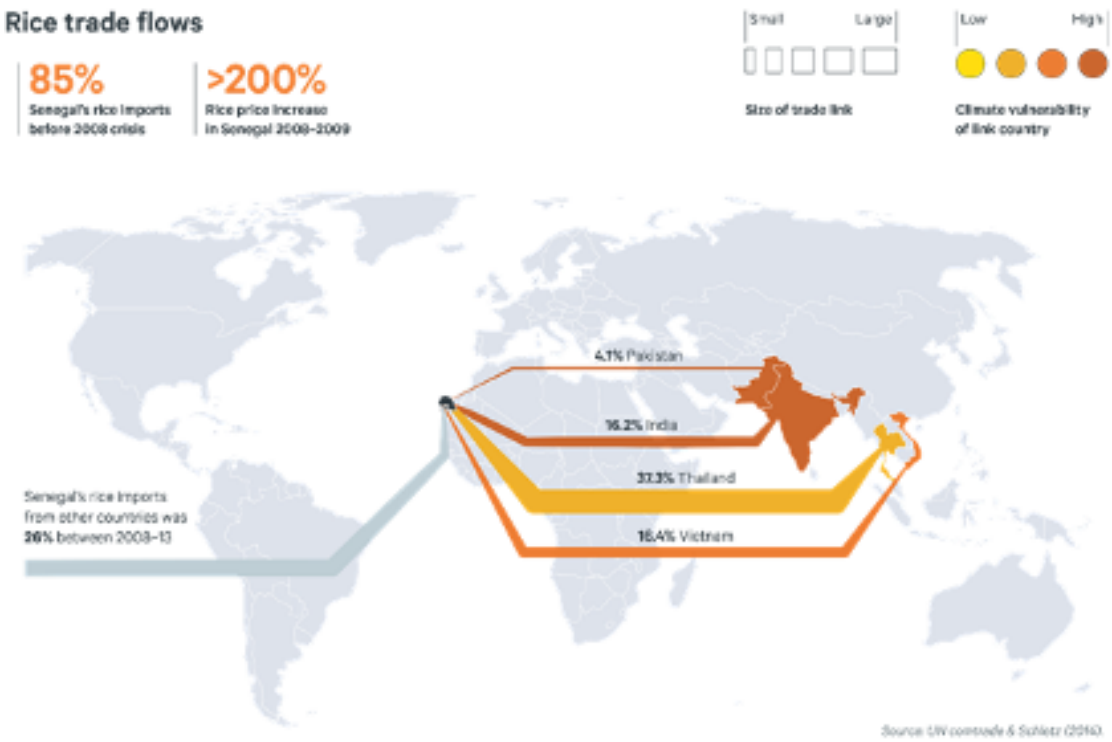
In keeping with the AU and AMCEN's calls to action and the Paris Agreement, this brief highlights five significant TCRs in Africa – biophysical, financial, trade, people-centred and geopolitical – that urgently need consideration for management. The authors draw on real examples from countries across Africa to show how TCRs, and the ways in which they are handled, create significant impacts for other countries. The brief provides some practical recommendations for how African regional economic communities and their Member States can work together to manage these risks, in keeping with existing climate policy frameworks and objectives.

(TCR 1) Trade: imports and food security

Food security under a changing climate, with growing populations and shifting diets, is a major concern globally. Within Africa, the IPCC estimates that 'global warming above 2℃ will result in yield reductions for staple crops across most of Africa compared to 2005 yields (e.g. 20-40% decline in west African maize yields), even when considering adaptation options' (Trisos et al., 2022: 1291).

At the same time, diets within various African countries are shifting away from traditional crop staples and increasingly relying on imported food. As demand for imports grow, so do TCRs to food security due to trade-climate risks in food commodities. For example, the Senegalese diet has become increasingly dependent on rice, which now makes up 30% of daily caloric intake, as opposed to traditional domestically produced staples such as millet, sorghum and cassava (Figure 3). This shift in food preference is driven mainly by urbanisation and the availability of cheap rice imports from Asia.

FIGURE 3 RICE IMPORTS INTO SENEGAL



Note: The figure shows Senegal's imports of rice from four countries (plus the rest of the world, in grey). The size of the flow indicates the amount of rice imported from that country; the colour of the flow indicates the climate vulnerability of the exporting country, using data from the ND-GAIN Index. Trade data is taken from UN Comtrade.
Source: Benzie and Bessanova, 2018.

As a result of this increasing dependence on rice, food security in Senegal is affected both by climate change impacts on rice production in key rice-exporting countries such as India, Thailand and Vietnam, and by the adaptation responses of other countries in the global rice market.

Given the high proportion of incomes spent on food, food prices – particularly the price of rice – are a politically sensitive topic. Even small fluctuations in price make a material difference to household budgets; price rises can leave little money for school or medical fees, and contribute to food insecurity and malnutrition. For instance, food prices increased between 10-30% in late 2022, due to a number of factors, including export bans by India of wheat in May, 2022 and non-basmati rice in July, 2023 (Glauber and Mamun, 2023). India imposed the export bans to combat domestic grain price increases due to crop losses associated with extreme rainfall during the monsoon (*The Economist*, 2023).

It is estimated that every degree Celsius of warming equates to global rice yield losses (and maize and wheat) of 10-25%; such estimates do not include changes to crop pests possible due to climate change or to sea level rise impacts on low-lying coastal rice producing areas of South and Southeast Asia, which would further impact yields (Shaw et al., 2022). The impacts of climate change on rice (and other grain) yields in Asia will impact food prices and food security in various African countries.

The impacts of climate change on rice (and other grain) yields in Asia, as well as Asian country adaptation responses, will impact food prices and food security in various African countries.

(TCR 2) Finance: foreign direct investment and infrastructure investments

A main aspiration of the Africa Agenda 2063 is 'a prosperous Africa based on inclusive growth and sustainable development' including through 'cities and other settlements [which] are hubs of cultural and economic activities, with modernised infrastructure, and people have access to affordable and decent housing including housing finance together with all the basic necessities of life such as, water, sanitation, energy, public transport and ICT' (AU, 2013). In short, infrastructure is critical to Africa's economic development – whether for modernising agriculture and strengthening agricultural value chains, enhancing manufacturing or linking to global value chains and commodity exchanges.

Large-scale transportation, internet and telecommunications, electricity, water and sanitation infrastructure are financed by a number of lending institutions (e.g. the African Development Bank or the World Bank) and through bilateral agreements between countries (e.g. Ethiopia courting Chinese foreign direct investment [FDI] and FDI through the Belt and Road Initiative). However, robust climate change risk assessments of potential impacts on infrastructure performance and damage due to increasing heat waves, more droughts and extreme rainfall and storms over the expected lifetime of the infrastructure are not always mandatory or conducted, and the design and construction of such infrastructure does not account for climate change. For instance, hydropower reservoirs have expected lifetimes of 80-100 years, but are sensitive to multi-year droughts, heat waves and shifting precipitation patterns which alter river hydrology and ultimately impact electricity generation and water storage (Opitz-Stapleton et al., 2022). Infrastructure cannot be built using the climate-design standards of the past.

As a result, two major financial TCRs arising around infrastructure are that of sovereign debt and cascading regional economic losses, should such infrastructure be damaged or destroyed by a major climate extreme (Opitz-Stapleton et al., 2021 and 2021a). Loan conditions for infrastructure projects funded through FDI may require loan repayments to continue even if the infrastructure becomes non-functional, creating a TCR for sovereign debt (Opitz-Stapleton et al., 2021a). In addition, damage or destruction of infrastructure which is critical to connecting markets, facilitating the flow of people and trade, or providing services also causes cascading regional economic impacts by disrupting connectivity, sometimes for months. An example of this is the Ethiopia-Djibouti Railway, which has flooded multiple times; current and future flood risks under climate change were not accounted for in the design and location of the railway (Calabrese et al., 2021).

(TCR 3) Biophysical: water and energy security nexus

Water and energy resources in Africa have important transboundary dimensions. About 70% of Africa's electricity is generated from hydropower (Addaney, 2021). Hydropower in Southern Africa accounts for over 90% of electricity generated and consumed in the Democratic Republic of Congo, Malawi, Mozambique, Namibia and Zambia (Challinor et al., 2018). Direct climate risks to water supply cascade and trigger cross-border risks to energy generation, as southern Africa countries generate much of their electricity from rivers fed by transboundary river basins: the Zambezi River for Zambia and Mozambique and the Shire River/Lake Malawi partly supplied by Ruvuma and Songwe Rivers.

Both local and cross-border prolonged drought have adversely affected regional power supply and escalated consumer costs. Current drought risk in southern Africa is largely driven by El Niño events associated with below-normal rainfall in extensive areas of the region (Nicholson and Kim 1997). For example, the major El Niño event of 2015–2016 increased global rainfall variability (Blunden and Arndt 2016), including below-normal rainfall that resulted in drought conditions in much of southern Africa (Tsidu, 2016). This caused major disruption in hydropower generation, triggering load shedding in Malawi, Tanzania, Zambia and Zimbabwe which then had a cascading impact of significant economic disruption (Conway et al., 2017). For example, in May 2015, the one-third reduction in electricity supply in Zambia depressed the forecast of national GDP growth by over 1% (Challinor et al 2018; Kozacek, 2015). Extreme rainfall and flood risks can also curtail hydropower generation (Conway et al., 2017).

Direct climate risks to water supply cascade and trigger cross-border risks to energy generation, as southern Africa countries generate much of their electricity from rivers fed by transboundary river basins

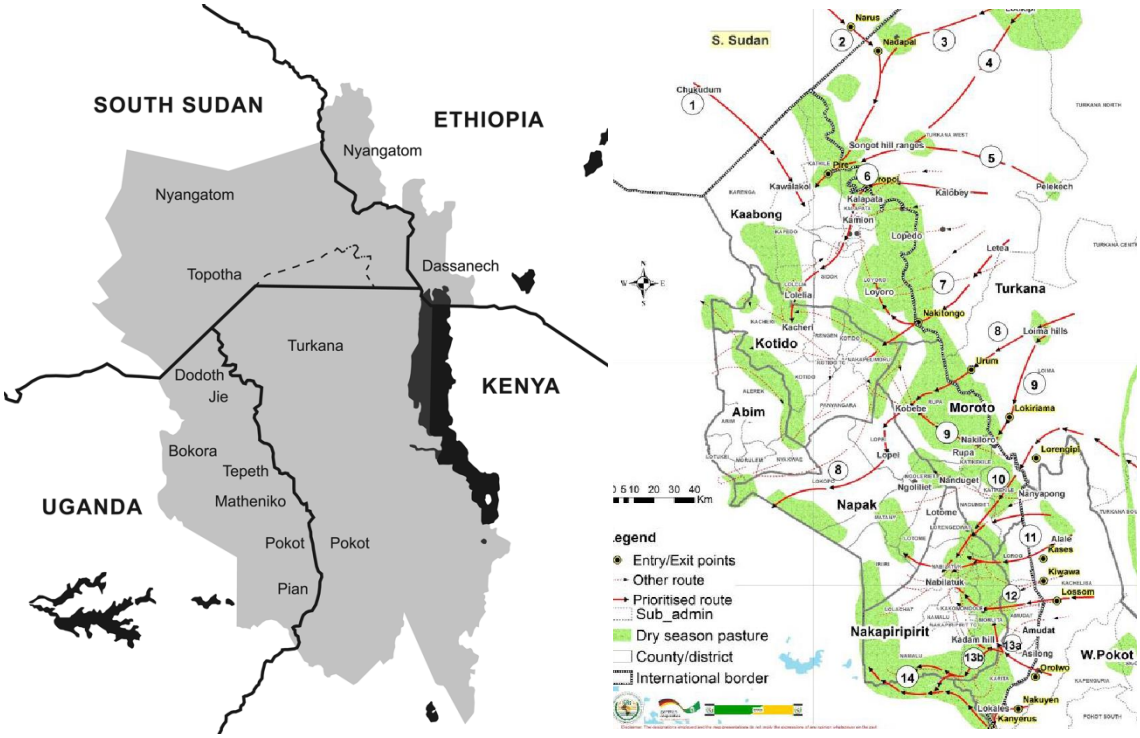
The Southern African Power Pool (SAPP) is the existing regional mechanism for energy trading and transmission infrastructure between many countries of the region, and serves in part to address energy deficits and fluctuations. Although it plays an important role in climate risk mitigation of supply disruptions, intra-regional trade in energy is still very low. The system faces considerable political and infrastructural challenges. The short-term climate risk management strategies of some countries have been to rely upon expensive, privately owned gas generators that increase the cost of energy (Challinor et al., 2018). The outcome of such structural weaknesses is the marginalisation of the poor who cannot afford such generators. Other countries like Malawi and

Tanzania are looking to diversify their energy generation mix into fossil fuels as a longer-term climate risk management strategy, but this further contributes to global climate change and exposes the countries to financial losses due to more volatile fossil fuel markets as global climate mitigation policies ramp up (ibid.). The projected increase in the frequency and intensity of both droughts and floods, as well as higher temperatures due to climate change, will threaten Africa's energy supply, and contribute to more frequent and longer-lasting multi-country power outages with cascading adverse impacts on economies in the absence of managing TCRs (Challinor et al., 2018; Addaney, 2021).

(TCR 4) People-centred: transhumance

The Intergovernmental Authority on Development (IGAD) defines the Karamoja Cluster in Eastern Africa as a cross-border region covering an area of approximately 177,650 km^2, spanning eastern Uganda (Karamoja sub-region), northwestern Kenya (Turkana and West Pokot counties), southwestern Ethiopia (multiple regional states) and southeastern South Sudan (Eastern Equitaoria state). See Figure 4.

FIGURE 4 THE KARAMOJA CLUSTER AND TRANSHUMANCE ROUTES WITHIN IT



Source: Catley et al., 2021 and IGAD, 2020

The region is predominantly arid and semi-arid, receiving annual average precipitation ranging from 188 mm to 1200 mm, and is prone to prolonged droughts. The frequency of drought occurrence has increased from 1-in-8 years to 1-in-3 years (Dereje, 2020). Extreme rainfall, flooding and heat waves are some of the other extremes impacting the Horn of Africa with increasing frequency and are expected to intensify due to climate change (Trisos et al., 2022).

Pastoral livelihoods (with limited rainfed agriculture) dominate the area and are highly sensitive to and dependent upon climactic conditions; food security is inextricably linked with livelihood security. Prolonged droughts have contributed to a depletion of water resources for domestic and livestock use and fodder availability reductions. Extreme climate events across parts of the Horn of Africa, such as the droughts of 2016-17 or 2021-23, have detectable climate change signatures (Uhe et al., 2017; Kimutai et al., 2023). Flooding has also been problematic. These extremes have triggered widespread hunger, displacement, livelihoods and deaths of both livestock and people (Humphrey et al., 2023; Opitz-Stapleton et al. 2023).

Traditionally, pastoralists have moved their herds over long distances into parts of Karamoja using 14 main routes in search of pasture and water resources (Figure 4). The increasing climate variability and prolonged droughts have prompted unprecedented cross-border movements, with pastoralists having to travel farther in search of natural resources, including into the green belt of Uganda (Juma, 2022). And in the absence of multi-country coordinated tracking of livestock and monitoring of disease, there are increased concerns of the spread of transboundary animal diseases. As will be seen in the final TCR example highlighted in this brief, the movement of people is also contributing to security and geopolitical risks.

(TCR 5) Geopolitical: security challenges in cross-border livelihoods

Cattle rustling and armed conflicts are occurring across the Kenya-Uganda border of the Karamoja cluster. Cattle rustling is a traditional cultural practice to restock herds after outbreaks of disease or drought. Due to recurrent drought, cross-border conflicts among pastoralists are increasing (Mwanika, 2010) and governments are taking action to reduce these. One such action by the governments of Uganda and Kenya was the development of a 2019 memorandum of understanding '*The Cross-Border Integrated Programme for Sustainable Peace and Socio-Economic Transformation for The Karamoja Cluster*'. The main goal of the MoU is to empower the local communities through various socio-economic programmes, to result in transformative development and sustainable peace.

While the MoU was perceived to be a new dawn for Kenya and Uganda towards ending conflicts across the border, it has failed to fully meet expectations. Uganda has been at the forefront in the implementation of this peace agreement through a disarmament programme, which is aimed at ensuring the pastoralists surrender their arms to the Ugandan authorities (Catley et al., 2021). Frustrations have emerged on the Ugandan side as the Kenyan government is perceived to have been less effective in the implementation of the peace agreement, including disarmament. It is further reported that while Uganda is disarming the pastoralists on their side, arms are still being acquired from neighbouring countries including Kenya and South Sudan, making it yet more challenging to implement the memorandum (ibid.). With climate change impacts expected to worsen, the situation is likely to become critical in the future, especially if the governments fail to work together towards avoiding maladaptive practices.

Recommendations

As has been demonstrated in this brief, a number of transboundary climate risks are already impacting Africa in areas related to trade and food security, water and energy and shared natural resources and conflict. New policies are not necessarily needed, as the African Union Climate Change and Resilient Development Strategy and Action Plan (2022-2032) already calls for enhancing coordination to address and manage transboundary and cascading climate risks. What is now needed are concrete actions toward implementing this objective. Towards this aim, we recommend that:

Recommendation 1**:** the AUC, AUDA-NEPAD and partners should facilitate a *pan-African transboundary climate risk assessment* and publish a flagship report to profile its findings and recommendations, including on the roles that AU institutions, RECs, Member States and partners need to adopt in building resilience to these risks.

Recommendation 2: the AU Institutions and RECs, working with research and development partners, should *develop transboundary climate risk indicators*, with the explicit intention of incorporating these into AU monitoring, reporting and learning dashboard (MRLD) currently under development.

Recommendation 3: AGNES, in collaboration with AUDA-NEPAD and partners, *produce and pilot guidance on how to integrate transboundary and cascading climate risks into risk and vulnerability assessments and adaptation plans* at local, national, regional and continental scales.

Recommendation 4: the AU Institutions and RECs, with support from development partners, *convene a knowledge exchange programme* on transboundary and cascading climate risks in Africa, running to 2032, to stocktake the risks being faced and responses to them.

Recommendation 5: the IPCC National Focal Points, AGN, AGNES and other stakeholders identify Africa's priority knowledge gaps on transboundary climate risks to facilitate engagement in UNFCCC climate negotiations and IPCC processes, including *proposing an IPCC Special report* on the topic.

Recommendation 6: the AU Institutions, AMCOMET, UNECA and other partner organisations *design a data management plan* to strengthen the capacity of researchers and policy makers to assess progress towards the indicators developed and the research needs identified.

Acknowledgements

This policy brief is a collaborative effort between many institutions and individuals, including: ODI, the African Group of Negotiators Expert Support (AGNES), the Stockholm Environment Institute (SEI), the International Livestock Research Institute (ILRI) and ENDA Energie. The brief was requested by the African Union Commission (AUC) as an outcome of a joint SPARC and Adaptation Without Borders Policy Dialog on Transboundary Climate and Adaptation Risks that was held in Nairobi, Kenya in July 2023, with participants from the AUC, the African Union Development Agency (AUDA-NEPAD) and various regional economic communities. We thank our reviewers: George Wamukoya (AGNES) and Laura Cramer (ILRI), as well as other AGNES members who contributed their insights (Cromwel Lukorito and Ishaku Huzi). We also thank Charlotte King and Zoë Windle for their assistance with copy edit and layout.

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This material has been funded by UK aid from the UK government; however the views expressed do not necessarily reflect the UK government's official policies.

Funded by
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