

Pastoralism and climate change

Enabling adaptive capacity

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Regional
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Preface

This publication forms one of a series of six reports prepared under the ECHO-funded project on ‘Reducing the vulnerability of pastoral communities through policy and practice change in the Horn and East Africa’. The aim of the project is to raise awareness among planners and policymakers about the full potential of pastoral systems to make a significant contribution to the economies of the region. Each of the six reports presents evidence-based research findings to overcome misconceptions and misunderstandings regarding particular aspects of pastoral livelihoods, and highlights appropriate policy recommendations that favour pastoralist systems. The reports present evidence to help inform thinking in order that policymakers can keep abreast of new opportunities and threats in the rangelands.

Understanding pastoralism and its future is the subject of fierce debate. The term ‘pastoralism’ is used to describe societies that derive some, but not necessarily the majority, of their food and income from livestock. For many decades, governments regarded pastoralism as ‘backward’, economically inefficient and environmentally destructive, leading to policies that have served to marginalise and undermine pastoralist systems. More recently, pastoralism has come to be regarded by many as a viable and economically effective livestock production system, but the policies needed to reverse its historical marginalisation and address the chronic levels of poverty and vulnerability faced by many pastoralist communities have yet to be put in place.

We define pastoralists both in the economic sense (i.e. those who earn part of their living from livestock and livestock products) and also in the cultural sense, in which livestock do not form the main source of income, yet people remain culturally connected to a pastoralist lifestyle in which the significance of livestock is more cultural than economic. Based on the evidence presented in these reports, we believe that herding livestock over rangelands will remain part of a vital and dynamic production system for many – but not all – who live in the arid and semi-arid lands of the Horn and East Africa. Appropriate policies are required that support both the economic potential of pastoralism and pastoralist lifestyles that depend on alternative livelihoods. As such, the series aims to help create a vision for development in the arid and semi-arid lands (ASALs).

Mobile pastoralism constitutes a rational use of dryland environments, but this livelihood is undermined by lack of access to basic services, inappropriate policies on land use, repeated humanitarian responses to emergencies (responses that fail to address root causes and structural issues), population growth and decades of economic and social

marginalisation. In order to realise the economic potential of pastoralism and achieve projected growth in livestock sectors, governments will have to invest in pastoral production systems. An initial and vital step in this process will be adapting livestock and disease control policies to enable international trade from mobile pastoral systems. More specifically, the paper on commodity-based trade proposes two options: 1) alignment of disease control policies with the standards of livestock markets within the region (which are more realistic and easier to attain than the international standards set by the world animal health organisation); or 2) a certified compartmentalised production system through which animals can be traced to their source, a strict animal health regime (which could be implemented by supervised community animal health workers) in which treatments are recorded, and the slaughtering of animals (and removal of all bones and lymphatic tissue) in abattoirs which comply with international standards, thus allowing for the export of meat from animals produced in pastoral systems anywhere in the world.

For those pastoralists still practicing their traditional way of life, as well as those who have lost their livestock and abandoned the traditional pastoralist way of life, various forms of social protection will be essential. Many of these so-called ‘destitute’ pastoralists have moved to urban settlements in search of alternative livelihoods. Social protection can contribute towards economic growth involving ‘alternative’ livelihoods, but it is important that governments in East Africa should implement both unconditional safety net programmes (i.e. that do not require productivity in exchange for resources) in pastoral areas, as well as providing basic social services and infrastructure.

Whilst social protection, service provision and support for alternative livelihoods can enhance the resilience of households and communities to the effects of recurrent disasters such as drought, livestock disease and conflict, there is also the need to address the underlying causes of vulnerability to these shocks. Current emergency responses are designed primarily to save lives and often have the perverse effect of encouraging people to remain in places that cannot sustain them; decades of almost continuous food aid, water trucking and other last-resort emergency inputs have led to the mushrooming of settlements, associated degradation of the local environment and decreased access to dry season pastures. More effective emergency responses require the ability to respond much earlier in the disaster cycle through contingency plans and funds that effectively protect different livelihood strategies before household assets become depleted. These issues are addressed in the paper on preparedness planning, which highlights the need for a detailed understanding of livelihoods as part of existing early warning systems.

The need for effective disaster risk management is paramount and reflected in the Regional Drought Decision (RDD) implemented by ECHO. The implementation of the action is heralding a new era of donor policy and partner practice. This initiative is helping to release funds and enabling NGO presence to be sustained when there is a need to rapidly transfer resources within existing projects in a more timely way as emergency threatens. We are already seeing some cases where new action has helped prevent predicted crises from emerging. The gradual shift in donor policy and practice contributes to a growing Community of Practice (CoP) that wants to see a greater incorporation of preparedness, recovery and development planning in any emergency response and vice-versa. This momentum must now be maintained as a vital part of humanitarian action and risk reduction if exit strategies are ever to become a reality.

Responding to climate change will also require a long-term approach to provide the investments necessary for appropriate and sustainable development, allowing pastoralists either to adapt to their changing environment, or to transition out of pastoralism into alternative livelihoods. The paper on climate change argues that this must be effected through a rights-based approach, to increase the integration of pastoralists into political, social and economic systems at national and regional levels, thus addressing the fundamental problems of marginalisation and weak governance that lie at the root of the chronic poverty and vulnerability of pastoral areas. Where

pastoral communities are currently associated with degrading rangelands, climate change should result in these communities being seen as custodians of these environments as policy adapts and politicians recognise the huge contribution these mobile systems can make economically, socially and, especially, environmentally.

The overall message that emerges from this publication series is that pastoralists must be supported not only to maintain the extraordinary resilience inherent in their traditional way of life, but also to adapt and – for some – to create viable alternative livelihoods in and beyond the ASALs. Concerns over population growth, climate change, conflict and declining productivity of the natural resource base present very real challenges for pastoralists in the Horn of Africa. Without significant support, levels of poverty, vulnerability and destitution will rise due to the effects of marginalisation, recurrent drought and floods, conflict and livestock epidemics. Market development can help to realise the economic potential of livestock and livestock products, such that mobile pastoral systems of production and management remain a viable option for some pastoralists. For others, support is needed to allow for the adoption of alternative and diversified livelihood options. The evidence presented by the current series encompasses broad views that relate to the future viability of pastoralism, providing guidance in identifying appropriate practical and policy interventions in the arid and semi-arid lands of the Horn of Africa.

List of acronyms

ALDEF	Arid Land Development Focus
ALLPRO	ASAL Based Livestock and Rural Livelihoods Support Project
ASAL	Arid and Semi Arid Land
AU	African Union
CDM	Clean Development Mechanism
CEMIRIDE	Centre for Minority Rights Development
COMESA	Common Market for Eastern and Southern Africa
ETB	Ethiopian Birr
FAO	Food and Agriculture Organisation
GoK	Government of Kenya
IBLI	Index Based Livestock Insurance
IDRC	International Development Research Centre
IGAD-LPI	Inter Governmental Authority on Development Livestock Policy Initiative
ILRI	International Livestock Research Institute
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
KMC	Kenya Meat Commission
NAPA	National Adaptation Programme of Action
PFE	Pastoralist Forum Ethiopia
RECONCILE	Resource Conflict Institute
ROSP	Report on the Status of Pastoralism Project
RREAD	Regional Resilience Enhancement Against Drought

Executive summary

The effects of climate change on the drylands of the Horn of Africa pose particular and difficult policy challenges. The arid nature of the climate together with the poverty levels faced by those people living in the drylands mean that the increasing temperatures, the intensifying rains and the increased frequency of extreme weather events that climate science projects for the region can only exacerbate the problems of development. However, as discussed here, the drylands have under-exploited development potential and the dominant land use system – pastoralism – has unique adaptive characteristics that, together with the right enabling policies, mean that climate change can be adapted to and the development of the region and the people achieved.

Drylands are a large part of the Horn and East Africa. Their main defining characteristic is extreme climatic variability. Despite this variability, the drylands make significant contributions to national economies and support millions of people. They are also areas of great untapped potential, and can play an important role in supplying an increasing demand for livestock, fuels, wild products and sequestering carbon. Despite these opportunities the drylands in the region receive little investment and continue to be marred by poverty, food insecurity and conflict.

Many lucrative land uses co-exist in the drylands, but some are more resilient against climatic variability and change than others. Pastoralism is the most resilient among them, yet it is the form of land use least recognised and supported. This is so even though it makes a tremendous contribution, under-represented by national statistics, to the economy; to maintaining the health of ecosystems, which makes all other land uses possible; and to ensuring that millions of people remain fed and employed. For 7,000 years pastoralism has flourished in the drylands because it is a rational, adaptable, tried and tested production system uniquely suited to them.

The climate of the Horn and East Africa is becoming more variable and less predictable, and trends towards future changes are emerging. Global climate models predict changes over the longer term – increased temperature, shifts in rainy seasons, intense rains over much of East Africa – which will result in a mosaic of changing climate conditions with serious implications for land use and production systems. In order to appropriately inform policy, it is imperative to better understand what the ranges of likely effects are going to be in different locations.

A brief review of the National Adaptation Plans of Action prepared over the last three to four years by the least developed countries in the region – Eritrea, Ethiopia, Uganda and Tanzania – show that, although there is a general consensus

on the climate vulnerability of drylands and pastoralists, the planned policy responses differ as to the importance of enabling pastoralist climate adaptation.

In order to focus on the likely climate change effects on the Horn and East Africa region, a set of downscaled climate projections was carried out, based on weather station data from Kenya and Tanzania. Even though there is always a degree of uncertainty with climate prediction models, at both the global and local levels, climate change evidence from downscaled projections is ‘defensible’ as the convergence of findings from different models is sufficient to confirm the trends.

Downscaled projections revealed significant increases in temperatures across all months, and an increase in precipitation for most rainy season months. However, it must be noted that the positive effects of the likely increase in rainfall amounts will be offset to a certain extent by increasing temperatures.

The downscaled climate projections were discussed with pastoralists and representatives of pastoralists’ organisations. Their reactions confirmed that the trends revealed were already being seen in the areas analysed. Further analysis of the projections provided some information on the areas of concern to the pastoralists in terms of the changes to the initiation and cessation of rains, their intensity during the wet seasons, the variation between years in terms of rainfall, and the likely increases in extreme weather events.

Climate will seriously aggravate the impacts of current challenges in the drylands. Of all the natural resource-based land uses in the drylands, pastoralism functions better within the context of wide rainfall variability and unpredictability. It therefore presents a more logical adaptation route than livelihood activities and land uses which do not have the advantage of mobility (Nori and Davies, 2006).

Pastoralists employ various coping strategies to deal with climate and non-climate stress. However, they are increasingly less able to do so, and more pastoralists are losing their livestock assets and their livelihoods. Wealth and social differentiation also affect the ability of people to adapt to climate and non-climate stress, with the poor at a distinct disadvantage.

It is important, therefore, to build pastoral capacities to adapt. Evidence suggests it would be more effective – including cost-effective – to enable and strengthen the inherent adaptive capacity of pastoralists, and find ways to encourage their autonomous adaptation, than to provide adaptation strategies for them. It is also recognised that pastoralism is a system in

flux, with some pastoralists making a living only from livestock and livestock products, others practicing supplementary livelihoods alongside pastoralism, and yet others who, for various reasons, no longer keep livestock at all (for more on this, see the accompanying report ‘Getting it right: understanding livelihoods to reduce the vulnerability of pastoral communities’). Enabling autonomous adaptation accommodates this fluidity in the system, leaving people free to choose the best options to suit their needs. This paper maintains that, with the right policies, investment and support, pastoralism is a viable and sustainable livelihood that will support many, but at the same time recognises that viable and

sustainable alternative or supplementary livelihood activities also need to be accessible.

Improvements in governance, access to markets (infrastructure, providing appropriate credit facilities, livestock insurance and cash and asset-based assistance rather than food aid), and provision of basic services like education, which recognise the value and contributions that pastoralists bring, will help increase the drylands’ resilience against climate change, facilitate ecosystem management, and allow states to derive benefits from servicing the increasing global rise in demand for livestock products.

1 Introduction

This evidence-based report was commissioned by Oxfam GB to highlight the arguments necessary to showcase the adaptive potential of pastoralism to climate change and to promote investment in pastoral areas in East Africa. It is part of the Reducing the Vulnerability of Pastoral Communities through Policy and Practice Change in the Horn and East Africa Project (RGLAP). The report presented here is organised into three arguments. Argument 1 highlights how drylands in East Africa still make significant contributions to national economies despite chronic underinvestment. Argument 2 illustrates how effective pastoralism is a rational use of the drylands, which maintains livelihoods, provides food, benefits the ecosystem and significantly contributes to national economies. Argument 3 emphasises how pastoralist livestock-keeping has unique adaptive potential to climate change, presents climate projections for the region along with the implications of climate change for different land uses, highlights the importance of climate foresight to enable adaptation, and presents the key areas of intervention which would allow pastoralists to auto-nomously adapt to increasingly variable climate. Following the arguments, conclusions and policy recommendations are put forth.

1.1 Methodology

The work is based on a review of evidence and the development of downscaled climate projections, followed by deriving and testing policy messages with stakeholders, mapping relevant interventions, and developing an advocacy strategy. Throughout this document, the authors stress the added value of the pastoralist system to East African nations.

In parallel with an in-depth desk review, a set of downscaled climate projections based on weather station data from Kenya and Tanzania was carried out with the help of the Stockholm Environment Institute in Oxford, UK, in order to focus in on the likely climate change effects on the Horn and East Africa region up to the year 2050. Subsequently, the authors consulted over 30 people over a two-week period in Ethiopia and Kenya, representing pastoralists, government, inter-national and national NGOs, donors, research institutions, specialised projects and independent research interests working on pastoralism and climate change in East Africa. Semi-structured interviews were used to test the arguments and present the climate projections put forward in the evidence-based report, and the main arguments and findings presented are those which resonated most during the consultations.

2 Discussion of the arguments

2.1 Argument 1: despite chronic under-investment, the drylands make a significant contribution to national economies

Drylands occupy 70% of the Horn of Africa – ranging from 95% in Somalia, more than 80% in Kenya, 60% of Uganda and approximately half of Tanzania (Kirkbride and Grahn, 2008). These drylands are productive and contribute to national economies and to society. They support agriculture, livestock rearing, tourism and wild resource harvesting, and play a critical role in ensuring national food sufficiency (Nori and Davies, 2006; Mortimore et al., 2008).

2.1.1 Livestock

Eleven million of the 35m cattle in Ethiopia are kept by pastoralists in the drylands (Simpkin, 2005). Of Ethiopia's 42m sheep and goats, 18m are kept by pastoralists (Simpkin, 2005). In Kenya, over 75% of the cattle herd is made up of indigenous breeds, which are traditionally kept by pastoralists in the drylands. Cattle herds in Tanzania and Uganda are also almost entirely made up of indigenous breeds (over 95%), indicating

that the bulk of the nations' animal wealth is in dryland areas (Hesse and MacGregor, 2006). The bulk of the meat, milk and other livestock products consumed in the Horn of Africa region comes from the drylands (Kirkbride and Grahn, 2008).

The contribution of the livestock sector to national income across the region is underestimated. A large amount of livestock trading occurs through informal and unofficial markets including cross-border sales – 95% of which goes unrecorded (Little, 2007), and the *nyama choma* (roast meat) industry. National accounts do not capture the value of these enormous herds to people in the drylands. They provide the majority of subsistence needs of dryland people – some 10m in the drylands of Kenya (GoK, 2007) alone.

2.1.2 Wild resources

Drylands provide the fuelwood and charcoal which supplies more than 70% of the national energy demand in Sudan and Kenya (Mortimore et al., 2008). In Senegal, wild drylands products contributed \$9m to the national economy in 2006 (which went unrecognised in the national accounts) (Madswamuse et

al., 2007). Farmers in Sudan earn about \$50m a year from the export of gum arabic – according to the Bank of Sudan, 30,000 tonnes of gum arabic were exported in 1999 (Chamay et al., 2007).

Demand for natural products is steadily growing in EU, US and Japanese markets. This trend offers real opportunities for livelihood diversification in drylands, as huge potential in wild harvested products remains untapped.¹

2.1.3 Tourism

This sector makes a sizeable contribution to national economies in some countries in the Horn and East Africa where the national parks and other protected areas fall predominantly within the drylands. Tourism brings in annual returns of \$900m to \$1.2 billion to Tanzania's economy, represents 13% of Kenya's GDP (Kirkbride and Grahn, 2008), and over 9% for Uganda (Hesse and MacGregor, 2006).

As lucrative as national parks and protected areas are to national economies in the region, they are still largely treated as revenue-generating units isolated from their surroundings, ignoring vital dryland ecosystem goods and services as inputs, which fundamentally maintain the presence of wildlife populations. The important contribution of mobile pastoralism to the maintenance of natural systems is also not taken into account, as evidenced by the limited financial benefits returning to local communities in the drylands (Tanzania Natural Resource Forum, 2008).

The relationship between dryland communities and wildlife is also largely ignored. Wildlife is present throughout many pastoral areas in the region and often also depends on the natural resources which pastoralists need to support their livestock. Wildlife also poses the threat of spreading disease to pastoralist herds and there have been incidences of human fatalities as a result of encounters with wildlife. Policies at the national level do not recognise the importance of the role that pastoralists can and do play in maintaining wildlife populations. In Kenya, for example, compensation for human mortality as a result of an encounter with a wild animal stands at around \$380 and livestock mortality due to wildlife is not compensated at all (John Letai, Oxfam, personal communication). On the other hand, pastoralist culture is used to promote all aspects of tourism in the drylands, from hotels and lodges to non-pastoralist tour operators, where little if any revenue from such activities is ploughed back into pastoralist communities.

Even though policies in some countries in the region increasingly recognise the role of communities as partners in conservation, there is still a need to clearly define how communities will be involved.

2.1.4 The drylands as environmental resource

Drylands ecosystems are valuable and unique. They are able to maintain soil fertility, hold water and maintain water and air quality, control erosion, protect against storms and landslides, and also sequester carbon. These complex systems harbour key natural resources, including species adapted to dryland conditions. The degradation and/or loss of these resources would reduce climate adaptation and resilience options (Shackleton et al., 2008).

Carbon sequestration is an emerging opportunity in the drylands. Grasslands store approximately 34% of the global stock of CO² – a service worth \$7 per hectare (Mortimore et al., 2008). African grasslands extend to 13m km² and have vast carbon sequestration potential (Reid et al., 2004). In order to exploit carbon sequestration opportunities, the carbon sink capacity of drylands needs to be rehabilitated in some areas and preserved in others. Ecosystem degradation, which entails soil degradation, reduced quality of pasture, overgrazing, soil and wind erosion and land conversion to croplands (when rangelands are converted to croplands, 95% of above-ground and 50% of below-ground carbon can be lost) must be addressed, and appropriate rangeland management strategies restored (Reid et al., 2004).

Using suitable land management strategies, carbon sequestration projects in Africa are already seeing monetary returns, such as in the Nhambita Community Carbon Project in Mozambique, where each participating household is set to receive a cash payment of \$242.60 per hectare over the next seven years (or \$34.70 per annum) for carbon sequestered by various land-use activities (Jindal, 2006).

The land management strategies traditionally employed by mobile pastoralists have been recognised as one of the most effective means of restoring ecosystem health and reversing degradation in drylands, and are being implemented as a rehabilitation strategy for degraded land. Holistic Management International² and its partner organisation in Kenya, World Vision Kenya, are already putting this strategy into effect and recognise that 'healthy and significant levels of animal impact from animals simulating the behavior of wild herds on rangeland sets up a chain reaction of events that help heal the land, increase organic matter in the soil and remove CO² from the atmosphere and store vast amounts of water'.

2.1.5 Persistent poverty

In the midst of the opportunities in the drylands, poverty is chronic. On average, most dryland populations 'lag far behind the rest of the world in terms of human well-being and development indicators', and dryland populations suffer from the poorest economic conditions in the world (Millennium Ecosystem Assessment, 2005, cited in Chamay et al., 2007) (for more on this, see the accompanying report 'Social protection in pastoral areas'). In Kenya, huge proportions of the population

¹ Such as uses for the aloe plant and the Neem tree.

² <http://www.holisticmanagement.org/>

fall below the national poverty line, with poverty levels in Turkana, Marsabit, Mandera and Wajir above 90%. In Uganda, ten of the districts with the lowest Human Development Index scores are in the drylands (Kirkbride and Grahn, 2008). Degradation of dryland environments could 'threaten future improvements in human wellbeing and even reverse gains in some regions' (Millennium Ecosystem Assessment, 2005, cited in Chamay et al., 2007). Contributing factors to continued unsustainable pressure on ecosystems are intrinsically linked to the well-being of dryland communities, including a lack of alternative economic opportunities, weak regulatory frameworks and institutional structures (Scholes and Biggs, 2004, cited in Madswamuse et al., 2007).

2.1.6 Underinvestment

Capital investment in drylands in countries such as Argentina, Mexico and Israel reflects the value of these areas and shows that drylands need not be poor (Mortimore et al., 2008). It has also been shown that public investment in rain-fed dryland regions in India and China may actually yield higher rates of return than in irrigated and more humid regions, and investment in roads, electricity and education in semi-arid zones has a greater impact on reducing numbers of poor people than in irrigated areas (Mortimore et al., 2008). In Ethiopia, public investments have been shown to increase consumption growth by 16% and reduce the incidence of poverty by 6.7% (Dercon et al., 2007).

In East Africa investments in drylands are falsely perceived to provide low returns. A study has shown returns on investment of 20% in the Niger Illela (soil and water conservation programme) and in Tigray (forestry), and 12% in Tanzania (forestry) (Reij and Steeds, 2003, cited in Chamay et al., 2007). Past failed sectoral investments (Madswamuse et al., 2007) largely focused on the agriculture sector and on the intensification of livestock production (ranching). These did not take into consideration the dryland ecosystem and climate dynamics, and paid little attention to the basic needs of communities.

2.2 Argument 2: pastoralists use drylands rationally to fulfill their needs, the environment's needs and to contribute to the needs of nations

2.2.1 Pastoralism is a rational, adaptable, tried and tested production system uniquely suited to the drylands

Pastoralism developed autonomously across the world's drylands from some 7,000 years ago (Brooks, 2006). It is still widely practiced today and remains a dominant feature of rural East Africa. Pastoralists live in some of the harshest, most climatically variable landscapes, and many still manage to exercise their traditional way of life despite efforts to settle them and to 'modernise' their livelihood system.

Pastoralists are specialists. They respond to and use, even choose and profit from, variability. Highly variable, unpredictable and often scarce rainfall dictates where, when, and how much

vegetation is available for their livestock to graze (Behnke, 1994). The same variability explains why crop farmers in dryland areas experience huge inter-annual differences in crop yields and harvest success (Anderson et al., 2008). Pastoralists are mobile, allowing them to respond quickly to fluctuations in resource availability and thereby to maintain their herds and other assets as well as their productivity (Behnke, 1994). Mobility enables pastoralists to inhabit areas of harsh and volatile climate and to transform seemingly unproductive 'wastelands' into productive assets. Mobility in this way allows them to track changes in the dramatic fluctuations in feed supply, avoid areas where forage is insufficient and mop up surpluses where they are abundant (Sandford, 1983; Behnke and Scoones, 1993, cited in Behnke, 1994).

Pastoralists employ a number of highly specialised risk-spreading strategies to safeguard their herds in the face of unpredictable and sometimes extreme climatic events, disease outbreaks and social unrest. These strategies ensure the rational use of the natural resource base on which the herds depend and also build strong social networks. These strategies include (from Hesse and MacGregor, 2006):

- building up herd size as insurance against times of hardship;
- splitting herds across different locations and movement patterns to spread risks from lack of grazing and exposure to diseases etc;
- keeping different species and breeds to make use of different ecological niches;
- selecting animals for different traits that enable survival in prevalent conditions;
- loaning surplus animals to family and friends for their subsistence requirements and building of their herd, to develop and strengthen social relations as a form of social capital; and
- matching the number of animals to the availability of natural pastures and water.

Pastoral groups can actually thrive on variability instead of just minimising its associated risks. Through an elaborate and knowledge intensive system, the WoDaaBe in Niger 'don't wait for their cattle to "adapt" to the changes in the environment, but have a sophisticated system in place to harness, enhance and even train their animals' individual and herd capacity for niche construction' (Krätli, 2008). This allowed the WoDaaBe to withstand the severe droughts of the 1970s and 1980s when other groups lost all their livestock assets. Exploiting unpredictability as an opportunity in this manner, coupled with a deep understanding of the relationship between humans, animals and the environment, ensures the resilience of the pastoral livelihood system in the face of hardship (Krätli, 2008).

2.2.2 Pastoralism contributes significantly to the health of dryland ecosystems

Grazing management can contribute to biodiversity and promotes biomass production. Dryland ecosystem health is

Box 1: Grazing is good for pastures

Grazing opens up pastures, stimulates vegetation growth, fertilises the soil, enhances the soil's water infiltration capacity by hoof action breaking the soil crust, aids in seed dispersal to maintain pasture diversity, prevents bush encroachment and enhances the cycling of nutrients through the ecosystem (Thebaud, 2004, cited in Hesse and MacGregor, 2006; Bolwig, 2007). In many areas in East Africa, the effects of too little grazing can be seen, where bush encroachment has rendered large areas of the drylands unusable as a result of reduced numbers of grazing animals due to drought, or where conflict deters herders from using the area (The Global Drylands Imperative 2003).

better where mobile pastoralism continues to be practiced effectively (McNaughton, 1993 and Niamir Fuller, 1999, cited in Rodriguez, 2008) (Box 1).

Healthy ecosystems encourage the presence of the wildlife upon which the tourism industry is based. In Tanzania, more than one-third of the protected areas have traditionally belonged to pastoralist communities (Kirkbride and Grahn, 2008), and in Kenya 92% of protected areas fall within pastoral lands (Barrow and Mogaka, 2007).

Contrary to the belief that pastoralism causes overgrazing there is little evidence that dryland pastures are generally over-stocked or overgrazed (The Global Drylands Imperative UNDP, 2003). In fact, much more pasture degradation is evident in areas around permanent settlements than in open rangelands where mobile pastoralists seasonally move their herds to allow pastures to regenerate (Niamir Fuller, 1999). In Wajir prior to the 1970s, distinct dry-season and wet-season grazing areas were in evidence, and pastoralists moved seasonally between them. Now, as a legacy of proliferated settlements and pastoralists not able to pursue traditional uses of the natural resource base, the area's dry-season and wet-season patches no longer exist, great areas of Wajir district are barren and pastoralists have to move long distances to access pasture (Kirkbride and Grahn, 2008).

Policies need to move away from promoting ranching and other sedentary forms of livestock production, as these modes of production ultimately fail in the unique climatic conditions of the drylands and contribute to ecosystem degradation.

Extensive pastoralism has also co-existed alongside wildlife populations for centuries, and many rangelands habitats which support wild-life based tourism have in part been created by the grazing effects of pastoral livestock, which maintained significant levels of plant as well as animal biodiversity (Homewood, 2008). Today, a considerable proportion (80% in Kenya) of wild-life exists outside of national parks and protected area boundaries. This highlights

the importance of pastoral lands for supporting these animals, which as we have seen bring millions of dollars in yearly revenue into East African economies.

2.2.3 Pastoralism contributes significantly to national economies

Twenty million people are estimated to have pastoralist livelihoods in the Horn and East Africa region (OAU/IBAR Policy Briefing No. 2, cited in Hesse and MacGregor, 2006). The livestock sector represents 20% to 25% of agricultural GDP across Africa (Mortimore et al., 2008). Significant portions of African livestock are found in pastoral areas (e.g. 70% in Kenya (GoK, 2007)). This indicates that pastoralism provides a considerable amount of the red meat, milk and other livestock products in the region, as well as employing millions of people (Kirkbride and Grahn, 2008).

Conventional methods to record the economic contribution of pastoralism do not represent its true value. Omissions are related to the value of the informal economy and the subsistence function of pastoralism, and the value of maintaining the health of ecosystems and other land uses e.g. wild product harvesting (for further information see Argument 1).

In terms of the missing value of the informal economy, the following examples illustrate its significance.

- 2.2m people in Tanzania obtain a part of their annual income from the pastoral meat trade – worth \$22m annually in the nyama choma industry. Every pastoral cow slaughtered supports 0.24 full-time jobs and 1.07 dependents outside of the pastoral economy, with \$172-worth of value added to the economy (Letara et al., 2006, cited in Hesse and MacGregor, 2006).
- In Namibia, pastoralism is estimated to contribute 1.8 times the reported figure (Davies, 2007).
- 95% of livestock cross-border trade in East Africa occurs informally (Little, 2001). In Ethiopia's Somali region, it is estimated that the actual value of cross-border livestock sales is three to six times that of the official figures for the whole country (Scott-Villiers, 2006).
- Pastoralist animals provide about 20% of draught power in Ethiopia, worth about \$155m annually (Rodriguez, 2008). The value of the manure collected and sold by pastoralists is significant. A study in Ethiopia showed that manure could increase the national production of wheat by 1.29m tons, and the potential value of this service to agriculture could be up to \$160m a year (Rodriguez, 2008).
- In Ethiopia, hides and skins are among the top four of the country's exports and account for 85% of its livestock product exports – a third of which is from pastoral sources (Rodriguez, 2008). In Uganda and Tanzania hides and skins are significant exports and the pastoralist contribution is also undervalued (Kirkbride and Grahn, 2008).

It is estimated that the cross-border and international contribution of pastoralism to national GDP in most East African countries is as much as five times the amount that governments spend on the livestock sector (Scott-Villiers, 2006). In pastoral districts in Uganda, even though pastoralism contributes a sizeable proportion of the locally generated revenue, very little of this goes back into pastoral areas (Sarah Ossiya, Oxfam, personal communication). In Ethiopia, only a fraction of the returns from hides and skins goes back to pastoral communities (Rodriguez, 2008).

The livestock sector is growing faster than any other agricultural sub-sector (Bolwig et al., 2007), internationally as well as regionally and nationally. According to the FAO, global meat and milk production must double by 2050 if demand is to be met. However, Africa supplies only 2% of global trade, much of which is from industrialised production (Babagana, 2008). There is a clear opportunity for East African governments to capitalise on the rapid projected growth in demand for livestock products over the next couple of decades by focusing on the latent opportunities in pastoral production systems, especially since pastoralism has been shown to be the most productive use of land for the rearing and production of livestock (two to ten times higher per hectare than ranching systems) (Scoones, 1995 cited in Mortimore, 2008), and evidence also suggests that there is a strong preference for meat from pastoral areas in regional markets (Krätli, 2008; Letara et al., 2006).

2.2.4 *The importance of mobility for livelihoods and security*

Past attempts to introduce more intensive production systems into drylands have largely resulted in failure e.g. attempts at large-scale irrigated agriculture and intensive ranching in the 1970s and 1980s (Mortimore et al., 2008; SOS Sahel UK, 2008).

Policies need to support pastoral mobility rather than promote sedentarisation

Mobile pastoralists are better-off than those who have settled, especially where access to secondary education is limited. A study conducted by Little et al. (2008) in Kenya showed that, in 80% of pastoralist households, those that practiced mobility were generally better-off (less likely to lose their livestock assets and become food insecure) than those who had fewer animals and were sedentary. Another study in Ethiopia confirms these findings, showing that livestock are more at risk of succumbing to drought in areas where pastoralists are settled into a semi-sedentary lifestyle. In 2004, many pastoral settlements were partially or entirely abandoned, as people left to escape drought (Devereux, 2006).

Pastoralists maintain social relationships in order to exercise effective, well-thought-out mobility strategies in response to changes in their natural, political and economic environments (Mortimore et al., 2008). They move not only to ensure food for

their herds, but also to access markets, avoid disease, escape conflict and enhance exchanges with other land users (e.g. exchanging manure for crop residue with farmers). Depending on circumstances, movements can be highly predictable or unpredictable, and the scale at which they move can vary – sometimes whole households move and sometimes just the animals and herders. Pastoralists' need for static links varies also. If land tenure is an issue they may need to be visible and have a static link to stake claims, or if they need to access services that are not available through other means, like education and healthcare (IIED, 2008). Examples of ensuring tenure through static links have been seen in many areas in Tanzania and Kenya, where pastoralists will farm knowing that harvests will partially fail, if not entirely, just to prove that they have a claim to the land (Homewood and Chevenix-Trench, 2008).

Policies need to recognise pastoralists' communal land tenure as a viable tenure system extremely well suited to areas of climatic variability. Legal recognition of this tenure system also needs to be improved.

Because pastoralists need to be mobile, often over wide spatial scales, relationships between groups need to be carefully managed to avoid conflict. Pastoralists use negotiation, reciprocity and building strong social bonds and networks as fundamental processes which allow them to better manage the drylands.

Between pastoral groups, relationships are strictly governed by defined rules and rights put in place by their customary institutions, which dictate the way in which communal land is managed. To many, it appears that the drylands belong to no-one in particular, and that communal land means free-for-all grazing where pastoralists try to outdo each other in terms of herd size to ensure that individual persons or groups benefit the most from this assumed 'open access' resource. Such 'open access' is expected to eventually lead to exhausted and degraded pastures ('tragedy of the commons' thinking) (Behnke, 1994). But drylands under communal land tenure are not 'open access'; they are divided up between groups, and rights to the use of these areas are defined and redefined through negotiations, communications and other means. Strict rules are put in place to maintain these rights (Behnke, 1994; The Global Drylands Imperative UNDP, 2003). In this way, pastoralists ensure that pastures can sustain them and are allowed to replenish. For example, among the Maasai, encroachment on a neighbour's grazing territory without prior permission has grave consequences. The community selects the most valuable bull among the trespassing party and slaughters the animal for random distribution. For the Maasai, this is a heavy fine (John Letai, Oxfam, personal communication).

2.2.5 *Pastoralists and farmers*

Over centuries, pastoralists and farmers have developed a relationship of mutual benefit in the drylands, where pastoralists

provide traction animals and manure for farmers (20% of animal traction for farming in Ethiopia is provided by pastoralists as a service (Rodríguez, 2008)), and the effects of grazing have made the use of the drylands for food production possible (OAU/IBAR Policy Briefing Paper No. 1). Farmers in turn provide pastoralists with crop residues for fodder in times of environmental stress and allow pastoralists access across their land.

The exchange of services and negotiation of land access between pastoralists and farmers have allowed pastoralists to adapt to climatic variability. John Letai, Oxfam's Regional Pastoral Programme Coordinator for the Horn and East Africa, gives an example from personal experience in Laikipia, Kenya. During the last drought, members of his community worked out an agreement with neighbouring farmers whereby they bought the stunted wheat from the failed harvest, which could not have been sold on the market, to supplement the reduced productivity of pastures. Both farmers and pastoralists therefore benefitted. Also during the 2006 drought, pastoralists moved nearer to Mt. Kenya to access forest areas for browse. However, they had to negotiate temporary land use rights with farmers who owned the land surrounding the forests, in order to base themselves on their land during the night to access browse during the day. When the rains came, these pastoralists moved back to their own areas (John Letai, Oxfam, personal communication).

2.2.6 Pastoralism and policy developments (from IIED/RECONCILE, 2009)

Across many East African countries, pastoral land continues to be annexed for uses which are perceived as more productive, such as conservation, commercial agriculture, ranching and tourism. Areas selected for appropriation are invariably the better and more strategic lands, such as wetlands and forests. This seriously undermines the capacity of the pastoral system to function properly. Alongside converting lands to more 'productive' land uses, restrictions on access are instigated through tenure systems which favour landholding by individuals or groups of individuals over the more flexible system of traditional communal tenure. Again, this seriously undermines pastoralists' capacity to effectively respond to environmental variability.

There is great need to harmonise sectoral policies so that well-intentioned macro-level policy is not undermined.

Strategies for 'modernising' the pastoral sector, such as allocating parcels of land and controlling stocking rates, increasing off-take for markets and providing in-situ services (water, veterinary care etc.) have performed poorly (for more on this, see the accompanying report 'Pastoralism, policies and practice in the Horn and East Africa: a review of current trends'). Ranching fails to accommodate environmental variability and the livelihood objectives of pastoral communities. It has also been clearly demonstrated that pastoralism yields higher productivity

per hectare in drylands than in intensive ranching and is a much more sustainable use of rangelands (Mortimore et al., 2008; Bolwig et al., 2007; Behnke, 1985; Kirkbride and Grahn, 2008). Often, the policy focus has been on the transformation and modernisation of livestock agriculture (such as Tanzania's Proposed National Livestock Policy of 2005 and Proposed Range Management Act of 2005), which has resulted in the alienation of pastoralists. There has been a lack of investment in institutions to support pastoralism as a livelihood and as a rational land use system in drylands. This has led to an absence of appropriate financial services, for example, to lessen the impact of forage seasonality and a lack of appropriate safety nets in times of drought to protect assets, though this is now slowly changing.

Efforts to settle pastoralists have also been shown to be ineffective in improving conditions. Settlement has led to severe livestock losses as escape from the effects of drought is hampered (Devereux, 2006). Areas surrounding settlements are severely overgrazed, and the economic alternatives practiced in settlements are still dominated by unskilled casual labour, which largely continues to rely on the natural resource base (e.g. charcoal burning), with few options for diversification (Little et al., 2008). Access to markets in situations where pastoralists are more vulnerable to livestock losses, such as in settlements, does not improve well-being and settled pastoralists are worse off than their mobile counterparts (Little et al., 2008). Furthermore, the argument that pastoralists have better access to basic services through settlements is also largely unfounded. In Ethiopia's Somali region, for example, there is no difference between settled communities and mobile pastoralists in terms of general levels of education, despite the government's argument that sedentarisation will facilitate the delivery of basic services.

Legislative systems in the countries of the Horn and East Africa are largely based on those of the former colonial powers. Customary rights and pastoral social institutions are not recognised by law e.g. in Ethiopia, Somaliland, Sudan (Dyer, 2008) and Uganda (Rugadya, 2005). However, the legal security of pastoral land tenure has recently improved in Ethiopia, Uganda and Tanzania (Box 2).

Furthermore, statutory governance institutions are based on received wisdom that does not fully recognise or understand

Box 2: Improved tenure security – theory or practice?

Tenure security for pastoralists has improved in some countries, as in Ethiopia, Uganda, and Tanzania (Mortimore, 2008). However, this has not translated well into practice, with the appropriation of valuable resources still evident (Dyer, 2008). In Ethiopia, for example, 10,000 hectares have been appropriated from pastoral lands to grow castor beans for biofuel in Oromiya regional state (Cotula et al., 2008: 39, cited in Dyer, 2008).

Box 3: Hampering mobility

‘When we have to move further afield to access grazing land in times of drought, local government officials automatically think that we are moving to cause trouble, when we are just doing what we have always done; seeking to negotiate or buy access rights with our neighbours. Because of this lack of understanding, government closes off areas to us which we would otherwise have access to through negotiation and purchase of access rights.’ Ole Sumuk; Maasai pastoralist from Magadi, Kenya.

the need for transhumance among pastoral communities (Box 3). Where pastoralism is better integrated into governance systems, enforcement of legislation continues to be weak due to a lack of administrative or financial resources to implement and enforce legislation on the ground (Dyer, 2008). This situation is even more pronounced for local governments, such as in Somaliland where legislation prohibits the enclosure of pastoral areas, which local government has difficulty enforcing (Dyer, 2008).

Decentralisation in East Africa has yet to take full advantage of traditional institutions, even though these offer opportunities for better governance as local officials are closer to the communities (IIED, 2008) and can see for themselves the realities on the ground. However, decentralised bodies in pastoral areas often are too weak to pursue an independent policy, for example in Ethiopia (Dyer, 2008).

Because statutory governance institutions, especially at the local level, are often weak or inaccessible to local people, customary tenure systems operate in parallel with state institutions, which results in contradictory rules and competing authorities (Mortimore et al., 2008). This legal pluralism showcases a ‘gap’ between customary regulations and state legislation (Dyer, 2008), and continued intervention of the state in customary resource tenure and its administration is slowly eroding customary institutions.

Policy-makers need to acknowledge and value the contribution and know-how of traditional pastoral institutions to begin to address the problem of legal pluralism and conflicting authorities.

Political representation of pastoralists in many East African countries is ineffective. There is an absence of an overall framework for pastoral rights, and often the capacity of elected officials to represent their constituencies is weak (IIED, 2008).

The drivers of conflict in East Africa are complex and many. However, increasing poverty due to reduced mobility, lack of alternative livelihoods, confused and competing rights and entitlements and poor provision of basic needs all aggravate

the situation. Persistent and aggravated violence in East African drylands points to the presence of factors which have degraded the ability of customary institutions to resolve conflict (Mwangi and Dohrn, 2006). However, this does not discredit the peace-promoting values upheld within pastoral customary institutions. The fact that they have persisted and continue to operate within dryland systems today, despite the odds, speaks for their value.

In the context of climate change, it is clear that pastoralism has evolved to manage and even benefit from climatic variability through mobility and risk-spreading strategies. At the same time, these same strategies allow pastoralists to contribute significantly to ecosystem health, to the healthy functioning of other land uses and to national economies. Removing policy obstacles and allowing mobile pastoralism to function unimpeded will help ensure the resilience of the drylands and their communities in the face of climate change.

2.3 Argument 3: pastoralist livestock-keeping has unique adaptive potential to climate change*2.3.1 The climate is changing*

The climate of the drylands is characterised by scarce absolute rainfall which falls unreliably and within short rainy seasons, and which is often of limited availability for human use. High temperatures during rainy seasons ensure that much of the rainfall is lost in evaporation, and intense downpours ensure that water runs off in floods (Anderson et al., 2008). The drylands are also characterised by substantial and unpredictable differences in total rainfall between years, within the year and even between areas in one year, so that neighbouring villages can experience very different crop yields and harvest success (Anderson et al., 2008).

Even though the drylands are known for their unpredictable and variable climate, ‘the unprecedented rate and scale of human-induced climate change is beginning to pose more problems.’ (Kirkbride and Grahn, 2008: 11).

The climate of the Horn and East Africa is becoming more variable, less predictable and trends towards future changes are emerging.

1. Successive poor rains, increases in drought-related shocks and less predictable and more intense rainfall events are likely to continue over the medium term (Kirkbride and Grahn, 2008; Anderson et al., 2008; Mortimore et al., 2008; Jennings, 2007). In terms of drought, the Kenya Food Security Group reports that, whereas in the past, droughts used to occur every ten years, now they occur every five years or less (Kirkbride and Grahn, 2008).
2. Global climate models predict changes over the longer term – increased temperature, shifts in rainy seasons, intense rains over much of East Africa – which will result in a mosaic of changing climate conditions with serious

Table 1: Climate change projections in dryland regions in Africa, IPCC, 4th Assessment Report

Region	Median projected temperature increase (°C)	Median projected precipitation increase (%)	Agreement on precipitation among models	Projected frequency of extreme warm years (%)	Projected frequency of extreme wet years (%)	Projected frequency of extreme dry years (%)
East Africa	3.2	+7	Strong for increase in DJF, MAM, SON	100	30	1
Southern Africa	3.4	-4	Strong for decrease in JJA, SON	100	4	13
Sahara	3.6	-6	Strong for decrease in DJF, MAM	100	na	na

implications for land use. Pastoralists in Kotido, in north-eastern Uganda, report that the long rains which are supposed to start in March now start as late as May (Kirkbride and Grahn, 2008).

3. More intense rain predicted for the short rains (October–December) over much of Kenya, Uganda and northern Tanzania as early as the 2020s, becoming more pronounced in the following decades (Kirkbride and Grahn, 2008).
4. People describe living through long periods of hot, dry weather when it should be raining steadily, punctuated by violent downpours that may be accompanied by very heavy winds, thunder, lightning and destructive hailstorms. Paul Isabirye, Principal Meteorological Officer in the Department of Meteorology in Uganda's Prime Minister's Office, stated that 'production from the agriculture sector is becoming less and less as we experience more extreme events which are becoming more frequent and more intense, notably droughts. The rain oscillation is becoming bigger, rainfall distribution is poor so planning on seasonal rains is becoming harder and harder' (Magrath, 2008).

The variability in climate change impacts across different locations and at different times into the future, the interactions of increasing temperatures and more erratic rainfall, and soil types and landscape topography, will all result in mosaics of climate change effects across the Horn and East Africa region. This clearly has implications for economic productivity and poverty reduction, and there is a need to better understand what the ranges of likely effects are going to be in different locations.

Table 1 shows what the Inter-governmental Panel on Climate Change says in its Fourth Assessment Report in terms of climate change projections in drylands regions of Africa. They compare current climate with projections for 2080–2099.

At a regional scale, climate science predicts both increased rainfall and increased temperatures for the Horn and East Africa. Only a few attempts have been made to downscale climate projections on a within-region scale. However, according to Bruce Hewitson, a leading climate scientist at the

University of Cape Town, the region is one where the climate change evidence from downscaled projections is 'defensible' as the convergence of findings from different climate models is sufficient to have confidence in the trends revealed.

In order to focus on the likely climate change effects on the Horn and East Africa region a set of downscaled climate projections based on weather station data from Kenya and Tanzania was carried out with the help of Ben Smith at the Stockholm Environment Institute in Oxford, UK. The results are summarised in the Box 4 (p. 10).

Thornton et al. (2006) have attempted to map out the implications of climate change projections for African rural livelihoods. They looked at climate impacts on crop and forage growth as proxies for likely livelihood impacts. These implications of climate change for farming systems have been overlaid on socio-economic vulnerability information to identify climate and poverty hot spots. Many of the hot spots identified are in dryland areas of the Horn and East Africa – see Table 2.

2.3.2 Climate change intensifies the challenges already facing the drylands

'Climate alone, even the more extreme climate that will be caused by global warming, is rarely the reason people fall into poverty. It interacts with existing problems and challenges and makes them worse. It can be the trigger, but not the main cause, the proverbial "last straw that broke the camel's back"' (Magrath, 2008; Nori and Davies, 2006).

Table 3 demonstrates some of the interactions likely to be seen between climate change and non-climate challenges. From Table 3, it is clear how the effects of climate change will compound the effects of other problems facing people in East African drylands, such as poverty, insecure property rights, the HIV pandemic, population increase, state fragility and armed conflict and environmental degradation (for more on population increase, see the accompanying report 'Demographic trends, settlement patterns, and service provision in pastoralism: transformation and opportunity').

Table 2: Climate change and poverty hotspots across Africa (source: Thornton et al., 2006)

Scenario A1 F1	Highest vulnerability quartile	Second-highest vulnerability quartile
Possibly severe length of growing period loss (>20% to 2050)	<ul style="list-style-type: none"> Some arid/semi-arid systems in Sahel Mixed rainfed and highland perennial systems in Great Lakes region of East Africa Arid/semi-arid systems in parts of east Africa 	<ul style="list-style-type: none"> Arid/semi-arid systems in large parts of Sahel Livestock systems and some mixed systems in parts of east and southern Africa Coastal systems in east and parts of southern Africa
Possibly moderate length of growing period loss (5–20% to 2050)	<ul style="list-style-type: none"> mixed systems in parts of east Africa 	<ul style="list-style-type: none"> Coastal systems of parts of west Africa Tree crop systems in parts of west Africa Forest-based systems in central Africa Root-based and root-mixed systems in south central Africa

Table 3: Interactions of non-climate stressors with climate change

Non-climate stressors	Examples of interactions of non-climate stressors with climate change effects
Environmental degradation caused by population, poverty and ill-defined and insecure property rights (Vosti and Reardon (eds), 1997), including widespread soil degradation (Lal, 2000)	Migration as a climate adaptation strategy increases population pressure, balance of poor and non-poor and destabilises property rights systems (Eriksen et al., Climate Policy, 2007)
Regionalised and globalised markets, and regulatory regimes, increasingly concerned with issues of food quality and food safety (Reardon et al., 2003)	Concern over carbon emissions and food miles increases downward pressure on food imports affecting agricultural dependent economies
HIV/AIDS pandemic, reducing household labour supply, eroding household assets, disrupting knowledge transmission and agricultural services (Barnett and Whiteside, 2002)	Distribution and spread of climate sensitive diseases alters with precipitation and temperature changes leading to new disease burdens in high HIV/AIDS regions (IRI, 2006)
Population increase driving fragmentation of landholding (Sadik, 1991)	Reduced agricultural productivity due to rainfall and temperature changes exacerbates fragmentation effects by reducing per area yields and carrying capacities (MA, 2005)
Threats of zoonotics (e.g. avian influenza) attacking livelihoods and constraining trade (ILRI, 2005)	Increased frequency of extreme weather events increases probability of disease outbreaks e.g. flooding in northern Nigeria where a focus of avian influenza due close proximity of intensive and low input poultry systems
State fragility and armed conflict in some regions (FAO, 2005)	Climate change effects of both fast and slow onset represent increased hazards that fragile states are ill-equipped to deal with and are likely to fuel conflicts. Both types of effects can cause decreasing resource availability or equity of access (Eriksen et al., Climate Policy, 2007)

Source: Anderson et al (2008) 'Climate Change for Agrarian Societies in Drylands: Implications and Future Pathways' Presentation for the World Bank Social Development Division Conference on the Human Dimension of Climate Change' March, 2008.

2.3.3 Mobile, as compared to sedentary, forms of land use are less risky as climate variability and the frequency of extreme weather events increase

Of all the natural resource-based land uses in the drylands, pastoralism functions better within the context of wide rainfall variability and unpredictability. Therefore, it presents a more

logical adaptation route (Nori and Davies, 2006) as compared to land uses which do not have the advantage of mobility and therefore are more susceptible to changes in climate, such as crop agriculture, intensive livestock production and tourism (Aaheim and Aasen, 2008). This, in turn, has implications for economic returns and poverty alleviation, as less sensitive,

Box 4: Downscaled climate projections for northern Kenya

Projections of changes in precipitation from eight different climate models at eight weather stations in East Africa are compared. Weather stations included in the analysis were, for Tanzania – Arusha and Same, and for Kenya – Lodwar, Marsabit, Mandera, Wajir, Narok and Garissa. Graphs were plotted for each weather station to show the precipitation ‘anomalies’ for each month for the period 2046–2065. That is, the difference between the average monthly precipitation in the future period, and the average monthly precipitation in the 1960–1990 control period. So an anomaly of +20mm for March means that the average rainfall in March in the period 2046–2065 is projected to be 20mm greater than the average rainfall in March for the period 1960–1990. Eight different climate models were used for this analysis and all of the future projections are for the A1 emissions scenario, and for the period 2046–2065.

Significant increases in temperatures across the months were projected by all models. The analysis shows agreement between models of a projected increase in precipitation for most months at the weather stations looked at. The agreement is strongest for wet season months, for example March to May, suggesting that there will be a general increase in wet season precipitation, which at some locations may be in the form of a longer wet season, and in some areas due to an increase in precipitation intensity. There is disagreement at various stations over the change that is expected to occur at the beginning or the end of the rainy seasons, for example for May and September. The models tend to disagree as to the direction of change expected in the dry season. However, they agree that any changes will be small. There are only a few months at a few stations where all of the models agree on the direction of change, so it is important to use the range of projections, even if most models do point to an increase.

The figures below illustrate the climate projection information developed through the analysis – in this case for Lodwar. The first graph shows the reanalysis data of average monthly rainfall for the period 1960–1990 rainfall and the second shows the rainfall anomaly for 2046–2065.

The interpretation of the projection information for Lodwar is:

- The models are fairly consistent in their projections. The only month with real disagreement is August, where the models are split between an increase and a decrease.
- April, May and October have the most robust signal, as all models agree that there will be an increase in precipitation. This indicates a likely intensification of the rainy months.

The changes in precipitation are not great in absolute terms, but rainfall at Lodwar is low, so even the small changes seen could be significant – for example some of the projected changes for January would more than double the monthly rainfall as recorded by the reanalysis data

From this first coarse analysis across the weather stations, it would appear that adaptation strategies which plan for an increase in precipitation in most months, but which would not be adversely affected by a small decrease, would be most robust against future changes in climate.

The downscaled climate projections were discussed with pastoralists and representatives of pastoralists’ organisations. Their reactions to the projections confirmed that the trends revealed were already being seen in the areas analysed. They wanted greater details from the projections especially in terms of the changes to the initiation and cessation of rains, the intensity of rains during the wet seasons, the variation between years in terms of rainfall and the likely increases in extreme weather events.

A second round of analysis looking at projections based upon the weather station data from Wajir, Mandera, Marsabit and Lodwar revealed that the intensity of rainfall during the rainy season is expected to increase at all stations. Maximum temperatures across all of the stations are likely to increase in the range of +1.0–3.2C, and while the seasonal warming varies slightly depending on the station the maximum warming is commonly found to be June–September, and the minimum in November–December.

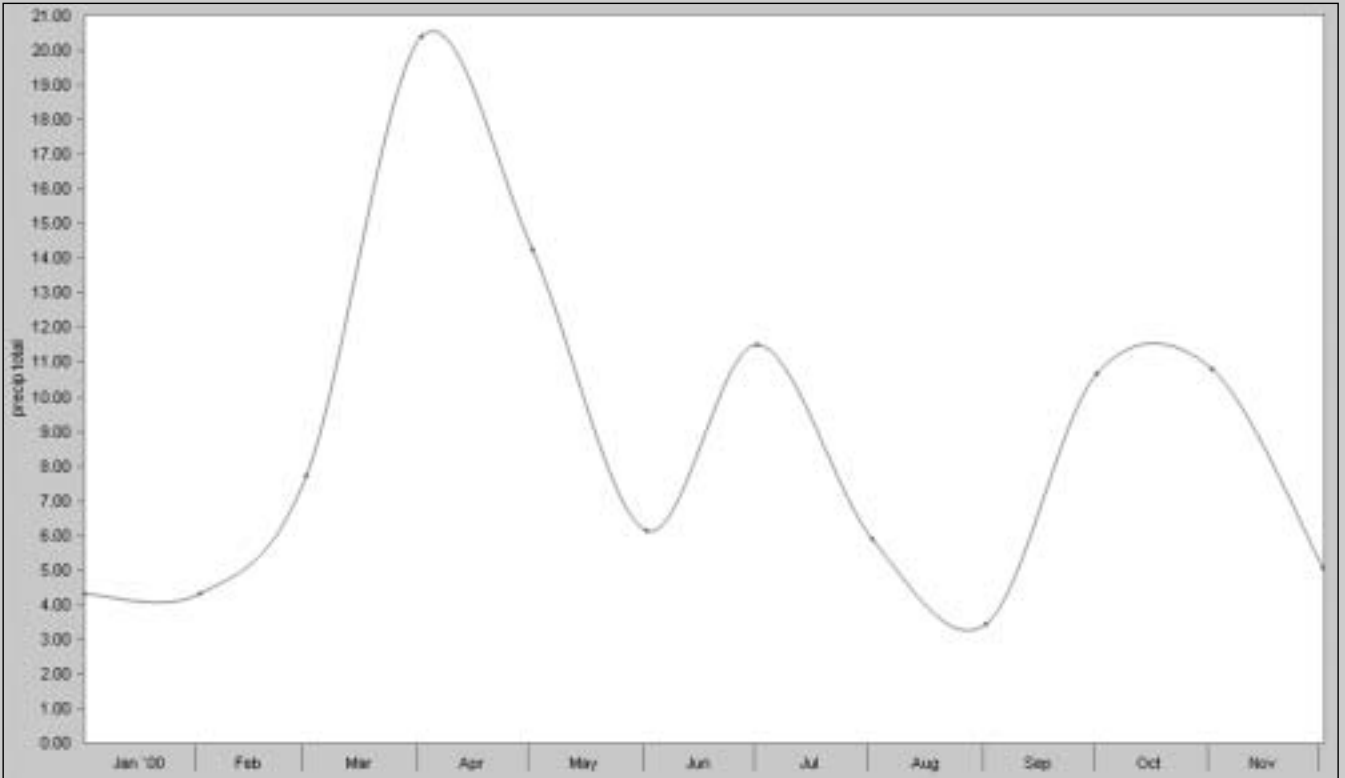
On the timing of the onset and cessation of rains it is more difficult to draw robust conclusions, and a supplementary analysis using thresholds of what amount of rainfall constitutes the start and cessation of rains for pastoralist groups would be useful. The results suggest the following changes but need further work for confirmation.

- Wajir: Magnitude of changes is important, however there are indications for a longer first rainy season, and a stronger start to the second rainy period. It is unclear what change will occur at the end of the second rains.
- Mandera: No agreement about the start of the first rains, but an increase in rainfall during the peak season and agreement on increased rainfall at the end of the season, suggesting a later end to the rains. Indications are stronger and longer second rains, however, much depends on the magnitude of change.
- Marsabit: Similar to Mandera, with indications that the first rains may end later, and the second rains may be stronger and longer. Once again, the magnitude of the change will be important.
- Lodwar: Possible extension of the first rainy period and strengthening of the later rains. However, rainfall totals are low and further work would be needed.

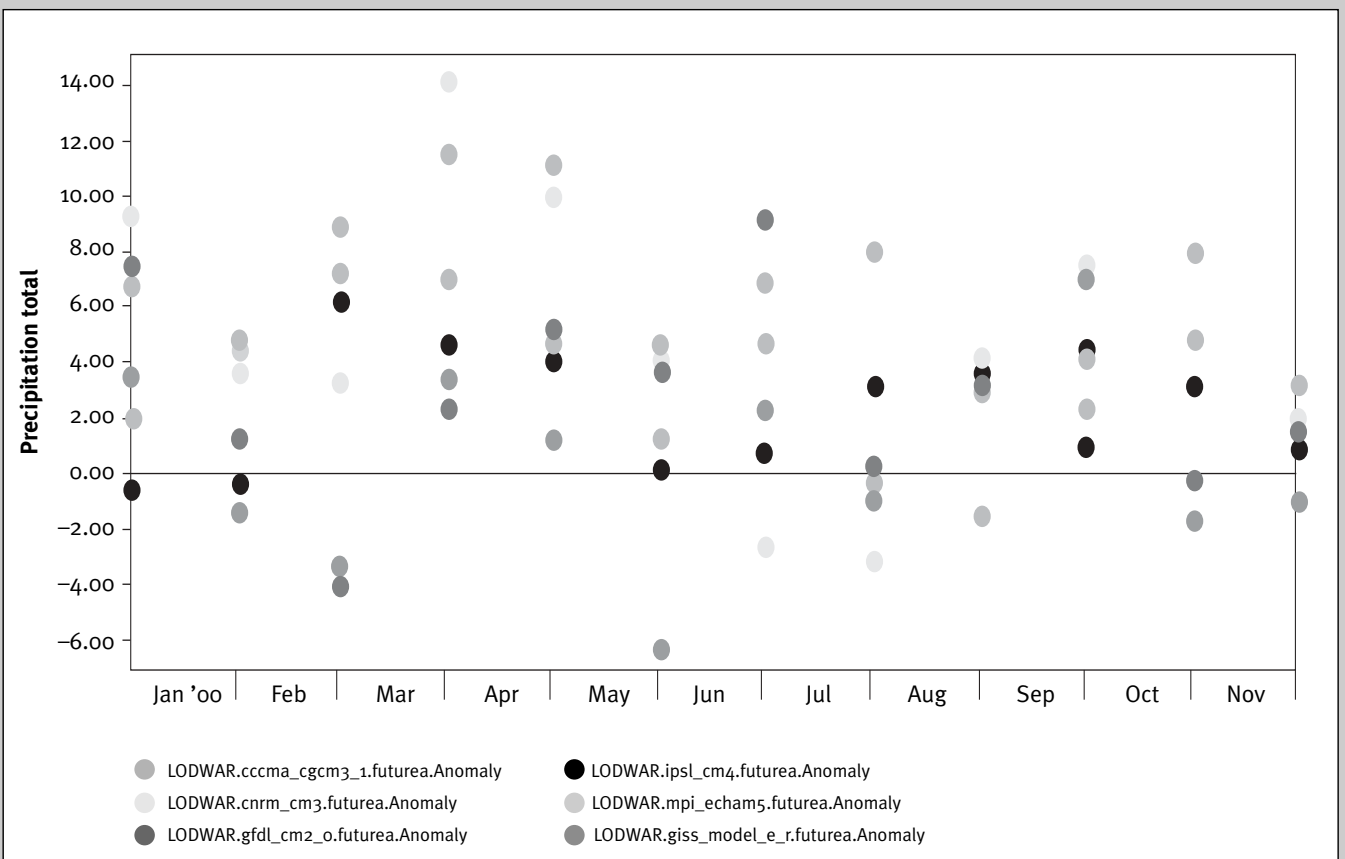
It is likely that inter-annual variability will increase, but no analysis of this can be made with the downscaled data.

Box 4: (continued)

Total monthly precipitation



Total monthly precipitation anomaly



low-input land use options known to perform well in variable climate are less risky and will result in more robust economic performance. In short, pastoralism has an important role where climatic conditions are becoming more variable and other livelihoods are likely to fail (Kirkbride and Grahn, 2008).

Agriculture

African agriculture is vulnerable to climate change. Significant reductions are predicted in the length of crop and forage growing periods across most of the Horn and East Africa (Figure 1) (Anderson et al., 2008; Van De Steeg et al., 2008). This holds true even where the climate models are predicting increases in absolute rainfall for the medium term because increased evapo-transpiration due to temperature rise and foreshortened rainy season lengths counteract the positive effects of increased rainfall. The exceptions to this are some parts of the Ethiopian uplands where for periods in the next 40 to 50 years temperature and rainfall rises are projected to combine favourably to increase the length of the growing period. Up to 2030, most areas where crops are produced are not likely to undergo significant changes, but over the longer term, most areas where cultivation is currently taking place may experience moderate to severe losses in length of crop growing period (Van De Steeg et al., 2008).

The shifts in length of growing period are likely to affect cereal and legume cropping, especially maize, wheat, beans and teff in the highlands of Ethiopia, Eritrea, Kenya and Tanzania (Kinyangi et al., 2008). In the lowlands, decreases in length of

Policies need to correct the undiscerning skew towards agriculture, and support other land uses, like pastoralism, where evidence indicates that it is better suited.

growing period are likely to affect the coastal areas of Kenya and Tanzania, and the coastal and inland areas of Sudan, Somalia, Kenya and Tanzania. Tanzania is at higher risk of expansion of arid and semi arid areas, rendering much of Tanzania more suitable for pastoral systems than crop production (Kinyangi et al., 2008).

Current agricultural land across the region is becoming increasingly fragmented as a result of population pressure. The most productive agricultural areas face land scarcity due to fragmentation (Devereux, 2006). However, land use allocation in drylands must be conducted with care. Irrigated agriculture is capital-intensive and predicted increases in rainfall in some areas of the region are likely to be offset by increasing temperatures, translating into reduced water availability. In the face of uncertain agricultural production and revenue generation in drylands, agricultural expansion into pastoral areas is a gamble. Enabling effective pastoralism is a safer investment route, requiring lower inputs and more reliable performance in variable climates (Kirkbride and Grahn, 2008).

Tourism

Climate change is likely to affect tourism – already vulnerable in some areas due to political instability (Mortimore et al., 2008;

Figure 1: Percentage of failed seasons, where growing periods will be insufficient to support harvest (Thornton et al., 2006, cited in Anderson et al., 2008)

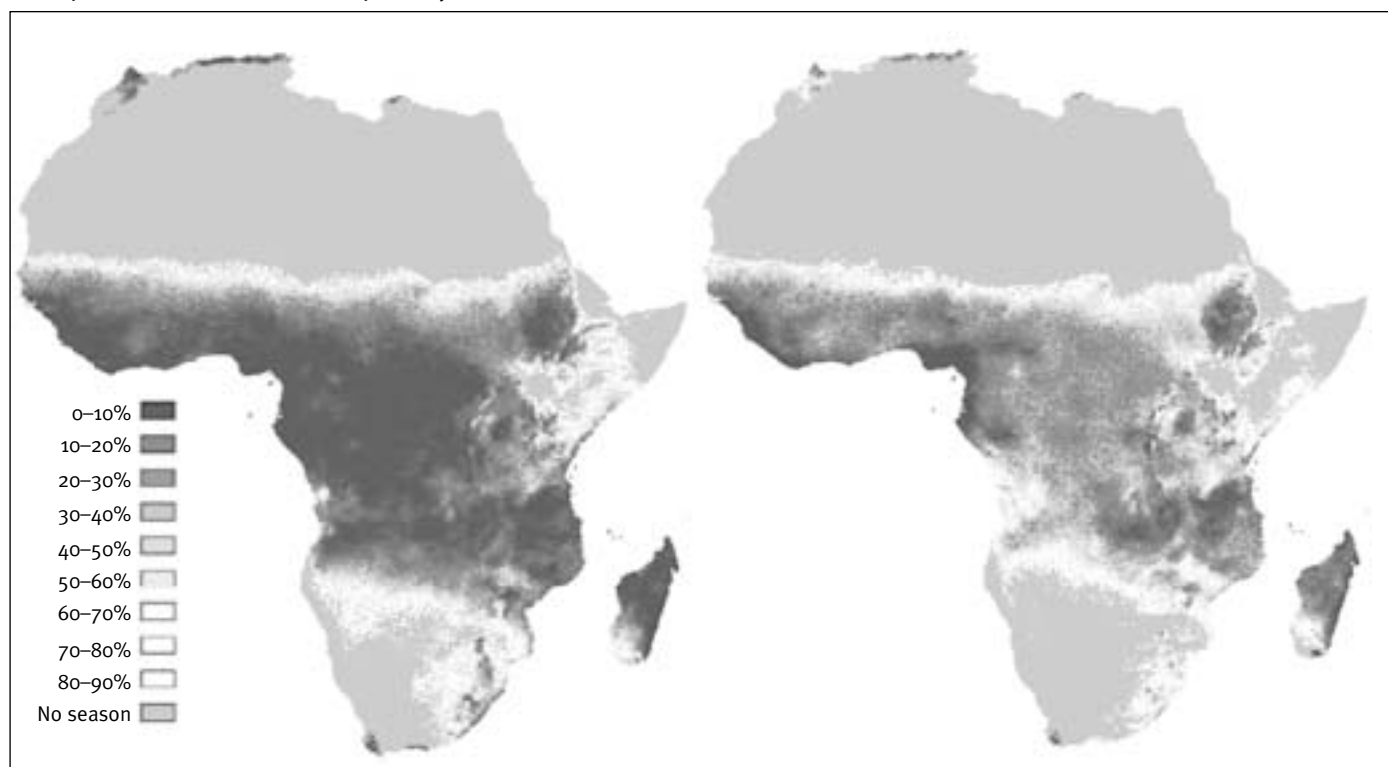


Table 4: A simple model for household coping with exposure to drought in the Red Sea and Wollo provinces of Sudan and Ethiopia, respectively

Stage sequence	Coping strategy	Household behaviour
One	Insurance mechanisms	<ul style="list-style-type: none"> • Changes in cropping and planting practices • Sale of small livestock • Reduction of current consumption levels • Increased petty commodity trade • Migration in search of employment • Collection of wild foods • Use of inter-household transfers and loans
Two	Disposal of assets	<ul style="list-style-type: none"> • Sale of livestock • Sale of agricultural tools • Sale of mortgaging of land • Credit from merchants and money lenders • Reduction of current consumption levels
Three	Destitution	<ul style="list-style-type: none"> • Distress and migration

Homewood and Chevenix-Trench, 2008). Wildlife distribution and abundance may change in response to changing climate, and increased temperatures may also influence tourist destination choices (Aaheim and Aasen, 2008). Reductions in international air travel are also anticipated due to the increased price of air travel and an increasingly climate-aware middle class in northern countries (Jennings, 2007).

2.3.4 Consequences of ignoring the combined climate and non-climate challenges facing pastoralists

Pastoral and agro-pastoral communities employ various coping strategies to deal with climate and non-climate stress, and the various stages of coping are best summarised in Table 4 (from Kinyangi et al., 2008). Even though it focuses on provinces in Sudan and Ethiopia, this is equally applicable across the region.

Coping usually refers to the shorter-term management of climate shock impact ex-post (Anderson et al., 2008). This can lead to adaptation for groups able to protect and increase assets, but can be a vicious spiral towards poverty for the poorer through scattered efforts in low-skilled, low-income, broad-spectrum casual employment (discussed below) (Homewood, 2008; Homewood and Chevenix-Trench, 2008; Little, 2001). Often, returns are insufficient to invest in rebuilding household assets (Homewood and Chevenix-Trench, 2008). In addition, by just trying to survive by any means, people are actively destroying the environment. For example, the price of paraffin and the unit price of electricity have shot up in Uganda, causing families to turn back to charcoal for cooking because they can no longer afford the alternative (Magrath, 2008).

Increasing numbers of pastoralists are losing their livestock assets, and as a result are reaching the second and third stages of coping (Little et al., 2008), forcing many to leave livestock rearing altogether due to a seriously eroded capacity

to adapt. The combination of increased climatic shocks, policies which hinder mobile pastoralism and a lack of other viable livelihood options pushes more and more pastoralists out of the system. Whereas climatic shocks are outside the realm of control, policies and the provision of livelihood alternatives are not. Pastoralists' inherent adaptive capacity, which has enabled them to adapt to climatic variability for centuries, is increasingly being compromised by policies which aim to sedentarise and modernise their livelihood system, ignoring the vital need for mobility and resource access. As discussed below, pastoralist mobility is vital to maintaining healthy livestock herd sizes, where livestock represents wealth and to a large extent food security, and ensures resilience in the harsh environments of the drylands. Loss of livestock assets below a certain threshold translates into poverty in the absence of viable alternative livelihoods. Increased poverty, pressure on settlements and urban areas, displacement and conflict are common results of loss of livelihood without the option of viable alternatives.

Wealth and social differentiation affects the ability of people to adapt to climate and non-climate stress. Wealth, among pastoralists, can either be in the form of numbers of livestock (i.e. asset wealth), or access to better wage-paying jobs made possible through education (often secondary and post-secondary education), which safeguards livelihoods irrespective of herd size (Little et al., 2008). Larger herd sizes or better stable income improve resilience and enable pastoralists to flexibly respond to challenges. However, larger herd sizes require space and mobility, and better stable income (irrespective of herd size) requires access to 'enabling' services which allow alternatives to livestock-keeping, such as education and skills development. In terms of the latter, Little et al. (2008) found that, among six settlements studied in rural Kenya, only 20% of the households, confined to two of the six settlements, were able to generate

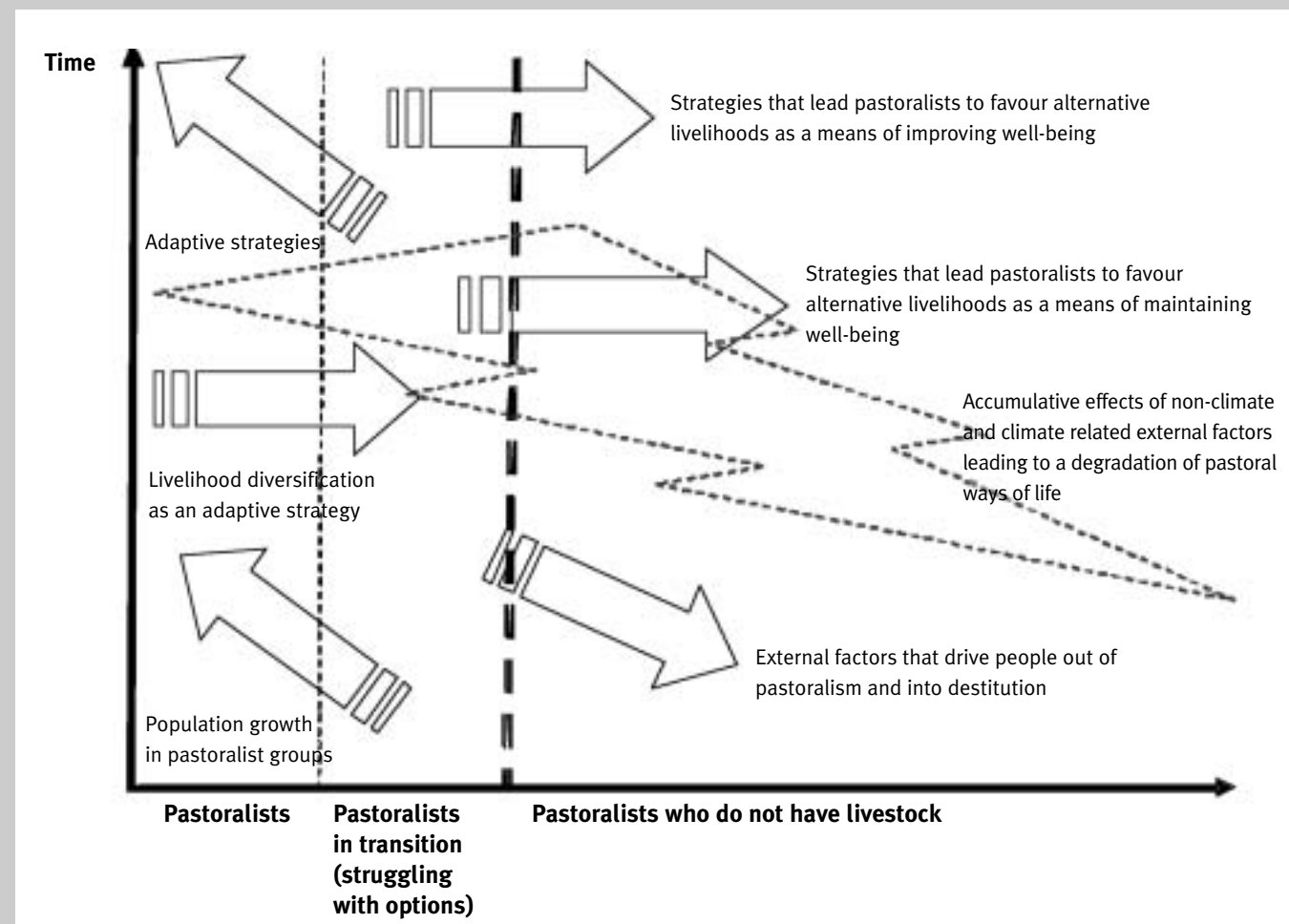
healthy levels of income irrespective of herd size, primarily because they had access to secondary and post-secondary education. This was made possible through piecemeal efforts – in one of the settlements, due to Christian missionaries, and in the other, because it is in the political constituency of former Kenyan President Daniel Arap Moi, where financial aid for education was given to children of elite families.

Poor pastoralists are less able to respond to challenges due to a lack of asset wealth and to poor access to these ‘enabling’ services, which would allow them alternatives outside livestock-keeping (Little et al., 2008). However, both rich and poor engage in income diversification to cope with change and to safeguard livelihoods. The main difference is that, whereas diversification is a positive investment for the rich, allowing them to generate income and keep herds (if they so choose), or leave pastoralism altogether at no cost to themselves or to others, the poor are forced to scatter their efforts in low-skilled, low-income, broad-spectrum casual employment, to meet household needs and to rebuild herds. At a certain point, if households own a number of livestock below a critical threshold, casual labour and petty trade do not allow them to meet the needs of the family and build up herd size at the

same time, resulting in a vicious cycle of poverty and entrapment in casual unskilled labour (Homewood, 2008), increasing the load on settlements and urban areas, and prohibiting their return to livestock rearing.

Assets, health, knowledge and governance are the four pillars of adaptive capacity (Adger et al., 2006, cited in Anderson et al., 2008). These are least accessible to the poor, which places them among the most vulnerable. However, as shown elsewhere in the report, when pastoralists are allowed to practice their traditional livelihood unhindered to rebuild their herds, they need not be poor. In fact, they are better-off and more secure than settled pastoralists (Little et al., 2008). Also, if they are given options out of natural resource-based livelihoods, they are also less likely to fall into poverty. This second option of providing viable alternatives independent of livestock, and even independent of the natural resource base altogether, is becoming increasingly important because population is increasing, climate is becoming increasingly variable, and a healthy pastoral system depends on human and livestock numbers being commensurate (Kirkbride and Grahn, 2008). Pastoralism as a livelihood will be a viable option for many in the drylands, but others will require access to alternatives (see Box 5).

Box 5: Pastoralism in flux



The figure in Box 5 attempts to show how the cumulative effects of external factors lead to a depletion of pastoralists from the system. Transition away from pastoralism can have different outcomes. Because very few people not born into the system are recruited in, the numbers of people involved depend upon the reproductive capacity of the system. Under the circumstances of climate change exacerbating stresses on the system, the rate of destitution is likely to increase unless policies are implemented which enable adaptation and a choice of livelihoods which allows people to maintain or improve their conditions independent of livestock-keeping.

Pastoralism is important for the rural economy because economic activities in East African drylands are fundamentally interconnected, and the loss of one can damage others (Devereux, 2006). Pastoralists negotiate and pay for access to land and water. Their livestock are sometimes exchanged many times through intermediaries and traders when sold. Farmers' agricultural production benefits from the presence of pastoralist herds in terms of nutrient importation through manure and from traction power. Farmers often fall back on pastoralists to buy their crop residues and failed harvests for animal feed (John Letai, Oxfam, personal communication). Urban residents purchase various goods and services from pastoralists, farmers and traders. Family members with jobs in urban centres invest in the rural economy, and those living abroad send cash back to the region (Devereux, 2006). Disrupting these flows that include pastoralists will have negative effects throughout the rural economy.

2.3.5 *Developing climate foresight to enable adaptation*

In summary, the Horn and East Africa faces:

- significant increases in temperatures all year round;
- increased intensity of rainfall during the rainy seasons;
- some changes in the dates for initiation and cessation of rains;
- probable increases in frequency of extreme weather events, and
- probable increases in inter-annual variation.

The effects of the aforementioned changes mean that adaptive measures that need to be taken include:

- better resilience (preparation and recovery) to droughts and floods and the adjacent incidence of both;
- improved water management to prepare for abundance and scarcity;
- regimes to better and equitably allocate access to areas where crop and forage production can act as buffers against neighbouring harsh environments; and
- investment in infrastructure (roads, communications and public utilities) that is robust enough to withstand more frequent extreme weather events.

All these changes will require people in the region to adapt.

The nature of the changes – the likelihood that uncharacteristic weather patterns will happen and increasing incidence of climate-related disasters (droughts and floods, one after the other) – means that people will have to adapt to conditions beyond their ken. Adaptation usually occurs with regard to perceived changes in the conditions of local environments. Climate change will stretch this, and means that people have to adapt to what they do not necessarily perceive as probable changes.

There is an important role for the state and intervention agencies to play, therefore, in facilitating what can be called 'climate foresight'. By this we mean the ability to utilise climate projections – estimates of most likely climate changes – in the planning of activities and investments related to and/or affected by climate.

In addition, local communities need to play a central role in informing planning in the drylands, and therefore need to be equipped with information on climate change and its implications on a localised scale, as different communities will face different climatic effects in different places and there is a need to understand what the ranges of likely climate change effects are going to be in different locations.

Dialogue between pastoralists and the scientific community has already been initiated, where findings from downscaled data gleaned from this analysis were communicated with pastoralists and institutions working with pastoralists in Kenya. Feedback from consultations showed that anticipated climatic changes are already being seen on the ground, validating the analysis, and this initiation of dialogue prompted pastoralists to further query the climate models, asking questions which would make climate feedback more relevant to them. Questions asked were related to the timing of the rains, the length of dry periods, the frequency of failed rains, the intensity of extreme events, and whether increase in rainfall will be useful or not. (It is not useful if it is so intense that it runs off in floods). The types of questions asked also show how the process of making climate information more locally relevant and available can have an important function in enabling autonomous adaptation.

Climate change effects present the development of pastoralism with new challenges. However, pastoralism has inherent adaptive attributes which means that this production and livelihood system, if enabled to adapt, can continue to make contributions to pastoralist livelihoods, the health and integrity of ecosystems and the economies and societies of dryland nations.

2.3.6 *Policy responses to the climate change challenge – a brief review of the National Adaptation Plans of Action*

The least developed countries of the region – Eritrea, Ethiopia, Uganda and Tanzania – have prepared national adaptation plans of action (NAPAs) over the last four years. These are

published on the UNFCCC website.³ The NAPAs identify and rank immediate and urgent adaptation needs. They provide lists of the highest priority adaptations actions – most often projects – to be implemented.

The NAPAs from across the region share a consensus that ‘in terms of livelihoods, small scale rain-fed subsistence farmers and pastoralists are the most vulnerable’ (Ethiopian NAPA). However, the NAPAs differ in their assessment of how climate adaptation should happen in pastoral areas, and how pastoralist livelihoods should be supported. The box below provides some quotes from the NAPAs in respect of pastoralist mobility and shows the prioritised adaptation actions.

The quotes (Box 6) illustrate how pastoralist mobility is seen as adding to the climate change challenge in Uganda and Tanzania. In the cases of Eritrea and Ethiopia, priorities for adaptation action relevant to pastoralists have been

identified. In the cases of Tanzania and Uganda, few of the prioritised adaptations have direct relevance to pastoralists.

2.3.7 Enabling autonomous adaptation

Autonomous adaptation refers to the measures taken by people at local levels to prepare for, cope with and recover from the effects of increased climate variability and climate change. Evidence suggests it would be more effective, including cost-effective, to enable and strengthen the inherent adaptive capacity of pastoralists and find ways to encourage their autonomous adaptation, rather than provide adaptation for them. Not only could this be an effective approach for governments, but it has the added benefit that ‘expanding people’s freedom to do the best for themselves and for their societies, broadening choices and strengthening their capabilities as economic, social and political actors implies freedom; “freedom from” poverty, and “freedom to” take beneficial action’ (Scott-Villiers, 2006).

Box 6: Extracts from the Uganda and Tanzania NAPAs and Priority Adaptation Projects for Eritrea, Ethiopia, Tanzania and Uganda

‘Various forms of incursion into the Protected Areas (PAs) are experienced because of drought. Pastoralists drive their cattle into the PAs in search of pasture and water. In Lake Mburo National Park (LMNP), over 300,000 cattle entered the park to access water from river Rwihizi, thus degrading over 100sq km of park.’ Uganda NAPA

‘In the pastoral communities where livestock is the major source of food, migration of the men (family leaders) with the livestock herds in search of water and pasture often leaves the family behind more vulnerable to famine.’ Uganda NAPA

‘... climate change is expected to further shrink the rangelands which are important for livestock keeping communities in Tanzania. This shrinkage will be more aggravated by the fact that about 60% of the total rangeland is infested by tsetse fly

making it unsuitable for livestock pastures and human settlements. Shrinkage of rangelands is likely to exacerbate conflicts between livestock keepers and farmers in many areas. Surveys show that existing number of cattle in Tanzania has already surpassed the normal carrying capacity in most of the areas ... As a result, most livestock keepers are shifting their herd towards southern Tanzania in search of pastures.’ Tanzania NAPA.

‘... civil conflicts have been occurring between livestock keepers and farmers over grass and water for the animals in Morogoro, Mara and Kilimanjaro regions. Similarly due to mass exodus of cattle keepers in search of animal feeds school attendance has gone down. On more commercial basis, crop and animal production has been affected negatively in areas with decreasing rainfall and vice versa.’ Tanzania NAPA.

List of highest priority adaptation projects from the Eritrea NAPA

Sector	Key adaptation needs/activities	Final ranking
Agriculture	Breeding drought and disease resistant crops	1
Livestock	Introducing community based pilot rangeland and improvement and management in selected agro-ecological areas in the eastern and northwestern lowlands rangelands	2
	Introducing community based pilot projects to intensify existing production models, areas and species specific in eastern and northwestern ,owlands selecting suitable sheep and goat breeds.	3
Forestry	Encourage afforestation and agroforestry through community forestry initiative	4
Water resources	Groundwater recharge for imigration wells	5

³ See <http://www.unfccc.int/adaptation>.

Priority adaptation projects identified in the Ethiopian NAPA

	Title of project	Average standard score	Rank	Estimated cost (US\$m)	Estimated project design cost (US\$m)
1	Promoting drought/crop insurance programme in Ethiopia	1.00	1	8	0.1
2	Strengthening/enhancing drought and flood early warning systems in Ethiopia	1.00	2	10	0.1
3	Development of small-scale irrigation and water harvesting schemes in arid, semi-arid and dry sub-humid areas of Ethiopia	0.99	3	30	0.5
4	Improving/enhancing rangeland resource management practices in the pastoral areas of Ethiopia	0.95	4	2	0.05
5	Community-based sustainable utilisation and management of wetlands in selected parts of Ethiopia	0.95	5	2	0.05
6	Capacity-building programme for climate change adaptation in Ethiopia	0.85	6	3	0.1
7	Realising food security through multi-purpose large-scale water development project in Genale-Dawa Basin	0.80	7	700	2
8	Community-Based Carbon Sequestration Project in the Rift Valley System of Ethiopia	0.78	8	1	0.05
9	Establishment of national research and development (R&D) centre	0.78	9	2	0.2
10	Strengthening malaria containment programme (MCP) in selected areas of Ethiopia	0.78	10	6	0.5
11	Promotion of on-farm and homestead forestry and agro-forestry practices in arid, semi-arid and dry-sub humid parts of Ethiopia	0.76	11	5	0.1
Total cost				770	3.75

Priority activities in the agricultural sector from the Tanzanian NAPA

Sector	Activities	Rank
Agriculture and food security (including livestock)	Increase irrigation to boost maize production in all areas	1
	Alternative farming systems	2
	Make better use of climate and weather data, weather forecasts and other management tools and expand climate and weather data collection network	3
	Create awareness of the negative effects of climate change	4
	Increase use of manure and fertilizer	5
	Range management for livestock production	6
	Change land-use patterns	7
	Drip irrigation for specific regions	8
	Control pests, weeds and diseases	9
	Biological control of tsetse fly	10
	Promote indigenous knowledge	11

Priority adaptation projects from the Uganda NAPA

Sector	Intervention strategy	Urgency	Immediacy	Magnitude	Total score	Rank
Forestry	Promote tree-growing in farmland	4	4	4	12	1
	Strengthen community sensitisation and advocacy of climate change-related issues	4	4	4	12	1
Weather/ climate information	Expansion of weather-observing infrastructure (networks)	4	4	4	12	1
	Promotion of multimedia approach to dissemination of weather and climate information	4	4	4	12	1
Water resources	Scaling-up of safe water supply and sanitation using appropriate technologies	4	4	3	11	2
Water resources	Promote community best practices of collaborative water resource management	3	3	3	9	3
	Develop and promote drought-tolerant and early-maturing plant varieties and animal breeds	3	3	3	9	3
Forestry	Integrate climate change issues into sectoral planning and implementation	3	3	3	9	3
Water resources	Promote appropriate and sustainable water harvesting, storage and utilisation technologies	3	3	3	9	3
Agriculture	Promote community best practices of collaborative natural-resource management	3	2	4	9	3
Wildlife	Promote use of trees in demarcation of PAs	2	2	4	8	4
Wildlife	Enhance water supply to communities adjacent to PAs	3	1	3	7	5
Health	Improve and expand health infrastructure	2	2	3	7	5
Forestry	Promote the cultivation of forest medicinal and edible plant species outside PAs	2	2	3	7	5
	Promote the cultivation of forest medicinal and edible plant (eg Malewa) species outside PAs	2	1	3	6	6
	Promote use of IK as a coping mechanism	2	1	2	5	7
	Study and promote traditional food preservation technologies	1	1	1	3	8

Population is set to increase, and a healthy pastoral system depends on human and livestock numbers being commensurate (Kirkbride and Grahn, 2008). Pastoralists need the ‘freedom’ to take action, whether they choose to remain in pastoralism, or to diversify their livelihoods and ensure economic well-being (Magrath, 2008). Failure to enable adaptive capacity is likely to result in a continuation of current trends towards increasing poverty and, in turn, increasing dependence on outside assistance. This does not negate, however, the need for additional external support and greater investment in and effectiveness of drought preparedness, disaster management structures, preparedness planning and risk reduction efforts in the face of extreme climatic events.

Three main areas of intervention to enable autonomous adaptation have been identified – governance, access to markets and basic services.

Governance

Moves towards harmonisation between statutory and customary institutions have started, and positive steps towards reconciling the two systems have been taken. For example, governments’ decentralisation processes in many countries across the region provide opportunities for more local participation in decision-making. In addition, the efforts of various initiatives, such as the ‘Pastoralist Livelihoods Initiative’ in the Borana region in Ethiopia, aim to revitalise and strengthen traditional institutions, and recognise and appreciate local institutions and practices, directly involving local communities (Nori and Davies, 2006).

However, the food aid case load is still increasing. In Kenya, the number of people receiving food aid has grown from around 1.5m in 1992 to 3.5m during 2005–2006 (Key messages for DFID Pastoralism and Climate Change Meeting, 6 December 2007 –

Oxfam); in Ethiopia enrollment in the Productive Safety Nets Programme has grown from about 5.8m people to a current 8.2m (Matthew Hobson, Save the Children UK, personal communication). There is tension between the diverse interests in the drylands (pastoralists, farmers, private investors in tourism and agricultural production, etc.), and governments are spending large sums on security issues. In Uganda, it is estimated that the government spends about 50% of its national budget on military interventions to reduce conflict in pastoral areas, amounting to \$100m a year, representing the single highest expenditure item in the budget (Adan and Pkalya, 2005). In addition, legitimacy issues still exist between statutory and customary institutions. These trends indicate that there is still room for improvement.

Land tenure and access rights (adapted from Mwangi and Dohrn, 2006)

The need for mobility in pastoralist areas dictates communal land tenure, where boundaries for grazing areas and transhumance corridors, as well as membership within these areas, are ill-defined or 'fuzzy'. This 'fuzziness' is believed to accommodate the successful functioning of the pastoralist system because it crucially allows access to critical resources during times of scarcity (Mwangi and Dohrn, 2006). This form of tenure has been shown to produce more stable and higher returns than well-defined private property rights (Goodhue and McCarthy, 1999, cited in Mwangi and Dohrn, 2006). Privatisation of land, on the other hand, 'has weakened established norms and rules for managing drylands, and opened up customary land to non-traditional users who were not tied by those customary norms and rules' (Mwangi and Dohrn, 2006).

However, the fact remains that multiple resource users exist in the drylands, all with legitimate claims to sustaining their livelihood strategies, and requiring assurance of appropriate and effective land access. In order to create land use legitimacy, a legal framework which focuses on dialogue and negotiation, and which highlights process rather than content, should be considered, leaving the specifics to local people and enabling them to adapt their local systems to specific threats. The state, in this case, would need to function as a capable mediator and enforcer (Mwangi and Dohrn, 2006).

Improvements to the existing land tenure situation in drylands could contribute to reducing conflict and discourage individual interests at the expense of the wider community. Three main focal areas have been identified (from Mwangi and Dohrn, 2006):

1. Legal recognition of local rules, norms and principles granting legitimacy and increasing the likelihood of enforcement and sustainability.
2. Validate rules originating from local levels to capture the range of rights and issues.
3. Give a premium to local processes of negotiation and conflict resolution.

In addition, recognising the need for pastoral mobility and communal land tenure, and valuing the contributions of customary institutions, will allow pastoral communities' inherent adaptive capacities to be expressed in order to cope effectively with increasing and more extreme climatic variability. It will also allow pastoralists to help hedge against potential climate-induced losses in other land uses which may be more vulnerable to climate change.

Increased representation and involvement of pastoralist groups

In Kenya, small-scale farmers tend to be better organised and represented than pastoralist groups. They have a degree of political power through their economic and electoral significance, in contrast to many of the country's pastoralist areas (Grahm et al., 2007). This situation is mirrored in other countries in the region (IIED, 2008). A skewed focus towards more 'visible' land users results in biases against other groups who have less capacity to advocate for themselves. Climate change makes remedying this state of affairs more urgent.

Across the region, pastoralism is most visible at the decision-making level in Kenya, through the action of civil society groups, research organisations and NGOs, as well as strong and vocal village and district level pastoral associations. Relatively less 'voice' and capacity to influence is evident in the other countries of the region (Kirkbride and Grahm, 2008). For example, the pastoral union in Sudan is meant to elect representatives from all administrative levels down to the level of the locality, but in reality the union and its members, based in Khartoum, have very weak links on the ground. Ten seats are allocated for pastoralists in parliament, but these are generally filled by members of the pastoral union, who are not exposed to the issues facing people on the ground. On the ground level, traditional pastoral structures are very strong, but are few in number (IIED, 2008). Strengthening existing pastoralist institutions' capacity and ability to speak on their own behalf is critical, because two-way dialogue is necessary to promote mutual understanding. Governments need to be able to 'read' pastoralists and 'be read' by them.

The critical role that pastoral communities play in shaping effective responses to climate change at the local level is highlighted by the outcomes of initial consultations held with pastoralists and institutions working on their behalf regarding the downscaled climate projections developed as part of this work. The outcomes of these consultations also underscore the importance of engaging and communicating effectively and constructively with pastoralists. Pastoralists and other land users in the drylands already employ coping and adaptation strategies to handle increasing climatic variability, and consultations have shown how establishing dialogue and a two-way stream of information-sharing better enables pastoralists to make decisions and prioritise at the local level within the context of climate change. It also strengthens their case to articulate on their own behalf as community

observations are backed up by climate science, and feedback from pastoralists themselves better equips the scientific community to provide relevant and useful information.

Governance is a key issue if the opportunities in pastoralism are to be fully realised, especially given its potential impact on conflict resolution. Reducing conflict through the recognition of rights could serve to open up huge regions which currently lie fallow as a result of insecurity, and also help increase levels of market participation and use of services, such as education, veterinary services and others which have broken down in many areas due to recurrent violent outbreaks.

In addition, unilateral and heavy-handed military approaches only serve to alienate and antagonise people, without giving credit to their role as productive citizens. Failure of one-sided military approaches has been demonstrated, for example when security forces engaged in excesses such as the Kenyan Wagalla massacre of 1994. They only served to alienate the state from the community, and thereby forestalled the goodwill between the two that is needed to solve the security problem (Adan and Pkalya, 2005).

Conflict

Continued conflict in drylands has a deep socio-economic impact on its people, disrupting the livelihoods of thousands of pastoralists and farmers, and resulting in the loss of assets, production means and the ability to translate production into wealth for both dryland communities and for the state. In a conflict-fraught year in Samburu district, for example, the district council could lose about \$378,000⁴ in revenue due to market closures and halted trade (Adan and Pkalya, 2005). Besides this, market closures and inaccessibility of grazing areas due to insecurity come at huge costs to pastoralists themselves, who lose their livestock wealth to theft, starvation and increased incidence of disease (up to 50% loss of potential capacity over ten districts in Kenya (Adan and Pkalya, 2005)), and thereby communities face increased food insecurity. They also have increasingly limited outlets for the sale of their animals, lose their bargaining power, and have to deflect household income to bear the costs of security. Farmers too bear the brunt of conflict, and in the same districts as the abovementioned study, a loss of 16,655 tonnes of cereals valued at around \$5m between 1994 and 2004 was reported: a sum which could finance free primary education in the entire North Rift region for three years (Adan and Pkalya, 2005). Conflict not only comes with a hefty financial price tag, but also results in the wholesale displacement of people. Around half of the refugees and displaced people in Africa are pastoralists, and of the total African refugee population, around half are in the Horn of Africa, with over four million displaced people in Sudan and 500,000 in Eritrea (The Economist, 2001, cited in Homewood, 2008). The fact that so many victims of conflict are pastoralists, and that pastoralism enjoys relatively high degrees of security elsewhere in the world, indicates that violent conflict

⁴ About 30m Kenya Shillings.

is not inherent in the pastoralist system, but is a result of factors outside the sector.

Working with customary pastoral institutions rather than against them provides an opportunity to tackle some of the causes of conflict at much less cost to the state, because the foundations are already in place, and the traditional mechanisms for conflict resolution continue to operate. For example, the dhedha system among the Borana has proved successful in tackling local tensions (IIED, 2008) and continues to do so today, and key individuals in pastoral society still exert a large degree of influence, including female 'allocators' among the Karamojong, who are vocal and effective in diffusing and preventing conflict (IIED, 2008). The fact that pastoralists still operate and contribute substantially to the national economies of East African countries, despite the little investment in their areas, attests to the value inherent in the system and to the value of customary institutions in managing them.

Access to markets and enabling services

Access to markets, bargaining power and enabling services (credit and livestock insurance) are crucial to increase pastoralists' market participation and thereby release the full economic potential of the pastoralist system.

The absence of an organised pastoral approach to markets, and the placement of markets to favour the consumer rather than the producer, means that pastoralists are less able to control the prices they can demand for their livestock, especially if the condition of the animal is poor due to weight loss and stress caused either by drought, a long-distance trek over difficult terrain, or both (Scott-Villiers, 2006). Market chain analysis suggests that pastoralists still receive a very small share of the total market value of their products (Rodriguez, 2008). This skew against pastoralists is often exploited by traders in markets, and sheds light on why they often receive relatively little in the extended livestock supply chain.

However, there are a number of initiatives at the continental and regional levels addressing the issue of pastoral market access, including the African Union (AU) Pastoral Policy Framework, the Common Market for Eastern and Southern Africa (COMESA) initiative to promote livestock trade, and the Inter Governmental Authority on Development Livestock Policy Initiative (IGAD-LPI) (IIED, 2008).

Infrastructure

Physical access to markets is often a stumbling-block for market participation in dryland areas. Pastoralists often need to cover long distances to reach markets using exceedingly poor or non-existent road networks. Improved road networks and increased livestock sales-points, like abattoirs, which are perhaps more locally accessible than established markets, are therefore needed. The need for infrastructure is made more urgent by current and anticipated changes in climate. Pastoralists need to be able to make rapid decisions concerning the sale of their

livestock as climate is set to become increasingly variable and extreme events are projected to increase. Poor and scarce infrastructure and difficult transport options put pastoralists at a distinct disadvantage as they may not be able to make marketing decisions that would allow them to best respond to conditions, resulting in the unnecessary loss of livestock assets or the sale of assets at a loss.

Roads promote increased market participation and reduce transaction costs, and can have a significant impact on livelihoods. For example, in Karakoram, Pakistan, investing in a highway which opened up rangelands allowed pastoralists to stop farming grain and instead buy grain on the market at lower prices, converting their land to fodder production and boosting the more lucrative livestock sector (Mortimore et al., 2008). Additionally, investing in roads benefits multiple land users, not just pastoralists; in Ethiopia, public investments have been shown to increase consumption growth by 16% and reduce the incidence of poverty by 6.7% (Dercon et al., 2007). However, placement of roads should be done in consultation with local land users, because as much as roads open up opportunities, they could also increase raiding and land grabbing, thereby fuelling conflict.

Better access to other livestock sales outlets, besides markets, has also been identified as a potential way of increasing market participation. Consultations with pastoralists in Magadi, Kenya, have resulted in findings which indicate that building abattoirs closer to pastoral communities could help open up commercial opportunities for pastoralists who have lost their animals, provide nearer options for livestock sales when difficult climatic periods are anticipated, and provide access to rapid cash injections when emergency expenses arise, like emergency medical expenses, for example. The nearest abattoir to where the consultations were conducted is four days trekking time assuming the animal is to arrive in good condition.

Improved bargaining power and awareness of product value

The better pastoralists are compensated for their products to reflect their true value, the more incentive there is to participate effectively in markets. Pastoralists are often unaware of the true value of their products, like hides and skins. In Ethiopia, for example, of an estimated actual value of \$180m, only \$43m returns to pastoralists (Rodriguez, 2008). Pastoral areas also have poor product processing facilities, the presence of which would help add value. There is also limited knowledge of other market opportunities, such as those in wild harvested products, which could help diversify and potentially increase market participation.

To strengthen pastoralists' market position, efforts need to be made to identify and organise pastoralist trading groups or individuals to improve bargaining power (Daoud Abkula, pastoralist advisor to SOS Sahel UK, personal communication), perhaps through the promotion of pastoralist associations. In

addition, livestock and agriculture departments of the different countries should develop and promote mechanisms to enhance product access to and quality for markets (Rodriguez, 2008), and government institutions related to markets need to be strengthened, to help pastoralists counter traders' monopolies.

In Kenya, a potential opportunity is to work with the Kenya Meat Commission (KMC), which is a government institution with branches in different dryland areas, complete with abattoirs and holding grounds for fattening during the dry season (Victor Orindi, IDRC, personal communication). Working closely with the KMC could help correct the skew that favours traders at the expense of pastoralists.

Opportunities in other, non-livestock related products should also be explored and communicated. If pastoral communities were fully aware of the value of many of the drylands' wild natural resources, this would promote commercial diversification.

Awareness is already increasing for the added value of pastoral products in some areas. For example, in Kenya, pastoralists realise the added value of their animals' manure for agriculture, and in Laikipia and Naivasha, they supply organic agriculture ventures such as Ibis, HomeGrown, and AgriFresh, where a lorry of manure now sells for \$200, when the same lorry used to sell for only \$8 (Victor Orindi, IDRC, personal communication).

Credit

The Director of Pastoralist Forum Ethiopia commented, 'pastoralists contribute to the economy and should have the same level of access to services as highlanders. It is not right that someone who owns 1000 camels cannot access \$10 from a bank.'

Access to credit in the drylands needs to be improved, and the mechanisms of establishing credit need to be revised to suit the needs of the drylands. The mechanism for accessing loans at present is not appropriate for pastoralist areas, and promotes land fragmentation through the need for private tenure (for 'proof of address' and traceability), and promotes the establishment of permanent structures, often required as collateral.

Insurance

Insurance is a mechanism which could ensure that investments in livestock are cumulative and that people are buffered through drought. 'If assets are protected through droughts, investments can be cumulative, if not, then divestment in food emergencies frustrates growth' (Mortimore et al., 2008).

A pilot study recently initiated in Marsabit, Kenya, by the International Livestock Research Institute (ILRI), is currently exploring the feasibility of introducing Index-Based Livestock Insurance (IBLI), which is well suited to protecting against asset loss associated with drought.

The concept of IBLI is that a specific location is selected, a specific index variable for the area is defined (e.g. the average livestock mortality or rainfall shortfalls), and a specific level of the index that would trigger insurance payments is selected (e.g. greater than 30% average livestock mortality within the insured area and period, or the rainfall shortfall that corresponds to 30% mortality). To enroll in this scheme, clients are required to make a non-refundable payment, or premium, either directly to an insurance company or an intermediary actor for a specified amount of time. During this timeframe, if the index is triggered, the insurance company will pay policy-holders according to the amount insured (ILRI, 2008).

As opposed to traditional insurance, which requires that the insurer monitor the activities of their clients and verify the truth of their claims, which in turn translates into forbiddingly high costs in areas with poor access and infrastructure, index-based insurance is much more cost-effective because monitoring costs are substantially reduced – all one has to do is pay attention to the index and when it is triggered; payments are made to policy-holders according to the amount insured (ILRI, 2008).

Cash or asset-based assistance

Cash and asset-based assistance allows pastoral communities to autonomously adapt, rather than depend on food aid, and it is cheaper for the state to provide this type of assistance rather than provide emergency relief ex-post.⁵

Cash for Food (adapted from Save the Children UK, 2008)

The huge cost savings associated with cash-based programmes were highlighted in 2003, with the external evaluation of Save the Children UK's pilot cash for work intervention. The study found that the cost of supporting 100 programme participants with 12.5kg of cereal, or 25 Ethiopian Birr per month, was Ethiopian Birr (ETB) 4,126 with imported food, ETB 2,770 with locally purchased food, and ETB 2,513 for a cash-based programme, highlighting considerable cost savings through cash based assistance. This also empowered communities to adapt as they saw fit.

Cash for Restocking (adapted from Croucher et al.)

Distributing cash to allow families to restock themselves proved cheaper than supplying the animals, and more effective. A 'one size fits all' livestock restocking approach does not take into consideration the various needs across households, and may only force households to sell the restocked animals to meet other household priorities, wasting time and resources. Cash distributed to households gave them the freedom to select the right time of purchase, what animals to purchase and how much of the allocation to spend on restocking versus other household needs, like education, debt repayment and medical expenses. This is particularly relevant in the context of changing climate. Some of the

⁵ Studies are based on food prices before the 2008 increases. Adjustments may need to be made.

adaptation strategies among pastoralists have seen a shift in breed and type of livestock preference, favouring smaller livestock like sheep and goats. As communities are best able to determine their priorities given environmental conditions, and as these priorities may change with changing climate, the option which allows flexibility in timing and type of purchase is more suitable. Some households even used the money to open small businesses, foregoing acquiring livestock altogether. However, the majority did use the money to buy livestock, with only 4% of 589 households not allocating any of the cash to livestock purchase.

Destocking (Abebe et al., 2008)

A study undertaken in Ethiopia during the 2006 drought has shown that investments in helping overcome barriers to export, by tackling market access head-on, can yield much higher returns than supplying emergency food aid. This study demonstrated that it was 97 times more expensive to supply local food aid, and 165 times more expensive to supply international food aid, as opposed to helping overcome market barriers⁶ (Andy Catley – personal communication). Through facilitating livestock traders' access to the drought-affected south, 20,000 cattle were purchased, fattened in fattening centres set up in Moyale district, and exported, primarily to Egypt. Over 5,400 households benefited, each earning \$186, most of which was spent on protecting the core livestock herd and buying food for families. Not only will this kind of approach help to meet the rising global demand for meat, but it will also help to secure and improve livelihoods.

Basic services – Education

In better-off pastoral areas, such as in Kajiado in Kenya, pastoralists are investing their own funds in education, highlighting the demand for this service (Patricia Parsitau, Oxfam, personal communication). Skills and education will increase adaptive capacity to climate change and options for diversification, and will allow the freedom to make wider use of opportunities based on drylands' natural resources. They will also open up opportunities to sustain livelihoods which do not depend on the natural resource base. As climatic conditions change in the drylands and become more severe, education allows pastoralists the freedom to supplement livestock-keeping with other livelihood options which may not be affected by extreme drought or flooding, or to move away from pastoralism altogether if they choose to do so, at no cost to themselves or to others.

The need for basic services such as education is clear. However, for the provision of these services to be more widely effective, improvements in the quality and accessibility of education are necessary (in Ethiopia's Somali region, less than one person in five over 15 years can read or write (Devereux, 2006)). Education should also not compromise mobility, but rather accommodate it so that one does not occur to the detriment of the other. In settlements, trade-offs between

⁶ Prior to recent increases in food prices.

access to basic services and mobility are a recurring feature, because sedentary schooling and health facilities impact upon a household's ability to practice mobile pastoralism (Little et al., 2008). Cases have been shared where households send some children for schooling but keep others back so that families benefit from some educated members, but not at the expense of the family's mobile livelihood. Others split families, with some family members moving to settlements to access education and the remainder staying behind to continue livestock-rearing. There is scope for improvement in delivering education to pastoral communities to better suit their needs.

To reach more people, mobile education is currently being piloted in Kenya, through the government's Arid Lands Resource Management Project, and pastoralist boarding schools are in evidence in the south of the country. Boarding schools allow families to continue practicing mobile pastoralism, while their children benefit from education. Another option for pastoralists

could be radio and/or other forms of distance education – radio brings education to rural students in the Alps in Switzerland today (Jeremy Swift, personal communication).

In terms of skills, knowledge exchange should be promoted between pastoral communities across the region, where successful alternative livelihood strategies could be shared between them. For example, communities which have benefited from wild resource harvesting and have been successful at accessing niche markets could share their experiences with communities in other areas.

Another issue which needs serious consideration is the school curriculum. As one interviewee noted, 'education is double-edged, because at the same time as children benefit from it, they are taught that progress is outside the pastoral system, which leads to the erosion of culture and to a 'brain drain' out of pastoral communities'.

3 Conclusions and recommendations

This report highlights how pastoralism makes significant contributions to the economy, to ecosystem health and to ensuring food security. These contributions remain undervalued and insufficiently recognised.

Climate is set to become increasingly unpredictable and variable, and projected increases in temperature, shifts in rainy seasons, and intense rains over much of East Africa will result in a mosaic of changing climate conditions with serious implications for land use. By its very nature, mobile pastoralism adapts to climatic variability, and has done so for millennia, allowing pastoralists to transform seeming 'wastelands' into productive assets. This fact, along with the fact that it is a low-input system with well-established traditional management institutions, makes it a practical and cost-effective land use option to support in the drylands. Supporting effective pastoralism will allow nations to make the most of areas receiving low and unpredictable rainfall, and to hedge against the potential failure of other land uses which may not be as flexible in the face of increasingly variable climate. It will also allow East African governments to benefit from the global rise in demand for meat and other livestock products.

At present, the various land uses in the drylands do not enjoy a level playing field, with some land uses much better understood and supported than others, like agriculture and tourism. Despite its significant contributions and potential, pastoralism receives the least attention of all and is subject to policies which do not enable it to function effectively. Given an enabling environment, it may prove a vital form of land use which will ensure that climate change need not become 'a narrative of loss' (Birch and Grahn, 2004). It is also likely to

prove cheaper to invest in enabling pastoralism to alleviate the stresses of conflict, poverty and food insecurity. Supporting pastoralism does not, however, challenge the fact that multiple resource users exist in the drylands, all with legitimate claims to sustaining their livelihood strategies. Nor does it negate the need to explore and expand options for diversification. However, it is necessary to level the playing field and support this land use system as a viable and rational livelihood strategy alongside the others, as it may play a critical role in buffering against the expected adverse impacts of climate change in the region.

The arguments put forward in this report recognise the inherent adaptive capacity of the pastoralist system. Given this inherent adaptive capacity, it is likely to be most effective to find ways to enable autonomous adaptation *by* pastoralists, rather than provide adaptation *for* them. This is reflected in lessons learned from development interventions in the drylands; it has been shown that it is cheaper and more effective to strengthen people's own capacity to cope with drought than to solely provide food aid after a crisis.

Three key areas of intervention have been identified which would allow for effective autonomous adaptation by pastoralists; governance, access to markets and basic services – most importantly, education.

Further effort to improve the harmonisation between statutory and customary institutions is a key area of focus. Customary institutions are already in place, possessing a deep understanding of the management needs of areas which experience highly variable and unpredictable climate. Safeguarding

pastoralist land tenure and allowing improved political representation will enable pastoralists to address many of the challenges they face in the drylands themselves at less cost to the state, and increase their positive contributions to the economy, to food security and to the environment, while at the same time reducing conflict and poverty.

Improving access to markets will further boost the contribution of pastoralism to national economies and will at the same time benefit other land users. Investment in infrastructure and facilitating market access by providing appropriate credit and insurance services will be vital to invigorate trade with and within the drylands.

Finally, providing access to appropriate education and skills development opens up options – options which do not result in the further degradation of the natural resource base – and options to access opportunities which do not depend on natural resources, breaking the vicious cycle of poverty and degradation so widely seen in the region's drylands.

3.1 Policy recommendations for enabling climate adaptation

1. The climate adaptive capacity of pastoralism and of different pastoralist groups needs to be better understood and recognised. The external factors that hinder the expression of adaptive capacity need to be identified and removed.
2. Climate foresight must be integrated into planning for pastoralist development. Better awareness of how to access and use climate projections is required at different levels of planning and implementation.
3. Full socio-economic costs and benefits estimates should be calculated for different adaptation strategies involving pastoralists. The costs and benefits should consider livelihoods, ecosystems and wider economic contributions.
4. The returns – in terms of enhanced adaptive capacity – on investments in pastoralism for income generation (through better market access), human and animal health, education and information provision and empowerment of local adaptive decision-making need to be assessed and factored into adaptation policy development (for more on animal health, see the accompanying report 'Mobile pastoral systems and international zoosanitary standards: devising a compatible approach').
5. The National Adaptation Programmes of Action (NAPAs) for Tanzania, Ethiopia, Eritrea and Sudan need to be reviewed from the perspective of how prioritised projects will contribute to pastoralist adaptive capacity. The learning from these exercises should be fed into the planning of the Kenya National Adaptation Plan and into the developments arising from the Kenyan Climate Bill.
6. Climate adaptation should be mainstreamed into dryland plans and strategies at national and local/district level and at sectoral levels, such as disaster risk reduction, livestock development and agriculture.
7. There should be a focus on water management at regional, national and local levels to reduce risks from flooding, and capture rainfall for agricultural, livestock and ecosystem use through a mix of micro- and larger-scale investments.
8. The access of pastoralists and other dryland dwellers to markets for carbon finance, such as the CDM and Forest Carbon Finance Facility, should be improved.
9. Successful pilot community-based adaptation projects with pastoralists and other vulnerable dryland communities should be scaled-up, to ensure the documentation and rapid replication of these activities at community scales.
10. Action research is required to build and share knowledge on climate adaptation by pastoralists and to share and disseminate learning to key regional and national institutions.
11. Advance regional cooperation to help scale up successful initiatives and address pastoral development issues.
12. Ensure effective public information campaigns to help people understand and respond to the climate change challenges faced in different regions and districts.

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